

Product Safety and RF Exposure Compliance



Caution

CAUTION!

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

ATTENTION!

This radio is restricted to occupational use only to satisfy FCC RF energy exposure requirements. Before using this product, read the RF energy awareness information and operating instructions in the **Product Safety and RF Exposure** booklet enclosed with your radio (Motorola Publication part number 68P81095C99) to ensure compliance with RF energy exposure limits.

Introduction

The antennas described in this section are supplied with an appropriate antenna whip, coaxial cable and connector, and mounting hardware. Mounting hardware and installation is described for permanent vehicle type mounting.

Table 1. Model Complement

Antenna Model	Frequency Range (MHz)
<i>Roof Mount Models</i>	
RAD4012ARB	150.8-162
RAD4020ARB	162-174
HKAD4001A	216-225
RAE4022ARB	403-430
RAE4034ARB	450-470
RAF4021ARB	806-870

Refer to Table 1 for model identification. Figures 1 through 3 identify the component parts of the antenna. Refer to the recommendations for antenna location paragraph at the end of this instruction section for safety information.

Installation

Mounting Hardware Installation – Roof Mount

General

The installation procedure which follows is for a typical passenger car. The procedure may vary slightly with the type of vehicle on which the antenna is to be installed. Generally speaking, however, the procedures outlined are of a universal nature.

ROD WITH CHROME NUT (ROD)	ANTENNA ONLY		
	MOTOROLA PART NO.	ANTENNA MODEL NO.	FREQ. RANGE (MHz)
01-80352A07	01-83938B03	RAD4012ARB	150.8-162
01-80352A08	01-83938B04	RAD4020ARB	162-174
01-80305K05	01-83938B12	HKAD4001A	216-225
01-80352A11	01-83938B06	RAE4034ARB	450-470
01-80352A90	01-83938B11	RAF4021ARB	806-870

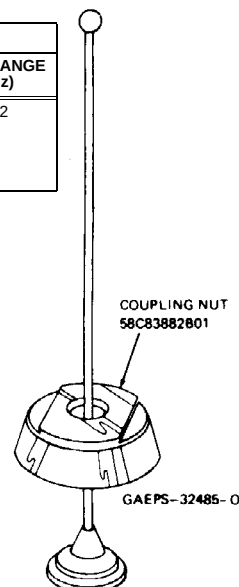


Figure 1. Whip Parts Identification

NOTE

The antenna should be mounted on a flat metal roof of .020 to .040 inch thickness.

1. First, select a location for the antenna as near the center of the roof as possible.
2. The headlining may be probed with the fingers to make sure that all points of obstruction are avoided.

Installation Procedure Single Wall Construction

1. Locate the center of the roof by careful measurement, remove the headlining as necessary,



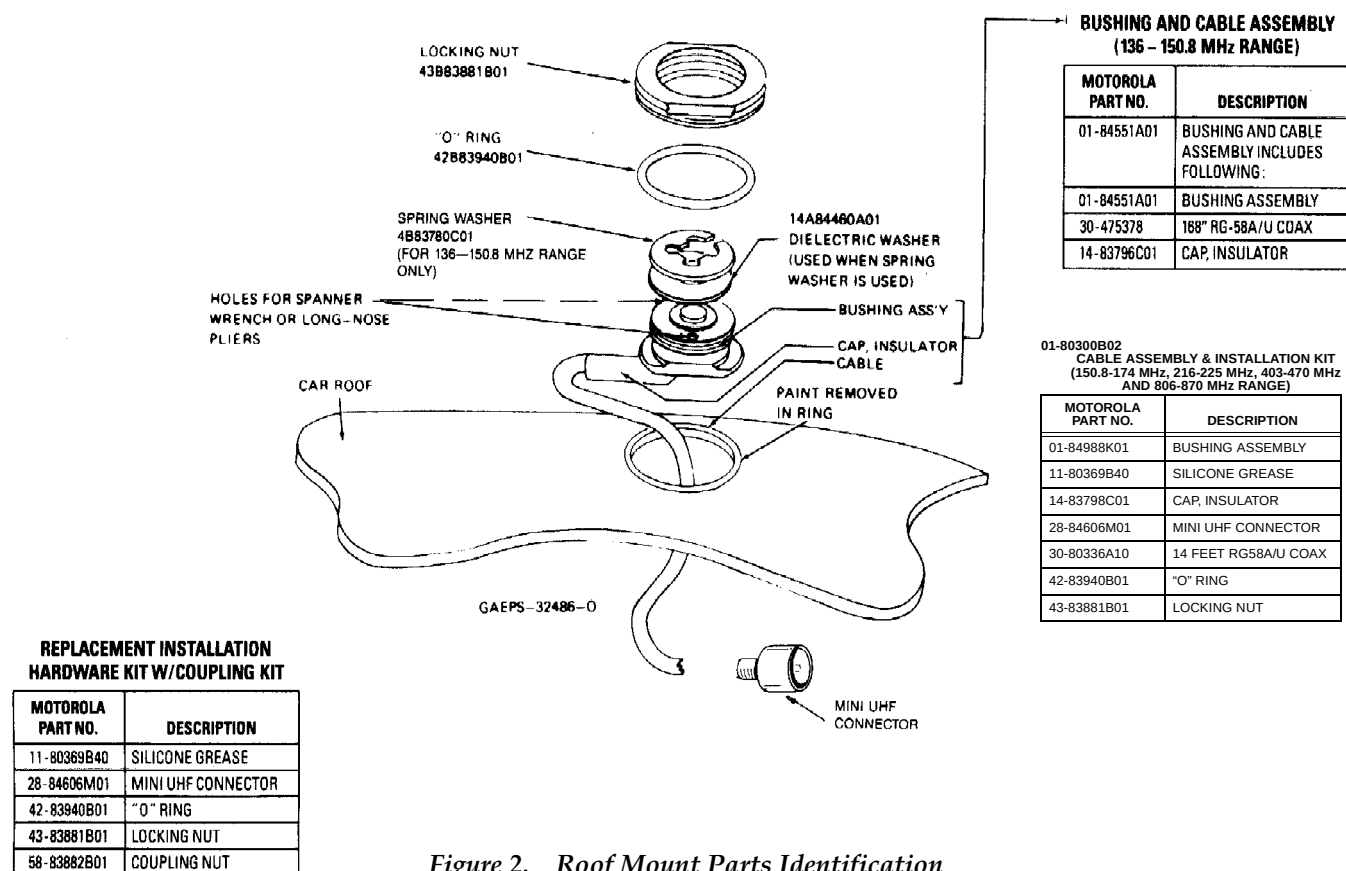


Figure 2. Roof Mount Parts Identification

**REPLACEMENT INSTALLATION
HARDWARE KIT W/O COUPLING KIT**

MOTOROLA PART NO.	DESCRIPTION
11-80369B40	SILICONE GREASE
28-84606M01	MINI UHF CONNECTOR
42-83940B01	"O" RING
43-83881B01	LOCKING NUT

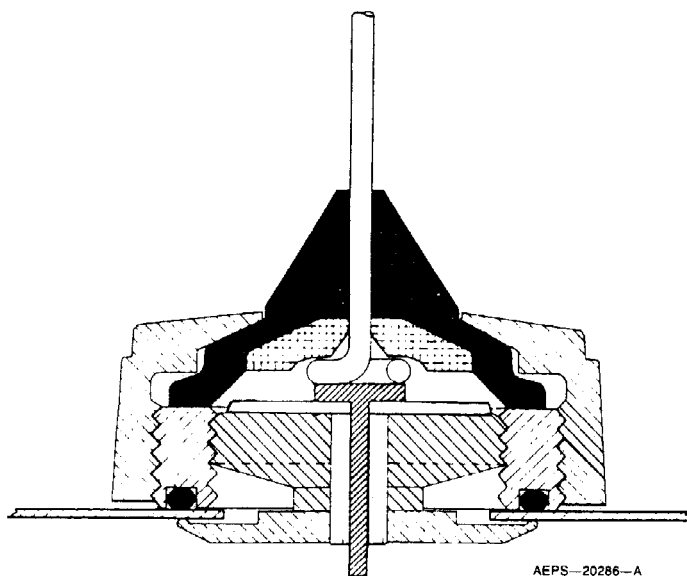


Figure 3. Cross-Section of Assembled Antenna

and drill a pilot hole down through the roof. If the interior light of the car is centered in the roof, remove this light and fixture and drill the pilot hole up through the roof at about the center of the interior light mountings. This centers the antenna mount on the roof and allows for easy access.

2. Drill a 3/4-inch hole from the top of the roof until the saw bottoms. Use a Motorola hole cutting saw (01-80382A25) or equivalent. When the saw bottoms on the roof, it cleans off the paint in a neat circle and assures good contact with the locking nut.

IMPORTANT

For proper seating of brushing assembly, remove burrs and scrape any foreign matter from underside of hole out to at least 1/8-inch from edge.

3. Determine the routing of the cable from the antenna mounting base to the radio set; then remove the molding and trim necessary to facilitate pulling the cable through.

NOTE

To ensure ease of assembly, thread the locking nut on and then off the bushing assembly before installation. This removes any burrs which may be present.

4. Refer to Figure 4. From the top, feed the RG-58A/U lead-in cable between the headlining and the metal roof. Then route the cable between the roof and the radio set.
5. Refer to Figure 5. The bushing assembly is now in a position to drop into the hole in the roof. It should be tilted at a slight angle and fed into the 3/4-inch hold. The threaded top will not fall through the hole.
6. Refer to Figure 7. Hold the antenna bushing assembly in place with the index finger and thread the locking nut onto it as shown.



Figure 4. Coaxial Cable Insertion

7. Pull up on the bushing assembly as illustrated in Figure 8, and make sure it is centered and seated (both shoulders inside the drilled hole), and that the "O" ring is in the groove in the locking nut. (As furnished, the "O" ring has been placed in the locking nut groove and imbedded in silicone grease.) Use a 15/16-inch open-end wrench to tighten the locking nut until it bottoms firmly against the roof top.

IMPORTANT

Refer to Figure 2. If the bushing assembly should slip or rotate for any reason during the tightening procedure, insert the tips of a long nose plier or spanner wrench into the two holes in the bushing assembly and apply force to prevent rotation until the locking nut is tight.

The locking nut *must* come into contact with the car roof to insure the proper antenna radiation pattern. This can only happen when the rubber "O" ring is fully compressed.

8. Take up the slack in the cable and replace the headlining retainer molding.
9. Replace headlining and dome light if removed.

Installation Procedure - Double Wall Construction

Vehicles With Dome Lights or Removable Headlining

1. Remove the dome light from its mount or remove the headlining from the installation area.
2. Drill a small pilot hole centered in the roof of the vehicle. The center of the cavity where the dome light was removed is sufficiently close.
3. Using a 1-1/4-inch diameter hole saw cut a hole in the inside layer of the metal.
4. Remove the metal and filler from this 1-1/4-inch diameter hole.

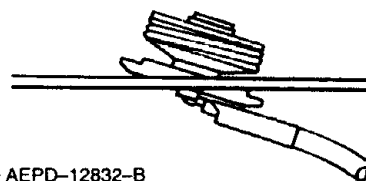


Figure 5. Bushing Assembly Insertion

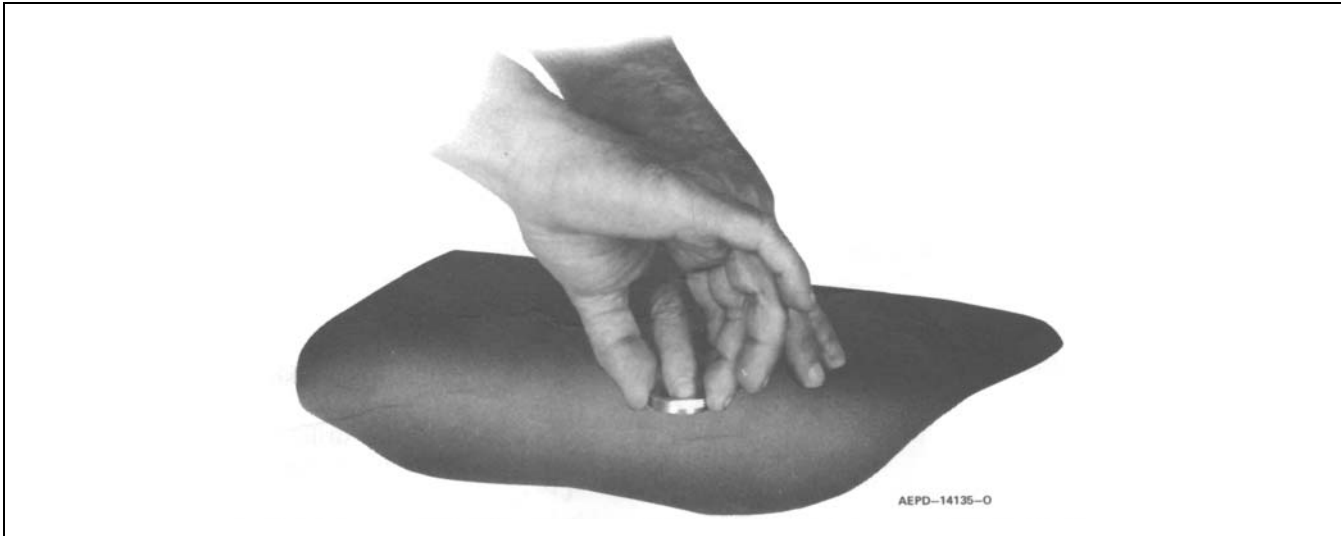


Figure 7. Locking Nut Positioning

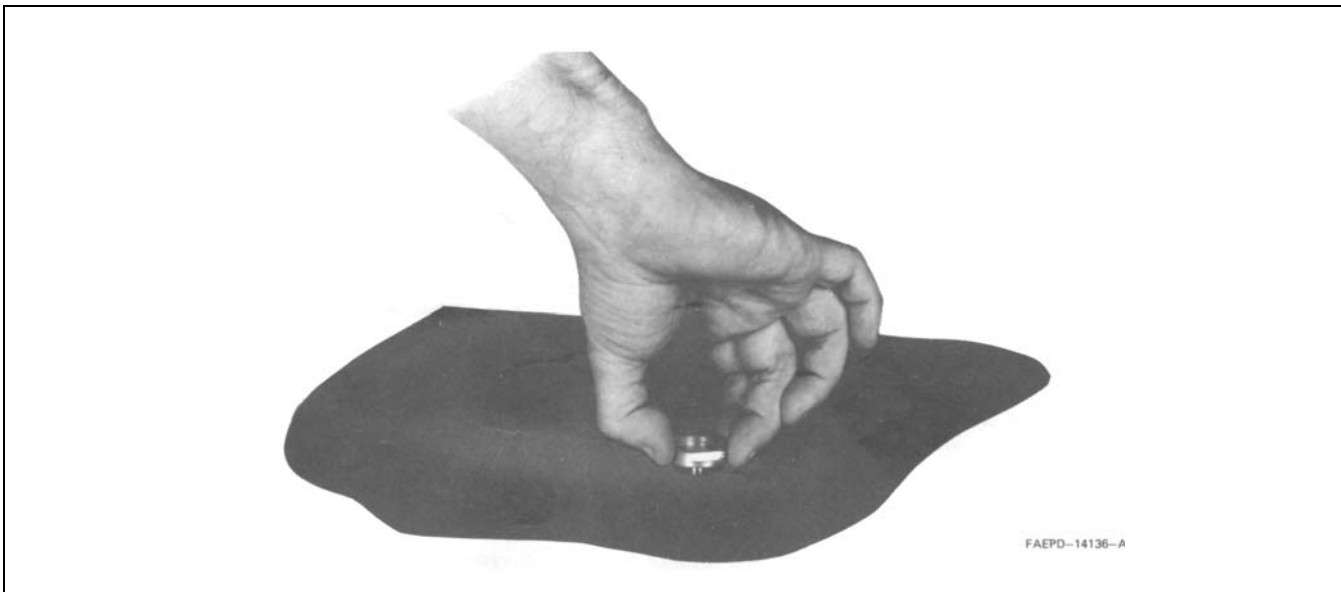


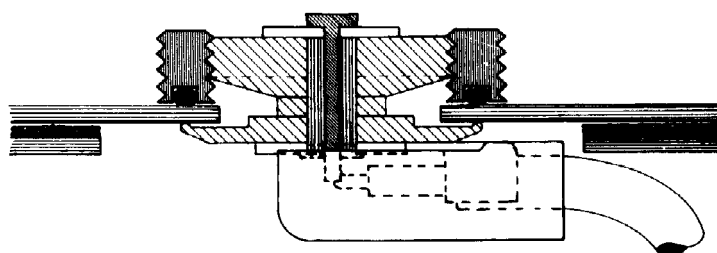
Figure 8. Locking Nut Tightening

5. Complete the installation per installation procedure given for vehicles with single wall construction. A completed mount is illustrated in Figure 9.

Vehicles Without Dome Lights

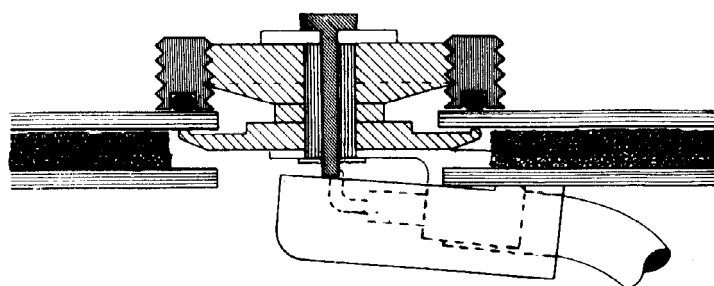
When the vehicle has no dome light, and it is not feasible to remove the headlining to get to the inside surface, proceed as follows:

1. Locate the center of the roof and make sure the area beneath this point is clear to allow passage of a drill.
2. With a 3/4-inch diameter hole cutting saw carefully cut a 3/4-inch hole from the top of the roof through both thicknesses of metal. Clean the metal in a neat circle around the hole to assure a good contact between the roof metal and the locking nut.
3. Remove any burrs and remove the filler separating the roof thickness for a distance of 1/4-inch back from the hole.



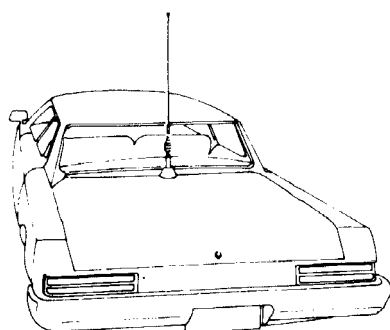
GAEPS-8707-C

Figure 9. Roof Mount in Vehicle With Dome Light or Removable Headlining



GAEPS-8708-D

Figure 10. Roof Mount in Vehicle Without Dome Light



GAEPS-13094-O

Figure 11. Typical Mount Location

4. Install the mount to the outside roof thickness per installation procedure given for vehicles with single wall construction..

Mini-UHF Connector Installation

Use Motorola hand tool part #66-80388A26 (Refer to Figure 12). A deluxe ratchet type tool is available; order part #66-80334B40.

1. Slip ferrule and collar onto cable. Refer to Figure 13.
2. Prepare cable to strip dimensions per Figure 14, which is also marked on the hand tool.
3. Insert stripped cable into plug body until conductor is exposed (front end) and dielectric bottoms inside body. Refer to Figure 13.
4. Crimp center contact using proper crimp section of tool. Refer to Figure 12 marked "CENTER CONTACT."
5. Push collar forward onto plug assembly. Fit cable braid over the support sleeve of the connector. Refer to Figure 13.
6. Push ferrule over braid until flange butts against connector body. Refer to Figure 13. Using the correct crimp area of the tool, crimp the ferrule close to the plug body. See Figure 12, crimp location "C." Crimp ferrule a second time close to the cable end.
7. The protruding center conductor should be trimmed flush with the end of the center contact.

Frequency Conversion

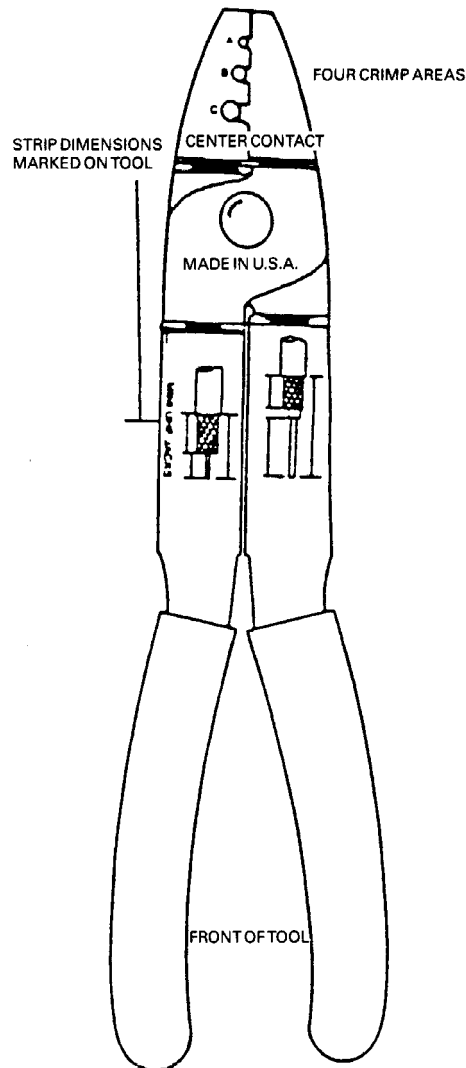


Figure 12.

See Table 1. Antennas in each band are equipped with whip radiators cut to the proper length for that specific band. To change from one band to another, a whip assembly of the proper length should be substituted for one previously in use. Antennas in the 136-150.8 MHz range are also equipped with a spring washer (roof mount models only; see Figure 2) to provide for proper impedance matching. Should it be desired to change from an antenna in the 136-150.8 MHz range to one in the other ranges, this washer must be removed in addition to changing the whip assembly. Conversely, to shift from the other ranges to the 136-150.8 MHz range, a spring washer must be installed in addition to changing the whip assembly.

Plug Assembly Procedure

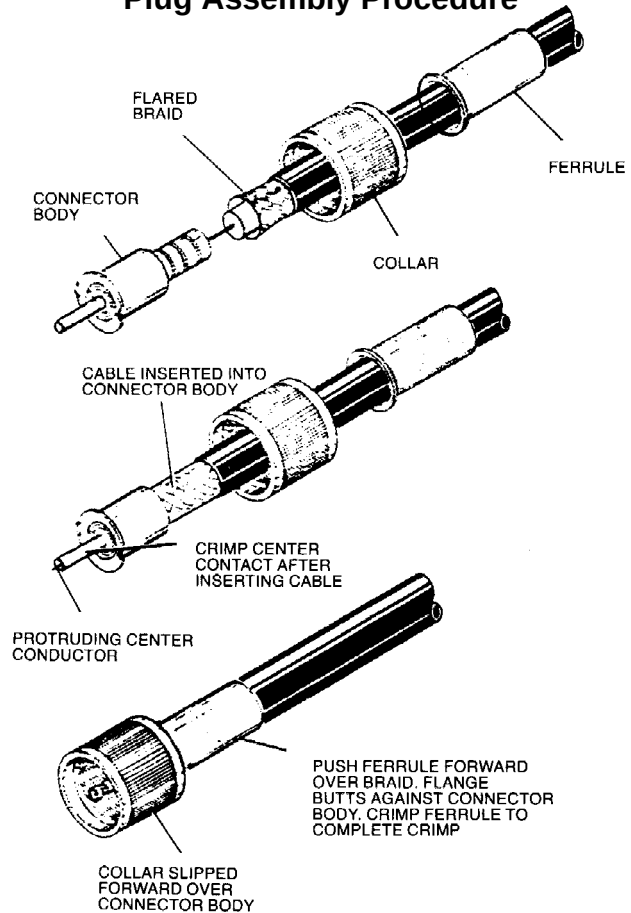


Figure 13. Plug Assembly Procedure

Motorola Recommendations for Mobile Antenna Location

Recommended mobile antenna installations are limited to metal body vehicles at the center of the roof and center of the trunk deck locations. Refer to Table 2.

The antenna installation must additionally be in accordance with:

- the requirements of the antenna manufacturer/supplier
- instructions in the Radio Installation manual.

Antenna Location

Mobile Antenna Installation

Selecting an Antenna Site

1. Install the vehicle antenna *external* to the vehicle and in accordance with the requirements contained in this manual.

2. The best mounting location for the antenna is in the center of a large, flat conductive surface. In almost all vehicles, mounting the antenna in the center of the roof will satisfy these requirements. A good alternative location is in the center of the trunk lid. If you use the trunk lid, ensure that the trunk lid is grounded by connecting grounding straps between the trunk lid and the vehicle chassis.
3. Ensure the antenna cable can be easily routed to the radio. Ensure that the antenna cable is routed separately and not in parallel to any other vehicle wiring or mobile radio cable wiring.
4. 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, etc.) in close proximity to the antenna can cause severe receiver interference.

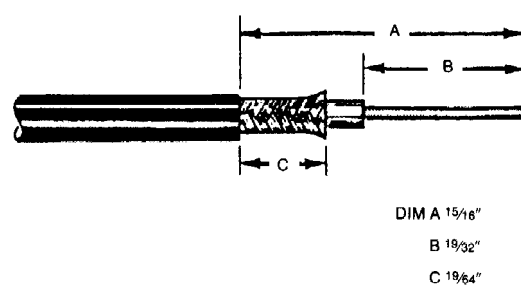


Figure 14.

5. If the vehicle is equipped with an electronic anti-lock braking system (ABS), mount the antenna at the center of the roof or trunk lid and do not route the antenna cable near the ABS Modulator Box. Mount the radio as far away from the Modulator Box as physically possible. This minimizes radio interference to the modulator box from the radio.
6. Make sure the mobile radio antenna is installed at least one foot (30.48cm) away from any other antenna on the vehicle.

Table 2.

Standard metal passenger vehicles	Center roof or center trunk lid
Vans, pickups, and other light trucks (metal roofs)	Center roof
Heavy duty equipment with metal roofs (heavy duty trucks, semi-tractors, heavy refuse trucks, cement mixer trucks)	Center cab roof
Specialty vehicles (such as T-roofs, sun roofs, or convertibles)	Center trunk lid – recommended only for transmitter output of less than 7 W.
Other vehicles	Contact your Motorola Field Technical Representative.

