APX[™] TWO-WAY RADIOS APX 900 MODEL 2





Public Works

MOTOROLA SOLUTIONS

Declaration of Conformity

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 900

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.

(continued)

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.

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 Solutions-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 the Motorola Solutions-approved antenna types with the maximum permissible gain and required antenna impedance for each antenna type indicated.

Antenna types not included, 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 R16.00.00 or later.

Access General Radio Information to determine your radio's software version.

Notice to Users (FCC and Industry Canada)

This device complies with Part 15 of the FCC rules and RSS 247 of the Industry Canada rules per the following conditions:

- 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 Solutions, could void the user's authority to operate this equipment.

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Battery

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Bottom View

Fleet map

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

Preparing Your Radio for Use Charging the Battery



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 Solutions-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.

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

Battery Charger

To charge the battery, place the battery, with or without the radio, in a Motorola Solutions-approved charger. The charger's LED indicates the charging progress; see your charger's user guide.

Preparing Your Radio for Use Attaching/Removing the Battery

To attach, slide the battery into the radio's frame until the bottom latch clicks into place.



To remove the battery, turn the radio off. Press down the latch then slide the battery down to remove the battery from the radio.



Preparing Your Radio for Use Attaching/Removing the Antenna

With the radio turned off, set the antenna in its receptacle and turn clockwise to attach it to the radio.

To remove the antenna, turn the antenna counterclockwise.



Preparing Your Radio for Use Attaching/Removing 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.

Insert the hooked end of the cover into the slot above the connector.

Press downward on the cover's top to seat it in the slot.

Once in place, tighten by rotating the thumbscrew clockwise by hand.

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

If the thumbscrew is too tight, use an Allen wrench to loosen it first.

Rotate and lift the connector cover to disengage it from the radio.

Preparing Your Radio for Use Attaching/Removing the Belt Clip

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

To remove the clip, 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.

Preparing Your Radio for Use Turning On/Off the Radio



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

If the power-up test is successful, you see the Home screen.

Note: 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.

Note: If the power-up test is successful, but you see **Hardware board absent** or **Hw Board Mismatch**, send the radio to the qualified technician to fix this error.

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

Preparing Your Radio for Use Adjusting the Volume

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

To decrease the volume, rotate the **On/Off/Volume Control Knob** counterclockwise.



Identifying Radio Controls Programmable Features

Any reference in this manual to a control that is "preprogrammed" means that the control must be programmed by a dealer or a qualified radio technician using the radio's 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 programmed duration (between 0.25 seconds and 3.75 seconds).
- Hold down Keeping the button pressed.

Identifying Radio Controls

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.
- Use the Menu Select buttons.



Menu Select Buttons



The Menu Select buttons are not programmed

(continued)



Home Button

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

For selected radio features, the home 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 home 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.



4-Way Navigation Button

Use this button to scroll up, down, left or right.

Press and release one of the button to scroll from one entry to the next one. Press and hold one of the button to have the radio toggles through the list automatically (release the button to stop).

Identifying Radio Controls 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.

Identifying Status Indicators Status Icons

The front liquid crystal display (LCD) of your radio shows radio status, text entries, and menu entries. The top two display rows contain color icons that indicate radio operating conditions.

Selected icons are also shown on the first row of the top monochrome display screen of your radio.

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



(continued)

H or L	 Power Level L = Radio is set at Low power. H = Radio is set at High power.
Z	Scan Radio is scanning a scan list.
Z.	 Priority Channel Scan Blinking dot = Radio detects activity on channel designated as Priority-One. Steady dot = Radio detects activity on channel designated as Priority-Two.

Identifying Status Indicators LED Indicator

The LED indicator 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 nonpriority 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.

Identifying Status Indicators 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.

Backlight and Bar Color	Notification	When	
	Emergency Alerts	The radio initiates an emergency alarm or call.	
Orange		The radio receives an emergency alarm or call.	
		The radio initiates the Man Down Post-Alert timer.	
	Critical Alerts	The radio battery is low.	
		The radio is out of range.	
Ded		The radio enters failsoft mode.	
Rea		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.	
	Call Alerts	The radio receives a private call.	
		The radio receives a phone call.	
Green		The radio receives a call alert.	
		The radio receives a selective call.	
		The radio enters Geofence.	

(continued)





Identifying Status Indicators 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,	Radio Self Test Fail	When radio fails its power-up self test.		
Low-Pitched	Reject	When unauthorized request is made.		
Tone (1)) Play	Time-Out Timer Warning	Four seconds before time out.		
	No ACK Received	When radio fails to receive an acknowledgement .		
	Individual Call Warning Tone	When radio is in an individual call for greater than 6 seconds without any activity.		
Long,	Time-Out Timer Timed Out	After time out.		
Low-Pitched	Talk Prohibit/PTT Inhibit	(When PTT button is pressed) transmissions are not allowed.		
Ione	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.		
Play	Out of Range	(When PTT button is pressed) the radio is out of range of the system.		
. iug	Invalid Mode	When radio is on an unprogrammed channel.		
A Group of Low-Pitched Tones	Busy	When system is busy.		

(continued)

Short, Medium- Pitched	Valid Key-Press	When correct key is pressed.		
	Radio Self Test Pass	When radio passes its power-up self test.		
Tone	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.		
Play	Central Echo	When central controller has received a request from a radio.		
Long,	Volume Set	When volume is changed on a quiet channel.		
Medium- Pitched	Emergency Exit	When exiting the emergency state.		
Tone				
Play				
A Group of	Failsoft	When the trunking system fails.		
Medium- Pitched	Automatic Call Back	When voice channel is available from previous request.		
Tones	Keyfail	When encryption key has been lost.		
	Console Acknowledge	When status, emergency alarm, or reprogram request ACK is received.		
Play				
Two Short, Medium- Pitched Tones	Over-the-Air Programming request	When the radio receives an over-the-air programming request.		

(continued)

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	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.
Play	Phone Call Received	When a land-to-mobile phone call is received.
Gurgle	Dynamic Regrouping	(When the PTT button is pressed) a dynamic ID has been received.
(1)) Play	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-	Bluetooth Paired	When Bluetooth accessory is paired with the radio.
Pitched Tone	Bluetooth Connected	When Bluetooth accessory is connected to the radio.
Decremental-	Bluetooth Unpaired	When Bluetooth accessory is unpaired from the radio.
Pitched Tone	Bluetooth Disconnected	When Bluetooth accessory is disconnected from the radio.

Selecting a Zone

A zone is a group of channels.

Procedure:

Press the Side Middle button to scroll Up the Zones

Press the Side Bottom button to scroll Down the Zones



Selecting a Radio Channel

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

Procedure:

[16-Position Select Knob]

- 1. Turn the preprogrammed **16-Position Select Knob** to the desired channel.
- 2. Press the **PTT** button to transmit on the displayed zone channel.

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 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]

Press the preprogrammed Side Top Button to turn the Scan on

Press the Top Side Button to turn the Scan off

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 mode:

Emergency Alarm with Emergency Call



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

(continued)

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.

Emergency Operation 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.

Procedure:

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

The display shows **Emergency** and the current zone or channel.

You hear a short, medium-pitched tone and the LED momentarily blinks red.

OR

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. The radio enters the Emergency Call state when:

You receive the dispatcher's acknowledgement. The display shows **Ack received**.

OR

You receive no acknowledgement.

The display shows No acknowledge.

OR

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

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. Press and hold the preprogrammed **Emergency** button for about a second to exit the Emergency Call mode.

Turning off the radio also cancels the emergency state.

Trunking System Controls Operating in Failsoft System

The failsoft system ensures continuous radio communication 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 every 10 seconds and the display shows Failsoft.

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

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.

Trunking System Controls Out-of-Range Radio

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



Procedure:

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 failsoft channel.

OR

It is turned off.

Trunking System Controls 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 **Site trunking**.

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

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 timer resets.

3. Press the **PTT** button to re-transmit.

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

Radio Care







Your radio casing has a vent port that allows for pressure equalization in the radio. Never poke this vent 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.

- The radio with antenna attached properly is designed to be submersible to a maximum depth of 1 meter (3.28 feet) and a maximum submersion time of 30 minutes. Exceeding either maximum limit or use without antenna may result in damage to the radio.
- 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.

Radio Care Cleaning Your Radio



Caution • 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).
- Apply the solution sparingly with a stiff, non-metallic, short-bristled brush, making sure excess detergent does not get entrapped near the connectors, controls or crevices. Dry the radio thoroughly with a soft, lintfree cloth.
- 3. Clean battery contacts with a lint-free cloth to remove dirt or grease.

Radio Care 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.
- Avoid subjecting the radio to corrosives, solvents or chemicals.
- Do not disassemble the radio.



• Do not use the radio without an accessory connector or a dust cover in place as contamination can build up on the contacts.

• When charging the radio using a wall mounted charger, the radio must be turned off. Otherwise, the Emergency may be accidentally triggered.

Radio Care Radio Service and Repair

Proper repair and maintenance procedures will assure efficient operation and long life for this product. A Motorola Solutions 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 Solutions to support maintenance services. Through its maintenance and installation program, Motorola Solutions 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 Solutions service or sales representative, or an authorized Motorola Solutions dealer.



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.
- You can also check the battery charge status via the menu entry.
- 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).

Battery Care Fuel Gauge Icons

A blinking fuel gauge icon (Gauge **Battery Charge** displayed only when the battery voltage 76% to 100% full * drops to low level. In this case, replace the battery with a fully charged one. 51% to 75% * 26% to 50% * 11% to 25% * 10% or less (at 10%, the gauge begins blinking) * These are for IMPRES[™] battery operation only.

Battery Care Battery Recycling and Disposal

- In the U.S. and Canada, Motorola Solutions participates in the nationwide Call2Recycle program for battery collection and recycling. Many retailers and dealers participate in this program.
- For the location of the drop-off facility closest to you, access Call2Recycle's Internet web site at http://www.call2recycle.org/ 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.