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Operator's Manual

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UNITY® XG-100M Mobile Radio

Full-Spectrum Multiband Radio
With CH-721 Control Head

MANUAL REVISION HISTORY

REV	DATE	REASON FOR CHANGE
-	May/11	Initial Release.
A	Oct/11	Added antenna.

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1 SAFETY SYMBOL CONVENTION

The following conventions are used throughout this manual to alert the user to general safety precautions that must be observed during all phases of operation, service, and repair of this product. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the product. Harris Corporation assumes no liability for the customer's failure to comply with these standards.

The WARNING symbol calls attention to a procedure, practice, or the like, which, if not correctly performed or adhered to, could result in personal injury. Do not proceed beyond a WARNING symbol until the conditions identified are fully understood or met.

The **CAUTION** symbol calls attention to an operating procedure, practice, or the like, which, if not performed correctly or adhered to, could result in a risk of danger, damage to the equipment, or severely degrade the equipment performance.

The **NOTE** symbol calls attention to supplemental information, which may improve system performance or clarify a process or procedure.

The **ESD** symbol calls attention to procedures, practices, or the like, which could expose equipment to the effects of **E**lectro-**S**tatic **D**ischarge. Proper precautions must be taken to prevent ESD when handling circuit modules.

2 RF ENERGY EXPOSURE INFORMATION

2.1 RF ENERGY EXPOSURE AWARENESS, CONTROL INFORMATION, AND OPERATION INSTRUCTIONS FOR FCC OCCUPATIONAL USE REQUIREMENTS

Before using your mobile two-way radio, read this important RF energy awareness and control information and operational instructions to ensure compliance with the FCC's RF exposure guidelines.

NOTE

This radio is intended for use in occupational/controlled conditions, where users have full knowledge of their exposure and can exercise control over their exposure to meet FCC limits. This radio device is NOT authorized for general population, consumer, or any other use.

CAUTION

Changes or modifications not expressly approved by Harris could void the user's authority to operate the equipment.

This two-way radio uses electromagnetic energy in the radio frequency (RF) spectrum to provide communications between two or more users over a distance. It uses RF energy or radio waves to send and receive calls. RF energy is one form of electromagnetic energy. Other forms include, but are not limited to, electric power, sunlight, and x-rays. RF energy, however, should not be confused with these other forms of electromagnetic energy, which, when used improperly, can cause biological damage. Very high levels of x-rays, for example, can damage tissues and genetic material.

Experts in science, engineering, medicine, health, and industry work with organizations to develop standards for exposure to RF energy. These standards provide recommended levels of RF exposure for both workers and the general public. These recommended RF exposure levels include substantial margins of protection. All two-way radios marketed in North America are designed, manufactured, and tested to ensure they meet government established RF exposure levels. In addition, manufacturers also recommend specific operating instructions to users of two-way radios. These instructions are important because they inform users about RF energy exposure and provide simple procedures on how to control it. Please refer to the following websites for more information on what RF energy exposure is and how to control your exposure to assure compliance with established RF exposure limits.

http://www.fcc.gov/oet/rfsafety/rf-faqs.html

http://www.osha.gov./SLTC/radiofrequencyradiation/index.html

2.1.1 Federal Communications Commission Regulations

Your Harris Unity mobile two-way radio is designed and tested to comply with the FCC RF energy exposure limits for mobile two-way radios before it can be marketed in the United States. When two-way radios are used as a consequence of employment, the FCC requires users to be fully aware of and able to control their exposure to meet occupational requirements. Exposure awareness can be facilitated by the use of a label directing users to specific user awareness information. Your Harris Unity two-way radio has an RF exposure product label. Also, your Unity Installation and Operator's Manuals include information and operating instructions required to control your RF exposure and to satisfy compliance requirements.

2.2 COMPLIANCE WITH RF EXPOSURE STANDARDS

Your Harris Unity mobile two-way radio is designed and tested to comply with a number of national and international standards and guidelines (listed below) regarding human exposure to RF electromagnetic energy. This radio complies with the IEEE and ICNIRP exposure limits for occupational/controlled RF exposure environment at duty factors of up to 50% talk-50% listen and is authorized by the FCC for occupational use. In terms of measuring RF energy for compliance with the FCC exposure guidelines, your radio antenna radiates measurable RF energy only while it is transmitting (talking), not when it is receiving (listening) or in standby mode.

Your Harris Unity mobile two-way radio complies with the following RF energy exposure standards and guidelines:

- United States Federal Communications Commission (FCC), Code of Federal Regulations; 47 CFR §§ 2 sub-part J.
- American National Standards Institute (ANSI)/Institute of Electrical and Electronic Engineers (IEEE) C95.1-2005.
- Institute of Electrical and Electronic Engineers (IEEE) C95.1-2005.
- IC standard RSS-102, Issue 2, 2005: "Spectrum Management and Telecommunications Radio Standards Specification. Radiofrequency Exposure Compliance of Radio communication Apparatus (All Frequency Bands).

CAUTION

Table 2-1 lists the recommended minimum lateral distance for a controlled environment and for unaware bystanders in an uncontrolled environment, from transmitting types of antennas (i.e., monopoles over a ground plane, or dipoles) at rated radio power for mobile radios installed in a vehicle. Transmit only when unaware bystanders are at least the uncontrolled recommended minimum lateral distance away from the transmitting antenna.

2.2.1 Mobile Antennas (Vehicle Installations)

Table 2-1: Recommended Minimum Safe Lateral Distance from a Transmitting Antenna Connected to a Unity XG-100M Mobile Radio

RF BAND	ANTENNA PART NUMBERS	RECOMMENDED MINIMUM LATERAL HUMAN BODY DISTANCE FROM TRANSMITTING ANTENNA	
		CONTROLLED ENVIRONMENT	UNCONTROLLED ENVIRONMENT
VHF	AN-125001-002 (mount) with 12099-0310-01 (element)	28.3 inches (72 centimeters)	63.0 inches (160 centimeters)
	AN-125001-004 (mount) with 12099-0310-01 (element)		
	AN-125001-006 (mount) with 12099-0310-01 (element)		
	AN-125001-008 (mount) with 12099-0310-01 (element)		
	AN-125001-002 (mount) with 12099-0330-01 (element)		
	AN-125001-004 (mount) with 12099-0330-01 (element)		

Table 2-1: Recommended Minimum Safe Lateral Distance from a Transmitting Antenna Connected to a Unity XG-100M Mobile Radio

RF BAND	ANTENNA PART NUMBERS	RECOMMENDED MINIMUM LATERAL HUMAN BODY DISTANCE FROM TRANSMITTING ANTENNA	
		CONTROLLED ENVIRONMENT	UNCONTROLLED ENVIRONMENT
UHF	AN-125001-002 (mount) with 12099-0310-01 (element)	24.4 inches (62 centimeters)	54.3 inches (138 centimeters)
	AN-125001-004 (mount) with 12099-0310-01 (element)		
	AN-125001-006 (mount) with 12099-0310-01 (element)		
	AN-125001-008 (mount) with 12099-0310-01 (element)		
	AN-125001-002 (mount) with 12099-0330-01 (element)	33.9 inches 86 cm	75.6 inches 192 cm
	AN-125001-004 (mount) with 12099-0330-01 (element)		
700/800 MHz	AN-125001-002 (mount) with 12099-0310-01 (element)	7.9 inches (20 centimeters)	19.7 inches (50 centimeters)
	AN-125001-004 (mount) with 12099-0310-01 (element)		
	AN-125001-006 (mount) with 12099-0310-01 (element)		
	AN-125001-008 (mount) with 12099-0310-01 (element)		
	AN-125001-002 (mount) with 12099-0330-01 (element)	7.9 inches (20 centimeters)	24 inches (61 centimeters)
	AN-125001-004 (mount) with 12099-0330-01 (element)		

* Install the radio's antenna (refer to Table 2-1 for applicable antenna part numbers) in the center of the vehicle's roof. These mobile antenna installation guidelines are limited to metal body motor vehicles or vehicles with appropriate ground planes. The antenna installation should additionally be in accordance with the following:

- The requirements of the antenna manufacturer/supplier included with the antenna.
- Instructions in the Unity Radio Installation Manual, including minimum antenna cable lengths.
- The installation manual providing specific information of how to install the antennas to facilitate recommended operating distances to all potentially exposed persons.

Use only the Harris approved/supplied antenna(s) or approved replacement antenna. Unauthorized antennas, modifications, or attachments could damage the radio and may violate FCC regulations.

2.2.2 Approved Accessories

This radio has been tested and meets the FCC RF guidelines when used with the Harris accessories supplied or designated for use with this product. Use of other accessories may not ensure compliance with the FCC's RF exposure guidelines, and may violate FCC regulations.

For a list of approved accessories refer to the product manuals, the Products and Services Catalog, or contact Harris at 1-800-368-3277.

2.2.3 Contact Information

For additional information on exposure requirements or other information, contact Harris at 1-800-528-7711 or at www.pspc.harris.com.

2.3 REGULATORY APPROVALS

2.3.1 Part 15

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

2.3.2 Industry Canada

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

3 OPERATION SAFETY RECOMMENDATIONS

3.1 TRANSMITTER HAZARDS

The operator of any mobile radio should be aware of certain hazards common to the operation of vehicular radio transmitters. A list of several possible hazards is given:

- **Explosive Atmospheres –** Just as it is dangerous to fuel a vehicle with the motor running, similar hazards exist when operating a mobile radio. Be sure to turn the radio off while fueling a vehicle. Do not carry containers of fuel in the trunk of a vehicle if the radio is mounted in the trunk.

  Areas with potentially explosive atmosphere are often, but not always, clearly marked. Turn OFF your radio when in any area with a potentially explosive atmosphere. It is rare, but not impossible that the radio or its accessories could generate sparks.

- **Interference to Vehicular Electronics Systems –** Electronic fuel injection systems, electronic anti-skid braking systems, electronic cruise control systems, etc., are typical electronic systems that can malfunction due to the lack of protection from radio frequency energy present when transmitting. If the vehicle contains such equipment, consult the dealer and enlist their aid in determining the expected performance of electronic circuits when the radio is transmitting.

- **Electric Blasting Caps –** To prevent accidental detonation of electric blasting caps, **DO NOT** use two-way radios within 1000 feet of blasting operations. Always obey the "**Turn off Two-Way Radios**" signs posted where electric blasting caps are being used. (OSHA Standard: 1926-900)

- **Liquefied Petroleum (LP) Gas Powered Vehicles –** Mobile radio installations in vehicles powered by liquefied petroleum gas with the LP gas container in the trunk or other sealed-off space within the interior of the vehicle must conform to the **N**ational **F**ire **P**rotection **A**ssociation standard **NFPA 58** requiring:
  - The LP gas container and its fittings.
  - Outside filling connections shall be used for the LP gas container.
  - The LP gas container shall be vented to the outside of the vehicle.

3.2 SAFE DRIVING RECOMMENDATIONS

(Recommended by AAA)

- Read the literature on the safe operation of the radio.
- Keep both hands on the steering wheel and the microphone in its hanger whenever the vehicle is in motion.
- Place calls only when the vehicle is stopped.
- When talking from a moving vehicle is unavoidable, drive in the slower lane. Keep conversations brief.
- If a conversation requires taking notes or complex thought, stop the vehicle in a safe place and continue the call.
- Whenever using a mobile radio, exercise caution.

4 OPERATING RULES AND REGULATIONS

Two-way FM radio systems must be operated in accordance with the rules and regulations of the local, regional, or national government.

In the United States, the Unity mobile radio must be operated in accordance with the rules and regulations of the Federal Communications Commission (FCC). As an operator of two-way radio equipment, you must be thoroughly familiar with the rules that apply to your particular type of radio operation. Following these rules helps eliminate confusion, assures the most efficient use of the existing radio channels, and results in a smoothly functioning radio network.

When using your two-way radio, remember these rules:

- It is a violation of FCC rules to interrupt any distress or emergency message. As your radio operates in much the same way as a telephone "**party line**," always listen to make sure that the channel is clear before transmitting. Emergency calls have priority over all other messages. If someone is sending an emergency message – such as reporting a fire or asking for help in an accident – ***KEEP OFF THE AIR!***
- The use of profane or obscene language is prohibited by Federal law.
- It is against the law to send false call letters or false distress or emergency messages. The FCC requires that you keep conversations brief and confine them to business. To save time, use coded messages whenever possible.
- Using your radio to send personal messages (except in an emergency) is a violation of FCC rules. You may send only those messages that are essential for the operation of your business.
- It is against Federal law to repeat or otherwise make known anything you overhear on your radio. Conversations between others sharing your channel must be regarded as confidential.
- The FCC requires that you identify yourself at certain specific times by means of your call letters. Refer to the rules that apply to your particular type of operation for the proper procedure.
- No changes or adjustments shall be made to the equipment except by an authorized or certified electronics technician.


NOTE

Under U.S. law, operation of an unlicensed radio transmitter within the jurisdiction of the United States may be punishable by a fine of up to $10,000, imprisonment for up to two (2) years, or both.

The following conditions tend to reduce the effective range of two-way radios and should be avoided whenever possible:

- Operating the radio in areas of low terrain, or while under power lines or bridges.
- Obstructions such as mountains and buildings.
- In areas where transmission or reception is poor, some improvement can be obtained by moving a few yards in another direction or moving to a higher elevation.

5 PRODUCT DESCRIPTION

The Unity mobile is a state-of-the-art radio designed to meet the critical demands of its users. The XG-100M provides full-spectrum multiband coverage:

- 30 to 50 MHz, VHF Low (Receive Only)
- 136 to 174 MHz, VHF High (5 – 50 W)
- 380 to 520 MHz, UHF-Low, UHF-High (5 – 50 W)
- 762 to 805 MHz, 700 MHz (2 – 30 W)
- 805 to 870 MHz, 800 MHz (2 – 35 W)

The XG-100M has the following capabilities:

- Project 25 (P25) Conventional
- P25 Trunking
- Analog FM
- Advanced Encryption Standard, 256-bit (AES-256)
- Digital Encryption Standard Output Feedback (DES-OFB) Encryption
- Digital Encryption Standard Cipher Feedback (DES-CFB) Encryption
- Global Positioning System (GPS)
- P25 Trunking Over The Air Rekey (OTAR)
- Preemptive Priority Scanning
- Feature Management (Using Radio Personality Manager [RPM] R7A or later)

The XG-100M mobile radio supports the CH-721 Control Head which is available in System and Scan models. The display is designed to maximize readability and ease of use. The CH-721 utilizes a 3-line 12-character alphanumeric display with large buttons, volume knob, and channel knob, providing a user-friendly interface.

For remote mount installations configured with a CH-721 control head, all normal radio operations and interfaces can be handled via the control head connected to the radio unit via a 3-wire Controller Area Network (CAN) cable. Two CH-721 control heads may be attached to the XG-100M. Each control head provides a serial access point for data and any one (only one at a time) can be connected to a data device such as a personal computer.

Where multiple control heads are connected or where a dash-mount radio is installed with an additional remote control head, the following features are available from both positions:

- Either control head can initiate a call but only one can talk at a time. The other connected control head hears both sides of the conversation.
- Incoming and outgoing audio can be heard.
- Independent audio control is available.
- Radio settings such as talk group, scan mode etc., can be controlled by either control head.
- Comfort settings, such as volume and display brightness that are applicable to the individual control head can be adjusted and cannot be overridden by the other control head.

6 OPERATION

6.1 TURN THE RADIO ON

Rotate the **POWER ON-OFF/VOLUME** knob clockwise, out of detent to turn the radio on. A short beep (if enabled through programming) indicates the radio is ready for operation. The display indicates, if programmed, the last selected system name on line 1 and the last selected group or channel name on line two.

6.2 CH-721 FRONT PANEL COMPONENTS

The front panel of the control head includes a dot matrix display, controls for menu navigation, an emergency button, three pre-set buttons, a Power On-Off/Volume Control knob, and a microphone connector. In addition, the system model control head features a DTMF keypad.

Table 6-1 lists all default front panel controls and their functions. All functions and controls of the Scan radio operate the same as the corresponding functions and controls on the System radio.

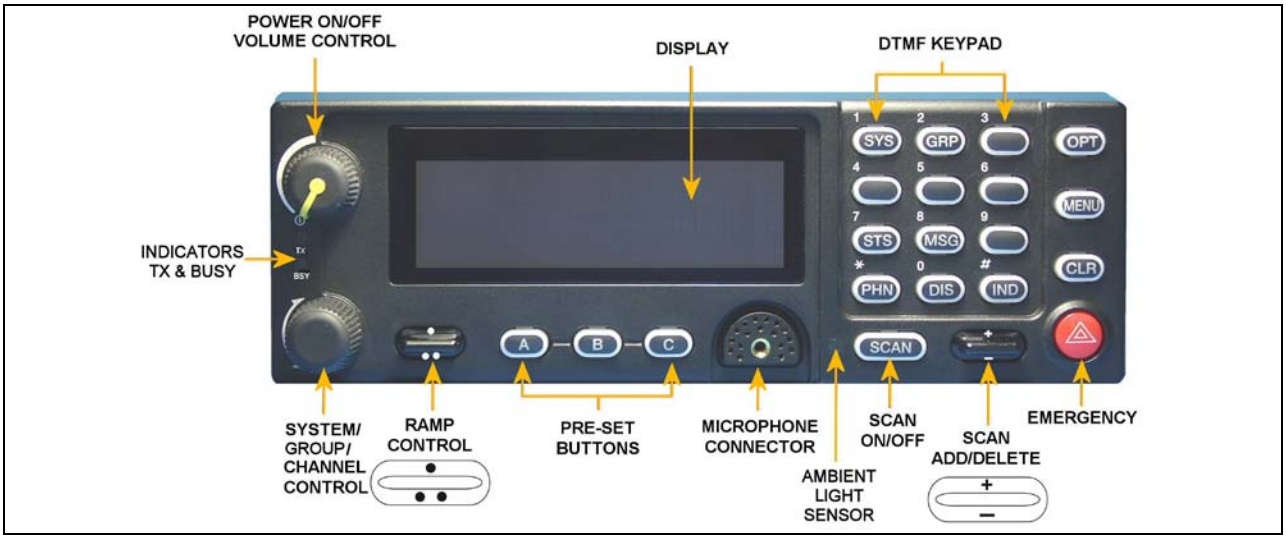


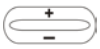
Figure 6-1: System Model

Figure 6-2: Scan Model

NOTE

Button function may vary depending upon system programming, radio hardware, and optional configurations. Complete the table in Section 9 if the keys have been remapped to provide new functions.

Table 6-1: Front Panel Default Controls and Functions

PART	FUNCTION
Power On-Off/Volume Control knob	Turn knob clockwise to power on the radio and increase volume. Turn counter-clockwise to decrease volume and power off the radio.
Mic Connection	Connection for hand-held, hands-free, speaker-mic, or headset.
	Declares an emergency, if enabled through programming.
Ambient Light Sensor	Radio automatically adjusts the display and button backlight brightness level based on ambient light. Do not block this sensor.
	This rotary switch selects the systems or groups/channels, depending upon programming.
	This rocker type button is used to display the current SCAN status for a group/channel and then add or delete the group/channel from the system scan list. Pressing the add/delete button twice while the radio is actively receiving or three times when the radio is not receiving selects the last scanned channel (Last Scanned Channel Recall).
	The primary function of this rocker type button is to scroll through the System list or the Group/Channel list depending upon programming. The secondary function is to increment or decrement items within a list (phone list for example).
OPT/OPTION	Toggle a PC programmable feature ON and OFF.
CLR/CLEAR	Exits the current operation and removes all displays associated with it. The radio and display then return to the group receive state. In Conventional mode, pressing this button unmutes the receiver so activity on the selected channel can be monitored.
MENU	Primary function - access the menu list. This is a list of additional features not available directly from the keypad. Secondary function - activate a selected item within a list, similar to an enter key.
SCAN	Toggles scan operation ON and OFF.
Pre-Set buttons **A**, **B**, & **C**	Used to store and recall user-selectable parameters.
SYS	Used to enter the System select mode.
GRP	Used to enter the Group select mode.
STS	Permits the transmission of a pre-programmed status message to a P25 Trunked site.
MSG	Permits the transmission of a pre-programmed message to a P25 Trunked site.
DIS	Used to adjust the current display intensity and the keypad backlight level.
IND	Used to call an individual or make an all-call by selecting the individual call function.

6.3 KEYPAD LOCK/UNLOCK

1. Scroll through the menu until “KEY LOCK” is displayed.
2. Press **MENU**.

Press **MENU** and **OPTION** to unlock the keypad.

6.4 RADIO STATUS ICONS

Status icons are indicators that show the various operating characteristics of the radio.

Figure 6-3: Typical Display

Table 6-2: Icons and Descriptions

ICON	DESCRIPTION
	Indicates selected group or channel is in scan list.
	Indicates selected group or channel is programmed as Priority 1 in scan list.
	Indicates selected group or channel is programmed as Priority 2 in scan list.
	Indicates scan mode enabled.
	Volume bars – indicates relative volume level.
	Indicates the current channel is set up as an analog channel.
	Indicates the current channel is set up as a Project 25 (P25) channel.
	Indicates receiving or transmitting Encrypted Calls.
	Indicates a conventional channel enabled with Channel Guard Function.

6.5 RADIO MESSAGES

During radio operation, various messages are displayed on either line 1 or line 2. Typical messages include control channel status information, such as system busy or call denied, or messages associated with the radio's operation, (i.e., volume adjust). These messages are described as follows:

Table 6-3: Radio Messages

MESSAGE	NAME	DESCRIPTION
QUEUED	Call Queued	Indicates the system has placed the call in a request queue.
SYS BUSY	System Busy	Indicates the system is busy, no channels are currently available, the queue is full or an individual call is being attempted to a radio that is currently transmitting.
DENIED	Call Denied	Indicates the radio is not authorized to operate on the selected system.
CC SCAN	Control Channel Scan	Indicates the control channel is lost and the radio has entered the Control Channel Scan mode to search for the control channel.
WA SCAN	Wide Area Scan	Indicates the control channel is lost and the radio has entered the Wide Area Scan mode to search for a new system (if enabled through programming).
RXEMER	Receive Emergency	Indicates an emergency call is being received. This message is flashing on line 2.
TXEMER	Transmit Emergency	Indicates an emergency call has been transmitted. This message is flashing on line 2.
VOL=31	Volume Level	Indicates the current volume level. The volume level display ranges from OFF (silent) to 40 (loudest).
UNKNOWN	Caller's ID Not Received	Indicates that an individual call is being received, but the caller's ID was not received.
SYSC ON	System Scan Features ON	Indicates the System Scan features are enabled.
SYSC OFF	System Scan Features OFF	Indicates the System Scan features are disabled.
PA ON	Public Address ON	Indicates that the public address function of the radio is enabled.
PA OFF	Public Address OFF	Momentary (2 seconds) - indicates that public address function of the radio was disabled.
ALRM ON	External Alarm Enabled	Indicates that the external alarm function of the radio is enabled.
ALRM OFF	External Alarm Disabled	Momentary (2 seconds) - indicates that the external alarm function of the radio was disabled.
PVT DIS	Private Mode Disabled	Indicates that private mode is disabled.
FRCD PVT	Forced Private Operation	Indicates that forced private operation has been pre-programmed into radio.
NO KEY #	Encryption Key Missing	Flashing - indicates that no encryption key or an incorrect encryption key is programmed into the radio.
BCKL=1-6	Backlight	Indicates the display intensity and keypad backlight level.
GR	Group ID	Indicates that the call is a group call and is followed by the radio unit ID of the caller.
ID	Individual ID	Indicates the call is an individual call and the ID number of the caller, example "ID 2725."
WHC=1	Who Has Called	This display indicates the number from the *Who Has Called* list. Individual calls received but not responded to are stored in a *Who Has Called* list. This list is accessible by pressing the # key and then the INDV key after the Individual call has timed out or the Clear button is pressed. This display is on line 2 and the LID of the caller is displayed on the top line. Currently the list is not implemented and the display is always WHC=1.
MENU		Displayed when the menu key is pressed and remains displayed in line 1 until a menu item is selected.
SYS=1-64	System = 1 - 64	The system number for the current base station of the system displayed in line 1. It is displayed in line 2 of the display. Press the system key to obtain this display.

MESSAGE	NAME	DESCRIPTION
GRP=1-1250	Group = 1 - 1250	The group number of the group displayed in line 2 of display. It is displayed in line 1 of the display. Press the group key to obtain this display. The maximum number of groups programmed in a radio is determined by the personality.
INDV=1-255	Individual = 1 - 255	Indicates which item in the individual call list is being displayed. It is displayed in line 2 of the display. The name or ID of the item in the list is displayed in line 1 of the display.
SEL INDV	Select Individual ID	Displayed on line 1 when an entry from the individual ID list is selected after pressing the INDV key. The entry is a number between 1 and 32 inclusive.
SYS ALL	System All Call	Displayed on line 1 to indicate a system all-call has been received.
Ggg-v.vv	Code Group and Revision Number	This is code group and revision number that is displayed in line 2 when the menu item "REVISION" is selected. The 'gg' is the group number of the software. The first 'v' is the hardware version and 'vv' is the revision of the software.
NO ENTRY		Indicates that there is no data stored in one of the programmable items. The user programmable items are items 1 through 10 in each list.
INV SYS	Invalid System	Displayed when the current system is an invalid type.
INV CHAN	Invalid Channel	Displayed when the current system is valid, but the channel is invalid (the feature bit for one frequency band is turned off).
CHN=1-1000	Channel = 1 - 1000	Displayed on line 1 of the display. This is a conventional channel index displayed when the group key is pressed.
FIX LIST	Fixed List	The Priority scan list is fixed and cannot be changed using add or delete keys.
FIXED P1	Fixed Priority 1	The Priority 1 scan channel is fixed and cannot be changed using add or delete keys.
EM	Emergency	Indicates an emergency has been declared by the LID that follows the display, "EM." An example of this is "EM 01201."
INDV	Individual Call	Displayed in line 2 of the display when an individual call is in progress.
SPKR ON	External Speaker ON	Displayed when the external speaker is enabled.
SPKR OFF	External Speaker OFF	Displayed when the external speaker is disabled.
BANK=1-8		The bank of keys that are going to be loaded when the keyloader loads encryption keys. This is only valid for radios that support VGS, VGE, or DES encryption. It is displayed on line 2 of the display when the encryption keyloader is connected.
REGR_0x	Dynamic Regroup	Indicates which group in the dynamic regroup operation has been enabled, where "x" is a digit of 1 to 8.
KEY LOAD		Displayed on line 1 of the display when the encryption keyloader is connected.
KEY ZERO		Displayed on line 2 of the display when the reset and option buttons are pressed simultaneously for approximately two seconds. The encryption keys are zeroed.
SYS KEY	System Key	Displayed on line 1 of the display in the display key mode of the menu. It is followed in the second line with a key number "KEY = <1..7>."
GRP KEY	Group Key	Displayed on line 1 of the display in the display key mode of the menu for trunked systems only. It is followed in the second line with a key number "KEY = <1..7>."
KEY=1-7		Displayed on line 2 of the display in the display key mode of the menu for conventional systems when the "SYS KEY" or "CHN KEY" is displayed in line 1 and for trunked systems when the "SYS KEY" or "GRP KEY" is displayed in line 1.
PRIMARY		Displayed on line 1 of the display when the primary keys are enabled.
PRS NAME	Personality Name	Displayed on line 1 of the display under the revision selection of the menu. The personality name is displayed on line 2 at the same time.
BND SCAN	Band Scan	**Only displayed if the P25T system is configured for "EnhancedCC" mode of operation.** When the radio cannot find a Control Channel in either the trunked frequency set or the list of discovered adjacencies, the radio is able to perform a full spectrum frequency scan to find a new Control Channel.
REGISTER		Displayed when the radio is performing a registration/affiliation on a P25 trunking site.

6.6 ALERT TONES

The Unity mobile radio also provides audible alert tones or “beeps” to indicate the various operating conditions. These alert tones can be enabled or disabled through programming.

Table 6-4: Alert Tones

NAME	TONE	DESCRIPTION
Call Originate	A short mid-pitched tone.	Sounds after keying the radio (Push-To-Talk button is pressed). Indicates the radio has been assigned a working channel.
Autokey	A mid-pitched tone.	After being placed in a queue or releasing the PTT button prior to a working channel assignment, the site calls the radio when a channel becomes available. At this point, the radio automatically keys the transmitter (autokey) for a short period to hold the channel. The radio sounds a mid-pitched tone when it is clear to talk. Immediately press the PTT button to keep the assigned channel.
Call Queued	A high-pitched tone.	Sounds after pressing the PTT button indicating the system has placed the call request in the queue. The receiving unit(s) also sound(s) the tone to indicate they will receive a call shortly.
System Busy	Three low-pitched tones.	Sounds if the radio is keyed when the system is busy, if no channels are available for sending the message, if the call queue is full, or if an individual call is being attempted to a radio that is transmitting.
Call Denied	A low-pitched tone.	Indicates the radio is not authorized on the system that has been selected.
Carrier Control Timer	Five short high-pitched warning tones followed by a long low-pitched tone.	Sounds if the programmed time for continuous transmission is exceeded. The transmitter shuts down shortly after the alert, interrupting communications. Release and re-key the PTT button to maintain communications. This resets the carrier control timer and turns the transmitter back on.
Key Press Alert	A short tone.	Indicates a key has been pressed. A short low-pitched tone indicates no action was taken because the key is not active in the current mode.
Page (P25T Only)	Three high-pitched tones.	In P25 trunked mode, if the receiving radio accepts a page, both the receiving and transmitting radios emit three high-pitched tones.
Out of Range	One low pitched tone.	Indicates the radio is in Wide Area Scan. The radio periodically beeps when in Wide Area Scan.

6.7 MENU

The menu function accesses features that are not available directly from the keypad. The order and specific number of menu items available is configurable through programming. Upon radio power up, the menu item at the beginning of the menu list is always displayed first. Subsequent access to the menu function returns the last menu item shown in the display. To enter the menu mode, press **MENU**. Scroll through available menu items using the  ramp control to scroll through the list in increasing and decreasing order. The displayed menu item is made active by pressing **MENU**.

An example of the menu item selection process and menu item parameter change is detailed below for the contrast menu item.

1. Press **MENU** to enter the menu mode.
2. Press the  ramp control until the display shows:

M E N U
BACKLGHT

3. Press **MENU.**
4. Use the  ramp control to increase or decrease backlight brightness. Once the desired setting is reached, press **MENU** to store the value and return to the normal display.

For menu items that display radio information, use  to scroll through a list of informational displays. The menu items are listed in Table 6-5.

Table 6-5: Menu Item Information

MENU ITEM	DISPLAY	PARAMETER SETTINGS	COMMENT
Backlight Adjust	Menu Item: **BACKLGHT**		Increases or decreases the brightness of the backlight.
Radio Revision Information	Menu item: **REVISION**	Informational displays only; no user selectable settings.	Selects the information display to view.
Individual Call	Menu Item: **INDV**		Allows access to the Individual Call Feature.
Public Address	Menu item: **PUB ADDR**	ON, OFF	Public Address is toggled ON and OFF.
External Speaker	Menu item: **EXT SPKR**	ON, OFF	External Speaker is toggled ON and OFF.
Encryption Key Loading	Menu item: **KEY LOAD**	Up to 8 banks of 7 keys	Enables the radio to accept the loading of encryption keys.
Display Current Encryption Key(s)	Menu item: **DISP KEY**		Displays current encryption key number.
Scan	Menu item: **SCAN**	ON, OFF	Toggles scan function ON or OFF.
Private Mode	Menu Item: **PRIVATE**	ON, OFF	Toggles private function ON or OFF.
Scan Add	Menu item: **SCAN ADD**	S, 2 or 1	Adds group or channel to scan list.
Scan Delete	Menu item: **SCAN DEL**		Deletes group or channel from scan list.
Scan Add/Delete	Menu item: **SCAN A/D**	Toggle sequence S, 2, 1, S, ...	Changes present group or channel to next scan choice in scan list.
Home group or channel selection	Menu item: **HOME**		Changes to the group or channel defined for Home function.

MENU ITEM	DISPLAY	PARAMETER SETTINGS	COMMENT
System select	Menu item: **SYS**		Used to enter the system select mode and select a new system.
External alarm #2	Menu item: **EXTALRM2**	ON, OFF	Toggles external alarm #2 feature ON or OFF.
System and group selection	Menu item: **S/G1** - **S/G16**		Selects the system/group or channel programmed for the corresponding system/group key.
Mute	Menu item: **MUTE**	ON, OFF	Toggles the mute function ON or OFF to control the audio output from the selected radio.
Group selection	Menu item: **GRP**	Number of desired group	Used to enter the group select mode and select a new group.
Status Condition	Menu item: **STATUS**	0-9 = (n)umber of pre-programmed status	Transmits a pre-programmed status message.
Message Condition	Menu item: **MSG**	0-9 = (n)umber of pre-programmed message	Transmits a pre-programmed message.
Feature Encryption Display	Menu Item: **FEATURES**	Informational displays only; no user selectable settings	Indicates current features programmed into the radio as well as certain information required to add features to the radio.
System Scan Enable	Menu Item: **SYS SCAN**	ON, OFF	Toggles Wide Area System Scan ON and OFF.
Talk-around feature	Menu item: **TALK**	ON, OFF	Toggles Talk-around ON or OFF (transmit frequency changed to receive frequency).

6.8 FEATURE ENCRYPTION DISPLAY

Feature Encryption Display is available through the menu function and, if programmed, appears in the menu as "**FEATURES**." This data indicates current features programmed into the radio as well as information required to add features to the radio.

Once the feature has been accessed, all normal menu functions work. The user can scroll up or down through all of the entries.

Feature Encryption Display provides the ability to view, in the order displayed, the following:

- Serial number ROM data - serial number of the ROM
- Feature encryption data stream - used to enable features
- Number Fields - defines limits
- Features enabled - displays bit fields of enabled features

6.8.1 Serial Number ROM (12 Hex Digits)

Example:

To enable a feature in a radio, call Harris and ask for the ROM serial number. The serial number shown here is for example only.

6.8.2 Feature Encryption Data Stream

Example:

These data streams define the features the user has enabled in his radio and are required by Harris to enable other features. The data streams shown here are for example only. ***Note:*** There are four displays: FD1, FD2, FD3, and FD4. All four are required.

Number Fields

Example:

These number fields show the set limits of the of the user's radio as:

- SG# XXX - Maximum number of system/groups combination available
- SY# XXX - Maximum trunked system limit
- CH# XXX - Maximum number of conventional channels available

The user needs to know the limits of his radio before attempting to enable other features. The numbers shown here are for example only.

6.8.3 Features Enabled

These numbers indicate which features are enabled.

Example:

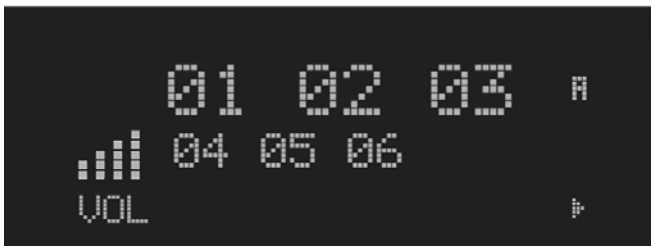


Table 6-6 lists possible features available in the user's radio.

Table 6-6: Available Feature Numbers

FEATURE NUMBER	POSSIBLE FEATURES	STANDARD OR OPTIONAL
01	Conventional Priority Scan	Standard
04	Group Scan (P25 Trunked)	Standard
05	Priority System Scan (P25 Trunked)	Optional
06	WAscan/ProScan (P25 Trunked)	Optional
07	Dynamic Regroup	Standard
10	Conventional Emergency	Standard
17	Status/Message (P25 Trunked)	Optional
23	Narrowband	Standard
29	ProVoice™	Optional
32	FIPS-140-2	Optional
33	P25 Common Air Interface	Optional
34	Direct Frequency Entry	Standard
37	AES and DES encryption.	Optional
41	VHF Low Band (30-50) Operation	Standard
42	VHF High Band (136-174) Operation	Standard
43	UHF Operation	Standard
44	700/800 Operation	Standard
45	DES-CFB	Optional
46	Vote Scan	Optional

6.9 SYSTEM/GROUP/CHANNEL SELECTION

The Unity **SYSTEM/GROUP/CHANNEL** knob and the  ramp control are programmable for maximum flexibility. By default, the SYSTEM/GROUP/CHANNEL knob is assigned to select groups and the  ramp control is assigned to select systems.

Either systems or groups/channels can also be selected by pressing the **SYS** or **GRP** button. After pressing the **SYS** or **GRP** button, use the  ramp control to scroll through available systems or groups/channels.

6.10 LAST SYSTEM/GROUP/CHANNEL RECALL

This feature, enabled through programming, allows the user to recall the last selected system/group after an emergency or home function or system/group key function. For example, if the Home button (pre-programmed) is pressed, the radio goes to the designated Home system/group or channel. If the Home button is pressed again, the radio returns to the previous system/group or channel. At this time, the user can toggle between the Home system/group or channel and the previous system/group or channel.

6.11 MACRO KEY OPERATION

Macro key operation permits the user to accomplish a series of keystrokes with a single "macro" keystroke. Up to ten (10) macro keys can be defined, each capable of executing up to twenty (20) keystrokes, to any pushbutton input (i.e., keypad keys, buttons, etc.). Each macro key can be pre-programmed to activate when pressed or when released.

A macro key can also be pre-programmed to change the keystroke sequence the next time the macro key is activated.

For detail operation and assignment of macro keys, contact your system administrator.

6.12 RECEIVE A CALL

1. Turn the radio on by rotating the POWER ON-OFF/VOLUME knob clockwise (out of detent). A short alert signal (if enabled through programming) indicates the radio is ready to use. If the radio is unable to obtain a control channel, line 2 shows **CC SCAN**.
2. Adjust the POWER ON-OFF/VOLUME knob to the desired volume level.
3. Select the desired system and group/channel. The display indicates the current system and group/channel names.
4. The radio is now ready to receive calls.
5. When the radio receives a call, it unmutes on the assigned working channel and the **BSY** indicator comes on. Line 1 shows **GR** followed by the logical ID number (if received) of the unit sending the message, or the associated name if the ID number is found in the individual call list.

6.13 TRANSMIT A CALL

1. Turn the radio on and set the POWER ON-OFF/VOLUME knob to the desired volume level. Select the desired system and group.
2. Press and hold the PTT button. The radio displays the system and group names and performs the necessary signaling required to obtain a communication channel.
3. When the working channel is assigned, **TX** and **BSY** indicators are turned ON and a short beep is sounded indicating communication can begin.


NOTE

If two or more tones, or a high-pitched tone is heard, the system may be busy and the call request has been placed in queue or the request has been denied for some reason. Refer to the Section 6.6 for more details.

4. Hold the microphone approximately 2 inches from the mouth and speak in a normal voice.
5. Release the PTT button when the transmission is complete and listen for a reply.

6.14 EMERGENCY OPERATION

The radio's ability to declare an emergency, clear an emergency, remain locked on an emergency and group, and the emergency audio and display freeze can each be enabled or disabled through programming. When an emergency is declared, scanning stops and restarts after the emergency is cleared.

6.14.1 Receive an Emergency Call

When receiving an emergency call from the selected group and system, an alert beep sounds and the **BSY** indicator illuminates. The message ***RXEMER*** flashes in the display on line 2 until the emergency condition is cleared. Follow standard emergency procedures.

By default, The ID of the radio declaring an emergency appears in the display until the emergency hangtime expires. After the hangtime expires, the radio displays emergency (with no ID) until the emergency is cleared. If enabled via radio programming, the radio continues to display the ID of the radio declaring the emergency until the emergency is cleared.

6.14.2 Declare an Emergency

To send an emergency call to the selected system and group (or on an optionally pre-programmed emergency group), proceed as follows:

1. Press and hold the red emergency button for approximately one second. (This time is programmable and therefore could be longer or shorter. Check with the system administrator.) The radio transmits an emergency call request with the radio ID until an emergency channel assignment is received.
2. When the working channel assignment is received, the radio sounds a single beep (Autokey alert tone – see Table 6-4) indicating it is ready for voice transmission. *TXEMER* flashes on line 2 in the display until the emergency is cleared.
3. Press PTT and speak into the microphone in a normal voice.
4. Release PTT when the transmission is complete and listen for a reply.
5. The emergency can be cleared by pressing and holding the **CLR** button followed by pressing the red emergency button then releasing both buttons.

6.14.3 Emergency Lock

If Emergency Lock is enabled via radio programming, the radio locks on the group or channel after an emergency is declared. The radio user cannot change to another group or channel until the emergency is cleared.

6.15 ENCRYPTION

The XG-100M mobile radio supports AES, DES-OFB, and DES-CFB encryption. Encryption protects against unauthorized reception and use of radio communications. DES encryption uses 56-bit keys, while AES uses 128, 192, or 256-bit keys. Since every additional bit doubles the number of keys that must be attempted for decoding, this makes AES significantly more robust than DES.

When operating on a group or channel programmed for encryption, all transmissions are encrypted. The radio receives unencrypted and encrypted signals.

To enable or disable encryption for the system/group/channel displayed:

1. Scroll through the menu until **PRIVATE** is displayed.
2. Press the **MENU** button to toggle between encrypted and unencrypted.

Or

A button on the control head or HHC can be programmed to toggle encryption on or off.

 appears on the display when encryption is enabled.

6.16 WIDE AREA SYSTEM SCAN (TRUNKED ONLY)

The Unity mobile radio can be programmed for Wide Area System Scan (WA Scan) operation for multi-site applications. Upon the loss of the currently selected system's control channel, radios can be programmed to automatically scan the control channels of other systems. If a new control channel is found, the radio switches to the new system and sounds an alert tone.

If the radio cannot find the control channel of the selected system and begins WA Scan, the radio only scans for the priority system control channel if the priority system is in the WA Scan list.

1. Press **MENU** and then use the  ramp control to scroll through the selections until **SYS SCAN** is displayed.
2. Press **MENU** to toggle the System Scan state.
3. The **SYSC ON** or **SYSC OFF** display message is displayed for two seconds to show the new state.

6.17 PROSCAN

The radio can be programmed for ProScan system scan operation for multi-site applications. ProScan provides the radio with the ability to select a new system for the radio to communicate on when the selected system drops below a predefined level. This is accomplished by enabling each radio to analyze the signal quality of its current control channel and compare it with the signal quality of the control channel for each site in its adjacency scan list. The signal quality metric used for the ProScan algorithm is based on a combination of both Received Signal Strength Indicator (RSSI) and Control Channel Verification (CCV) measurements. When the selected system's signal quality level degrades below a pre-programmed level, the radio begins to look for a better control channel. Once a control channel that exceeds the pre-programmed parameters is found, the radio changes to the new system and emits a tone. If the control channel is completely lost, the radio enters Wide Area System Scanning and searches the programmed adjacent systems until a suitable control channel is found.

6.18 PRIORITY SYSTEM SCAN

The radio can also be programmed for Priority System Scan. To ensure that this feature operates correctly, the control channel of the priority system must be located on channel one unless you are using ProScan. The priority system is the desired or preferred system. While receiving the control channel of the selected system, the radio periodically leaves the selected system and searches for the control channel of the priority system at a programmable rate. The programmable rate is defined by the value in the Priority Scan Time control, (unless ProScan is enabled, as explained below). This priority scan timer is reset each time the PTT button is pressed or when a call is received. If the priority system control channel is found, or meets the predefined ProScan criteria, the radio automatically switches to the priority system.

6.18.1 When Wide Area System Scan is Enabled

If the radio cannot find the control channel of the selected system and begins Wide Area System Scan (WA Scan), the radio only scans for the priority system control channel if the priority system is in the WA Scan list.

6.18.2 When ProScan is Enabled

The radio monitors the priority system and switches to the priority system if the priority system meets the criteria defined in the "ProScan Options" dialog box. If ProScan is enabled, the rate at which the radio scans for the priority system is defined by the System Sample Time control.

6.19 SCAN OPERATION

Only groups or channels that are part of the radio's scan list are scanned. Groups/channels are added to the scan list on a per system basis through programming, the radio keypad, or both, dependent upon programming. The scan list can be changed by the user from the keypad unless programmed otherwise. Each system's scan list is retained in memory when the radio is turned off.

The following is a description of programmable scan features that should be helpful in understanding the Scan Operation of the radio:

Scan Hang Time - The delay time the radio waits before resuming scan after the push-to-talk is released or after the carrier has dropped a channel.

Transmit Select - The group the radio transmits on while scanning. The radio is programmed to transmit on either the scanned group or the selected group.

Scan List (privileges) - This feature allows or prohibits scan list changes by the user.

P1 Programming - Priority 1 programming is accomplished by one (and only one) of three methods:

- From the keypad, where the Priority programming is not fixed and does not follow the selected channel.
- Follows the selected channel.
- Fixed during PC programming and cannot be changed by the user.

P1 Always Scan - Determines if the Priority 1 Group is always scanned, regardless of the scan state set by the user.

P2 Programming – Priority 2 programming is accomplished by one two methods:

- From the keypad, where the Priority programming is not fixed and does not follow the selected channel.
- Fixed during PC programming and cannot be changed by the user.

6.19.1 Vote Scan

If vote scan is enabled via RPM, the radio automatically selects the strongest signal ensuring that the best audio quality is delivered to the user. If vote scan is enabled, the radio is always scanning. You cannot stop scanning, start normal scanning, or monitor the channel.

NOTE

If Talk-around is enabled, Vote Scan is turned off.

6.19.2 Add Groups/Channels to Scan List

1. With scan operation turned off, select the desired group/channel to add to the selected scan list.
2. Press (**+**) or (**-**) with  to display the current priority status of the group on line 1 for a time-out period.
3. While the status is displayed, press (**+**) with  to add the group to the scan list.  is displayed. This sets the selected group/channel for non-priority scanning.

4. Press (**+**) with  a second time to set the group to Priority 2.  is displayed.

5. Press (**+**) with  a third time to set the group to Priority 1.  is displayed in column 1, line 1. The priority level selection sequence only advances the group to the next higher priority level and stops at priority level 1. To select a lower priority level, the group must be deleted from the scan list and then added back to the scan list. Each new group added to the scan list starts at the lowest priority. If the Priority 1 and Priority 2 groups are already set and a new group is assigned as Priority 1 or Priority 2, the previously assigned group changes to non-priority scanning.

6.19.3 Delete Groups/Channels from Scan List

1. With scan operation turned off, select the desired group/channel to delete from the selected trunked system's group scan list.

2. Press (**+**) or (**-**) with  . The current scan status of the group is displayed for a time-out period.

3. Press (**-**) with  to delete the group from the scan list.  ,  or  turns off. Any group that is not in a scan list shows a blank when it is the selected channel.

6.19.4 Nuisance Delete

A group or channel can also be deleted from the scan list, if it is not the currently selected group by pressing (**-**) with  during scan operation while the radio is displaying the unwanted group or channel. The group or channel is deleted from the scan list in the same manner as using the steps above. Deletions performed in this manner do not remain deleted if the radio is turned off and then back on.

6.19.5 Turn Scan On

1. Toggle scan operation by pressing **SCAN**. The SCAN indicator  turns on when the radio is scanning.
2. When a group on the scan list receives a channel assignment, the radio unmutes on the assigned channel, the **BSY** indicator comes on, and the received scan group is displayed.
   - The radio continues scanning if a new group is selected when scan is on.
   - Pressing the PTT button when scan is on causes the radio to transmit on the displayed group or on the currently selected group depending on programming.
   - Pressing up with  when scan is on causes the radio to recall the scanned group that was last received. This group is recalled for a period equal to the scan hang time.

6.19.6 Priority Scanning

When scan is enabled and the Priority 1 and Priority 2 groups/channels have been identified, the radio listens to calls on those groups/channels and the selected group/channel. While receiving a scanned call, the radio continues to monitor the selected Priority 1 and Priority 2 groups/channels and drops the call if the selected group/channel or other higher priority call becomes active. During a Priority 2 call the radio continues to monitor for a Priority 1 call.

6.19.7 Turn Scan Off

Turn scan operation off by pressing **SCAN**. The radio resumes operation on the selected group.

6.20 INDIVIDUAL CALLS (P25 MODES ONLY)

6.20.1 Receive and Respond to an Individual Call

When the radio receives an individual call (a call directed only to the user's radio), it unmutes on the assigned working channel and turns on the **BSY** indicator. Line 1 shows "ID" followed by the logical ID number of the radio sending the message, or the associated name if the ID number is found in the individual call list. The individual call indicator displays ***INDV*** on line 2. The radio can be programmed to ring when an individual call is received. If enabled, the ring begins five seconds after the caller unkeys and continues until the PTT button, the **CLR** button, or **IND** is pressed.

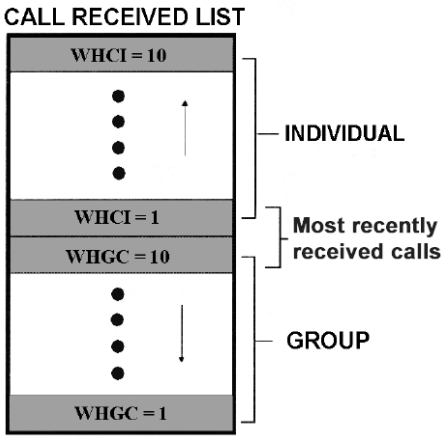
NOTE

Hookswitch functions the same as **CLR** key in I-CALL and menu modes.

If a response is made to the call prior to the programmed call-back time-out, the call is directed to the originating unit. If a response is not made before the call-back time-out, the radio returns to normal receive mode, but *** WHC *** is displayed. If the caller's ID is not received, **UNKNOWN** displays for the duration of the call and there is no call-back hang time.

To respond after the call-back time-out, press the **IND** key. The radio's display shows the callers ID on the first line and **WHCI=1** on the second line. Pressing the PTT button at this point initiates an individual call back to the original caller. If the last call was a group call, the display shows **WHCG=1**. Pressing the PTT button places the call as an individual call.

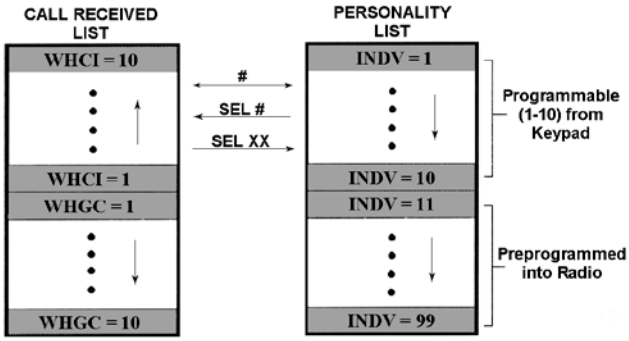
The radio stores the IDs of the last 10 callers in the Calls Received List as shown. Individual calls are stored in the top half of the list (1-10) and group calls are stored in the bottom half of the list (1-10). The most recent call is stored in position 1, the second most recent call is stored in position 2, etc.



To access the list, press the **IND** key twice. Use  to scroll through the list. Press the **MENU** key to display the time elapsed since the call was received.

6.20.2 Call Storage Lists

There are two lists available for call storage in the radio; the calls received list (1-10) and the personality list (1-99 as defined by the user). When the individual call mode is entered by pressing **IND**, the calls received list is available. The user can toggle to the personality list by selecting any key other than **DIS** or toggle between the two lists by pressing the **IND** key. If wrap is enabled, the calls received list wraps on itself and not into the other list.



The saved call list shows all ten storage locations. If no calls have been received, the saved call list is empty and the pre-stored list is available upon entering the individual call mode.

When in the saved call list, pressing **MENU** toggles the time stamp ON and OFF. The time stamp indicates how long ago the call was received. The display indicates this information as HH:MM:SS where HH = hours, MM = minutes and SS = seconds.

When in the pre-stored list, pressing **MENU** toggles the Logical Identification (LID) ON and OFF.

6.20.3 Send an Individual Call

The following procedures describe how to initiate and complete an individual call.

1. To select a previously stored individual, select the I-Call mode from the menu or press **IND** followed by the ramp control to scroll through the list of stored individuals. The selection mode rules apply. While in the individual call list, the menu key toggles the display between the call name and the unit ID number. If the individual is not stored in this list but the individual's unit ID is known, it can be entered directly from the keypad.
2. Press the PTT button; the radio performs the necessary signaling to obtain a communication channel. When the signaling is complete and the radio is clear to transmit, **TX** indicator turns ON and the channel access tone sounds. Line 1 shows the called individual's name if found in the list of stored individuals or ID followed by the logical ID number of the unit being called. The message ***INDV*** displays on line 2. Proceed with the call.

6.21 STATUS/MESSAGE OPERATION (P25 TRUNKED)

Status and message operation is possible with either the Scan or System version of the Unity mobile radio unit. The following procedure is applicable for the System version. For operation with the Scan version, the four primary keycaps must be reconfigured and pre-programmed for status/message operation.

6.21.1 Status Operation

Status operation permits the transmission of a pre-programmed status condition to the P25 Trunked site.

To send a status condition, press the **STS** button (keylight comes on) then press one of the number buttons (**0-9**) to select the pre-programmed status. If no status has been programmed for the selected number button, the radio displays **NO ENTRY** and the radio sounds a low tone. A valid selection permits the status text to appear in the display for a pre-programmed time. After the time-out expires or the **MENU** button has been pressed (the **MENU** button overrides the time-out period), the status is selected and is transmitted to the site or stored in the radio memory where it can be polled by the site at a future time. If the site receives the status properly, when transmitted or polled by the site, a high-pitched tone sounds and the keylight associated with that status remains lit. If the site does not receive the status properly, a low-pitched tone sounds and the keylight associated with the status blinks.

If an incorrect status was selected or the incorrect number button was pressed, the status can be changed during the pre-programmed time-out period by pressing another number button. The status selection can also be cancelled by pressing the **CLR** button prior to the time-out period.

To view the currently selected status after it has been transmitted, press the **STS** button. If the status was not sent successfully to the site, the text associated with the status flashes in the display.

The radio can also be pre-programmed to re-designate the keypad buttons for **ST0** thru **ST9** to send status condition. In this configuration the radio status operation operates as previously described except the **STS** button is not required. The keylight associated with **ST0** thru **ST9** indicates which status is selected.

6.21.2 Message Operation

Message operation permits the transmission of a pre-programmed message text to a P25 Trunked site.

To send a message, press the **MSG** button (keylight comes on) then press one of the number buttons (**0-9**) to select the pre-programmed message text. If no message text has been programmed for the selected number button, the radio displays **NO ENTRY** and a low-pitched tone sounds. A valid selection permits the message text to appear in the display for a pre-programmed time. After the time-out expires or the **MENU** button has been pressed (the **MENU** button overrides the time-out period), the message text is selected and is transmitted to the site. If the site receives the message properly when transmitted, a high pitched tone sounds and the **MSG** keylight remains lit. If the site does not receive the message properly, a low-pitched tone sounds and the **MSG** keylight blinks.

If an incorrect message text was selected or the incorrect number button was pressed, the message text can be changed during the pre-programmed time-out period by pressing another number button. The message text selection can also be cancelled by pressing the **CLR** button prior to the time-out period.

To view the currently selected message text after it has been transmitted, press the **MSG** button and then the **CLR** button prior to the time-out period. If the message text was not sent successfully to the site, the text associated with the message flashes in the display.

6.22 SQUELCH ADJUST (CONVENTIONAL)

In the conventional mode of operation, the squelch can be re-adjusted in the MENU selection mode or from a front panel key on the keypad that has been pre-programmed. A default value of 9, or any user level between 1 and 16, can be selected using programming software. The user can change this setting either of two ways from the front panel keys.

NOTE

A value of 16 requires a strong signal to open squelch, a value of 2 requires a very weak signal to open squelch, and a value of 1 is open squelch.

NOTE

When the squelch adjust feature is activated, Channel Guard and Scan are disabled. When the squelch adjust feature is exited, Channel Guard and Scan are restored to their previous states.

6.22.1 Menu Selection

1. Press the **MENU** key and then use the ramp control  to scroll through the selections until **SQUELCH** is displayed. Then press **MENU** (select) again.

2. The display shows **SQLCH=xx**, where "xx" is the value between 1 and 16.
3. Use the ramp control  to scroll through the values. Then press the **MENU** (select) key to save the new value after the display time-out (2 seconds). The displayed value is selected and saved.
4. If the **MENU** or **CLR** key is pressed before the time-out, the menu feature exits and the squelch level is not updated. The original value is restored.

6.22.2 Pre-Programmed Keypad Key

1. Press the pre-programmed key and the display indicates **SQLCH=xx**, where "xx" is the value between 1 and 16.
2. Use the ramp control  to scroll through the values. Then press **MENU** to save the new value or wait for the display time-out (2 seconds). The displayed value is selected and saved.
3. If the **CLR** key is pressed before the time-out, the squelch level is not updated and the original value is restored.

6.23 TALK-AROUND (CONVENTIONAL)

Talk-around provides short range, line of sight communications.

1. Make sure the radio is ON and then select the desired conventional system and channel.
2. If enabled via programming, press **MENU** and then use the  ramp control to scroll through the selections until **TALKARND** is displayed. Press **MENU** again to toggle Talk-around ON.

   or

   Press the pre-programmed button to toggle the Talk-around function ON.
3. Ensure that the channel is not busy by pressing the **CLR** (System version) or **CLEAR** (Scan version) to briefly disable any channel decoding and unmute the receiver or observe the unlit **BSY** indicator. If the TX Busy feature is programmed for the selected channel, the radio does not transmit when the channel is busy.
4. Press and hold the PTT button. The **TX** indicator illuminates and a short beep sounds (if pre-programmed) indicating that communication can begin.
5. Release the PTT button when the transmission is complete and listen for a reply.
6. When the communication is completed, press the pre-programmed button to toggle the Talk-around function OFF.

7 BASIC TROUBLESHOOTING

If the radio is not operating properly, check Table 7-1 for likely causes. For additional assistance, contact a qualified service technician.

Table 7-1: Basic Troubleshooting

SYMPTOM	CAUSE	SOLUTION
Radio will not turn on.	No power.	Test the connection to the vehicle power supply.
Radio will not turn off.	If in multiple control head configuration, one of the attached control heads is still powered up.	Power off all control heads.
No audio.	Speaker volume is muted.	Increase the volume level.
Poor audio.	Transmitting or receiving in a poor coverage area or subject to interference.	Check network connectivity and move to a better coverage area if possible. Report the area without coverage to an authorized network technician.
Poor display visibility.	Ambient Light Sensor is obstructed.	Clear the obstruction and give the sensor a clear path to ambient light.
Radio will not transmit.	Radio may be out of coverage area or may be overheated.	Return to coverage area if possible. If overheated, let radio cool before retrying transmission. Report this failure to an authorized technician.
Control head randomly changes display.	In multiple control head configurations, another user is operating the radio from another control head.	None
Encrypted calls cannot be made.	Not authorized to use.	Contact system administrator to request encryption privileges.

8 TECHNICAL ASSISTANCE

The Technical Assistance Center's (TAC) resources are available to help with overall system operation, maintenance, upgrades and product support. TAC is the point of contact when answers are needed to technical questions.

Product specialists, with detailed knowledge of product operation, maintenance and repair provide technical support via a toll-free (in North America) telephone number. Support is also available through mail, fax and e-mail.

For more information about technical assistance services, contact your sales representative, or call the Technical Assistance Center at:

North America:	1-800-528-7711
International:	1-434-385-2400
Fax:	1-434-455-6712
E-mail:	PSPC_tac@harris.com

9 KEYPAD REMAPPING

If the keys have been remapped to provide new functions, fill in the following template for future reference.

BUTTON	FUNCTION	BUTTON	FUNCTION
Emergency		1	
Preset A		2	
Preset B		3	
Preset C		4	
Rocker •		5	
Rocker ••		6	
Rocker +		7	
Rocker -		8	
MENU		9	
OPT/OPTION		*	
CLR/CLEAR		0	
SCAN		#	

10 RADIO SETUP

RADIO TYPE:

FREQUENCY BAND:

OPERATOR'S NAME:

EMERGENCY GROUP:

SYSTEM NUMBER	SYSTEM NAME	TRK/CNV	GRP/CHN NUMBER	GRP/CHN NAME	USE

SYSTEM NUMBER	SYSTEM NAME	TRK/CNV	GRP/CHN NUMBER	GRP/CHN NAME	USE

SYSTEM NUMBER	SYSTEM NAME	TRK/CNV	GRP/CHN NUMBER	GRP/CHN NAME	USE

SYSTEM NUMBER	SYSTEM NAME	TRK/CNV	GRP/CHN NUMBER	GRP/CHN NAME	USE

WARRANTY

Please register this product within 10 days of purchase. Registration validates the warranty coverage, and enables Harris to contact you in case of any safety notifications issued for this product.

Registration can be made on-line at http://www.pspc.harris.com/Service/WarrantySupport.asp.

A. Harris Corporation, a Delaware Corporation, through its RF Communications Division (hereinafter "Seller") warrants to the original purchaser for use (hereinafter "Buyer") that Equipment manufactured by or for the Seller shall be free from defects in material and workmanship, and shall conform to its published specifications. With respect to all non-Seller Equipment, Seller gives no warranty, and only the warranty, if any, given by the manufacturer shall apply. Rechargeable batteries are excluded from this warranty but are warranted under a separate Rechargeable Battery Warranty (ECR-7048).

B. Seller's obligations set forth in Paragraph C below shall apply only to failures to meet the above warranties occurring within the following periods of time from date of sale to the Buyer and are conditioned on Buyer's giving written notice to Seller within thirty (30) days of such occurrence:

1. for fuses and non-rechargeable batteries, operable on arrival only.
2. for parts and accessories (except as noted in B.1), ninety (90) days.
3. for XG-75, P7300, P7200, P7100^{IP}, P5500, P5400, P5300, P5200, P5100, P3300, M7300, M7200 (including V-TAC), M7100^{IP}, M5300 and M3300 radios, two (2) years, effective 10/01/2007.
4. for Unity® XG-100P, three (3) years.
5. for all other equipment of Seller's manufacture, one (1) year.

C. If any Equipment fails to meet the foregoing warranties, Seller shall correct the failure at its option (i) by repairing any defective or damaged part or parts thereof, (ii) by making available at Seller's factory any necessary repaired or replacement parts, or (iii) by replacing the failed Equipment with equivalent new or refurbished Equipment. Any repaired or replacement part furnished hereunder shall be warranted for the remainder of the warranty period of the Equipment in which it is installed. Where such failure cannot be corrected by Seller's reasonable efforts, the parties will negotiate an equitable adjustment in price. Labor to perform warranty service will be provided at no charge during the warranty period only for the Equipment covered under Paragraph B.3 and B.4. To be eligible for no-charge labor, service must be performed at Seller's factory, by an Authorized Service Center (ASC) or other Servicer approved for these purposes either at its place of business during normal business hours, for mobile or personal equipment, or at the Buyer's location, for fixed location equipment. Service on fixed location equipment more than thirty (30) miles from the Service Center or other approved Servicer's place of business will include a charge for transportation.

D. Seller's obligations under Paragraph C shall not apply to any Equipment, or part thereof, which (i) has been modified or otherwise altered other than pursuant to Seller's written instructions or written approval or, (ii) is normally consumed in operation or, (iii) has a normal life inherently shorter than the warranty periods specified in Paragraph B, or (iv) is not properly stored, installed, used, maintained or repaired, or, (v) has been subjected to any other kind of misuse or detrimental exposure, or has been involved in an accident.

E. The preceding paragraphs set forth the exclusive remedies for claims based upon defects in or nonconformity of the Equipment, whether the claim is in contract, warranty, tort (including negligence), strict liability or otherwise, and however instituted. Upon the expiration of the warranty period, all such liability shall terminate. The foregoing warranties are exclusive and in lieu of all other warranties, whether oral, written, expressed, implied or statutory. NO IMPLIED OR STATUTORY WARRANTIES OF MERCHANTABILITY OR FITNESS FOR PARTICULAR PURPOSE SHALL APPLY. IN NO EVENT SHALL THE SELLER BE LIABLE FOR ANY INCIDENTAL, CONSEQUENTIAL, SPECIAL, INDIRECT OR EXEMPLARY DAMAGES.

This warranty applies only within the United States.

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