

APX™ TWO-WAY RADIOS

# APX 4500 O2 CONTROL HEAD



**County Law**

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: Motorola Solutions, Inc., 1303 East Algonquin Road Schaumburg, IL60196, U.S.A.

Phone Number: 1-800-927-2744

Hereby declares that the product:

Model Name: **APX 4500**

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 Notes to Users**

The following FCC information applies to Bluetooth radio options

**IC Model Name:** PMHN4193A

**Description:** O2 Bluetooth Option Board

**FCC ID:** AZ492FT6002

**IC:** 109U-92FT6002

**Conforms to the following regulations:** FCC Part 15, Section 15.19, 15.12, 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 user. The users 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.



Caution

Before using this product, read the operating instructions for safe usage contained in the Product Safety and RF Exposure booklet enclosed with your radio.

## ATTENTION!

**This radio is restricted to occupational use only to satisfy FCC RF energy exposure requirements.**

Before using this product, read the RF energy awareness information and operating instructions in the Product Safety and RF Exposure booklet enclosed with your radio (Motorola Publication part number 6881095C99) to ensure compliance with RF energy exposure limits.

For a list of Motorola-approved antennas and other accessories, visit the following website: <http://www.motorola.com/APX>

All the features described in the following sections are supported by the radio's software version **R08.05.00** or later. See **Accessing Radio Information** to determine your radio's 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 conditions listed below:

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

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This Interactive End User Toolkit (IEUTK) covers the basic operation of the **APX 4500 O2 Control Head**.

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.

Adobe Flash player is required to run the demos included with this kit.

Please refer to the Adobe website (<http://get.adobe.com/flashplayer/>) to update/download/install the Adobe Flash Player.

### **Notations Used in This Tutorial**

Throughout the text in this toolkit, 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.



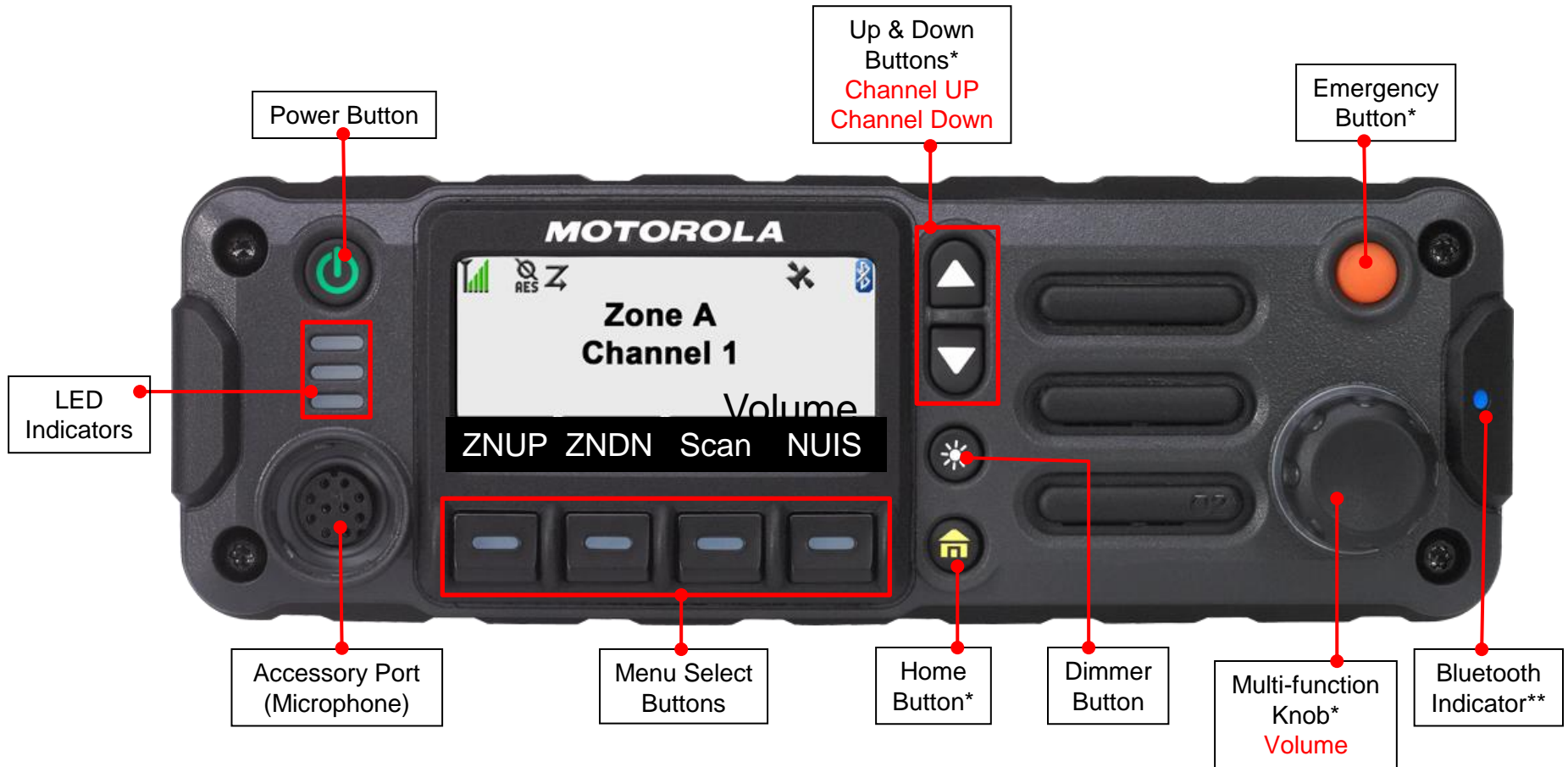
An operational procedure, practice, or condition, etc., which may result in injury or death if not carefully observed.



An operational procedure, practice, or condition, etc., which may result in damage to the equipment if not carefully observed.

**Note:** *An operational procedure, practice, or condition, etc., which is essential to emphasize.*

## ❑ O2 Control Head



	Z1	Z2	Z3	Z4	Z5	Z6
C1						
C2						
C3						
C4						
C5						
C6						
C7						
C8						
C9						
C10						
C11						
C12						
C13						
C14						
C15						
C16						

## ❑ Turning on/off the Radio

Press the **Power Button** briefly to power on the radio.

After a short time, the red, yellow and green LEDs light up. The display then shows Zone and channel text, and menu items display on the screen.

The backlight will turn on to the last selected dim level.

### Note:

Pressing the Power Button before the LED lights up will be ignored.

If **FAIL ###/##** appears in the display, the radio will not function until the condition has been corrected.

If **ERROR ###/##** appears, some non-critical data has been changed.

If the power-up test is unsuccessful, you see **Error XX/YY** (XX/YY is an alphanumeric code).

Turn off the radio, check the battery, and turn the radio back on. If the radio fails the power-up test again, record the **Error XX/YY** code and contact your dealer.

If **CH MISMATCH** appears, means that either the Control Head has been connected to an incompatible transceiver, or vice versa.

If your radio does not power up, contact your dealer.

To turn off the radio, press the **Power Button** after the LEDs light up.



## ❑ Validating Compatibility During Power Up

The radio validates and updates the software and hardware of your control head(s) during power up.

Follow the procedure below when your radio runs this task.

### Procedure:

- 1 The display shows **Maintenance mode remote device**; promptly followed by other maintenance statuses.
- 2 The display shows **Update done please reset** upon completion.  
**OR**  
The display shows **Update failed please reset** when it fails to update.
- 3 Press the **Power Button** to reset.  
The radio runs the usual power up operation if the software updates are complete.  
**OR**  
The radio runs the Maintenance Mode if the updates are not complete and repeat step 1.

## ❑ Adjusting the Volume

To increase the volume, rotate the **Multi-function Knob (MFK)** clockwise.

The display shows volume bars and volume level when you change the volume.

To **decrease** the volume, rotate the **Multi-function Knob (MFK)** counterclockwise.



## ❑ Accessing the Preprogrammed Functions

You can access various radio functions through one of the following ways:

- A short or long press of the relevant programmable buttons.

**OR**

- Use the **Menu Select Buttons** (  ).

### Using the Menu Select Buttons

The **Menu Select Buttons** allow to access the menu entries of features.


**Note:** Check with your dealer or system administrator for the list of features activated in your radio.


Your radio may be preprogrammed differently from the following example, but the steps for selecting a zone may appear as shown below:


- Press the **Menu Select** button (  ) directly below **Zone**.

## Using the Navigation Buttons

### Home Button

The  button returns you to the Home (default) screen. In most cases, this is the current mode.

For selected radio features, the  button is also used to save user-edited radio settings or information before returning you to the Home screen.



**Note:** Some features do not require you to press  to go to the Home screen. Refer to the individual feature sections in this manual for further details on saving user-edited radio settings or information.

### Dimmer Button

Use this button to adjust the brightness of the display.

Long press to toggle between day and night mode.

### Up and Down Buttons

By default, the  and  buttons are used as up and down arrow input. These buttons are programmable. They are programmed to navigate through channels



## ❑ Push-To-Talk (PTT) Button

The **PTT** button 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.



## ❑ Status Icons

The liquid crystal display (LCD) of your radio shows the radio status, text entries, and menu entries.

The following are the icons that appear on the radio's display.



### Receiving

Radio is receiving a call or data.



### Transmitting

Radio is transmitting a call or data.



### 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.



### 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.



### Power Level

- L = Radio is set at Low power.
- H = Radio is set at High power.



### Scan

Radio is scanning a scan list.



### Priority-One Channel Scan

- **Blinking dot** = Radio detects activity on channel designated as Priority-One.
- **Steady dot** = Radio detects activity on channel designated as Priority-Two.

## ❑ LED Indicator

LEDs

 Red  
 Yellow  
 Green



The LED indicator shows the operational status of your radio.

**Solid red** – Radio is transmitting.

**Blinking red** – Radio is transmitting at low battery condition.

**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.

## ❑ Intelligent Lighting Indicators

This feature temporarily changes the radio's display backlight color and the alert text background color 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.
		The radio initiates the Man Down Post-Alert timer.
Red	Critical Alerts	The radio battery is low.
		The radio is out of range.
		The radio enters fail-soft mode.
		The radio is unable to establish a full connection with the system.
		The radio is unable to authenticate or register with the system.
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.

Orange

Emergency Alerts



Red

Critical Alerts



Green

Call Alerts



## ❑ Multi-function Knob - Concentric Ring LED




The concentric ring LED blinks green when the **MFK** is using the secondary feature. See [Multi-function Knob \(MFK\)](#) to understand the functionality of **MFK**.

If Intelligent Lighting is activated, the concentric ring LED will not blink green when the **MFK** is in the secondary mode. The LED turns into solid color of orange, red or green depending on the status of Intelligent Lighting.








## ☐ Alert Tones

An alert tone is a sound or group of sounds. Your radio uses alert tones to inform you of your radio's conditions. The following table lists these tones and when they occur.

You Hear	Tone Name	Heard
<b>Short, Low-Pitched Tone</b>  <b>Play</b>	Radio Self Test Fail	When radio fails its power-up self test.
	Reject	When 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.
	Talk Prohibit/ <b>PTT</b> Inhibit	(When <b>PTT</b> button is pressed) transmissions are not allowed.
<b>Long, Low-Pitched Tone</b>  <b>Play</b>	Time-Out Timer Timed Out	After time out.
	Out of Range	(When <b>PTT</b> button is pressed) the radio is out of range of the system.
	Invalid Mode	When radio is on an unprogrammed channel.
<b>A Group of Low-Pitched Tones</b>  <b>Play</b>	Busy	When system is busy.



You Hear	Tone Name	Heard
<b>Short, Medium-Pitched Tone</b>  <b>Play</b>	Valid Key-Press	When 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 Entry	When entering the emergency state.
	Central Echo	When central controller has received a request from a radio.
<b>Long, Medium-Pitched Tone</b>  <b>Play</b>	Volume Set	When volume is changed on a quiet channel.
	Emergency Exit	When exiting the emergency state.
<b>A Group of Medium-Pitched Tones</b>  <b>Play</b>	Fail-soft	When the trunking system fails.
	Automatic Call Back	When voice channel is available from previous request.
	Keyfail	When encryption key has been lost.
	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.
	Call Alert Sent	When Call Alert is received by the target radio.

You Hear	Tone Name	Heard
<b>Ringing</b>  <b>Play</b>	Fast Ringing	When system is searching for target of Private Call.
	Enhanced Call Sent	When waiting for target of Private Call to answer the call.
	Phone Call Received	When a land-to-mobile phone call is received.
<b>Gurgle</b>  <b>Play</b>	Dynamic Regrouping	(When the <b>PTT</b> button is pressed) a dynamic ID has been received.
	Talk Permit	(When <b>PTT</b> button is pressed) verifying system accepting transmissions.
<b>Unique, Low-Pitched Chirp</b>	New Message	When a new message is received.
<b>Unique, High-Pitched Chirp</b>	Priority Status	When a priority message is received.

## ❑ Selecting a Zone

A zone is a group of channels.

### Procedure:

[Menu]

1 ◀ or ▶ to **Zone**.

2 Press the **Menu Select** button directly below **Zone**.

3 ▲ or ▼ to the required zone.

Press the **PTT** button to transmit on the displayed zone.



## ❑ Selecting a Radio Channel

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

### Procedure:

Press the **UP** or **DOWN** arrow to select the channel

Press the **PTT** button to transmit on the displayed 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.



## ❑ Repeater or Direct Operation

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.



## ❑ 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



## ❑ Scan Lists

### *Viewing a Scan List*

#### Procedure:

- 1 ◀ Or ▶ to **ScnL**.
- 2 Press the **Menu Select** button directly below **ScnL**.
- 3 ▲ Or ▼ to view the members on the list.
- 4 Press 🏠 to exit the current display and return to the Home screen.





## ❑ Scan

*Turning Scan On or Off*

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

### Procedure:

#### [Preprogrammed Button]

- 1 Press the preprogrammed **Scan** button.



## ☐ Scan


*Transmitting While the Scan is On*

### Radio Programmed for Non-Talkback Scan

#### Procedure:

- 1 Press the **PTT** button at any time to transmit on the selected channel or fixed channel.

To make a Call Alert page, or Private Conversation call while scanning, press either the **Menu Select** button directly below **Page** or **Call**.

The call is entered on the selected channel and scanning is halted until the call is exited by pressing  or pressing the **Menu Select** button below either **Page** or **Call**.

## ❑ Scan

### *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.

#### **Procedure:**

- 1 When the radio is locked onto the channel to be deleted, ◀ or ▶ to **Nuis**.
- 2 Press the **Menu Select** button directly below **Nuis**.  
*The radio continues scanning the remaining channels in the list.*



**☐ Scan***Restoring a Nuisance Channel***Procedure:**

To restore the deleted nuisance channel, do one of the following:

- Turn the radio off and then turning it on again.

**OR**

- Change modes.

**OR**

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

Nuisance mode delete can be disabled by the system administrator.

## ❑ Emergency Operation

The Emergency feature is used to indicate a critical situation.

If the **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 with Emergency Call
- 

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



## ❑ Emergency Operation

### *Sending an Emergency Alarm with Emergency Call*

This feature allows you to send an Emergency Alarm to another radio. Upon acknowledgement, both radios can communicate over a preprogrammed Emergency channel.

If the radio has both emergency call and alarm features enabled, it automatically proceeds to the call mode after the alarm is acknowledged.

#### **Procedure:**

- 1 Press the preprogrammed **Emergency** button.

*You hear a short medium-pitched tone and the display shows **Emergency** and the current zone or channel.*

**OR**

*You hear a short low-pitched tone to indicate the selected channel does not support emergency and rejects to launch emergency mode.*

*When you receive the dispatcher's acknowledgment, the display shows **Ack received**.*

*You hear four tones, and the radio exits the Emergency Alarm mode then enters the Emergency Call mode.*

- 2 Press and hold the **PTT** button.  
Speak clearly into the microphone.
- 3 Release the **PTT** button to end the transmission and wait for a response from the dispatcher.
- 4 To exit Emergency Call, press and hold the preprogrammed **Emergency** button for about a second.

Turning the radio off also cancels the emergency state.

## ❑ Trunking System Controls

### *Using the Fail-soft System*

The fail-soft system ensures continuous radio communications during a trunked system failure.

If a trunking system fails completely, the radio goes into fail-soft operation and automatically switches to its fail-soft channel.

The fail-soft condition is indicated by a faint beeping tone every nine seconds (radio un-squelched) until the trunking system returns to normal operation.

To continue, in Fail-soft, to communicate with other talkgroup, refer to the following procedure.

#### **Procedure:**

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

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

## ❑ Trunking System Controls

### *Going Out of Range*

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

#### **Procedure:**

- 1 You hear a low-pitched tone.

#### **AND/OR**

The display shows the currently selected zone/channel combination and **Out of range**.

#### **Your radio remains in this out-of-range condition until:**

It locks onto a control channel.

#### **OR**

It locks onto a fail-soft channel.

#### **OR**

It is turned off.





## ❑ 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 will hear a brief, low-pitched, warning tone four seconds before the transmission times out.

### Procedure:

- 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 LEDs relight and the timer resets.*
- 3 Press the **PTT** button to re-transmit.  
*The time-out timer restarts and the LED lights up solid red.*