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APX™ TWO-WAY RADIOS

APX 8500 MOBILE RADIO
INSTALLATION MANUAL

MOTOROLA SOLUTIONS

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Foreword

This manual covers the O2, O3, O5, O7 and O9 models of the ASTRO® APX™ mobile radios. It includes all the information necessary to install high and mid power radios and configure radio installation inside vehicles.

For details on radio operation or component-level troubleshooting, refer to the applicable manuals available separately. A list of related publications is provided in the section "Related Publications"

RF Energy Exposure and Product Safety Guide for Mobile Two-way Radios

See "Installation Requirements for Compliance with Radio Frequency (RF) Energy Exposure Safety Standards,".

Manual Revisions

Changes which occur after this manual is printed are described in PMRs (Publication Manual Revisions). These PMRs provide complete replacement pages for all added, changed, and deleted items.
To obtain PMRs, go to https://businessonline.motorolasolutions.com.

Parts Ordering

See Appendix A: Replacement Parts Ordering for information on how to obtain replacement parts. For part numbers, refer to the ASTRO APX Mobile Radio Basic Service Manual (Motorola Solutions publication).

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Installation Requirements for Compliance with Radio Frequency (RF) Energy Exposure Safety Standards

ATTENTION!

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

To ensure compliance to RF Energy Exposure Regulations:

- Install only Motorola Solutions approved antennas and accessories
- Be sure that antenna installation is per "Antenna Installation" of this manual
- Be sure that Product Safety and RF Safety Booklet enclosed with this radio is available to the end user upon completion of the installation of this radio

Before using this product, read the guide enclosed with your radio 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 and other accessories, visit the following web site which lists approved accessories for your radio model: http://www.motorolasolutions.com.

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Mobile Radio Model Numbering Scheme

Typical Model Number:	M	3	7	T	S	S	9	P	W	1	A	N	S	P	0	1
Position:	1	2	3	4	5	6	97	8	9	10	11	12	13	14	15	16

Position 1 - Type of Unit
M = Mobile
L = Table Top Station

Positions 2 & 3 - Model Series
Model Series
30 = APX 7500   24 = APX 2500
25 = APX 6500   22 = APX 4500
36 = APX1500   37 = APX 8500

Position 4 - Frequency Band
A = Less than 29.7MHz   UHF Range
B = 29.7 to 35.99MHz   N = 330 to 370MHz
C = 36 to 41MHz   P = 366 to 410MHz
D = 42 to 50MHz   Q = 403 to 437MHz
E = 300 to 345MHz   R = 438 to 482MHz
F = 66 to 80MHz   S = 470 to 620MHz
G = 74 to 90MHz   T = Product Specific
H = Product Specific   U = 806 to 870MHz*
        VHF Range   V = 825 to 870MHz
J = 136 to 162MHz   W = 896 to 941MHz
K = 146 to 178MHz   X = 403-470MHz
L = 174 to 210MHz   Y = 1.0 to 1.6GHz
M = 190 to 235MHz   Z = 1.5 to 2.0GHz
* For APX 7500 "K" in Position 4 represents
    136-174MHz.
* For APX 7500 "Q" in Position 4 represents
    380-470MHz.
* For APX 7500 "S" in Position 4 represent
    470-520MHz.
* For APX 7500 "U" in Position 4 represent
    762-870MHz.
Note: Values represented are not absolute,
    and are given to indicate range only

Position 5 - Power Level
A = 0 to 0.7 Watts   K = 36 to 60 Watts
B = 0.7 to 0.9 Watts   L = 61 to 110 Watts
C = 1.0 to 3.9 Watts   M = Up to 125 Watts
D = 4.0 to 5.0 Watts   N = 1 to 25 Watts
E = 5.1 to 6.0 Watts   P = 25 to 40 Watts
F = 6.1 to 10 Watts   Q = 25 to 45 Watts
G = 10.1 to 15 Watts   R = 10 to 35 Watts
H = 16 to 25 Watts   S = 10 to 50 Watts
J = 26 to 35 Watts   T = 25 to 110 Watts
Note: Values represented are not absolute
    and are given to indicate range only

Position 6 - Physical Packages
A = RF Modem Operation
B = Receiver Only
C = Standard Control; No Display
D = Standard Control; With Display
E = Limited Keypad; No Display
F = Limited Keypad; With Display
G = Full Keypad; No Display
H = Full Keypad; With Display
J = Limited Controls; No Display
K = Limited Controls; Basic Display
L = Limited Controls; Limited Display
M = Rotary Controls; Standard Display
N = Enhanced Controls; Enhanced Display
P = Low Profile; No Display
Q = Low Profile; Basic Display
R = Low Profile; Basic Display, Full Keypad
S = Tranceiver with Selectable Control Head
T =
U =
V = VDV Control Head
W = Control Head #2

Position 7 - Channel Spacing
0 =   5 = 15KHz
1 = 5KHz   6 = 20/25KHz
2 = 6.25KHz   7 = 30KHz
3 = 10KHz   8 = 12.5/25KHz
4 = 12.5KHz   9 = Variable/Programmable

Positions 13 - 16
SP Model Suffix

Position 12 - Unique Model Variations
C = Cenelec
N = Standard Package

Position 11 - Version
Version Letter (Alpha) - Major Change

Position 10 - Feature Level
1 = Basic   6 = Standard Plus
2 = Limited Package   7 = Expanded Package
3 = Limited Plus   8 = Expanded Plus
4 = Intermediate   9 = Full Feature/
5 = Standard Package   Programmable

Position 9 - Primary SystemType
A = Conventional
B = Privacy Plus
C = Clear SMARTNET
D = Advanced Conventional Stat-Alert
E = Enhanced Privacy Plus
F = Nauganet 888 Series
G = Japan Specialized Mobile Radio (JSMR)
H = Multi-Channel Access (MCA)
J = CoveragePLUS
K = MPT1327* - Public
L = MPT1327* - Private
M = Radiocom
N = Tone Signalling
P = Binary Signalling
Q = Phonenet
R = IDEN Basic
S = IDEN Advanced Feature
T = JSMR Digital
U = LTR Protocol
V = Single Sideband
W = Programmable
X = Secure Conventional
Y = Secure SMARTNET
Z = TETRA
2 = SmartZone
    * MPT = Ministry of Posts and Telecommunications

Position 8 - Primary Operation
A = Conventional/Simplex
B = Conventional/Duplex
C = Trunked Twin Type
D = Dual Mode Trunked
E = Dual Mode Trunked/Duplex
F = Trunked Type I
G = Trunked Type II
H = FDMA* Digital Dual Mode
J = TDMA** Digital Dual Mode
K = Single Sideband
L = Global Positioning Satellite Capable
M = Amplitude Companded Sideband (ACSB)
N = Digital Dispatch
P = Programmable
Q = Digital Interconnect
R = Digital Multi-Service
S = 9600 Capable
T = TDMA
    * FDMA = Frequency Division Multiple Access
    ** TDMA = Time Division Multiple Access

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Commercial Warranty

Limited Warranty

MOTOROLA SOLUTIONS COMMUNICATION PRODUCTS

I. What This Warranty Covers And For How Long

MOTOROLA SOLUTIONS INC. ("MOTOROLA") warrants the MOTOROLA SOLUTIONS 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 APX Mobile Radio	One (1) Year
Product Accessories	One (1) Year

Motorola Solutions, 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 SOLUTIONS.

This express limited warranty is extended by MOTOROLA SOLUTIONS 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 SOLUTIONS. MOTOROLA SOLUTIONS assumes no obligations or liability for additions or modifications to this warranty unless made in writing and signed by an officer of MOTOROLA SOLUTIONS. Unless made in a separate agreement between MOTOROLA SOLUTIONS and the original end user purchaser, MOTOROLA SOLUTIONS does not warrant the installation, maintenance or service of the Product.

MOTOROLA SOLUTIONS cannot be responsible in any way for any ancillary equipment not furnished by MOTOROLA SOLUTIONS 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 SOLUTIONS disclaims liability for range, coverage, or operation of the system as a whole under this warranty.

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II. General Provisions

This warranty sets forth the full extent of MOTOROLA SOLUTIONS'S responsibilities regarding the Product. Repair, replacement or refund of the purchase price, at MOTOROLA SOLUTIONS'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 SOLUTIONS 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 Solutions through one of its authorized warranty service locations. If you first contact the company which sold you the Product, it can facilitate your obtaining warranty service. You can also call Motorola Solutions at 1-888-567-7347 US/Canada.

V. What This Warranty Does Not Cover

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B. Defects or damage from misuse, accident, water, or neglect.

C. Defects or damage from improper testing, operation, maintenance, installation, alteration, modification, or adjustment.

D. Breakage or damage to antennas unless caused directly by defects in material workmanship.

E. A Product subjected to unauthorized Product modifications, disassemblies or repairs (including, without limitation, the addition to the Product of non-Motorola Solutions supplied equipment) which adversely affect performance of the Product or interfere with Motorola Solutions's normal warranty inspection and testing of the Product to verify any warranty claim.

F. Product which has had the serial number removed or made illegible.

G. 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.

H. Freight costs to the repair depot.

I. A Product which, due to illegal or unauthorized alteration of the software/firmware in the Product, does not function in accordance with MOTOROLA SOLUTIONS's published specifications or the FCC certification labeling in effect for the Product at the time the Product was initially distributed from MOTOROLA SOLUTIONS.

J. Scratches or other cosmetic damage to Product surfaces that does not affect the operation of the Product.

K. Normal and customary wear and tear.

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MOTOROLA SOLUTIONS 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 SOLUTIONS 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:

A. that MOTOROLA SOLUTIONS will be notified promptly in writing by such purchaser of any notice of such claim;

B. that MOTOROLA SOLUTIONS will have sole control of the defense of such suit and all negotiations for its settlement or compromise; and

C. should the Product or parts become, or in MOTOROLA SOLUTIONS's opinion be likely to become, the subject of a claim of infringement of a United States patent, that such purchaser will permit MOTOROLA SOLUTIONS, 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 noninfringing 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 SOLUTIONS.

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VII. Governing Law

This Warranty is governed by the laws of the State of Illinois, USA.

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Chapter 1   Introduction

This manual covers the installation procedures for ASTRO APX mobile and motorcycle radios with O2, O3, O5, O7 and O9 control heads, and accessories required to complete the radio system. The radio system consists of a control head, radio, antenna, microphone, speaker, cabling, Universal Relay Controller (URC), and accessories.

NOTE: APX Mobile high power do not support motorcycle radios.

1.1   Mobile Radio Description

1.1.1   Dimensions

When installing the radio, plan the installation carefully and leave additional room in the rear of the radio for cabling and accessory connections. Allow additional room in the front of the radio for access, controls, and cabling for remote mount and to the sides of the radio so that you can access and install the trunnion screws/wing screws.

NOTE: The measurement unit used in Figure 1-1 to Figure 1-20 is millimeter.
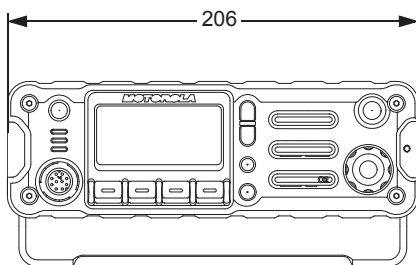
Figure 1-1. Front View of O2 Control Head Attached to APX 8500 Mid Power Dash Mount Transceiver and Trunnion
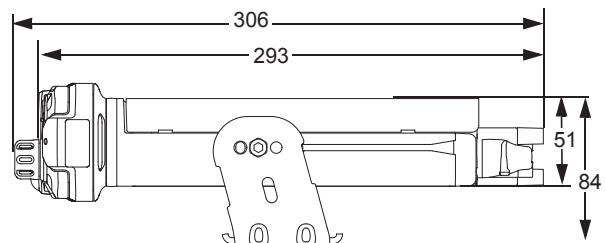
Figure 1-2. Side View of O2 Control Head Attached to APX 8500 Mid Power Dash Mount Transceiver and Trunnion
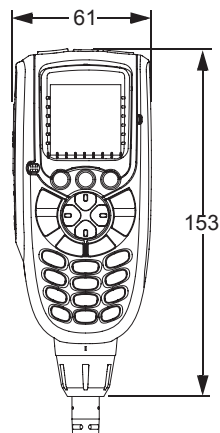
Figure 1-3. Front View of O3 Control Head with Coiled Cable
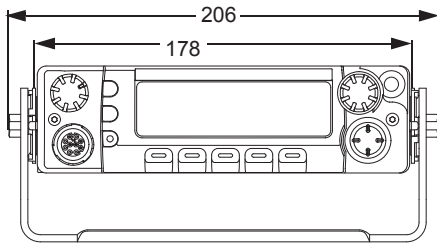
Figure 1-4. Side View of O3 Control Head with Coiled Cable
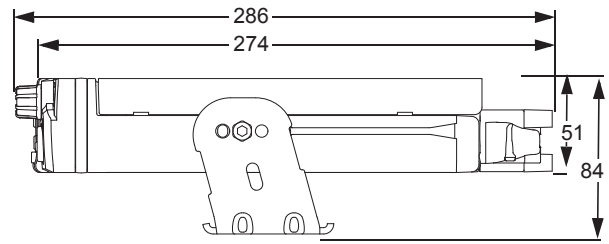
Figure 1-5. Front View of O5 Control Head Attached to APX 8500 Mid Power Dash Mount Transceiver and Trunnion
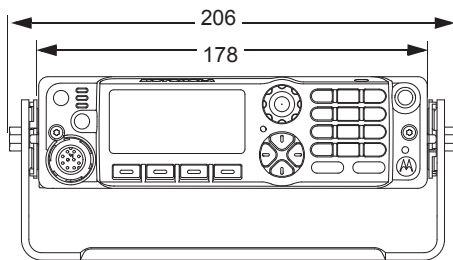
Figure 1-6. Side View of O5 Control Head Attached to APX 8500 Mid Power Dash Mount Transceiver and Trunnion
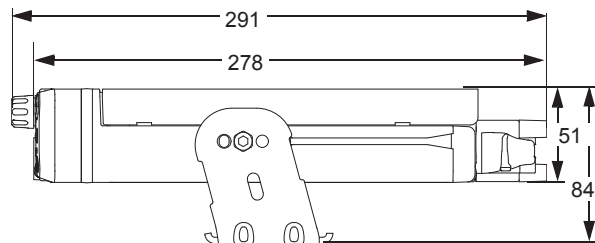
Figure 1-7. Front View of O7 Control Head Attached to APX 8500 Mid Power Dash Mount Transceiver and Trunnion

Figure 1-8. Side View of O7 Control Head Attached to APX 8500 Mid Power Dash Mount Transceiver and Trunnion

Figure 1-9 and Figure 1-10, show the basic dimensions of the remote mount transceiver trunnion APX mobile radio.
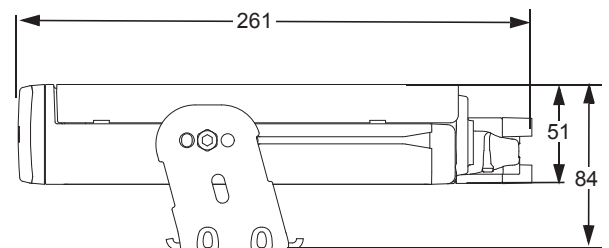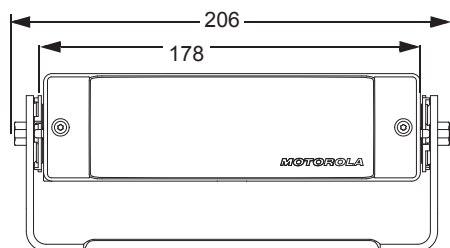
Figure 1-9. Front View of Remote Mount and Trunnion

Figure 1-10. Side View of Remote Mount and Trunnion

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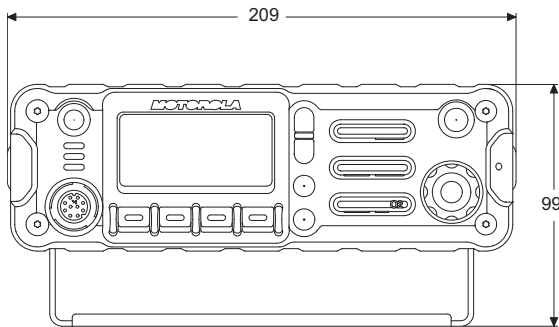
Figure 1-11. Front View of O2 Control Head with Remote Mount and Trunnion
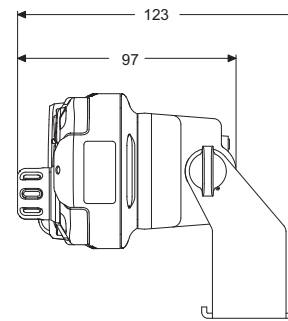
Figure 1-12. Side View of O2 Control Head with Remote Mount and Trunnion
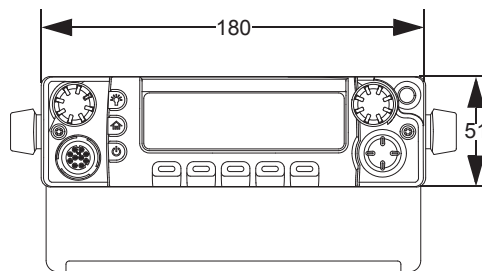
Figure 1-13. Front View of O5 Control Head with Remote Mount and Trunnion
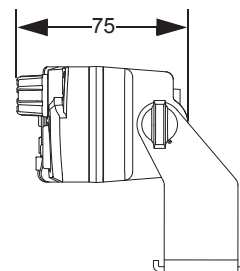
Figure 1-14. Side View of O5 Control Head with Remote Mount and Trunnion
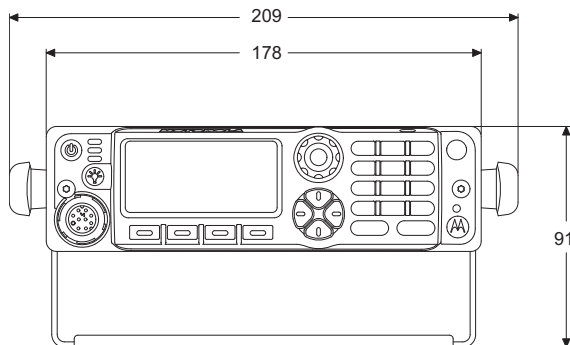
Figure 1-15. Front View of O7 Control Head with Remote Mount and Trunnion
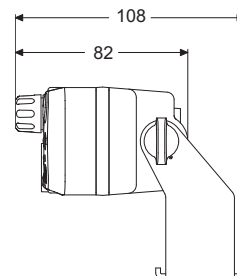
Figure 1-16. Side View of O7 Control Head with Remote Mount and Trunnion
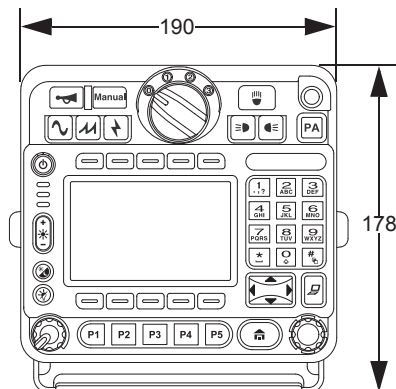
Figure 1-17. Front View of O9 Control Head with Trunnion
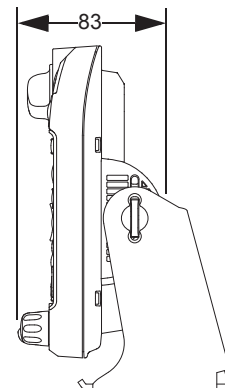
Figure 1-18. Side View of O9 Control Head with Trunnion
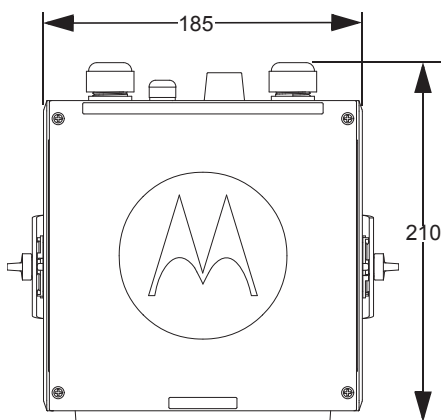
Figure 1-19. Top View of O9 Universal Relay Controller with Trunnion (URC is an orderable accessory)
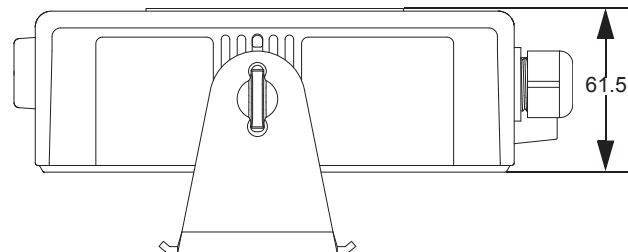
Figure 1-20. Side View of O9 Universal Relay Controller with Trunnion (URC is an orderable accessory)

Figure 1-21. Siren and Lights Interface Module (SLIM)
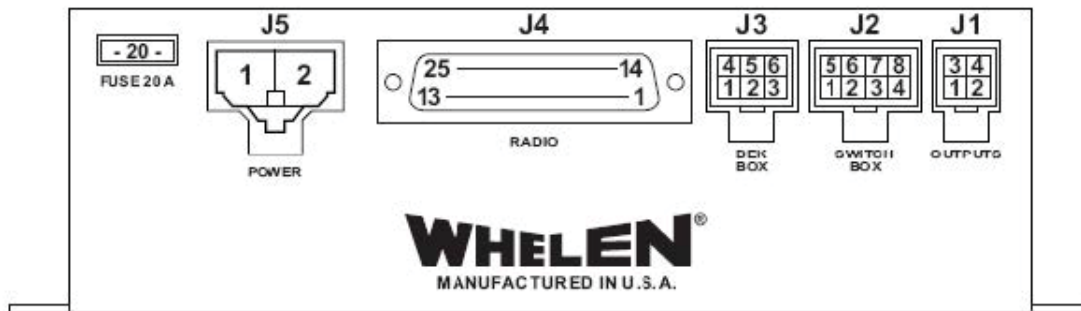
Figure 1-22. Front View of SB9600 Whelen Siren
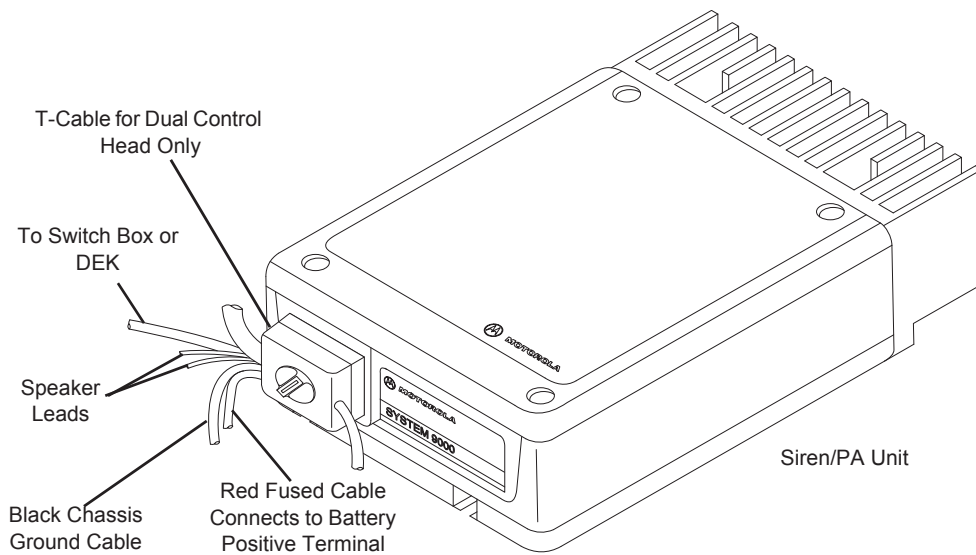
Figure 1-23. Siren/PA Cable Connections

1.2   Standard Configurations

1.2.1   Dash Mount Configuration - Mid Power

NOTE: The dash mount configuration is not applicable for O9 control heads.

There are two versions of the APX mobile dash mount. The first are the O2, O5 and O7 control heads which are mounted on the front of the transceiver housing. The second is the O3 control head which is connected to the transceiver through a coiled cable, which is plugged into the CAN connector on the transceiver.

Electrical connection between the two takes place within the radio through a flexible circuit board between the connectors on the front of the transceiver and at the back of the control head for O2, O5 and O7.
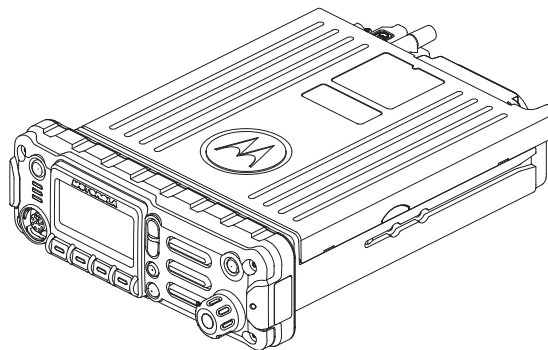
Figure 1-24. Dash Mount Configuration for O2 Control Head
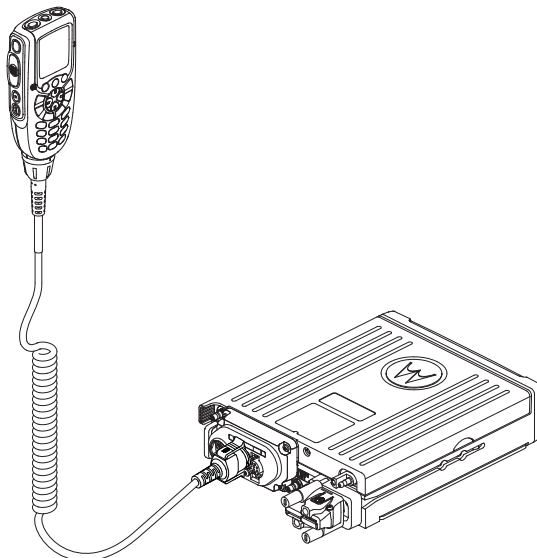
Figure 1-25. Dash Mount Configuration for O3 Control Head
(No Extension Cable Present)
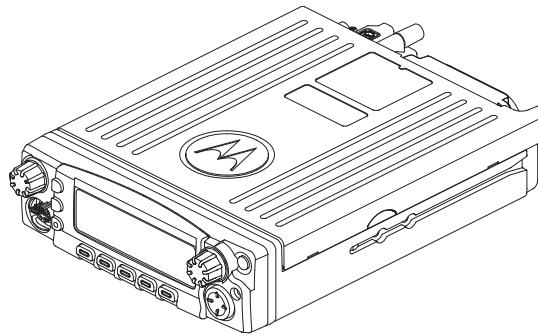
Figure 1-26. Dash Mount Configuration for O5 Control Head
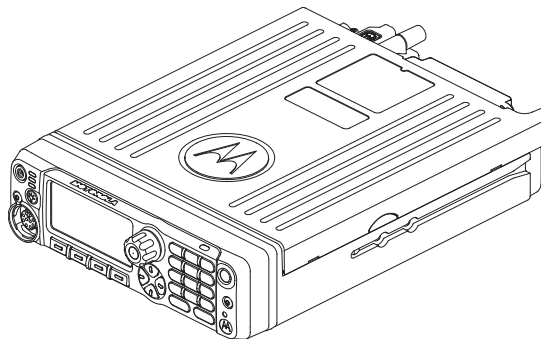
Figure 1-27. Dash Mount Configuration for O7 Control Head

For details on this configuration, see See 2.2.1.

1.2.2   Remote Mount Configuration

In the remote mount configuration, the transceiver and the control head are mounted separately in the vehicle. The O2, O5, O7 and O9 control heads are mounted in remote trunnions near the operator. The transceiver and control head are mounted using a trunnion or other mounting hardware. If the transceiver is located in a car trunk, ensure that it is mounted securely and that sufficient cooling is provided. Do not cover the transceiver with baggage, blankets, and others.

NOTE: The keypad mic should only be plugged into the Mobile Microphone Port (MMP) connector located on the control head, in either dash mount or remote mount configuration.
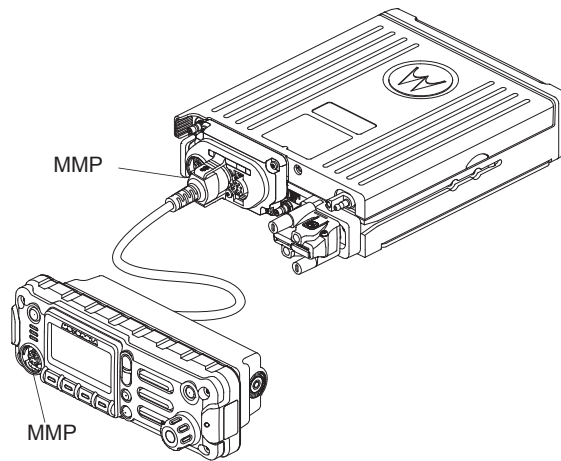
Figure 1-28. Remote Mount Configuration with Mid Power Transceiver, Transceiver Interface Board, CHIB Rear Assembly and O2 Control Head

Figure 1-29. Remote Mount Configuration with High Power Transceiver, Transceiver Interface Board, CHIB Rear Assembly and O2 Control Head

5 m (17 ft) Extension Cable
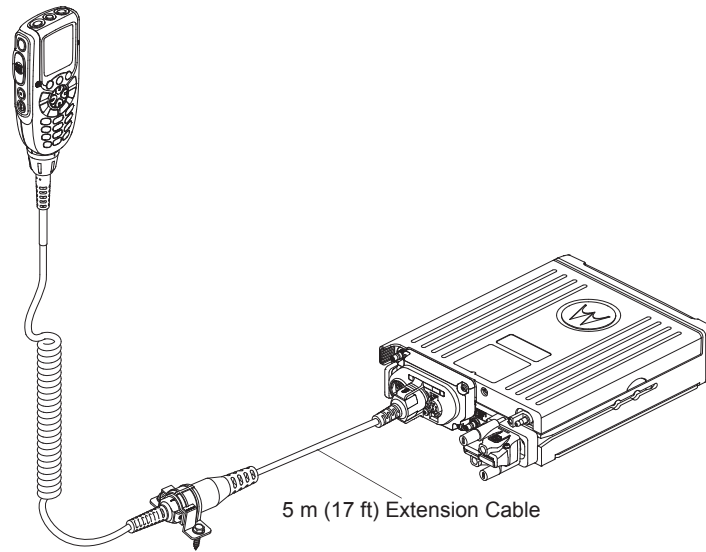
Figure 1-30. Remote Mount Configuration with Mid Power Transceiver, Transceiver Interface Board and O3 Control Head

5 m (17 ft) Extension Cable
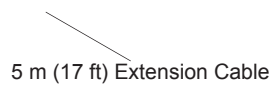
Figure 1-31. Remote Mount Configuration with High Power Transceiver, Transceiver Interface Board and O3 Control Head

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MMP
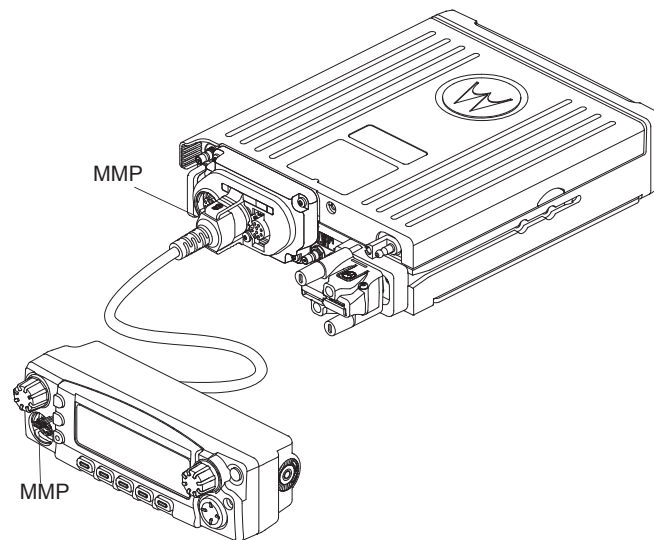
Figure 1-32. Remote Mount Configuration with Mid Power Transceiver, Transceiver Interface Board, CHIB Rear Assembly and O5 Control Head

MMP

MMP

Figure 1-33. Remote Mount Configuration with High Power Transceiver, Transceiver Interface Board, CHIB Rear Assembly and O5 Control Head
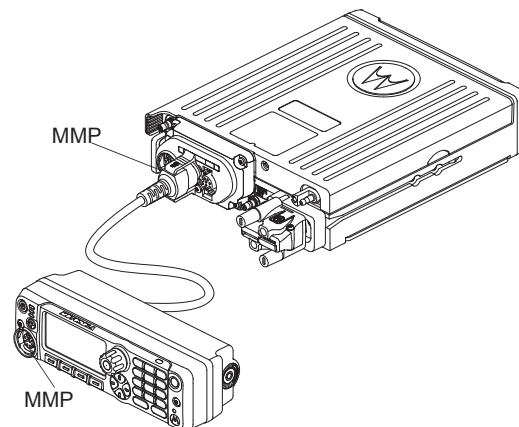
Figure 1-34. Remote Mount Configuration with Mid Power Transceiver, Transceiver Interface Board, CHIB Rear Assembly and O7 Control Head

MMP

MMP

Figure 1-35. Remote Mount Configuration with High Power Transceiver, Transceiver Interface Board, CHIB Rear Assembly and O7 Control Head

17 ft Extension Cable
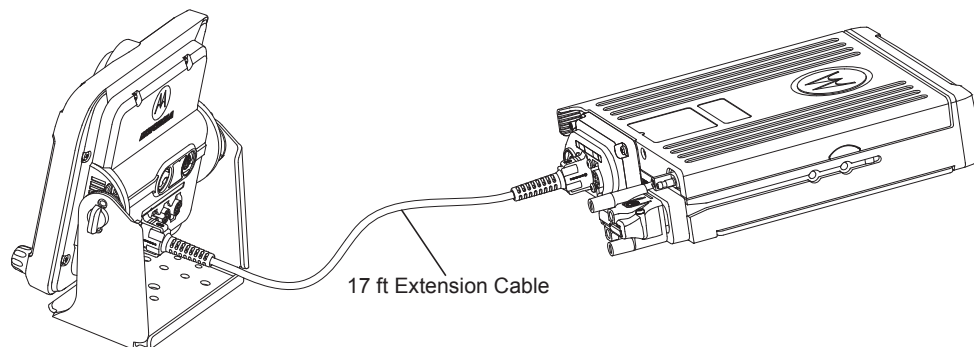
Figure 1-36. Remote Mount Configuration with Mid Power Transceiver, Transceiver Interface Board and O9 Control Head

17 ft Extension Cable

*Figure 1-37. Remote Mount Configuration with High Power Transceiver,
Transceiver Interface Board and O9 Control Head*

17 ft Extension Cable

O7 to URC Cable
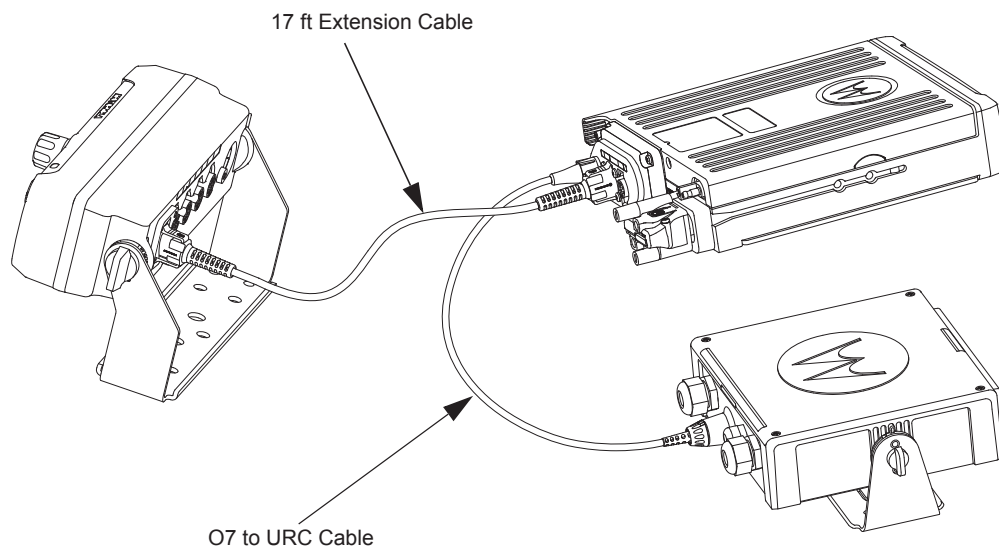
*Figure 1-38. Remote Mount Configuration with Mid Power Radio Transceiver,
Universal Relay Controller and O7 Control Head (URC is optional)
(Also Applicable for O2 and O5 Control Heads)*

Draft

17 ft Extension Cable

O7 to URC Cable
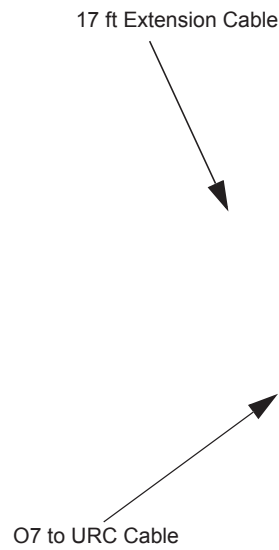
*Figure 1-39. Remote Mount Configuration with High Power Radio Transceiver,
Universal Relay Controller and O7 Control Head (URC is optional)*
(Also Applicable for O2 and O5 Control Heads)

17 ft Extension Cable

O9 to URC Cable
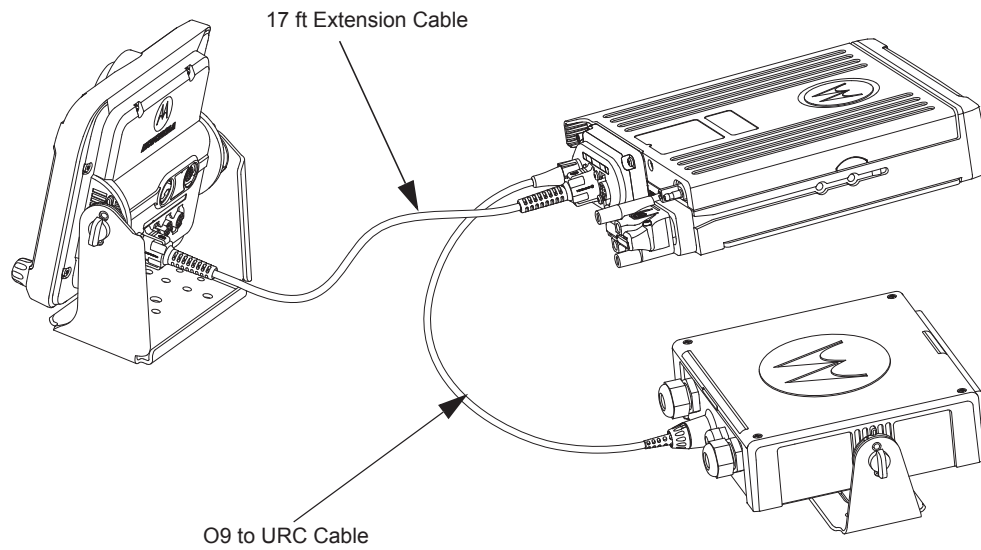
*Figure 1-40. Remote Mount Configuration with Mid Power Radio Transceiver,
Universal Relay Controller and O9 Control Head (URC is optional)*

17 ft Extension Cable

O9 to URC Cable
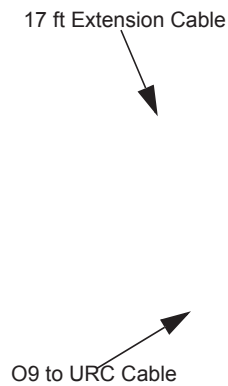
*Figure 1-41. Remote Mount Configuration with High Power Radio Transceiver,
Universal Relay Controller and O9 Control Head (URC is optional)*

For details on these configurations, See 2.2.2.

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1.2.3 Multi Control Head

The multi control head option allows separate, remotely operated control heads to operate and control the radio. For example, a fire truck could have a control head located in the cab and on the rear of the truck so that the radio could be operated from outside the vehicle.

1.3 Motorcycle Configurations - Mid Power

NOTE: The motorcycle configurations are not applicable for O9 control heads.

See Chapter 5: Motorcycle Radio Installation for further information.

1.4 Base/Control Stations

NOTE: The base/control station option is not applicable for O9 control heads.

If mobile radio equipment is installed at a fixed location and operated as a control station or as a fixed unit, the antenna installation must comply with the following requirements in order to ensure optimal performance and compliance with the RF energy exposure limits in the standards and guidelines listed in the Safety Manual (refer to related publications):

- The antenna should be mounted outside the building on the roof or a tower if at all possible.
- As with all fixed site antenna installations, it is the responsibility of the licensee to manage the site in accordance with applicable regulatory requirements and may require additional compliance actions such as site survey measurements, signage, and site access restrictions in order to ensure that exposure limits are not exceeded.

1.5 Tools Required for APX Mobile Installations

Tool	Part Number
10 mm wrench	–
5 mm Allen wrench	–
Regular slot screwdriver of Phillips #2	–
Pin removal tool	6680163F01

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Chapter 2   Standard Configurations

2.1   Planning the Installation

The APX mobile radio operates only in negative ground electrical systems with a valid operating range of 13.6 V +/- 20%. Before starting the radio installation, make sure that the ground polarity of the vehicle is correct. Accidentally reversing the polarity could damage the radio and cause the cable fuses to blow.

Planning is the key to fast, easy radio installation. Before starting the installation, inspect the vehicle and determine how and where you intend to mount the antenna, radio, and accessories. Plan wire and cable runs to provide maximum protection from pinching, crushing, and overheating.

⚠️ **Caution**	Before installing any electrical equipment, check the vehicle manufacturer user manual for warnings or recommendations. The installation of this device should be completed by an authorized servicer or installer. Failure to properly install the device may result in damage to the device, or improper operation.

2.1.1   Installation Examples

The mobile two-way radio offers various methods of installation, with accessories placed to the vehicle as desired. The radio can be a dash or remote mount except with O9 control head, which can only be mounted remotely. The O9 control head with the radio and the URC can only be mounted remotely (see).
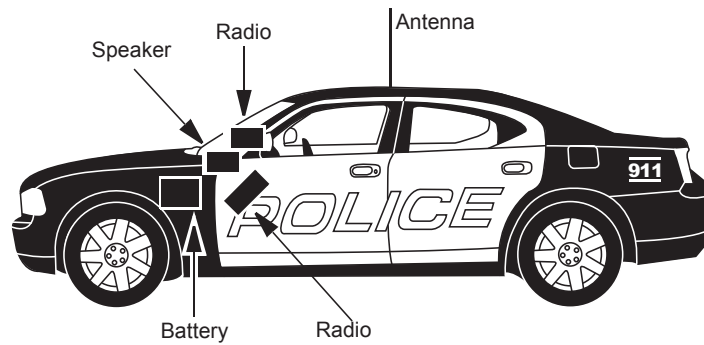
Figure 2-1. Dash Mount Radios Can Be Located in the Middle Console, on the Transmission Hump, or Under the Dash (Mid Power)
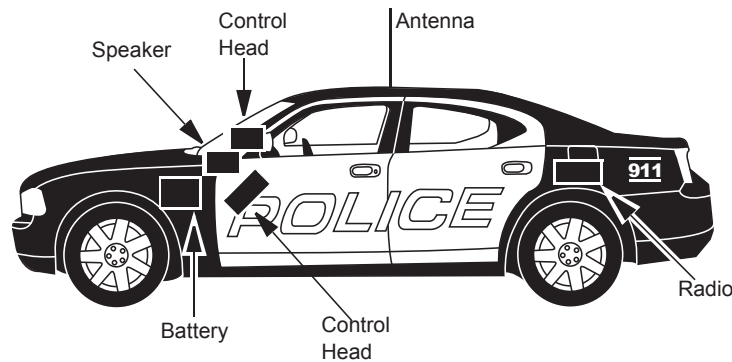
Figure 2-2. Remote Mount Radio Control Heads Can Be Located in the Middle Console, on the Transmission Hump, or Under the Dash (Mid Power)
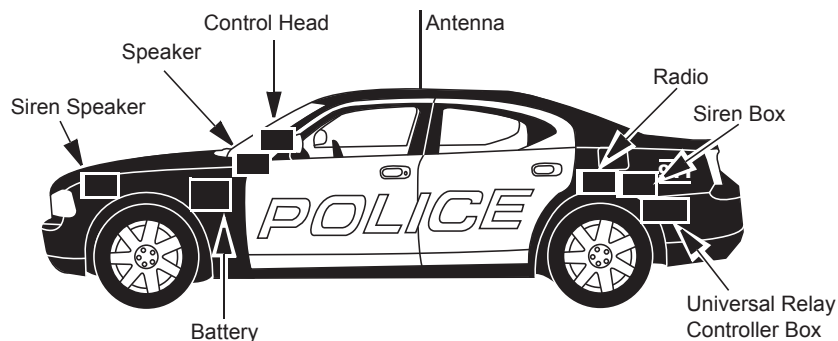
Figure 2-3. Remote Mount of the Radio, O9 Control Head and Universal Relay Controller (URC is optional)

2.1.2   Wiring Diagrams

Figure 2-4 through Figure 2-18 show the wiring diagrams for all the possible configurations. The title under each figure identifies the O2, O3, O5, O7 or O9 control head configurations. Identify which of these figures shows the configuration that you are installing, and use the diagram when planning the installation.
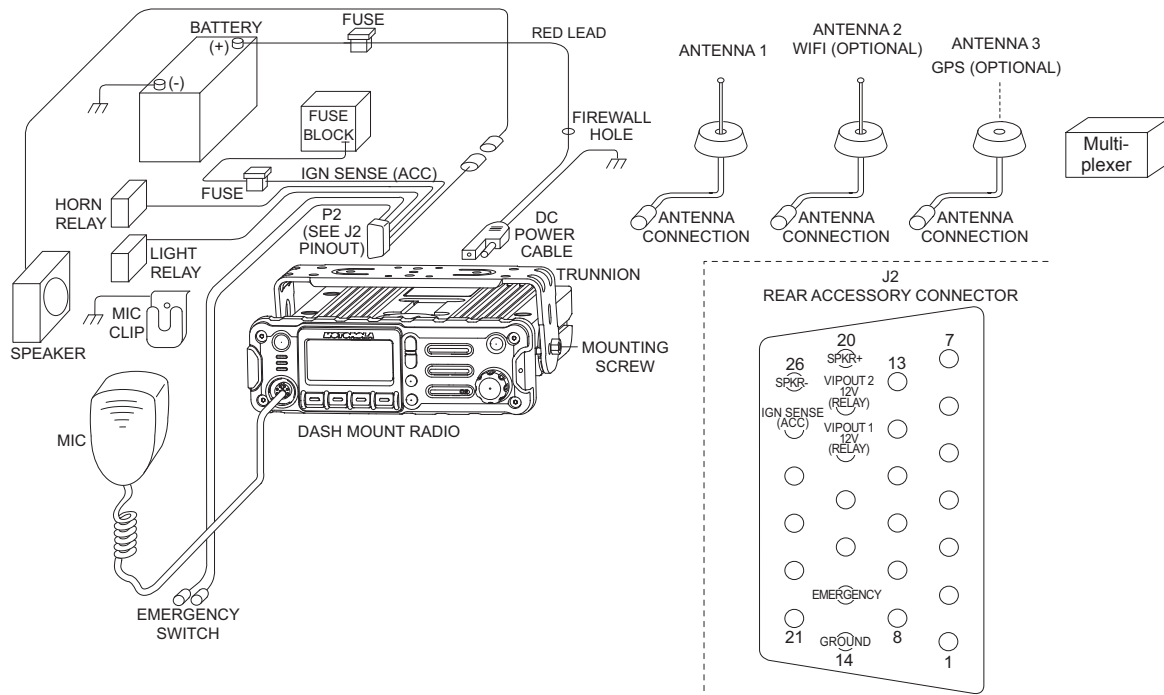
Figure 2-4. Radio Installation (O2 Mid Power Dash Mount)
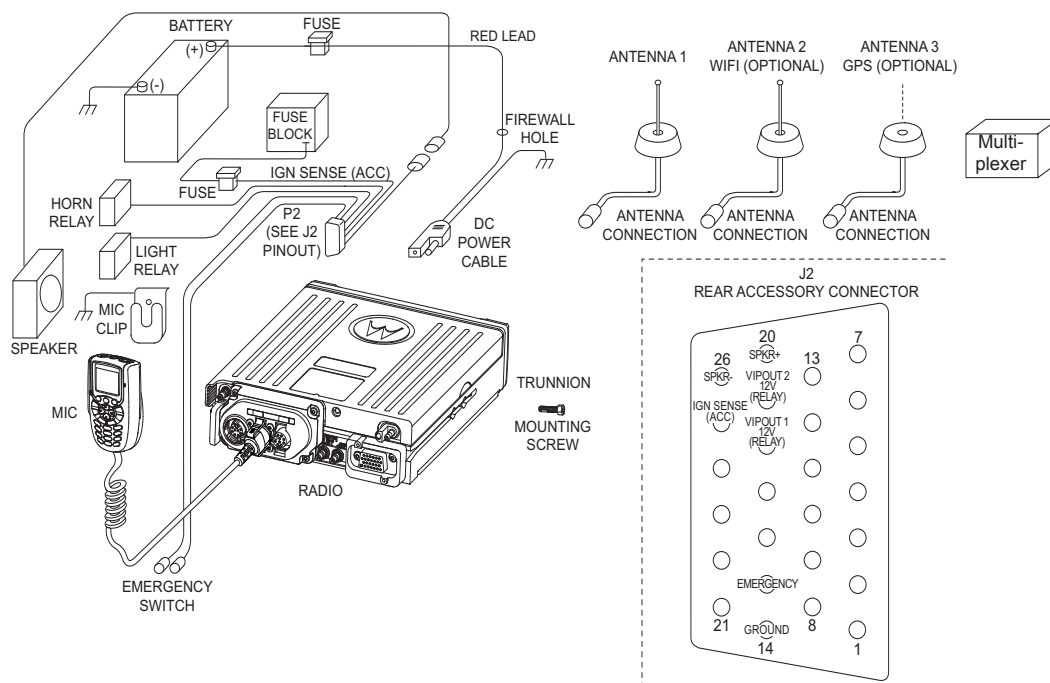
Figure 2-5. Radio Installation (O3 Mid Power Dash Mount)

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Figure 2-6. Radio Installation (O5 Mid Power Dash Mount)

Figure 2-7. Radio Installation (O7 Mid Power Dash Mount)
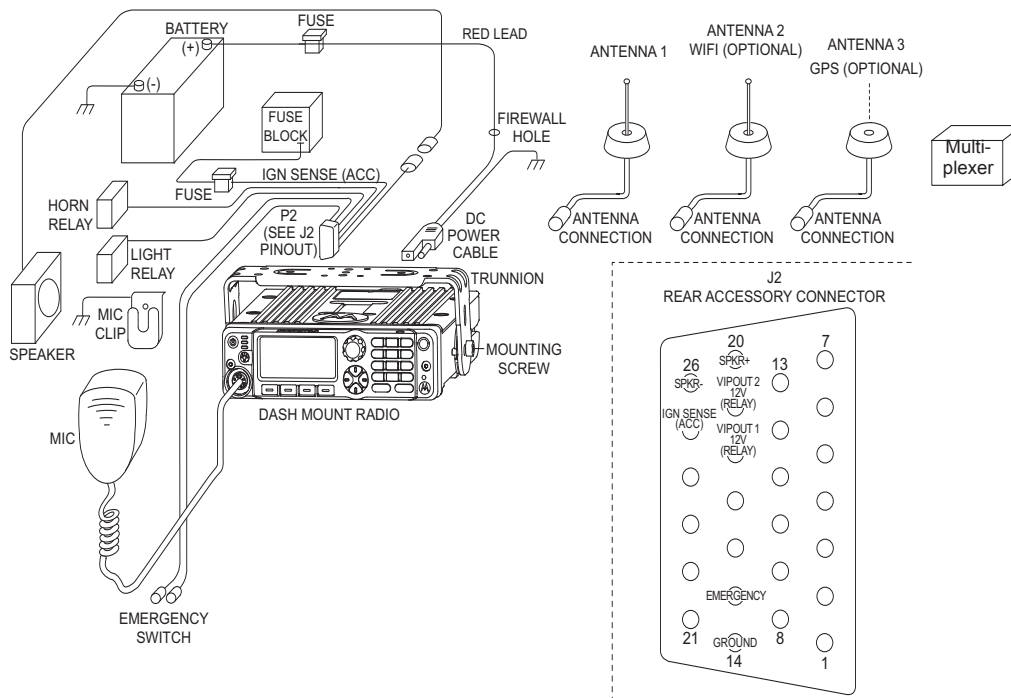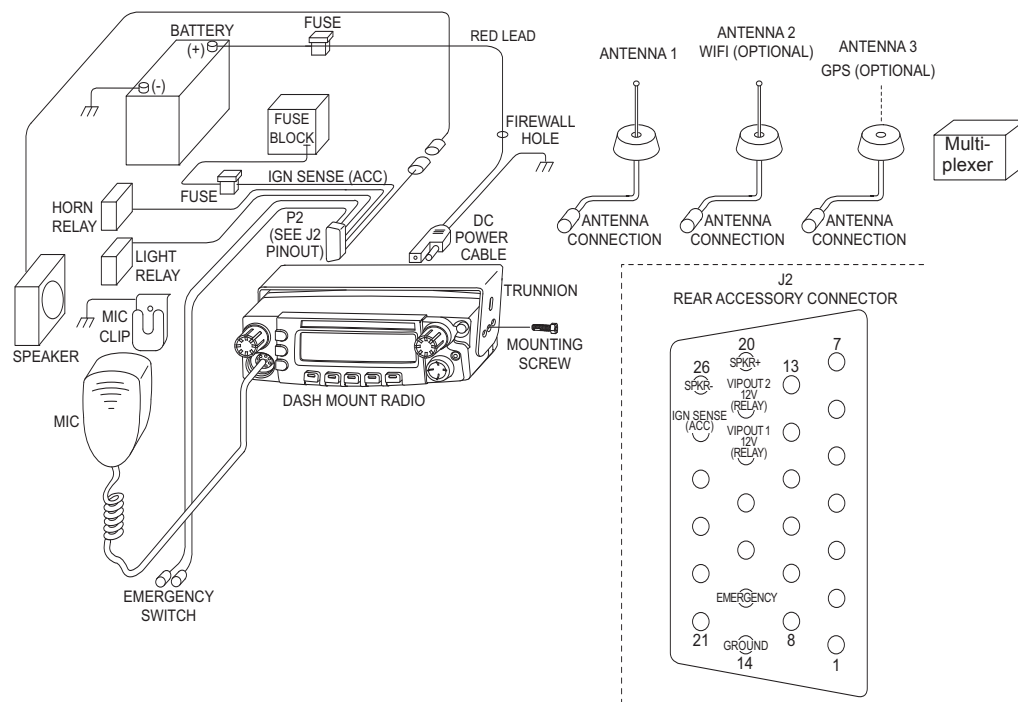
NOTE: In dash mount configuration, it is mandatory that a rear accessory cable be attached at the back of a mid power transceiver, in order to ground the Emergency pin to GND. Or, an emergency footswitch or pushbutton switch must be attached at the back of a mid power. If the emergency pin is not grounded, upon the attachment of the A+ cable at the DC connector, the radio detects a HIGH for the emergency pin state, and assume that emergency has been activated. This attempts to power on the radio, and results in excessive current draw and incorrect radio operation. Refer to Section 2.1.3.1 for further details and recommended wiring of emergency in dash mount.

Radio Pin Number	VIP Cable (HKN6196_) Wire Color	Function
J400-1	RED	SWB +
J400-2	GREEN	GND
J400-3	-	NO PIN
J400-4	-	"VIP" detect: GPIO=HIGH
J400-5	BLUE	VIP_OUT_1
J400-6	YELLOW	VIP_OUT_2
J400-7	BLACK	VIP_OUT_3
J400-8	WHITE	VIP_IN_1 (VIP_IN GPIO)
J400-9	ORANGE	VIP_IN_2 (VIP_IN GPIO)
J400-10	VIOLET	VIP_IN_3
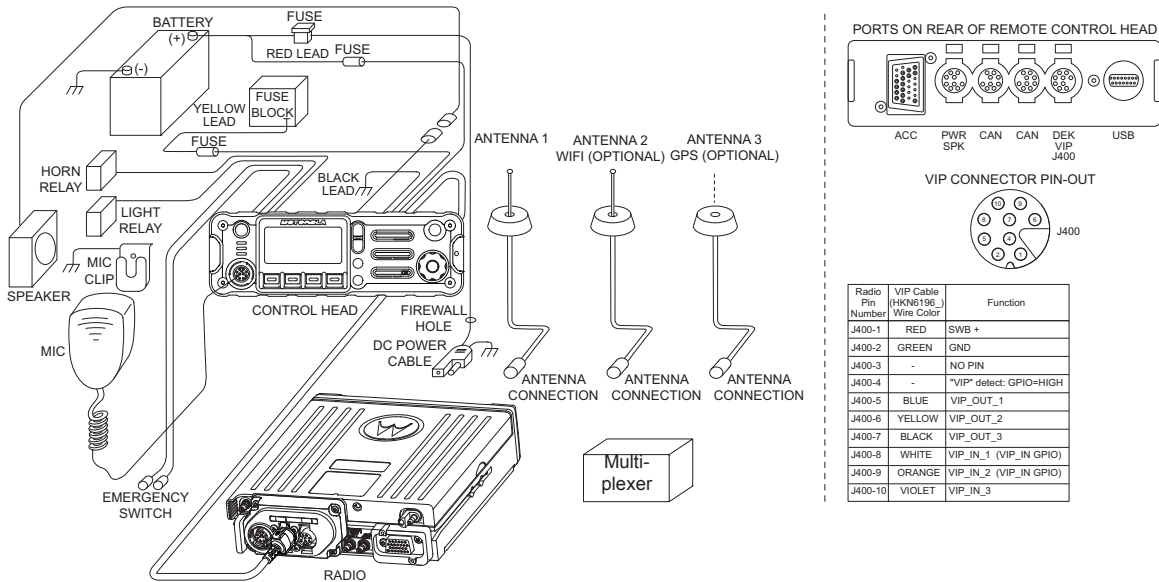
Figure 2-8. Radio Installation (O2 Mid Power Remote Mount)

Figure 2-9. Radio Installation (O2 High Power Remote Mount)

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Figure 2-10. Radio Installation (O3 Mid Power Remote Mount)
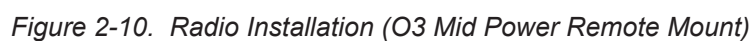
Multi-
plexer

Figure 2-11. Radio Installation (O3 High Power Remote Mount)

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Figure 2-12. Radio Installation (O5 Mid Power Remote Mount)

Radio Pin Number	VIP Cable (HKN6196_) Wire Color	Function
J400-1	RED	SWB +
J400-2	GREEN	GND
J400-3	-	NO PIN
J400-4	-	"VIP" detect: GPIO=HIGH
J400-5	BLUE	VIP_OUT_1
J400-6	YELLOW	VIP_OUT_2
J400-7	BLACK	VIP_OUT_3
J400-8	WHITE	VIP_IN_1 (VIP_IN GPIO)
J400-9	ORANGE	VIP_IN_2 (VIP_IN GPIO)
J400-10	VIOLET	VIP_IN_3

Multi-
plexer

Figure 2-13. Radio Installation (O5 High Power Remote Mount)

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PORTS ON REAR OF REMOTE CONTROL HEAD

ACC — PWR SPK — CAN — CAN — DEK VIP J400 — USB

VIP CONNECTOR PIN-OUT

J400

Radio Pin Number	VIP Cable (HKN6196_) Wire Color	Function
J400-1	RED	SWB +
J400-2	GREEN	GND
J400-3	-	NO PIN
J400-4	-	"VIP" detect: GPIO=HIGH
J400-5	BLUE	VIP_OUT_1
J400-6	YELLOW	VIP_OUT_2
J400-7	BLACK	VIP_OUT_3
J400-8	WHITE	VIP_IN_1 (VIP_IN GPIO)
J400-9	ORANGE	VIP_IN_2 (VIP_IN GPIO)
J400-10	VIOLET	VIP_IN_3

Figure 2-14. Radio Installation (O7 Mid Power Remote Mount)

Multi-plexer

Figure 2-15. Radio Installation (O7 High Power Remote Mount)

Refer to Section 2.1.3.2 and Section 4.2.1 for further details and recommended wiring of emergency in remote mount.
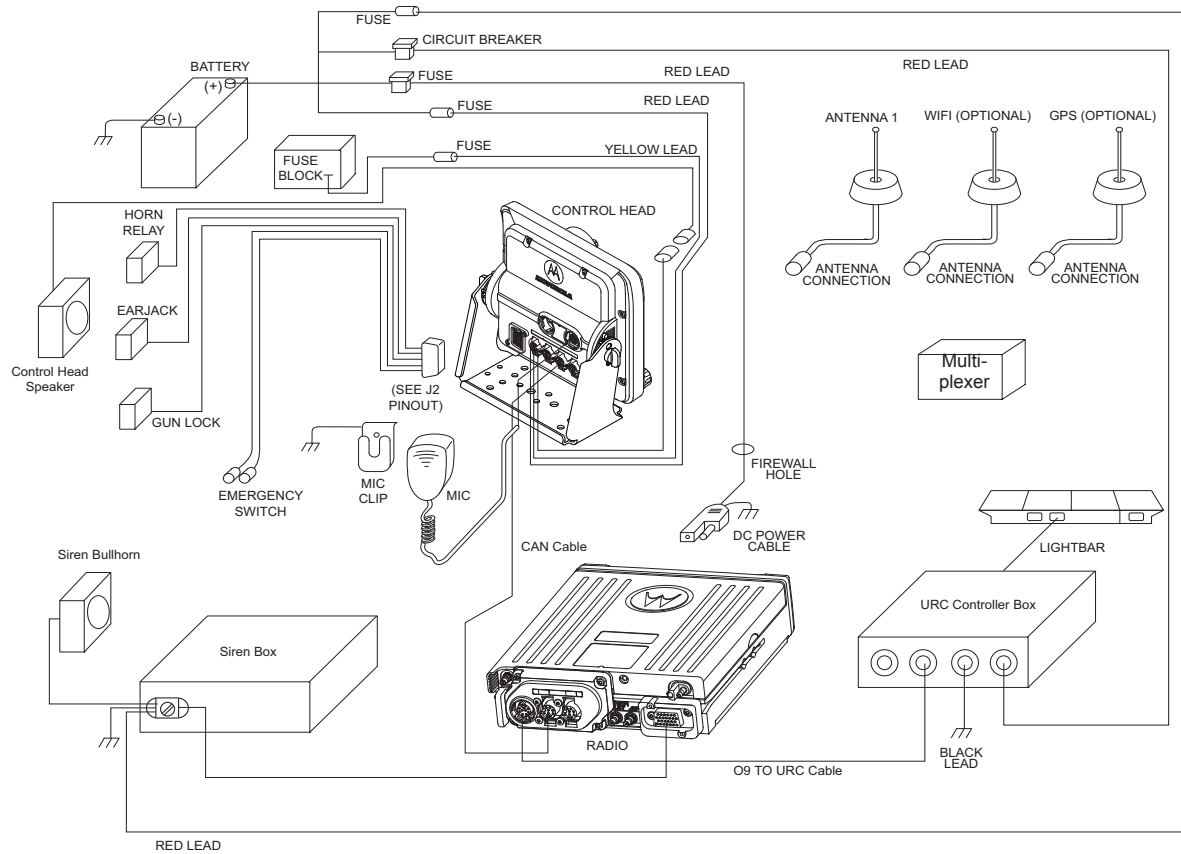
Figure 2-16. Radio Installation of O9 Remote Mount with Transceiver (URC is optional) - Mid Power

Multi-
plexer

Figure 2-17. Radio Installation of O9 Remote Mount with Transceiver (URC is optional) - High Power

Draft

J2
REAR ACCESSORY CONNECTOR

20 SPKR+	13	7
26 SPKR-	VIPOUT 2 12V (RELAY)	
IGN SENSE (ACC)	VIPOUT 1 12V (RELAY)	
EMERGENCY		
21	GROUND 8	1
14		

J500 USB

J100 M.A.P.

J200 PWR/SPKR (RED)

J300L CAN (BLUE)

J300R CAN (BLUE)

J400 DEK/VIP (YELLOW)

MMP

VIP CONNECTOR PIN-OUT

J400

Radio Pin Number	VIP Cable (HKN6196_) Wire Color	Function
J400-1	RED	SWB +
J400-2	GREEN	GND
J400-3	-	NO PIN
J400-4	-	"VIP" detect: GPIO=HIGH
J400-5	BLUE	VIP_OUT_1
J400-6	YELLOW	VIP_OUT_2
J400-7	BLACK	VIP_OUT_3
J400-8	WHITE	VIP_IN_1 (VIP_IN GPIO)
J400-9	ORANGE	VIP_IN_2 (VIP_IN GPIO)
J400-10	VIOLET	VIP_IN_3

Figure 2-18. Radio Installation (O9 Remote Mount with Pinouts)

Refer to Section 2.1.3.2 and Section 4.2.1 for further details and recommended wiring of emergency in remote mount.

J100

J200

J300L

J300R

J400

J500

M.A.P.

PWR SPK (RED)

CAN (BLUE)

CAN (BLUE)

DEK VIP (YELLOW)

USB
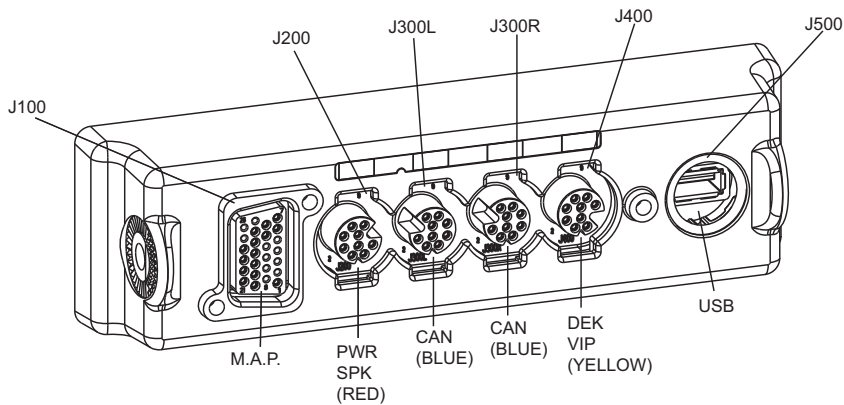
Figure 2-19. Remote Control Head Pinouts

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RADIO COMPARTMENT = OPERATOR COMPARTMENT

VEHICLE BATTERY COMPARTMENT

MICROPHONE

CONTROL HEAD

TRANSCEIVER

TIB

SPEAKER

DASH IGN SENSE (thin RED)

A+ (RED)

FUSE

VEHICLE IGNITION SWITCH

ACC line

SEE NOTE

GROMMET

FUSE

VEHICLE BATTERY

(-)

(+)

CHASSIS GND

LOCK
OFF
ACC
ON
START

NOTE:
See TABLE 2-1 for wiring of the thin RED wire on rear accessory plug. A good GROUND connection to the car chassis is required for correct radio operation.

NOTE:
Ignition sense cable uses either 3-amp fuse (6580283E01) or 4-amp fuse (6580283E02)

Figure 2-20. Cabling Interconnect Diagram for Dash Mount

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Figure 2-21. Cabling Interconnect Diagram for Remote Mount
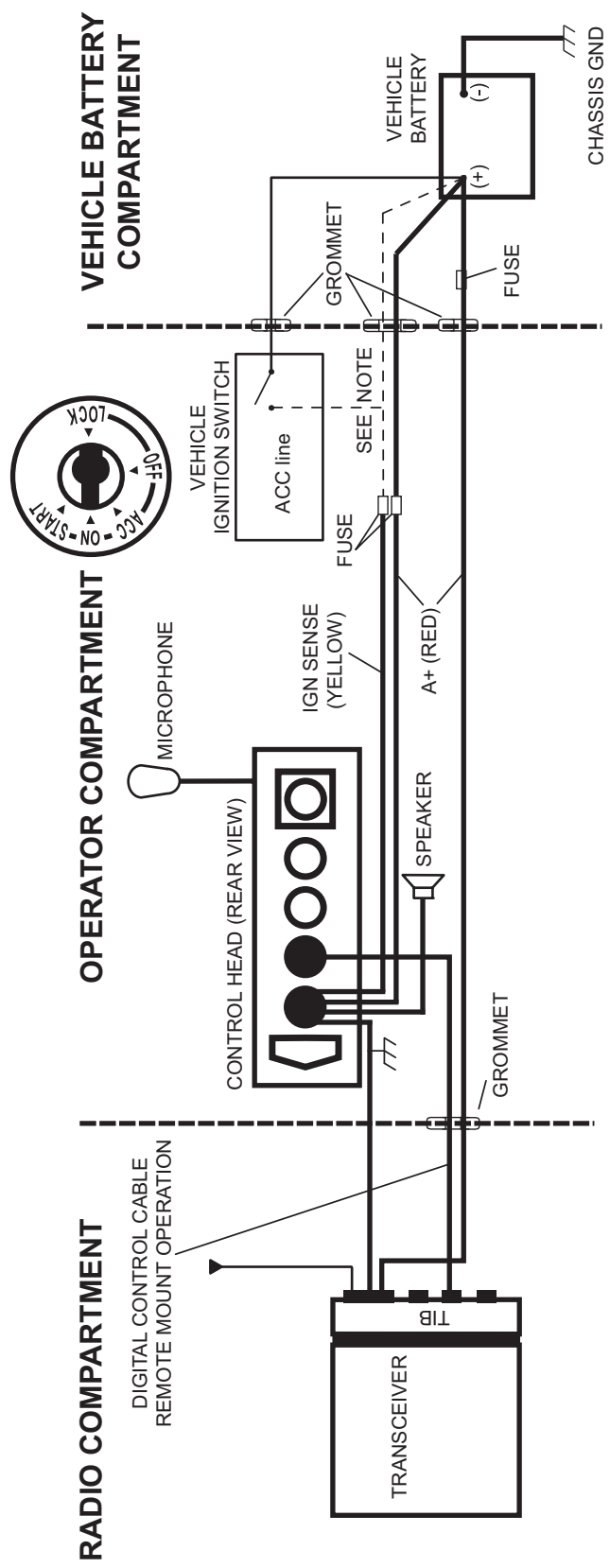
NOTE:
See TABLE 2-1 for wiring of the YELLOW wire. A good GROUND connection to the car chassis is required for correct radio operation.

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VEHICLE BATTERY COMPARTMENT

OPERATOR COMPARTMENT

RADIO COMPARTMENT CAUTION

Siren Speaker

PART OF VEHICLE WIRING

Chassis GND

VEHICLE BATTERY

GROMMET

GROMMET

VEHICLE IGNITION SWITCH

ON/ACC

SEE NOTE

3A OR 4A FUSE

A+ (Red)

15A Fuse

A+ (Red)

IGN Sense (yellow)

(BLK)

SPEAKER

Control Head (Rear View)

CAN extension cable

RADIO POWER CABLE (RED/BATTERY HOT)

15A, 20A OR 30A FUSE

A+ (Red)

16A Circuit Breaker

GROMMET

(BLK)

Siren Box

TIB

TRANSCEIVER

URC Controller Box

Chassis GND

MMP to RJ45 Cable

Figure 2-22. Cabling Interconnect Diagram for 09 Remote Mount (URC is optional)

NOTE:
For remote mount configurations, do not supply IGNITION at the radio's rear accessory connector. See TABLE 2-2 for combinations of wiring the RED and YELLOW cables. Alternator whine and other noise problems may occur. Isolate the RED cable with a Motorola Solutions relay (5900813674).

2.1.3 Radio Operation Wiring for Dash and Remote Configurations

Determine from Table 2-1 or Table 2-2 the radio functionality you want to achieve, which is controlled by the vehicle ignition switch state, the physical wiring of the radio ignition sense (ACC) wire, and by the programmed CPS setting. For additional radio functionality as determined by the programming of the ignition switch in CPS, refer to the HELP menu in your CPS that is Ignition as: Required, Blank, Soft Power Off, TX Inhibit, PTT TX Inhibit, Ignition Only Power Up).

Choose a clean ignition point which is not shared in the immediate vicinity by other high current accessories/devices to reduce the transients on the ignition line. Examples of high-current accessories/devices are: Air Horn, relays, lightbars, and others. It is recommended to wire to the vehicle ACC line, not the START or the solenoid side of the ignition circuit. Refer to chapter 6 for best installation practices. The Ignition sense (ACC) cable uses either a 3-amp fuse (6580283E01) or 4-amp fuse (6580283E02).

2.1.3.1 Dash Mount: Power, Ignition, and Emergency Cable Installation - Mid Power

The standard dash mount rear ignition sense cable HLN6863 contains a "thin red" ignition wire, a jumper wire that shorts emergency to ground, and two gray wires attached to an external speaker plug. The thin RED wire is the ignition sensed wire. Refer to Table 2-1 or Table 2-2 for its correct wiring configurations.

NOTE: This cable **MUST** be attached in order for the radio to operate in Dash mount, regardless of how emergency is programmed in CPS or wired inside the vehicle. Either the emergency jumper wire or an emergency accessory (footswitch or button) must be wired to the rear of the transceiver in Dash mount. Otherwise, upon attachment of the radio power cable to the vehicle battery, the radio incorrectly determines that emergency operation has been activated, such as when an emergency footswitch is de-pressed and the emergency pin is ungrounded.

2.1.3.2 Remote Mount: Power, Ignition, and Emergency Cable Installation

The single control head O2, O5, O7 or O9 remote mount configurations receive power from the J200 connector red and black wires. The yellow wire at J200 is one ignition sense wire. The J2 connector can also be used for ignition sense. If the HLN6863 is attached at J100 of the O2, O5, O7 or O9 control head, the "thin red" wire do NOT function as an ignition sense wire, since the J100 connector has no ignition sense electrical connection.

NOTE: It is incorrect for installation to attach ignition sense at more than one wire or connector. Refer to Table 2-1 or Table 2-2 for its correct wiring configurations.

The O3 control head receives its power down the CAN cable, and detects the ignition state by the ignition sense pin at J2. The J2 connector can also be used for ignition sense.

In Multi-Control Head installations, the yellow ignition wire must be connected to the head assigned ID # 1. Section 2.2.2.4: "Setting the Initial Control Head ID" for further information.

The design of the control head is different compared to the transceiver, therefore it is also **NOT** necessary to attach HLN6863 at J100 to prevent accidental emergency operation. The control head can have an emergency accessory attached at connector J100 instead of at the transceiver connector J2. Wherever the emergency accessory is placed, it is recommended to only attach at one location rather than multiple emergency accessories attached at different points of the radio.

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Table 2-1. Dash and Remote O2, O3, O5, O7 or O9 Radio Power ON @ J2

Dash/Remote Mount	Transceiver Red Power Wire	HLN6863 Thin Red Wire @ J2	Transceiver Red Power Wire	HLN6863 Thin Red Wire @ J2	Transceiver Red Power Wire	HLN6863 Thin Red Wire @ J2
Connected to battery	X	X	X			X
Connected to ignition switch				X	X	X
Ignition switch controls	No ignition switch control.		Enables ignition switch functionality as programmed in the codeplug.		Illegal wiring configuration. See CAUTION note.	

Table 2-2. Remote O2, O5, O7 or O9 Radio Power ON @ J200

Remote	Control Head Red Wire @J200	Control Head Yellow Wire @J200	Control Head Red Wire @J200	Control Head Yellow Wire @J200	Control Head Red Wire @J200	Control Head Yellow Wire @J200
Connected to battery	X	X	X			X
Connected to ignition switch				X	X	X
Ignition switch controls	No ignition switch control.		Enables ignition switch functionality as programmed in the codeplug.		Illegal wiring configuration. See CAUTION note.	

Table 2-3. Ignition Interface Cables

Part Number	Description
HLN6863_	Cable, M.A.P. 26pin with Only Ignition and SPK
KT000274A01	Y-Cable, M.A.P to M.A.P. and DB 25

⚠️ **Caution**

DO NOT connect any wires to the battery terminals until you have finished the entire radio installation (Dash or Remote Mount) configuration to avoid potential equipment damage.

Incorrect wiring of the radio may result in incorrect ignition sense detection, incorrect power-on state, or incorrect power-off state of the radio system.

The Control Head Power cable wire (RED) and Transceiver Power cable wire (RED) are always attached to the battery terminal and NOT to the ignition switch.

2.1.4 Ignition Sense Switch (Radio Wide Advance)

CPS selectable settings to control the radio functionality based on the state of the vehicle Ignition status. These descriptions can be found in the CPS (customer programming software) tool HELP Guides and are repeated here for convenience.

Table 2-4. Ignition Sense Switch Settings in CPS

Feature	Description
Blank	• Radio POWERS ON when the Power Button is pressed or with the emergency power up feature. • Radio POWERS OFF when the Power Button is pressed.

TX Inhibit	(Available only when: the radio is model/option capable)
	• Radio POWERS ON with a radio Power On button / knob selection.
	• Radio POWERS OFF with a radio Power Off button / knob selection, or when the Inactivity Auto Power Off timer expires.
	• While "**IGNITION**" is <u>not</u> present, certain communications are not possible:
	  I. The radio does <u>not</u> register with ASTRO 25 (APCO) - Trunking Systems and therefore <u>cannot</u> receive this type of Trunking communications (see the System Type field), however, Type II Trunking Systems can receive dispatch without being registered.
	  II. Also, the radio <u>cannot </u>be powered-on with the Emergency Power UP feature, and Emergency Alarm transmissions using the Emergency Power UP footswitch are <u>not</u> possible.

PTT TX Inhibit	(Available only when: the radio is model/option capable)
	• Radio POWERS ON with a radio Power On button / knob selection.
	• Radio POWERS OFF with a radio Power Off button / knob selection, <u>or</u> when the Inactivity Auto Power Off timer expires.
	• While "**IGNITION**" is <u>not</u> present, all **PTT button transmissions** are inhibited:
	  I. The radio does <u>not</u> register with ASTRO 25 (APCO) - Trunking Systems and therefore <u>cannot</u> receive this type of Trunking communications (see the System Type field), however, Type II Trunking Systems can receive dispatch without being registered.
	  II. Also, the radio <u>cannot</u> be powered-on with the an Emergency Power UP footswitch-press; however, the footswitch can be used to initiate Emergency Alarm transmissions if the radio is already on.

Required	• Radio POWERS ON when the Power Button is pressed and Ignition is present. • Radio POWERS ON when Ignition is cycled and radio was previously ON. • Radio POWERS OFF when the Power Button is pressed, or when Ignition is lost.
Soft Power Off	• Radio POWERS ON when the Power Button is pressed, or when Ignition is detected. • Radio POWERS OFF when the Power Button is pressed, or when Ignition is lost.
Ignition Only Power Up	• Radio POWERS ON when Ignition is present. • Radio POWERS OFF when Ignition is lost. • Control head power button is ignored.

NOTE: When either TX Inhibit, PTT TX Inhibit or Required are selected, the Emergency Power Up feature is not be available to the radio-user.

When any other Ignition Switch setting is made, Emergency Power Up is available to the radio-user, regardless of current ignition state.

Any optional inactivity time-out timer setting in CPS may delay the power off of the radio once Ignition sense is removed.

2.1.5   Motorola Solutions Branded SB9600 Siren/PA Configuration/Programming

The Siren/PA is shipped pre-wired for 100 W operation. It can be rewired for 65 W, 75 W, or 130 W power levels.

To change to another power level, perform the following:

1. Open the Siren/PA connector cover to gain access to the two-connector speaker leads. Do not change the speaker common lead (pin 20). The other lead is connected to pin 35 (for 100 W operation).

2. Using an appropriate pin removal tool, extract pin 35 and move it to one of the following pin locations:

   - pin location 36 for 75 W operation

   - pin location 28 for 65 W or 130 W operation

3. For 65 W or 75 W operation, no further changes are required. Reassemble the connector.

4. For 130 W operation, you must parallel two 11 Ω speakers, each rated at 65 W minimum. Proper phasing of the two speakers is important--when connecting two speakers in parallel, wire similar speaker terminals together to ensure maximum loudness and prevent "deadspots." For example, if the terminals are marked "1" and "2", connect the terminals marked "1" together and connect those wires to one speaker lead. Connect the terminals marked "2" together and connect those wires to the other speaker lead.

> ⚠ **Caution**
>
> Before continuing, remember that under a high-line supply condition (16.6 V), up to 30 % more power goes to the speaker(s) after reconfiguring for 130 W operation. Do this only when your PA speakers are capable of handling the extra power.

5. When the Siren/PA is configured for dual speaker, 130 W operation, it is necessary to remove a resistor and move two jumpers to set the correct power level. Remove the Siren/PA cover, and locate resistor R219 (0 Ω). This resistor should be removed for 130 W operation. Locate jumpers JU100 and JU101. These jumpers should be installed for 130 W operation.

6. Close and reconnect the Siren/PA connector cover.

   NOTE: Jumpers JU100 and JU101 do not affect the Siren output level. JU100 and JU101 compensate for the lower speaker load and the two speakers in parallel, by decreasing the gain U102-1. JU100 affects the radio PA level and JU101 affects the PA audio level.

Pin locations of various power level configurations are listed in Table 2-5

Table 2-5. Power Level Configurations

	Pin location of speaker leads	R219	JU100/JU101
65 W	20,28	IN	Across pins A and B
75 W	20,36	IN	Across pins A and B
100 W	20,35	IN	Across pins A and B
130 W	20,28	OUT	Across pins B and C

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2.2   Radio Mounting

⚠️ **C a u t i o n**	DO NOT mount the radio on a plastic mounting surface without first reinforcing the mounting surface; the weight of the radio may crack or break the mounting surface. DO NOT mount the radio on any surface where the radio could be partially submersed in water. This is especially important if the cab area of the vehicle is cleaned by spraying with water. If the radio sits in water for a length of time, moisture may seep inside the radio and damage the electronic components. DO NOT allow water to stand in recessed areas of vertically mounted radios. Remove any moisture immediately to prevent it from seeping down into the radio. Care must be taken to shield the control head (front and back) from direct exposure to pressurized water. The pressurized water from a hose, in most cases, is more severe than the stated test and conditions in typical environments.

The mounting location must be accessible and visible. Select a location that permits routing the RF antenna cable as directly as possible.

NOTE: For optimum radio performance, orient the mounting trunnion as shown in Figure 2-23. For new or existing installations of all use only the APX mobile trunnion, kit number HLN7002 (mid power) and HLN7003 (high power).

RADIO

APPLIES TO RADIOS IN DASH AND REMOTE INSTALLATIONS
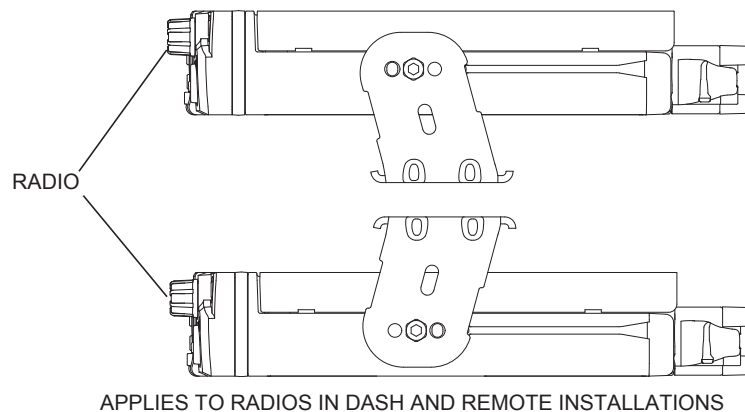
Figure 2-23. APX8500 Mid Power Trunnion Orientation

NOTE: .

RADIO FRONT
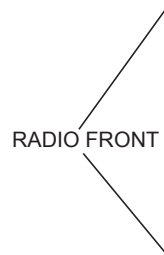
APPLIES TO RADIOS IN REMOTE INSTALLATIONS

Figure 2-24. APX8500 High Power Trunnion Orientation

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2.2.1 Dash Mount with Trunnion - Mid Power

1. Select the location to mount your radio on the transmission hump (see Figure 2-25) or under the dash (see Figure 2-26)

NOTE: When mounting the trunnion on the transmission hump take care that the transmission housing is not affected. Plan your installation ensuring enough room for the Accessory connector and cable in the back of the radio.

2. Using the trunnion mounting bracket as a template, mark the positions of the holes on the mounting surface. Use the innermost four holes for a curved mounting surface such as the transmission hump, and the four outmost holes for a flat surface such as under the dash.

3. Center punch the spots you have marked and realign the trunnion in position.

4. Secure the trunnion mounting bracket with the four self-drilling screws provided (see Figure 2-25 and Figure 2-26).

5. Ensure that the plastic guides are aligned (horizontal) to the grooves of the trunnion. Slide the radio into the grooves until it snaps into place (see Figure 2-26).

Table 2-6. High/Mid Power Trunnion Kit

Item	Part Number	Description	High/Mid Power Transceiver
1	0371859H01	Trunnion Mounting Screw	APX 8500
2	0312002B14	Self-Drilling Tapping Screw	APX 8500
3	HLN7002_	Mackinaw Trunnion Hardware Kit	APX 8500
4	HLN7003_	Mackinaw Trunnion Hardware Kit	APX 8500
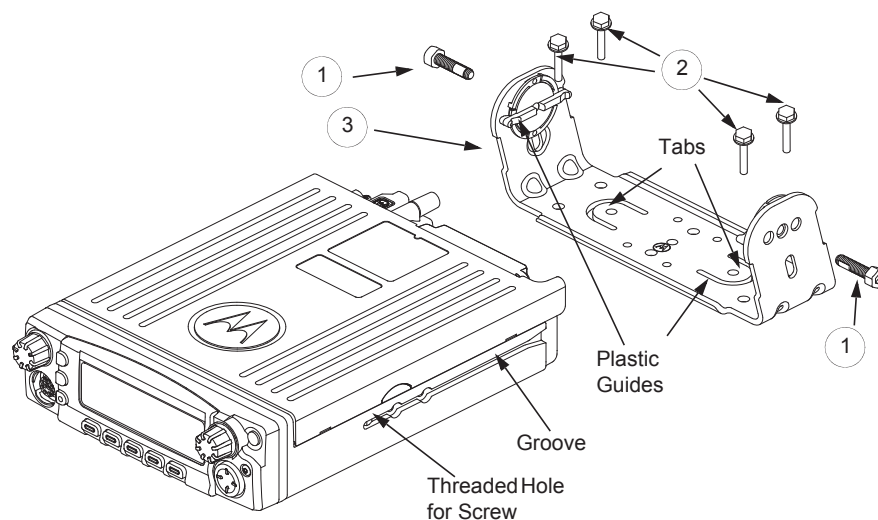
Figure 2-25. Below Dash Trunnion Mounting

Figure 2-26. Below Remote Trunnion Mounting
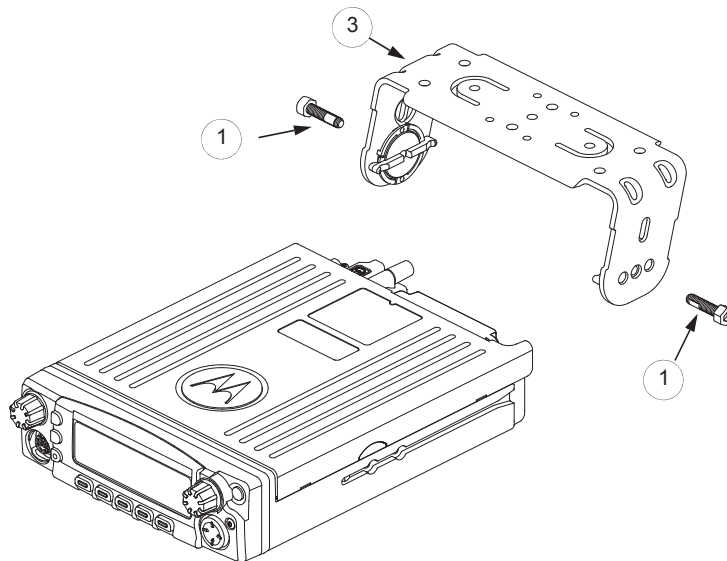
Figure 2-27. Transmission Hump Trunnion Mounting - Mid Power
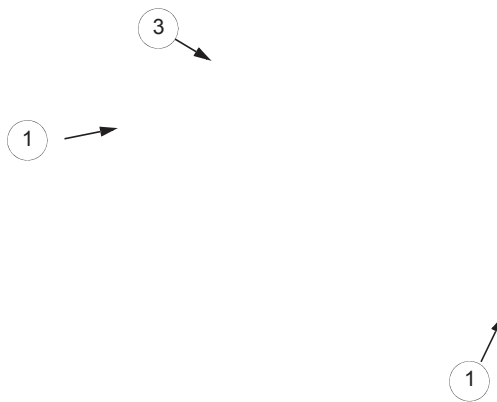
Figure 2-28. Transmission Hump Trunnion Mounting - High Power

6. For mid power radio, secure the radio with two screws provided (Item 1 in Table 2-6). The torque down force for 0371859H01 should be between 50 in-lbf to 52 in-lbf.

NOTE: This configuration shows the O5 control head. The TIB is used for O3 control head for the same configuration.

2.2.2 Remote Mount with Trunnion

⚠ C a u t i o n	Before installing any electrical equipment, check the vehicle manufacturer user manual. The installation of this device should be completed by an authorized servicer or installer. Before making any holes in the trunk for radio mounting, check the vehicle manufacturer's user manual for restrictions such as due to the gas tank location.

For a remote mount installation, the transceiver may be mounted anywhere in the vehicle, provided that the installation location is safe, follows the cautions mentioned at the beginning of this section, and is accessible for servicing/maintenance as well as cabling. A typical mounting location recommended by Motorola Solutions is in the vehicle trunk. For mid power, the trunnion provided may still be used to mount the transceiver, and the mounting process is the same as for the dash mount installation (Section 2.2.1). See Figure 2-12 or Figure 2-14 for a remote installation.

The followings are the remote installation procedure for high power:

1. Select the location to mount your radio on the transmission hump (see) or under the dash (see)

NOTE: When mounting the trunnion on the transmission hump ensure that the transmission housing is not affected. Plan your installation ensuring enough room for the Accessory connector and cable in the back of the radio.

2. Using the trunnion mounting bracket as a template, mark the positions of the holes on the mounting surface. Use the innermost four holes for a curved mounting surface such as the transmission hump, and the four outmost holes for a flat surface such as under the dash.

3. Center punch the spots you have marked and re-align the trunnion in position.

4. Secure the trunnion mounting bracket with the four self-drilling screws provided (see and)

5. Ensure that the plastic guides are aligned (horizontal) to the grooves of the trunnion. Slide the radio into the grooves until it snaps into place (see)

2.2.2.1 Remote Mount Control Head Installation

Choose a mounting location for the radio, considering accessibility, and control and antenna cable lengths.

The recommended mounting surfaces for the control unit are under the mounting surface, on the transmission hump, or on the center console. Figure 2-29 and Figure 2-30 shows how the trunnion, control head, and cables should be installed for the O2, O3, O5, O7 or O9 control head.

NOTE: Connector-protective covers (Remote Mount Dust Cover kit) KT000246A01 are provided with the radio.
They should be installed on exposed connectors for added environmental robustness.

An adjustable trunnion, which allows a number of mounting positions, is supplied for mounting the control unit. The installation must not interfere with the operation of the vehicle or its accessories, nor disturb passenger seating or leg room. The control head must be within convenient reach and viewing of the user.

If the trunnion is mounted on a plastic mounting surface, all four mounting screws should penetrate the mounting surface supporting metal frame. If that is not possible, use a metal backing plate (not supplied) to strengthen the installation. The followings are the installation procedure:

1. Use the control unit trunnion as a template to mark the mounting holes; drill 5/32" holes. If mounting on a plastic surface, use a metal backing plate.

2. Attach the trunnion bracket using all four 10-16" x 5/8" self-tapping screws provided.

3. Temporarily install the control head (adjusting for proper viewing angle) and fasten it to the trunnion with two wing screws. Test the installation to be sure the control head feels securely locked in place while you are pressing its buttons.

4. Finish installation by fully tightening screws.
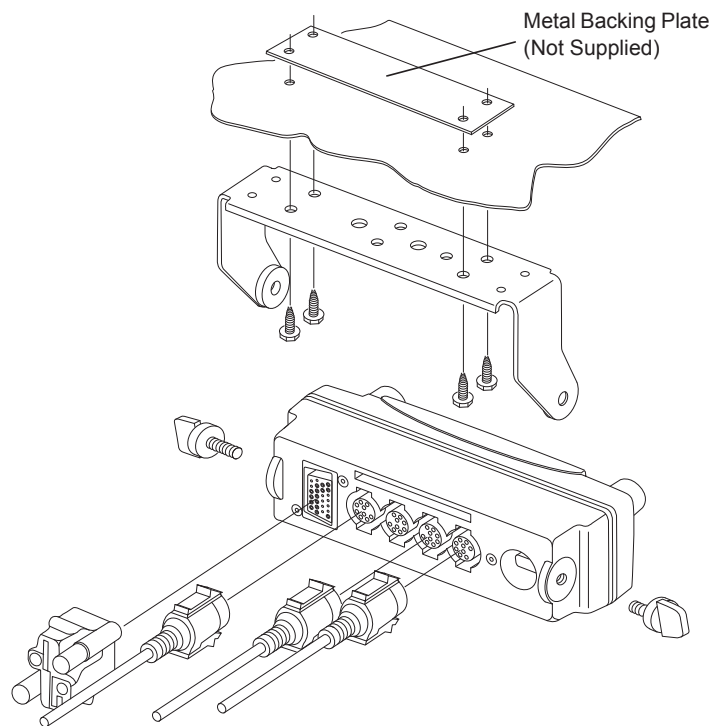
Figure 2-29. O5 Control Head Installation Exploded View (Also applicable for O2 and O7 Control Heads)

Adjust the control head to desired
angle and secure with wing screws

Use four mounting screws on all
installations

Trunnion

Mounting surface

Drill four 5/32" holes in
mounting surface

IMPORTANT:
Use a metal backing plate (not
supplied) if mounting trunnion on
plastic or unstable surface
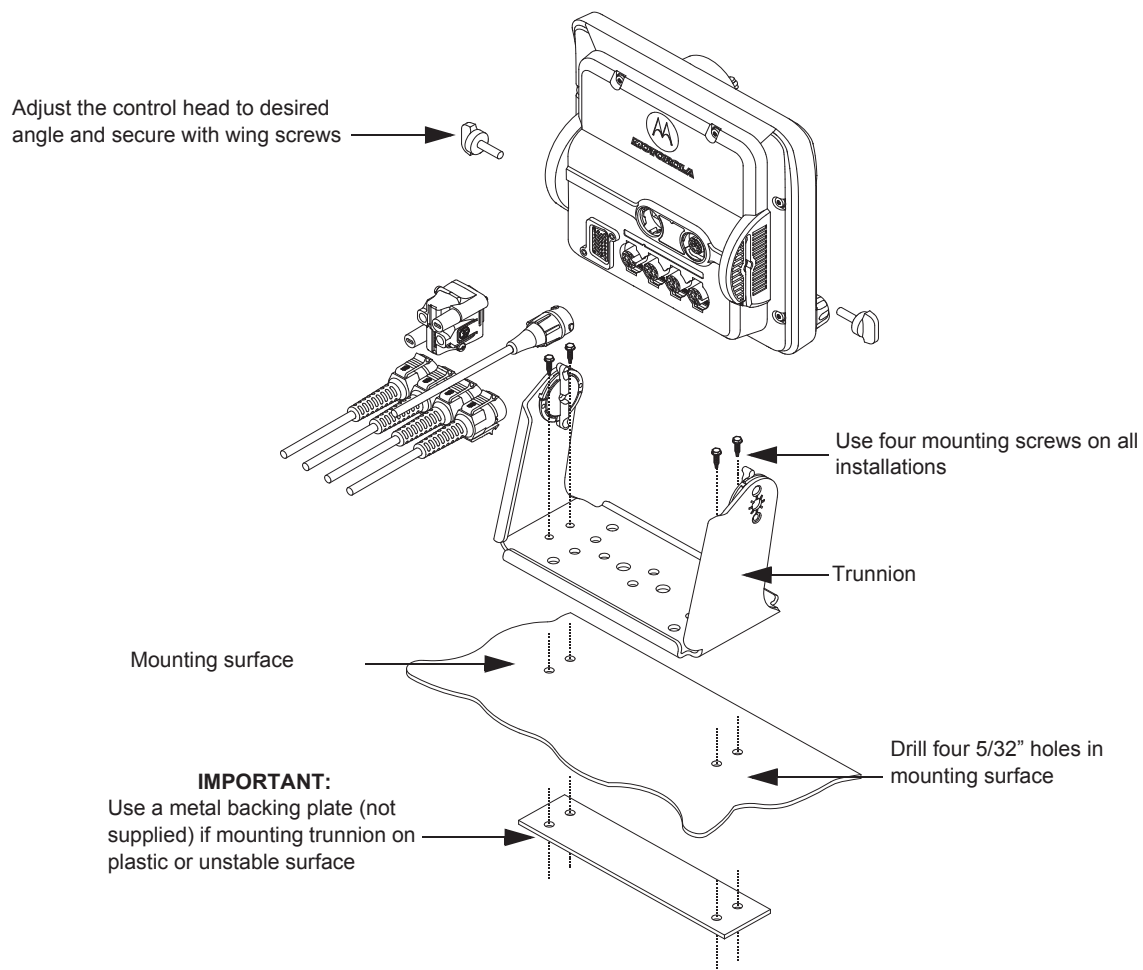
Figure 2-30. O9 Control Head Installation Exploded View
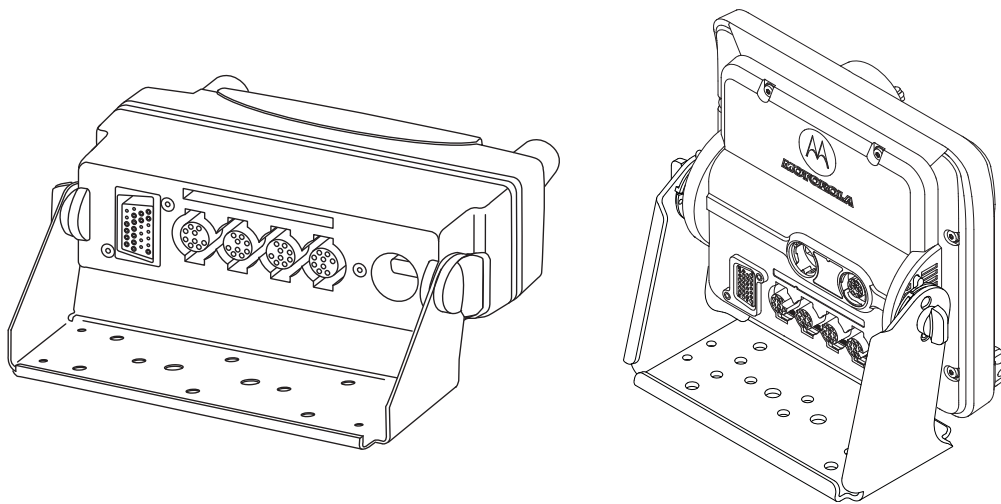
Figure 2-31. O5 and O9 Control Head Rear View

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2.2.2.2 Multiple Control Head Installation

Control heads in a multiple control head configuration should be installed per the steps detailed in Section 2.2.2.1: "Remote Mount Control Head Installation" . Two heads can be connected to each of the two CAN connectors on the transceiver, see Figure 2-32. Control heads can also be connected a "daisy chain" configuration from a single transceiver CAN connector. See Figure 2-34 for examples.

NOTE: The transceiver must be configured for Multiple Control Head through CPS programming. Navigate to the "Control Head" tab in the Radio Wide section of CPS, and select "Help" for further information and tutorials.
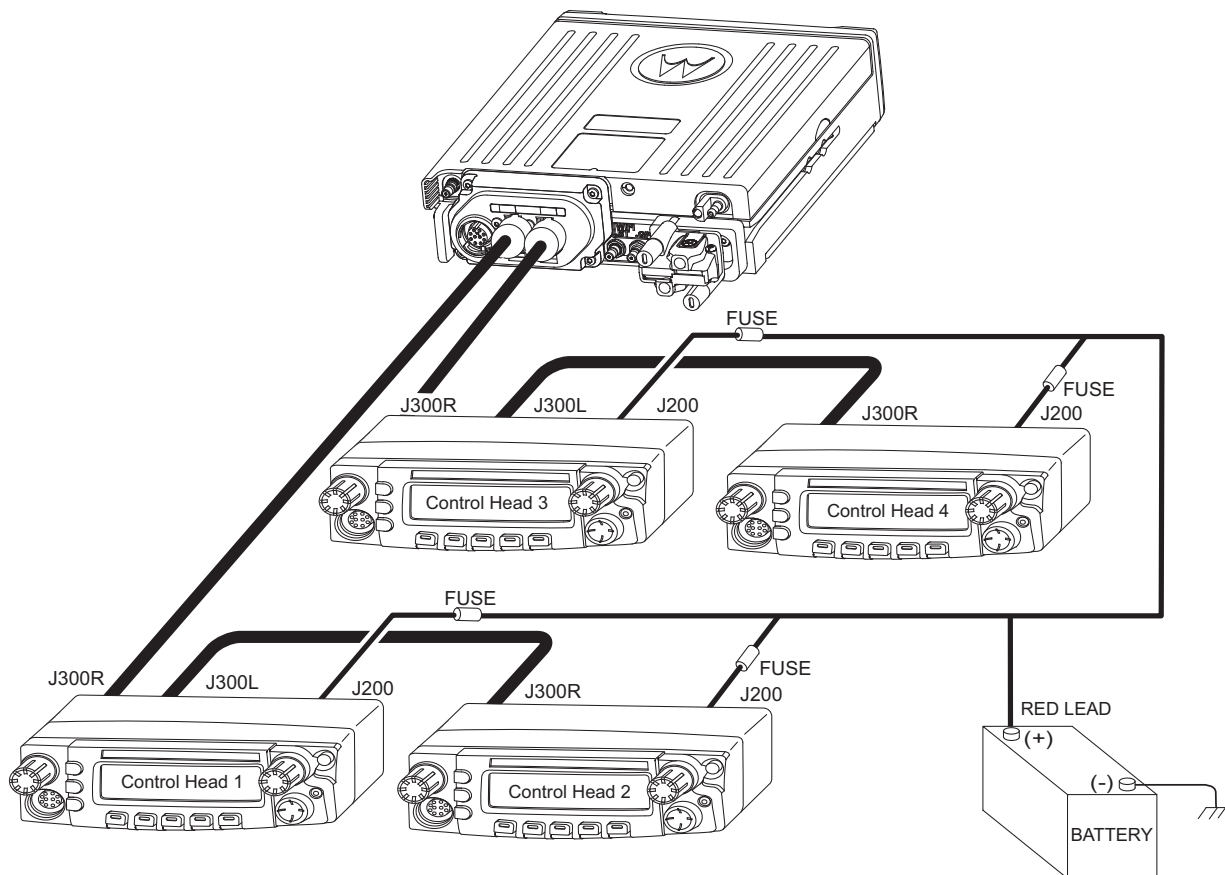
Figure 2-32. Multiple Control Heads Parallel Configurations - Mid Power

Draft

Figure 2-33. Multiple Control Heads Parallel Configurations - High Power
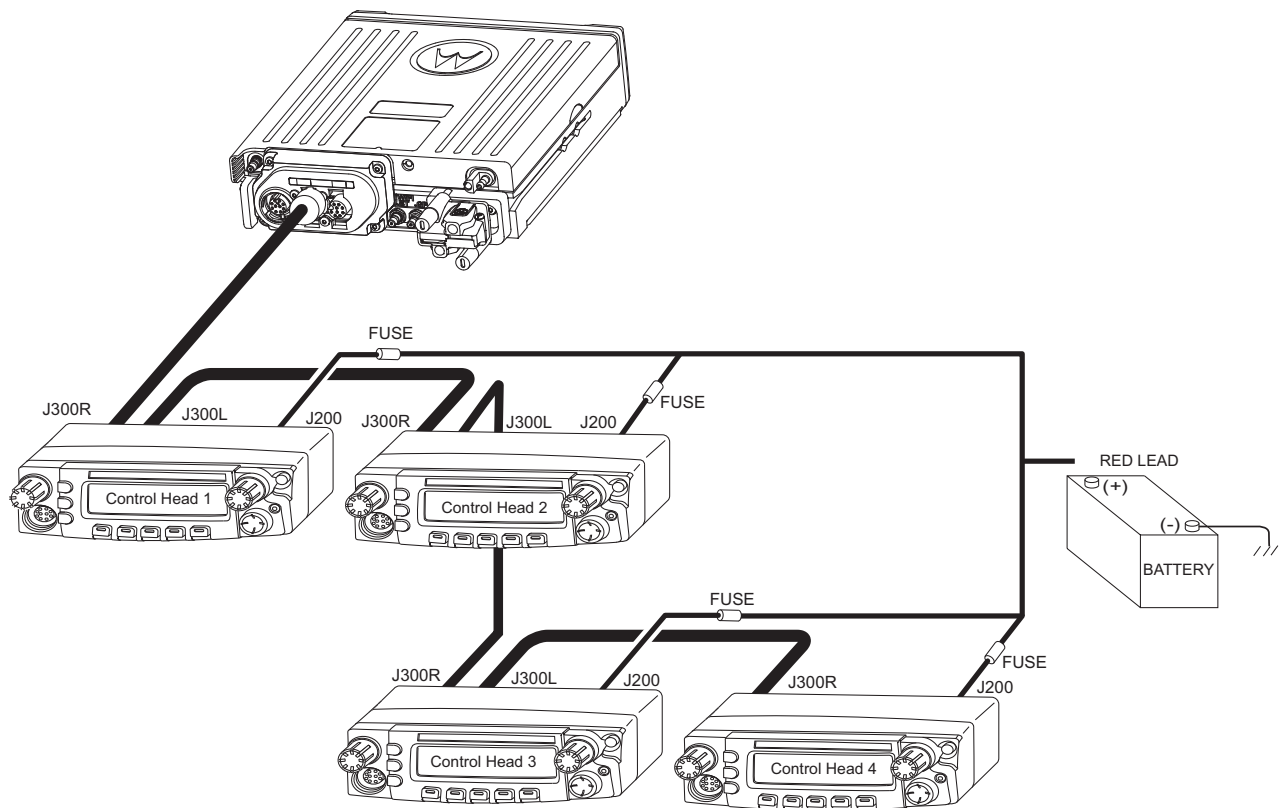
Figure 2-34. Multiple Control Heads Series Configurations - Mid Power

Figure 2-35. Multiple Control Heads Series Configurations - High Power

NOTE: In Multiple Control Head (MCH) installations, the yellow ignition sense wire must be connected to the head assigned ID # 1. Section 2.2.2.4: "Setting the Initial Control Head ID" for further information.

Use the most convenient configuration for your installation, ensuring that the combined cable lengths do not exceed 131 feet (40 meters). See Table 2-7 for a list of available CAN cable lengths. Control head ground, power and ignition sense wires (black, red, and yellow respectively) may need additional length (not supplied) in installations that locate the head more than 10 feet from a power source.

Table 2-7. Available CAN Cables

Part Number	Description
HKN6164_	Cable, Remote Mount, 40 m (131 ft)
HKN6165_	Cable, Remote Mount, 35 m (115 ft)
HKN6166_	Cable, Remote Mount, 23 m (75 ft)
HKN6167_	Cable, Remote Mount, 15 m (50 ft)
HKN6168_	Cable, Remote Mount, 9 m (30 ft)
HKN6169_	Cable, Remote Mount, 5 m (17 ft)
HKN6170_	Cable, Remote Mount, 3 m (10 ft)

Table 2-7. Available CAN Cables

Part Number	Description
PMLN4958_	Cable, O3 Extension, 5 m (17 ft)

2.2.2.3 Cable Installation

Route the cables where they are protected from pinching, sharp edges or crushing. Use grommets in any holes where the cable passes through metal panels. Figure 2-20 shows how the cables and components are connected. It is not recommended to route cabling or wiring inside the wheel wells of a vehicle.

2.2.2.4 Setting the Initial Control Head ID

The Front Panel Programming (FPP) mode allows you to define which control head in a Multi Control Head system becomes control head number 1-4.

Set the control head ID number for each attached head the first time Multi Control Head is used.

1. Press the power button to power off the radio.

2. Press and hold left-most menu and the orange button on the control head simultaneously.
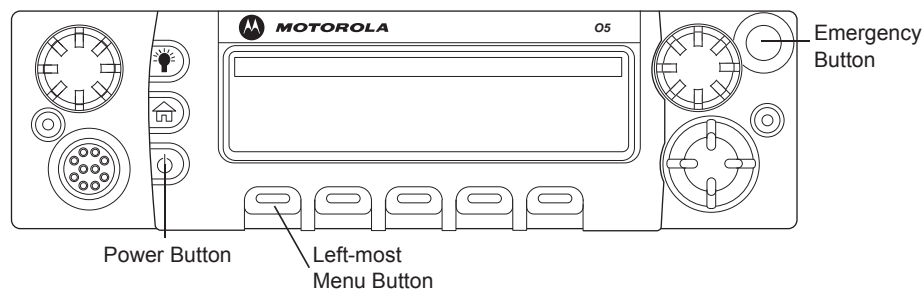
Figure 2-36. APX Mobile O5 Control Head Front View

3. Press the power button to power on the control head. The head powers on into FPP mode and display the current control head ID number:
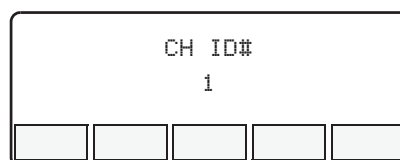
Figure 2-37. Radio Display with Current Control Head ID

4. Turn the **Mode** knob to change the control head ID number.

MN003109A01_aa
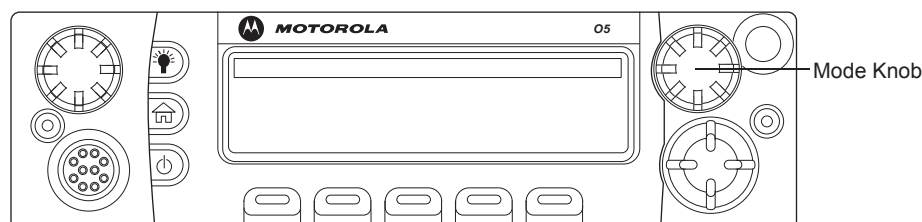
Figure 2-38. APX Mobile O5 Control Head Front View – Mode Knob

5. Repeat steps 1 to 4 above to set the ID of the remaining control heads.

NOTE: In Multiple Control Head (MCH) installations, the yellow ignition sense wire must be connected to the head assigned ID # 1.

2.2.2.5 O3 Control Head and Remote Mount Cabling

Choose a mounting location for the radio, considering accessibility, and control and antenna cable lengths. The control head extension cable and the accessories cable should be installed and routed properly to avoid complications. Route the cables in the vehicle wiring troughs (where available) 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 2-39. O3 Control Head

The recommended mounting surface for the control unit is on the center console. Figure 2-41 shows how the hang-up clip control head, and cables should be installed for the O3 control head.

NOTE: Connector-protective covers are provided with the radio. They should be used for added environmental robustness.

A mounting clip, which allows the control head to be mounted, is supplied together with the control head. The installation must not interfere with the operation of the vehicle or its accessories, nor disturb the passenger seating. The control head must be within convenient reach and viewing of the user.

Install the mounting clip as follows:

1. Use the provided mounting clip to determine the location of the two screw holes.

2. Drill 7/16" deep holes for upper and lower screws.

3. Use the tapping screw provided to install the mounting clip.

> ⚠️
> **C a u t i o n**
> Care must be taken to shield the control head (front and back) from direct exposure to pressurized water. The pressurized water from a hose, in most cases, is more severe than the stated test and conditions in typical environments.

Vehicle Mounting Surface

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

Figure 2-40. O3 Control Head Rear View

Figure 2-41. Hang-Up Clip Installation Exploded View

2.2.3 Locking Kit (Optional) - Mid Power

2.2.3.1 All Radios

If an optional locking kit (HLN6372_) is used (shown in Figure 2-42), 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.
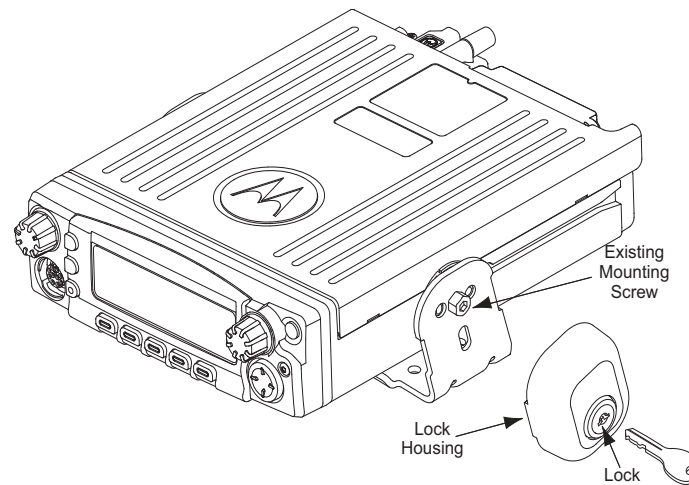
Figure 2-42. Locking Kit (Optional)

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-amp (part number 6580283E06), 20-amp (part number 6580283E07) or 30-amp (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 2-43 and Figure 2-44. Connect the black lead to a convenient solid chassis ground point. DO NOT connect the black lead directly to the battery negative terminal.

Table 2-8. Power Cables

Description	Part Number
Mid Power Dash Mount	HKN4191_
Mid Power Remote Mount	HKN4192_
High Power Remote Mount	HKN6110
O5, O7, and O9 Remote Control Head Power Cable - Mid Power	HKN6188_
O5, O7, and O9 Remote Control Head Power Cable - High Power	HKN6188_ or HKN6188_

2.3.1   O2, O5, O7 or O9 Control Head Power Cables
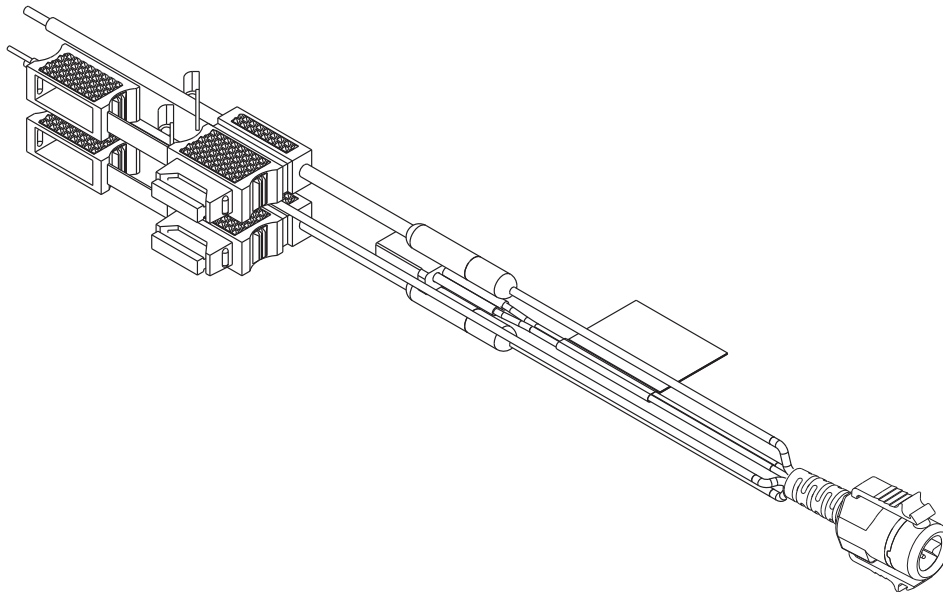
Figure 2-43. HKN6188_ Power Cable with External Speaker Connector
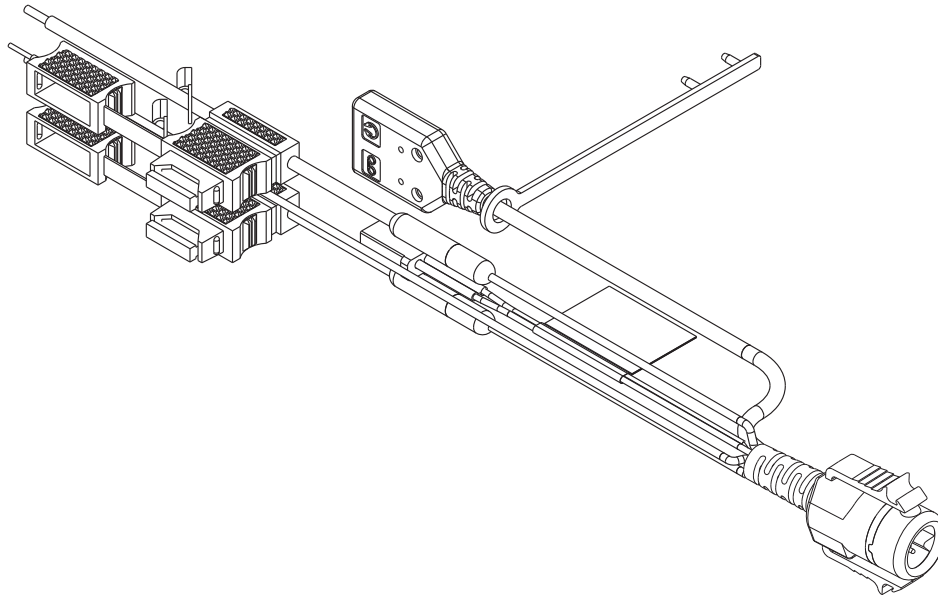
Figure 2-44. HKN6187_ Power Cable with External Speaker Connector, Record Audio Output Jack (2.5 mm) and Earphone Jack (2.5 mm)

NOTE: <u>Audio Out</u> – Does not require CPS programming. Attaching a headset mutes the external speakers of the radio which are attached at the SPK jack of the control head.

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

2.3.2 Battery Selector Switch

In vehicles which have installed a Battery Selector Switch, the ignition sense (yellow) wire should be the only wire connected to the battery selector switch (see Figure 2-45). 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 all power and ignition sense wires must be routed through the battery selector switch, so that the control head and radio transceiver both see the loss of battery power at the same time.
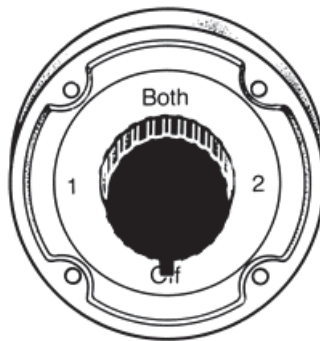
Figure 2-45. Battery Selector Switch

2.4 Antenna Installation

IMPORTANT: To assure optimum performance and compliance with RF Energy Exposure regulations, these antenna installation guidelines and instructions are limited to metal-body vehicles with appropriate ground planes and take into account the potential exposure of back seat passengers and bystanders outside the vehicle.

2.4.1 Selecting an Antenna Site/Location on a Metal Body Vehicle

1. **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.

2. **Roof top** – For optimum performance and compliance with RF Energy Exposure regulations, mount the antenna in the center area of the roof.

3. **Trunk lid** – On some vehicles with clearly defined, flat trunk lids, the antennas of some radio models (see restrictions below) can also be mounted on the center area 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 in the center area of the roof.

   Before installing an antenna on the trunk lid,

   - Be sure that the distance from the antenna location on the trunk lid is at least 85 cm (33 inches) 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.

---

4. **Mounting restrictions for certain radio models.**

   NOTE: Do not cut antenna cables to ensure compliance with RF Energy Exposure regulations

   NOTE: **VHF and UHF 1/4 wave antennas and all VHF and UHF antennas transmitting above 60W** should be mounted on the roof (LOC1 and LOC3 in Figure 2-46). **All Band antenna** should be mounted only in the center area of the roof, not on the trunk lid, to ensure compliance with RF Energy Exposure regulations.

5. 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.

6. Check the antenna location for any electrical interference.

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

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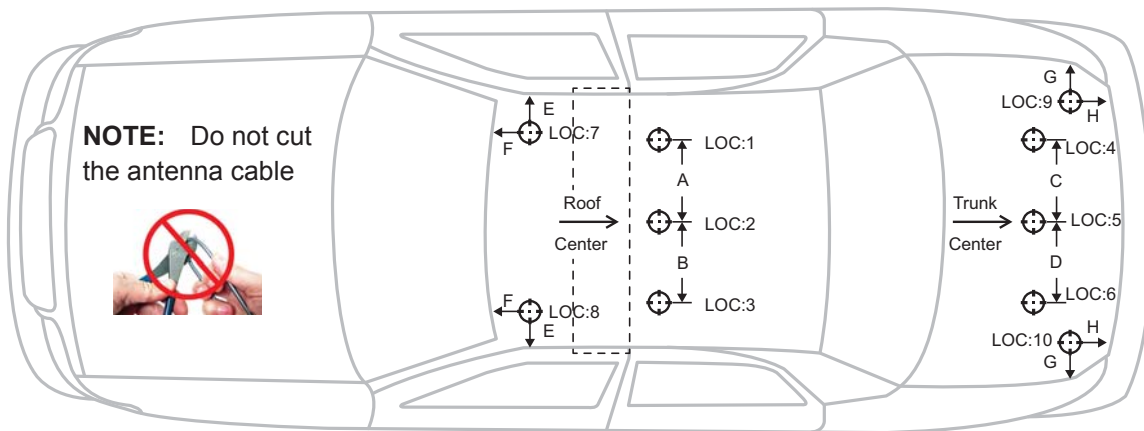
Figure 2-46. Multiple Antennas Separation for locations 1-10

Figure 2-46 indicates the separation distances required for the various antennas used with an APX 8500 radio. Each "cross-hair" symbol represents a possible location, that is 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. This picture is not drawn to scale.

For letters A, B, C, and D, the table indicates the EXACT distance for separation of the LMR antennas.

For letters E, F, G, and H, the table indicates the maximum distance between the edge of the ground plane and the accessory antenna (BT/WLAN, LTE or GPS) location.

Table 2-1 Distance Between Antenna

Characters	Distance	Characters	Distance
A	8 inches	E	8 inches
B	8 inches	F	8 inches
C	8 inches	G	8 inches
D	8 inches	H	8 inches

NOTE:
- A minimum of 18 inch separation is required between lightbar and any roof mounted antennae, to prevent interference with the lightbar circuitry (see lightbar manufacturers installation information).

- The LMR 700/800 antennae should only be placed at LOC:2 or LOC:5.

- Standard LMR VHF and UHF antennae should only be placed at LOC:1, LOC:3, LOC:4 and LOC:6.

- 1/4 wave LMR VHF and UHF antennae and all VHF and UHF antennae transmitting above 60W should only be placed at LOC:1 and LOC:3 (i.e.roof only) to ensure compliance with RF Energy Exposure regulations.

- The VML antenna must be separated from any LMR antenna by at least 40 inches.

- The LTE Main and Diversity Antenna locations should be at LOC:9 and LOC:10 when the LMR All-Band or LMR 700/800 narrow band antennae are at LOC:2 (i.e LTE opposite location from the LMR).

- The LTE Main and Diversity Antenna locations should be at LOC:7 and LOC:8 when the LMR All-Band or LMR 700/800 narrow band antennas are at LOC:5 (i.e LTE opposite location from the LMR).

- In some mobile installations that include an LTE modem, external filtering on the LMR port and/ or the LTE port may be needed to reduce interference. Contact your local Motorola Solutions Service Center for more information and for filter kit numbers (See Appendix for contact info).

2.4.2   Multiplexers and Vehicle Installation
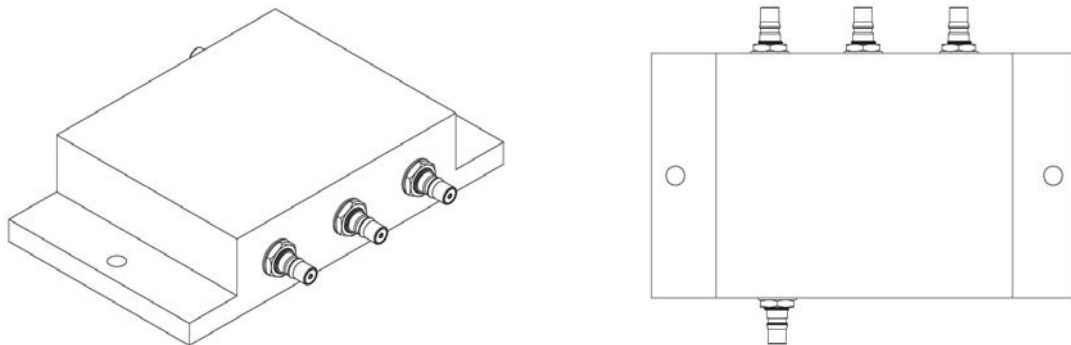
Figure 2-47. Multiplexer Views

2.4.3   QMA Connection (APX 8500 Only)

APX8500 is using 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.

2.4.4   GPS/GLONASS/Wi-Fi/Antenna Placement (APX 8500 Only)
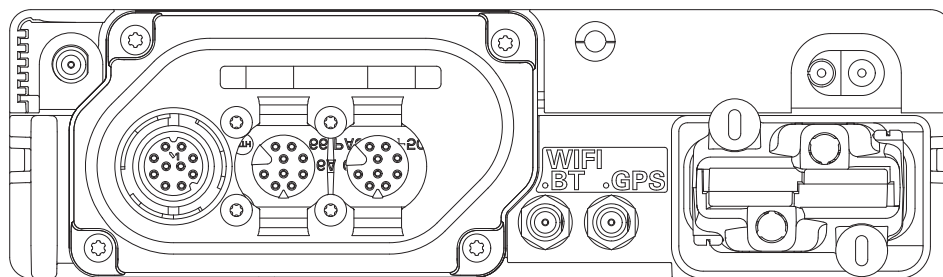
Figure 2-48. GPS/GLONASS and Wi-Fi Antenna Connector on the Radio

2.5   Speaker

⚠️ **Caution**	DO NOT ground the radio's 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.

The speaker kit includes a trunnion bracket that allows the speaker to be mounted in a variety of 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 it is not kicked or knocked around by the vehicle occupants. Mount the speaker as follows:

1. Use the speaker mounting bracket as a template to mark the mounting hole locations.
2. Use the self-drilling screws provided to fasten the trunnion.
3. Attach the speaker and fasten to the trunnion with two wing screws.
4. Route the speaker wires under the carpet or floor covering, or behind the kick panels. Be sure the wires are out of the way and is not snagged and broken by the occupants of the vehicle.
5. Do not submerse the 2-pin speaker connector in water nor place this connector in an area that could have standing water.
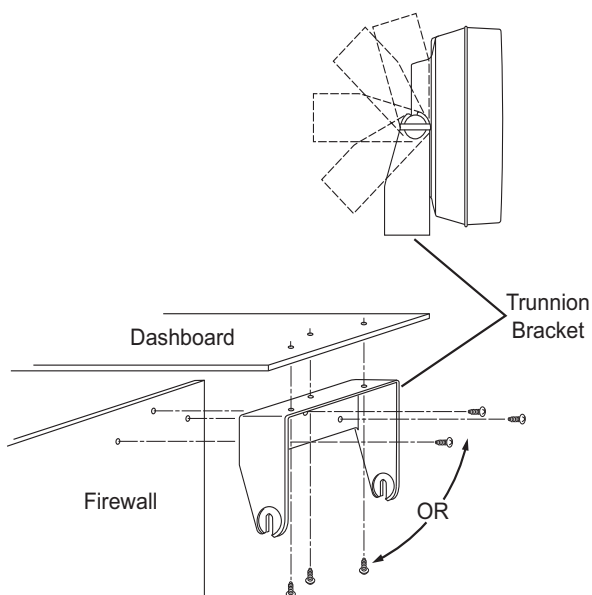
Figure 2-49. Speaker Mounting

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2.5.1   Internal Speaker Disassembly

NOTE: This configuration is only applicable for O2 Control Heads.

You can disable the internal speaker of your radio by following the instructions below.

The followings are the procedure to disassemble your radio for mid power radios:

1.   Unplug 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 as shown in Figure 2-50. Discard the screws.
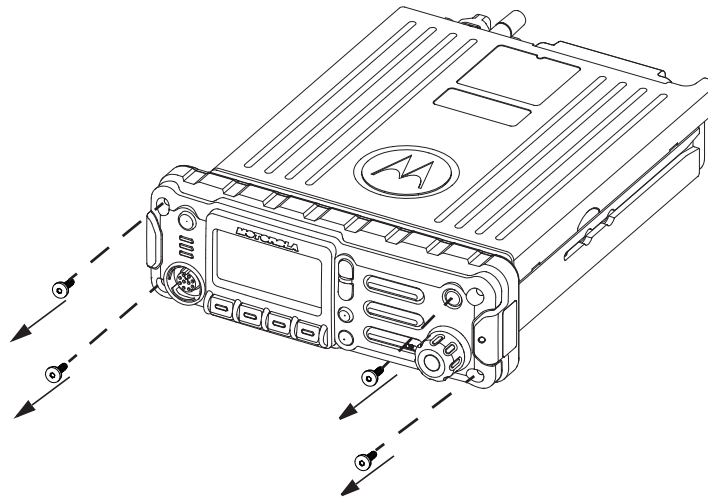
Figure 2-50. Removing the screws on the Control Head

3.   Firmly grasp the front panel of the control head. Carefully remove the front housing assembly from the back housing assembly as shown in Figure 2-51. Note the position of the attached flex and do not pull on it excessively.
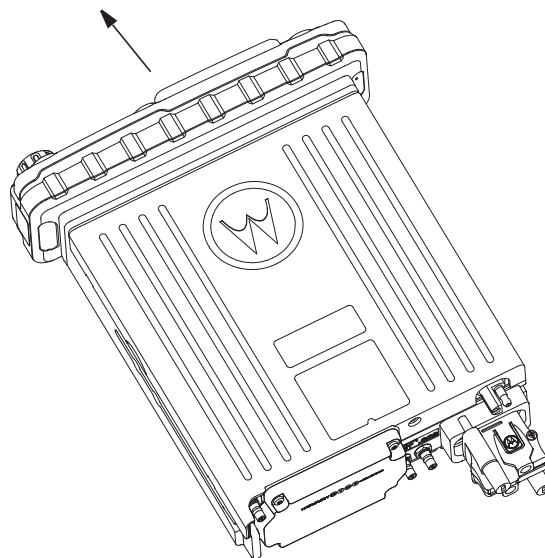
Figure 2-51. Removing the Control Head

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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 as shown in Figure 2-52.
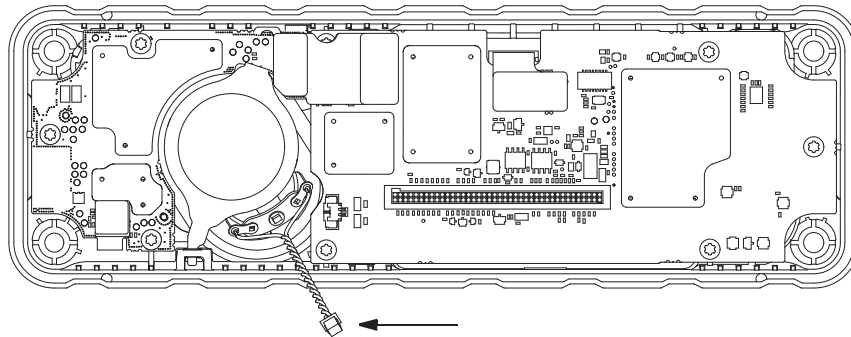
Figure 2-52. Disconnecting the Speaker Connector

6. Reattach the front housing assembly to the back housing assembly as shown in Figure 2-53. Make sure that the flex is returned to its original position and that the o-ring on the back housing assembly is not pinched.
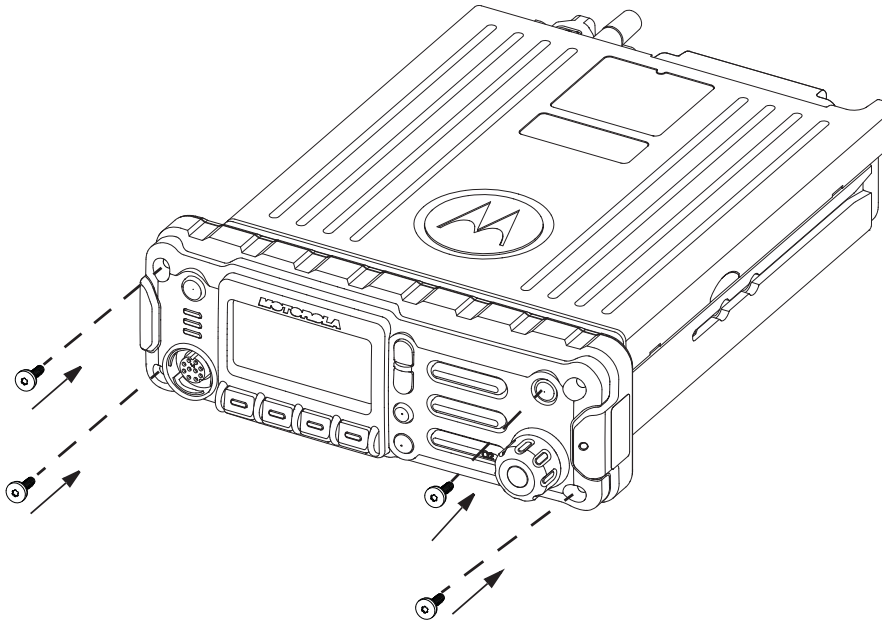
Figure 2-53. Reattaching the Control Head

7. Secure the front housing assembly back to the back housing assembly with four new screws using the Torx T-20 bit as shown in Figure 2-53. Apply 9 in. lbs. torque for each screw.

The followings are the procedure to disassemble your radio for high power radios:

1. Remove the O2 Control Head front housing assembly. Refer to the A*PX8500 HP Basic Service Manual (Add APX8500 HP Basic Service ManualP/N)*.

2. 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.

3. Carefully disconnect the speaker connector from the circuit board as shown in Figure 2-52.

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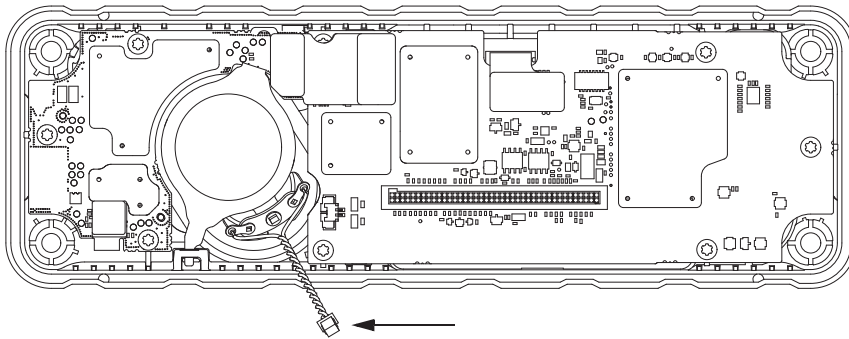
Figure 2-54. Disconnecting the Speaker Connector

4. Reattach the front housing assembly. Refer to the *APX8500 HP Basic Service Manual, Remove the O2 Control Head* .

2.6   Microphone Hang-Up Clip

2.6.1   Standard or O3 Control Head Hang-Up Clip

The hang-up clip must be within reach of the operator(s) 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, the microphone can be mounted in any position.

Use the hang-up clip as a template to locate the mounting holes. To avoid interference when removing the microphone, install the flathead screw in 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.

NOTE: 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)

An APX mobile radio equipped with an RFID tag allows an alternate option for tracking the radio asset. Each RFID equipped radio has an RFID tag preprogrammed with the individual radio serial number (also found on the FCC label) as well as band and radio model information (see below for further information).
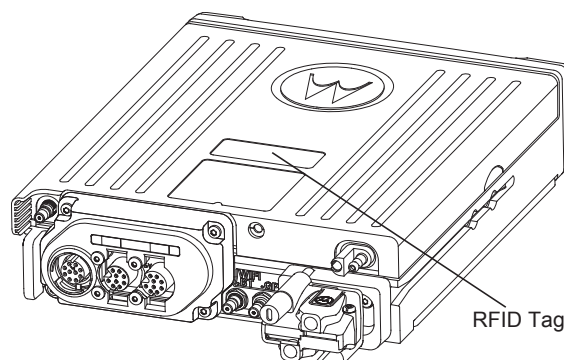
RFID Tag

Figure 2-55.   RFID Location on Mid Power Radio
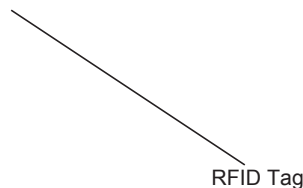
RFID Tag

Figure 2-56.   RFID Location on High Power Radio

2.7.1   RFID Reading

To read an RFID tag using a UHF Gen 2 RFID reader (e.g. Motorola Solutions MC9090-G), open an appropriate RFID read application, point the RFID reader at the tag and activate the reader's RFID antenna (e.g. pull Motorola Solutions MC9090-G scanning trigger). RFID reader must be within 1 foot from tag in order to read.

Two variables, Read Angle and Reader Orientation, aid in the distance needed to read and write to 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; tag becomes unreadable once Read Angle exceeds 90 degrees (see Figure 2-57). 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 (see Figure 2-61).
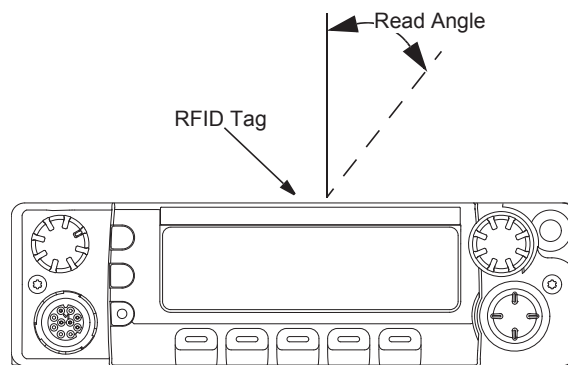
Figure 2-57. Read Angle for Mid Power Radio
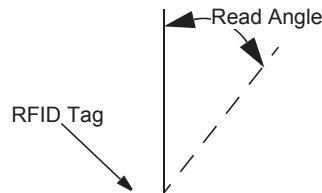
Figure 2-58. Read Angle for High Power Radio

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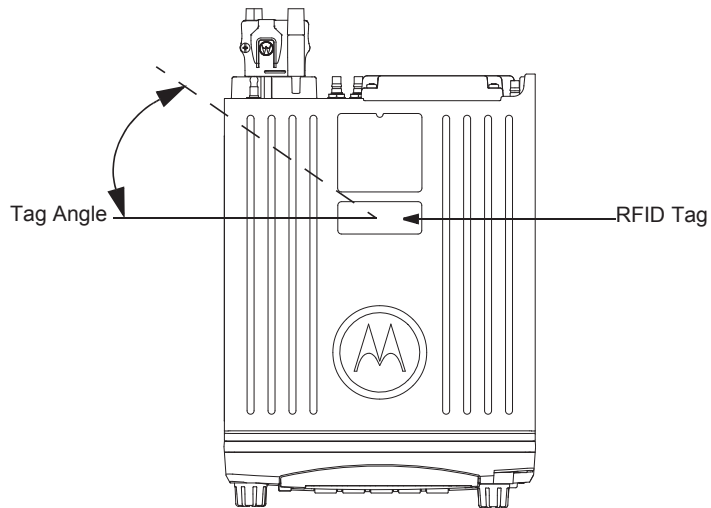
Figure 2-59. Tag Angle for Mid Power Radio

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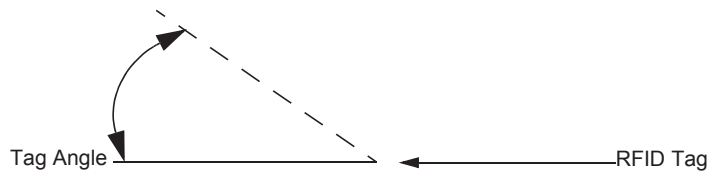
Figure 2-60. Tag Angle for High Power Radio
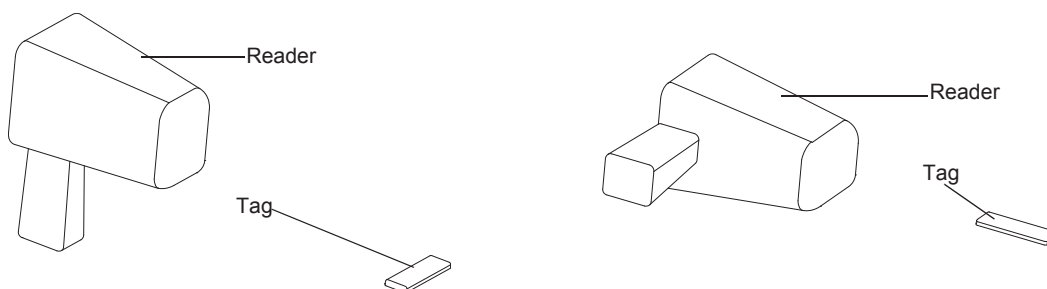
Figure 2-61. Examples of Reader and Tag Aligned (Reader Orientation)
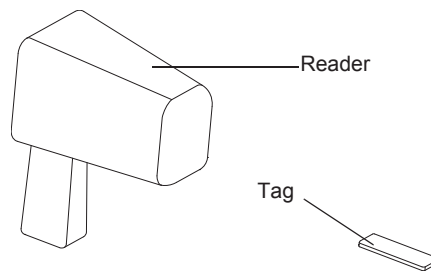
Figure 2-62. Example of Reader and Tag Misaligned (Reader Orientation)

2.7.2   Programming RFID (If Equipped)

The user can reprogram the tag (up to 12 ASCII characters when encoded to hexadecimal format) using any UHF Gen 2 capable RFID writer (e.g. Motorola Solutions MC9090-G).

NOTE: Follow read direction in to optimized reprogramming.

Table 2-1. Model Number Chart in 12-Digit ASCII Format

Model Number	Radio Tier/Band/Output Level	Last Two Digits
M37TXS9PW1AN	APX Mobile 700/800 VHF UHF–HP	T0
M37TSS9PW1AN	APX Mobile 700/800 VHF UHF–MP	
M30KSS9PW1AN	APX Mobile SB–MP VHF	D2
M24KSS9PW1AN	APX Low Tier Mobile–MP VHF	D8
M22KSS9PW1AN		
M36KSS9PW1AN	APX Lowest Tier Mobile–MP VHF	D9
M30KTS9PW1AN	APX Mobile SB–HP VHF	D3
M30QSS9PW1AN	APX Mobile SB–MP UHF1	E2
M30QTS9PW1AN	APX Mobile SB–HP UHF1	E3
M30SSS9PW1AN	APX Mobile SB–MP UHF2	D2
M20TSS9PW1AN	APX Mobile DB–MP 700/800–MP VHF	R2
M30TXS9PW1AN	APX Mobile DB–MP 700/800–HP VHF	R3
M30URS0PW1AN	APX Mobile SB–MP 700/800	F2
M22URS9PW1AN	APX Low Tier Mobile–MP 700/800	F8
M24URS9PW1AN		
M36URS9PW1AN	APX Lowest Tier Mobile–MP 700/800	F9
M24QSS9PW1AN	APX Low Tier Mobile–MP UHF1	E8
M22QSS9PW1AN		
M36QSS9PW1AN	APX Lowest Tier Mobile–MP UHF1	E9
M24SSS9PW1AN	APX Low Tier Mobile–MP UHF2	E8
M22SSS9PW1AN		
M36SSS9PW1AN	APX Lowest Tier Mobile–MP UHF2	E9
M22WRS9PW1AN	APX Low Tier Mobile–MP 900	F8

Table 2-2. Serial Number with Radio Band/Tier/Power

Characters	Radio Band/Tier/Power
F	700/800 and 900

Table 2-2. Serial Number with Radio Band/Tier/Power

D	VHF
E	UHF
R	700/800 and VHF
T	Multi-Band
E	UHF1 and UHF2
S	700/800 and UHF
0	APX 8500
1	APX 7000
2	APX 7500 Mid Power
3	APX 7500 High Power
4	APX 6000
5	APX 6500 Mid Power
6	APX 6500 High Power
7	APX Low Tier Portable
8	APX Low Tier Mobile MP/APX 4500 MP/APX 2500 MP
9	APX Lowest Tier Mobile MP/APX 1500 MP

2.8   Completing the Installation

Complete the installation by connecting the speaker to the accessory cable; verify the ignition sense wire is attached according to planned ignition sense; verify the control head is attached to either the TIB or the CAN extension cable; and then attach the power cable to the back of the transceiver.

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Chapter 3   Universal Relay Controller Installation

The Universal Relay Controller (URC) is an extension of and an orderable accessory for O7 or O9 control head. URC is used to control high power switching peripherals, e.g. lightbar. URC works on all lightbars which can be controlled by power application. URC is connected to the transceiver's MMP port.

The URC design consists of a microcontroller and uses 10 relays to control the switching device. A separate ground for isolation exists between the relay and MCU sections, which is provided by the use of iCoupler from Analog Devices. Each relay is connected to an output with 15 A fuse. The maximum load allowed on each output is 12 A. Two cables, each with the maximum of 60 A, can be used to connect to the input connector at the bus bar. Each cable is connected with a 60 A circuit breaker. One-wire EEPROM is employed to enable MMP to recognize the URC accessory ID. CPS can be used to program the relay patterns.

When installing URC, make sure to plan the installation carefully and leave additional room in the front and rear of the box for cabling and accessory connections; and also to the sides of the radio so that you may access and install the trunnion screws.

The recommended mounting location for URC is in the car trunk, either next to the transceiver or within the area not further than 4.5 m away from the transceiver. Ensure that sufficient cooling is provided. Do not cover URC with baggage, blankets, and others

> ⚠ **C a u t i o n**   Do not backfeed power into URC.

3.1   Universal Relay Controller Mounting

The mounting location must be accessible and visible. Select a location that permits routing the cable as directly as possible.

NOTE: For optimum URC performance, orient the mounting trunnion as shown in Figure 3-1.
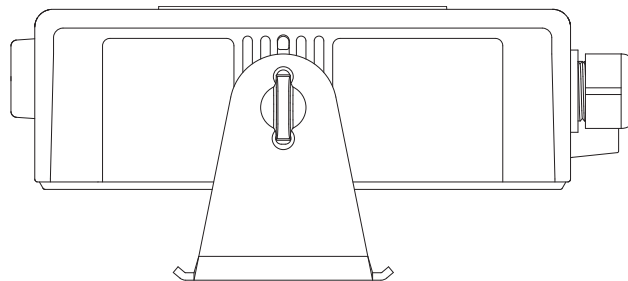
Figure 3-1. Universal Relay Controller Orientation

An adjustable trunnion, which allows a number of mounting positions, is supplied for mounting the URC. The installation must not interfere with the operation of the vehicle or its accessories.

Install the URC as follows:

1. Use the URC trunnion as a template to mark the mounting holes; drill 5/32" holes. If mounting on a plastic surface, use a metal backing plate.

2. Attach the trunnion bracket using all four 10 – 16" x 5/8" self-tapping screws provided.

3. Temporarily install the URC (adjust for proper viewing angle) and fasten it to the trunnion with two wing screws. Test the installation to ensure that the unit is securely locked in place.

Use four mounting screws on all installations

Adjust the universal relay controller to desired angle and secure with wing screws

TRUNNION

Mounting surface

Drill four 5/32" holes in mounting surface

IMPORTANT:
Use a metal backing plate (not supplied) if mounting trunnion on plastic or unstable surface

Figure 3-2. Universal Relay Controller Installation Exploded View

3.2   O7/O9 Universal Relay Controller Cable Assembly

3.2.1   Power Cable

1. Remove the cap nut of power cable gland assembly, and insert the power cable through the cap nut and neoprene seal in the cable gland body. Use power cable with either AWG 6 or AWG 8 only (recommended OD range of cable is 5.5 mm to 9 mm) that is able to withstand 80 A and 50 A respectively, to ensure water sealing of the controller. User can decide to install one or two power cables based on the requirements. The power cables (A+) are not supplied.

2. The loose end of the power cable with cable strip length 7.94 mm (5/16") is then placed on the power lug and secured down by a set screw. The cap nut is then reassembled with tightening torque 18 lb-in.

3. The other end of the power cable should be connected to circuit breaker (Motorola Solutions part number 40012006001) end which indicates "AUX" and then, to power supply on the other end which indicates "BAT", instead of connecting to power supply directly.

4. Repeat steps 1 to 3 to install the second power cable, if required.

5. If only one power cable is installed, it is recommended to cover the other side of the power cable gland with power cable gland seal with tightening torque 18 lb-in.

3.2.2   Ground Cable
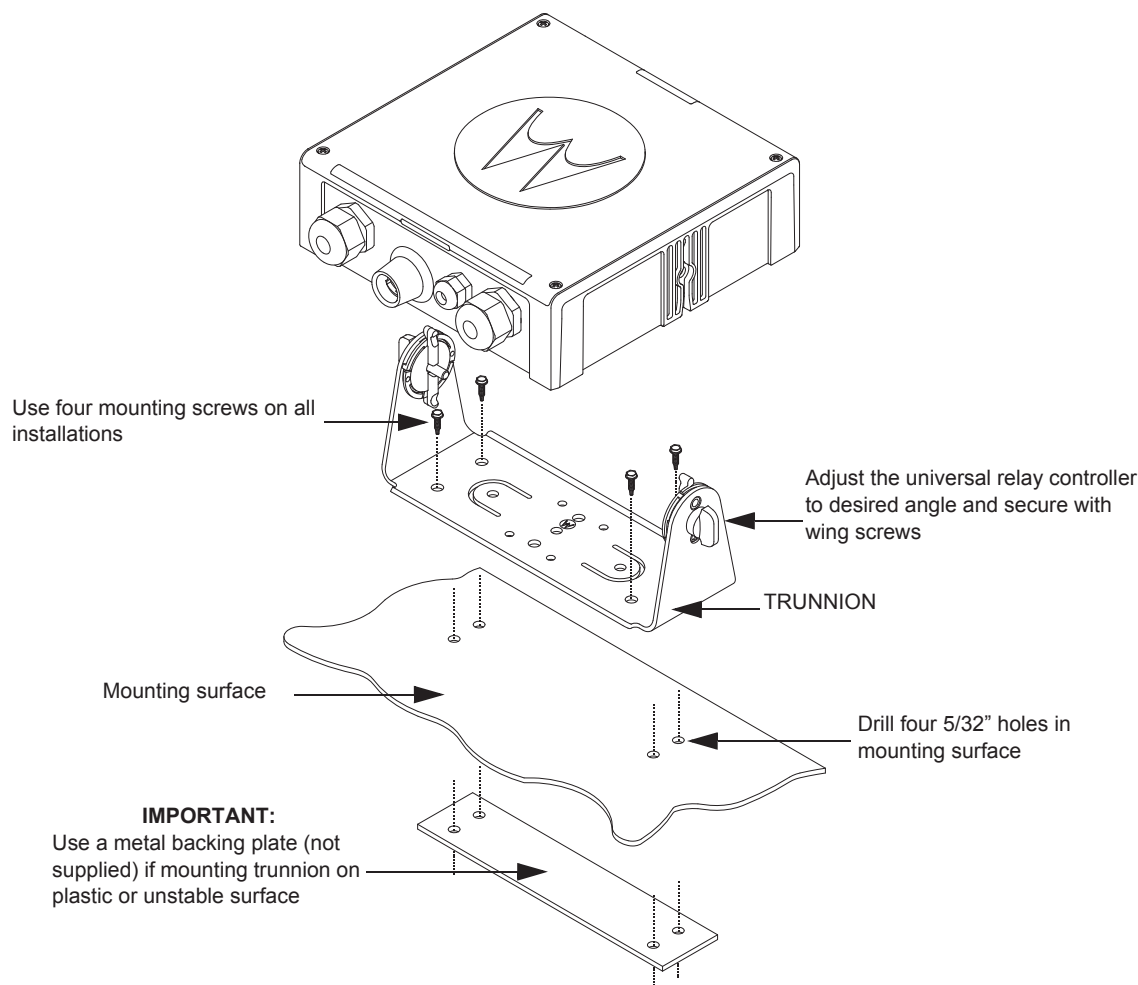
1. Remove the cap nut of ground cable gland assembly, insert the ground cable through the cap nut and then reassemble the cap nut. Use ground cable with AWG 14 only (recommended OD range of cable is 2 mm to 4 mm) that is able to withstand 5 A. The ground cables (A+) are not supplied.

NOTE: The ground is used to switch the relays, and not act as a ground to the actual device being controlled.

2. The loose end of the ground cable with cable strip length 7.94 mm (5/16") is then connected to a two-pin terminal block. Both pins on the terminal block are inter-connected and either pin can be used. The cap nut is then reassembled with tightening torque 7 lb-in.
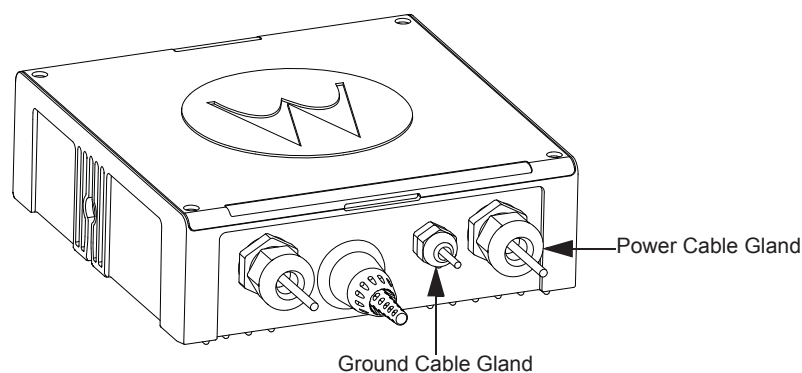
Figure 3-3. Power and Ground Cable Glands
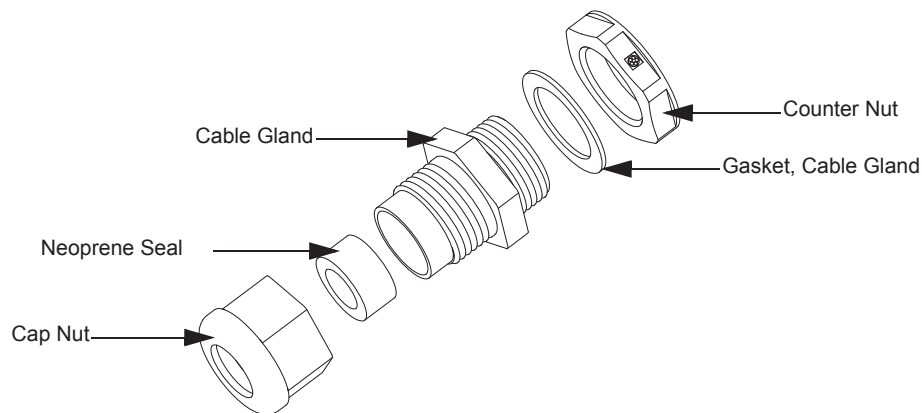
Figure 3-4. Cable Gland Assembly with Gasket

3.2.3 Wires

1. Assemble the wires into the lightbar gasket retainer and lightbar gasket. The URC can support lightbars through control wires with outer diameter ranging from 1.52 mm to 3.77 mm (0.06" to 0.148"), with wire gages ranging from AWG 12 – 20.

2. Each individual loose wire (prior to stripping off the wire jacket) needs to be inserted one at a time through the chassis. Ensure the lightbar wire is straight before inserting the wire into the chassis. Each wire is sealed individually by the radial gasket seal. When a thick wire that is AWG 14 wire or wire OD > 2.90 mm is inserted through the chassis, there is potential torn at the rubber gasket. Remove the rubber gasket residual and continue to the next step.

3. Thin wires 2.5 mm and below should be dressed into the retention feature using a black stick (see Figure 3-5); thick wires above 2.5 mm should be routed above the retention feature. Strip off the wire until 7.94 mm (5/16") after the wire is inserted into the URC, and install the wire into respective lightbar terminal block.

4. Cover the lightbar gasket retainer's hole with seal, gasket and ground cable gland, if no wire is inserted.
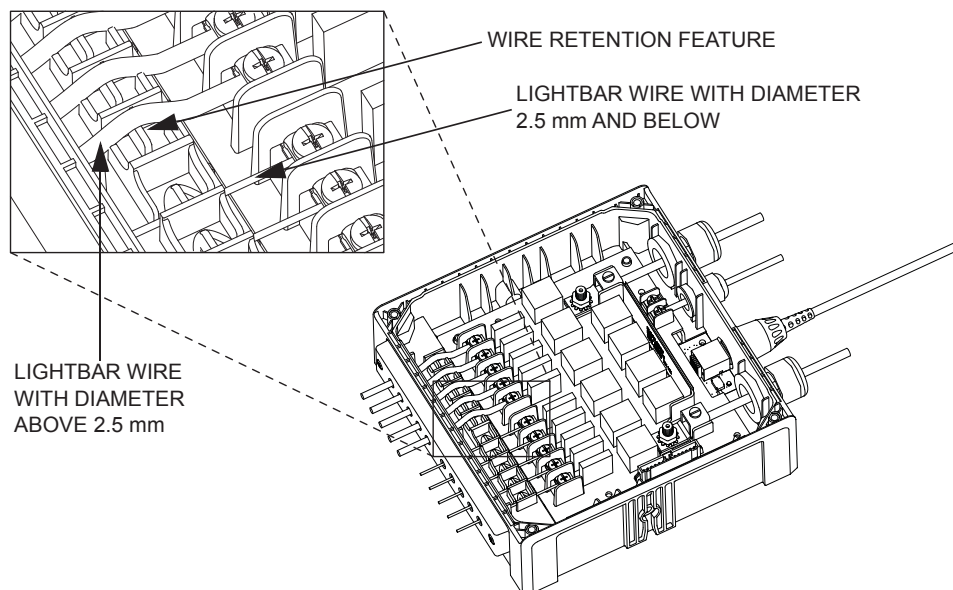
Figure 3-5. Wires Installation
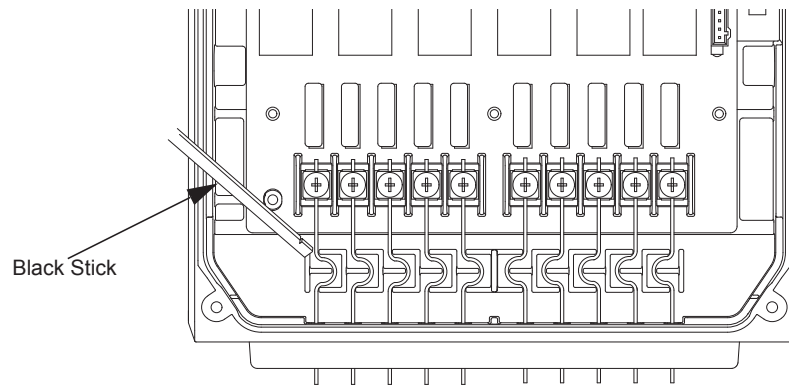
Figure 3-6. Wire Installation with Black Stick

5.   The lightbar gasket should be replaced at each reassembly of the wire.

NOTE: Use of other cable gages except as recommended in this manual may result in water intrusion. Any reassembly of wire needs a new lightbar gasket replaced. If the current loading for one wire is higher than 12 A, the wires should be splitted before being assembled to the URC system. Wires kit (PMKN4109_) is provided to ease installation of the URC. Incorrect use of the wires kit, e.g. improper connection at external loose end wires, may impact the robustness of the URC.

Remove the wires and gasket residual inside the URC after the wire installation, before closing the top housing of the URC.

3.2.4   O7/O9 to URC Cable

The O7/O9 to URC cable (Motorola Solutions part number 3064153H02) can be assembled either before or after reassembling the top housing. Assemble the RJ45 port of the cable into the RJ45 connector on the URC and turn the locking collar instead of cable, 90 degrees to the right to ensure it is locked properly. After that, test whether the cable is locked properly or not by trying to pull out the cable.

Figure 3-7. O7/O9 to URC Cable Installation

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Notes

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Chapter 4   Options and Accessories Installation

4.1   Dash-Mount Accessory Installation - Mid Power

For dash-mounted configurations, the accessories must be installed through the accessory connector assembly that is located on the rear of the radio, adjacent to the power connector. Motorola Solutions-approved accessories are supplied with male terminals crimped to a 20-gauge wire specifically designed to fit the plug of the accessory connector assembly.

Insert the male terminal into the accessory connector assembly in the appropriate location and connect the accessory connector assembly in the rear accessory port. Do not use other generic terminals in the plug. Generic terminals can cause electrical intermittencies and may cause damage to the plug.
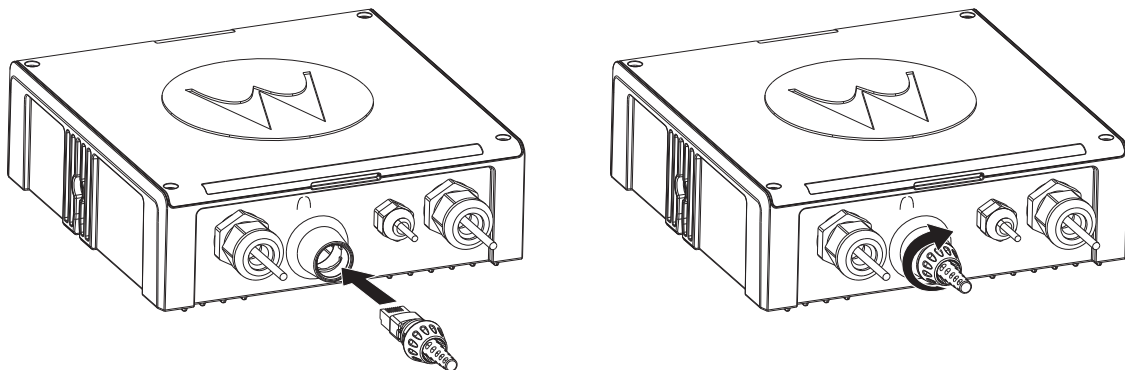
4.1.1   Dash-Mount Emergency Pushbutton or Footswitch Installation

Mount the footswitch using the hardware that comes with the kit. Open the accessory cable connector housing; remove the jumper wire. Connect the emergency switch wires to pins 14 and 15 (see Figure 4-1). Close the connector housing; route the finished cable from the switch location to the control head location.

NOTE: The emergency footswitch should be attached with A+ unattached.
A+ should be attached after successfully securing the screws in the connector.

Figure 4-1. Emergency Switch Wiring Diagram

⚠ **C a u t i o n**	The radio is sold with correct accessory cables and jumpers in order to have emergency de-activated by default, regardless of the setting in CPS. However, if cables are not used, or if jumpers are removed without replacing with an emergency accessory button/switch at one of the accessory ports, the radio power-up upon the application of A+. The display may not show an indication that the radio is on, and this can result in an incorrect operation of the radio as well as excessive current drain of the vehicle battery when the engine is off.