

APX™ TWO-WAY RADIOS

APX 7000XE

MODEL 1

USER GUIDE





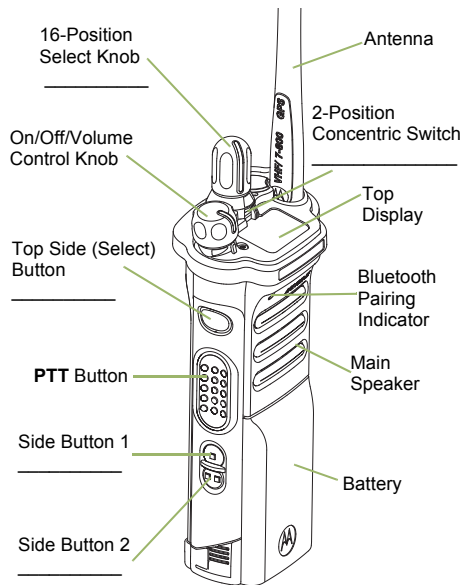
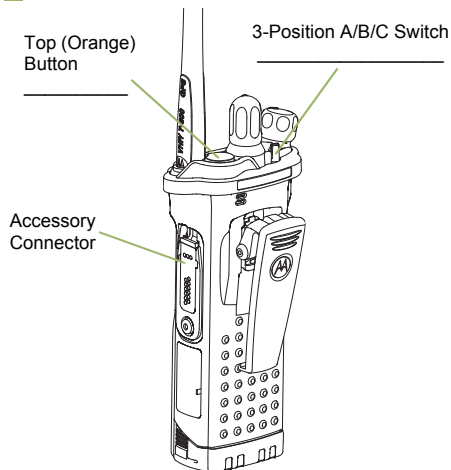
ASTRO® APX™ 7000XE Series Digital Portable Radios Quick Reference Card

RF Energy Exposure and Product Safety Guide for Portable Two-Way Radios

ATTENTION!

This radio is restricted to **Occupational use only**. Before using the radio, read the RF Energy Exposure and Product Safety Guide for Portable Two-Way Radios which contains important operating instructions for safe usage and RF energy awareness and control for Compliance with applicable standards and Regulations.

Radio Controls



Radio On/Off

- **On** – On/Off/Volume knob clockwise.
- **Off** – On/Off/Volume knob counterclockwise.

Zones and Channels

- **Zone** – Zone switch to desired zone.
- **Channel** – Channel switch to desired channel.

Receiving and Transmitting

- 1 Select zone/channel.
- 2 Listen for a transmission.
OR
Press and hold **Volume Set** button.
OR
Press **Monitor** button and listen for activity.
- 3 Adjust volume, if necessary.
- 4 Press the **PTT** button to transmit; release to receive.

Sending an Emergency Alarm

- 1 Press and hold the **Emergency** button*.
- 2 The display shows **EMERGENCY** and the current zone/channel. A short, medium-pitched tone sounds, and the LED blinks red momentarily.
- 3 When acknowledgment is received, you hear four beeps; alarm ends; and radio exits emergency.

* **Default emergency button press timer is set to 1 second.** This timer is programmable, see page 33 in the user guide for details.

To exit emergency at any time, press and hold the **Emergency** button.



PMLN5818E



English

■ Sending an Emergency Call

- 1 Press the **Emergency** button.
- 2 Press and hold the **PTT** button. Speak clearly into the microphone.
- 3 Release the **PTT** button to end call.
- 4 Press and hold **Emergency** button to exit emergency.











*To exit emergency at any time, press and hold the **Emergency** button.*













■ Sending a Silent Emergency Call

- 1 Press the **Emergency** button.
- 2 The display does not change; the LED does not light up, and there is no tone.
- 3 Silent emergency continues until you:
Press and hold the **Emergency** button to exit emergency state.
OR
Press and release the **PTT** button to exit the Silent Emergency Alarm mode and enter regular dispatch or Emergency Call mode.

*To exit emergency at any time, press and hold the **Emergency** button.*

■ Display Status Icons

	Blinks when the battery is low.
	The more stripes, the stronger the signal strength for the current site (trunking only).
	Direct radio to radio communication or connected through a repeater. On = Direct Off = Repeater
	This channel is being monitored.
	L = Radio is set at Low power. H = Radio is set at High power.
	Scanning a scan list.
	Blinking dot = Detects activity on the Priority-One Channel during scan. Steady dot = Detects activity on the Priority-Two Channel during scan.
	The vote scan feature is enabled.
	On = Secure operation. Off = Clear operation. Blinking = Receiving an encrypted voice call.
	On steady = View mode Blinking = Program mode

 A or  B or  C	Basic Zone Bank 1 A = Radio is in Zone 1. B = Radio is in Zone 2. C = Radio is in Zone 3.
 D or  E or  F	Basic Zone Bank 2 D = Radio is in Zone 4. E = Radio is in Zone 5. F = Radio is in Zone 6.
 A, B,  C  X or  Y	Enhanced Zone Bank A = Contains Zone 1, Zone 2 and Zone 3, B = Contains Zone 4, Zone 5 and Zone 6, C = Contains Zone 7, Zone 8 and Zone 9, . . . X = Contains Zone 70, Zone 71 and Zone 72, Y = Contains Zone 73, Zone 74 and Zone 75.
	Bluetooth is ready.
	Bluetooth is connected to the device.

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Declaration of Conformity

This declaration is applicable to your radio only if your radio is labeled with the FCC logo shown below.

Declaration of Conformity

Per FCC CFR 47 Part 2 Section 2.1077(a)



Responsible Party

Name: Motorola Solutions, Inc.

Address: 1303 East Algonquin Road, Schaumburg, IL 60196-1078, U.S.A.

Phone Number: 1-800-927-2744

Hereby declares that the product:

Model Name: **APX 7000XE**

conforms to the following regulations:

FCC Part 15, subpart B, section 15.107(a), 15.107(d) and section 15.109(a)

Class B Digital Device

As a personal computer peripheral, 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.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Additional FCC Note to Users

The following FCC information applies to Bluetooth radio options.

Model Name: MNUK6000

Description: APX 7000XE Bluetooth Option Board

FCC ID: AZ489FT6000

IC: 109U-89FT6000

Conforms to the following regulations: FCC Part 15, Section 15.19, 15.21, and 15.105

Note: Changes or modifications not expressly approved by Motorola may void the users authority, as authorized by the FCC, to operate this device and should not be made. See 47 CFR Part 15.21. Information to the user. The user manual or instruction manual for an intentional or unintentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

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. See 47 CFR Part. 15.19(3).

This device has been tested and found to comply with the limits of Part 15.15 of the FCC rules. Parties responsible for equipment compliance should note that the limits specified in this part will not prevent harmful interference under all circumstances.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. See Part 15.105b These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Industry Canada (IC) Statements:

This Class B digital apparatus complies with ICES-003 and Radio Standards Specification (RSS) 210. This product also complies with CAN ICES-3 (B) / NMB-3 (B).

Note: If the customers are purchasing the Bluetooth Option Board for the first time and their radios are FM approved, please send the radios back to the service center in order to keep the certification.

If customers have already purchased the radio with the Bluetooth Option Board as part of the tanapa and they need to replace (repair) the option board, they can send the radio to any Motorola FM audited.

Important Safety Information

RF Energy Exposure and Product Safety Guide for Portable Two-Way Radios

ATTENTION!

This radio is restricted to Occupational use only.

Before using the radio, read the RF Energy Exposure and Product Safety Guide for Portable Two-Way Radios which contains important operating instructions for safe usage and RF energy awareness and control for Compliance with applicable standards and Regulations.

For a list of Motorola-approved antennas, batteries, and other accessories, visit the following website:

<http://www.motorolasolutions.com/APX>

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

This radio transmitter has been approved by Industry Canada to operate with Motorola-approved antenna with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Software Version

All the features described in the following sections are supported by the radio's software version **R13.00.00** or later.

See [Accessing the Radio Information](#) to determine your radio software version.

Check with your dealer or system administrator for more details of all the features supported.

Notice to Users (FCC and Industry Canada)

This device complies with Part 15 of the FCC rules and RSS 210 of the Industry Canada rules per the following conditions:

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.
- Changes or modifications made to this device, not expressly approved by Motorola, could void the user's authority to operate this equipment.

Consignes de sécurité importantes

Radios bidirectionnelles portatives : exposition aux radiofréquences et sécurité du produit

ATTENTION!

Cette radio ne doit être utilisée qu'à des fins professionnelles. Avant d'utiliser la radio, lisez le guide Radios bidirectionnelles portatives : exposition aux radiofréquences et sécurité du produit, qui contient d'importantes instructions de fonctionnement pour une utilisation sécuritaire et des informations sur l'exposition aux fréquences radioélectriques, dans le but d'assurer votre conformité aux normes et règlements en vigueur.

Visitez le site Web suivant pour obtenir la liste des antennes, des batteries et des autres accessoires approuvés par Motorola :

<http://www.motorolasolutions.com/APX>

Selon la réglementation d'Industrie Canada, cet émetteur radio ne peut être utilisé qu'avec une antenne dont le type et le gain maximal (ou minimal) sont approuvés par Industrie Canada pour cet émetteur. Afin de limiter les interférences radio pour

les autres utilisateurs, le type et le gain de l'antenne doivent être choisis de façon à ce que la puissance isotrope rayonnée équivalente (P.I.R.E.) ne soit pas plus forte qu'il ne le faut pour établir la communication.

Cet émetteur radio a été approuvé par Industrie Canada pour utilisation avec une antenne approuvée par Motorola offrant le gain maximal autorisé et l'impédance requise pour le type d'antenne indiqué. Il est strictement interdit d'utiliser avec cet appareil tout type d'antenne ne figurant pas dans cette liste et présentant un gain supérieur au maximum indiqué pour le type.

Version logicielle

Toutes les fonctions décrites dans les sections suivantes sont prises en charge par la version **R13.00.00** ou les versions ultérieures du logiciel de la radio.

Pour obtenir davantage de renseignements à propos des fonctions prises en charge, adressez-vous à votre détaillant ou à votre administrateur de système.

Avis aux utilisateurs (FCC et Industrie Canada)

Cet appareil est conforme à la Partie 15 des règlements de la FCC et RSS 210 du règlement d'Industrie Canada selon les conditions énumérées ci-dessous:

- Ce dispositif ne doit pas causer d'interférences nuisibles.
- Cet appareil doit accepter toute interférence reçue, y compris les interférences qui peuvent perturber le fonctionnement.
- Les changements ou les modifications apportées à ce dispositif, non expressément approuvées par

Motorola, peuvent annuler le droit de l'utilisateur à utiliser cet équipement.

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The Motorola products described in this manual may include copyrighted Motorola computer programs stored in semiconductor memories or other media. Laws in the United States and other countries preserve for Motorola certain exclusive rights for copyrighted computer programs including, but not limited to, the exclusive right to copy or reproduce in any form the copyrighted computer program. Accordingly, any copyrighted Motorola computer programs contained in the Motorola products described in this manual may not be copied, reproduced, modified, reverse-engineered, or distributed in any manner without the express written permission of Motorola. Furthermore, the purchase of Motorola products shall not be deemed to grant either directly or by implication, estoppel, or otherwise, any license under the copyrights, patents or patent applications of Motorola, except for the normal non-exclusive license to use that arises by operation of law in the sale of a product.



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Getting Started

How to Use This Guide

This User Guide covers the basic operation of the APX Portables.

However, your dealer or system administrator may have customized your radio for your specific needs. Check with your dealer or system administrator for more information.

Notations Used in This Manual

Throughout the text in this publication, you will notice the use of **Warning**, **Caution**, and **Note**. These notations are used to emphasize that safety hazards exist, and the care that must be taken or observed.



Warning: An operational procedure, practice, or condition and so on, which may result in injury or death if not carefully observed.



Caution: An operational procedure, practice, or condition and so on, which may result in damage to the equipment if not carefully observed.

Note: An operational procedure, practice, or condition and so on, which is essential to emphasize.

Additional Performance Enhancement

The following performance enhancements are some of the latest creations designed to enhance the security, quality and efficiency of the radios.

ASTRO 25 Enhanced Data

ASTRO 25 Enhanced Data is optimized to handle different message sizes and variable update rates from different applications of the radio. Add Enhanced Data to the Integrated Data system with a software installation to improve data channel efficiency and enable denser network traffic.

Dynamic System Resilience (DSR)

DSR ensures the radio system is seamlessly switched to a backup master site dynamically in case of system failure. DSR also provides additional indication e.g. failure detection, fault recovery, and redundancy within the system to address to the user in need. Mechanisms related to the Integrated Voice and Data (IV&D) or data centric are all supported by DSR.

CrossTalk Prevention

This feature prevents crosstalk scenario from happening, especially when a wideband antenna is used. This feature allows the adjustment of the Trident Transmitting SSI clock rate in the radio to be varied from the Receiving Frequency. This subsequently reduced the possibilities of radio frequency interfering spurs and prevents the issues of crosstalk.

Encrypted Integrated Data (EID)

EID provides security encryption and authentication of IV&D data bearer service communication between the radio and the Customer Enterprise Network.

SecureNet

SecureNet allows user to perform secured communications on an Analog or Motorola Data Communication (MDC) channel. The MDC Over-the-Air Rekeying (OTAR) feature will allow users to perform OTAR activities on an MDC channel.

Conventional Talkgroup and Radio Scan Enhancements

A few enhancements have been made to the Conventional Talkgroup at the system. These

enhancements improve the Scan feature operation significantly when multiple agencies are using a single conventional radio frequency channel. These enhancements allow users to use Selective Squelch to operate on only the subset of talkgroups that are relevant to the users rather than all talkgroups on the channel. These Scan improvements have been made to eliminate the audio holes that were present and to turn on the busy LED when activity is present on the channel. Mixed Vote Scan and Standard Conventional Scan configurations are supported. Priority Operation is also supported.

Up to 30 different talkgroups can be supported using conventional channels. A maximum of four talkgroups can be supported when Vote Scan channels are being used.

Smart PTT is supported with this enhancement as Smart PTT prevents users from transmitting while other users are on the channel.

Note: User Selectable Talkgroups are not compatible with this Conventional Talkgroup Enhancement.

What Your Dealer/System Administrator Can Tell You

Check with your dealer or system administrator for the correct radio settings, if the radio is to be operated in extreme temperatures (less than $-30\text{ }^{\circ}\text{C}$ or more than $+60\text{ }^{\circ}\text{C}$), to ensure proper top and front display operation.

You can consult your dealer or system administrator about the following:

- Is your radio programmed with any preset conventional channels?
- Which buttons have been programmed to access other features?
- What optional accessories may suit your needs?

Preparing Your Radio for Use

This section provides simple instructions to prepare your radio for use.

Charging the Battery



Warning: To avoid a possible explosion:

- Do **not** replace the battery in any area labeled **hazardous atmosphere**.
- Do **not** discard batteries in a fire.

The Motorola-approved battery shipped with your radio is uncharged. Prior to using a new battery, charge it for a minimum of 16 hours to ensure optimum capacity and performance. For a list of Motorola-authorized batteries and chargers available for use with your radio, see [Accessories](#) on page 88.

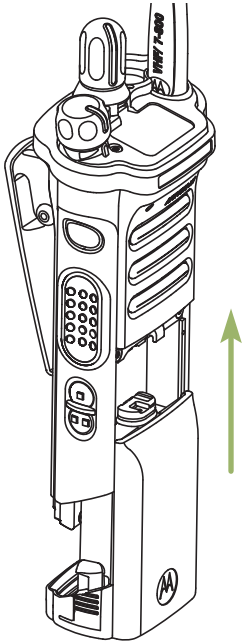
Note: When charging a battery attached to a radio, turn the radio off to ensure a full charge.

To charge the battery, place the battery (with or without the radio) in a Motorola-approved charger. The LED on the charger indicates the charging progress; see the charger user guide.

Attaching the Battery

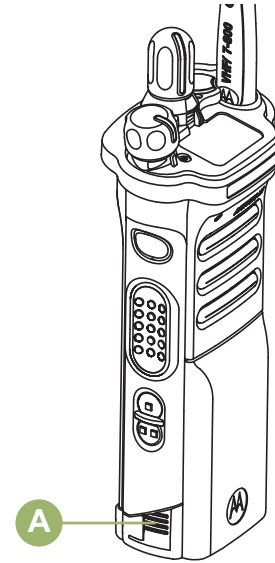
If your radio is preprogrammed with volatile-key retention, the encryption keys are retained for approximately 30 seconds after battery removal. Check with your dealer or system administrator for more information.

- 1 Slide the battery into the radio frame until the side latches click into place.



- 2 To remove the battery, squeeze the release latches **A** at the bottom of the battery until the battery releases from the radio and remove the battery from the radio.

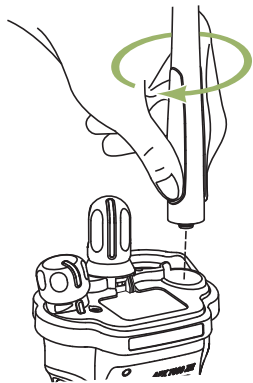
Note: When removing the battery, ensure that the radio is turned off.



Attaching the Antenna

Ensure the radio is turned off before attaching the antenna.

- 1 Set the antenna in its receptacle.
- 2 Turn the antenna clockwise to attach to the radio.



- 3 To remove the antenna, turn the antenna counterclockwise.

Note: When removing the antenna, ensure that the radio is turned off.

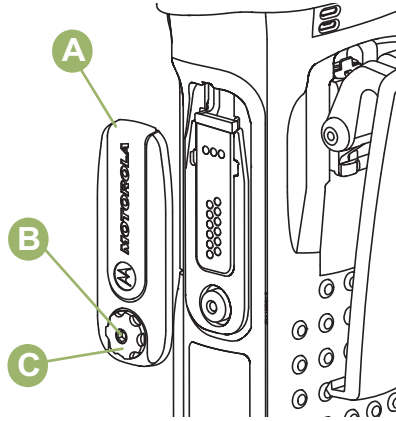
Removing and Attaching the Accessory Connector Cover

The accessory connector is located on the antenna side of the radio. It is used to connect accessories to the radio.

Note: To prevent damage to the connector, shield it with the connector cover when not in use.

- 1 To remove the accessory connector cover, rotate the thumbscrew **Ⓑ** counterclockwise until it disengages from the radio.

Note: If the thumbscrew is too tight, use an Allen wrench at **Ⓒ** to loosen it first.



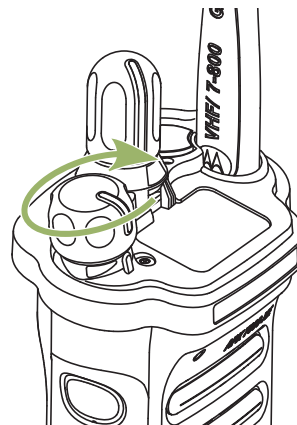
- 2 Rotate and lift the connector cover to disengage it from the radio.
- 3 To attach the accessory connector cover, insert the hooked end **A** of the cover into the slot above the connector.
- 4 Press downward on the cover's top to seat it in the slot.
- 5 Once in place, tighten by rotating the thumbscrew **B** clockwise by hand.

Attaching the Belt Clip

- 1 Align the grooves of the belt clip with those of the radio and press upward until you hear a click to attach the belt clip.



- 2 Use a flat-bladed object to press the belt clip tab away from the radio. Then, slide the clip downward and away from the radio to remove the clip.



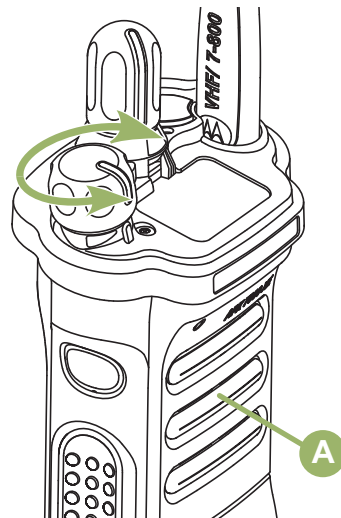
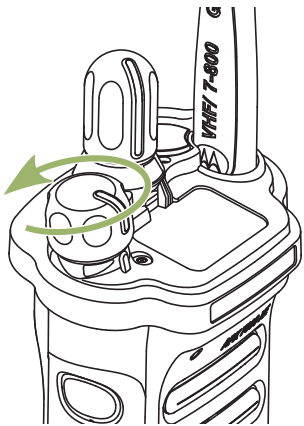
Turning On the Radio

- 1 Rotate the **On/Off/Volume Control Knob** clockwise until you hear a click.

- If the power-up test is successful, you see momentary **SELFTEST** on the radio display, followed by the Home screen.
- If the power-up test is unsuccessful, you see **ERROR XX/YY** (XX/YY is an alphanumeric code).

Note: If the radio fails to power-up after repeating a few times, record the **ERROR XX/YY** code and contact your dealer.

- 2 To turn off the radio, rotate the **On/Off/Volume Control Knob** counterclockwise until you hear a click.



- 2 To decrease the volume, rotate this knob counterclockwise.

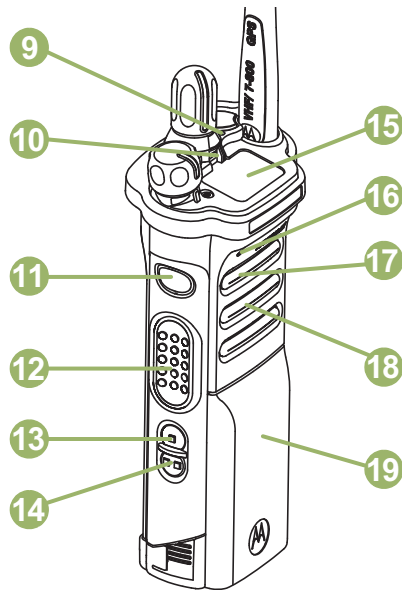
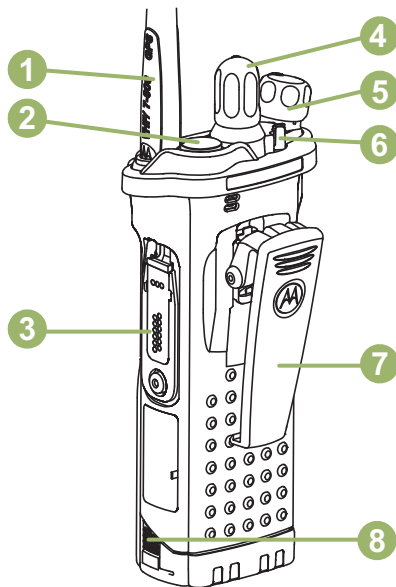
Adjusting the Volume

Ensure the radio is power on and the main speaker is pointed towards you for increased loudness and intelligibility, especially in areas with loud background noises.

- 1 To increase the volume, rotate the On/Off/Volume Control Knob **A** clockwise.

Identifying Radio Controls

Radio Parts and Controls



1	Antenna
2	Top (Orange) Button ^[1]
3	Accessory Connector
4	16-Position Select Knob ^[1]
5	On/Off/Volume Control Knob

6	3-Position A/B/C Switch ^[1]
7	Belt Clip
8	Battery Latch
9	LED
10	2-Position Concentric Switch ^[1]
11	Top Side (Select) Button ^[1]
12	Push-to-Talk (PTT) Button
13	Side Button 1 ^[1]
14	Side Button 2 ^[1]
15	Top Display
16	Bluetooth Pairing Location Indicator
17	Microphone
18	Main Speaker
19	Battery

¹ These radio controls/buttons are programmable.

Programmable Features

Any reference in this manual to a control that is preprogrammed means that the control must be programmed by a dealer or qualified radio technician using the radio programming software, in order to assign a feature to that control.

The programmable buttons can be programmed as shortcuts to radio functions or preset channels/groups depending on the duration of a button press:

Press Pressing and releasing rapidly.

Long Press Pressing and holding for the preprogrammed duration (between 0.25 seconds and 3.75 seconds).

Hold down Keeping the button pressed.

Assignable Radio Functions

Bluetooth On/Off Allows you to turn on/off the Bluetooth.

Bluetooth Audio Reroute Allows you to toggle the audio route between radio speaker or

	Remote Speaker Microphone and Bluetooth headset.				
Bluetooth Headset PTT	Keys up the Bluetooth Headset microphone.	Internet Protocol Address	Display the Internet Protocol (IP) address, device name and status of the radio.		
Bluetooth Clear All Pairing	Allows you to clear all pairing information for Bluetooth. This is accessed by a long press of the Bluetooth On/Off Button.	Man Down Clear	Clears the alarm of Man Down mode which was triggered when your radio achieves or passes a tilt angle threshold or a combination of the angle threshold and a motion sensitivity level.		
Bluetooth Inquiry On/Off	Enables Bluetooth Search feature.	Monitor (Conventional Only)	Monitors a selected channel for all radio traffic until function is disabled.		
Bluetooth Discoverable On/Off	Enables Bluetooth visibility. This is accessed by a long press of the Bluetooth Inquiry On/Off Button.	Nuisance Delete	Temporarily removes an unwanted channel, except for priority channels or the designated transmit channel from the scan list.		
Call Response	Allows you to answer a private call.	One Touch 1– 4	Launches a specific feature with one single button-press. You can setup as many as four		
Dynamic Priority (Conventional Only)	Allows any channel in a Scan List (except for the Priority-One channel) to temporarily replace the Priority-Two channel.				
Emergency	Depending on the programming, initiates or				

	separately programmed buttons for four different features.		
Private Line Defeat (Conventional Only)	Overrides any coded squelch (DPL or PL) that is preprogrammed to a channel.	Secure Transmission Select (Conventional and Trunking)	Toggles the Secure Transmission On or Off when the Secure/Clear Strapping fields is set to <code>Select</code> for the current channel and when the radio is model/option capable.
Rekey Request	Notifies the dispatcher you want a new encryption key.	Site Display/Search (Trunking Only)	Displays the current site ID and RSSI value; performs site search for Automatic Multiple Site Select (AMSS) or SmartZone operation.
Repeater Access Button (RAB) (Conventional Only)	Allows user to manually send a repeater access codeword.	Site Lock/Unlock (Trunking Only)	Locks onto a specific site.
Reprogram Request (Trunking Only)	Notifies the dispatcher you want a new dynamic regrouping assignment.	Talkaround/Direct (Conventional Only)	Toggles between using a repeater and communicating directly with another radio.
Request-To-Talk (Conventional Only)	Notifies the dispatcher you want to send a voice call.	Basic Zone Bank	Provides access from up to 6 zones by toggling between 2 banks of 3 zones, one group of 3 (A, B and C) to a second group of 3 zones (D, E and F).
Scan	Toggles scan on or off.	Enhanced Zone Bank	Provides access from up to 75 zones by toggling between 25
Scan List Programming	Selects the scan list for editing (by long press on the Scan button).		

banks (A, B ... X or Y) of 3 zones.

Assignable Settings or Utility Functions

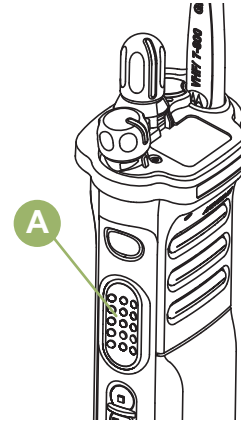
Controls Lock	Locks or unlocks the programmable buttons, switches or rotary knobs.
Light/Flip	Press the button to toggle the display backlight on or off; press and hold the button to reverse the content of the top display.
TX Power Level	Toggles transmit power level between high and low.
Voice Announcement	Audibly indicates the current feature mode, Zone or Channel the user has just assigned.
Voice Mute	Toggles voice mute on or off.
Volume Set Tone	Sets the volume set tone.

Accessing the Preprogrammed Functions

You can access various radio functions through the following method.

A short or long press of the relevant programmable buttons.

Push-To-Talk (PTT) Button



The **PTT** button **A** on the side of the radio serves two basic purposes:

- While a call is in progress, the **PTT** button allows the radio to transmit to other radios in the call.




Press and hold down **PTT** button to talk. Release the **PTT** button to listen. The microphone is activated when the **PTT** button is pressed.

- While a call is not in progress, the **PTT** button is used to make a new call. See [Making a Radio Call](#) on page 43 for more information.

Identifying Status Indicators

Status Icons

Selected icons are also shown on the first row of the 112 x 32 pixel top monochrome display screen of your radio. The following icons are for the front display screen unless indicated otherwise.

	<p>Receiving</p> <p>Radio is receiving a call or data.</p>
	<p>Transmitting</p> <p>Radio is transmitting a call or data.</p>
	<p>Battery</p> <p>For IMPRES battery operation only – the icon shown indicates the charge remaining in the battery.</p> <p>For all battery operation – the icon blinks when the battery is low.</p>



Received Signal Strength Indicator (RSSI)

The number of bars displayed represents the received signal strength for the current site, for trunking only. The more stripes in the icon, the stronger the signal.



Roaming

The radio has roamed to and is currently registered to a foreign system.



Direct


On – Radio is currently configured for direct radio-to-radio communication (during conventional operation only).

Off – Radio is connected with other radios through a repeater.



Monitor (Carrier Squelch)

Selected channel is being monitored (during conventional operation only).

H or L	<p>Power Level</p> <p>L – Radio is set at Low power.</p> <p>H – Radio is set at High power.</p>
Z	<p>Scan</p> <p>Radio is scanning a scan list.</p>
Z.	<p>Priority Channel Scan</p> <p>Blinking dot – Radio detects activity on channel designated as Priority-One.</p> <p>Steady dot – Radio detects activity on channel designated as Priority-Two.</p>
	<p>View/Program Mode</p> <p>Radio is in the view or program mode.</p> <p>On steady – View mode</p> <p>Blinking – Program mode</p>
Z	<p>Vote Scan Enabled</p> <p>The vote scan feature is enabled.</p>

A or B or C	<p>Basic Zone Bank 1</p> <p>A – Radio is in Zone 1.</p> <p>B – Radio is in Zone 2.</p> <p>C – Radio is in Zone 3.</p>
D or E or F	<p>Basic Zone Bank 2</p> <p>D – Radio is in Zone 4.</p> <p>E – Radio is in Zone 5.</p> <p>F – Radio is in Zone 6.</p>
A , B , C until X or	<p>Enhanced Zone Bank</p> <p>A – Contains Zone 1, Zone 2 and Zone 3,</p> <p>B – Contains Zone 4, Zone 5 and Zone 6,</p> <p>C – Contains Zone 7, Zone 8 and Zone 9,</p> <p>until</p> <p>X – Contains Zone 70, Zone 71 and Zone 72,</p>



Y – Contains Zone 73, Zone 74 and Zone 75.



Secure Operation

On Secure operation.

Off Clear operation.

Blinking Receiving an encrypted voice call.



GPS Signal

On – Feature is enabled and signal is available.

Off – Feature is disabled.

Blinking – Feature is enabled, but no signal is available.



Bluetooth On

Bluetooth is on and ready for Bluetooth connection.

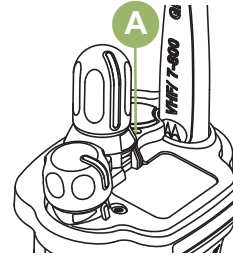
Bluetooth Connected



Bluetooth is currently connected to the external Bluetooth device.

LED Indicator

The LED indicator **A** shows the operational status of your radio.



Solid red

Radio is transmitting.

Blinking red

Radio is transmitting at low battery condition.

Double blinking red

Radio is in Emergency Mode.

Rapidly blinking red Radio has failed the self test upon powering up or encountered a fatal error.

Solid yellow (Conventional Only) Channel is busy.

Blinking yellow Radio is receiving a secured transmission.

Solid green Radio is powering up, or is on a non-priority channel while in the Scan List Programming mode.

Blinking green Radio is receiving an individual or telephone call, or is on a Priority-Two channel while in the Scan List Programming mode.

Rapidly blinking green Radio is on a Priority-One channel while in the Scan List Programming mode.

Note: No LED indication when the radio receives a clear (non-secured) transmission in trunking Mode. LED indication can be preprogrammed by qualified technician to be permanently disabled. Consult your dealer for further details if you want to disable it.

Intelligent Lighting Indicators

This feature temporarily changes the backlight of the top display screen, and adds a color bar to the main display screen to help signal that a radio event has occurred.

Note: This feature must be preprogrammed by a qualified radio technician.

Backlight and Bar Color	Notification	When
Orange	Emergency Alerts	The radio initiates an emergency alarm or call.
		The radio receives an emergency alarm or call.
Red	Critical Alerts	The radio battery is low.
		The radio is out of range.
		The radio enters Failsoft mode.
		The radio is unable to establish a full connection with the system.
		The radio is unable to authenticate or register with the system.
		The radio lost GPS signal or GPS function fails.
Green	Call Alerts	The radio receives a private call.
		The radio receives a phone call.
		The radio receives a call alert.
		The radio receives a selective call.
		The radio enters Geofence.

Alert Tones

Your radio uses alert tones to inform you of your radio's condition. The following table lists these tones and when they occur.

You Hear	Tone Name	Heard
Short, Low-Pitched Tone	Radio Self Test Fail	When radio fails its power-up self test.
	Reject	When an unauthorized request is made.
	Time-Out Timer Warning	Four seconds before time out.
	No ACK Received	When radio fails to receive an acknowledgment.
	Individual Call Warning Tone	When radio is in an individual call for greater than 6 seconds without any activity.
	Man Down Entry	When radio initiates Man Down mode.
Long, Low-Pitched Tone	Time-Out Timer Timed Out	After time out.
	Talk Prohibit/PTT Inhibit	(When PTT button is pressed) transmissions are not allowed.
	Lack of Voice PTT Time out	When the radio ends your call after it detected there are lack of voice for 5 seconds after the PTT is pressed and hold. Your radio ends the call to enable your radio to receive calls from other radio users.
	Out of Range	(When PTT button is pressed) the radio is out of range of the system.

You Hear	Tone Name	Heard
	Invalid Mode	When radio is on an unprogrammed channel.
A Group of Low-Pitched Tones	Busy	When system is busy.
Short, Medium-Pitched Tone	Valid Key-Press	When a correct key is pressed.
	Radio Self Test Pass	When radio passes its power-up self test.
	Clear Voice	At beginning of a non-coded communication.
	Priority Channel Received	When activity on a priority channel is received.
	Emergency Alarm /Call Entry	When entering the emergency state.
	Central Echo	When central controller has received a request from a radio.
Long, Medium-Pitched Tone	Volume Set	When volume is changed on a quiet channel.
	Emergency Exit	When exiting the emergency state.
A Group of Medium-Pitched Tones	Failsoft	When the trunking system fails.
	Automatic Call Back	When voice channel is available from previous request.
	Keyfail	When encryption key has been lost.

You Hear	Tone Name	Heard
	Console Acknowledge	When status, emergency alarm, or reprogram request ACK is received.
	Received Individual Call	When Call Alert or Private Call is received.
	Site Trunking	When a SmartZone trunking system fails.
Short, High-Pitched Tone (Chirp)	Low-Battery Chirp	When battery is below preset threshold value.
Two High-Pitched Tones	GPS Fails	When the GPS signal is lost or when GPS fails.
Ringing	Phone Call Received	When a land-to-mobile phone call is received.
Gurgle	Dynamic Regrouping	(When PTT button is pressed) a dynamic ID has been received.
	Talk Permit	(When PTT button is pressed) is verifying with the system for accepting its transmissions.
Unique, Low-Pitched Chirp	New Message	When a new message is received.
Unique, High-Pitched Chirp	Priority Status	When a priority message is received.
Incremental-Pitched Tone	Bluetooth Paired	When Bluetooth accessory is paired with the radio.

You Hear	Tone Name	Heard
	Bluetooth Connected	When Bluetooth accessory is connected to the radio.
Decremental-Pitched Tone	Bluetooth Unpaired	When Bluetooth accessory is unpaired from the radio.
	Bluetooth Disconnected	When Bluetooth accessory is disconnected from the radio.
A Group of Very High-Pitched Tones	Man Down Continuous Tone	When radio is in Man Down mode and prepares to transmit Emergency Alarm when the timer of this alarm ends.
	Critical Man Down Continuous Tone	When radio is in Man Down Enhanced mode and prepares to transmit Emergency Alarm when the timer of this alarm ends.
Unique Low-High Tone	Enhanced Zone Bank Up	When EZB Up button is pressed to scroll the Enhance Zone Bank up.
Unique High-Low Tone	Enhanced Zone Bank Down	When EZB Down button is pressed to scroll the Enhance Zone Bank down.

General Radio Operation

Selecting a Zone

Your radio must be preprogrammed to allow you to use this feature.

A zone is a group of channels.

Select a zone via the preprogrammed **Zone (3-Position A/B/C)** switch:

- a) Move the preprogrammed **Zone (3-Position A/B/C)** switch to the position of the required zone.
If the zone number entered is unprogrammed, the display shows **INVALID**. Repeat this step.
- b) Press the **PTT** button to transmit on the displayed zone channel.

Selecting a Radio Channel

A channel is a group of radio characteristics, such as transmit/ receive frequency pairs.

Select a channel via the preprogrammed **16-Position Select Knob** to the desired channel.

- a) Rotate the preprogrammed **16-Position Select Knob** to the desired channel.
- b) Press the **PTT** button to transmit on the displayed zone channel.

Receiving and Responding to a Radio Call

Once you have selected the required channel and/or zone, you can proceed to receive and respond to calls.

The LED lights up solid red while the radio is transmitting. In conventional mode, the LED lights up solid yellow when the radio is receiving a transmission. In trunking mode, there is no LED indication when the radio receives a transmission.

If the radio is receiving a secure transmission, the LED blinks yellow.

Receiving and Responding to a Talkgroup Call

To receive a call from a group of users, your radio must be configured as part of that talkgroup.

When you receive a talkgroup call (while on the Home screen) the radio triggers for your attention with one of the following scenarios depending on the system your radio is configured:

- For ASTRO Conventional system, the LED lights up solid yellow. The display shows the talkgroup alias or ID, and the caller alias or ID.
- For Trunking system, the display shows the caller alias or ID.

1 Hold the radio vertically 1 to 2 inches (2.5 to 5.0 cm) from your mouth.

2 Press the **PTT** button to respond to the call. The LED lights up solid red.

3 Release the **PTT** button to listen.

See also [Making a Talkgroup Call](#) on page 43 for details on making a Talkgroup Call.

Receiving and Responding to a Private Call (Trunking Only)

A Private Call is a call from an individual radio to another individual radio.

The one-to-one call between the two radios are not heard by the others in the current talkgroup. The transmitting radio automatically verifies that the receiving radio is active on the system and can display the caller ID.

Note: With the inactivity timer enabled (optional), when there is no response from the receiving radio, the transmitting radio exits the call with Menu Inactive Exit tone after the timer expires.

When you receive a Private Call, you hear two alert tones and the LED blinks green. The display shows CALL RCV, alternating with the caller alias (name) or ID (number).

1 Press the **Call Response** button within 20 seconds after the call indicators begin.

2 Press and hold the **PTT** button to talk. Release the **PTT** button to listen.

3 Press the **Call Response** button to hang up and return to the Home screen.

You cannot initiate a Private Call.

Receiving and Responding to a Telephone Call (Trunking Only)

This feature allows you to receive calls similar to standard phone calls from a landline phone.

Note: With the inactivity timer enabled (optional), if there is no response to the call after the timer expires, your radio exits the call with Menu Inactive Exit tone.

When you receive a Telephone Call, you hear telephone-type ringing and the LED blinks green. The display shows PHN CALL and the call received icon blinks.

- 1 Press the **Call Response** button within 20 seconds after the call indicators begin.
- 2 Press and hold the **PTT** button to talk. Release the **PTT** button to listen.
- 3 Press the **Call Response** button to hang up and return to the Home screen.

You cannot initiate a Telephone Call.

Making a Radio Call

You can select a zone, channel, subscriber ID, or talkgroup by using:

- The preprogrammed **Zone** switch.
- The **16-Position Select Channel Knob**.

Making a Talkgroup Call

To make a call to a group of users, your radio must be configured as part of that talkgroup.

- 1 Turn the **16-Position Select Channel Knob** to select the channel with the desired talkgroup.
- 2 Hold the radio vertically 1 to 2 inches (2.5 to 5.0 cm) from your mouth.
- 3 Press the **PTT** button to make the call. The radio shows different indicators based on the system the radio is configured.
 - For ASTRO Conventional system, the LED lights up solid red. The display shows the talkgroup alias or ID.
 - For Trunking system, the LED lights up solid red.
- 4 Speak clearly into the microphone.
- 5 Release the **PTT** button to listen.

Switching Between Repeater or Direct Operation Button

The **Repeater Operation** increases the radio's range by connecting with other radios through a repeater. The transmit and receive frequencies are different.

The **Direct** or "talkaround operation" allows you to bypass the repeater and connect directly to another radio. The transmit and receive frequencies are the same.

Press the preprogrammed **Repeater/Direct** switch to toggle between talkaround and repeater modes.

The display shows **RPTR MOD** if the radio is currently in Repeater mode.

The display shows **DIR MODE** and the Talkaround icon if the radio is currently in Direct mode (during conventional operation only).

Monitor Feature

Radio users who switch from analog to digital radios often assume that the lack of static on a digital channel is an indication that the radio is not working properly. This is not the case.

This digital technology quiets the transmission by removing the noise from the signal and allows only the clear voice or data information to be heard.

Use the Monitor feature to make sure a channel is clear before transmitting.

Monitoring a Channel

Monitoring a Channel via the **Monitor** and **Volume Set** button.

- a) Press the preprogrammed **Monitor** button.
The Carrier Squelch indicator appears on the display when you monitor a channel via the preprogrammed Monitor button.
 - b) Press and hold the **Volume Set** button to hear the volume set tone.
 - c) Adjust the **Volume Control Knob** if necessary.
 - d) Release the **Volume Set** button.
 - e) Press and hold the **PTT** button to transmit.
The LED lights up solid red.
 - f) Release the **PTT** button to receive (listen).
-

Monitoring Conventional Mode

Your radio may be preprogrammed to receive Private-Line® (PL) calls.

- 1** Momentarily press the **Monitor** button to listen for activity.
The Carrier Squelch indicator appears on the display.

- 2** Press and hold the **Monitor** button to set continuous monitor operation.
The duration of the button press is programmable.

- 3** Press the **Monitor** button again, or the **PTT** button, to return to the original squelch setting.
If you try to transmit on a receive-only channel, you hear an invalid tone until you release the **PTT** button.

Advanced Features

Advanced Call Features

Selective Call (ASTRO Conventional Only)

This feature allows you to receive a call from a specific individual with privacy and without the annoyance of having to listen to conversations that are of no interest to you.

Receiving a Selective Call

When you receive a Selective Call, you hear two alert tones and the LED lights up solid yellow. The backlight of the screen turns green momentarily and the display briefly shows CALL RCV.

The speaker unmutes.

- 1 Hold the radio vertically 1 to 2 inches (2.5 to 5.0 cm) from your mouth.
 - 2 Press and hold the **PTT** button to talk. Release the **PTT** button to listen.
-

You cannot initiate a Selective Call.

Responding to the Dynamic Regrouping Feature (Trunking Only)

This feature allows the dispatcher to temporarily reassign selected radios to a particular channel where they can communicate with each other. This feature is typically used during special operations and is enabled by a qualified radio technician.

You will not notice whether your radio has this feature enabled until a dynamic regrouping command is sent by the dispatcher.

Note: If you try to access a zone or channel that has been reserved by the dispatcher as a dynamically regrouped mode for other users, you hear an invalid tone.

When your radio is dynamically regrouped, it automatically switches to the dynamically regrouped channel. You hear a Gurgle tone and the display shows the dynamically regrouped channel's name.

Press the **PTT** button to talk. Release **PTT** button to listen.

When the dispatcher cancels dynamic regrouping, the radio automatically returns to the zone and channel

that you were using before the radio was dynamically regrouped.

Requesting a Reprogram (Trunking Only)

This feature allows you to notify the dispatcher when you want a new dynamic regrouping assignment.

Press the preprogrammed **Reprogram Request** button to send reprogram request to the dispatcher.

The display shows `RPGM` and `PLS WAIT`.

If you hear five beeps, the dispatcher has acknowledged the reprogram request. The display shows `ACK RCVD` and the radio returns to the **Home** screen.

If the dispatcher does not acknowledge the reprogram request within six seconds, you hear a low-pitched alert tone and the display shows `NO ACK`.

Classification of Regrouped Radios

The dispatcher can classify regrouped radios into either of two categories:

Select Enabled Select-enabled radios are free to change to any available channel, including the dynamic-regrouping

channel, once the user has selected the dynamic-regrouping position.

Select Disabled Select-disabled radios cannot change channels while dynamically regrouped. The dispatcher has forced the radio to remain on the dynamic-regrouping channel.

The Scan or Private Call feature cannot be selected while your radio is Select Disabled.

Scan Lists

Scan lists are created and assigned to individual channels/ groups. Your radio scans for voice activity by cycling through the channel/group sequence specified in the scan list for the current channel/ group.

Your radio supports different types of Scan Lists:

- Trunking Priority Monitor Scan List
- Conventional Scan List
- Talkgroup Scan List

Please refer to a qualified radio technician for the maximum number of Scan Lists can be programmed

in your radio. These lists must be preprogrammed by a qualified radio technician.

Viewing a Scan List

Turn the **16-Position Select Knob** to view the members on the list.

Viewing and Changing the Priority Status

Press the **Top Side (Select)** button to change the priority status of the currently displayed channel or the scan list status icon of the currently displayed channel.

The radio shows one of following priority status icons and scenarios:

- A Scan icon indicates that the current channel is in the scan list as a non-priority channel. The LED lights up solid green.
- A Priority-Two Channel Scan icon indicates that the current channel is in the scan list as the Priority-Two channel. The LED blinks green.
- A Priority-One Channel Scan icon indicates that the current channel is in the scan list as the Priority-One channel. The LED rapidly blinks green. You hear all traffic on the Priority-

One channel, regardless of traffic on non-priority channels.

- No icon indicates that the current channel is deleted from the scan list.

Scan

This feature allows you to monitor traffic on different channels by scanning a preprogrammed list of channels.

Turning Scan On or Off

Press the preprogrammed **Scan** button to toggle **SCAN ON** or **SCAN OFF** to initiate or stop scan.

If the scan is enabled, the display shows **SCAN ON** and the scan status icon.

If the scan is disabled, the display shows **SCAN OFF**.

Making a Dynamic Priority Change (Conventional Scan Only)

While the radio is scanning, the dynamic priority change feature allows you to temporarily change any channel in a scan list (except for the Priority-One channel) to the Priority-Two channel.

This change remains in effect until scan is turned off. Scan then reverts to the preprogrammed (original) setting.

Making a Dynamic Priority Change via the preprogrammed **Dynamic Priority** button:

- a) When the radio locks onto the channel designated as the new Priority-Two channel, press the preprogrammed **Dynamic Priority** button.

The radio continues scanning the remaining channels in the list.

Deleting a Nuisance Channel

If a channel continually generates unwanted calls or noise (termed a “nuisance” channel), you can temporarily remove the unwanted channel from the scan list.

This capability does not apply to priority channels or the designated transmit channel.

Note: Deleting a nuisance channel is only possible through the preprogrammed **Nuisance Channel Delete** button.

When the radio is locked onto the channel to be deleted, press the preprogrammed **Nuisance Delete** button.

The radio continues scanning the remaining channels in the list.

Restoring a Nuisance Channel

To restore the deleted nuisance channel, perform one of the following actions:

- Turn scan off, and then on.
- Change channels.
- Turn off the radio, and then turn it back on.

Nuisance mode delete can be disabled by the system administrator.

Call Alert Paging

This feature allows your radio to work like a pager.

The radio which you missed its call can send a Call Alert page to your radio. The sender also able to know that your radio is active.

Note: This feature must be preprogrammed by a qualified radio technician.

Receiving a Call Alert Page

When you receive a Call Alert page, you hear four repeating alert tones and the LED blinks green. The call received icons blinks and the display shows PAGE RCV.

Press any button to clear the Call Alert page.

You cannot send a Call Alert page.

Emergency Operation

The Emergency feature is used to indicate a critical situation.

If the **Top (Orange)** button is preprogrammed to send an emergency signal, this signal overrides any other communication over the selected channel.

Your radio supports the following Emergency modes:

- Emergency Alarm
- Emergency Call (Trunking Only)
- Emergency Alarm with Emergency Call
- Silent Emergency Alarm

Check with your dealer or system administrator for more information on the programming of this feature.

Only **one** of the Emergency modes above can be assigned to the preprogrammed **Emergency** button.

Note: To exit emergency at any time, press and hold the preprogrammed Emergency button for about a second.

The radio operates in the normal dispatch manner while in Emergency Call, except if enabled, it returns to one of the following:

Tactical/Non-Revert

The radio sends emergency alarm and/or make emergency call on the current selected channel.

Non-Tactical/Revert for Conventional system

The radio reverts to the preprogrammed emergency channel to send alarm and/or make emergency call.

Non-Tactical/Revert for Trunking system

The radio reverts to the preprogrammed emergency talkgroup to send alarm and/or make emergency call.

Man Down is an alternate way to activate the Emergency feature on the condition the Emergency must be set up for this feature to operate.

See *Man Down* on page 56 for details.

Sending an Emergency Alarm

This feature allows you to send a data transmission, which identifies the radio sending the emergency, to the dispatcher.

Note: Emergency button press timer by default is set to 1 second. This timer is programmable from 0 – 6 seconds by a qualified technician.

Press the preprogrammed **Emergency** button.

One of the following scenarios occurs:

- The display shows **EMERGENCY** and the current zone or channel. You hear a short medium-pitched tone and the LED blinks red momentarily.
- You hear the radio sounds a short low-pitched tone to indicate that the selected channel does not support emergency and rejects to launch emergency mode.

When you receive the dispatcher's acknowledgment, the display shows **ACK RCVD**. You hear four tones, the alarm ends, and the radio exits the Emergency Alarm mode.

If no acknowledgement is received, the display shows **NO ACK**. The alarm ends and the radio exits the Emergency Alarm mode.

Sending an Emergency Call (Trunking Only)

This feature gives your radio priority access to a talkgroup.

- 1 Press the preprogrammed **Emergency** button. One of the following scenarios will occur:
 - The display shows **EMERGENCY** and the current zone or channel. You hear a short medium-pitched tone and the LED blinks red momentarily.
 - You hear the radio sounds a short low-pitched tone to indicate the selected channel does not support emergency and rejects to launch emergency mode.
-
- 2 Hold the radio vertically 1 to 2 inches (2.5 to 5.0 cm) from your mouth.
-
- 3 Press and hold the **PTT** button. Speak clearly into the microphone.
-

- 4 Release the **PTT** button to end the transmission and wait for a response from the dispatcher.
- 5 To exit Emergency Call, press and hold the preprogrammed **Emergency** button for about a second.

Sending an Emergency Alarm with Emergency Call

This feature gives your radio priority access on a channel for conventional system, and to a talkgroup for trunking system.

- 1 Press the preprogrammed **Emergency** button.
If successful, the display shows **EMERGENCY** on the current zone and channel. You hear a short, medium-pitched tone and the LED blinks red momentarily.
The radio exits Emergency Alarm and enters the Emergency Call state when one of the following scenarios occur:
 - You receive the dispatcher's acknowledgment. The display shows **ACK RCVD**.
 - You receive no acknowledgement. The display shows **NO ACK**.

- You press the **PTT** button while in the Emergency Alarm mode.

If unsuccessful, you hear the radio sounds a short low-pitched tone to indicate the selected channel does not support emergency and rejects to launch emergency mode.

- 2 Hold the radio vertically 1 to 2 inches (2.5 to 5.0 cm) from your mouth.
- 3 Press and hold the **PTT** button. Speak clearly into the microphone.
- 4 Release the **PTT** button to end the transmission and wait for a response from the dispatcher.
- 5 To exit Emergency Call, press and hold the preprogrammed **Emergency** button for about a second.
Turning the radio off also cancels the emergency state.

Sending a Silent Emergency Alarm

This feature allows you to send an Emergency Alarm to the system without triggering any audio or visual indicators.

- 1 Press the preprogrammed **Emergency** button. The display shows no changes, the LED does not light up, and you hear no tones. The silent emergency state continues until you perform the next step.
-

- 2 Perform one of the following actions:
 - You press and hold the preprogrammed **Emergency** button for about a second to exit the Silent Emergency Alarm mode.
 - Press and release the **PTT** button to exit the Silent Emergency Alarm mode and enter regular dispatch or Emergency Call mode.
-

Change of Channels during Emergency

For ALL Emergency transmissions, when changing channels:

- If the new channel is also preprogrammed for Emergency, you can change channels while in Emergency operation. The emergency alarm or call continues on the new channel.
- If the new channel is **NOT** preprogrammed for Emergency, the display shows **NO EMERG**, and you hear an invalid tone until you exit the Emergency

state or change to a channel preprogrammed for Emergency.

Emergency Keep-Alive Feature

This feature, when enabled, prevents the radio from being turned off via the **On/Off Control Knob** when the radio is in the Emergency state.

Note: The radio only exits the Emergency state using one of the ways mentioned in the previous sections.

See [Sending an Emergency Alarm](#) on page 51, [Sending an Emergency Call \(Trunking Only\)](#) on page 51, [Sending an Emergency Alarm with Emergency Call](#) on page 52, or [Sending a Silent Emergency Alarm](#) on page 52.

Fireground (Conventional Only)

The portable Fireground Communications System is designed for deployment at an incident scene. It consists of five central components:

- Your APX portable radios
- Incident Management Software
- Command Terminal
- Radio Frequency (RF) Modem
- DVRS (Optional)

These components provide on-scene and inbuilding radio coverage, and enhanced personnel accountability and monitoring.

The radio helps to indicate your presence on the scene if it is in the range of the Incident Commander command terminal.

Each Fireground Communication System radio automatically reports your radio ID on the commander mobile command terminal. Your name, riding position and sector are all can be configured to be seen at the Commander's command terminal.

If you have a critical situation, you can press the Emergency button which activates an alarm on the Incident Management Software at the command terminal.

The Fireground signals transmission is always exchanging data between your radio and the RF Modem and command terminal. The status of your radio includes:

- Powering up or down the radio
- Automatic response to Polling
- Response to Evacuation commands
- Pressing the **PTT** button to make voice transmission

- Sending an Emergency Alarm and Call

Entering Fireground Zone Channel

- 1 Upon powering up, perform one of the following actions:
 - If the Fireground Zone Channel is set as default, you hear gurgle tone and the home screen. You are in Fireground zone channel.
 - If the Fireground Zone Channel is set as default, but you hear a short, low-pitched tone, the display shows **REG FAIL** to indicate that the command terminal does not respond to Fireground Zone Channel. Get a qualified technician for assistance.
 - If your home channel is not Fireground Zone Channel, toggle or change the radio zone channel to Fireground Zone Channel.

- 2 Listen for a transmission. Adjust the **Volume Control Knob** if necessary.

- 3 Perform one of the following actions:
 - Press and hold the preprogrammed **Volume Set** button to hear the volume set tone. Adjust

the **Volume Control Knob** if necessary.
Release the **Volume Set** button.

- At the desired Fireground zone and channel, press the preprogrammed **Monitor** button and listen for activity. Adjust the **Volume Control Knob** if necessary.
- If your radio is working in Fireground Zone Channel, proceed to next step.

4 Press and hold the **PTT** button to transmit. The LED lights up solid **red** while transmitting. Talk into the microphone clearly if needed.

5 Release the **PTT** button to receive. You hear a Transmit End Tone.

Responding to Evacuation Indicator

When Incident Commander triggers Evacuation signal from his command terminal, the RF Modem updates everyone in the Fireground Communication System with the order to evacuate the incident site.

Your radio sounds the Evacuation Tone at the profile maximum alert tone volume level. The display shows EVACUATE.

Perform one of the following actions:

- Move the **Volume Control Knob** to adjust the volume of the Evacuation Tone from full volume.
- Perform any action on the radio other than volume adjustments to cancel the evacuation indications and update the command terminal.
- If preprogrammed with Manual Acknowledgement of Evacuation Command, pressing the **PTT** button shall cancel the indications and acknowledge the command terminal.

Tactical Public Safety(TPS) (Conventional Only)

TPS enabled the user of a group to identify a transmission starts and ends clearly by displaying the caller name or ID on the radio display.

Using TPS Normal Transmission

At TPS Zone Channel, perform one of the following actions:

- Press **PTT** button to transmit. Talk clearly into the microphone. Release **PTT** button to listen.

- Receive and listen to call, the radio displays the caller's name or ID.

Using TPS Emergency Transmission

The following are two important alert tones designed for this feature.

Emergency Beacon During Emergency if the TPS radio user pushes the **Emergency** button, the radio sounds a Beacon at the maximum volume of the radio at the radio's internal speaker and it is not adjustable. This beacon goes to silent when user presses the **PTT** button for voice transmission.

Emergency Call De-Key Sidetone The radio sounds an alert tone to remind radio user that the Emergency Mode is still active after user releases the **PTT** button for an Emergency call transmission. The volume of loudness depends on the maximum tone at your radio profile.

- 1 Press the **Emergency** button to enter Emergency Mode.
You hear Emergency Beacon.
-

- 2 Press **PTT** button to make Emergency Call.
-

- 3 Release to listen.
You hear Emergency Call De-Key Sidetone. After a short pause, you hear Emergency Beacon.
-

- 4 Long press **Emergency** button to exit Emergency mode and cancel Emergency Beacon.
-

Man Down

Man Down condition is determined based upon the radio tilt angle or a combination of radio tilt angle and the lack of radio motion.

Man Down feature is an alternate way to activate the Emergency feature if Emergency has been programmed in your radio.

Note: This feature could be preprogrammed for all channels that support Emergency feature or could be preprogrammed specifically to a zone and channel which has Emergency feature. Consult your agent or qualified technician for more details.

Your radio automatically activates Emergency Alarm or Call when the radio achieves or passes a tilt angle threshold or a combination of the angle threshold and

radio motion below the motion sensitivity level, depending upon how the radio is programmed. The radio must stay in this condition for a preprogrammed amount of time before the Emergency Alarm or Call is activated.

Note: It is recommended that an Emergency button is preprogrammed in order to allow the user to exit the emergency condition.

The Man Down feature provides a **Clear** function to the user. After a Man Down condition has been detected, the user can press a preprogrammed **Clear** button or preprogrammed **Menu Select** button to cancel the Man Down condition. The radio remains in the Man Down state without triggering an emergency condition until the radio is moved out of the Man Down state, at which point Man Down functionality resumes.

The Man Down feature has three phases:

- 1 The radio senses the Man Down condition and Pre-Alert Timer is initiated.
- 2 Man Down condition continues for the time duration defined in the Pre-Alert Timer field. At the end of this time, the radio alerts the user on the Man Down status with an audible alert tone and

MAN-DOWN text on the screen. The Post-Alert Timer also initiates at this point.

- 3 Man Down condition continues for the time duration defined in the Post-Alert Timer field. Once the timer expires, the Emergency alarm is transmitted. The Man Down Clear function is used in this phase to cancel the Man Down condition.

The following scenarios affect the timers:

- Pressing the **PTT** button suspends the Man Down timers; releasing the **PTT** button re-initiates the Pre-Alert Timer.
- Pressing other buttons on the radio does not impact these timers.
- Repositioning the radio exits the Man Down feature, which stops and resets the timers.
- Pressing a preprogrammed **Clear** button or pressing a **Menu Select** button preprogrammed for **Clear** stops and resets the timers. The timers do not restart until the radio is repositioned.

Note: Emergency must be set up for this feature to operate. For details on operating the Emergency alerts, please see [Emergency Operation](#) on page 50.

If the radio is preprogrammed to horizontal only, it must be worn in a vertical position otherwise the Man Down alert may be inadvertently triggered.

When the radio is programmed with Man Down feature, special care is required when charging the radio with a wall mounted charger. See [Proper Ways to Handle the Radio](#) on page 85 for details.

Pre-Alert Timer

This timer sets the amount of time that a Man Down condition must be present before the radio-user is warned of the Man Down condition.

When the radio detects that it has returned to the vertical position or when the radio detects motion, the Pre-Alert timer stops and is reset.

The Pre-Alert timer reinitiates when the radio detects it is in the horizontal position or motionless again.

Post-Alert Timer

This timer sets the amount of time the radio needs to remain in the Man Down condition before the Emergency alarm is transmitted. When the Post-Alert Timer is initiated, the radio alerts the user with an audible tone and displays the "MAN-DOWN" text.

See [Exiting Man Down Feature](#) on page 59 to exit Man Down feature.

Radio Alerts When Man Down Feature is Triggered

The Man Down alert tone volume is directly related to the radio's volume. Ensure that the radio's volume is loud enough so that the user does not miss the Post-Alert tone.

Note: If the radio is programmed with Silent Emergency, the radio inhibits the alert tone and visual alert associated with the emergency feature.

If the radio is programmed in Surveillance Mode, the radio inhibits all tones and lights on the radio including the Man Down tones.

Triggering Emergency

When the user does not clear the Man Down condition and the Post-Alert Timer comes to an end, Emergency Alarm or call is triggered. The radio sends emergency message to units within the same Talkgroup. The radio also sends ID number and GPS coordinates to dispatcher if these features are enabled. User can exit Emergency following the Emergency procedure. See [Emergency Operation](#) on page 50 for details.

Note: At this point the Man Down features is complete. Use normal Emergency procedures to cancel Emergency transmissions.

Radio Alerts When Man Down Enhanced is Triggered

Note: This feature is to be preprogrammed specifically to a zone and channel which supports Emergency feature.

The volume and repetition duration of Man Down Enhanced alert tone could be customized and preprogrammed to suite the required situation.

Consult your agent or qualified technician for more details.

When the radio initiates Man Down Enhanced, you hear the Critical Man Down Continuous alert tone from the radio speaker. The volume of this tone is set to the louder of the preprogrammed minimum level or the current radio speaker level. This acts as a beacon to find the radio.

Note: If the radio is programmed with Silent Emergency, the radio inhibits the alert tone and visual alert associated with the emergency feature.

If the radio is programmed in Surveillance Mode, the alert tone can be heard from the radio speaker.

Once the alert tone is active, changing to another channel with different setup triggers a different response from the radio as described next.

- The alert tone is inhibited when you change to a channel without Emergency feature.
- The alert tone is inhibited when you change to a channel with Emergency but no Man Down feature.
- The current alert tone is inhibited and is replaced with a different alert tone when you change to a channel with Emergency and different Man Down configuration.
- The alert tone continues when you change to a channel with Emergency and similar Man Down configuration.

Exiting Man Down Feature

If you are not in a real Man Down situation, you should exit the Man Down feature and prevent emergency from going off with the following operation.

Perform one of the following actions:

- Repositioning the radio or shaking the radio (when motion sensitivity is enabled).

- Press the preprogrammed **Man Down Clear** button to exit.

Re-Initiating Man Down

After exiting the Emergency Operation when the radio is still in Man Down condition (tilted achieving threshold angle or motionless), user must first exit Man Down condition to then reinitiate the Man Down feature.

Return the radio to the vertical position or shake the radio (when motion sensitivity is enabled).

Testing the Man Down Feature

Enable the Emergency feature with Silent Alarm disabled, but not in Surveillance Mode before running this test on the radio.

- 1 Turn the radio on and place in the vertical position, for at least 5 seconds.
- 2 Lay the radio down in the horizontal position.
- 3 Wait for alert tone.

One of the following scenarios will occur:

- The radio alerts with audible tone and displays **MAN-DOWN**.
- If no tone is heard, make sure that the Man Down feature is enabled on your radio. If Man Down feature was not enabled, please enable it and repeat **1** to **3**.
- If the Man Down feature is enabled and no tone is heard, send the radio to a qualified technician.

Secure Operations

Secure radio operation provides the highest commercially available level of voice security on both trunked and conventional channels.

Unlike other forms of security, Motorola digital encryption provides signaling that makes it virtually impossible for others to decode any part of an encrypted message.

Selecting Secure Transmissions

Turn the preprogrammed **Secure/Clear** switch to the secure position.

Note: If the selected channel is preprogrammed for clear-only operation, when you press the **PTT**

button, you hear an invalid mode tone and the display shows CLR TX.

The radio will not transmit until you set the **Secure/Clear** switch to the clear position.

Selecting Clear Transmissions

Turn the preprogrammed **Secure/Clear** switch to the clear position.

Note: If the selected channel is preprogrammed for secure-only operation, when you press the **PTT** button, you hear an invalid mode tone and the display shows SEC TX.

The radio will not transmit until you set the **Secure/ Clear** switch to the secure position.

The radio can be configured to ignore the clear voice or insecured transmission when the radio is in secured transmission. Check with your agent for details.

Managing Encryption

Loading an Encryption Key

Note: Refer to the key-variable loader (KVL) manual for equipment connections and setup.

1 Attach the KVL to your radio.
The display shows KEYLOAD, and all other radio functions, except for power down, backlight, and volume, are locked out.

2 Select the required keys and press the **Menu Select** button directly below LOAD on the KVL.
This loads the encryption keys into your radio.

When the key has been loaded successfully, one of the following scenarios occurs:

- You hear a short tone for single-key radios.
- You hear an alternating tone for multikey radios.

Multikey Feature

This feature allows the radio to be equipped with different encryption keys and supports the DES-OFB algorithm.

There are two types:

Conventional Multikey The encryption keys can be tied (strapped), on a one-per-channel basis, through Customer Programming Software. In addition, you can have operator-selectable

keys, operator-selectable keysets, and operator-selectable key erasure. If talkgroups are enabled in conventional, then the encryption keys are strapped to the talkgroups.

Trunked Multikey

If you use your radio for both conventional and trunked applications, you have to strap your encryption keys for trunking on a per-talkgroup or announcement-group basis. In addition, you may strap a different key to other features, such as dynamic regrouping, failsoft, or emergency talkgroup. You can have operator-selectable key erasure.

Erasing the Selected Encryption Keys

This feature allows you to erase all or selected encryption keys.

Erasing the single key in radios with the single-key option and erasing all keys in radios with the multikey option via the preprogrammed **Top Side (Select)** button and **Top (Orange)** button:

a) Press and hold the **Top Side (Select)** button.

b) While holding **Top Side (Select)** button down, press the **Top (Orange)** button. The display shows PLS WAIT. When all the encryption keys have been erased, the display shows ALL ERASED.

Note: Do **not** press the **Top (Orange)** button before pressing the **Top Side (Select)** button, unless you are in an emergency situation as this sends an emergency alarm.

Requesting an Over-the-Air Rekey (ASTRO Conventional Only)

Ensure that the Unique Shadow Key (USK) is loaded into the radio with the key-variable loader (KVL) before the rekey request can be sent. Refer to your local key management supervisor for more information.

This feature, also known as OTAR, allows the dispatcher to reprogram the encryption keys in the radio remotely. The dispatcher performs the rekey operation upon receiving a rekey request from the user.

Press and hold the preprogrammed **Rekey Request** button to send the rekey request.

If the rekey operation fails, a bad-key tone sounds and the display shows `RKY FAIL`.

Note: The rekey operation failure indicates that your radio does not contain the Unique Shadow Key (USK).

MDC Over-the-Air Rekeying (OTAR) Page

This feature allows you to view or define MDC Over-the-Air Rekeying (OTAR) features. It is applied only when operating in secure encrypted mode and only for conventional communications. In addition to Rekey Requests, OTAR transmissions include Delayed Acknowledgements, and Powerup Acknowledgements.

Some of the options selected may also need to be set up at the Key Management Controller (KMC) site to work properly.

Note: This feature must be preprogrammed by a qualified radio technician. Check with your dealer or system administrator for more information.

Infinite UKEK Retention

This feature enables Unique Key Encryption Key (UKEK) to be permanently stored in the radio even when all of the encryption keys is erased. Without this

UKEK key, the radio could not be over the air rekeyed.

Note: This feature must be preprogrammed by a qualified radio technician. Check with your dealer or system administrator for more information.

Hear Clear

Note: This feature must be preprogrammed by a qualified radio technician. Check with your dealer or system administrator for more information.

There are two components of Hear Clear.

Companding Reduces the channel noise, e.g. OTA transmission, that is predominantly present in UHF2 and 900 MHz channel with the following features.

Compressor Reduces the background noise flow and the speech signal at transmitting radio.

Expander Expands the speech while the noise flow

remains the same at receiving radio.

Random FM Noise Canceller (Flutter Fighter)

Reduces the unwanted effects of random FM noise pulses caused by channel fading under high Signal-to-Noise (S/N) conditions such as in a moving in a transportation. The fading effects, heard as audio pops and clicks, are cancelled without affecting the desired audio signal.

The Random FM Noise Canceller operates only in receive mode.

For example, GPS location fixes are very difficult to obtain indoors, in covered locations, between high buildings, or in situations where you have not established a clear broad view of the sky.

Once GPS is enabled, the radio displays the GPS icon on the screen. The dispatcher can always request the system to determine the real-time location coordinates of the radio.

GPS Operation

The GPS technology uses radio signals from earth orbiting satellites, to establish the location coordinates, maximizing your view of clear unobstructed sky is essential for optimum performance.

Where adequate signals from multiple satellites are not available (usually because you cannot establish a view of a wide area of the sky), the GPS feature of your radio will not work. Such situations include but are not limited to:

- Underground locations
- Inside of buildings, trains, or other covered vehicles
- Under any other metal or concrete roof or structure

Global Positioning System (GPS)

This feature uses information from the Global Positioning System (GPS) satellites orbiting the Earth to determine the approximate geographical location of your radio, expressed as latitude and longitude or MGRS format per request from customers. The availability and accuracy of this location information (and the amount of time that it takes to calculate it) varies depending on the environment in which you are using the GPS feature.

- Between tall buildings or under dense tree-cover
- In temperature extremes outside the operating limits of your radio

Even where location information can be calculated in such situations, it may take longer to do so, and your location estimate may not be as accurate. Therefore, in any emergency situation, always report your location to your dispatcher.

Keep in mind that the accuracy of the location information and the time it takes to obtain it varies depending upon circumstances, particularly the ability to receive signals from an adequate number of satellites.

Note: Even where adequate signals from multiple satellites are available, your GPS feature only provides an approximate location, usually within 20 meters from your actual location, but sometimes farther away.

The satellites used by the GPS feature are controlled by the U.S. government and are subject to changes implemented in accordance with the Department of Defense GPS user policy and the Federal Radio Navigation Plan. These changes may affect the performance of the GPS feature on your radio.

GPS Performance Enhancement

Sometimes, the GPS feature may be unable to complete a location calculation successfully. You then see a message indicating that your radio cannot connect to enough visible satellites.

To maximize the ability of your radio to determine a fix, take note of the following guidelines:

- For your initial fix, hold the radio in the face position.
- Stay in the open. The GPS feature works best where there is nothing between your radio and a large amount of open sky.

Peer-Location on the Display (ASTRO Conventional only)

This feature is only available for radio-to-radio voice transmissions, dispatch call and selective call in conventional ASTRO system. For radio-to-radio transmission, in order to allow the radio to show peer-location, the voice should be directly sent from one radio to another radio without passing through any infrastructure facility such as repeaters, phone or DVRS system. Both the transmitting radio and receiving radio must be configured to enable them to send and/or receive the GPS coordinates. You can

check with your nearest qualified technician for more details.

Note: If the receiving radio is operating in a Mixed Mode channel, only if its voice transmission is via conventional ASTRO system then it can receive the location coordinates of its peers.

This feature is also operable in a Scan Active channel or Scan Talkback channel.

Upon receiving a voice transmission with GPS coordinates enabled on the receiving radio, the display shows the coordinates available in full or in short coordinates. There are two different formats available. Refer to the following list for the details shown in the Peer-Location quick text. Consult your agent to pick the best format to configure to your radio.

Full location coordinates

- PTT ID (This is optional.)
- Longitude and latitude
- Relative distance or direction.

Short location coordinates

- PTT ID (This is optional.)
- Longitude and latitude

Note:

If the transmitting radio is stale at its location after a period of time, the receiving radio display shows ID:<PTT ID> LKL: <Coordinates> <distance>. If the radio is not configured to show PTT ID, you see LAST KNOWN LOC: <Coordinates> <distance>.

If the transmitting radio does not have GPS or the receiving radio could not decode the GPS signal of the received signal, the receiving radio display shows ID:<PTT ID> UNK LOC. The PTT ID seen here is optional to be shown on the display per requirement of usage.

Trunking System Controls

Using the Failsoft System

The failsoft system ensures continuous radio communications during a trunked system failure. If a trunking system fails completely, the radio goes into failsoft operation and automatically switches to its failsoft channel.

During failsoft operation, your radio transmits and receives in conventional operation on a predetermined frequency. You hear a medium-pitched tone and the display shows FAILSOFT.

When the trunking system returns to normal operation, your radio automatically leaves failsoft operation and returns to trunked operation.

To continue, in Failsoft, to communicate with other talkgroups, refer to the following procedure.

- 1 Rotate the **Mode Knob** to change to a different repeater frequency.
- 2 Press the **PTT** button to talk, and release the button to listen.

Out-of-Range Radio

When your radio goes out of the range of the system, it can no longer lock onto a control channel.

You hear a low-pitched tone and/or the display shows the currently selected zone/channel combination and **OUT RNG**. Your radio remains in this out-of-range condition until it locks onto a control channel, it locks onto a failsoft channel, or it is turned off.

Site Trunking Feature

If the zone controller loses communication with any site, that site reverts to site trunking.

The display shows the currently selected zone/channel combination and **STE TRNK**.

Note: When this occurs, you can communicate only with other radios within your trunking site.

Locking and Unlocking a Site

This feature allows your radio to lock onto a specific site and not roam among wide-area talkgroup sites. This feature should be used with caution, since it inhibits roaming to another site in a wide-area system.

Use the preprogrammed **Site Lock/Unlock** button to toggle the lock state between locked and unlocked.

The radio saves the new site lock state and returns to the Home screen.

Site Display and Search Button

The **Site Display** and **Site Search** button allows you to view the name of the current site or force your radio to change to a new one.

Viewing the Current Site

Press the preprogrammed **Site Displ/Srch** button.

The display shows momentarily the name of the current site and its corresponding received signal strength indicator (RSSI).

Changing the Current Site

Press and hold down the preprogrammed **Site Displ/Srch** button.

You hear a tone and the display shows momentarily SCANNING.

When the radio finds a new site, it returns to the Home screen.

Mission Critical Wireless - Bluetooth®

This feature allows your radio to extend its functionality by connecting to external proprietary Motorola accessories.

Note: It is recommended to use Motorola proprietary Mission Critical Wireless (MCW) devices with APX radios during Mission Critical operations as other Bluetooth® devices may or may not meet the mission critical standard.

Your radio must be preprogrammed to allow you to use this feature.

The default setting for Bluetooth-enabled radio is Bluetooth ON. See [Turning the Bluetooth Off](#) on page 69 to turn the Bluetooth OFF.


Currently your radio supports the following Bluetooth devices or profiles.

- Headset (HSP)
- Dial Up Networking (DUN)
- Personal Area Networking (PAN)
- Serial Port (SPP)

Turning the Bluetooth On

Turning the Bluetooth on via the preprogrammed button:

- a) Press the preprogrammed button to turn on the Bluetooth.
You hear a short, medium-pitched tone. The


display shows momentarily BT ON, and  appears.

If Bluetooth fails to launch, the display shows BT ON FL.

Turning the Bluetooth Off

Turning the Bluetooth off via the preprogrammed button:

- a) Press the preprogrammed button to turn off the Bluetooth.

You hear a short, medium-pitched tone. The display shows momentary BT OFF and  and disappears.

Re-Pair Timer

There are two options for configuring the Bluetooth pairing type of the radio. The type defines the duration the radio and the accessory retain the pairing information.

Immediate (For MCW accessories only.) When the radio and/or device is turned off after pairing, the keys are lost. Due to this, when your radio and your device are turned back on, they are unable to re-connect. The user must re-pair the devices to re-establish a new set of pairing keys. See [Pairing with Low Frequency-Motorola Proximity Pairing](#)

[\(LF-MPP\) Feature](#) on page 71 and [Standard Pairing Feature](#) on page 72.

Infinite

(For all Bluetooth devices.) When the radio and/or device are turned off after pairing, keys are **not** lost. When the radio and the device are turned back on, they can resume the Bluetooth connection without user intervention.

Re-Pair Timer Options	Re-Pair Timer Scenarios
Immediate (For MCW Accessories only)	<ul style="list-style-type: none"> When the radio is powered off, pairing key is lost immediately, and accessory attempts to pair again. If pairing is unsuccessful within the Drop Timer value, the accessory automatically powers off. When the accessory is powered off, all keys are lost immediately, and the user must re-pair the devices.

Re-Pair Timer Options	Re-Pair Timer Scenarios
	<ul style="list-style-type: none"> When the device loses Bluetooth connection, the device will attempt to re-establish Bluetooth Connection within the Drop Timer value.
Infinite (For all Bluetooth devices)	<ul style="list-style-type: none"> When the radio is powered off, the accessory attempts to re-establish the Bluetooth Connection for a period of time depending upon the Drop Timer value. If the device fails to reconnect within the period, the accessory then powers off.

Bluetooth Drop Timer

The Bluetooth Drop Timer has two different settings and functions, depending upon the selection of the Re-Pair Timer.

Re-Pair Timer Options	Description
Immediate (For MCW Accessories only)	<p>0 – 15 minutes programmable buffer time to re-establish the Bluetooth Connection when the Bluetooth signal is out of range.</p> <p>If either device powers off, the pairing keys are immediately cleared from both devices and the devices must re-pair.</p>
Infinite (For all Bluetooth devices)	<p>This Timer only applies to the accessory. The programmable timer choices are: 0 – 15 minutes, 2 hours, 4 hours or 8 hours.</p> <p>Do note there are exceptions for Operation Critical Wireless (OCW) headset and PTT which are preprogrammed to 8 hours.</p> <p>This is a "stay alive" time that the accessory will remain on without the device reconnecting before powering off. The radio will remain</p>

Re-Pair Timer Options	Description
	<p>on until the user powers the radio off. The radio and accessory will remain paired indefinitely. Once the device re-connect, the timer is reset.</p>

The radio could not control the Drop Timer of Personal Area Networking (PAN), Dial-Up Networking (DUN), Commercial Off- The-Shelf (COTS) and data services. It is depends on the specifications of these external devices.

Check with your dealer or system administrator for more information about these timers.

To establish the Bluetooth Connection, see [Pairing with Low Frequency-Motorola Proximity Pairing \(LF-MPP\) Feature](#) on page 71 or [Standard Pairing Feature](#) on page 72 .

Pairing with Low Frequency-Motorola Proximity Pairing (LF-MPP) Feature

Ensure that Bluetooth feature of your radio is on and the Bluetooth tones are enabled.

Bluetooth tones, Bluetooth menu and preprogrammed buttons must be preprogrammed by a qualified radio technician. Check with your dealer or system administrator for more information.

The range of Bluetooth operation is 10 meters line-of-sight communication. This is an unobstructed path between the location of the signal transmitter (your radio) and the location of the receiver (your device or accessory).

Obstacles that can cause an obstruction in the line-of-sight include trees, buildings, mountains, cars and etc.

It is **not** recommended that you leave your radio behind and expect your accessory to work with a high degree of reliability when they are separated.

At the fringe areas of reception, both voice and tone quality will start to sound "garbled" or "broken". To correct this problem, simply position the accessory and radio closer to each other (within the 10 meter defined range) to re-establish clear audio reception.

Note: Once a COTS headset is paired to your radio, it is always connected. Therefore the battery life of the accessory is aligned with the Talk Time power consumption, not the Standby Time consumption.



Turn on the accessory. Then place it close to your radio aligning the Bluetooth Pairing Location (A) on the radio to the Bluetooth Pairing Location (a blue dot) on the accessory.

If the pairing process is successful, you hear an incremental-pitched tone. The radio begins to connect to the device.

If the pairing process fails, you hear a short, low-pitched tone. The display shows PAIRING alternates with FAILED. Repeat this step.


The radio tries to establish connection with the device once paired.


Note: If the connection fails within 6 seconds, you hear a decremental-pitched tone to indicate that the device is unpaired. The display shows <Device Type> UNPAIRED. Repeat this step to re-initiate the pairing process.




If the connection is successful, you hear an incremental-pitched tone. The display shows <Device Type> CONNECTED and the Bluetooth icon turns from  to .

If the radio has the pairing record of the device and the connection fails, you hear a short, low-pitched tone. The display shows <Device Type> CON FAIL.

Radio Indications of Lost Bluetooth Connection

The radio shows  when the device has a Bluetooth connection. Below is the scenario and radio indications when the connection is interrupted.

The  starts blinking for up to 10 seconds. You hear a decremental-pitched tone. The display shows <Device Type> alternating with CON LOST.

If the Bluetooth device successfully re-connects before the Bluetooth Drop Timer expires, the display shows momentary <Device Type> CONNECTED, and  shows persistently, or if the Bluetooth device fails to re-connect within 10 seconds, the blinking  is replaced by a persistent .

Standard Pairing Feature

Note: Bluetooth tones, Bluetooth menu and preprogrammed buttons must be preprogrammed by

a qualified radio technician. Check with your dealer or system administrator for more information.

Once a COTS headset is paired to your radio, it is always connected. Therefore the battery life of the accessory is aligned with the Talk time power consumption, not the Standby time consumption.

The Bluetooth Standard Pairing feature enables your Bluetooth enabled radio to search for other Bluetooth enabled and discoverable device. Once the device is discovered, your radio automatically pairs with the device.

This feature also enables your Bluetooth enabled radio to be visible to another Bluetooth enabled device and receive request to pair from other device.

Searching and Pairing the Bluetooth Device

Ensure the Bluetooth on your device is turned to On and is set to **Discoverable** in order to enable your radio to detect your device in Bluetooth.

Bluetooth Search in Bluetooth Standard Pairing method is used to scan for other Bluetooth devices nearby. It is set to off by default.

The radio only search for HSP devices and Motorola MCW & OCW accessories. Radio will filter out other profiles.

Press the preprogrammed **Bluetooth Inquiry On/Off** button, to enable the **Bluetooth Search** feature.

One of the following scenarios occurs:

- If successful, the display shows SRCH ON followed by SRCH END when the radio is pairing with a device found. The display shows <Device Name> PAIRED to indicate pairing is complete.
- The display shows SRCH END when the search timer expires without pairing with any device. Repeat this step.

One of the following scenarios occurs:

- The radio continues to connect to the device. If the connecting process is successful, the radio sounds an incremental-pitched tone. The display shows <Device Type>CONNECTED, and the Bluetooth icon turns from b to a.
- If the device already has pairing records and the connecting process fails, the radio sounds a short,

low-pitched tone. The display shows <Device Type> CON FAIL.

- If the connection fails within 6 seconds, you hear a decremental-pitched tone to indicate that the device is unpaired. The display shows <Device Type> UNPAIRED.

Turning Bluetooth Visibility On

Turning Bluetooth visibility to on enables other Bluetooth devices to search for your radio. The visibility of the Bluetooth is set to off by default.

Turn Bluetooth visibility on via the preprogrammed button.

- a) Press and hold the preprogrammed **Bluetooth Inquiry On/ Off** button for three seconds to enable the Bluetooth visibility feature.

One of the following scenarios occurs:

- Keep holding the button although you hear a short, medium-pitched tone with the display shows momentary `VISIBLE`.^[2] This indicates the visibility is turned on successfully.

- If the visibility fails to turn on, the display shows `VISIBLYFAILED`.
- When the timer expires, the display shows `VISI OFF`.

Receiving Pairing Request from other Devices

Turn on your radio Bluetooth Visible mode. Your radio automatically accept the request and pair with any request received from other device.

Turning On the Bluetooth Audio (Routing the Audio from the Radio to the Headset)

Turning on the Bluetooth audio via the preprogrammed button:

- a) Press the preprogrammed **Bluetooth Audio Reroute** button to route the audio from the radio to the headset. A short, medium-pitched tone sounds. The display shows `HDSET ON`.

² Releasing the preprogrammed button turns off the Visibility mode.

Turning Off the Bluetooth Audio (Routing the Audio from the Headset to the Radio)

Turning off the Bluetooth audio via the preprogrammed button:

- a) Press the preprogrammed **Bluetooth Audio Reroute** button to route the audio from the headset to the radio.
A short, medium-pitched tone sounds. The display shows `SPKR ON`.

Adjusting the Volume of the Radio from Bluetooth Audio Device

Ensure that the Bluetooth audio device is connected to the radio.

Your radio can only control the volume of MCW and OCW Bluetooth enabled audio device. If the radio is paired with other Bluetooth enabled audio device, its volume is independent from the APX radio. In this case, the volume is only adjustable on the device.

Adjust volume up/down on the Bluetooth audio device.

The radio display shows `VOL XX` and sounds a short, medium-pitched tone.

Clearing All Bluetooth Devices Information

Clearing all Bluetooth devices information via the preprogrammed **Bluetooth On/Off** button:

- a) Long press the preprogrammed **Bluetooth On/Off** button.

You hear a short, medium-pitched tone. The display shows `PLS WAIT` to indicate clearing is in progress.

If successful, the display shows `ALL CLR`.

If unsuccessful, you hear the radio sounds a short, low-pitched tone. The display shows `CLR FAIL`.

Note: If Re-Pair Timer is set to infinite and you clear keys on the radio, you must clear keys on all previously paired devices as well. (Please see your accessories manual for further details.)

Programming Over Project 25 (POP 25) (ASTRO 25 and ASTRO Conventional)

This feature enables configuration data to be upgraded to your radio over-the-air. This feature retains full use of the radio during the configuration

data transfer without interrupting communication. The upgrade pauses to give priorities to voice call, and continues after the voice call ended.

Once a configuration upgrade is downloaded to your radio, you can install new changes immediately or delay changes to be installed on the radio when it is being powered up.

Note: This feature must be preprogrammed by a qualified radio technician. Check with your dealer or system administrator for more information.

Check with your agent if Voice Announcement is available for the feature you need.

The two options of priority for the Voice Announcement available are:

- High** Enables the voice of the feature to announce even when the radio is receiving calls.
- Low** Disables the voice of the feature from announcing when the radio is receiving calls.

You hear a voice announcement when the features below are preprogrammed in the radio.

- The radio powers up. The radio announces the current zone and channel it is transmitting.
- Press the preprogrammed voice announcement button (which specifically programmed to playback the current zone and channel). The radio announces the current zone and channel it is transmitting.

Note: Pressing this preprogrammed playback button will always enable the voice feature to announce in High priority.

All the three programmable buttons at the side of the radio support this feature.

Voice Announcement

This feature enables the radio to audibly indicate the current feature mode, zone or channel the user has just assigned. This audio indicator can be customized per customer requirements. This is typically useful when the user is in a difficult condition to read the content shown on the display.

Each voice announcement is within a limit of three seconds maximum. The sum duration of all different voice announcements in a radio shall be no more than 1000 seconds.

Note: This feature must be preprogrammed by a qualified radio technician.

- Change to a new zone. The radio announces the current zone and channel it is transmitting.
- Change to a new channel remaining within the current zone. The radio announces the current channel.
- Press either the preprogrammed button or switch of the radio to launch or terminate Scan, Talkaround/Direct or Transmit Inhibit. The radio announces the corresponding feature activation.

Site Selectable Alerts (ASTRO 25)

A Site Selectable Alert (SSA) is an Intelligent Lighting indicator together with audio alert sent to radios at a site or a few sites to notify the users when there is a special situation that they need to be aware of. Only authorized radios are enabled to send SSA.

Upon the activation of a SSA, the receiving radios display the alert alias and generate the periodic alert tone.

Note: Alert alias, alert tone, and alert period can be preprogrammed. Alert period is the duration for the radio to repeat the alert tone. An interval of 5 seconds might impact the battery life of the radio. Check with your dealer or system administrator for more details.

When mixing SSA with received voice audio, the SSA alert is reduced in volume to ensure that the voice message is still heard clearly. Therefore, it is important that the SSA audio files are created with clear loud audio to ensure they can still be heard clearly when played at reduced levels.

Utilities

Using the Flip Display

This feature allows you to flip the content of the top display upside down. It is particularly useful when you would like to read the top display while the radio is still in the carry holder attached to your belt.

To flip the display, press and hold the preprogrammed **Light/Flip** button

Selecting a Basic Zone Bank

The Basic Zone Select feature must to be preprogrammed to the **3-position A-B-C** switch, while the Basic Zone Bank feature must be preprogrammed to any **side** button or **Top (Orange)** button before you can use this feature.

This feature allows twice as many zones to be accessed from a switch, doubling the amount of switch positions.

Use the preprogrammed **Basic Zone Bank** button to toggle the position between Bank 1 and Bank 2. The top display shows the status icons (A, B, C, D, E or F) or the zone name based on the bank and switch position selected.

Note: See the [Basic Zone Bank 1](#) and [Basic Zone Bank 2](#) icons for more information on the status icons.

preprogrammed to any **side** button or **Top (Orange)** button before you can use this feature.

- 1 Press the preprogrammed **EZB Up** or **EZB Down** button to scroll the EZB up or down or press and hold the preprogrammed **EZB Up** or **EZB Down** button to fast scroll the EZB up or down.
- 2 Turn the **3-Position A/B/C** Switch to select the first, second or third zone in the selected EZB.

Selecting an Enhanced Zone Bank

This feature is created in order to allow users to communicate in more zones. An **Enhanced Zone Bank (EZB)** consists of three zones. This also means each icon A, B, C, ... or Y consist of three zones. You can use the preprogrammed **3-position A-B-C** switch to select the first, second or third zone in an EZB.

This feature allows user to navigate from up to 75 zones in 25 EZBs.

Note: The Zone Select feature must to be preprogrammed to the **3-position A-B-C** switch, while the Enhanced Zone Bank feature must be

Selecting the Power Level

Note: This feature must be preprogrammed by a qualified radio technician.

This feature enables you to reduce the transmit power level for specific case that requires a lower power level. You can select the power level at which your radio transmits. The radio always turns on to the default setting. These reduced transmit power level settings do not affect the receiving performance of your radio, nor diminish the overall quality of the audio and data functionality of the radio given the following conditions.

Power level **Low** enables a shorter transmitting distance and to conserve power. Power level **High** enables a longer transmitting distance.

Use the preprogrammed **Transmit Power Level** switch to toggle the power level between low and high power.

The display shows **LOW PWR** and the low power icon or the display shows **HIGH PWR** and the high power icon.

Controlling the Display Backlight

You can enable or disable the radio's display backlight as needed, if poor light conditions make the display or keypad difficult to read.

Note:

The backlight remains on for a preprogrammed time before it automatically turns off completely or returns to the minimum backlight level.

Perform one of the following actions:

- To toggle the backlight on or off, press the preprogrammed **Light/Flip** button.
 - To turn the backlight on, press any programmable radio controls or buttons.
-

Locking and Unlocking the Controls

You can lock the programmable buttons, switches and rotary knobs of your radio to avoid inadvertent entry. Check with your dealer or qualified technician for best selection to suit your usage.

- 1 Toggle the preprogrammed **Keypad/Control Lock** button or switch to on.
-
- 2 The display shows **CTRL LCK**.
-
- 3 To unlock the knobs and buttons, toggle again.
-

Turning Voice Mute On or Off

You can enable and disable voice transmission, if needed.

Turning Voice Mute on or off via the preprogrammed **Voice Mute** button:

- a) To turn the feature off or on, press the preprogrammed **Voice Mute** button.
-

The display shows momentary **VMUT OFF**, and you hear a short tone, indicating that the feature is disabled or the display shows momentary **VMUT ON**,

and you hear a short tone, indicating that the feature is enabled.

Using the Time-Out Timer

This feature turns off your radio's transmitter. You cannot transmit longer than the preset timer setting.

If you attempt to do so, the radio automatically stops your transmission, and you hear a talk-prohibit tone.

The timer is defaulted at 60 seconds, but it can be preprogrammed from 3 to 120 seconds, in 15-second intervals, or it can be disabled entirely for each radio mode, by a qualified radio technician.

Note: You hear a brief, low-pitched, warning tone four seconds before the transmission times out.

- 1 Hold down the **PTT** button longer than the preprogrammed time.
You hear a short, low-pitched warning tone, the transmission is cut-off, and the LED goes out until you release the **PTT** button.
- 2 Release the **PTT** button.
The timer resets.
- 3 To re-transmit, press the **PTT** button.

The time-out timer restarts and the LED lights up solid red.

Using Conventional Squelch Operation Features

This feature filters out unwanted calls with low signal strength or channels that have a higher than normal background noise.

Analog Options

Tone Private Line (PL), Digital Private-Line (DPL), and carrier squelch can be available (preprogrammed) per channel.

Mode	Result
Carrier squelch (C)	You hear all traffic on a channel.
PL or DPL	The radio responds only to your messages.

Digital Options

One or more of the following options may be preprogrammed in your radio. Check with your dealer or system administrator for more information.

Option	Result
Digital Carrier-Operated Squelch (COS)	You hear any digital traffic.
Normal Squelch	You hear any digital traffic having the correct network access code.
Selective Switch	You hear any digital traffic having the correct network access code and correct talkgroup.

Using the PL Defeat Feature

This feature allows you to override any coded squelch (DPL or PL) that might be preprogrammed to a channel. The radio also unmutes to any digital activity on a digital channel.

Place the preprogrammed **PL Defeat** switch in the PL Defeat position.

One of the following scenarios occurs:

- You hear any activity on the channel.
- The radio is muted if no activity is present.

Note: When this feature is active, the Carrier Squelch status indicator is displayed.

Digital PTT ID Support

This feature allows you to see the radio ID (number) of the radio from whom you are currently receiving a transmission. This ID, consisting up to a maximum of eight characters, can be viewed by both the receiving radio and the dispatcher.

Your radio's ID number is also automatically sent every time the **PTT** button is pressed. This is a per-channel feature. For digital voice transmissions, your radio's ID is sent continuously during the voice message.

Smart PTT Feature (Conventional Only)

Smart **PTT** is a per-personality, programmable feature used in conventional radio systems to keep radio users from talking over other radio conversations.

When smart **PTT** is enabled in your radio, you cannot transmit on an active channel.

If you try to transmit on an active smart-**PTT** channel, you hear an alert tone, and the transmission is

inhibited. The LED lights up solid yellow to indicate that the channel is busy.

The following table shows the variations of smart **PTT**:

Mode	Description
Transmit Inhibit on Busy Channel with Carrier	You cannot transmit if any traffic is detected on the channel.
Transmit Inhibit on Busy Channel with Wrong Squelch Code	You cannot transmit on an active channel with a squelch code or (if secure-equipped) encryption key other than your own. If the PL code is the same as yours, the transmission is not prevented.
Quick-Key Override	This feature can work in conjunction with either of the two above variations. You can override the transmit-inhibit state by quick-keying the radio. In other words, two PTT button presses within the preprogrammed time limit.

Transmit Inhibit

This feature is available for APCO 25 trunking, Type II trunking and Conventional operations for all APX radios.

When Transmit Inhibit feature is enabled, the radio stops all transmission including voice and data. The radio could receive messages but not replying the acknowledgement request of the received message.

User could physically control the transmission of the radio especially during operation in hazardous environments with this feature. An environment is considered hazardous when the power emitted by the radio power amplifier could initiate an explosion or other dangerous reactions.

When the Transmit Inhibit feature is disabled, the radio functions according to its normal operations.

The radio sounds alert tone when user enters or exits this feature and also when PTT is pressed.

Note: Acknowledgement of any messages required from the radio is not transmitted if the Transmit Inhibition is enabled.

Enabling Transmit Inhibition

Press the Transmit Inhibit programmable button.

Note: If the user has disabled TX Inhibit via the menu and then moves the switch to the position where TX Inhibit is enabled, the new value overwrites the menu value.

The display shows `Tx inhibit on`. You hear a sequence of short, low-high tones to indicate transmission is inhibited.

Pressing **PTT** triggers the radio sounds a constant short, low-pitched tone (reject tone).

Note: The status of the Transmit Inhibit does not change after the radio powers up.

Disabling Transmit Inhibition

Press the Transmit Inhibit programmable button.

Note: If the user has disabled TX Inhibit via the softkey and then moves the switch to the position where TX Inhibit is enabled, the new value overwrites the menu value.

The display shows `Tx inhibit off`. You hear a sequence of short, high-low tone (Transmit Inhibit Off tone) to indicate transmission is back to normal operation.

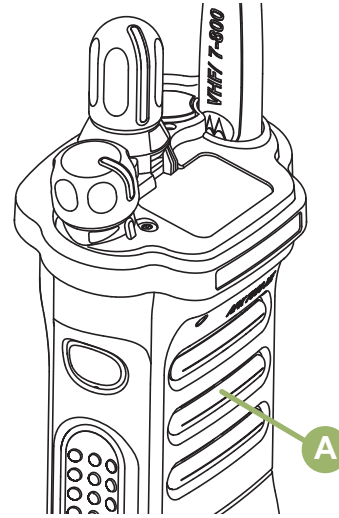
Helpful Tips

Radio Care



Caution:

- Your radio casing has a vent port that allows for pressure equalization in the radio. Never poke this vent **A** with any objects, such as needles, tweezers, or screwdrivers. This could create leak paths into the radio and the radio's submergibility will be lost.



- Your radio is designed to be submerged to a maximum depth of 6 feet, with a maximum submersion time of 2 hours. Exceeding either maximum limit may result in damage to the radio.
- Elastomer technology materials used for seals in rugged portable radios can age with time and environmental exposure. Therefore, Motorola recommends that rugged radios be checked annually as a

preventive measure in order to assure the watertight integrity of the radio. Motorola details the disassembly, test, and reassembly procedures along with necessary test equipment needed to inspect, maintain and troubleshoot radio seals in the radio's service manual.

- If the radio battery contact area has been submerged in water, dry and clean the radio battery contacts before attaching a battery to the radio. Otherwise, the water could short-circuit the radio.
- If the radio has been submerged in water, shake the radio well so that any water that may be trapped inside the speaker grille and microphone port can be removed. Otherwise, the water will decrease the audio quality of the radio.
- Do **not** disassemble the radio. This could damage radio seals and result in leak paths into the radio. Any radio maintenance should be performed only by a qualified radio technician.

Cleaning Your Radio



Caution: Do **not** use solvents to clean your radio as most chemicals may permanently damage the radio housing and textures.

Do **not** submerge the radio in the detergent solution.

To clean the external surfaces of your radio, follow the procedure described next.

- 1 Combine one teaspoon of mild dishwashing detergent to one gallon of water (0.5% solution).

- 2 Apply the solution sparingly with a stiff, non-metallic, shortbristled brush, making sure excess detergent does not get entrapped near the connectors, controls or crevices. Dry the radio thoroughly with a soft, lint-free cloth.

- 3 Clean battery contacts with a lint-free cloth to remove dirt or grease.

Proper Ways to Handle the Radio

- Do **not** pound, drop, or throw the radio unnecessarily. Never carry the radio by the antenna.

- Avoid subjecting the radio to an excess of liquids. Do not submerge the radio unless it is a ruggedized.
- Avoid subjecting the radio to corrosives, solvents or chemicals.
- Do **not** disassemble the radio.
- Keep the accessory-connector cover in place until ready to use the connector. Replace the cover immediately once the accessory has been disconnected.
- When charging the radio using a wall mounted charger, the radio must be turned off. Otherwise, the Man Down Alert and Emergency may be accidentally triggered.

Radio Service and Repair

Proper repair and maintenance procedures will assure efficient operation and long life for this product. A Motorola maintenance agreement will provide expert service to keep this and all other communication equipment in perfect operating condition. A nationwide service organization is provided by Motorola to support maintenance services. Through its maintenance and installation program, Motorola makes available the finest service to those desiring reliable, continuous communications

on a contract basis. For a contract service agreement, please contact your nearest Motorola service or sales representative, or an authorized Motorola dealer.

Express Service Plus (ESP) is an optional extended service coverage plan, which provides for the repair of this product for an additional period of either one or two years beyond the normal expiration date of the standard warranty. For more information about ESP, contact the Motorola Radio Support Center at 3761 South Central Avenue, Rockford, IL 61102 (800) 227-6772 / (847)725-4200.

Battery Care

Battery Charge Status

Your radio can indicate the battery's charge status through:

- the LED and sounds.
- the fuel gauge icon on the display.


LED and Sounds





When your battery is low:


- the LED blinks red when the **PTT** button is pressed.

- you hear a low-battery “chirp” (short, high-pitched tone).

Fuel Gauge Icons

A blinking fuel gauge icon () is displayed only when the battery voltage drops to low level. In this case, replace the battery with a fully charged one.

Gauge	Battery Charge
	76% to 100% full ^[3]
	51% to 75% ^[3]
	26% to 50% ^[3]
	11% to 25% ^[3]

Gauge	Battery Charge
	10% or less (at 10%, the gauge begins blinking)

Battery Recycling and Disposal

In the U.S. and Canada, Motorola participates in the nationwide Rechargeable Battery Recycling Corporation (RBRC) program for battery collection and recycling. Many retailers and dealers participate in this program.

For the of the drop-off facility closest to you, access RBRC's Internet web site at www.rbrc.com or call 1-800-8-BATTERY. This internet site and telephone number also provide other useful information concerning recycling options for consumers, businesses, and governmental agencies.

³ These are for IMPRES™ battery operation only.

Accessories

The accessory link below is for APX radios. Not all accessories are FCC certified to operate with all APX models and/or bandsplits. Please refer to the specific APX radio price pages for a list of FCC certified accessories or contact your sales representative for accessory compatibility.

<http://www.motorolasolutions.com/APX>

Note: GPS only antenna is only used in either a single band UHF or 700/800 application where the Public Safety Microphone (PSM) is used with the corresponding PSM antenna. This antenna is only for GPS reception and cannot be used for receive/transmit operation at UHF, VHF or 700/800. This antenna is never to be used on the PSM.

Maritime Radio Use in the VHF Frequency Range

Special Channel Assignments

Emergency Channel

If you are in imminent and grave danger at sea and require emergency assistance, use VHF Channel 16 to send a distress call to nearby vessels and the United States Coast Guard. Transmit the following information, in this order:

- 1 “MAYDAY, MAYDAY, MAYDAY.”
- 2 “THIS IS _____, CALL SIGN _____.” State the name of the vessel in distress 3 times, followed by the call sign or other identification of the vessel, stated 3 times.
- 3 Repeat “MAYDAY” and the name of the vessel.
- 4 “WE ARE LOCATED AT _____.” State the position of the vessel in distress, using any information that will help responders to locate you, e.g.:
 - latitude and longitude
 - bearing (state whether you are using true or magnetic north)

- distance to a well-known landmark
 - vessel course, speed or destination
- 5 State the nature of the distress.
 - 6 Specify what kind of assistance you need.
 - 7 State the number of persons on board and the number needing medical attention, if any.
 - 8 Mention any other information that would be helpful to responders, such as type of vessel, vessel length and/or tonnage, hull color, etc.
 - 9 “OVER.”
 - 10 Wait for a response.
 - 11 If you do not receive an immediate response, remain by the radio and repeat the transmission at intervals until you receive a response. Be prepared to follow any instructions given to you.

Non-Commercial Call Channel

For non-commercial transmissions, such as fishing reports, rendezvous arrangements, repair scheduling, or berthing information, use **VHF Channel 9**.

Operating Frequency Requirements

A radio designated for shipboard use must comply with Federal Communications Commission Rule Part 80 as follows:

- on ships subject to Part II of Title III of the Communications Act, the radio must be capable of operating on the 156.800 MHz frequency.
- on ships subject to the Safety Convention, the radio must be capable of operating:
 - in the simplex mode on the ship station transmitting frequencies specified in the 156.025 – 157.425 MHz frequency band, and
 - in the semiduplex mode on the two frequency channels specified in the table below.

Note:

Simplex channels 3, 21, 23, 61, 64, 81, 82, and 83 cannot be lawfully used by the general public in US waters.

Additional information about operating requirements in the Maritime Services can be obtained from the full text of FCC Rule Part 80 and from the US Coast Guard.

Table 1: VHF Marine Channel List

Channel Number	Frequency (MHz)	
	Transmit	Receive

1	156.050	160.650
2	156.100	160.700
*	156.150	160.750
4	156.200	160.800
5	156.250	160.850
6	156.300	–
7	156.350	160.950
8	156.400	–
9	156.450	156.450
10	156.500	156.500
11	156.550	156.550
12	156.600	156.600
13**	156.650	156.650
14	156.700	156.700
15**	156.750	156.750
16	156.800	156.800
17**	156.850	156.850

18	156.900	161.500
19	156.950	161.550
20	157.000	161.600
*	157.050	161.650
22	157.100	161.700
*	157.150	161.750
24	157.200	161.800
25	157.250	161.850
26	157.300	161.900
27	157.350	161.950
28	157.400	162.000
60	156.025	160.625
*	156.075	160.675
62	156.125	160.725
63	156.175	160.775
*	156.225	160.825
65	156.275	160.875

66	156.325	160.925
67**	156.375	156.375
68	156.425	156.425
69	156.475	156.475
71	156.575	156.575
72	156.625	–
73	156.675	156.675
74	156.725	156.725
75	***	***
76	***	***
77**	156.875	–
78	156.925	161.525
79	156.975	161.575
80	157.025	161.625
*	157.075	161.675
*	157.125	161.725
*	157.175	161.775

84	157.225	161.825
85	157.275	161.875
86	157.325	161.925
87	157.375	161.975
88	157.425	162.025

Note:

* *Simplex channels 3, 21, 23, 61, 64, 81, 82, and 83 cannot be **lawfully used** by the general public in US waters.*

** *Low power (1 W) only.*

*** *Guard band.*

Note: A – in the Receive column indicates that the channel is transmit only.

Declaration of Compliance for the Use of Distress and Safety Frequencies

The radio equipment does not employ a modulation other than the internationally adopted modulation for maritime use when it operates on the distress and safety frequencies specified in RSS-182 Section 7.3.

Technical Parameters for Interfacing External Data Sources

	RS232	USB	SB9600
Input Voltage (Volts Peak-to-peak)	18V	3.6V	5V
Max Data Rate	28 kb/s	12 Mb/s	9.6 kb/s
Impedance	5k ohm	90 ohm	120 ohm

Glossary

This glossary is a list of specialized terms used in this manual.

ACK	Acknowledgment of communication.		
Active Channel	A channel that has traffic on it.		
Analog Signal	An RF signal that has a continuous nature rather than a pulsed or discrete nature.		
ARS	Automatic Registration Service		
ASTRO 25	Motorola standard for wireless digital trunked communications.		
ASTRO Conventional	Motorola standard for wireless digital conventional communications.		
Autoscan	A feature that allows the radio to automatically scan the members of a scan list.		
Bluetooth	Bluetooth is an open wireless technology standard for exchanging data over short		distances from fixed and mobile devices with high levels of security.
		Bluetooth Pairing	Bluetooth pairing occurs when two bluetooth devices exchanged a passkey to form a paired Bluetooth wireless connection.
		Call Alert	Privately page an individual by sending an audible tone.
		Carrier Squelch	Feature that responds to the presence of an RF carrier by opening or unmuting (turning on) a receiver's audio circuit. A squelch circuit silences the radio when no signal is being received so that the user does not have to listen to "noise".
		Central Controller	A software-controlled, computer-driven device that receives and generates data for the trunked radios assigned to it. It monitors and directs the

	operations of the trunked repeaters.	Digital Signal	An RF signal that has a pulsed, or discrete, nature, rather than a continuous nature.
Channel	A group of characteristics such as transmit/ receive frequency pairs, radio parameters, and encryption encoding.	Dispatcher	An individual who has radio system management duties.
Control Channel	In a trunking system, one of the channels that is used to provide a continuous, twoway/ data communications path between the central controller and all radios on the system.	Dynamic Regrouping	A feature that allows the dispatcher to temporarily reassign selected radios to a single special channel so they can communicate with each other.
Conventional	Typically refers to radio-to-radio communications, sometimes through a repeater (see Trunking).	Failsoft	A feature that allows communications to take place even though the central controller has failed. Each trunked repeater in the system transmits a data word informing every radio that the system has gone into failsoft.
Conventional Scan List	A scan list that includes only conventional channels.	FCC	Federal Communications Commission.
COTS	Commercial Off-The-Shelf	FM	Frequency Modulation
Digital Private Line (DPL)	A type of coded squelch using data bursts. Similar to PL except a digital code is used instead of a tone.	Hang Up	Disconnect.

Home screen	The first display information after the radio completes its self test.	MDC	Motorola Data Communication
IV&D	Integrated Voice and Data	Monitor	Check channel activity by pressing the Monitor button. If the channel is clear, you hear static. If the channel is in use, you hear conversation. It also serves as a way to check the volume level of the radio, since the radio “opens the squelch” when the monitor button is pressed.
KVL	Key-variable loader: A device for loading encryption keys into the radio.	Multi-System Talkgroup Scan List	A scan list that can include both talkgroups (trunked) and channels (conventional).
LCD	Liquid crystal display.	Network Access Code	Network Access Code (NAC) operates on digital channels to reduce voice channel interference between adjacent systems and sites.
LED	Light-emitting diode.	NiMH	Nickel-metal-hydride.
Li-Ion	Lithium ion.	Non-Tactical/ Revert	The user talks on a preprogrammed emergency channel. The emergency alarm
Man Down	A life-saving feature that senses the radio user may be in trouble by monitoring the whether the radio is in a vertical or horizontal position or whether the radio is motionless. When this feature is triggered, the radio alerts the user with audio and visual alerts. It can also trigger Emergency Alarm the Post-Alert Timer is not cancelled.		
MCW	Mission Critical Wireless		

	is sent out on this same channel.	PTT	Push-To-Talk. The PTT button engages the transmitter and puts the radio in transmit (send) operation when pressed.
OCW	Operation Critical Wireless		
OTAR	Over-the-air rekeying.		
Page	A one-way alert, with audio and/or display messages.	Radio Frequency (RF)	The part of the general frequency spectrum between the audio and infrared light regions (about 10 kHz to 10,000,000 MHz).
Personality	A set of unique features specific to a radio.		
Preprogrammed	Refers to a software feature that has been activated by a qualified radio technician.	Repeater	A conventional radio feature, where you talk through a receive/transmit facility that re-transmits received signals, in order to improve communications range and coverage.
Private (Conversation) Call	A feature that lets you have a private conversation with another radio user in the talkgroup.		
Private Line (PL)	A sub-audible tone that is transmitted such that only receivers decoding the tone receives it.	Selective Switch	Any digital P25 traffic having the correct Network Access Code and the correct talkgroup.
Programmable	Refers to a radio control that can have a radio feature assigned to it.	Squelch	Special electronic circuitry, added to the receiver of a radio, that reduces, or cuts off,

	unwanted signals before they are heard in the speaker.	Trunking	The automatic sharing of communications paths between a large number of users (see Conventional).
Standby	An operating condition whereby the radio's speaker is muted but still continues to receive data.	Trunking Priority Monitor Scan List	A scan list that includes talkgroups that are all from the same trunking system.
Status Calls	Pre-defined text messages that allow the user to send a conditional message without talking.	USK	Unique Shadow Key.
Tactical/ Non-Revert	The user talks on the channel that was selected before the radio entered the emergency state.	Zone	A grouping of channels.
Talkaround	Bypass a repeater and talk directly to another unit for easy local unit-to-unit communications.		
Talkgroup	An organization or group of radio users who communicate with each other using the same communication path.		

Limited Warranty

MOTOROLA COMMUNICATION PRODUCTS

I. WHAT THIS WARRANTY COVERS AND FOR HOW LONG:

MOTOROLA SOLUTIONS, INC. (“MOTOROLA”) warrants the MOTOROLA manufactured Communication Products listed below (“Product”) against defects in material and workmanship under normal use and service for a period of time from the date of purchase as scheduled below:

ASTRO Portable Units	One (1) Year
Product Accessories	One (1) Year

For LACR region:

ASTRO APX7000XE Portable Units	Three (3) Years
Product Accessories	One (1) Year

MOTOROLA, at its option, will at no charge either repair the Product (with new or reconditioned parts), replace it (with a new or reconditioned Product), or refund the purchase price of the Product during the warranty period provided it is returned in accordance with the terms of this warranty. Replaced parts or boards are warranted for the balance of the original applicable warranty period. All replaced parts of Product shall become the property of MOTOROLA.

This express limited warranty is extended by MOTOROLA to the original end user purchaser only and is not assignable or transferable to any other party. This is the complete warranty for the Product manufactured by MOTOROLA. MOTOROLA assumes no obligations or liability for additions or modifications to this warranty unless made in writing and signed by an officer of MOTOROLA.

Unless made in a separate agreement between MOTOROLA and the original end user purchaser, MOTOROLA does not warrant the installation, maintenance or service of the Product.

MOTOROLA cannot be responsible in any way for any ancillary equipment not furnished by MOTOROLA which is attached to or used in connection with the Product, or for operation of the Product with any

ancillary equipment, and all such equipment is expressly excluded from this warranty. Because each system which may use the Product is unique, MOTOROLA disclaims liability for range, coverage, or operation of the system as a whole under this warranty.

II. GENERAL PROVISIONS:

This warranty sets forth the full extent of MOTOROLA'S responsibilities regarding the Product. Repair, replacement or refund of the purchase price, at MOTOROLA's option, is the exclusive remedy. THIS WARRANTY IS GIVEN IN LIEU OF ALL OTHER EXPRESS WARRANTIES. IMPLIED WARRANTIES, INCLUDING WITHOUT LIMITATION, IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE LIMITED TO THE DURATION OF THIS LIMITED WARRANTY. IN NO EVENT SHALL MOTOROLA BE LIABLE FOR DAMAGES IN EXCESS OF THE PURCHASE PRICE OF THE PRODUCT, FOR ANY LOSS OF USE, LOSS OF TIME, INCONVENIENCE, COMMERCIAL LOSS, LOST PROFITS OR SAVINGS OR OTHER INCIDENTAL, SPECIAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OR

INABILITY TO USE SUCH PRODUCT, TO THE FULL EXTENT SUCH MAY BE DISCLAIMED BY LAW.

III. STATE LAW RIGHTS:

SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES OR LIMITATION ON HOW LONG AN IMPLIED WARRANTY LASTS, SO THE ABOVE LIMITATION OR EXCLUSIONS MAY NOT APPLY.

This warranty gives specific legal rights, and there may be other rights which may vary from state to state.

IV. HOW TO GET WARRANTY SERVICE:

You must provide proof of purchase (bearing the date of purchase and Product item serial number) in order to receive warranty service and, also, deliver or send the Product item, transportation and insurance prepaid, to an authorized warranty service location. Warranty service will be provided by MOTOROLA through one of its authorized warranty service locations. If you first contact the company which sold you the Product (e.g., dealer or communication

service provider), it can facilitate your obtaining warranty service. You can also call MOTOROLA at 1-800-927-2744 US/Canada.

V. WHAT THIS WARRANTY DOES NOT COVER:

- 1 Defects or damage resulting from use of the Product in other than its normal and customary manner.
- 2 Defects or damage from misuse, accident, water, or neglect.
- 3 Defects or damage from improper testing, operation, maintenance, installation, alteration, modification, or adjustment.
- 4 Breakage or damage to antennas unless caused directly by defects in material workmanship.
- 5 A Product subjected to unauthorized Product modifications, disassembles or repairs (including, without limitation, the addition to the Product of non-MOTOROLA supplied equipment) which adversely affect performance of the Product or interfere with MOTOROLA's normal warranty inspection and testing of the Product to verify any warranty claim.

- 6 Product which has had the serial number removed or made illegible.
- 7 Rechargeable batteries if:
 - any of the seals on the battery enclosure of cells are broken or show evidence of tampering.
 - the damage or defect is caused by charging or using the battery in equipment or service other than the Product for which it is specified.
- 8 Freight costs to the repair depot.
- 9 A Product which, due to illegal or unauthorized alteration of the software/firmware in the Product, does not function in accordance with MOTOROLA's published specifications or the FCC certification labeling in effect for the Product at the time the Product was initially distributed from MOTOROLA.
- 10 Scratches or other cosmetic damage to Product surfaces that does not affect the operation of the Product.
- 11 Normal and customary wear and tear.

VI. PATENT AND SOFTWARE PROVISIONS:

MOTOROLA will defend, at its own expense, any suit brought against the end user purchaser to the extent

that it is based on a claim that the Product or parts infringe a United States patent, and MOTOROLA will pay those costs and damages finally awarded against the end user purchaser in any such suit which are attributable to any such claim, but such defense and payments are conditioned on the following:

- 1 that MOTOROLA will be notified promptly in writing by such purchaser of any notice of such claim,
- 2 that MOTOROLA will have sole control of the defense of such suit and all negotiations for its settlement or compromise, and
- 3 should the Product or parts become, or in MOTOROLA's opinion be likely to become, the subject of a claim of infringement of a United States patent, that such purchaser will permit MOTOROLA, at its option and expense, either to procure for such purchaser the right to continue using the Product or parts or to replace or modify the same so that it becomes non-infringing or to grant such purchaser a credit for the Product or parts as depreciated and accept its return. The depreciation will be an equal amount per year over the lifetime of the Product or parts as established by MOTOROLA.

MOTOROLA will have no liability with respect to any claim of patent infringement which is based upon the combination of the Product or parts furnished hereunder with software, apparatus or devices not furnished by MOTOROLA, nor will MOTOROLA have any liability for the use of ancillary equipment or software not furnished by MOTOROLA which is attached to or used in connection with the Product. The foregoing states the entire liability of MOTOROLA with respect to infringement of patents by the Product or any parts thereof.

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at 1800 457 439. You may also visit our website: http://www.motorolasolutions.com/XA-EN/Pages/Contact_Us for the most updated warranty terms.

VII. GOVERNING LAW:

This Warranty is governed by the laws of the State of Illinois, U.S.A.

VIII. For Australia Only:

This warranty is given by Motorola Solutions Australia Pty Limited (ABN 16 004 742 312) of Tally Ho Business Park, 10 Wesley Court. Burwood East, Victoria.

Our goods come with guarantees that cannot be excluded under the Australia Consumer Law. You are entitled to a replacement or refund for a major failure and compensation for any other reasonably foreseeable loss or damage. You are also entitled to have the goods repaired or replaced if the goods fail to be of acceptable quality and the failure does not amount to a major failure.

Motorola Solutions Australia's limited warranty above is in addition to any rights and remedies you may have under the Australian Consumer Law. If you have any queries, please call Motorola Solutions Australia



MOTOROLA

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