PUBLICATION NUMBER: 10515-0300-4200
JULY 2007
Rev. B

RF-5800V-HH
VHF HANDHELD RADIO
OPERATION MANUAL

ATTENTION

The default Security Level 3 password for this radio is:

2445830

This password can be modified by a Security Level 3 user. Zeroizing the radio will reset the password to that shown above (2445830).

For more information on security levels and passwords, refer to Paragraph 4.4.

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VHF HANDHELD RADIO
OPERATION MANUAL

FIRMWARE RELEASE: V6.5

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CHAPTER 1

EQUIPMENT DESCRIPTION

1.1 SAFETY PRECAUTIONS

All safety precautions necessary for the protection of personnel and equipment are cross-referenced in the following list. The WARNING or CAUTION is referenced to the paragraph number where it is used in the manual, and a brief subject phrase indicating the content is provided. Read these items in their entirety before performing the referenced procedure.

- WARNING - Paragraph 2.2.1 - Do not crush, disassemble, reverse polarity, incinerate, or mutilate the lithium-ion battery.
- WARNING - Paragraph 2.2.1 - If the battery becomes hot, a hissing sound is heard and an irritating smell occurs; move the equipment to a well-ventilated area if possible.
- WARNING - Paragraph 2.2.1 - Use only chargers approved by Harris, and never attempt to modify the battery or charger.
- CAUTION - Paragraph 2.2.1 - Acid contaminates Lithium-Ion (Li-ION) batteries.
- CAUTION - Paragraph 2.3 - If using the blade antenna, tighten onto radio by turning the base adapter to avoid damage to Radio Frequency (RF) antenna connector on the transceiver.
- CAUTION - Paragraph 2.4 - If using the blade antenna, loosen from the radio by turning the base adapter to avoid damage to RF antenna connector on the transceiver.
- WARNING - Paragraph 3.15.6 - Avoid contact with antennas in retransmit mode to prevent electrical shock and RF burns.

- CAUTION - Paragraph 4.8.1 - When the radio side connector is not being used, the **ANC Connector** setting should be set to **DISABLE** to avoid inadvertently short-circuiting the pins on this connector.
- WARNING - Paragraph 5.3.2 - Do not attempt to recharge a disposable lithium-ion battery.
- WARNING - Paragraph 5.3.3 - Do not dispose of Li-ION batteries in uncontrolled trash.
- WARNING - Paragraph 5.3.3 - Do not crush, disassemble, reverse polarity, incinerate, or mutilate the Li-ION battery. Do not expose to fire or temperatures above 160° F (71° C).

1.2 PURPOSE OF THIS MANUAL

This operation manual provides the user with RF-5800V-HH Very High Frequency (VHF) Handheld Radio (often referred to throughout this manual as RF-5800V-HH) operation instructions, as well as technical information required to support Level I (operator) Maintenance.

1.3 EQUIPMENT DESCRIPTION

The RF-5800V-HH is an advanced VHF handheld radio which provides reliable tactical communications performance in a small, lightweight package that maximizes user mobility. The RF-5800V-HH provides reliable Line-of-Sight (LOS) communications. Supported modulation modes are Frequency Modulation (FM) and 16 kbps Wideband Frequency Shift Keying (WBFSK) data. The radio also supports Continuously Variable Slope Delta (CVSD) voice communications. Communications can take place with handheld, manpack, mobile, and fixed-site radio stations. The RF-5800V-HH covers 30 MHz to 107.99999 MHz, with three selectable output power levels of 0.25, 2, and 5 watts. The radio operates from a single, rechargeable handheld battery.

The menu driven interface is similar to the RF-5800V-MP. Up to 25 user-defined net presets provide complete radio configuration including modulation, Communication Security (COMSEC) keys, and Transmission Security

(TRANSEC) keys. Quick selection of five nets can be done using the function switch on top of the radio. The radio also supports remote control operation from a customer-supplied remote control terminal.

Additionally, the RF-5800V-HH provides Built-In Test Equipment (BITE) for radio operational test and battery checks as well as a hold-up circuit to maintain programmed information when powered off.

1.4 FEATURES

The RF-5800V-HH offers the following features:

- Fixed frequency and Quicklook 1A frequency hopping operation
- Wireless cloning of radio configuration
- Net Scanning
- Situational Awareness Global Positioning System (GPS) position reporting
- Harris Citadel® I and Citadel® II encryption
- Citadel Algorithm Modification (CAM)
- Support for RF-5800V-V500 High Volume Manufacturing (HVM)
- Support for RF-5800M-V520 HVM Ultra-High Frequency (UHF) Power Amplifier (PA)
- Jerk and Run functionality for both RF-5800V-V500 HVM and RF-5800M-V520 HVM UHF PA
- Radio Lock
- Directed Calling/Telephony
- Wireless Internet Protocol (IP)

- Short Messaging Service (SMS)
- Falcon Watch™ Sensor Alert Messaging
- Automatic whisper operation
- Cross-band and cross-mode retransmit operation

1.5 CONFIGURATIONS

The RF-5800V-HH radio is available in the following configurations:

- RF-5800V-HH001 VHF radio, no internal GPS, Citadel® I
- RF-5800V-HH101 VHF radio, with internal GPS, Citadel® I
- RF-5800V-HH004 VHF radio, no internal GPS, Citadel® II (backwards compatible with Citadel® I)
- RF-5800V-HH104 VHF radio, with internal GPS, Citadel® II (backwards compatible with Citadel® I)

1.6 TECHNICAL SPECIFICATIONS

Table 1-1 lists the specifications for the RF-5800V-HH.

Table 1-1. RF-5800V-HH Specifications

Function	Specification
GENERAL	
Frequency Range	30.0 MHz to 107.99999 MHz on fixed-frequency and frequency hopping nets
Frequency Resolution	10 Hz - Fixed Frequency 25 kHz - Frequency Hopping
Modulation	FM, WBFSK (CVSD digital voice or clear voice)
FM Deviation	5 kHz, 6.5 kHz, and 8 kHz
Squelch	Noise, 150 Hz tone, digital squelch, or no squelch
Presets	25, fully programmable
Frequency Hopping	Quicklook 1A
RF Input/Output Impedance	50 ohms nominal, unbalanced
Power Input	Battery
Transmitter Power Output	Operator selectable 0.25, 2, 5 watts
Operating Temperature Range	-20° C to +60° C (-4° F to +140° F) - including battery
Size (including battery) With GPS Without GPS	 2.91 W x 9.1 H x 2.25 D in. (7.4 W x 23.1 H x 5.7 D cm.) 2.91 W x 9.1 H x 1.97 D in. (7.4 W x 23.1 H x 5.0 D cm.)

Table 1-1. RF-5800V-HH Specifications (Continued)

Function	Specification
Weight	1.1 kg (2.42 lbs.) including battery and short antenna, non-GPS
Altitude	Operate at 15,000 feet (4545 meters) above sea level for one hour, per MIL-STD-810F
Salt Water Submersion	2 meters (6.6 ft.) per MIL-STD-810F, non-operating

1.7 VOICE/DATA COMPATIBILITY

Refer to Table 3-2 for information on the capabilities of the RF-5800V-HH for voice or data in each modulation and radio model.

1.8 COMPATIBILITY

Successful communications depends on using the correct encryption type and compatible radios. Table 1-2 provides a list of compatible Harris radio models and encryption types.

The RF-5800V-HH is interoperable in non-secure, fixed-frequency modes with other VHF radio systems such as the AN/PRC-119, AN/PRC-77, and AN/VRC-12. When communicating with older radio equipment, several net compatibility issues must be considered when planning the net:

- **Frequency** - Older radio equipment does not support 10 Hz frequency resolution (fixed). When introducing older radio equipment to the net, only utilize frequencies that ALL radios can support.
- **Data/Voice** - Older radio equipment may not support data or digital voice operating modes. When introducing older radio equipment to the net, only utilize operating modes that ALL radios can support.

- **Squelch** - Older radio equipment does not support digital squelch. When introducing older radio equipment to the net, only utilize squelch types that ALL radios can support.

Table 1-2. Radio Model and Encryption Compatibility

Radio Model	Encryption		Modulation/Mode			
	Citadel	Citadel Resync	FM Analog Voice	CVSD Voice Over WBFSK	Data Over WBFSK	Hopping
RF-5800V-HH+	✓	✓	✓	✓	✓	✓
RF-5800V-MP+	✓	✓	✓	✓	✓	✓
RF-5800M-HH+*	✓	✓	✓	✓	✓	✓
RF-5800M-MP*	✓	○	✓	✓	✓	✓
AN/PRC-117F*	○	○	✓	○	○	○
RF-5800H-MP*	✓	○	✓	✓	✓	○

○ = Not Compatible, ✓= Compatible, * = Compatible when using compatible frequencies, + = Citadel® II

1.9 COMPATIBLE CABLES AND CONNECTORS

Several cables are available for connecting external equipment to the RF-5800V-HH. Refer to Paragraph 2.1 for a list of available options.

Refer to Paragraph A.1 for connector pinout information. For mating connector part numbers, refer to Table A-4.

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CHAPTER 2

SYSTEM SETUP AND TEARDOWN

NOTE

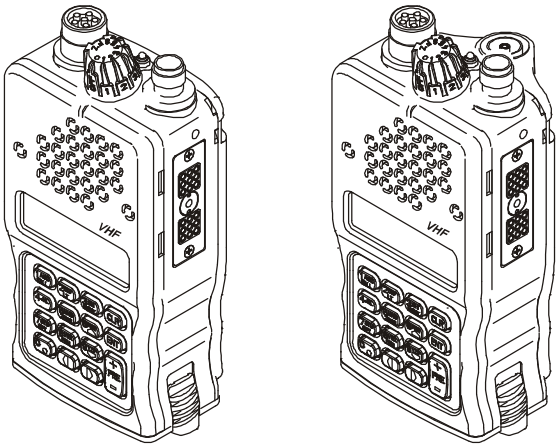
In applications where the RF-5800V-HH is installed in a radio system with other equipment, the system level documentation takes precedence.

2.1 ITEMS INCLUDED WITH THE RF-5800V-HH

Table 2-1 provides a list of the items included with the RF-5800V-HH. Figure 2-1 and Figure 2-2 show all of the items included with the RF-5800V-HH.

Table 2-1. Items Included With the RF-5800V-HH

Description	Part Number
RF-5800V-HH001 Radio Assembly w/o Global Positioning System (GPS) RF-5800V-HH101 Radio Assembly with GPS, Citadel® I RF-5800V-HH004 Radio Assembly w/o GPS, Citadel® II RF-5800V-HH104 Radio Assembly with GPS, Citadel® II	12011-1000-02 12011-1000-04 12011-1000-10 12011-1000-11
Handheld Whip Antenna	12011-2600-01
Rechargeable Lithium-Ion (Li-ION) Battery	12041-2100-02
Operator Card	10515-0300-4100
GPS antenna (only with GPS versions)	12041-6550-01



RF-5800V-HH001,
RF-5800V-HH004

RF-5800V-HH101,
RF-5800V-HH104

CL-0300-4200-0001

Figure 2-1. RF-5800V-HH Models

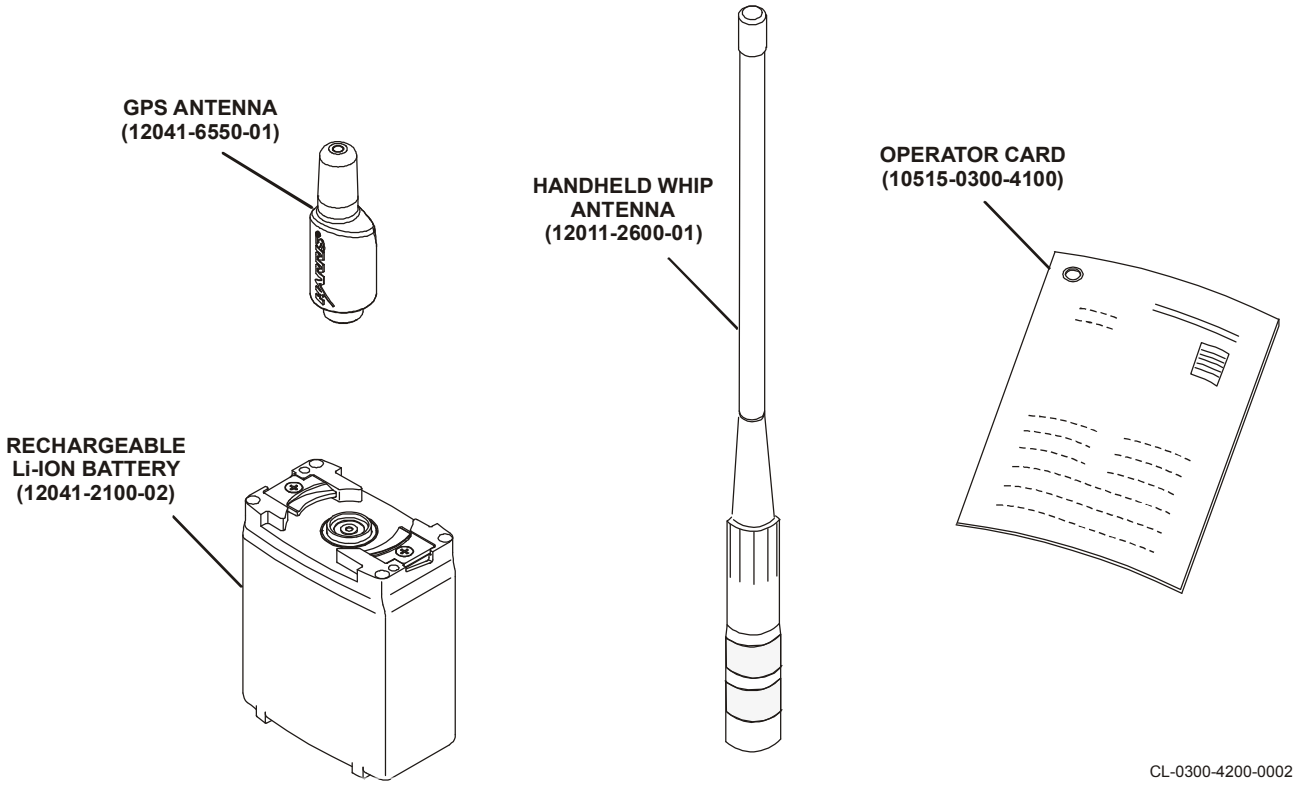


Figure 2-2. Items Included with RF-5800V-HH

2.1.1 Optional Items

Optional items available for the RF-5800V-HH include:

- One (1) meter blade antenna with gooseneck base (12011-2700-01)
- RF-3161-AT001 body worn dipole antenna (12006-2400-02)
- Modified H-250 Handset (10075-1399)
- Headset (12011-0400-xx)
- RF-5853-CH001 Single-bay charger (12011-2400-01)
- RF-5853-CH002 Two-bay charger (12011-3100-01)
- RF-5853-CH006 Six-bay charger (12011-2300-01)
- Data Cable, Side Connector to DB25 Synchronous (12011-0210-A006)
- Config/Fill Cable, Side Connector to DB9 Remote (12011-0200-A006)
- Retransmit cable (12011-0230-A050)
- Tactical Internet, Point-to-Point Protocol (PPP) Cable (12011-0775-A003/A006/A007)
- RF-6550V-PK002 Radio Programming Kit - includes RF-6550V Very High Frequency (VHF)- Ultra High Frequency (UHF) Radio Programming Application (RPA) and the Programming Cable Assembly (12011-0200-A006)
- Radio Holster (RF-5932-CA001 Camo) (RF-5932-CA002 Black)
- Flipdown Radio Holster (RF-5933-CA001 Camo) (RF-5933-CA002 Black)
- Handset Radio Accessory bag (12041-1595-01)
- Embedded GPS Cover Assembly (12011-6550-01)

The RF-5800V-HH can be used with either the whip antenna or the blade antenna over the entire 30 MHz to 107.99999 MHz frequency range of the radio. Other antennas may be used if they have a 50-ohm input impedance and use a Threaded N-Connector (TNC). For the GPS antenna, other antennas may be used if they have a 50-ohm input impedance and use a Sub-Miniature B (SMB) Connector.

2.2 BATTERY INSTALLATION

The following paragraphs contain warnings/cautions and storage/maintenance information for Li-ION batteries. Refer to Paragraph 5.3 for battery maintenance information.

2.2.1 Warnings and Cautions

Observe the following warnings and cautions:

Do not crush, disassemble, reverse polarity, incinerate, or mutilate the Li-ION battery. Do not expose to fire or temperatures above 160° F (71° C).

If the battery becomes hot, a hissing sound is heard, and an irritating smell occurs; if possible, move the equipment to a well-ventilated area.

Use only chargers approved by Harris, and never attempt to modify the battery or charger, or attempt to charge a disposable battery. Doing so may result in injury to the user and/or damage to the battery or radio.

ACID CONTAMINATES LITHIUM-ION BATTERIES. Every effort must be made to keep lithium-ion batteries as far away as possible from lead acid batteries because lead acid batteries contain sulfuric acid. DO NOT use the same tools and materials, such as screwdrivers, wrenches, syringes, hydrometers, and gloves for both types of batteries. Any trace of acid or acid fumes will permanently damage (Li-ION) batteries on contact.

2.2.2 Battery Storage and Maintenance

For maximum battery life, observe the following:

- It is not necessary to wait until the battery is fully discharged before recharging the battery.
- Keep the battery's metal contacts clean.

- Replace the battery when it no longer provides acceptable performance. The battery can be recharged several hundred times before requiring replacement.
- Store unused batteries in a cool, dry place.
- Recharge the battery after long periods (six months) of non-use to maximize battery life.

2.3 EQUIPMENT SETUP

See Figure 2-3. Perform the following procedure to set up the RF-5800V-HH:

NOTE

This procedure and Figure 2-3 reference a RF-5800V-HH radio equipped with GPS.

a. The lithium-ion battery has a quick twist mount for easy connect and disconnect. Attach battery to transceiver by seating the battery on the base of the radio at an angle to the base, and then twist the battery into position in a clockwise direction as viewed from the bottom of the battery. The battery latch on the side of the radio snaps into the lock position when the battery is properly positioned on the radio. Refer to Paragraph 5.3 for information on battery life and recharging batteries.

b. Connect the optional handset, if used, to the audio connector on top of the transceiver.

c. Screw either the optional blade antenna or short whip antenna to the antenna connector on top of the transceiver.

   - If using the optional blade antenna, connect antenna base to the transceiver by holding and tightening the adapter body, and then connect antenna to base.

CAUTION

Tightening the antenna assembly by holding onto the blade antenna can damage the Radio Frequency (RF) antenna connector on the transceiver.

- The short whip antenna does not require an antenna base adapter and can be connected directly to the antenna connector on the transceiver.

d. If the radio is equipped with internal GPS, screw the GPS antenna into the GPS connector on top of the transceiver.

2.4 EQUIPMENT TEARDOWN

See Figure 2-3. Perform the following procedure to tear down the RF-5800V-HH:

a. Zeroize the radio to erase communications plan, Transmission Security (TRANSEC) information, and Communications Security (COMSEC) information. Refer to Paragraph 3.12.

b. Turn the radio function switch to the OFF position.

c. If a blade antenna is used, first disconnect the antenna from the antenna base. If no antenna base is used, disconnect the antenna from the radio.

CAUTION

If a blade antenna is used, always remove the blade from the base first, and then remove base from transceiver. Holding and turning the blade antenna to remove the complete antenna assembly can damage the RF antenna connector on the transceiver.

d. Disconnect the antenna base (if used) from the antenna connector.

e. Disconnect the handset (if used) from the audio connector.

f. If equipped with internal GPS, disconnect the GPS antenna from the GPS antenna connector.

g. Remove battery from transceiver by sliding the battery latch up toward the side connector. Hold the battery latch in this raised position while rotating the battery in the counterclockwise direction as viewed from the bottom of the battery. Refer to Paragraph 5.3 for information on battery life, recharging batteries, and proper disposal of batteries.

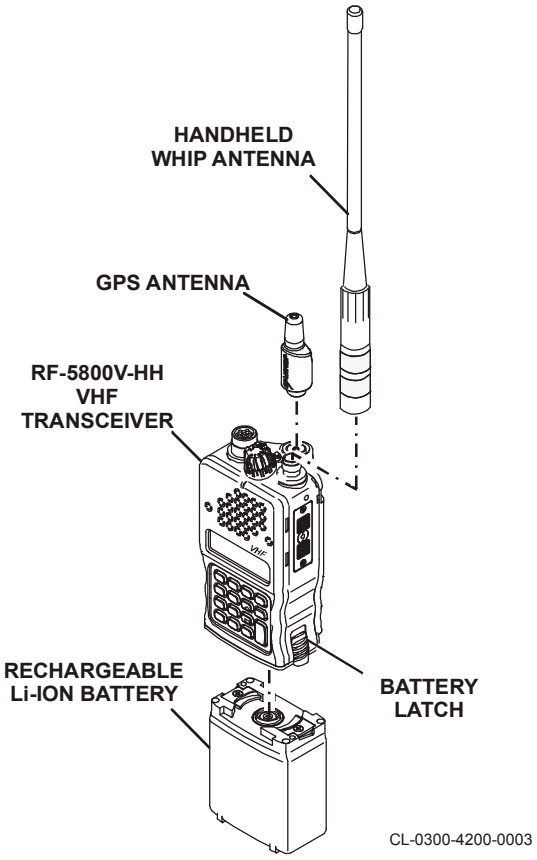


Figure 2-3. Equipment Setup and Teardown (GPS Version Shown)

CHAPTER 3

OPERATION

3.1 INTRODUCTION

This chapter discusses the operational capabilities and limitations of the RF-5800V-HH, and provides instructions on how to perform those operations. The user should first review Paragraph 3.3 to become familiar with the radio controls, indicators and connectors.

3.2 OPERATION TASK SUMMARY

Radio operation tasks, in general, are performed in the following order:

- Power on radio - Paragraph 3.4
- Radio lock/unlock - Paragraph 3.5
- Keypad lock/unlock - Paragraph 3.6
- Test radio - Paragraph 3.7
- Select Plain Text (PT) or Cipher Text (CT) - Paragraph 3.10
- Perform basic operations using net presets - Paragraph 3.11

Some operations can be performed at any time during normal operations and consist of:

- Optional tests - Paragraph 3.7.2, Paragraph 3.7.4
- Display lamp operation - Paragraph 3.8
- Zeroize radio - Paragraph 3.12
- Set radio options - Paragraph 3.13
- Net scanning - Paragraph 3.14
- Remote control mode - Paragraph 3.15.1
- Clone mode - Paragraph 3.15.2
- Retransmit mode - Paragraph 3.15.6

NOTE

Advanced features covered in Appendix B include Directed Calling, Situational Awareness (SA), Wireless Internet Protocol (IP) Network, Short Messaging Service (SMS), and Falcon Watch™ Sensor Alerts.

3.3 CONTROLS, INDICATORS, AND CONNECTORS

Figure 3-1 shows the radio controls, indicators, and connectors. Table 3-1 describes the controls, indicators, and connectors.

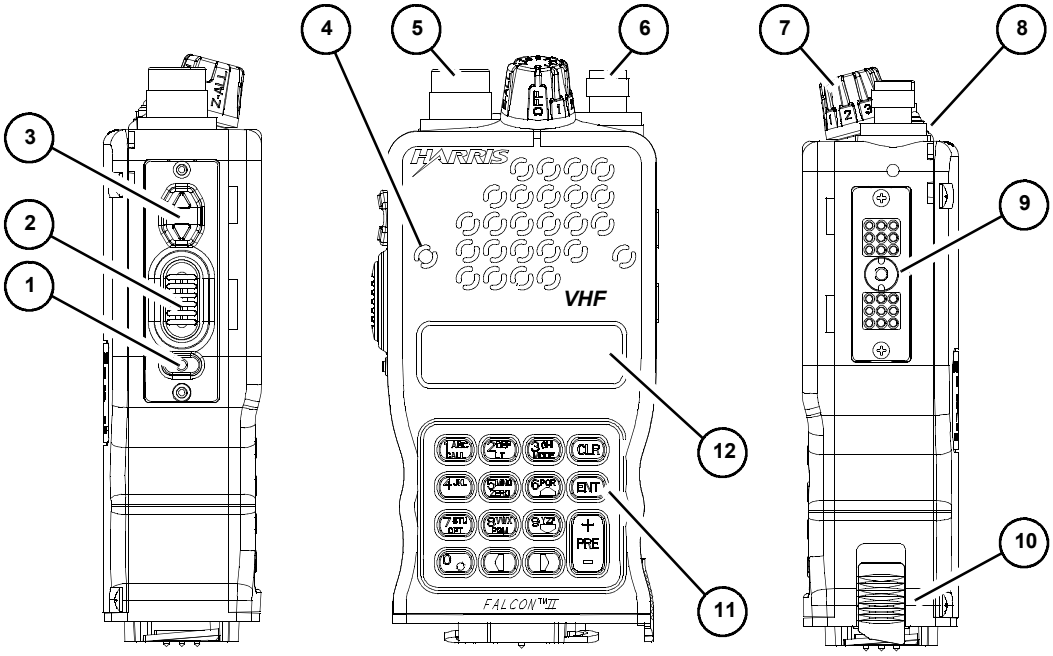


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Figure 3-1. RF-5800V-HH Controls, Indicators, and Connectors

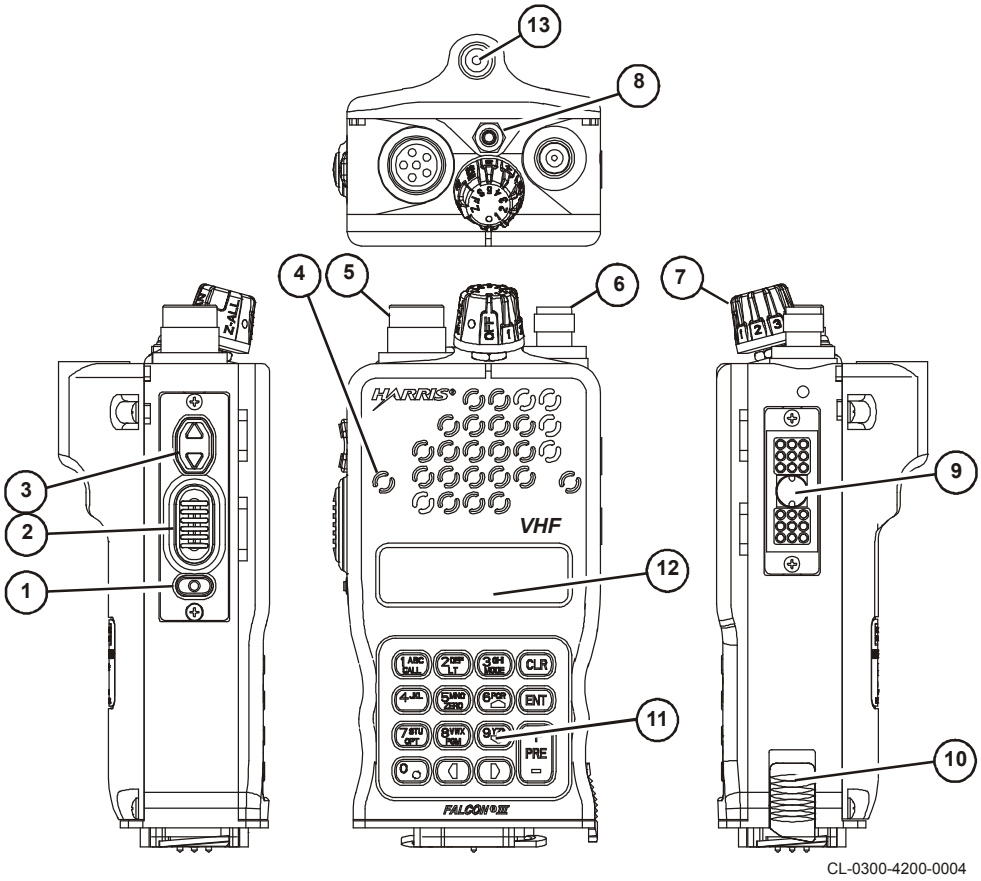

Figure 3-2. RF-5800V-HH w/GPS Controls, Indicators, and Connectors

Table 3-1. RF-5800V-HH Controls, Indicators, and Connectors

Key (Figure 3-1)	Control/Indicator	Function
1	Monitor	Toggles squelch on and off.
2	Push-To-Talk (PTT)	Push-To-Talk. (Not lockable.)
3	Volume Control	Increases/decreases volume. (Not lockable.)
4	MIC	Built-in microphone. (Not lockable.)
5	6-Pin Audio	Provides a connection for an audio handset or data device that uses a six-pin connector.
6	Antenna Connector	Provides a 50-ohm antenna port for a Threaded N-Connector (TNC).
7	Function Switch (labeled on side of switch)	
	OFF	Turns RF-5800V-HH Off.
	1 through **5**	Selects preset nets 1 through 5.
	SCAN	Places the radio in scan operation, if scan is enabled.
	FP	Places the radio in Front Panel (FP), permitting access to all presets and keypad functions.
	Z-ALL	Zeroizes all programmed variables, including encryption variables (momentary - with toggle switch in the “Z” position).
8	Toggle Switch	
	PT	Places the radio in Plain Text (PT).
	CT	Places the radio in the Cipher Text (CT - encryption).

Table 3-1. RF-5800V-HH Controls, Indicators, and Connectors (Continued)

Key (Figure 3-1)	Control/Indicator	Function
	Z	Zeroizes all programmed values, including Communications Security (COMSEC) and Transmission Security (TRANSEC) variables (with function switch in Z-ALL position.) (Momentary)
9	ANC Connector	Ancillary (ANC) side connector (18-pin) for remote or data device.
10	Battery Latch	Releases battery for removal.
11	Keypad	
		The circular arrow button shows alternate displays. Refer to Paragraph 3.11.2.
	[CALL]	Provides the ability to place directed calls to radios stations or phone calls through a 6010 basestation configuration. (Refer to Appendix B for details.).
	[LT]	Provides access to the keypad/display backlight control menus. Refer to Paragraph 3.8 and see Figure 3-5.
	[MODE]	Allows the operator to change the radio's operating mode. See Figure 3-3.
	[ZERO]	Provides access to the radio's zeroize menus. See Figure 3-8.
	[OPT]	Provides access to the radio's options menus. See Figure 3-9.
	[PGM]	Provides access to the radio's programming menus. See Figure 4-1.

Table 3-1. RF-5800V-HH Controls, Indicators, and Connectors (Continued)

Key (Figure 3-1)	Control/Indicator	Function
	[CLR]	Returns a field to its previous value, and activates the previous menu, or terminates a call while in a directed call.
	[ENT]	Enter. Selects scroll field choices or locks in entry field data.
	[PRE +/-]	Scrolls the operator through the programmed nets when the function switch is in the FP position.
	◀ and ▶	Allows the operator to move the cursor to the left or right, or to select a new menu field.
	▲ and ▼	Allows the operator to scroll through a scroll field list.
12	Display	Displays operational and programming screens.
13	GPS Antenna Connector	Antenna connector for internal GPS.

3.3.1 Number Entry

Alphanumeric fields are used to enter alphanumeric strings such as net names, security, and passwords. When selecting an alphanumeric field, the entire field flashes. Once a character is entered, only the next character to be updated flashes. This flashing character is the cursor.

- Each numeric button on the keypad (except 0) is assigned up to three letters of the alphabet. For example, the **1** button is also assigned the letters **A**, **B**, and **C**. To enter a **1** in a field, press the **1** button once, to enter an **A**, press the **1** button twice, etc.
- To advance the cursor to the next position, another button must be pressed. This automatically advances the cursor to the next position.

- If two consecutive letters need to be entered from the same button, the right arrow button must be pressed to advance the cursor.

The **CLR** button backspaces one digit and then clears all digits to the right of the cursor.

3.4 RADIO POWER ON

To power on the RF-5800V-HH, rotate the function switch from **OFF** to the **1** - **5**, **SCAN**, or **FP** position. This initializes the radio and performs a power on self-test. When the test is complete, the net preset screen is displayed.

NOTE

The radio and keypad may be locked to prevent accidental button operation. Refer to Paragraph 3.5 and Paragraph 3.6 before proceeding with radio and keypad functions.

When using the RF-5800V-HH with the optional RF-5800V-V500 Vehicular Adapter Amplifier (VAA) or RF-5800M-V520 VAA Ultra High Frequency (UHF), set the operating mode to **VAA** (refer to Paragraph 3.15.10). This allows the radio to be used with jerk and run operation.

3.5 RADIO LOCK

The Radio Lock function provides the capability to completely disable all keypad and all pushbutton functions of the radio. This eliminates the potential for any inadvertent key presses while the radio is turned on. The top function switch will remain operable even with the radio locked, allowing for CT and PT audio connections. See Figure 3-11.

3.5.1 Locking the Radio

Perform the following procedure to lock the radio:

a. Press the **[MODE]** button.

b. Use the up/down arrow buttons to select **RADIO LOCK,** and press **[ENT]**.

c. **RADIO LOCKED** will be seen on the display.

3.5.2 Unlocking the Radio

Perform the following procedure to unlock the radio:

a. Press the **[CLR]** button five times in quick succession to unlock the radio controls.

3.6 KEYPAD LOCK

The Keypad Lock function provides the capability to lock the radio keypad. This reduces the potential for inadvertent key presses to adversely affect radio operation or programming. See Figure 3-11.

3.6.1 Locking the Keypad

Perform the following procedure to lock the keypad:

a. Press the **[MODE]** button.

b. Use the up/down arrow keys to select **KEYPAD LOCK** and press **[ENT]**.

NOTE

Locking the keypad does not disable the monitor, PTT, or volume controls.

3.6.2 Unlocking the Keypad

Perform the following procedure to unlock the keypad:

a. Press the **[MODE]** button.

b. Enter the programmed operator security level 0 password and press **[ENT]** to unlock the keypad.

NOTE

If remote control and keypad lock are both enabled, remote control should be turned off prior to turning off keypad lock.

3.7 INITIAL TESTS

The following paragraphs provide tests that should be performed to ensure operational readiness of the RF-5800V-HH.

3.7.1 Automatic Test

See Figure 3-3 for the Mode>Test menu tree. Perform the following to run an automatic test:

NOTE

The keypad may have been locked. To unlock, refer to Paragraph 3.6.2.

a. Press the **[MODE]** button.

b. Use the up/down arrow buttons to select **TEST** and press **[ENT]**.

c. Select **AUTO** and press **[ENT]**.

d. If the radio displays a fault code, refer to Chapter 5.

3.7.2 Optional Manual Tests

See Figure 3-3 for the Mode>Test menu tree. Perform the following to run the manual tests:

a. Press the **[MODE]** button.

b. Use the up/down arrow buttons to select **TEST** and press **[ENT]**.

c. Select **MANUAL** and press **[ENT]**.

d. Run individual tests as desired:

1. **AUDIO** - Tests MIC/AUX MIC audio input capability. Audio also tests SPKR/AUX SPKR capability.
2. **KEYPAD** - Displays key presses detected.
3. **BACKLIGHT** - Toggles backlight settings.
4. **LCD** - Toggles LCD contrast settings.

e. If the radio fails any of the tests, refer to Chapter 5 for troubleshooting.

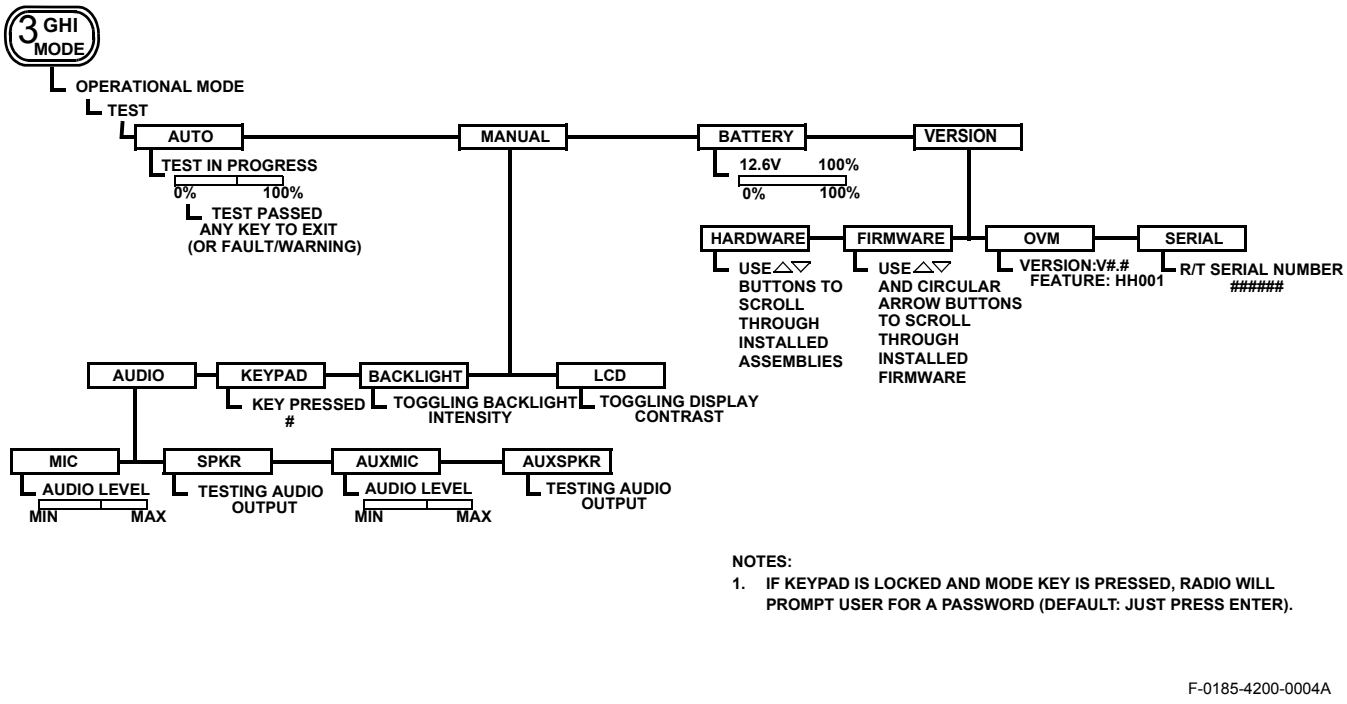

Figure 3-3. RF-5800V-HH Mode>Test Menu

3.7.3 Battery Test

See Figure 3-3 for the Mode>Test menu tree. For more information on batteries, refer to Paragraph 5.3. Perform the following to run the battery test:

a. Press the **[MODE]** button.

b. Use the up/down arrow buttons to select **TEST** and press **[ENT]**.

c. Select **BATTERY** and press **[ENT]**. The radio displays actual charge capacity in numeric form and with a graphical intensity meter display. Battery voltage is also displayed numerically. See Figure 3-4.

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Figure 3-4. Battery Display

3.7.4 Optional Version Tests

See Figure 3-3 for the Mode>Test menu tree. Perform the following to run version tests:

a. Press the **[MODE]** button.

b. Use the up/down arrow buttons to select **TEST** and press **[ENT]**.

c. Select **VERSION** and press **[ENT]**.

d. Select and check individual versions as desired:

1. HARDWARE
2. FIRMWARE
3. OVM (Option Validation Matrix)
4. SERIAL (serial number of radio)

3.8 LT BUTTON OPERATION

See Figure 3-5. To configure the keypad/display backlight operation, intensity and contrast, press the **[LT]** button.

a. To have the backlight remain on for a short time after any button is pressed, use the up/down arrow buttons to select **MOMENTARY,** then press the **[ENT]** button. To have the backlight remain continuously on, select **ON**, then press the **[ENT]** button. To disable the backlight, select **OFF**, then press the **[ENT]** button.

b. Use the left/right arrow buttons to adjust the backlight intensity, then press **[ENT]**.

c. Use the left/right arrow buttons to adjust the display contrast, then press **[ENT]** to exit.

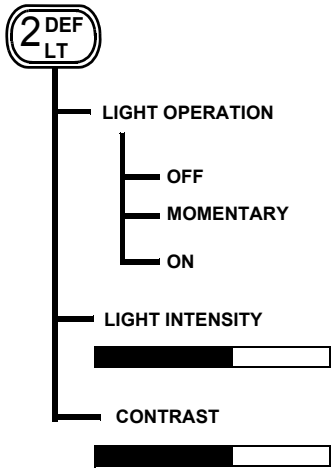


Figure 3-5. RF-5800V-HH LT Menu

3.9 BEFORE OPERATING THE RF-5800V-HH

Before operating the RF-5800V-HH, the net presets, keys, addresses, etc. must be established. Parameters can be programmed through the radio front panel per Chapter 4, or by using the RF-6550V VHF-UHF Radio Programming Application software (supplied separately).

3.9.1 Voice/Data Compatibility

Table 3-2 shows the operational mode capabilities of the RF-5800V-HH.

Table 3-2. Voice/Data Compatibility

Operating Mode	Intended Operation	Data/Voice (D/V)	Voice	Fixed Frequency Modulation
PT	Simple	VOC	CLEAR	FM
		D/V	CLEAR	WBFSK
		DATA	NONE	WBFSK
	Wireless IP/ Directed	VOC	CVSD	WBFSK
		D/V	CVSD	WBFSK
		DATA	NONE	WBFSK
CT	Simple, Directed, Wireless IP	VOC	CVSD	WBFSK
		D/V	CVSD	WBFSK
		DATA	NONE	WBFSK

3.9.2 Cipher Text Compatibility

Radios can communicate using Cipher Text (CT) only if they have exactly the same version of CITADEL encryption. Perform the following procedure to determine CITADEL version number.

a. Rotate function switch to **1 - 5**, or **FP**.

b. Press the **[MODE]** button. Select **TEST** and press **[ENT]**.

c. Select **VERSION** and press **[ENT]**.

d. Select **HARDWARE** and press **[ENT]**.

e. Use the up/down arrow buttons to scroll to the **CITADEL** version menu.

f. Verify that the Harris part numbers match exactly in the radio. In CITADEL I radios, the last four digits correspond to the CITADEL I version, and in CITADEL II radios, the last five digits correspond to the CITADEL II version.

3.10 SELECTING PT OR CT

Place the toggle switch on the top of the radio in the Plain Text (**PT**) or Cipher Text (**CT -** encrypted) position. The selection is shown on the top line of the display. Refer to Paragraph 3.9.2 for the procedure to verify CT compatibility.

3.11 BASIC OPERATION FROM NET PRESET

The RF-5800V-HH uses net presets to simplify radio operation.

3.11.1 Overview - Contents of a Net Preset

A net preset associates an encryption key, voice/data setting, squelch setting, and power level to either a fixed frequency or a hopnet. This hierarchy lessens the amount of manually programmed parameters in the radio. For instance, a user may use several encryption keys or data rates for a particular frequency or hopnet. All this information can be preprogrammed into the radio and stored as a net preset for simple access.

3.11.2 LCD Display - Preset Screens

The net preset screen, shown on the top of Figure 3-6 and Figure 3-7, is used to view and change net presets. The frequency/hopset screen, shown on the bottom of Figure 3-6 and Figure 3-7, is used to view and change frequency or hopset settings. Some points to remember with these screens consist of the following:

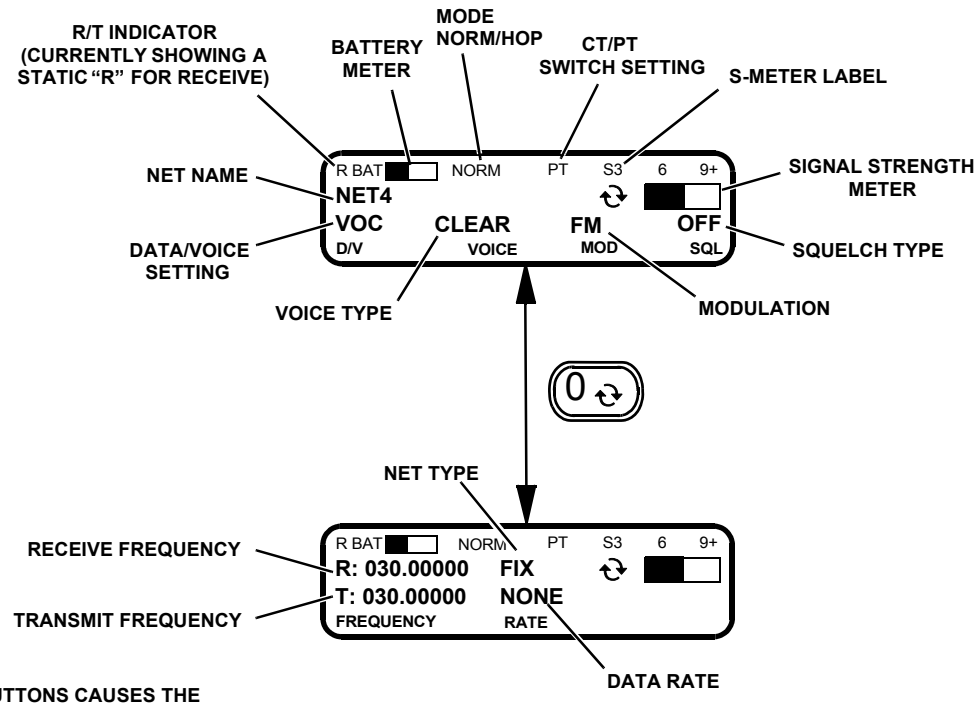
- To change settings, use the ◀ and ▶ keys to scroll to the setting, use ▲▼ to scroll choices, and press **[ENT]** to accept changes.
- To toggle between the net preset and frequency/hopset screen, use the  key.
- The battery meter is temporarily replaced with the volume level indicator when the Volume button is pressed.
- The receive signal strength meter (S-Meter) changes to display a power level meter when the RF-5800V-HH is transmitting.
- NORM is displayed for simple net presets; radio ID is displayed for directed or wireless IP presets.
- Only the net presets that are configured and enabled (activated in list) will be selectable.

NOTE

Whenever the operator manually changes a preprogrammed net parameter, the radio places an asterisk (*****) to the right of the net name on the LCD. In addition to receive and transmit frequencies, the operator can also change the Data/Voice setting and squelch type. Changing parameters in this way is called a temporary override. For more information on temporary override, refer to Paragraph 3.11.6.

NOTE

The radio function switch must be in the **FP** position to use the **[+PRE-]** buttons.



NOTES:

1. **PRESSING VOLUME BUTTONS CAUSES THE VOLUME METER TO REPLACE THE BATTERY METER FOR A SHORT TIME.**
2. **THE BATTERY METER GIVES AN INDICATION OF THE CHARGE CAPACITY OF THE BATTERY.**

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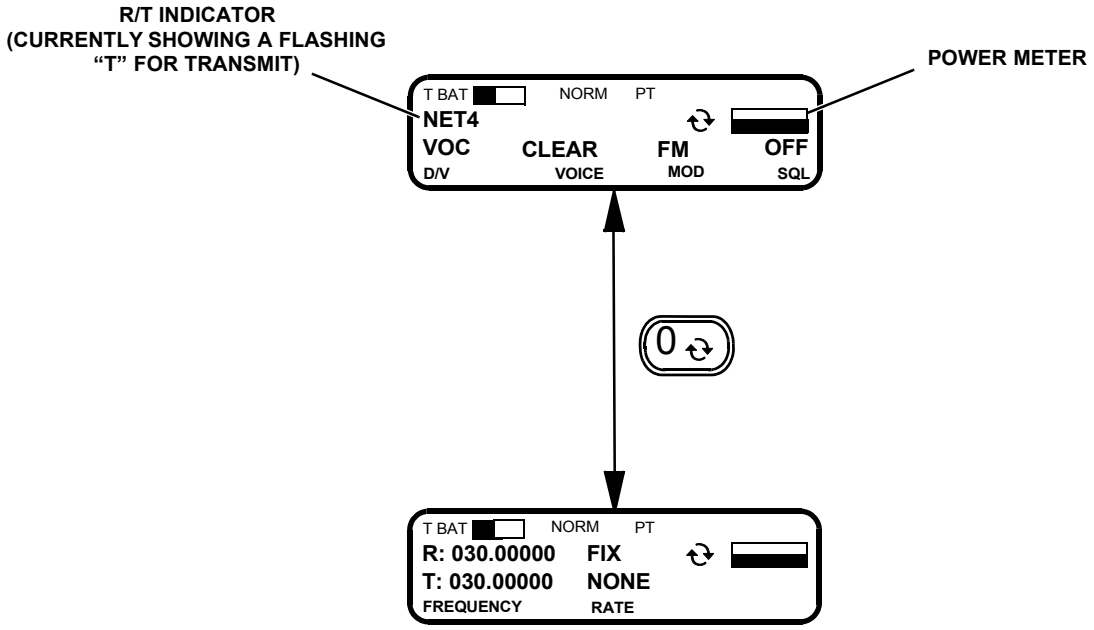
Figure 3-6. Net Preset and Frequency/Hopset Screen in Receive (Fixed Frequency Shown)



F-0185-4200-0010

Figure 3-7. Net Preset and Frequency/Hopset Screen in Transmit (Fixed Frequency Shown)

3.11.3 Select a Net Preset

Net presets are selected by using the **[+PRE-]** key to scroll the choices.

NOTE

The **[+PRE-]** key is disabled when the function switch is placed in **1 - 5**.

3.11.4 Data/Voice (D/V) Settings

The Data/Voice (**D/V**) field can be changed to Voice (**VOC**), Data/Voice (**D/V**), or **DATA**. The choices correspond to the types of audio input. Refer to Paragraph 3.9.1 for compatibility. The PTT will be ignored if **DATA** is selected.

3.11.5 Squelch (SQL) Settings

The RF-5800V-HH supports digital squelch, analog tone squelch, and analog noise squelch. Noise and Tone Squelch can be modified from the **SQL** field. Digital squelch requires that the radio receive a specific digital waveform in order to break the radio's squelch. Analog tone squelch requires that a 150 Hz tone be transmitted along with the normal radio traffic in order to break the receive radio's squelch. Analog noise squelch requires a signal that is strong enough to break the radio's squelch.

Digital squelch is only available on digital nets, when in **CT** position, or on a directed or WIP net. If switching to an analog net, the analog squelch type defaults to **TONE** for FM and **NOISE** for AM.

3.11.6 Radio Programming Versus Temporary Overrides

It is important to understand the differences between programming and temporary overrides. The radio is programmed from the keypad. Programmed parameters are stored in non-volatile Random Access Memory (RAM) until they are zeroized via user command. RAM is capacitor backed for a short period after the main battery is removed. A charged battery must be reinstalled within a short period to avoid losing programming data.

The operator can temporarily override given parameters from their programmed value. These changes are only valid until the operator selects another net. Once this occurs, the temporary changes are lost. The operator must select the **SAVE** command from the **[OPT]** menu in order to save the temporary overrides as programmed values.

NOTE

Saving temporarily overridden net parameters without coordinating those net changes with the other net members can compromise net and radio performance.

NOTE

Performing a temporary override may cause parameters of lower precedence to be overridden. This is to ensure that all radio parameters are consistent and work with one another. The operator is not notified of these additional overrides.

3.12 ZERO OPERATION

See Figure 3-8. Zeroizing clears all or a specific part of radio programming and returns the radio configurations to their factory defaults. The **[ZERO]** button is always enabled, except in radio and keypad lock.

- To zeroize the entire radio, press the **[ZERO]** button, select **ALL**, then press **[ENT]**.

NOTE

Zeroizing may also be accomplished by placing the function switch in the Z-ALL position, and placing the toggle switch in the Z position.

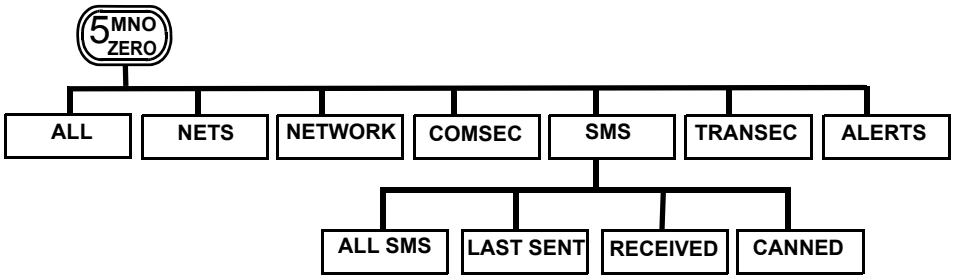
- To zeroize the radio's net programming, press the **[ZERO]** button, select **NETS**, then press **[ENT]**.
- To zeroize the radio's network settings, press the **[ZERO]** button, select **NETWORK**, then press **[ENT]**.
- To zeroize the radio's encryption programming, press the **[ZERO]** button, select **COMSEC**, then press **[ENT]**.
- To zeroize the radio's Short Messaging Service information, press the **[ZERO]** button, select **SMS**, then choose between the following**:**
  - **ALL SMS** - Deletes all SMS messages.
  - **LAST SENT** - Deletes only the last sent message.
  - **RECEIVED** - Deletes all received messages.
  - **CANNED** - Deletes all canned messages.

  Press **[ENT]**. Use the up/down arrow buttons to select **YES**, then press **[ENT]**.

- To zeroize the radio's frequency hopping programming, press the **[ZERO]** button, select **TRANSEC**, then press **[ENT]**.
- To zeroize all received Falcon Watch™ Alert messages, press the **[ZERO]** button, select **ALERTS**, then press **[ENT]**.

NOTE

In the default zeroized state of the radio when the function switch is in the FP position, the radio defaults to NET0. Otherwise, the radio defaults to the last net enabled while in FP.

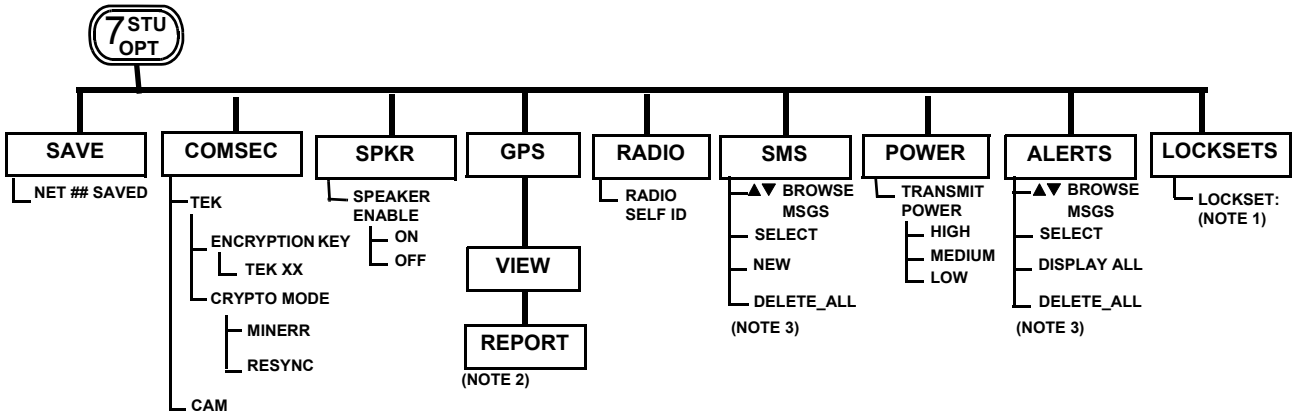


F-0300-4200-0008

Figure 3-8. Zero Menu

3.13 RADIO OPTIONS

Figure 3-9 shows the RF-5800V-HH options menu tree. The following paragraphs describe the radio options menus.



NOTES:

1. ONLY VISIBLE WHEN USING A FREQUENCY HOPPING NET.
2. ONLY VISIBLE WHEN GPS IS CONNECTED.
3. ONLY USED WITH DIRECTED CALLING AND WIRELESS IP NETS. REFER TO PARAGRAPH B.2 AND PARAGRAPH B.4.

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Figure 3-9. RF-5800V-HH Options Menu Tree

3.13.1 SAVE

To save changes made from net preset displays, press the **[OPT]** button, then select **SAVE** and press the **[ENT]** button. For more information on net programming, refer to Paragraph 4.5.2.1.

3.13.2 COMSEC

To view the Communications Security (COMSEC) setting for the active net, press the **[OPT]** button, select **COMSEC**, then press **[ENT]**. Select either **Traffic Encryption Key (TEK)** or **Citadel Algorithm Modification (CAM),** then press **[ENT]**. The CAM option provides an additional layer of encryption for both CITADEL I and CITADEL II type radios. CAM is not programmable in the radio but is generated using a separate Harris Key Generation Application (KGA) and loaded using the RPA. Under **TEK**, enter the **Encryption Key TEK** number and press **[ENT]**. Next, select the **Crypto Mode**. Valid options are:

- **MINERR** - This is the default mode. When using MINERR, the start of the transmission must be heard to receive an encrypted transmission. There is a crypto sync that precedes the waveform. This mode is supported across all net types: Simple, Directed Calling, and Wireless IP.
- **RESYNC** - This mode allows a radio on simple voice/data nets (not directed calling or wireless IP nets) to receive an encrypted transmission already in progress. The radio does not have to hear the start of the waveform, but can power on and start receiving in mid-transmission. RESYNC is more susceptible to noise than MINERR.

3.13.3 Speaker (SPKR)

To toggle the radio speaker on or off, press the **[OPT]** button, then select **SPKR**. Use the up/down arrows to select **ON** or **OFF**.

3.13.4 GPS

To view the status of an internal or externally connected GPS, press the **[OPT]** button, select **GPS**, then select **VIEW**. Press the circular arrow key to switch between the satellite status, heading and velocity, and altitude pages. Press the up/down arrow on each page to select status of the current radio or any radio reporting its position.

Refer to Paragraph B.3 for information on position reporting.

3.13.5 RADIO

To view the Radio SELF ID (used for Directed Calling), press the **[OPT]** button, then select **RADIO**. Refer to Paragraph B.2 for information about Directed Calling.

3.13.6 SMS

This menu allows the user to send new text messages, and to view and delete received text messages. For detailed information about Short Messaging Service, refer to Paragraph B.5.

3.13.7 POWER

The transmit power level can be programmed for each net preset, or it can be set manually. To manually select either **HIGH**, **MEDIUM**, or **LOW** transmit power, press the **OPT** button, then select **POWER**. Select the desired power level, then press **[ENT]**.

For FM, **HIGH** power is 5 watts, **MEDIUM** power is 2 watts, and **LOW** power is 0.25 watt. Refer to Paragraph 4.5.2 for information on how to program the power level for a net preset.

3.13.8 ALERTS

This menu allows the user to:

- View stored Alert messages from the optional Falcon Watch™ Sensor Alarm System.
- Reset the filtering (Display All) for any Sensor Nodes that were previously filtered (Ignored).
- Delete all Alert messages that have been received and stored in the radio.

For detailed information about Alerts, refer to Paragraph B.6.

3.13.9 LOCKSETS (Hopping Only)

A lockset specifies frequencies that cannot be used during list or wideband frequency hopping. For more information about locksets, refer to Paragraph 4.5.1.4. To view the frequency hopping lockset information for the radio, press the **[OPT]** button, select **LOCKSETS**, then press **[ENT]**.

NOTE

LOCKSETS data is only available when the active net is a frequency hopping net. LOCKSETS will not display on a fixed frequency net.

NOTE

LOCKSETS that have been programmed into the radio apply to all frequency hopping nets.

3.14 NET SCANNING

The RF-5800V-HH can be set for scan operation by placing the function switch in **SCAN** position. The radio will search fixed frequency net presets for the presence of a Radio Frequency (RF) signal. The user can program a list of up to 25 net presets into the scan list. This list is separate from the list of net presets that are activated in the list (for use with the **+PRE-** button).

NOTE

Net Scanning is only available in simple fixed frequency nets and is not available for nets with squelch type set to OFF.

The maximum number of nets that can be reliably scanned depends upon whether the radio is in PT or CT. A full 25-net scan list can be used in PT. Reliable operation in CT requires two procedural modifications because of the preamble synchronization required by encrypted transmissions. First, the calling radio should have Robust Preamble turned on (refer to Paragraph 4.8.1). This extends the transmitters preamble to give the scanning radio enough time to synchronize after it scans all other nets in the scan list. Second, the number of nets in a CT scan list should be no more than five with a sixth Receive (RX) Priority Net. It is possible to scan more nets in CT, but some calls may be missed.

There are two ways to scan: automatic and manual. Use the **[CLR]** button to toggle between the two methods.

In automatic scan, the radio scans each net in the list for the presence of an RF signal. If a signal is present on a net, the radio stops scanning and holds on that net for the programmed hold time. If no hold time is specified, the radio remains on that net until signal presence is lost or the user presses **[CLR]** to continue automatic scan. If signal presence is lost during the hold time, the radio waits the programmed hang time before continuing to automatically scan. For more information on hang time and hold time, refer to Paragraph 4.6.3.

To enter automatic scan, perform the following procedure:

a. Turn the function switch to the **SCAN** position. If **SCAN** is enabled, **SCAN** will initiate automatically.

NOTE

Pressing the PTT button while the radio is scanning causes the radio to transmit using the transmit priority net. Pressing the PTT button while the radio is stopped on a net will cause the radio to transmit on that net. For more information on the transmit priority net, refer to Paragraph 4.6.2.

b. To switch to manual scan, press the **[CLR]** button. When not automatically scanning (the radio has stopped on a net that has an RF signal, or has stopped because the operator has pressed the **[CLR]** button), the radio is in manual scan.

c. During manual scan, use the **[+PRE-]** button to manually scroll through the scan list.

d. To return to automatic scan, press the **[CLR]** button.

NOTE

When the radio is not scanning because the **[CLR]** button has been pressed or signal presence is detected, pressing the circular arrow button switches between the scan displays. See Figure 3-10.

e. To exit scanning, turn the function switch to a position other than **SCAN**.

The manual scan displays provide information similar to the normal net preset displays. See Figure 3-10.

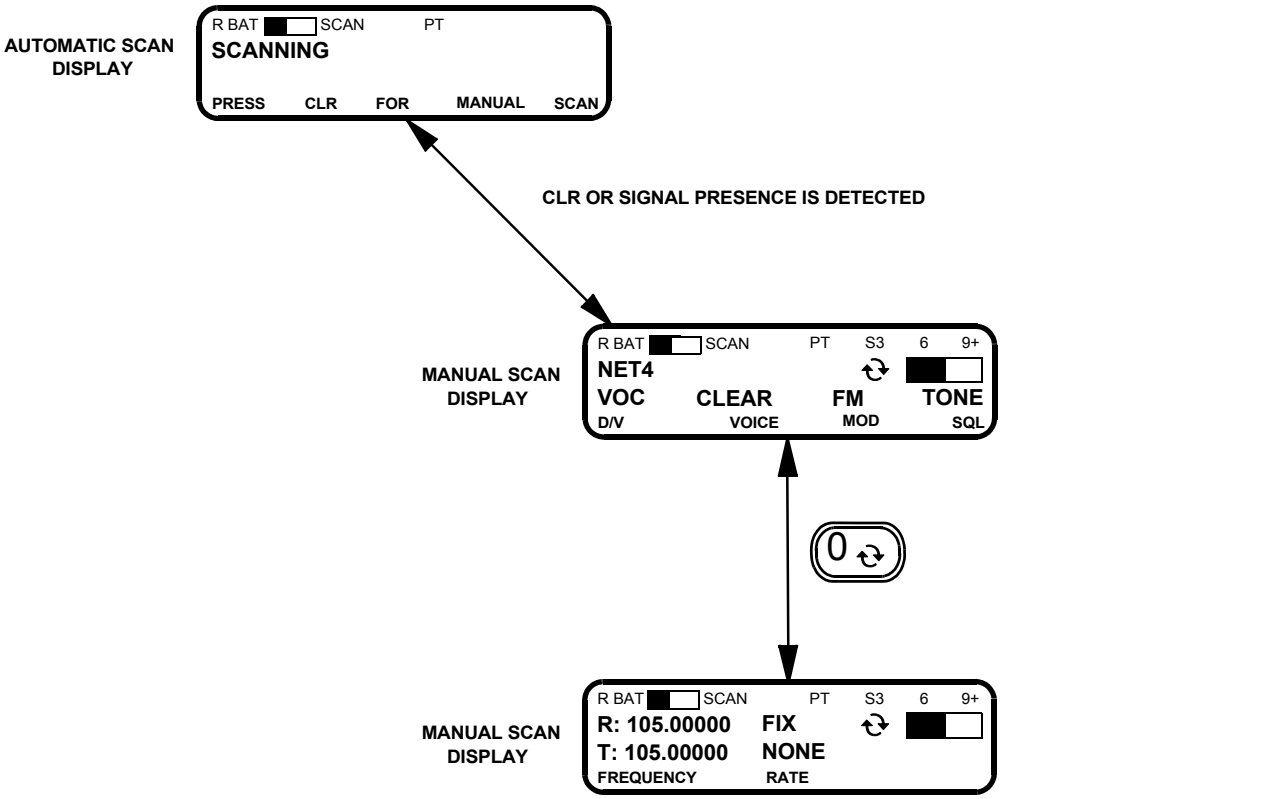


Figure 3-10. SCAN Displays

3.15 OPERATIONAL MODE MENU

Figure 3-11 shows the RF-5800V-HH MODE menu tree. The following paragraphs describe the radio MODE menus.

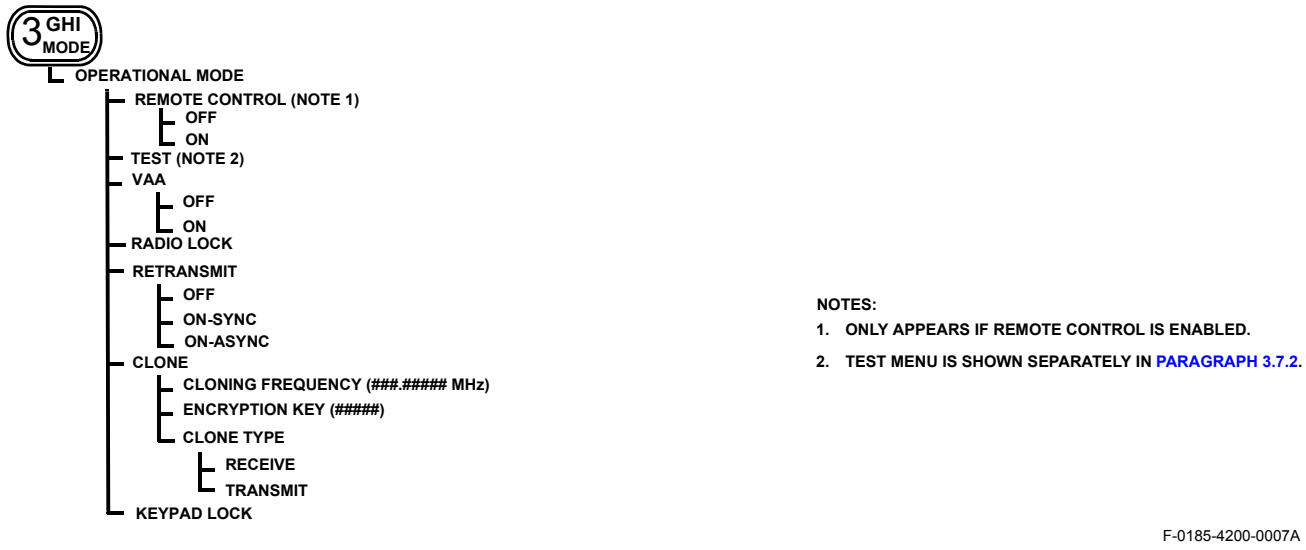


Figure 3-11. RF-5800V-HH Mode Menu

3.15.1 Remote Control

Remote control is only available when using a remote terminal or PC. Remote control can only be enabled from the remote terminal or PC, not from the function switch or **[MODE]** button. Once enabled, remote control can be disabled using the remote terminal, PC or **[MODE]** button.

NOTE

If remote control and keypad lock are both enabled, remote control should be turned off prior to turning off keypad lock.

3.15.2 CLONE Mode

The RF-5800V-HH is able to transfer all configuration parameters to compatible handheld radios and manpacks within a distance of 20 feet (six meters) using wireless cloning. The transferred data includes COMSEC keys, Transmission Security (TRANSEC) parameters, NET PRESETS, and CONFIGURATION settings - except for Wireless Internet (WIP) or Directed Call Nets. The transferred data does not include LIGHT or VOLUME settings. ALL clone data is transferred at LOW power in cipher text (encrypted), regardless of the setting of the toggle switch. The first radio in the process is set to transmit programming parameters and the other radios are set to receive them.

NOTE

If user level within the radio is set to 0, and security access is enabled, the radio CANNOT be put into clone mode.

3.15.3 Receiving Wireless Cloning Information

NOTE

When performing the following procedure, ensure that the radios are no more than 20 feet (6 meters) apart. This is the maximum separation distance allowed.

Any number of receive radios can be configured to accept cloning information. Perform the following procedure to set up a radio for cloning receive operation:

a. Press the **[MODE]** button. Select **CLONE** and press **[ENT]**.

b. Enter the desired frequency and press **[ENT]**. This defaults to the current radio frequency. This must match the frequency used by the transmitting source radio.

c. Enter the desired six-digit numeric encryption key and press **[ENT]**. This key is used to encrypt the cloning data. The encryption key must match the key used by the transmitting source radio.

d. Select **RECEIVE** and press **[ENT]**.

e. The radio displays **AWAITING RECEIVE**. A progress meter is shown on the next display line.

f. Press **[CLR]** to abort.

g. Display changes to **RECEIVING** as information is received. Progress meter increases to 100%.

h. On successful receipt of information, display changes to **RECEIVE COMPLETE ANY KEY TO EXIT**.

i. If information is not successfully received, several error messages are possible:

1. Receive failure - data integrity failure, wrong encryption key: **RECEIVE FAILURE ANY KEY TO EXIT**.
2. Software version failure - attempting to clone between dissimilar software versions: **VERSION MISMATCH ANY KEY TO EXIT**.
3. Wrong radio type - attempting to clone between dissimilar radios: **INVALID RADIO TYPES ANY KEY TO EXIT**.

3.15.4 Transmitting Wireless Cloning Information

Verify that all target radios have been prepared to receive the cloning information. All target radios must display **AWAITING RECEIVE** before cloning information is transmitted. Refer to Paragraph 3.15.3. Perform the following procedure to set up a radio for cloning transmit operation:

a. Press the **[MODE]** button. Select **CLONE** and press **[ENT]**.

b. Enter the desired frequency and press **[ENT]**. This defaults to the current radio frequency. This must match the frequency used by the target receiving radio(s).

c. Enter the desired six-digit numeric encryption key and press **[ENT]**. This key is used to encrypt the cloning data. The encryption key must match the key used by the target receiving radio(s).

d. Select **TRANSMIT** and press **[ENT]**.

e. Press **[CLR]** to abort.

f. The radio displays **TRANSMITTING**. A progress meter is shown on the next display line. The progress meter increases to 100%.

g. On successful transmission of information, display changes to **TRANSMIT COMPLETE ANY KEY TO EXIT**.

3.15.5 Verifying the Status of a Wireless Cloning Transfer

After the completion of a wireless cloning data transfer, turn off each Receiver-Transmitter (R/T). Turn on the R/Ts and perform communications checks to verify accurate cloning.

3.15.6 RETRANSMIT Mode

A retransmission or repeater station receives a signal transmitted on one net and retransmits that signal on another net (on another radio), enabling communication over a greater range than is possible using individual radios. A retransmission or repeater station for extending communication range can be set up using two radios.

Two types of operation are available using the retransmit setup:

- Black Digital operation - Paragraph 3.15.6.1
- Red Analog operation - Figure 3.15.6.2

Both types of operation use the same equipment and setup. The only difference in operation is how the retransmission/repeater station is used by other radios.

WARNING

To prevent electrical shock and RF burns, avoid contact with antennas in retransmit mode operation as each radio transmits automatically in response to incoming calls on the opposite retrans radio.

3.15.6.1 Black Digital Retransmit Operation

Figure 3-12 shows Black Digital retransmit operation. In the black digital retransmit scenario, all outstations operate in CT with the same COMSEC mode and key, while the retransmit site radios are operated in PT and simply pass the already encrypted digital signal through the retransmit cable. The retrans station consists of two radios connected by a retrans cable. Here the retrans station uses net N1 on one radio to transmit and receive with one group of radios. It uses net N2 to transmit and receive with a second group of radios. The retransmission operation can be summarized as follows:

- Signals received on N1 are retransmitted on N2.
- Signals received on N2 are retransmitted on N1.

N1 and N2 can be any LOS fixed frequency or frequency hopping net preset. The most common operation and preferred method is to operate the retransmit site in black digital retransmit mode. In this mode, all stations except the two retransmit site radios operate in CT with the same COMSEC mode and key. The retransmit site radios are operated in PT and just pass the encrypted digital signal through the retransmit cable.

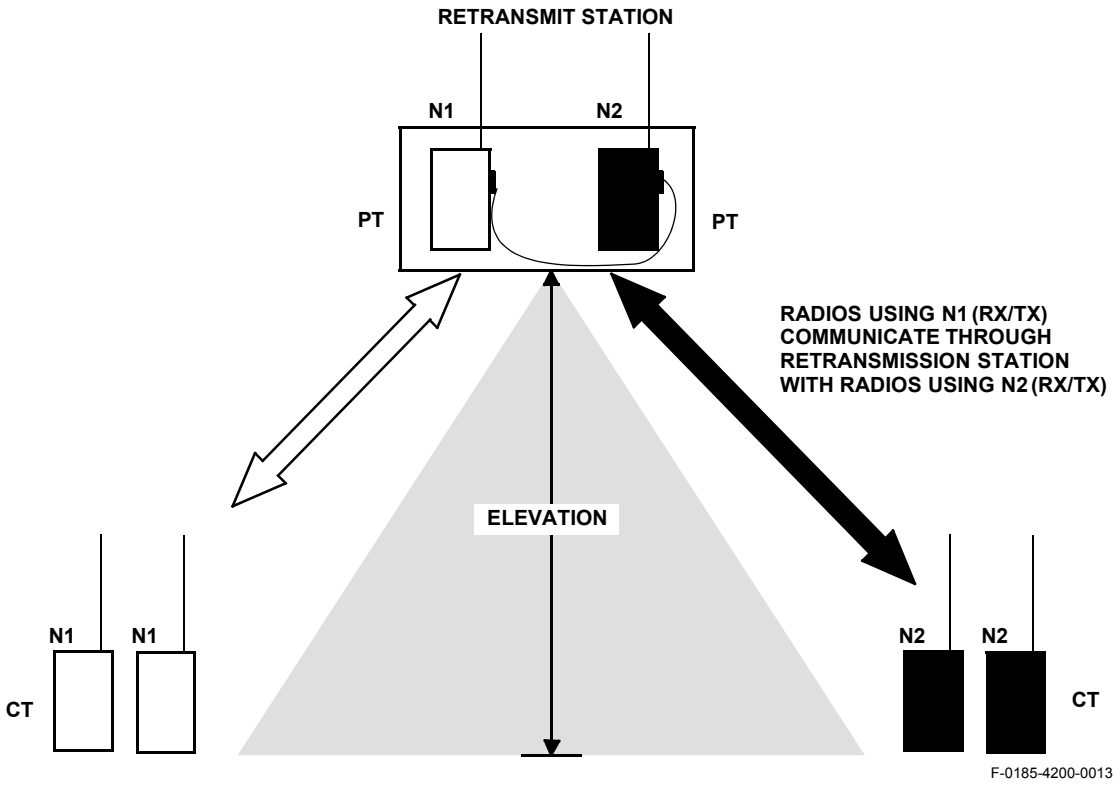


Figure 3-12. Black Digital Retransmission Operation

3.15.6.2 Red Analog Retransmit Operation

Figure 3-13 shows Red Analog retransmit operation. In Red Analog operation, all stations operate in CT mode, and each net has its own COMSEC key and operating type. All radios are operated in CT and must be secured.

The retransmit station consists of two radios connected by a retransmit cable. The retransmit station uses net N1 on one radio to transmit and receive with one group of radios. It uses net N2 to transmit and receive with a second group of radios. The retransmission operation can be summarized as follows:

- Signals received on N1 are retransmitted on N2.
- Signals received on N2 are retransmitted on N1.
- Digital Squelch is used to disable PT override (if necessary).

N1 and N2 can be any LOS fixed frequency or frequency hopping net preset.

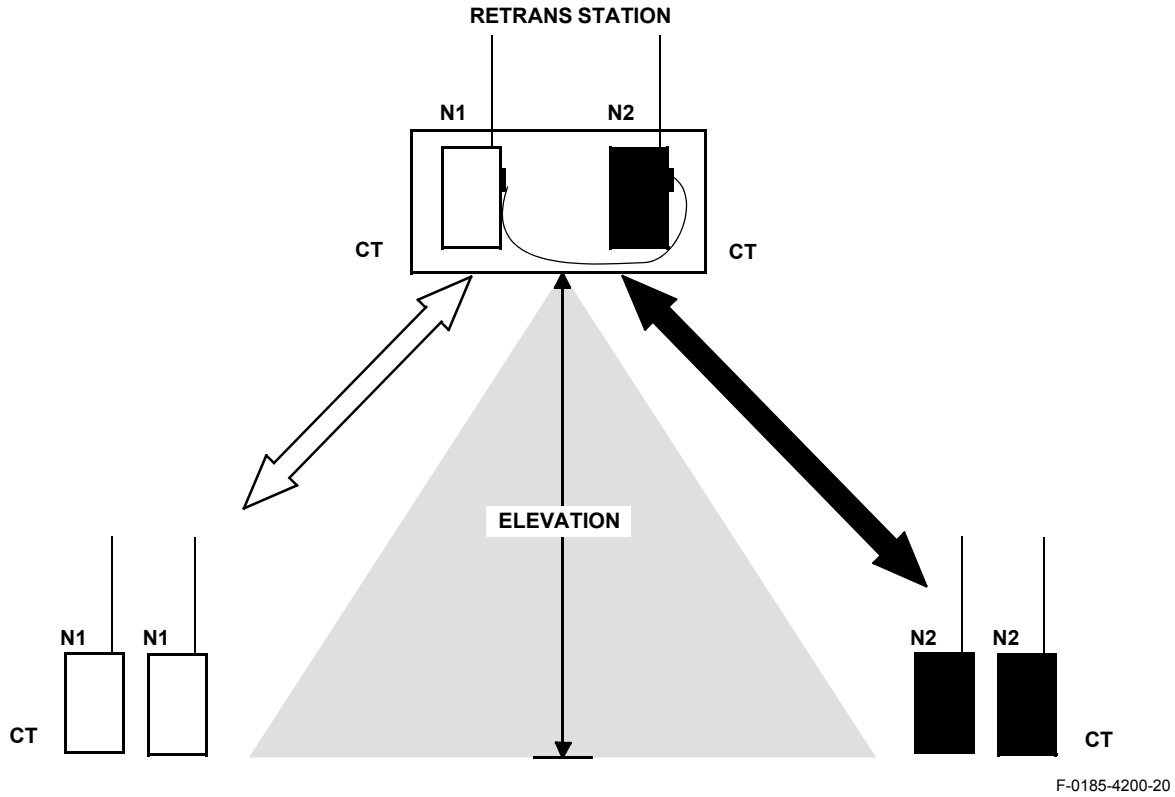


Figure 3-13. Red Analog Retransmission Operation

3.15.6.3 Repeater Retransmission Operation

Repeater operation is used when a net wants to gain extended range. All outstation radios that use the repeater station for retransmission operate half-duplex nets, where the same frequency or hopset serves for both transmitting and receiving. The repeater station uses simplex operation using separate transmit and receive frequencies or hopsets.

Figure 3-14 shows repeater operation. The repeater receives on frequency or hopset F1 and transmits on frequency or hopset F2. With this setup, all outstation radios transmit on F1 and receive on F2. Using this arrangement, all units must communicate with each other through the repeater.

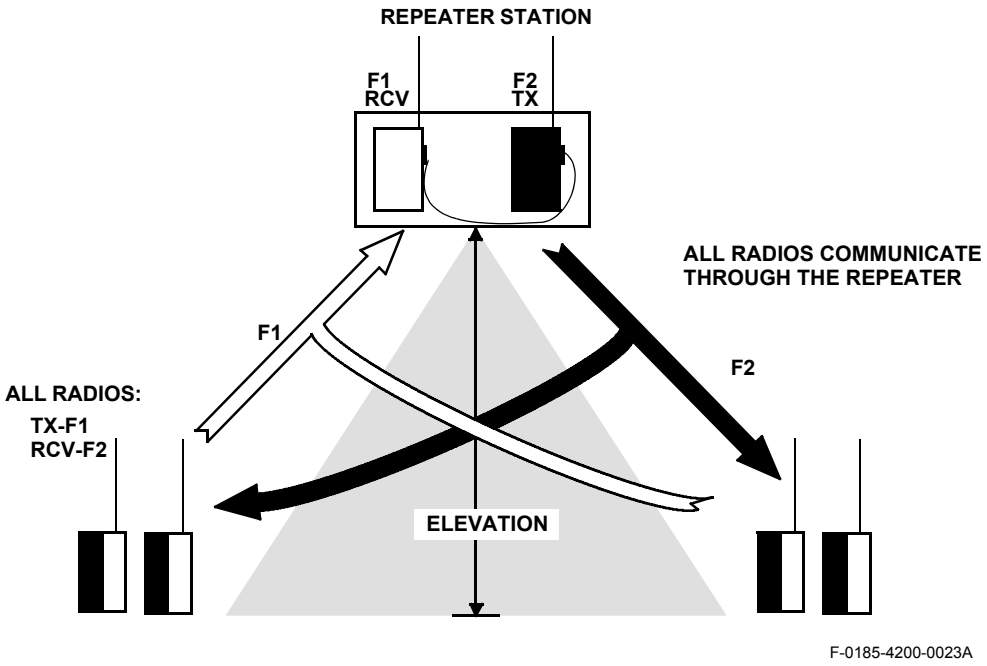


Figure 3-14. Repeater Operation

3.15.6.4 Hardware for Retransmission/Repeater Setup

The following equipment is used for retransmission/repeater operation:

- Two RF-5800V-HHs with antennas and battery packs
- Retransmit cable (12011-0230-A050)

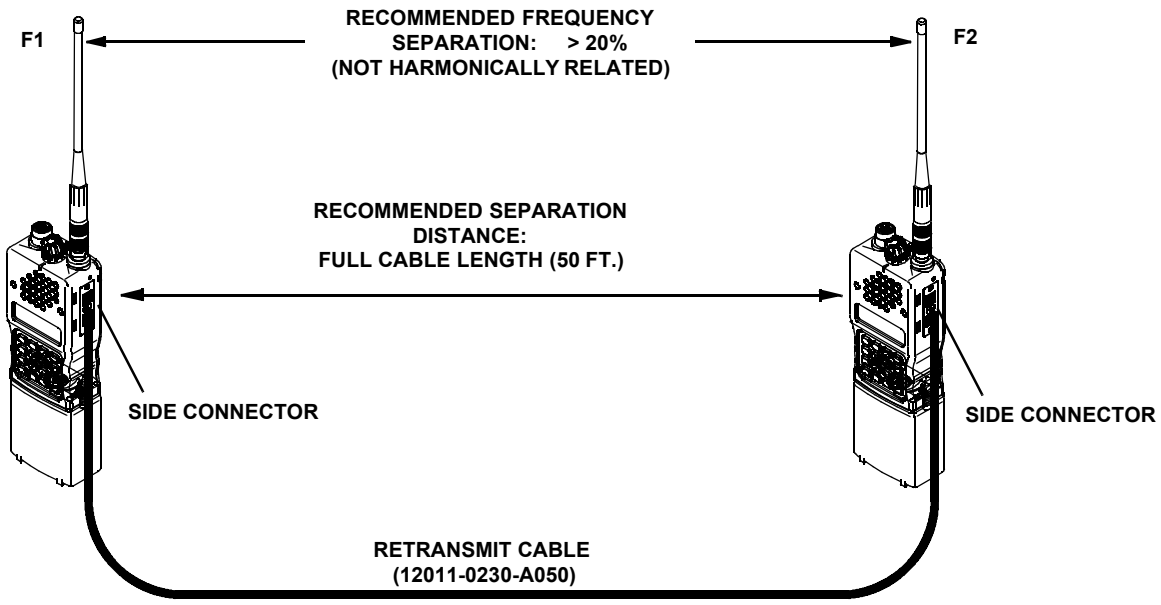
NOTE

When using Retransmit mode, locking the keypad of the radio will blank the radio's display.

Figure 3-15 shows the retransmission/repeater hardware configuration. For optimum performance, the repeater site should be elevated above the level of the outstations. Connect the retransmit cable to the Ancillary (ANC) side connector on each radio. Separate the radio units by fully extending the retransmit cable to prevent receiver desensitization and RF interference between units. For best retransmission performance, ensure the retransmit cable is in contact with the ground along most of its length.

3.15.6.5 Frequency Separation

For simplex operation, F1 and F2 should not be within 20% of each other, and should not be harmonically related (when one frequency is a whole number multiple of the second - for example: 60 MHz is the "first order" harmonic of 30 MHz).



F-0185-4200-0015

Figure 3-15. Retransmission/Repeater Hardware Setup

3.15.6.6 Retransmit Settings

Determine whether Black Digital or Red Analog operation is required. Perform the following procedure to configure the RF-5800V-HH:

a. Set the retransmit radios to the net preset that will be used for retransmission. The **Robust Preamble** setting (refer to Paragraph 4.8.1) should be set to **ON** when the RF-5800V-HH is being used in Retransmission/Repeater operation.

b. Turn radio switch to **OFF**.

c. Attach the retransmit cable to the side connector on both radios.

d. Turn on each RF-5800V-HH to **PT** position for black digital operation. Turn on each RF-5800V-HH to **CT** position for red analog operation.

e. Press the **[MODE]** button.

f. Use the up/down arrow keys to select **RETRANSMIT** and press **[ENT]**.

g. Use the up/down arrow keys to select **ON-SYNC** or **ON-ASYNC** and press **[ENT]**.

- **ON-SYNC** is used for backward compatibility with radio firmware prior to version 6.0.
- **ON-ASYNC** is used for radios with firmware version 6.0 or later.

NOTE

To determine the radio's firmware version, press **MODE>TEST> VERSION>FIRMWARE**.

NOTE

Black frequency hopping is supported using **RETRANSMIT>ON-ASYNC** mode only.

h. Begin retransmission operations. If one radio locks into continuous transmit, check for presence of interfering signals on the receiving radio and/or check squelch settings to determine if squelch falsing condition exists. Digital squelch must be used in each of the retransmit radios to prevent falsing condition where one radio is locked in transmit condition.

3.15.7 Radio Lock

Refer to Paragraph 3.5 for complete procedures.

3.15.8 Keypad Lock

Refer to Paragraph 3.6 for complete procedures.

3.15.9 Test Mode

Refer to Paragraph 3.7 for complete procedures.

3.15.10 VAA Mode

VAA Mode is used when an RF-5800V-HH is to be installed in the optional RF-5800V-V500 Vehicular Adapter Amplifier or to be integrated with the optional RF-5800M-V520 HVM UHF. See Figure 3-11 for menu tree selections. Setting VAA MODE to **ON** will enable the radio for Jerk and Run operation. This feature allows the user to disconnect the radio from the VAA without cycling power, and subsequently operate the RF-5800V-HH as a standalone handheld radio. The radio may also be reconnected to the VAA with power on. Set the VAA MODE to **OFF** if the RF-5800V-HH will be operated only as a standalone handheld radio. RF-5800V-HH radios with Citadel II use cable sense Jerk and Run hardware regardless of VAA mode.

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CHAPTER 4

GENERAL RADIO PROGRAMMING

NOTE

Performing programming functions places the radio in an offline state. Radio communications are not possible while the radio is being programmed.

4.1 PROGRAMMING TASK SUMMARY

The RF-5800V-HH can be programmed either from a Personal Computer (PC) using the Very High Frequency (VHF)-Ultra High Frequency (UHF) Radio Programming Application (RPA) software, or directly from the radio front panel keypad. If using the RF-6550V VHF-UHF RPA to program the radio, proceed to Paragraph 4.2 for setup information and use the remainder of this chapter for reference only. Front panel programming tasks, in general, are performed in the following order:

- Program security (access level) settings - Paragraph 4.4
- Program encryption keys - Paragraph 4.5.1.2
- Program hopsets - Paragraph 4.5.1.3
- Program locksets - Paragraph 4.5.1.4
- Program fixed frequency nets - Paragraph 4.5.2.2
- Program frequency hopping nets - Paragraph 4.5.2.3
- Program net scanning - Paragraph 4.6

- Program port parameters - Paragraph 4.7
- Program other configuration items - Paragraph 4.8
- Program advanced features as needed - Paragraph B.1

NOTE

Advanced features covered in Appendix B include Directed Calling, Situational Awareness (SA), Wireless Internet Protocol (IP) Network, Short Messaging Service (SMS), and Falcon Watch™ Sensor Alerts.

4.2 ATTACH A PC TO RADIO FOR VHF-UHF RPA PROGRAMMING

The RF-6550V VHF-UHF RPA (supplied separately) can be used to ensure programming consistency and faster programming of multiple units. The RPA uses the remote control feature of the Ancillary (ANC) side connector. The Remote Control/Programming Cable (supplied separately), part number (12011-0200-A006), is used to make this connection.

Perform the following procedure to attach a PC to the radio:

a. Rotate function switch to **1 - 5**, or **FP**.

b. Follow the procedure in Paragraph 4.7.1 to configure the remote port to match the serial port of the PC.

c. Power the RF-5800V-HH **OFF**.

d. Connect (12011-0200-A006) cable to the ANC side connector of the RF-5800V-HH.

e. Connect the other end of the cable to the appropriate serial port on the PC.

f. Rotate function switch to **FP**, or position **1** - **5**. The RF-5800V-HH is now ready to be programmed by the PC using the Harris RF-6550V VHF-UHF RPA. Refer to the RF-6550V VHF-UHF RPA Software User's Guide (10515-0318-4200) for more information about the program.

g. When programming is complete, the RPA will exit remote mode.

4.3 PROGRAMMING MENU TREE

See Figure 4-1 for a menu tree of the menus accessed in the procedures presented in this chapter.

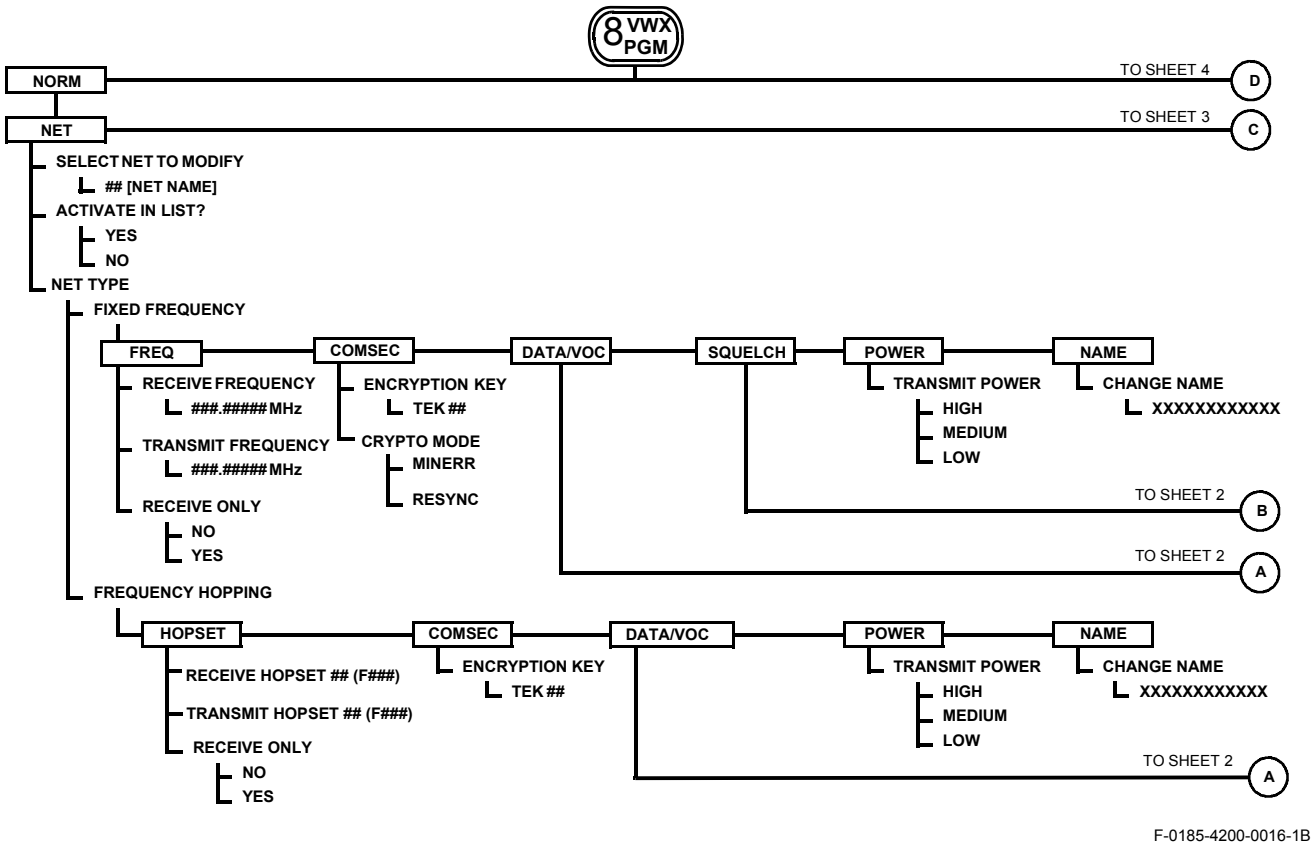


Figure 4-1. RF-5800V-HH Programming Menu (Sheet 1 of 6)

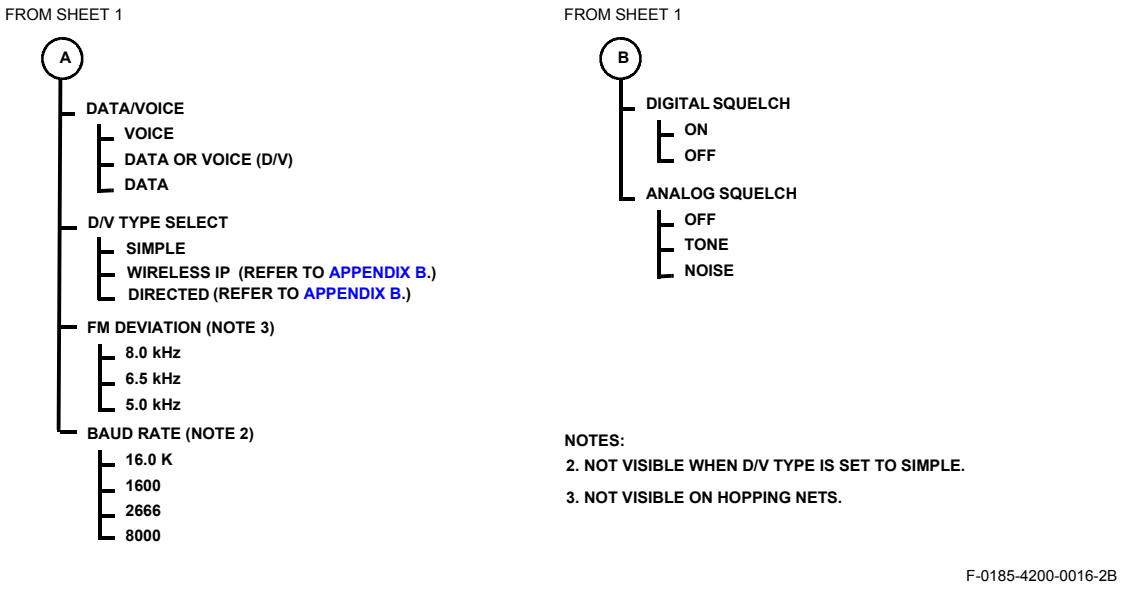


Figure 4-1. RF-5800V-HH Programming Menu (Sheet 2 of 6)

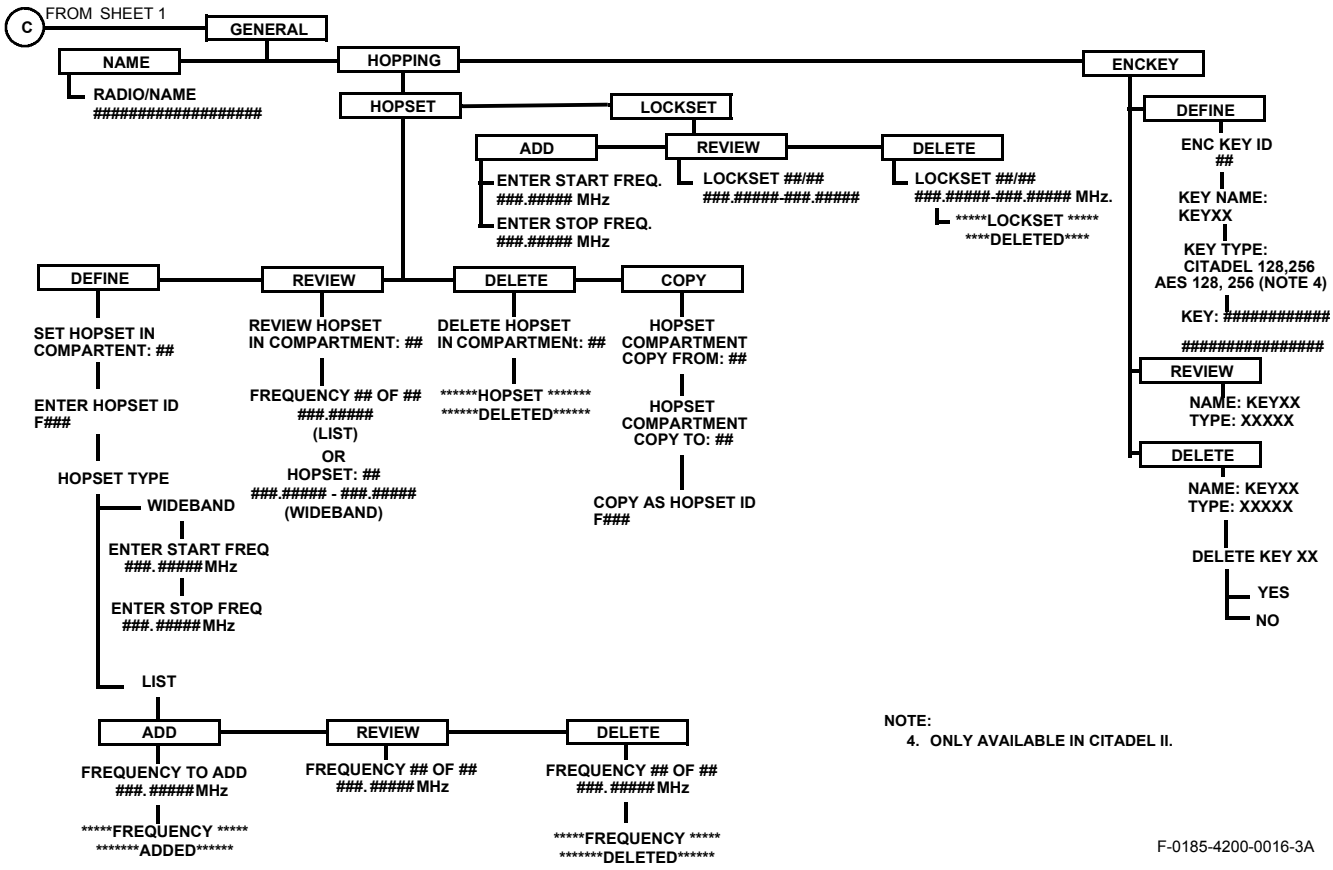
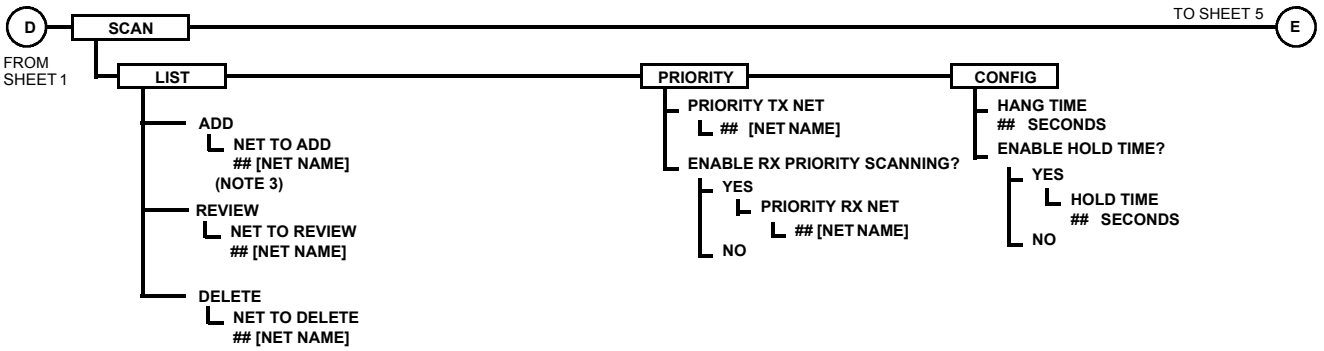


Figure 4-1. RF-5800V-HH Programming Menu (Sheet 3 of 6)



NOTES:
3. NET MUST BE FIXED FREQUENCY.

Figure 4-1. RF-5800V-HH Programming Menu (Sheet 4 of 6)

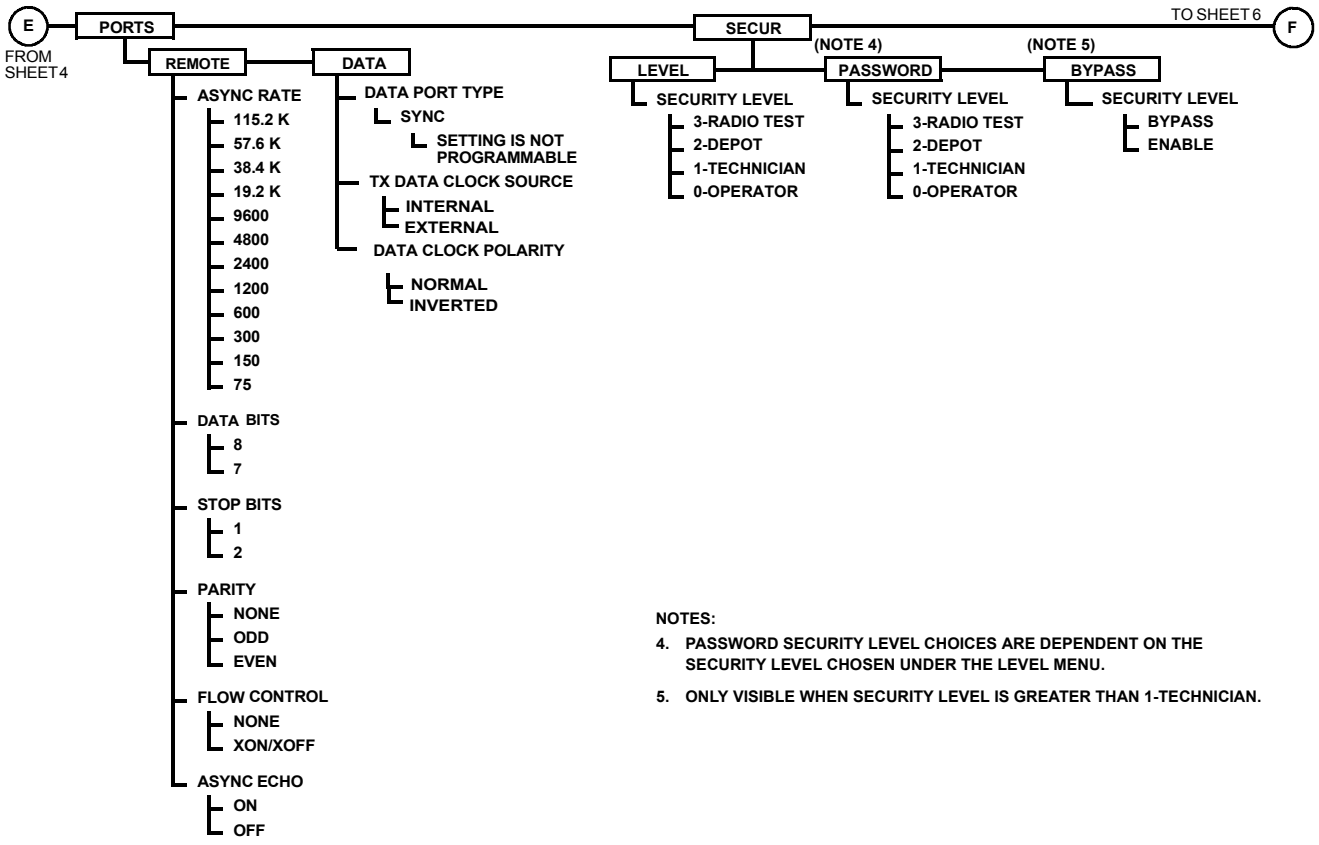


Figure 4-1. RF-5800V-HH Programming Menu (Sheet 5 of 6)

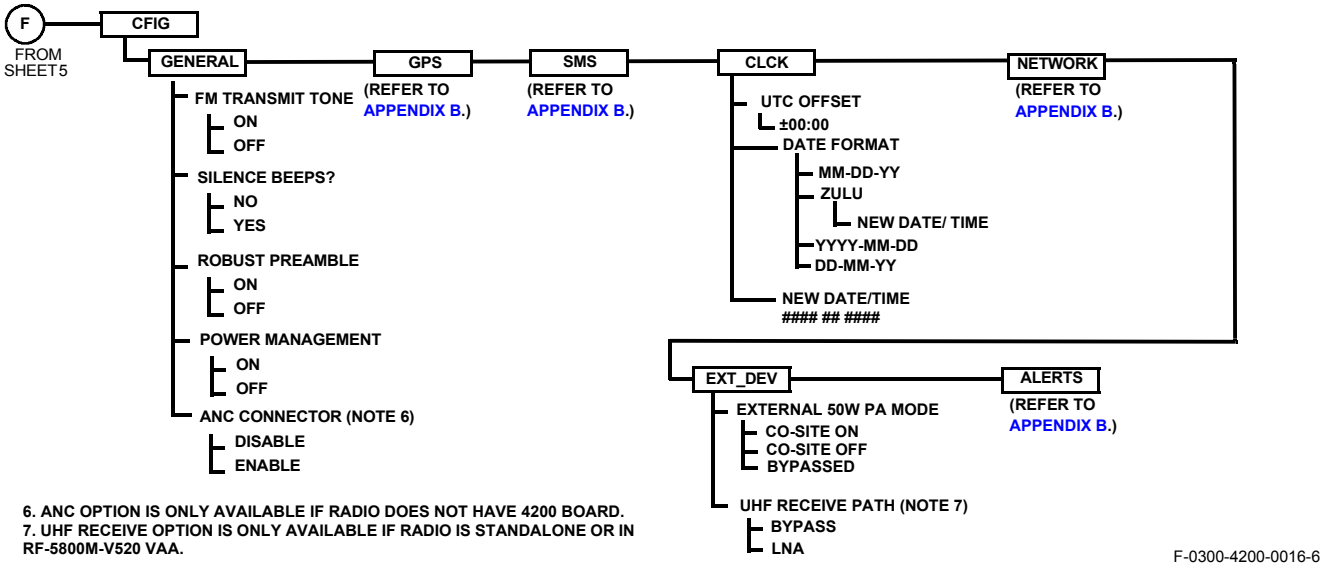


Figure 4-1. RF-5800V-HH Programming Menu (Sheet 6 of 6)

4.4 SECURITY MENU (SECUR)

The RF-5800V-HH provides four levels of security access:

- **0 - OPERATOR** - is the default security level for basic radio operators. A basic radio operator can change radio nets, enter scanning, run BITE, and override net parameters. Although the operator can override parameters such as power level, voice type, and frequency, these changes cannot be saved. The radio net parameters will revert back to the programmed settings once the operator changes to a different net.
- **1 - TECHNICIAN** - is for radio technicians. At this level, the technician can program radio nets, save overridden net parameters, program scan list, load keys, and change data and remote port settings.
- **2 - DEPOT** - is to be used at the depot level and only adds the ability to BYPASS security access. Refer to Paragraph 4.4.3 for security access BYPASS information.
- **3 - RADIO TEST** - is a radio test level. This allows for low level radio troubleshooting commands to be run.

4.4.1 LEVEL Access

To program the radio's security access level:

a. Press the **[PGM]** button, then the left/right arrow buttons to select **SECUR**, and press **[ENT]**.

b. Select **LEVEL** and press **[ENT]**.

c. Press the up/down arrow buttons to select the desired security level, and press **[ENT]**. If a level higher than the current level is selected, a password is required. The default password for **0 - Operator** is no entry, followed by **[ENT]**. The 0 - Operator password is used to unlock the keypad at all security levels. The default password for **1 - TECHNICIAN** is **HH1**. The default password for **2 - DEPOT** is **HH2**. For information on changing passwords, refer to Paragraph 4.4.2.

NOTE

When shipped from Harris Corporation, the first page of this document contains Security Level 3 password information. If this page is missing, it may have been removed by a Communications Security Monitor.

4.4.2 PASSWORD Programming

To change the security access level passwords, press the **[PGM]** button, select **SECUR**, then select **PASSWORD**. Identify the security level, then use the alphanumeric keypad to enter a new password.

NOTE

At the security level, a user can change their own level and all lower levels per the following:

Level	Password Level That Can be Changed
0 - Operator	0
1 - Technician	0, 1
2 - Depot	0, 1, 2
3 - Radio Test	0, 1, 2, 3

Zeroizing the radio does not return modified Security Level 1 or Security Level 2 passwords back to the default passwords.The Security Level 3 password can be changed, but will revert back to the factory default when the radio is zeroized.

4.4.3 BYPASS Programming

2 - DEPOT and **3 - RADIO TEST** users can choose to **BYPASS** security access for lower levels. In **BYPASS** mode, all radio commands become available, except for those at **3 - RADIO TEST**. To **BYPASS** security access, press the **[PGM]** button, select **SECUR**, select **BYPASS**, then change **SECURITY ACCESS** from **ENABLE** to **BYPASS**.

4.5 NORM MENU

To perform **NORM** programming, press **[PGM]**. Use the left/right arrow buttons to select **NORM** and press **[ENT]**. Two choices are available: **GENERAL** and **NET**.

4.5.1 GENERAL Programming

GENERAL programming is used to program radio name, encryption keys, hopsets, and locksets. See Figure 4-1. For information on **NAME** programming, refer to Paragraph 4.5.1.1. For information on **ENCKEY** programming, refer to Paragraph 4.5.1.2. For information on **HOPSET** programming, refer to Paragraph 4.5.1.3. For information on **LOCKSET** programming, refer to Paragraph 4.5.1.4.

4.5.1.1 NAME Programming

Perform the following procedure to program radio name:

a. Press **[PGM]**, select **NORM** and press **[ENT]**.

b. Select **GENERAL** and press **[ENT]**.

c. Use the left/right arrow keys to select **NAME** and press **[ENT]**.

d. Enter **NAME** and press **[ENT]**.

4.5.1.2 ENCKEY Programming

An encryption key for Citadel® I is a 32-digit hexadecimal number that the radio's encryption software (128-bit) uses to enable secure communications. For Citadel® II, the encryption key is a 64-digit hexadecimal number that the radio's encryption software (256-bit) uses. Up to 25 encryption keys can be programmed. All radios communicating on a net must use the same encryption key. From the **ENCKEY** menu the user can define, review, and delete keys.

Perform the following procedure to program encryption keys:

a. Press **[PGM]**, select **NORM** and press **[ENT]**.

b. Select **GENERAL** and press **[ENT]**.

c. Use the left/right arrow keys to select **ENCKEY** and press **[ENT]**.

d. Select **DEFINE** and press **[ENT]**.

e. Enter **ENC KEY ID** (1 to 25) and press **[ENT]**.

f. Enter a **KEY NAME** (up to eight alphanumeric characters) and press **[ENT]**.

g. If using Citadel® II, select the encryption (Citadel 128 or 256 or AES 128 or 256) and press **[ENT]**.

h. Enter 32-digit hexadecimal encryption key number and press **[ENT]**. (Valid hexadecimal characters include: **0 - 9**, **A - F**.)

i. To review a key, select **REVIEW** and enter the key ID number to review and press **[ENT]**.

j. To delete a key, select **DELETE** and enter the key ID number to delete and press **[ENT]**.

4.5.1.3 HOPSET Programming

A hopset consists of a hopset compartment number, a hopset identification (ID) number, and hopset frequency information. A wideband hopset requires a start frequency and a stop frequency. A list hopset requires a list of specific frequencies the net uses for hopping.

NOTE

A maximum of 30 frequencies can be programmed into a list hopset. The list must contain at least one frequency.

Perform the following procedure to define a hopset:

a. Press **[PGM]**, select **NORM** and press **[ENT]**.

b. Select **GENERAL** and press **[ENT]**.

c. Select **HOPPING** and press **[ENT]**.

d. Use the left/right arrow keys to select **HOPSET** and press **[ENT]**.

e. Use the left/right arrow keys to select **DEFINE** and press **[ENT]**.

f. Enter hopset compartment number (1 to 25) and press **[ENT]**.

g. Enter a unique three-digit hopset ID and press **[ENT]**.

h. Select a **HOPSET TYPE** of either **WIDEBAND** or **LIST** and press **[ENT]**.

   1. For wideband hopsets, enter a **START FREQ** and a **STOP FREQ**.

2. For list hopsets, **ADD** individual frequencies. The radio automatically rounds frequencies down to the nearest 25 kHz. Frequencies must be listed in the same order for all radios in a net. The operator can also **REVIEW** or **DELETE** list frequencies.

i. To review a hopset, select **REVIEW** and enter the hopset's two-digit hopset compartment number.

j. To delete a hopset, select **DELETE** and enter the hopset's two-digit hopset compartment number.

k. To copy a hopset from one hopset compartment to another compartment, select **COPY**, enter the two-digit hopset compartment number of the hopset to be copied, and enter the compartment number and hopset ID of the new hopset being created. Finally, use the **DEFINE** menu to modify the new hopset compartment as required.

4.5.1.4 LOCKSET Programming

A lockset, also known as an exclusion band, specifies a range of frequencies that cannot be used during list or wideband frequency hopping. A maximum of 25 locksets can be programmed into the radio. Programmed locksets apply to all hopsets. All radios must be programmed with the same locksets.

Perform the following procedure to define a lockset:

a. Press **[PGM]**, select **NORM** and press **[ENT]**.

b. Select **GENERAL** and press **[ENT]**.

c. Select **HOPPING** and press **[ENT]**.

d. Use the left/right arrow keys to select **LOCKSET** and press **[ENT]**.

e. Use the left/right arrow keys to select **ADD** and press **[ENT]**.

f. Enter a start frequency at **ENTER START FREQ** and press **[ENT]**.

g. Enter a stop frequency at **ENTER STOP FREQ** and press **[ENT]**.

h. To review a lockset, select **REVIEW** and use up/down arrow keys to scroll locksets.

i. To delete a lockset, select **DELETE** and use up/down arrow keys to select lockset to delete. Press **[ENT]**.

4.5.2 NET Programming

NET programming is used to program net presets. See Figure 4-1. For net programming considerations, refer to Paragraph 4.5.2.1. For information on **FIXED FREQUENCY** net programming, refer to Paragraph 4.5.2.2. For information on **FREQUENCY HOPPING** net programming, refer to Paragraph 4.5.2.3.

4.5.2.1 Net Programming Considerations

Nets have the following characteristics:

- Scan mode allows scanning of a user-defined list of fixed frequency simple net presets.
- Up to 25 net presets can be programmed into each radio (NET0 through NET24).
- A net name can consist of up to 12 alphanumeric characters.

NOTE

Spaces are not allowed within the net name. The default name for each net is **NET##** where ## represents a number from 0 to 24.

- Each net preset may be enabled or disabled during the Activate In List menu function. Enabled net presets appear in the scrolling list controlled by the **[PRE +]** or **[PRE -]** button (when the function switch is in the

FP position, or when manual scan is being used). A disabled net is retained in memory but does not appear in the scrolling list.

- While in programming, pressing the **PRE +** or **PRE -** button returns the radio to the last operational display if the function switch is in the **FP** position.
- Changing the function switch position causes the radio to exit programming.

4.5.2.2 Fixed Frequency Net Programming

Perform the following procedure to program a fixed frequency net:

a. Press **[PGM],** select **NORM** and press **[ENT]**.

b. Select **NET** and press **[ENT]**.

c. Use the numeric buttons to enter the number of the net to be programmed, then press **[ENT]**.

d. If **ACTIVATE IN LIST?** is set to **YES**, that net is available to the operator. If **ACTIVATE IN LIST?** is set to **NO**, that net is not available. Select **YES** or **NO** as appropriate. Nets 1 - 5 are always available when the function switch is in position 1 - 5.

e. Select **FIXED FREQUENCY** and press **[ENT]**.

f. Use the left/right arrows to select **FREQ** and press **[ENT]**. Enter the receive frequency and press **[ENT]**.

g. Enter the transmit frequency and press **[ENT]**. The transmit frequency is automatically set to match the receive frequency, so it is only necessary to make a change for a half-duplex net.

h. If the radio is to be in radio silence on the net, set **RECEIVE ONLY** to **YES**. If the radio is to be able to transmit on the net, set **RECEIVE ONLY** to **NO**. Press **[ENT]**.

i. Use the left/right arrow keys to select **COMSEC** and press **[ENT]**. Enter encryption key number and press **[ENT]**. Refer to Paragraph 4.5.1.2 for information on programming encryption keys. Select a crypto mode of either **MINERR** or **RESYNC** and press **[ENT].**

- **MINERR** - This is the default mode. When using MINERR, the start of the transmission must be heard to receive an encrypted transmission. There is a crypto sync that precedes the waveform. This mode is supported across all net types: Simple, Directed Calling, and Wireless IP.
- **RESYNC** - This mode allows a radio on simple voice/data nets (not directed calling or wireless IP nets) to receive an encrypted transmission already in progress. The radio does not have to hear the start of the waveform, but can power on and start receiving in mid-transmission. RESYNC is more susceptible to noise than MINERR.

j. Use the left/right arrow keys to select **DATA/VOC** and press **[ENT]**. Use the up/down arrow keys to select **VOICE**, **DATA**, or **DATA OR VOICE (D/V)** and press **[ENT]**. Refer to Table 3-2 for capabilities.

k. Use the up/down arrow keys to select **SIMPLE** for the D/V type and press **[ENT]**. If Directed Calling or Wireless IP operation are required, refer to Appendix B.

l. Use the up/down arrow keys to select Frequency Modulation **(FM) DEVIATION** for analog voice transmissions of either **5.0 kHz**, **6.5 kHz**, or **8.0 kHz**. Press **[ENT]**.

m. Use the left/right arrow keys to select **SQUELCH** and press **[ENT]**.

n. Use the up/down arrow keys to select digital squelch **ON** or **OFF**. Select and press **[ENT]**.

o. Use the up/down arrow keys select analog squelch type of **TONE**, **NOISE**, or **OFF**. Press **[ENT]**.

p. Use the left/right arrow keys to select **POWER** and press **[ENT]**. Use the up/down arrow keys to select **LOW**, **MEDIUM**, or **HIGH** and press **[ENT]**.

q. Use the left/right arrow keys to select **NAME**. The net preset name can be changed from the default **NET##** to any name, up to 12 characters long. Press **[ENT]**.

4.5.2.3 Frequency Hopping Net Programming

Perform the following procedure to program a frequency hopping net:

a. Press **[PGM],** select **NORM** and press **[ENT]**.

b. Select **NET** and press **[ENT].**

c. Use the numeric buttons to enter the number of the net to be programmed, then press **[ENT]**.

d. If **ACTIVATE IN LIST?** is set to **YES**, that net is available to the operator. If **ACTIVATE IN LIST?** is set to **NO**, that net is not available. Nets 1 - 5 are always available when the function switch is in position 1 - 5.

e. Select **FREQUENCY HOPPING** and press **[ENT]**.

f. Use the left/right arrow buttons to select **HOPSET** and press **[ENT]**.

g. Enter **RECEIVE HOPSET** (compartment number) and press **[ENT]**.

h. Enter **TRANSMIT HOPSET** (compartment number) and press **[ENT]**.

NOTE

For additional information on hopset compartments, refer to Paragraph 4.5.1.3.

i. If the radio is to be in radio silence on the net, set **RECEIVE ONLY** to **YES**. If the radio is to be able to transmit on the net, set **RECEIVE ONLY** to **NO**. Press **[ENT]**.

j. Use the left/right arrow keys to select **COMSEC** and press **[ENT]**. Enter encryption key number and press **[ENT]**. Refer to Paragraph 4.5.1.2 for information on programming encryption keys.

k. Use the left/right arrow keys to select **DATA/VOC** and press **[ENT]**. Use the up/down arrow keys to select **VOICE**, **DATA**, or **DATA OR VOICE (D/V)** and press **[ENT]**.

l. Use the up/down arrow keys to select **SIMPLE** and press **[ENT]**. If Directed Calling or Wireless IP operation is to be used, refer to Appendix B. Press **[ENT]**.

m. Use the left/right arrow keys to select **POWER** and press **[ENT]**. Use the up/down arrow keys to select **LOW**, **MEDIUM**, or **HIGH** and press **[ENT]**.

n. Use the left/right arrow keys to select **NAME**. The net preset name can be changed from the default **NET##** to any name, up to 12 characters long. Press **[ENT]**.

4.6 SCAN MENU

When the radio is in scan operation, only fixed frequency simple nets that are programmed in the scan list are scanned. Up to 25 nets can be programmed in the scan list. Refer to Paragraph 3.14 for information about operating the radio in scan mode.

4.6.1 Scan List Programming

Perform the following procedure to program a scan list:

a. Press **[PGM]** and use the left/right arrow keys to select **SCAN**. Press **[ENT]**.

b. Use the left/right arrow keys to select **LIST** and press **[ENT]**.

c. Use the left/right arrow keys to select **ADD** and press **[ENT]**.

d. Enter a two-digit net number and press **[ENT]**. Repeat until all desired nets are in list.

e. To review scan list, select **REVIEW**. Use up/down arrow keys to scroll scan list.

f. To delete a net from the scan list, select **DELETE**. Use the up/down arrow keys to select net to delete. Press **[ENT]**.

4.6.2 PRIORITY Programming

Once nets are added to the scan list (refer to Paragraph 4.6.1), a priority transmit net and a priority receive net can be programmed into the radio. The priority transmit net is the net that the radio transmits on if the Push-to-Talk (PTT) button is pressed when the radio is actively scanning. The radio checks the priority receive net every three nets so that it is checked more frequently for signal presence than the other nets.

Perform the following procedure to configure transmit and receive priority nets:

a. Press **[PGM]** and use the left/right arrow keys to select **SCAN**. Press **[ENT]**.

b. Use the left/right arrow keys to select **PRIORITY** and press **[ENT]**.

c. Use the up/down arrow keys to scroll to desired **PRIORITY TX NET** and press **[ENT]**.

d. The radio prompts: **ENABLE RX PRIORITY SCANNING?**, **YES** or **NO**. If **YES** is selected, use the up/down arrow keys to scroll to desired **PRIORITY RX NET** and press **[ENT]**.

4.6.3 CONFIG Programming

Scan **CONFIG** programming allows the operator to configure the radio's hang time and hold time. Hang time is the length of time after which the radio returns to automatic scanning after signal presence is lost on a net. Hold time is the maximum length of time that the radio will stay on a net after detecting signal presence. The radio will return to automatic scanning after the hold time has expired, even if the signal is still present on that net. If hold time is

enabled, the only way to keep the radio from returning to automatic scanning is to press either the **[PTT]** or **[CLR]** buttons.

Perform the following procedure to program scan configuration:

a. Press **[PGM]**, use the left/right arrow keys to select **SCAN**, and press **[ENT]**.

b. Use the left/right arrow keys to select **CONFIG** and press **[ENT]**.

c. Enter desired **HANG TIME** duration and press **[ENT]**. Use the numeric and/or left/right arrow keys to input a value, in seconds, between **00** and **99**.

d. At **ENABLE HOLD TIME?** use the up/down arrow keys to select **YES** or **NO**. Press **[ENT]**.

e. If **YES** is selected for enabling hold time, the operator is prompted **HOLD TIME**. Use the numeric and/or left/right arrow keys to input a value, in seconds, between **00** and **99**.

4.7 PORTS MENU

The RF-5800V-HH has a side connector for remote control operation, data devices, external GPS, or audio operations. Ports programming allows this connector to be configured for these functions. See Figure 4-1.

4.7.1 REMOTE Port Programming

Perform the following procedure to program the **REMOTE** port as required by the terminal or computer connected to the radio:

a. Press **[PGM]**, use the left/right arrow keys to select **PORTS**, and press **[ENT]**.

b. Use the left/right arrow keys to select **REMOTE** and press **[ENT]**.

c. Use the up/down arrow keys to select desired values for the following parameters:

1. **ASYNC RATE**
2. **DATA BITS**
3. **STOP BITS**
4. **PARITY**
5. **FLOW CONTROL**
6. **ASYNC ECHO**

4.7.2 View DATA Port Setting

Perform the following procedure to view the **DATA** port setting:

a. Press **[PGM]**, use the left/right arrow keys to select **PORTS**, and press **[ENT]**.

b. Use the left/right arrow keys to select **DATA** and press **[ENT]**. (The data port is not programmable.)

c. The data port type is displayed.

4.8 CFIG MENU

Configuration programming consists of the following settings: General radio, internal or external Global Positioning System (GPS), Short Messaging Service (SMS), Clock (CLCK), Network parameters, External Device (EXT_DEV), and Falcon Watch™ Alerts.

4.8.1 GENERAL Radio Settings

Perform the following procedure to configure the general radio settings:

a. Press **[PGM]**, use the left/right arrow keys to select **CFIG**, and press **[ENT]**.

b. Select **GENERAL** and press **[ENT]**.

c. Setting **FM TRANSMIT TONE** to **ON** causes the radio to transmit a 150 Hz tone whenever the radio is keyed. Select **ON** or **OFF** as appropriate.

d. Setting **SILENCE BEEPS?** to **YES** prevents the radio from beeping to indicate an operator error. Select **YES** or **NO** as appropriate.

e. Setting **ROBUST PREAMBLE** to **ON** causes the radio to transmit extra training frames in CT VOICE. This is required for guaranteed CT SCAN RX to work. Select **ON** or **OFF** as appropriate.

f. Setting **POWER MANAGEMENT** to **OFF** disables the battery saving feature of the radio. This setting may be required to interoperate with legacy equipment. Select **ON** or **OFF** as appropriate.

g. Setting **ANC CONNECTOR** to **Disable** causes the ancillary side connector (18-pin) to be placed in a non-functional state. If this side connector is not being used, the **ANC Connector** setting should be set to **DISABLE** to remove the possibility of inadvertently short-circuiting the pins on this connector. The ANC Connector must be set to **ENABLE** if a device such as an external GPS is connected.

CAUTION

If the side connector is not being used, the ANC CONNECTOR setting should be set to **DISABLE** to remove the possibility of inadvertently short-circuiting the pins on this connector.

4.8.2 Programming Situational Awareness Settings

Refer to Paragraph B.3 for this GPS information.

4.8.3 Programming SMS Settings

Refer to Paragraph B.5 for this information.

4.8.4 Programming CLCK Settings

Perform the following procedure to set the radio's clock:

a. Press **[PGM]**, use the left/right arrow keys to select **CFIG**, and press **[ENT]**.

b. Use the left/right arrow keys to select **CLCK**, and press **[ENT]**.

c. Set **UTC Offset** as required, and press **[ENT]**.

d. Select desired **DATE FORMAT** and enter the date. Valid entries are: **ZULU**, **YYYY-MM-DD**, **DD-MM-YY**, and **MM-DD-YY**.

NOTE

If **DATE FORMAT** of Zulu is selected, the display format will be DDHHMM**Z** MON YYYY, where **Z** is the time zone designator. Based upon the Universal Coordinated Time (UTC) Offset setting.

NOTE

If any other **DATE FORMAT** is selected, enter the **NEW DATE** followed by the **NEW TOD** (Time of Day) in the selected format.

4.8.5 Programming External Device (EXT_DEV) Settings

Perform the following procedure to configure the radio's external device settings:

a. Press **[PGM]**, use the left/right arrow keys to select **CFIG**, and press **[ENT]**.

b. Use the left/right arrow keys to select **EXT_DEV** and press **[ENT]**.

c. Use the up/down arrow keys to select the **EXTERNAL 50W PA MODE** options: **CO-SITE ON**, **CO-SITE OFF**, or **BYPASSED**. Selecting **CO-SITE ON** switches in the additional co-site filtering on the **EXTERNAL 50W PA MODE** option. Selecting **CO-SITE OFF** switches out the additional co-site filtering on the **EXTERNAL 50W PA MODE** option. Selecting **BYPASSED** bypasses the 50 W PA. The external 50 W PA is only available in standalone or VAU systems.

d. Set the **UHF RECEIVE PATH** to **BYPASS** or Low Noise Amplifier **(LNA)** and press **[ENT]**. This option is only available in standalone or VAA-UHF systems.

4.8.6 Programming Wireless IP Network Settings

Refer to Paragraph B.4 for this information.

4.8.7 Programming Alert Settings

Refer to Paragraph B.6.3 for this information.

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CHAPTER 5

PREVENTIVE AND CORRECTIVE MAINTENANCE

5.1 PREVENTIVE MAINTENANCE

The performance of the RF-5800V-HH is dependent on equipment that performs optimally. Therefore, preventive maintenance is of primary importance in order to avoid equipment failures.

Preventive maintenance is the systematic, scheduled care and inspection of equipment to prevent equipment failure and to reduce downtime.

Preventive maintenance consists of keeping the equipment clean, dry, and dust-free.

Use a soft brush, a moist sponge, and a clean cloth to keep equipment clean.

Table 5-1 contains the checks and services that should be performed either on a daily basis when the equipment is in use or on a weekly basis when the equipment is in a standby condition. Table 5-2 contains the checks and services that should be performed on a weekly basis.

NOTE

The RF-5800V-HH does NOT contain a memory Hold Up Battery (HUB).

Table 5-1. Daily Preventive Maintenance Checks and Services

Check No.	Item to be Inspected	Procedure
1	Operation	Perform initial tests as outlined in Paragraph 3.7.

Table 5-2. Weekly Preventive Maintenance Checks and Services

Check No.	Item to be Inspected	Procedure
1	Antenna(s)	Check for breaks or strains; repair or replace, as required.
2	Connectors	Inspect for corrosion or damage.
3	Protective Caps	Ensure protective caps are in place, if connectors are not in use.

5.2 CORRECTIVE MAINTENANCE

Shortcomings and defects which are revealed during preventive maintenance, or which appear when the radio system is in service, must be attended to by means of corrective maintenance. The type of work required determines if the corrective maintenance procedure can be performed by the operator, or if it must be executed at a maintenance repair facility.

The following procedures assume that the operator has determined that the radio is faulty. This could be determined in three ways:

- The operator has run self-test and a fault has been identified by the radio.
- A run-time warning is displayed by the radio.

- The operator has observed degraded operation that suggests the system is faulty.

Whenever the operator believes that the radio may be faulty, the troubleshooting procedures in this chapter should be followed to determine the recommended corrective action. If the symptom observed is not covered, report the problem to a Level III maintainer.

5.2.1 Troubleshooting Procedures

Faults can be detected by Built-In Test (BIT) or visual observation. Self-test faults are shown on the Liquid Crystal Display (LCD). The following paragraphs identify probable failure causes and suggested corrective actions.

5.2.1.1 Built In Test (BIT) Faults

BIT faults occur following an operator-executed self-test. For information on running a radio self-test, refer to Paragraph 3.7.

If the radio displays a fault message, cycle radio power and repeat the self-test. If the fault message is still displayed, record the fault code, and then report the fault to a Level III maintainer.

5.2.1.2 Run-Time Warnings

Run-Time warnings usually occur due to programming errors or hardware failures. Refer to Table 5-3 for a list of run-time warnings, their meaning and recommended action.

Table 5-3. Run-Time Warnings

Warning Message Displayed	Description	Action
*******FAULT ******** **SYNTH OUT OF LOCK**	RF board is temporarily or permanently rendered incapable of RX or TX on the currently loaded frequency.	Cycle radio power. If condition persists, this is a CRITICAL system fault. Radio needs repair.
********FAULT******** **GPS COMM FAILURE**	Global Positioning System (GPS) communications is not functioning correctly. GPS comms can be set to **Internal**, **External**, or **None**.	Check source of GPS comms for proper operation.
****CONFIGURATION**** ********CLEARED********	This message indicates the loss of all radio configuration, COMSEC, and TRANSEC data.	Radio must be reprogrammed. If condition persists, radio needs repair.
*******WARNING ******** **NO TEK FILLED**	Radio was placed into cipher (CT) switch position with no valid crypto key loaded.	Put radio in PT or program the required crypto key.
*******WARNING ******** **NO HOPSET FILLED**	A hopping net was loaded, but no valid hopset is programmed.	Radio must be programmed with valid hopset.
*******WARNING ******** **LOW BATTERY TEMP**	Posted if the battery temperature falls below -10° C and RX DC input is below 11.2 V or battery temperature falls below -20° C.	Warm the battery slowly to at least 0° C, but do not overheat.

Table 5-3. Run-Time Warnings (Continued)

Warning Message Displayed	Description	Action
******WARNING ****** LOW BATTERY VOLTAGE	Posted if the DC input operating voltage drops below 9.5 V in TX or 10.75 V in RX.	Replace current battery with charged battery.
******WARNING ****** LOW BATTERY	Posted if battery charge capacity is critically low.	Replace current battery with charged battery.
******WARNING ****** NO CRYPTO SYNC	Encrypted traffic was received but the CITADEL was unable to synchronize on the information. Under normal conditions this might be an indication of poor RX signal quality or the wrong TEK was used. CITADEL configuration might also be different between the two radios.	Make sure both radios are using the correct TEK. Verify CITADEL configurations are identical by comparing the part number information on the TEST-VERSION-HARDWARE displays. Validate signal quality by using another frequency, or PT voice operation.

5.2.1.3 Non-BIT Faults

Non-BIT faults are operator-observed failures or cases of degraded operation. Locate the observation in the first column of Table 5-4 and follow the recommended action. If the recommended action is unsuccessful, report the problem to a Level III maintainer.

Table 5-4. Non-BIT Faults

Observation	Action
Radio does not power on; completely dead.	Replace battery with a known good one. Clean battery connector. If radio still does not power on, Level III Maintenance is required.
No Receive (RX)/Transmit (TX) audio.	Check volume levels. If using a handset, clean connectors or replace handset.
Intermittent RX audio.	Check squelch level. If using a handset, clean connectors or replace handset.
GPS Failure	Inspect condition of GPS antenna and connection, ensure upright orientation. Replace GPS Antenna if faulty. Verify clear path to satellite.
Side Connector port not operational	Clean connections. Replace cable. If problem still occurs, Level III Maintenance is required.

5.3 BATTERIES

The RF-5800V-HH is supplied with a rechargeable high capacity Lithium-Ion (Li-ION) battery (12041-2100-02). Refer to Paragraph 2.2 for battery warnings and information. Refer to Paragraph 2.3 and see Figure 2-3 for information on installing the battery onto the transceiver.

5.3.1 Battery Life

Battery life is the approximate amount of time a battery can be used before it needs recharging or replacing. The RF-5800V-HH battery charge indicator can be used to help determine battery condition. Refer to Paragraph 3.7.3.

The chief factor in determining battery life is transmission power and duty cycle. To maximize battery life, transmit as little as possible, and utilize the lowest transmit power level required to successfully communicate. Refer to Table 5-5.

The battery life data is provided as a guideline and is typical data at +20° C with a 10% transmit, 10% receive, 80% idle (squelched) operating cycle. Actual results may vary. Battery life is dependent on battery age, temperature, charge times, and backlight use. Battery life will decrease approximately 20 - 25% at -20° C.

Table 5-5. RF-5800V-HH Typical Battery Life

		Transmit Power	
Radio Operation		5 W	2 W
VOICE	PT/CT Voice, headset/handset	16 hours	24 hours
	PT/CT Voice, speaker volume 90%	15 hours	22 hours
	PT/CT Hopping Voice, speaker volume 90%	12 hours	16 hours
DATA	CT Data	16 hours	24 hours
	PT/CT Hopping Data	12 hours	16 hours
	PT Data	12 hours	16 hours

5.3.2 Recharging the Li-ION Battery Packs

WARNING

Do not attempt to recharge a disposable Lithium battery.

The optional RF-5853-CH006 Six-Bay Battery Charger (12011-2300-01) provides fully automatic charging for the RF-5800V-HH Li-ION battery pack (12041-2100-02). It is capable of simultaneously charging up to six batteries in less than three hours at room temperature. It displays the status of each battery inserted into the charger bay during operation. The optional RF-5853-CH001 Single-Bay Battery Charger (12011-2400-01) provides fully automatic charging for the RF-5800V-HH Li-ION battery pack (12041-2100-02). It is capable of charging one battery in less than eight hours. It displays the status of the battery pack when inserted into the charger bay during operation. A separate manufacturer's battery charger manual is supplied with each battery charger.

5.3.3 Disposing of Li-ION Batteries

WARNING

Do not dispose of Li-ION batteries in uncontrolled trash.

Completely discharge batteries before proper disposal. Partially discharged batteries may contain a significant amount of energy and should be handled with care. The battery pack should be wrapped with insulating material, such as plastic, and packed for disposal.

WARNING

Do not crush, disassemble, reverse polarity, incinerate, or mutilate the Li-ION battery. Do not expose to fire or temperatures above 160° F (71° C).

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APPENDIX A

A.1 CHASSIS CONNECTOR PINOUT DATA

Table A-1 through Table A-3 provide pinout data for the external connectors mounted on the RF-5800V-HH chassis. Table A-4 provides part number for the mating connectors. See Figure A-1 for connector pinout details.

Table A-1. AUDIO Connector

Pin #	Signal Name	Dir	Description	Specifications	Notes/Modes
A	ADF_A	N/A	Ground, Analog	Ground	Audio
B	ADF_B	O	Variable Audio Output	3.0 Vrms, 600/1000 ohms	Audio
C	ADF_C	I	Handset Push-To-Talk (PTT)	3.3 V pulled up through 15 kohm, ground to activate	Audio
D	ADF_D	I	Audio In	2.6 mVrms, 150 ohm	Audio
E	ADF_E	O	Retransmit Out	Open Drain (15 V max, 25 mA max, 115 ohm sink)	
F	ADF_F	O	Electret Mic Bias	1k ohm pull-up to 3.3 V	

Table A-2. Side Connector Pinouts

Pin #	Signal Name	Dir	Description	Specifications	Notes /Modes
1	ANC_SIG_GND		Signal Ground		
2	ANC_AUDIO_OUT	O	Auxiliary Audio Output (Optional)	H-250 Compatible	Test, Retransmit
3	RETRANS	O	Retransmit Out Active Low	Open Drain (15 V max, 25 mA max, 115 ohm sink)	Retransmit
4	NC		No Connect		Reserved
5	ANC_PTT	I	Auxiliary Audio Keyline	H-250 Compatible	Test, Retransmit
6	ANC_RT_OFF	I	Overrides On/Off Switch		Test
7	ANC_DAT_DCD	O	Data Carrier Detect	RS-232/MIL-STD-188-114A	Data Port
8	ANC_DAT_RTS	I	Request To Send	RS-232/MIL-STD-188-114A	Data Port
9	ANC_AUDIO_IN	I	Auxiliary Audio Input	0 dBm nominal	Test, Retransmit
10	ANC_DAT_RXC	O	Synchronous Receive Data Clock	RS-232/MIL-STD-188-114A	Data Port
11	ANC_DAT_TXD	I	Transmit Data	RS-232/MIL-STD-188-114A	Data Port
12	ANC_DAT_RXD	O	Receive Data	RS-232/MIL-STD-188-114A	Data Port
13	ANC_RMT_RXD	I	Remote Control Receive Data	RS-232/MIL-STD-188-114A	Remote Port

Table A-2. Side Connector Pinouts (Continued)

Pin #	Signal Name	Dir	Description	Specifications	Notes /Modes
14	CABLE_SENSE	I	Cable Sense for Jerk and Run		No connect on 4200/4400 boards
15	ANC_RMT_TXD	O	Remote Control Transmit Data	RS-232/MIL-STD-188-114A	Remote Port
16	ANC_PWR	O	9.3 - 14 VDC External Power Supply (Switched)	30 mA @ 60 C	
17	ANC_DAT_CTS	O	Clear-To-Send	RS-232/MIL-STD-188-114A	Data Port
18	ANC_DAT_TXC	I	Synchronous Transmit Data Clock	RS-232/MIL-STD-188-114A	Data Port

Table A-3. VHF ANTENNA Connector

Pin #	Signal Name	Dir	Description	Specifications	Notes /Modes
Shield	Antenna Coax Ground	N/A	Ground		
Center	RX/TX RF	I/O	Receive and transmit signal	RX: -116 dBm min TX: 5 watts max	

Table A-4. Connectors and Mating Connector Part Numbers

Chassis Connector	Mating Connector Part Number
6-Pin Audio	J69-0001-623
18-pin ANC (Ancillary) Port	12011-9020-01

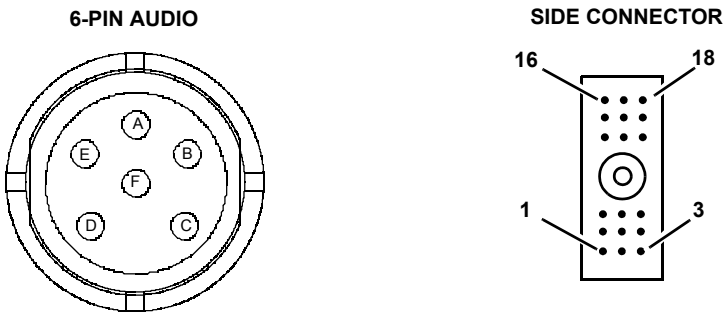

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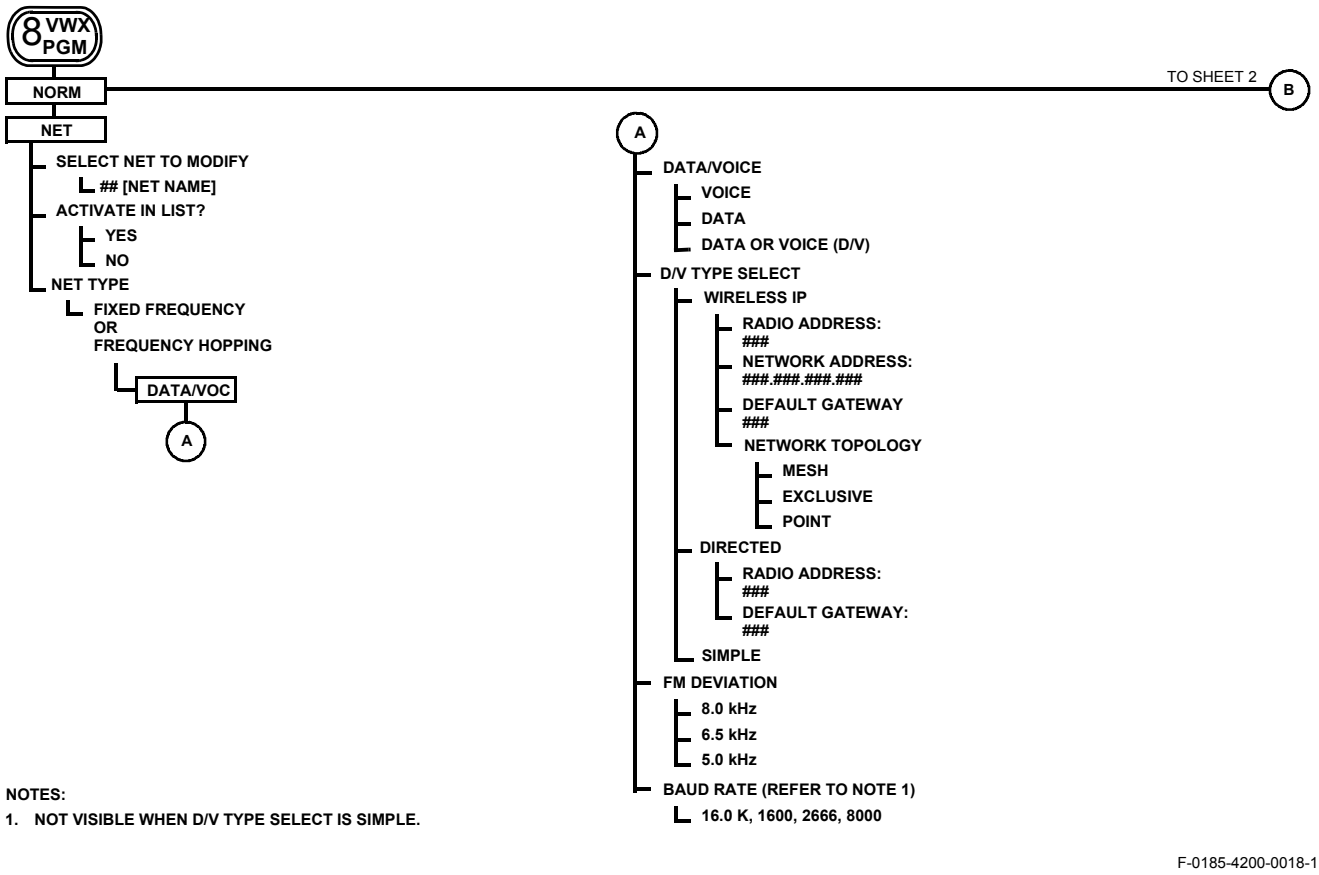
Figure A-1. Connector Pinouts

APPENDIX B

B.1 INTRODUCTION

This appendix describes advanced features of the RF-5800V-HH. See Figure B-1 for the programming menu of these advanced features. See Figure 4-1 for other basic programming.

- Directed Calling - Paragraph B.2
- Situational Awareness - Paragraph B.3
- Wireless IP Network - Paragraph B.4
- Short Messaging Service (SMS) - Paragraph B.5
- Falcon Watch™ Sensor Alerts - Paragraph B.6

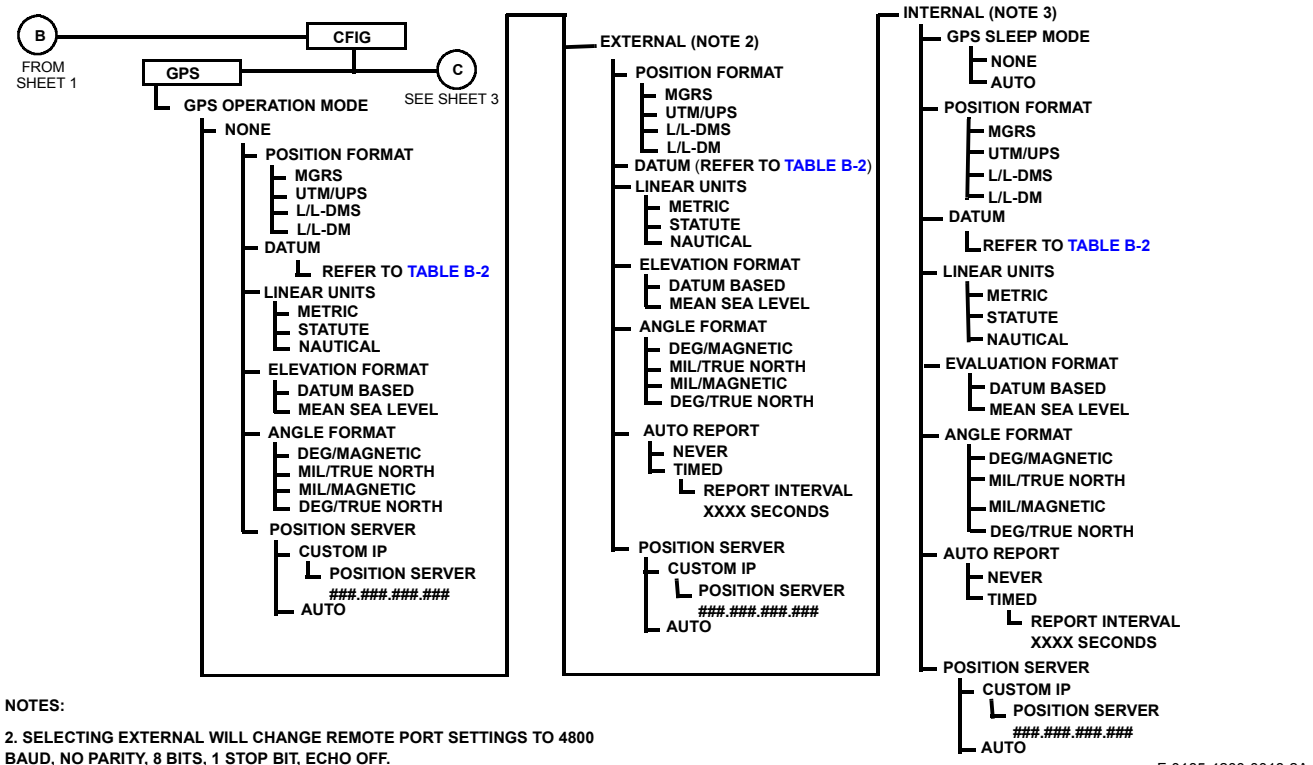


NOTES:

1. NOT VISIBLE WHEN D/V TYPE SELECT IS SIMPLE.

F-0185-4200-0018-1

Figure B-1. RF-5800V-HH Programming Menu (Sheet 1 of 3)



NOTES:

2. SELECTING EXTERNAL WILL CHANGE REMOTE PORT SETTINGS TO 4800 BAUD, NO PARITY, 8 BITS, 1 STOP BIT, ECHO OFF.
3. ONLY AVAILABLE WITH INTERNAL GPS.

Figure B-1. RF-5800V-HH Programming Menu (Sheet 2 of 3)

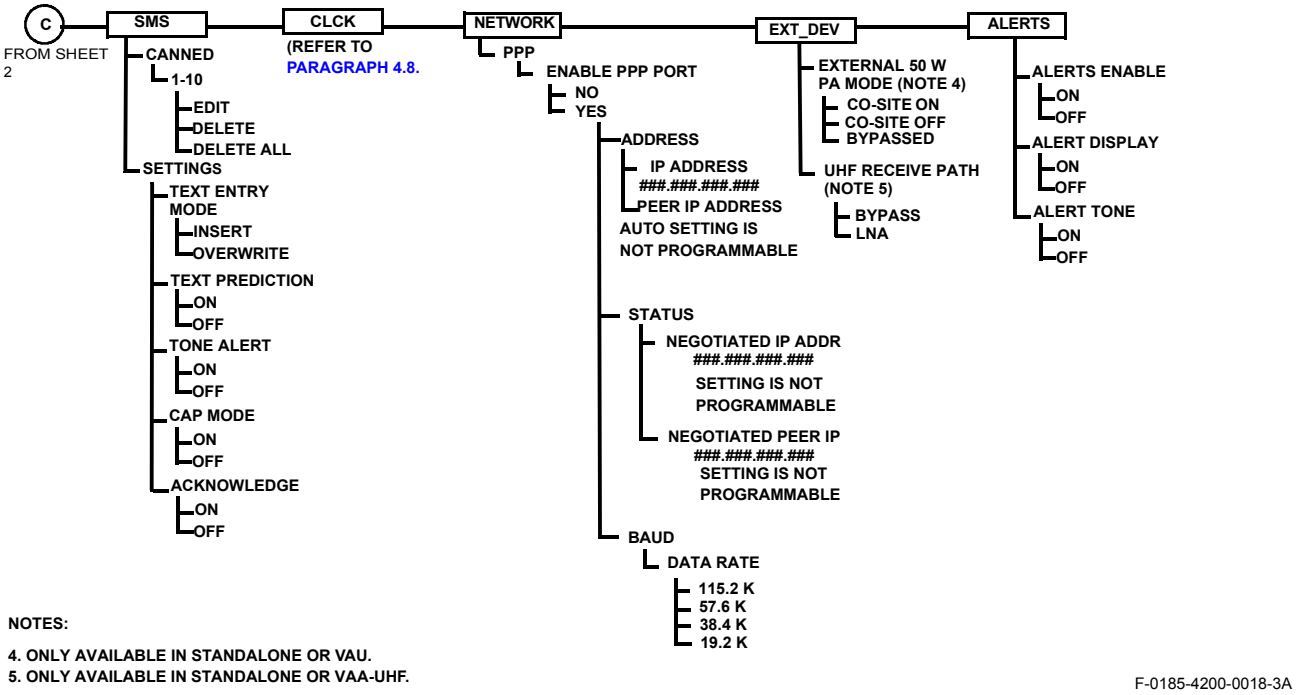


Figure B-1. RF-5800V-HH Programming Menu (Sheet 3 of 3)

B.2 DIRECTED CALLING

The following contains information and programming instructions for directed calling.

B.2.1 Description

The Directed Calling feature allows a radio operator to hold a private voice conversation with another radio in the net. The call may be performed in either fixed frequency or frequency hopping (Quicklook 1A). Calls support Plain Text (PT) and Cipher Text (CT) in Voice (VOC), or Data/Voice (D/V).

Directed Calls create a virtual circuit by reserving a channel. A channel is defined as a fixed frequency or a set of hop frequencies. Channel reservation informs other radios on the net that the channel is occupied. This indication appears on the front panel of the excluded radios as a BUSY-VOICE status message.

Radios in the net that are excluded from the directed call are not able to hear or participate in the conversation. Although these radios may not participate in the call, they have the ability to break-in on a directed call. This is a transmit-only function, intended for emergency use to alert the participants. The radios in the directed call can hear the incoming message, but the radio outside the call will still not be able to listen in. The break-in radio will not hear a response from the directed call radios until the virtual circuit is released.

If the channel is actively participating in a directed call, radios not participating in it have the ability to request a directed call. The request is placed in a queue and waits for the channel to be freed for use. If the channel does not free up after the default 20 seconds, the radio will display CALL FAILED: NO RESPONSE. The default time value can be set using the RPA.

After a transmission has completed on the circuit, the radio inactivity timer is started. If there has been no activity on a directed call circuit for the default 20 seconds, the circuit will be terminated. Since channel reservation and release consists of special signaling that uses a handshake mechanism to establish and tear down virtual circuits, only radios on nets that have a programmed radio identification (ID) may utilize this feature.

A radio operator initiating a directed call is presented with the option of using either a station name or radio ID. A station name is an easy to remember name that associates radio IDs with particular radio nets. The Very High Frequency - Ultra High Frequency (VHF-UHF) Radio Programming Application (RPA) can be used to preload a list of up to 50 radio stations into the radio.

NOTE

If no stations have been programmed by the VHF-UHF RPA, or no stations have radio IDs associated with the current radio net, then the operator will only be presented with the option of using a radio ID to make a call.

If the current radio net supports directed calling, then the radio's ID is displayed on the top line to the right of the battery status bar. If the current net does not support directed calling, then NORM is displayed. When a directed call has been established, either the station name (if one has been programmed) or radio ID of their other party is displayed on the bottom line of the display.

B.2.2 Initiating a Directed Call Using a Radio ID

The Directed Calling option allows a radio user to establish a private voice conversation between two radios. Only the two radios participating in the call will hear the audio. Perform the following to initiate a direct call using a radio ID:

a. From the main menu, press the **[CALL]** button.

b. If default gateway is programmed for RF-6010, use the up/down arrow keys to select **RADIO** for **CALL TYPE** and press **[ENT]**.

c. If radio names are programmed, use the up/down arrow keys to select **RADIO ID** and press **[ENT]**.

d. Use the keypad to enter the three-digit **RADIO ID** (001 - 254) to be called, and press **[ENT]**.

e. The radio initiates a call and establishes a circuit to a particular radio ID.

f. The radio is linked to another radio. The radio ID of the other radio in the Directed Call is displayed at the bottom of the screen.

B.2.2.1 Terminating a Directed Call

The radio operator can terminate a Directed Call at any time.

Perform the following to initiate a direct call using a station name:

a. With a Directed Call in process, press the **[CLR]** key to activate this screen.

b. Use the up/down arrows to select **YES**, then press **[ENT]** to terminate the link. The link was terminated successfully. After a few seconds, the screen will change to the main menu.

B.2.2.2 Breaking into a Directed Call

When a channel is reserved (directed call in process), radios not participating in the directed call will not be able to transmit on the net. If the Push-To-Talk (PTT) button is pressed, the operator is notified that the radio cannot transmit by emitting a tone and displaying a BUSY status on the main screen.

To break into the directed call, an operator can hold down the PTT button for five (5) seconds. During this time, the radio will emit a busy tone to indicate that it is not transmitting. The radio will break in and begin to transmit once the busy tone stops. The privacy of the directed call is still maintained since the operator breaking in cannot hear the directed call participants.

If the PTT button is released after the radio has broken into the directed call, the complete break-in process needs to be repeated for the radio to transmit over the reserved channel again.

B.2.2.3 Busy State

A radio that is excluded from a directed call cannot transmit/receive messages on the net until the call is terminated. The radio operator has the choice to wait for the directed call to terminate, utilize the directed call queue, or break into the directed call. If the operator presses the PTT button, the radio will warn the operator that it cannot transmit by emitting a tone. For the radios that are excluded from the directed call, **BUSY-VOICE** appears on the LCD.

B.2.2.4 Radio Call Inactivity Timer

If the PTT button has not been keyed and no traffic has been received on a directed call for a period of default 20 seconds, the call is terminated due to a timeout.

B.2.3 Directed Calling Programming

This section describes programming the Directed Calling feature from the radio front panel. Refer to Chapter 4 for general radio programming.

B.2.3.1 Net Programming

A radio net is defined as a group of radios that share common communication parameters, such as frequencies, data and voice types, etc. Net programming in the RF-5800V-HH consists of all the data that describes a radio net including name, frequency, data/voice settings, squelch, transmit power, etc.

Perform the following to program a radio for Directed Calling.

a. Press the **[PGM]** button, select **NORM**, and press **[ENT]**.

b. Use left/right arrow keys to select **NET** and press **[ENT]**.

c. Enter the NET number to be used and press **[ENT].**

d. Use the up/down arrow keys to select **YES** to **ACTIVATE IN LIST** and press **[ENT]**.

e. Use the up/down arrow keys to select **FIXED FREQUENCY** or **FREQUENCY HOPPING** and press **[ENT]**.

f. Use the left/right arrow keys to select **DATA/VOC** and press **[ENT]**.

g. Use the up/down arrow keys to select **DATA OR VOICE (D/V)** or **VOICE**, and press **[ENT]**.

h. Use the up/down arrow keys to select **DIRECTED** and press **[ENT]**.

i. Assign a radio ID number for the **RADIO ADDRESS** (001 - 254) and press **[ENT]**.

j. Assign the base radio ID number (**DEFAULT GATEWAY**) to interoperate with the RF-6010 and press **[ENT]**. (This enables phone calls to be placed. The default value (000) indicates that an RF-6010 is not present on this radio net.)

k. Use the up/down arrow keys to select the Frequency Modulation (FM) deviation (**FM DEVIATION**) to be used for net communications and press **[ENT]**.

l. Use the up/down arrow keys to select **BAUD RATE** (for data) and press **[ENT]**.

B.2.4 Error Messages and Corrective Actions

Table B-1 shows error messages and corrective actions that may be encountered during directed calling. It is assumed that the radio has been programmed correctly and this is not the reason for the error. When in doubt, verify that the programmed parameters are valid.

Table B-1. Error Messages and Corrective Actions

Fault Message	Corrective Action
[CALL FAILED] [NO RESPONSE] PRESS CLR/ENT TO CLEAR	The targeted radio is not listening on the current frequency, is currently in a circuit, is in a different operating state, or poor signal strength has caused the radio to miss the over-the-air signalling. Place the call again.

B.3 SITUATIONAL AWARENESS (SA)

The following contains information and programming instructions for Situational Awareness (SA) in the RF-5800V-HH.

B.3.1 Description

Situational Awareness (SA) is the ability to provide remote sites with information about a radio's geographical position. This positioning information is provided via the Global Positioning System (GPS). The remote sites may be radios or sophisticated applications running on PCs.

Situational Awareness reports can be sent via fixed frequency or frequency hopping (Quicklook 1A). The RF-5800V-HH can use either the optional internal GPS module or an external GPS device to read the position, and then the information can be transmitted to a remote site.

NOTE

The radio operator can send a position report to any remote net location, however, the net must be set up for directed calling or Wireless IP and operating in Cipher Text (CT).

RF-5800V-HH radio operators can view their own current position, and store/view other remote station positions. When a radio receives a remote station's position, it will automatically store the location in memory. The radio can calculate the distance and bearing of each remote station relative to its own current position. The radio will store up to 50 remote station positions, however, the stored locations are not saved when the radio is turned off.

NOTE

Maximum communications range can be achieved when interfering devices are kept at a distance from the radio. Therefore, it is recommended that the external GPS receiver be turned off and disconnected from the radio when it is not required to send a position report.

B.3.2 SA Features

The user can select the format of the reported position information using the RF-5800V-HH front panel menus.

- Position Format: This setting determines how position information is displayed. Selections include Military Grid Reference System (MGRS), Universal Transverse Mercator/Universal Polar Stereographic (UTM/UPS), Latitude/Longitude-degree, minute, second (L/L-dms), Latitude/Longitude-degree, minute (L/L-dm).
- Linear Units Format: The radio operator can select the units of altitude and velocity displays. Selections include Nautical (feet, knots), Metric (meters, kilometers per hour), or Statute (feet, miles per hour).
- Elevation Format: The operator can control whether altitude is based on Mean Sea Level or the currently selected datum.
- Angle Format: The radio operator can control the heading display. Selections are:
    - DEG/TRUE NORTH (degrees referenced to true north)
    - DEG/MAGNETIC (degrees referenced to magnetic north)
    - MIL/TRUE NORTH (mils referenced to true north)
    - MIL/MAGNETIC (mils referenced to magnetic north)

- DATUM: Provides positional information used with different kinds of paper maps. The radio contains several preprogrammed datums, and allows two customized datums to be entered.

B.3.3 SA Operation

This section describes how to use the SA feature of the RF-5800V-HH radio to either transmit or view positional information. Perform the following tasks to use SA:

a. Set the radio for Cipher Text (CT) operation.

b. Configure the radio for Directed Calling (Paragraph B.2.3.1), or Wireless IP (Paragraph B.4.2).

c. Configure the radio for SA Internal Mode (Paragraph B.3.3.1) or SA External Mode (Paragraph B.3.3.2.).

d. If SA External Mode is being used, configure the Garmin GPS receiver to operate with the radio (Paragraph B.3.3.2). Connect the cable and power the units (Paragraph B.3.3.3.1).

e. Allow time for satellites to be acquired.

f. The system is ready to operate.

B.3.3.1 SA Configuration - Internal GPS

To reach the programming menus for configuring SA, perform the following steps:

a. Press the **[PGM]** button, use the left/right arrows to select **CFIG**, and press **[ENT]**.

b. Use the left/right arrows to select **GPS** and press **[ENT]**.

c. Use the up/down arrows to select **INTERNAL** and press **[ENT]**.

d. Use the up/down arrows to choose the desired **GPS SLEEP MODE**, and press **[ENT]**. If set to **NONE**, the GPS receiver continuously tracks the GPS satellites. In the **AUTO** setting, the internal GPS receiver will obtain a position fix and then automatically enter a low power state.

NOTE

The GPS receiver will be taken out of power saving mode if the user manually views GPS position information as described in Paragraph B.3.4., or prior to Auto Reporting.

e. Use the up/down arrows to choose the desired **POSITION FORMAT**, and press **[ENT]**. This menu item determines how position information is displayed. Valid selections are **MGRS**, **UTM/UPS** (a universal grid format), **L/L-dms** (latitude and longitude in degrees, minutes, and seconds) and **L/L-dm** (latitude and longitude in degrees and minutes).

NOTE

Some datums are not supported by the MGRS position format and are not displayed if MGRS is selected. When MGRS is selected and the current datum is not valid for MGRS, the radio will default to WGE. Datums that are not valid for MGRS are indicated with an asterisk (*) in Table B-2.

f. Use the up/down arrows to choose the desired **DATUM** setting, which adjusts the reported position to work with different kinds of paper maps. The **DATUM** used when making a map is often noted on the map. The radio contains several preprogrammed datums, and allows two customized datums to be entered. Refer to Table B-2.

g. Use the up/down arrows to select the desired **LINEAR UNITS** setting. This selects the format of altitude and velocity displays. Valid settings are **METRIC** (meters, kilometers per hour), **STATUTE** (feet, miles per hour), or **NAUTICAL** (feet, knots).

h. Use the up/down arrows to set the **ELEVATION FORMAT**. This controls whether altitude is **DATUM BASED** or based upon **Mean Sea Level**.

i. Use the up/downs arrows to choose the **ANGLE FORMAT**, which controls the heading display. Available selections are **DEG/MAGNETIC** (degrees referenced to magnetic north), **MIL/TRUE NORTH** (gunner's mils referenced to true north), **MIL/MAGNETIC** (gunner's mils referenced to magnetic north) or **DEG/TRUE NORTH** (degrees referenced to true north).

j. Use the up/down arrows to select the desired **AUTO REPORT** setting. The RF-5800V-HH has the capability to automatically report its GPS position. For Auto Report to function, the D/V TYPE SELECT for the current Net has to be **DIRECTED** or **WIRELESS IP**. Valid options are: **NEVER (**AUTO REPORT is disabled), and **TIMED.** If TIMED is selected, the user then must enter a **REPORT INTERVAL** in seconds (**5** to **9999**). The radio will then broadcast GPS information periodically according to the selected report interval value.

k. Use the up/down arrows to select the **POSITION SERVER**. The RF-5800V-HH can report all stored GPS information to a remote GPS position application. Valid settings are **AUTO** and **CUSTOM IP**. The **AUTO** setting causes the **POSITION SERVER** to automatically be set to the Point-to-Point Protocol (PPP) peer IP address. The **CUSTOM IP** setting requires the full Position Server IP address. If a non-zero **Custom IP** is entered, the radio will forward GPS information to the selected Position Server every time it receives new GPS information from other radios. (To disable this function, enter 000.000.000.000 for the Position Server address.)

l. Press the **[CLR]** button twice to return to the main screen. The radio is now configured for GPS/SA operation - internal mode.

Table B-2. DATUM Abbreviations and Descriptions

DATUM	DATUM Description	DATUM	DATUM Description
***Not available with MGRS position format.**			
WGE	WGS-84	MIN-B	Minna, Nigeria
WGC	WGS-72	MOD	Rome 1940
ADI-A	Adindan, Ethiopia	MPO	M'Poraloko Gabon
ADI-B	Adindan, Sudan	MVS	Viti Levu 16 Fugi Island
ADI-C	Adindan, Mali	NAH-A	Nahrwan Masirah Island
ADI-D	Adindan, Senegal	NAH-B	Nahrwan, UAE
ADI-E	Adindan, Burkina Faso	NAH-C	Nahrwan, Saudi Arabia
ADI-F	Adindan, Cameroon	NAP	Naparima BWI Trinidat/Tobago
ADI-M	Adindan, Mean Solution	NAR-A	North America 1983, Alaska
AFG*	Afgooye, Somalia	NAR-B	North America 1983 Canada
AIA	Antigua, ISL Astro-43	NAR-C	North America 1983, Conus
AIN-A	AIN El ABD 1970, Bahrain	NAR-D	North America 1983, Mexico
AIN-B	AIN El ABD 1970, Saudi Arabia	NAR-E	North America 1983, Aleutian Islands
AMA	American Samoa, 1962	NAR-H	North America 1983, Hawaii
ANO	ANNA 1 Astro 1965, Cocos Islands	NAS-A	North America 1927, East US
ARF-A	ARC 1950, Bostwana	NAS-B	North America 1927, West US
ARF-B	ARC1950, Lesotho	NAS-C	North America 1927, Conus

Table B-2. DATUM Abbreviations and Descriptions (Continued)

DATUM	DATUM Description	DATUM	DATUM Description
***Not available with MGRS position format.**			
ARF-C	ARC 1950, Malawi	NAS-D	North America, 1927 Alaska (excluding Aleutian Islands)
ARF-D	ARC 1950, Swaziland	NAS-E	North America 1927, Canada
ARF-E	ARC 1950, Zaire	NAS-F	North America 1927, Alberta and British Columbia
ARF-F	ARC 1950, Zambia	NAS-G	North America 1927, Eastern Canada
ARF-G	ARC 1950, Zimbabwe	NAS-H	North America 1927, Manitoba, Ontario
ARF-H	ARC 1950, Burundi	NAS-I	North America 1927, NW Territory
ARF-M	ARC 1950, Mean	NAS-J	North America 1927, Yukon
ARS-A	ARC 1960, Kenya	NAS-L	North America 1927, Mexico
ARS-B	ARC 1960, Tanzania	NAS-N	Central America 1927
ARS-M	ARC 1960, Kenya/Tanzania	NAS-O	North America 1927, Canal Zone
ASC	Ascension Island, 1958	NAS-P	North America 1927, Caribbean
ASM	Montserrat Island, 1958	NAS-Q	North America 1927, Bahamas
ASQ	Astro Station 1952, Marcos Island	NAS-R	North America1927 San Salvador
ATF	Beacon E 1945, Iwo Jima	NAS-T	North America1927, Cuba
AUA	Australian Geodetic 1966	NAS-U	North America1927, Greenland

Table B-2. DATUM Abbreviations and Descriptions (Continued)

DATUM	DATUM Description	DATUM	DATUM Description
***Not available with MGRS position format.**			
AUG	Australian Geodetic 1984	NAS-V	North America 1927, East Aleutian Islands
BAT	Djakarta, Batavia	NAS-W	North America 1927, West Aleutian Islands
BBOHM*	Bessel-Bohm, Sweden	NSD	North Sahara 1959 Algeria
BER	Bermuda 1957	OEG*	Old Egyptian 1907
BID	Bissau Guinea, Bissau	OGB-A*	Ordinance Survey Great Britain 1936, England
BOO	Bogata Observatory	OGB-B*	Ordinance Survey Great Britain 1936, England, Wales
BUR	Bukit Rimpah, Bangka	OGB-C*	Ordinance Survey Great Britain 1936, Scotland
CAC	Cape Canaveral	OGB-D*	Ordinance Survey Great Britain 1936, Wales
CAI	Campo Inchauspe 1969	OGB-M*	Ordinance Survey Great Britain 1936 Mean
CAO	Canton Astro 1966, PH	OHA-A	Old Hawaiian, Hawaii
CAP	Cape, South Africa	OHA-B	Old Hawaiian, Kauai
CAZ	Camp Area Astro, Anta	OHA-C	Old Hawaiian, Maui

Table B-2. DATUM Abbreviations and Descriptions (Continued)

DATUM	DATUM Description	DATUM	DATUM Description
***Not available with MGRS position format.**			
CCD	S-JTSK, Czechoslovakia	OHA-D	Old Hawaiian, Oahu
CGE	Carthage, Tunisia	OHA-M	Old Hawaiian, CC Mean
CHI	Chatham Island 1971	OHI-A	Old Hawaiian, Hawaii
CHU	Chua Astro, Paraguay	OHI-B	Old Hawaiian, Kauai
COA	Corrego Alegre, Brazil	OHI-C	Old Hawaiian, Maui
DAL	Dabola, Guinea	OHI-D	Old Hawaiian, Oahu
DID	Deception Island, Antarctica	OHI-M	Old Hawaiian, Mean So
DOB	GUX 1 Astro Guadacanal	PHA	Ayabelle Lighthouse
EAS	Easter Island, 1967	PIT	Pitcairn Astro 1967
ENW*	Wake Eniwetok, 1960	PLN	Pico De Las Nieves
EST	COORD Sys 1937, Estonia	POS	Porto Santo 1936
EUR-A	Europe 1950, West	PRP-A	Provisional South America (PSA) 1956 Bolivia
EUR-B	Europe 1950, Greece	PRP-B	Provisional South America 1956, N. Chile
EUR-C	Europe 1950, Norway & Finland	PRP-C	Provisional South America, 1956 S. Chile
EUR-D	Europe 1950, Portugal & Spain	PRP-D	Provisional South America Colombia

Table B-2. DATUM Abbreviations and Descriptions (Continued)

DATUM	DATUM Description	DATUM	DATUM Description
***Not available with MGRS position format.**			
EUR-E	Europe 1950, Cyprus	PRP-E	Provisional South America 1956 Ecuador
EUR-F	Europe 1950, Egypt	PRP-F	Provisional South America 1956 Guyana
EUR-G	Europe 1950 England, Channel Islands	PRP-G	Provisional South America 1956 Peru
EUR-H	Europe 1950, Iran	PRP-H	Provisional South America 1956 Venezuela
EUR-I	Europe 1950, Sardinia	PRP-M	Provisional South America 1956 Mean
EUR-J	Europe 1950, Sicily	PTB	Point 58 Mean Solution
EUR-K	Europe 1950 England, Ireland, Scotland	PTN	Pointe Noire 1948
EUR-L	Europe 1950, Malta	PUK*	Pulkovo 1942, Russia
EUR-M	Europe 1950, Mean Solution	PUR	Puerto Rico
EUR-S	Europe 1950, Iraq, IS	QAT	Qatar National
EUR-T	Europe 1950, Tunisia	QUO	Qornoq, South Greenland
EUS	Europe 1979	REU	Reunion Mascarene Island
FAH	Oman	SAE	Santo 1965 Espirito
FLO	Observ Meteorlog, 1939	SAN-A	South American 1969 Argentina

Table B-2. DATUM Abbreviations and Descriptions (Continued)

DATUM	DATUM Description	DATUM	DATUM Description
***Not available with MGRS position format.**			
FOT	Fort Thomas 1955	SAN -B	South American 1969 Bolivia
GAA	Gan 1970, Maldives	SAN-C	South American 1969 Brazil
GEO	Geodetic Datum 1949, NZ	SAN-D	South American 1969 Chile
GIZ	DOS 1968, Gizo Island	SAN-E	South American 1969 Columbia
GRA	Graciosa Base 1948	SAN-F	South American 1969 Ecuador (excluding Galapagos Islands)
GSE	Gunung Segara Kalima	SAN-G	South American 1969 Guyana
GUA	Guam 1963	SAN-H	South American 1969 Paraguay
HEN	Herat North, Afganistan	SAN-I	South American 1969 Peru
HER	Hermannskogel, Old Y	SAN-J	South American 1969 Baltra Galapagos Islands
HIT	Prov. S. Chilean 1963	SAN-K	South American 1969 Trinidad &Tabago
HJO	Hjorsey 55, Iceland	SAN-L	South American 1969 Venezuela
HKD	Hong Kong 1963	SAN-M	South American 1969 Mean
HTN	HU-TZU-SHAN, Taiwan	SAO	SAO Brazil Santa Maria
IBE	Bellevue Efate N ERR	SAP	Sapper Hill 1943, Falklands
IDN*	Indonesian 1974	SCK*	Schwarzeck, Namibia

Table B-2. DATUM Abbreviations and Descriptions (Continued)

DATUM	DATUM Description	DATUM	DATUM Description
***Not available with MGRS position format.**			
IND-B	Indian Bangladesh	SGM	Selvagem Grande 1938
IND-I*	Indian, India/Nepal	SHB	Astro DOS 71/4
IND-P*	Indian, Pakistan	SIR	South American Geocent Ref
IND-S*	Indian, India	SOA*	South Asia, Singapore
INF-A	Indian 1954, Thailand	SPK-A*	S-42 Hungary
ING-A	Indian 1960 Vietnam	SPK-B*	S-42 Poland
ING-B	Indian 1960 Vietnam Con Son Island	SPK-C*	S-42 Former Czechoslovakia
INH-A	Indian 1975 Thailand	SPK-D*	S-42 Latvia
INH-A1	Indian 1975 Thailand Cycle 1	SPK-E*	S-42 Kazakhstan
IRL*	Ireland 1965	SPK-F*	S-42 Albania
ISG	ISTS 061 Asto 1968, South Georgia	SPK-G*	S-42 Romania
IST	ISTS 073 Astro 1969, Island Diego Garcia	SRL	Sierra Leone 1960
JOH	Johnston Island 1961	TAN	Tananarive Observation 25
KAN	Kandawala Sri Lanka	TDC	Tristan Astro 1968
KEA*	Kertau 1948, W Malay	TIL*	Timbalai 1948
KEG	Kerguelen Island 1949	TIL-S*	Timbalai Netherlands
KGS	Korean Geodesic 1995	TOY-A	Tokyo Japan

Table B-2. DATUM Abbreviations and Descriptions (Continued)

DATUM	DATUM Description	DATUM	DATUM Description
***Not available with MGRS position format.**			
KUS	Kusai Astro 1951, Cairo	TOY-B	Tokyo South Korea
LCF	LC5 Astro 1961, Caymen	TOY-B1	Tokyo South Korea Cycle 1
LEH	Legion Ghana	TOY-C	Tokyo Okinawa
LIB	Liberia 1964	TOY-M	Tokyo, Mean
LUZ-A	Luzon, Philippines	TRN	Astro Tern Island 1961
LUZ-B	Luzon Mindanao Island	USER1*	User Entered #1
MAS	Massawa, Ethiopia	USER2*	User Entered #2
MER	Merchich, Morocco	VOI	Voirol 1874 Tunisia Algeria
MID	Midway Astro 1961	VOR	Voirol 1960 Algeria
MID-1*	Midway Astro 1961-1	WAK	Wake Island Astro 1952
MIK	Mahe 1971 Mahe Island	YAC	Yacare Uruguay
MIN-A	Minna Cameroon	ZAN	Zanderij, Suriname

B.3.3.2 SA Configuration - External GPS

To reach the programming menus for configuring SA, perform the following steps:

a. Press the **[PGM]** button, use the left/right arrows to select **CFIG**, and press **[ENT]**.

b. Use the left/right arrows to select **GPS** and press **[ENT]**.

c. Use the up/down arrows to select **EXTERNAL** and press **[ENT]**. The message ***Port Remote Baud: 4800*** will display for a few seconds.

d. Use the up/down arrows to choose the desired **POSITION FORMAT**, and press **[ENT]**.

e. Use the up/down arrows to choose the desired **DATUM**, and press **[ENT]**.

f. Use the up/down arrows to choose the desired **LINEAR UNITS**, and press **[ENT]**.

g. Use the up/down arrows to choose the desired **ELEVATION FORMAT**, and press **[ENT]**.

h. Use the up/down arrows to choose the desired **ANGLE FORMAT**, and press **[ENT]**.

i. Use the up/down arrows to choose whether **AUTO REPORT** is **NEVER** or **TIMED**, and press **[ENT]**. If **TIMED** is selected, enter the reporting interval in seconds (**5** to **9999**), and press **[ENT]**. This will repeatedly transmit GPS information at each scheduled time interval.

j. Use the up/down arrows to select the **POSITION SERVER**. The RF-5800V-HH can report all stored GPS information to a remote GPS position application. Valid settings are **AUTO** and **CUSTOM IP**. The **AUTO** setting causes the **POSITION SERVER** to automatically be set to the PPP peer IP address. The **CUSTOM IP** setting requires the full Position Server IP address. If a non-zero **Custom IP** is entered, the radio will forward GPS information to the selected Position Server every time it receives new GPS information from other radios. (To disable this function, enter 000.000.000.000 for the Position Server address.)

k. Press the **[CLR]** button twice to return to the main screen. The radio is configured for SA operation.

B.3.3.3 Using the External GPS Receiver

To initiate Situational Awareness reporting using external GPS, the user must configure and connect the Garmin GPS receiver to the RF-5800V-HH radio side connector.

NOTE

This procedure only details the settings required to achieve compatibility with the RF-5800V-HH radio. Refer to the Garmin manual for operating details not covered here.

Perform the following procedure to configure the Garmin Etrex Vista® for use with the RF-5800V-HH:

a. Turn the GPS receiver on by pressing the On/Off button down for at least two seconds. The main menu will appear.

b. From the Garmin main menu, select **Setup**>**Interface**>**NMEA IN/NMEA OUT**. The baud rate will automatically default to 4800 bps. Click **X** to return to the Setup menu.

c. From the Garmin **Setup** menu, select **Units**>**Map Datum >WGS84**. Click **X** to return to the **Setup** menu.

d. From the Garmin **Setup** menu, select **System**>**GPS**>**Normal** to enable GPS tracking. Click **X** twice to return to the main menu.

e. The Etrex Vista® GPS receiver is configured for proper operation.

NOTE

Other GPS receivers can be used, but may require different cables and configuration.

B.3.3.3.1 GPS External Mode - Connecting the Units

Perform the following procedure to begin operation:

a. Align the pin on cable connector with the hole above the radio's side connector contacts. Use (12011-0280-A006) cable for the Garmin Etrex Vista®, or (12011-0875) cable for Garmin GPS 76. Hold the connector firmly in place while tightening the thumb screw. Do not overtighten.

b. Attach the cable to the GPS receiver by first opening the rubber cover on the back of the unit, and then slide the cable connector down onto the GPS receptacle. Make sure the groove on the cable connector is aligned properly with the receptacle.

c. Turn power on to the radio and the GPS receiver.

d. Ensure that the GPS receiver has line-of-sight visibility to the sky, and allow several minutes for satellite acquisition.There should be at least three satellites available to obtain positioning information.

e. If the radio has been configured to Auto Report, it will begin sending SA information at the programmed intervals. If Auto Report is not enabled, the user must perform a Forced Report to send information manually (refer to Paragraph B.3.4.1).

B.3.4 Viewing SA Information

To view SA position, heading, velocity, altitude, and distance data:

a. Press the **[OPT]** button.

b. Use the left/right arrows to select **GPS**, and press **[ENT]**.

c. Select **VIEW**, and press **[ENT]**. The current position is shown on the display.

d. Press the circle arrow button to view the current heading/velocity.

e. Press the circle arrow button again to view altitude.

f. Press the circle arrow button again to return to the position screen.

g. Press **[CLR]** three times to return to the main screen.

NOTE

Distance is relative to the sending radio, therefore, it can only be viewed in other stations' saved data.

To view SA data received from remote radios in the net:

a. Press the **[OPT]** button.

b. Use the left/right arrows to select **GPS**, and then press **[ENT]**.

c. Select **VIEW**, and then press **[ENT]**. The current GPS position is shown on the display.

d. Use the up/down arrows to scroll through saved GPS/SA data for any other stations (up to 50). Select the desired station to view the last saved position.

NOTE

Stored positions are not saved when the radio is turned off.

e. Press the circle arrow button to view the last saved heading, velocity, and altitude information.

B.3.4.1 Forced Reporting of GPS/SA Information

In CT mode, the GPS position can be reported at any time if the net supports the Directed Calling or Wireless IP feature. To transmit the current GPS information to other radios:

a. Press the **[OPT]** button.

b. Use the left/right arrows to select **GPS**, and press **[ENT]**.

c. Select **REPORT**, and then press **[ENT]**. GPS position is transmitted.

NOTE

The current net must be configured for Directed Calling or Wireless IP. Refer to Paragraph B.2 for Directed Calls, or Paragraph B.4 for Wireless IP.

B.4 WIRELESS IP NETWORK

The following contains information and programming instructions for Wireless IP Networking.

B.4.1 Theory of Operation

The operation detailed here uses the fixed frequency and frequency hopping (QuickLook 1A) in the radio for IP data delivery. Directed calling functionality is automatically integrated when the radios are configured for wireless IP operation. These features employ a single channel, where a channel is defined as an individual frequency or as set of hop frequencies. The radio operator is responsible for choice of channel (frequency) management - automated channel selection is not performed by the radio.

The RF-5800V-HH radio offers a wireless IP capability that allows system operators to use IP-based PC software applications. This feature permits the radio to interface with devices such as laptops using the radio's PPP interface. In addition, the radio offers an easy way to configure a wireless network without the need of adding and maintaining routes on PCs and radios. This easy way to configure a wireless network is known as bridging. Bridging is defined as setting the PPP PEER address on the radio equal to the radio's active wireless IP address. This is automatically set by the radio. With this set, the radios are behaving like a bridge rather than a router. A bridging device is able to provide IP packet connectivity between different media within the same IP subnet space.

See Figure B-2 for a basic network configuration for wireless IP data operation. Since all of the PCs are on the 192.168.0.x RF net, the radios automatically bridge received packets over to the connected computer. Any application that uses the IP protocol can be used, however, the limited bandwidth of narrowband radio communications will make the use of some applications impractical.

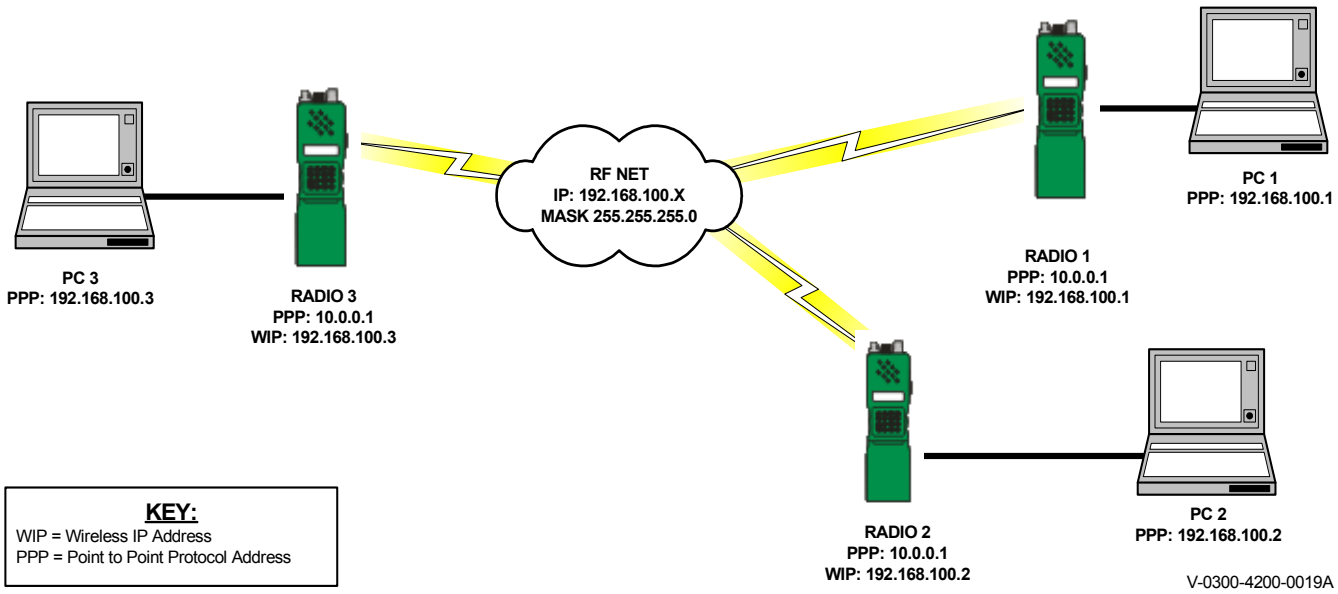


Figure B-2. Basic Wireless IP Network

B.4.2 Network Programming

The VHF-UHF Radio Programming Application (RPA) is a PC-based program used to configure Harris radios. For Network applications, the RPA is generally used to program the Network settings in the RF-5800V-HH, although this feature can also be programmed manually. See the **Network** Menu area of Figure B-1 for additional information. General radio programming is outlined in Chapter 4.

B.5 SHORT MESSAGING SERVICE (SMS)

Short Messaging Service (SMS) provides text-based messaging capability. This feature allows the user to send information using the RF-5800V-HH front panel when voice communication is not possible or desirable (as in covert voiceless operations). SMS can also be used to receive information when a radio is unattended. SMS operation is only available in Directed Calling nets and Wireless IP nets.

B.5.1 Short Messaging Service Programming

This section describes programming the SMS feature from the radio front panel. Refer to Chapter 4 for general radio programming.

a. Press the **[PGM]** button.

b. Use the left/right arrows to select **CFIG**, and press **[ENT]**.

c. Use the left/right arrows to select **SMS**, and press **[ENT]**.

d. Use the left/right arrows to select **SETTINGS**, and press **[ENT]**.

e. Use the up/down arrows to select the desired **TEXT ENTRY MODE**. Valid entries are **INSERT** and **OVERWRITE**. Press **[ENT]**.

f. Use the up/down arrows to set **TEXT PREDICTION**. Valid entries are **ON** or **OFF**. If enabled, this feature will automatically "predict" (based upon prior text entries) the letter which displays next when entering a message from the front panel. Press **[ENT]**.

g. Use the up/down arrows to set **TONE ALERT** to **ON** or **OFF**. If enabled, a beep sounds when a new message arrives. Press **[ENT]**.

h. Use the up/down arrows to select the desired **CAP MODE**. This feature causes entered characters to automatically be set to capital letters. Valid entries are **ON** or **OFF**. Press **[ENT]**.

i. Use the up/down arrows to set **ACKNOWLEDGE** to **ON** or **OFF**. When enabled, this feature automatically sends an acknowledgement to the sender when a message arrives. Press **[ENT]**.

B.5.1.1 Composing SMS Canned Messages

Up to ten messages can be pre-entered and saved for future transmission using the Canned Message feature.

a. Press the **[PGM]** button.

b. Use the left/right arrows to select **CFIG**, and press **[ENT]**.

c. Use the left/right arrows to select **SMS**, and press **[ENT]**.

d. Use the left/right arrows to select **CANNED**, and press **[ENT]**. The menu of Canned Messages (1- 10) displays. Messages can be created, edited or deleted from the front panel.

e. To create a new Canned Message, use the left/right arrows to select **Edit**, then use the up/down arrows to select the desired message number and press **[ENT]**. Canned Messages can be up to 160 characters in length.

f. Using the front panel keypad, type the desired canned message. The keys are used to type any of the characters which appear on that key. For example, the **5** key is used to type either **M**, **N**, **O**, or **5**. If you want to type the letter **O**, rapidly press the **5** key three times until the letter **O** is displayed. After a short delay, the cursor advances to the next position. Special characters, including delete and space, are accessed by pressing the circular arrow key.

g. When the canned message is composed, press **[ENT]** to save.

B.5.2 SMS Operation

NOTE

SMS operation is only available in Directed Calling nets and Wireless IP nets. Refer to Paragraph B.2.3 and Paragraph B.4.2 to configure the radio for these net types.

Refer to Figure B-3 for the SMS menu tree.

B.5.2.1 Sending New SMS Messages

This procedure describes how to send an SMS message from the radio front panel.

a. Press the **[OPT]** button.

b. Use the left/right arrows to select **SMS** and press **[ENT]**.

c. Use the left/right arrows to select **NEW** and press **[ENT]**.

d. If no messages have ever been sent, use the up/down arrows to select either **NEW** or **CANNED.** If messages have been sent, use the up/down arrows to select either **NEW MSG**, **CANNED MSG, LAST SENT MSG**, or **LAST ENTERED MSG.** Press **[ENT].**

e. Press **[ENT]**.

f. The message screen will display. If this is a new message, use the keypad to enter the message text. When the message is complete, press **[ENT]** to continue.

g. Use the up/down arrows to select the destination where the message will be sent. Destination can be chosen either by **RADIO ID** number (to one specific radio) or **ALL** (to all radios in the net). Press **[ENT]**.

h. If **RADIO ID** was selected, enter the ID number of the radio to receive the message. Press **[ENT]**.

i. Select **YES** to confirm the message destination. Press **[ENT]**.

j. The radio will display **MESSAGE TRANSMITTED** to confirm the message has been sent.

B.5.2.2 Forwarding SMS Messages

This procedure describes how to forward a received SMS message to another station.

a. Press the **[OPT]** button.

b. Use the left/right arrows to select **SMS** and press **[ENT]**.

c. Use the left/right arrows to choose **SELECT**, then use the up/down arrows to browse to the received message that will be forwarded. Press **[ENT]**.

d. The message screen will display. Use the left/right arrows to select **FORWARD** and press **[ENT]**.

e. The message text may be edited or left as displayed. When the message is complete, press **[ENT]** to continue.

f. Use the up/down arrows to select the destination where the message will be sent. Destination can be chosen either by **RADIO ID** number (to one specific radio) or **ALL** (to all radios in the net). Press **[ENT]**.

g. If **RADIO ID** was selected, enter the ID number of the radio to receive the message. Press **[ENT]**.

h. Select **YES** to confirm the message destination. Press **[ENT]**.

i. The radio will display **MESSAGE TRANSMITTED** to confirm the message has been sent.

B.5.2.3 Viewing a Received SMS Message

This procedure describes how to view a received SMS message. When a new message is received, it will display for several seconds, and then a flashing **M** will appear to the right of the Net Number on the main screen. Once the message has been viewed, the flashing M will disappear, but the message is held in memory until deleted by the user. The message can be retrieved as follows:

a. Press the **[OPT]** button.

b. Use the left/right arrows to select **SMS** and press **[ENT]**.

c. Use the up/down arrows to browse through the received messages. The radio can store up to 10 messages.

B.5.2.4 Deleting SMS Messages

This procedure describes how to delete SMS messages from memory.

a. Press the **[OPT]** button.

b. Use the left/right arrows to select **SMS** and press **[ENT]**.

c. To delete a single message:

- Choose **SELECT** and use the up/down arrows to browse to the message to be deleted. Press **[ENT]**.
- Use the left/right arrows to select **DELETE** and press **[ENT]**.
- Select **YES** to delete the message.

d. To delete all saved messages:

- Use the left/right arrows to select **DELETE_ALL** and press **[ENT]**.
- Select **YES** to delete all SMS messages.

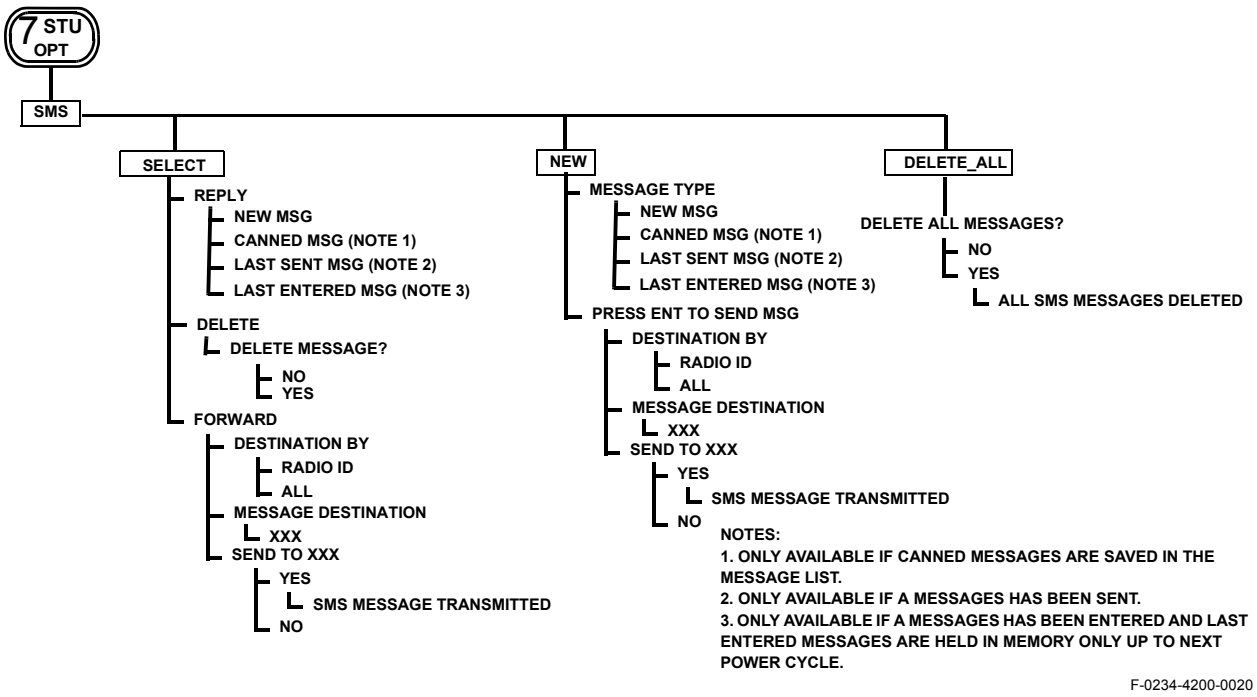


Figure B-3. SMS Menu Tree

B.6 FALCON WATCH™ SENSOR ALERTS

The Falcon Watch™ system is designed to meet a wide range of challenging surveillance and security needs. The Falcon Watch™ system utilizes the RF-5400V-SR Sensor Relay node, multiple detector types, and advanced software to provide true, real-time Situational Awareness. The system processes input data from seismic, magnetic, and passive infrared detectors, and transmits alerts when valid events occur. Falcon Watch™ Sensor Alerts for the RF-5800V-HH consist of text messages and GPS coordinate information received from an RF-5400V-SR Sensor Relay. Refer to the Falcon Watch™ Falcon II System Manual (10515-2801-4200) for complete system operation and programming.

There are three types of reports that can be received by the RF-5800V-HH:

- Activity Report - Indicates an Alert condition was detected from a Sensor detector.
- Tamper - Indicates if one or more of the Sensor Relay tamper indicators was tripped.
- Low Battery - Indicates battery on the Sensor Relay is low.

Using low band VHF frequencies, the RF-5400V-SR broadcasts alert reports to all radios in the net. When an alert is first received by the RF-5800V-HH radio, it can be stored and displayed. The following sensor data is included in the report:

- Sensor Name (or ID number if no name has been assigned)
- Detector Type - Seismic, Passive Infrared (PIR), or Magnetic
- Target Type - Vehicle, Personnel, etc.
- Bearing and Distance to sensor (if radio has GPS location)
- GPS coordinates of sensor
- Direction Indication (Left-to-Right, Right-to-Left)

- Date and Time of alert

NOTE

Direction information is only displayed if programmed on the RF-5400V-SR sending the sensor event report. Direction information for magnetic detectors is always displayed as unknown.

To create a compatible communications net between the RF-5400V-SR and the RF-5800V-HH radio, the following constraints must be considered while programming the radio:

- The radio net must be either Fixed Frequency/LOS or Quicklook 1A Frequency Hopping, and operated in the frequency range 30 MHz to 108 MHz.
- Citadel I encryption is required, the net cannot be operated in Plain Text (PT).
- Make sure the RF-5400V-SR and the RF-5800V-HH radio CAM settings match.
- Alert operation is only available in Directed Calling nets and Wireless IP nets.
- To ensure reliable communications, it is recommended that the RF-5800V-HH radio is programmed using RF-6550V VHF-UHF RPA with the same plan file that is used to program the RF-5400V-SR Sensor Node.

B.6.1 Sensor Alert Operation

When ALERT is set to ENABLE and when a Sensor Alert message is received at the RF-5800V-HH, it is:

- Displayed on the radio screen for 30 seconds (if ALERT DISPLAY is ON).
- Announced with an audible tone (if ALERT TONE is ON).
- Stored in the radio's internal message log (if ALERTS ENABLE is ON).

When a new message is received, it will display for 30 seconds, and then a flashing **A** will appear to the right of the Net Number on the main screen. The flashing **A** may be removed by viewing the list of stored messages under OPT> ALERTS, but the message is held in memory until deleted by the user.

If a Sensor Alert message is being displayed when another Sensor Alert message is received, the second Sensor Alert is queued and displayed after the first Sensor Alert message is removed from the display. An alert display will timeout after 30 seconds, or if **[CLR]** is pressed by the user to remove it from the display. Once removed, the alert message is still stored in memory and can be returned to the display by using the OPT menu.

If an SMS message arrives while a Falcon Watch™ Sensor Alert message is being displayed, the SMS message (and any subsequent SMS messages) will take precedence over the Falcon Watch™ Sensor Alert message. The interrupted Falcon Watch™ message is displayed after all SMS messages have been removed from the display screen.

The Falcon Watch™ Sensor Alert popup message consists of two screens that display the information received from the RF-5400V-SR Sensor Node. See Figure B-4. Use the up and down arrow keys to shift between the two displays. Pressing the up or down arrow keys will cancel the display timeout requiring the user to manually clear the message off the screen.

The list of possible alert messages are shown in Table B-3. The alert message is assigned to a sensor during programming of the RF-5400V-SR node by using the Falcon Watch Falcon II Mission Programming Application.

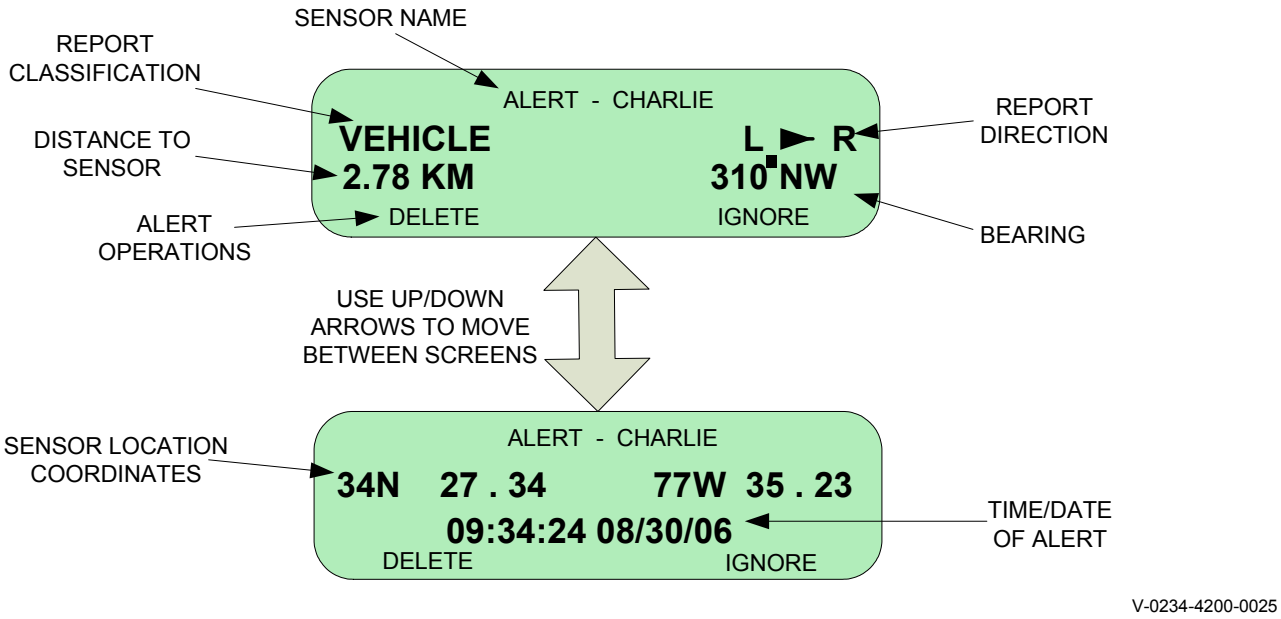


Figure B-4. Typical Sensor Report Screens

Table B-3. Alert Messages

Message
Unknown
Personnel
Vehicle
Light Vehicle
Heavy Vehicle
Wheeled Vehicle
Tracked Vehicle
Airborne
Helicopter
Propeller Aircraft
Jet Aircraft
Animal

B.6.1.1 Filtering Alert Messages

A sensor could transmit multiple false reports under some circumstances such as incorrect sensitivity settings, unusual weather conditions, etc. This will fill memory quickly with unnecessary information. The sensor can be ignored, which removes the message from the display and deletes it from the stored message list. All further messages from the filtered sensor will be ignored (neither displayed nor stored). However, all previously stored messages from this sensor that are currently in the radio's list will remain.

To ignore a sensor:

a. With the sensor alert message on the display, use the left/right arrows to select **IGNORE** and press **[ENT]**.

b. Select **YES** to ignore all further reports of all types received from the sensor.

c. Refer to Paragraph B.6.2.2 to restore the sensor to normal display status.

B.6.1.2 Deleting Alert Messages

The Sensor Alert popup messages can be deleted by the operator, in which case, the message is removed from the display and deleted from the stored message list.

To delete a single message:

a. Use the left/right arrows to select **DELETE** and press **[ENT]**.

b. Select **YES** to delete the message.

B.6.2 Stored Alert Messages

Upon reception, the Sensor Alert message is saved in a list of stored messages. The ten most recent alert messages are stored in non-volatile memory in the radio, and are saved even if the radio is turned off. Up to 30 alert messages can be stored for viewing, but those older than the last ten are lost when the radio is turned off.

B.6.2.1 Reviewing Alert Messages

The list of messages currently stored in the radio can be viewed by the operator. To select a Sensor Alert message from the list of stored messages and display the message, perform the following procedure:

a. Press the **[OPT]** button.

b. Use the left/right arrows to select **ALERTS** and press **[ENT]**.

c. Use the up/down arrows to scroll to the desired alert message, and then use the left/right arrows to choose **SELECT**. Press **[ENT]**.

d. The message screen will be displayed.

B.6.2.2 Display All Alert Messages

If messages from a sensor have been set as IGNORED, the operation can be returned to normal display/storage using the following procedure:

a. Press the **[OPT]** button.

b. Use the left/right arrows to select **ALERTS** and press **[ENT]**.

c. Use the left/right arrows to choose **DISPLAY ALL**. Press **[ENT]**.

d. Use the up/down arrows to select **YES** to enable displaying all messages from all sensors. Press **[ENT]**.

B.6.2.3 Deleting All Alert Messages

This procedure describes how to delete Alert messages from memory.

a. Press the **[OPT]** button.

b. Use the left/right arrows to select **ALERT** and press **[ENT]**.

c. Use the left/right arrows to choose **DELETE_ALL**. Press **[ENT]**.

d. Use the up/down arrows to select **YES** to delete all messages saved in memory. Press **[ENT]**.

B.6.3 Sensor Alert Programming

Perform the following procedure to set up Sensor Alerts from the front panel of the RF-5800V-HH. Refer to Chapter 4 for general radio programming.

a. Press the **[PGM]** button.

b. Use the left/right arrows to select **CFIG**, and press **[ENT]**.

c. Use the left/right arrows to select **ALERTS**, and press **[ENT]**.

d. Use the up/down arrows to set **ALERTS ENABLE**. Valid entries are **ON** or **OFF**. If **ON**, this feature will automatically receive and log any incoming messages from the Falcon Watch™ system. Press **[ENT]**.

e. Use the up/down arrows to set **ALERT DISPLAY**. Valid entries are **ON** or **OFF**. If **ON**, the radio will display incoming alerts for 30 seconds as they are received, then press **[ENT]**.

f. Use the up/down arrows to set **ALERT TONE** to **ON** or **OFF**. If **ON**, a beep sounds when a new message arrives. Press **[ENT]** to accept the setting and return to the ALERTS menu.

g. Press **[CLR]** twice to close Programming mode and return to the main operating display.

B.6.4 Tamper Alert Reports

The RF-5400V-SR node may be programmed to detect tamper conditions and report them to the RF-5800V-HH. Possible tamper alert messages that can be displayed on the radio are listed in Table B-4.

Table B-4. Tamper Alerts

Message
Device Movement
Detector Chan. A
Detector Chan. B
Detector Chan. C
Remote Sensor

B.6.5 Low Battery Alert

The RF-5400V-SR node will send low battery alerts to the RF-5800V-HH.

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GLOSSARY

-A-

AES Advanced Encryption Standard

ANC Ancillary

AUX Auxiliary

-B-

BIT Built-In Test

BITE Built-In Test Equipment. Self-test software that is built into the radio.

-C-

CAM Citadel Algorithm Modification. CAM provides an additional layer of encryption for CITADEL I and CITADEL II type radios.

CLCK Clock

COMSEC Communications Security

Configuration The process of setting parameter values which define the current hardware setup and/or operational modes. Also, a collection of all such values at any given time.

-C- - Continued

CT	Cipher Text
Cursor	A visible position indicator on the radio's display. This shows where the next entry from the keypad will be written to the display.
CVSD	Continuously Variable Slope Delta. Used on wideband digital voice.

-D-

DC	Direct Current
Display	An electronic device which produces visible output (in non-permanent form). The output may take the form of text, graphics, or a combination of the two.
Digital Voice (DV)	Analog voice that has been converted into a digital data stream of 1's and 0's.
D/V	Data or Voice

-E-

ECCM	Electronic Counter Counter Measures

-E- - Continued

EXT_DEV	External Device

-F-

Field	An area on a display that contains operator information, or provides an area for an operator to input or select data.
FH	Frequency Hopping
FM	Frequency Modulation
FP	Front Panel
FSK	Frequency Shift Keying

-G-

GPS	Global Positioning System

-H-

Hang Time	The length of time after which the radio returns to automatic scan after signal presence is lost on a net.

-H- - Continued

Harmonic	A frequency that is a whole number multiple of the fundamental frequency - for example, 60 MHz is a harmonic of 30 MHz.
Hexadecimal	Base 16 numbering structure used in computer systems. Valid characters are **0 - 9**, and **A - F**.
Hold Time	The maximum length of time the radio will stay on a net after detecting signal presence. The radio will return to automatic scan after the hold time expires even if the signal is still present on that net.
HUB	Hold Up Battery
HVM	High Volume Manufacturing

-I-

ID	Identification
IP	Internet Protocol

-J-

-K-

KGA	Key Generation Application. Used to generate and load additional keys providing an additional layer of encryption for Harris Falcon II CITADEL I and CITADEL II type radios.

-L-

Li-ION	Lithium-Ion
LCD	Liquid Crystal Display
LNA	Low Noise Amplifier
LOS	Line of Sight

-M-

Memory	A term used to describe the storage internal to the radio.
Menu	A list of options presented to a user along with some means of selecting one of those options.
MGRS	Military Grid Reference System
MHz	Abbreviation for megahertz, or millions of cycles per second.
MIC	Microphone
MINERR	Standard Citadel Mode. This is the default mode supported across all net types: Simple, Directed Calling, and Wireless IP.
Mode	The operational state of the radio as defined by accessing from the [MODE] button (TEST, RE-TRANSMIT, CLONE, RADIO LOCK, and KEYPAD LOCK).
Modem	Acronym for MOdulator/DEModulator. This is a type of data communications equipment which converts digital signals into an analog format (modulation) suitable for transmission through various media and reconverts received signals into a digital format (demodulation).

-N-

Net Configuration	Data describing a net including name, frequency, data/voice settings, squelch, and transmit power.
Net	A group of radios that share common communications parameters, such as frequencies, etc.
Non-Volatile	Information that is not lost when a unit is turned off. Non-volatile data is often retained by means of a battery back-up.

-O-

OVM	Option Validation Matrix

-P-

PA	Power Amplifier
PC	Personal Computer
PT	Plain Text
PTT	Push-to-Talk
PPP	Point-to-Point Protocol

-Q-

-R-

Radio Presets	A named, predefined set of radio parameters that allows the radio to be set up using only the preset name. Also see **Net Configuration**.
RAM	Random Access Memory
RCV	Receive
RCVR	Receiver
RESYNC	RESYNC mode allows a radio on simple voice/data nets (not directed calling or wireless IP nets) to receive an encrypted transmission already in progress. The radio does not have to hear the start of the waveform, but can power on and start receiving in mid-transmission. RESYNC is more susceptible to noise than MINERR.
RF	Radio Frequency
RPA	Radio Programming Application
RS-232	A set of standard specifications for the design of serial ports. An RS-232 port is a serial port which conforms to the EIA standards.
R/T	Receiver-Transmitter

-R- - Continued

RX	Receive

-S-

SA	Situational Awareness
SMB	Sub-Miniature B - a type of antenna connector
SMS	Short Messaging Service
Squelch (SQL)	The ability to mute the receive audio unless the radio receives the appropriate signal. Can be either digital squelch, tone squelch, or noise squelch.

-T-

TEK	Traffic Encryption Key
TNC	Threaded N-Connector - a type of antenna connector
TOD	Time-Of-Day
TRANSEC	Transmission Security
TX	Transmit

-U-

UHF	Ultra High Frequency
UTC	Universal Coordinated Time - International basis for civil and scientific timekeeping (see Zulu).
UPS	Universal Polar Stereographic
UTM	Universal Transverse Mercator
UTM/UPS	Universal Transverse Mercator/Universal Polar Stereographic

-V-

VAA	Vehicular Adapter Amplifier
VAU	Vehicular Adapter Unit
VHF	Very High Frequency
VOC	Voice
Volatile	Information that is lost when a unit is turned off.

-W-

WBFSK	Wideband Frequency Shift Keying
WIP	Wireless Internet

-X-

XCVR	Transceiver
XMT	Transmit
XMTR	Transmitter

-Y-

-Z-

Zeroize	A command sequence which erases all programmed channel parameter and option settings.
Zulu	Greenwich Mean Time - International basis for civil and scientific timekeeping (see UTC).

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