

2.2.2.5

### O3 Control Head and Remote Mount Cabling

Choose a mounting location for the radio, considering accessibility, control, and antenna cable lengths. The control head extension cable and the accessories cable should be installed and routed properly to avoid complications.

**Prerequisites:** Route the cables in the wiring troughs (where available) of the vehicle or route the cables where they are protected from pinching, sharp edges, or crushing. One suggested route is along one side of the driveshaft hump under the carpet. Use grommets in any holes where the cable passes through metal panels.

**Figure 48: O3 Control Head**




No.	Description
1	Top
2	Left
3	Front
4	Right
5	Back

The recommended mounting surface for the control unit is on the center console. [Figure 50: Hang-Up Clip Installation Exploded View on page 56](#) shows how the hang-up clip control head, and cables should be installed for the O3 control head.

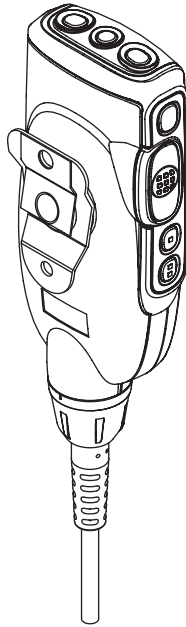
A mounting clip, which allows the control head to be mounted, is supplied together with the control head.

**Procedure:**

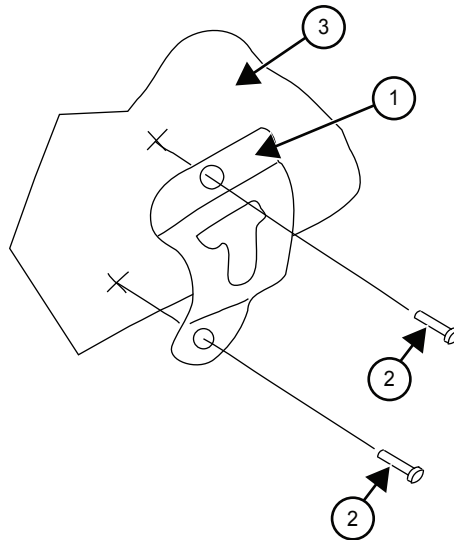
- 1 Use the provided mounting clip to determine the location of the two screw holes.
- 2 Drill 7/16" deep holes for the upper and lower screws.
- 3 Use the tapping screw provided to install the mounting clip.

 **CAUTION:** Shield the control head (front and back) from direct exposure to pressurized water. The pressurized water from a hose is usually more severe than the stated test and conditions in typical environments.

**Figure 49: O3 Control Head Rear View**



**Figure 50: Hang-Up Clip Installation Exploded View**



Item No.	Part Number	Description
1	01-80743T91	Mic Hang-Up Clip Assembly
2	03-07644M19	Screw, Machine, 8-32 x 7/16
3	-	Vehicle Mounting Surface

### 2.2.3

## Radio Locking

The section describes the radio locking on the trunnion.

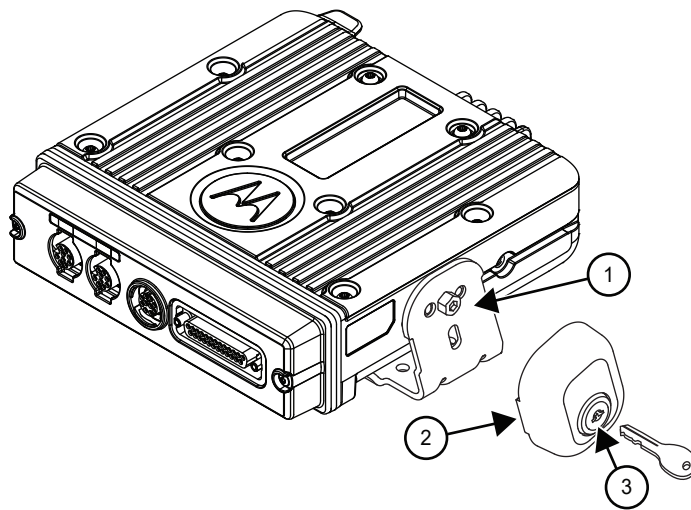
### 2.2.3.1

## Locking Kit

### Enhanced Single Band Mobile Radio

If an optional locking kit (HLN6372\_) is used, position the lock housing on the trunnion after installing the radio mounting screws. Then rotate the lock with the key in it and remove the key to lock the radio. You can install the lock on either side of the radio, and in dash and remote mount installations.

**Figure 51: Locking Kit (Optional)**



No.	Description
1	Wing Screw
2	Lock Housing
3	Lock

## 2.3

### Power Cables (Transceiver and Control Head)

Route the RED power cable from both the radio and the control head to the vehicle battery compartment, using accepted industry methods and standards. Be sure to grommet the firewall hole to protect the cable.

Remove the 15 A (part number 6580283E06), 20 A (part number 6580283E07), or 30 A (part number 6580283E09) fuse from the fuseholder and connect the red lead of the radio power cable to the positive battery terminal using the hardware provided as shown in [Figure 57: HKN6188\\_ Power Cable with External Speaker Connector](#) on page 60 and [Figure 58: HKN6187\\_ Power Cable with External Speaker Connector, Record Audio Output Jack \(2.5 mm\) and Earphone Jack \(2.5 mm\)](#) on page 61. Connect the black lead to a convenient solid chassis ground point. DO NOT connect the black lead directly to the battery negative terminal.

Table 10: Power Cables

Description	Part Number
Mid Power Dash Mount	HKN4191_
Mid Power Remote Mount	HKN4192_
O5, O7, and O9 Remote Control Head Power Cable	HKN6188_



**NOTICE:** Remote Control Head power cable uses a 5 A Fuse (part number 6580283E03).

#### 2.3.1

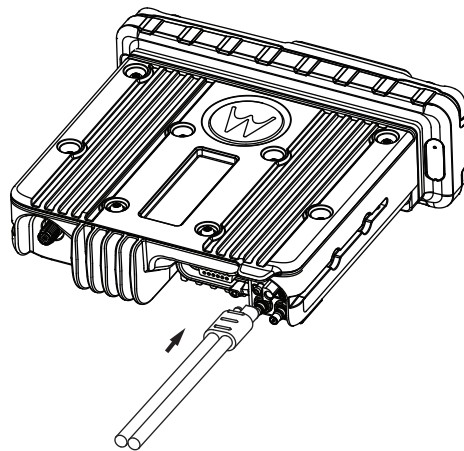
### Optional Locking Feature for High-Power Chassis Power Cables

An optional clip (HLN7017\_) can be used to increase DC cable retention in high-power radios.

#### Procedure:

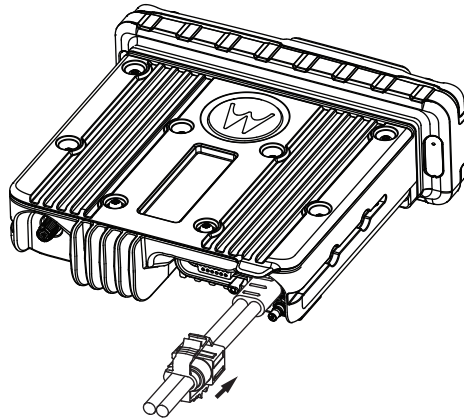
- 1 Insert the DC cable to the radio by aligning the male and female portions of the battery side with the mating components on the radio side.

**Figure 52: Inserting DC Cable to the Radio**

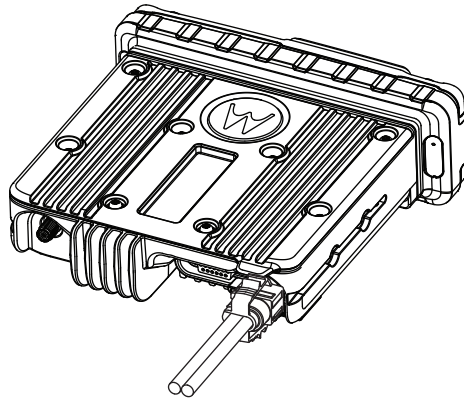


- 2 Insert the locking bracket (HLN7017\_) onto the DC cable.
- 3 Slide the bracket toward the radio until the bracket clips snap onto the radio features.

**Figure 53: Installing the Locking Bracket**

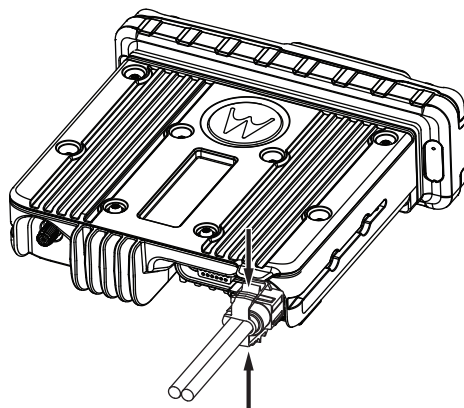


**Figure 54: Bracket Installation (Assembled State)**

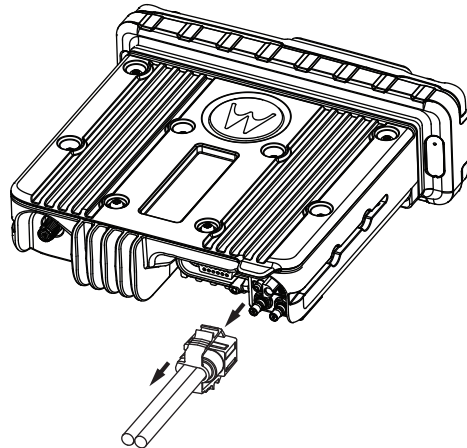


- 4 To disassemble the power cable, squeeze the locking bracket clips inward and while squeezing the clips, pull the locking clip and power cable to remove the power cable.

**Figure 55: Bracket Uninstallation (1 of 2)**



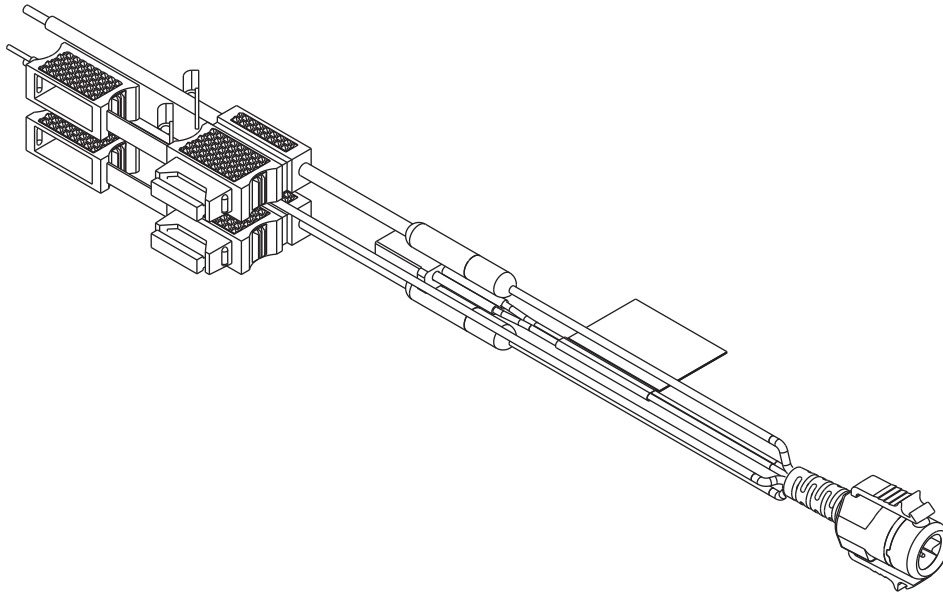
**Figure 56: Bracket Uninstallation (2 of 2)**



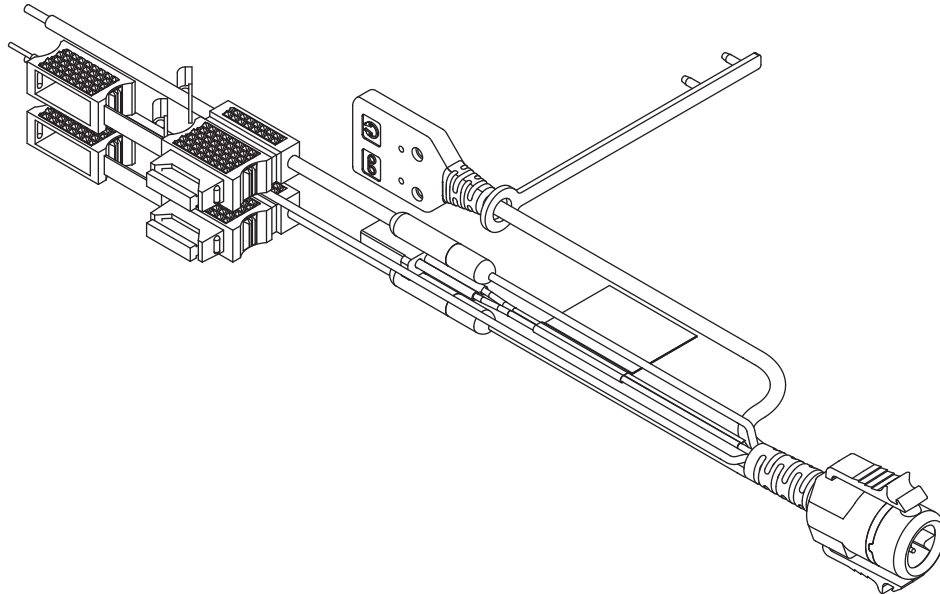
2.3.2

**O2, O3, O5, O7, or O9 Control Head Power Cables**

**Figure 57: HKN6188\_ Power Cable with External Speaker Connector**



**Figure 58: HKN6187\_ Power Cable with External Speaker Connector, Record Audio Output Jack (2.5 mm) and Earphone Jack (2.5 mm)**



**NOTICE:**

Audio Out – Does not require CPS programming. Attaching a headset mutes the external speakers of the radio which are attached to the SPK jack of the control head.

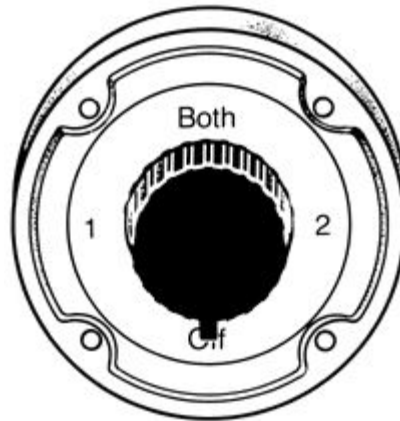
Record Out – Requires CPS programming. In CPS, navigate to **Radio Wide/Advanced/Record Audio** and select **TX + RX Audio**.

2.3.3

### Battery Selector Switch

In vehicles with a Battery Selector Switch, the ignition sense (yellow) wire should be the only wire connected to the Battery Selector Switch. The radio transceiver and control head power wires (red) must be connected directly to the vehicle battery. If the control head power wire and the control head ignition sense wire are both connected to a Battery Selector Switch, but the radio transceiver power lead is not, improper power-cycling and off-state battery drainage may occur. If the desired state of the radio is a total battery drain elimination, then route all power and ignition sense wires through the Battery Selector Switch, so that the control head and radio transceiver both see the loss of battery power at the same time.

**Figure 59: Battery Selector Switch**



## 2.4

### Antenna Installation



**IMPORTANT:** To ensure optimum performance and compliance with RF Energy Safety standards, these antenna installation guidelines, and instructions are limited to metal-body vehicles with appropriate ground planes and consider the potential exposure of back seat passengers and bystanders outside the vehicle.



**NOTICE:** For mobile radios with rated power of 7 W or less, the only installation restrictions are to use only Motorola Solutions approved antennas and install the antenna externally on metal body vehicles. For mobile radios with tuned power greater than 7 W, always adhere to all the guidelines and restrictions in [Antenna Installation on a Metal Body Vehicle on page 62](#).

#### 2.4.1

### Antenna Installation on a Metal Body Vehicle

You can install the antenna at the following locations:

- External installation – Check the requirements of the antenna supplier and install the vehicle antenna external to a metal body vehicle in accordance with those requirements.
- Roof top – For optimum performance and compliance with RF Energy Exposure regulations, mount the antenna at the center of the roof.
- Trunk lid – On some vehicles with clearly defined, flat trunk lids, you can mount the antennas of some radio models at the center of the trunk lid. For vehicles without clearly defined, flat trunk lids (such as hatchback autos, sports utility vehicles, and pick-up trucks), mount the antenna at the center of the roof. Ensure that the following are observed before installing an antenna on the trunk lid:
  - Ensure that the distance from the antenna location on the trunk lid is at least 85 cm (33 in.) from the rear seat head-rest to ensure compliance with RF Energy Exposure regulations.
  - Ensure that the trunk lid is grounded by connecting grounding straps between the trunk lid and the vehicle chassis.



**CAUTION:** If these conditions cannot be satisfied, then mount the antenna on the roof top.



**NOTICE:** Do not cut the antenna cables to ensure compliance with RF Energy Exposure regulations.

To ensure compliance with RF Energy Exposure regulations, mount the 1/4 wave antenna of VHF and UHF bands only at the center of the roof, .



Ensure that the antenna cable can be easily routed to the radio. Route the antenna cable as far away as possible from any vehicle electronic control units and associated wiring.

Check the antenna location for any electrical interference.



**NOTICE:** Any two metal pieces rubbing against each other such as seat springs, shift levers, trunk and hood lids, exhaust pipes, and others close to the antenna can cause severe receiver interference.

## 2.4.2

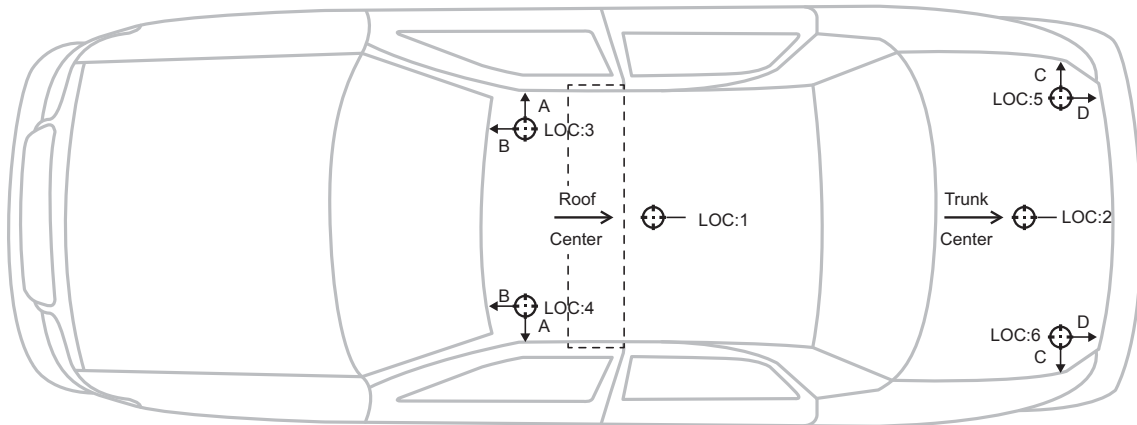
### Distance Between Antennas

The following figure indicates the separation distances required for the various antennas used with all mobile radios. Each "cross-hair" symbol represents a possible location (LOC) of an antenna. The recommendation is to locate them as close to the center of the roof and/or trunk as possible, without interference with a lightbar.



**NOTICE:** Do not cut the antenna cable.

**Figure 60: Multiple Antennas Separation for locations 1–6**



Letters A, B, C, and D indicates the maximum distance of 8 inches between the edge of the ground plane and the accessory antenna location.



**NOTICE:**

- A minimum of 18 inches separation is required between the lightbar and any roof-mounted antennas to prevent interference with the lightbar circuitry (see lightbar manufacturers installation information).
- LMR antennas should only be placed at the center of the roof (LOC:1) or center of the trunk (LOC:2).
- To ensure compliance with RF Energy Exposure regulations, install VHF and UHF 1/4 wave antenna at LOC:1 (center of the roof only).
- Install the Wi-Fi/Bluetooth roof mount antenna at LOC:3, LOC:4, LOC:5, or LOC:6. For the installation of glass mount Wi-Fi/Bluetooth antenna, refer to the antenna installation manual.

2.4.3

**Mini-UHF Connection**

To help the installation of the radio antenna, there are labels indicating the frequency. The first is on the FCC label at the top of the radio which calls out the frequency with arrows indicating the location of the RF connector at the back of the radio.

The second is at the back of the radio, next to the RF connector. To ensure a secure connection of an antenna cable mini-UHF plug to a radio mini-UHF jack, their interlocking features must be properly engaged. If they are not properly engaged, the system loosens. Do not use a tool (pliers or wrench) to overcome a poor engagement.

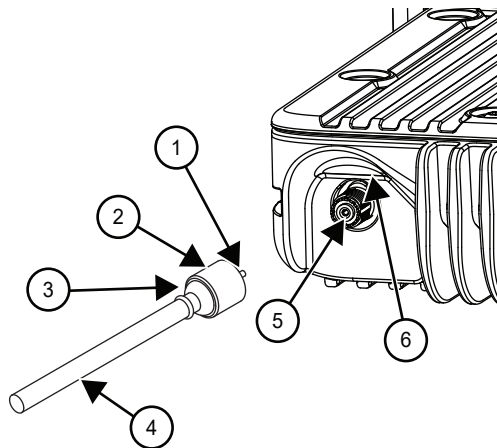


**NOTICE:** Applying excessive force with a tool such as stripping threads, deforming the collar or connector, or causing the connector to twist in the housing opening and break, can damage the antenna or the connector.

The mini-UHF connector tool (Motorola Solutions part number HLN6695\_) is designed to securely tighten the antenna plug–radio jack connection without damaging either the plug or the jack.

Motorola Solutions recommends the following sequence to ensure proper attachment of the system (see the following figures).

**Figure 61: Mini-UHF Connection**



No.	Description
1	Coax Conductor Plug (Pin)
2	Collar Pulled Back to Flange
3	Flange

No.	Description
4	Cable
5	Mini UHF Jack
6	RF Antenna Connector Label

### 2.4.3.1

## Installing Mini-UHF Connection

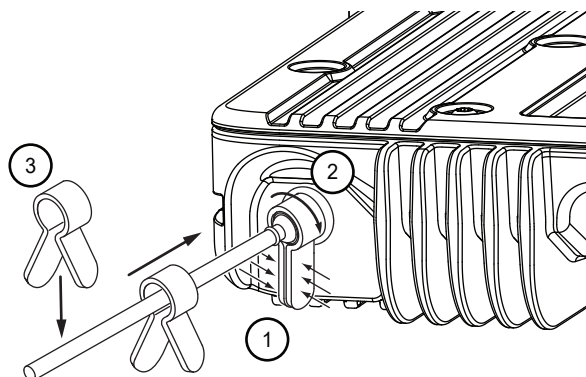
### Prerequisites:

- Ensure that there is sufficient slack in the antenna cable.
- Ensure that the collar of the antenna cable plug is loose and does not bind.
- Ensure that the mini-UHF jack is tight in the radio housing.

### Procedure:

- 1 Slide the collar back against the flange.
- 2 Insert the antenna cable plug pin fully into the radio jack, but do not engage the threads.
- 3 Ensure that the plug and jack interlocking features are fully seated. Do the check up by grasping the crimp on the cable jack, rotating the cable, and noting any movement. If the features are seated correctly, there should be NO movement.
- 4 Finger-tighten the antenna cable plug collar onto the radio jack.
- 5 Give a final tug by hand to the collar and retighten by hand as firmly as possible.
- 6 Slip the mini-UHF connector tool over the coaxial cable, using the gap between the tool legs.

**Figure 62: Mini-UHF Connector Tool**



No.	Description
1	Squeeze Firmly Together
2	Tighten
3	HLN6695_

- 7 Slide the tool up onto the knurled collar of the plug.
- 8 Squeeze the two straight legs of the tool firmly together between your thumb and index finger and turn clockwise (as shown) to tighten the collar. It should take 1/4 turn or less.



**NOTICE:** DO NOT use pliers or any other device to grip the tightening tool. It has been designed to allow you to achieve the proper torque on the collar without overtightening. Overtightening the collar can damage the connector and the radio.

When you feel the tool slipping on the collar, the connection has been properly tightened. The tool can also be used to loosen a tight collar.

#### 2.4.4

### GPS Antenna Placement

Place the GPS antenna (excluding the Motorcycle GPS antenna) at least, 3 ft (0.9 m) away from any transmitting antenna, and the antenna must have a clear, unobstructed view of the sky for best performance. Consider the length of the cabling before the installation is started.

#### 2.4.5

### QMA Connection

The radio uses a quick disconnect connection called QMA. This does not require any tightening.

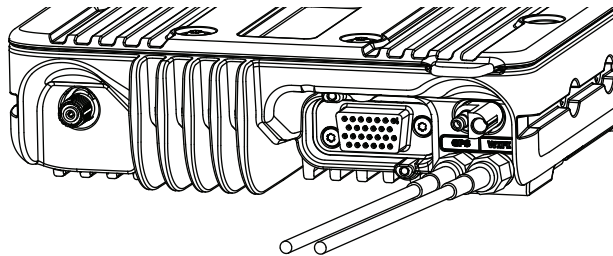
- Ensure there is sufficient slack in the antenna cable.
- Ensure that the collar of the antenna cable plug does not bind.
- Engage the QMA cable plug onto the jack, listening for a click to ensure proper engagement.
- Gently tug on the cable to ensure that it is engaged.
- To disengage, pull back on the cable plug collar and pull the cable straight off the jack.

#### 2.4.6

### GPS/GLONASS and Wi-Fi Antenna Connection

Connect GPS and Wi-Fi antenna cable QMA plug to the radio QMA jack for GPS and Wi-Fi respectively.

**Figure 63: GPS/GLONASS and Wi-Fi Antenna Connector on the radio**



#### 2.5

### Installing the Speaker

The speaker kit includes a trunnion bracket that allows the speaker to be mounted in various ways. With the trunnion bracket, the speaker can mount permanently on the mounting surface or in accessible firewall areas. The trunnion allows the speaker to tilt for best operation. Mount the speaker out of the way so that the vehicle occupants cannot kick or knock around it.

#### Prerequisites:

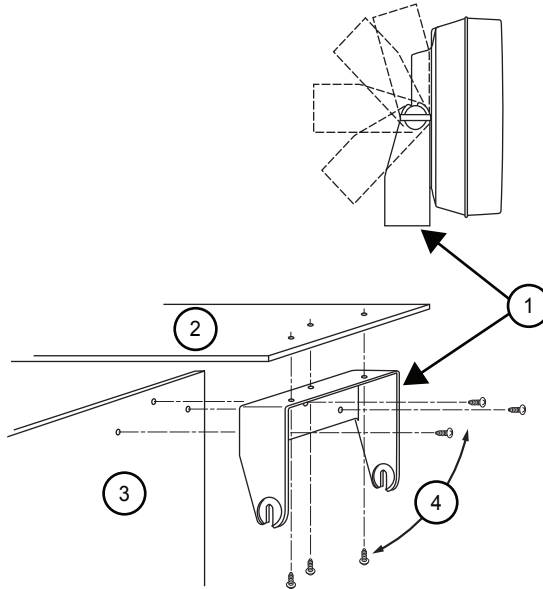


**CAUTION:** DO NOT ground the radio speaker leads. This system has a floating speaker output (DC voltage on both leads); damage to the audio circuit results if either lead is grounded or if they are shorted together.

**Procedure:**

- 1 To mark the mounting hole locations, use the speaker mounting bracket as a template.
- 2 Use the self-drilling screws provided to fasten the trunnion.
- 3 Attach the speaker and fasten it to the trunnion with two wing screws.
- 4 Route the speaker wires under the carpet or floor covering, or behind the kick panels. Ensure that the wires are out of the way of the occupants of the vehicle.
- 5 Do not submerge the 2-pin speaker connector in water nor place this connector in an area that could have standing water.

**Figure 64: Speaker Mounting**



No.	Description
1	Trunnion Bracket
2	Firewall
3	Dashboard
4	EITHER way

2.5.1

**Internal Speaker Disassembly**

**Prerequisites:**



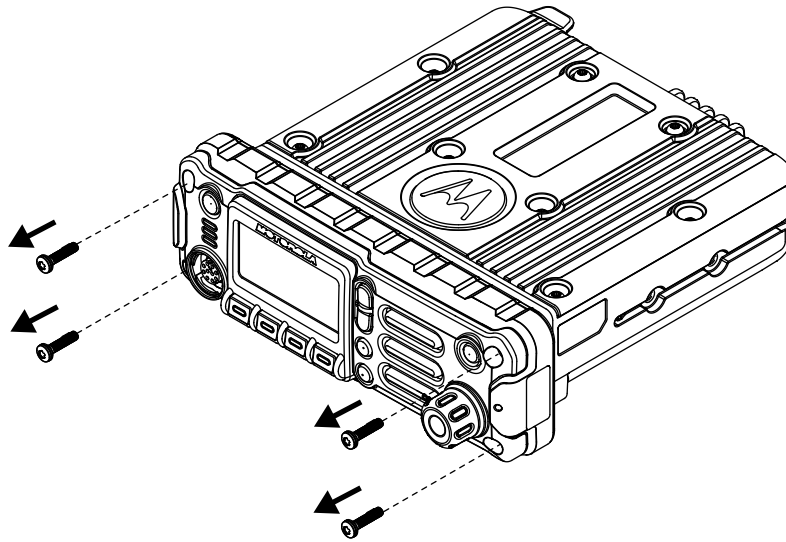
**NOTICE:**

This configuration is only applicable for O2 Control Heads.

**Procedure:**

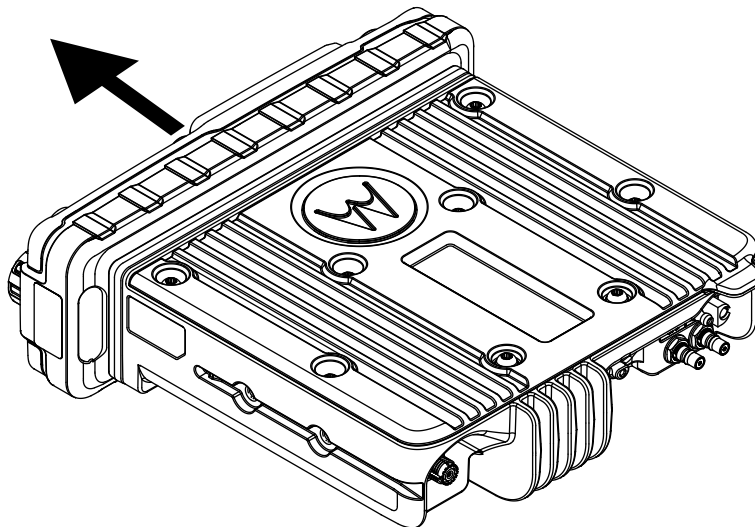
- 1 Unplug the power, antenna, microphone, and all accessories connections. If the radio is a remote-mount radio, disconnect the remote-mount control cable from the front of the transceiver.
- 2 Remove the four screws found on the control head with a Torx T-20 bit. Discard the screws.

**Figure 65: Removing the screws on the Control Head**



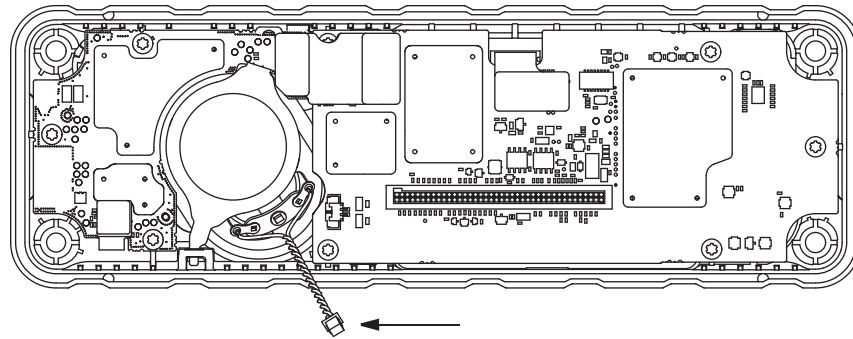
- 3 Firmly grasp the front panel of the control head. Carefully remove the front housing assembly from the back housing assembly. Note the position of the attached flex and do not pull on it excessively.

**Figure 66: Removing the Control Head**



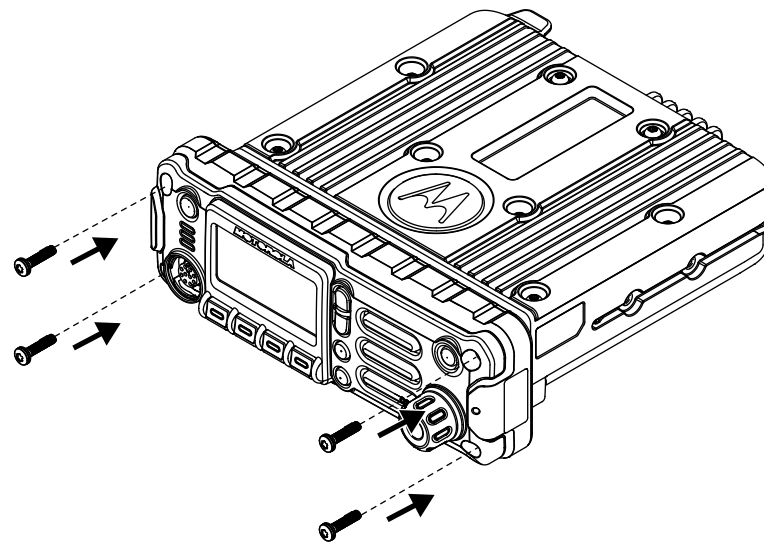
- 4 Put the control head face down on a clean, flat surface to avoid damaging it. Do not touch the o-ring on the back housing.
- 5 Carefully disconnect the speaker connector from the circuit board.

**Figure 67: Disconnecting the Speaker Connector**



- 6 Reattach the front housing assembly to the back housing assembly. Ensure that the flex is returned to its original position and that the o-ring on the back housing assembly is not pinched.

**Figure 68: Reattaching the Control Head**



- 7 Secure the front housing assembly back to the back housing assembly with four new screws using the Torx T-20 bit. Apply 9 in. lbs. torque for each screw.

## 2.6

### Microphone Hang-Up Clip

This section describes the microphone hang-up clip for mobile radios.

The hang-up clip must be within reach of the operator and close enough to the control head to prevent cable strain. Measure this distance before actually mounting the bracket. Since the bracket has a positive-detent action, you can mount the microphone at any position.

To locate the mounting holes, use the hang-up clip as a template. To avoid interference when removing the microphone, install the flathead screw at the top clip hole.

Some microphone models require the grounding of the microphone clip in order for HUB operation to work correctly. Refer to the documentation that comes with your Motorola Solutions microphone model.



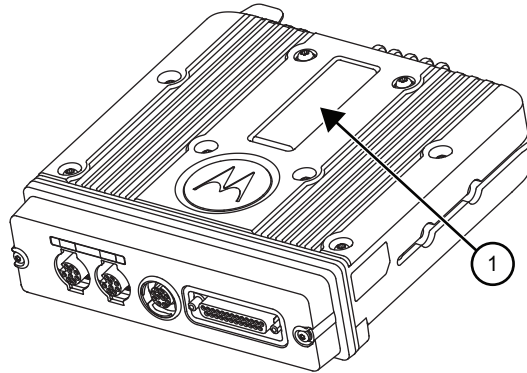
**NOTICE:** For multi-control head configuration where only one of the control heads has a microphone, the control heads without a microphone attached must have their HUB or Monitor pin (J100-22) jumpered by a wire to GND (J100-1 or J100-14) for HUB operation to work.

## 2.7

### RFID (Option)

A mobile radio equipped with an RFID tag allows an alternate option to track the radio. Each RFID equipped radio has an RFID tag preprogrammed with the serial number (also found on the FCC label), band, and radio model information of the radio.

**Figure 69: RFID Location**



No.	Description
1	RFID Tag

#### 2.7.1

### RFID Reading

To read an RFID tag using a UHF Gen 2 RFID reader (for example, Motorola Solutions MC9090-G), open an appropriate RFID read application, point the RFID reader at the tag, and activate the RFID antenna of the reader. The RFID reader must be within 1 ft. from the tag to read.

Two variables, Read Angle and Reader Orientation, aid in the distance to read and write the RFID Tag. Read distance is independent of Tag Angle, but the reader should be as close to perpendicular to the tag as possible (Read Angle). As Read Angle increases past 60 degrees, read distance begins to decrease, and the tag becomes unreadable once Read Angle exceeds 90 degrees. RFID tag cannot be read through metal. The orientation of the reader (Reader Orientation) and the tag must be aligned to improve read and writability.

**Figure 70: Read Angle for Enhanced Single Band Mobile Radio**

