



MOTOROLA

MOBILE QUARTER-WAVE ANTENNAS

ROOF MOUNT AND TRUNK LIP MOUNT

1. INTRODUCTION

1.1 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 two different types of mounting:

- roof mount.
- trunk lip mount.

1.2 Refer to Table 1 for model identification. Figures 1 through 4 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.

Table 1. Model Complement

Antenna Model	Frequency Range (MHz)
<i>Roof Mount Models</i>	
HAD4006A	136-144
HAD4007A	144-150.8
HAD4008A	150.8-162
HAD4009A	162-174
HAE4003A	450-470
HAF4002A	806-870
<i>Trunk Lip Mount Models</i>	
HAD4010A	136-144
HAD4011A	144-150.8
HAD4012A	150.8-162
HAD4013A	162-174
HAE4007A	449-470
HAF4003A	806-870

ROD WITH CHROME NUT (ROD)	ANTENNA ONLY		
	MOTOROLA PART NO.	ANTENNA MODEL NO.	FREQ. RANGE (MHz)
01-80352A05	01-83938B01	HAD4006A	136-144
01-80352A06	01-83938B02	HAD4007A	144-150.8
01-80352A07	01-83938B03	HAD4008A	150.8-162
01-80352A08	01-83938B04	HAD4009A	162-174
01-80352A11	01-83938B06	HAE4003A	450-470
01-80352A90	01-83938B11	HAF4002A	806-870

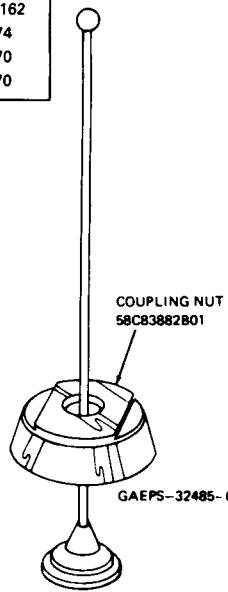


Figure 1. Whip Parts Identification

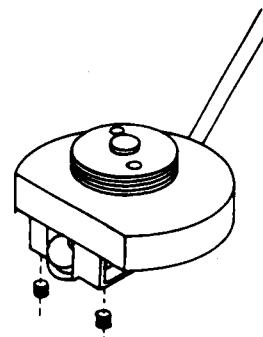
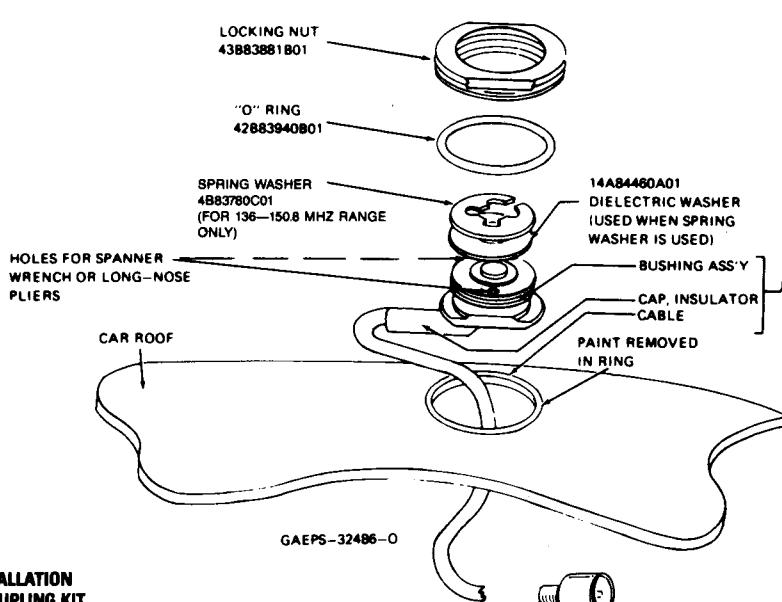


Figure 2. Antenna Trunk Lip Mount

01-80356A58 Trunk Lip Mount, 17' RG58A/U Cable, Mini UHF Connector



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

MOTOROLA PART NO.	DESCRIPTION
11-80369B40	SILICONE GREASE
28-84606M01	MINI UHF CONNECTOR
42-83940B01	"O" RING
43-83881B01	LOCKING NUT
58-83882B01	COUPLING NUT

**BUSHING AND CABLE ASSEMBLY
(136 - 150.8 MHZ RANGE)**

MOTOROLA PART NO.	DESCRIPTION
01-84551A01	BUSHING AND CABLE ASSEMBLY INCLUDES FOLLOWING:
01-84551A01	BUSHING ASSEMBLY
30-475378	168" RG-58A/U COAX
14-83796C01	CAP, INSULATOR

**BUSHING AND CABLE ASSEMBLY
(150.8 - 174 MHz, 449 - 470 MHz AND
806 - 870 MHz RANGE)**

MOTOROLA PART NO.	DESCRIPTION
01-80350A76	BUSHING AND CABLE ASSEMBLY INCLUDES FOLLOWING:
01-84988K01	BUSHING ASSEMBLY
30-475378	168" RG-58A/U COAX
14-83798C01	CAP, INSULATOR

Figure 3. 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

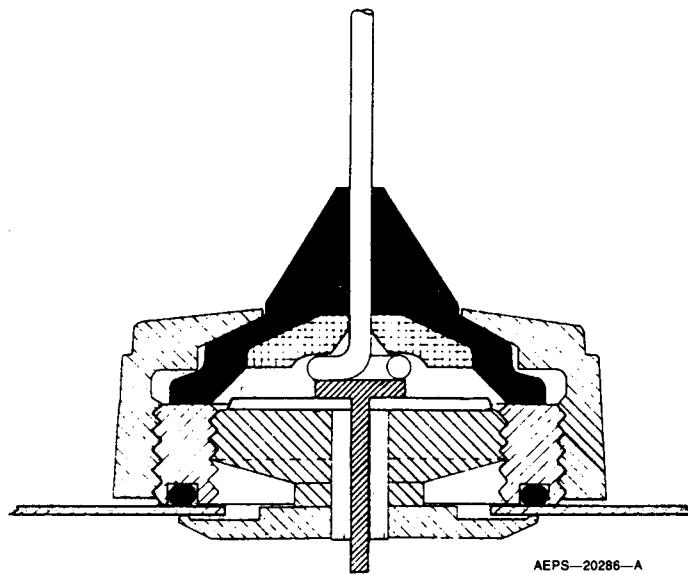


Figure 4. Cross-Section of Assembled Antenna

2. INSTALLATION

2.1 MOUNTING HARDWARE INSTALLATION – ROOF MOUNT

2.1.1 General

2.1.1.1 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.

NOTE

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

2.1.1.2 First, select a location for the antenna as near the center of the roof as possible.

2.1.1.3 The headlining may be probed with the fingers to make sure that all points of obstruction are avoided.

2.1.2 Installation Procedure Single Wall Construction

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

Step 2. Drill a $\frac{3}{4}$ " 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 $\frac{1}{8}$ " from edge.

Step 3. Remove the molding which secures the headlining in the rear quarter of the car on the side on which the radio set is installed.

NOTE

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

Step 4. See Figure 5. From the top, feed the RG-58A/U lead-in cable between the headlining and the metal roof, and into the trunk. Then take up the slack from the trunk end of the cable.

Step 5. See Figure 6. 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 $\frac{3}{4}$ " hold. The threaded top will not fall through the hole.

Step 6. See Figure 7. Hold the antenna bushing assembly in place with the index finger and thread the locking nut onto it as shown.

Step 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.) Tighten the locking nut until it bottoms firmly against the roof top.

NOTE

See 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.

Step 8. Take up the slack in the cable and replace the headlining retainer molding.

Step 9. Replace headlining and dome light if removed.

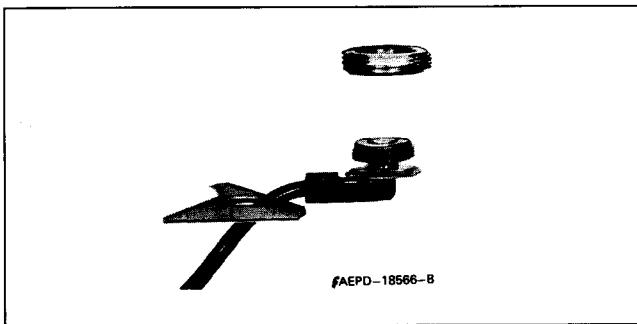


Figure 5. Coaxial Cable Insertion

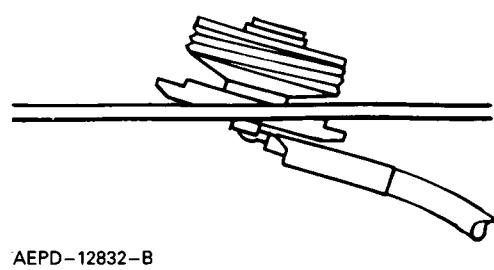


Figure 6. Bushing Assembly Insertion

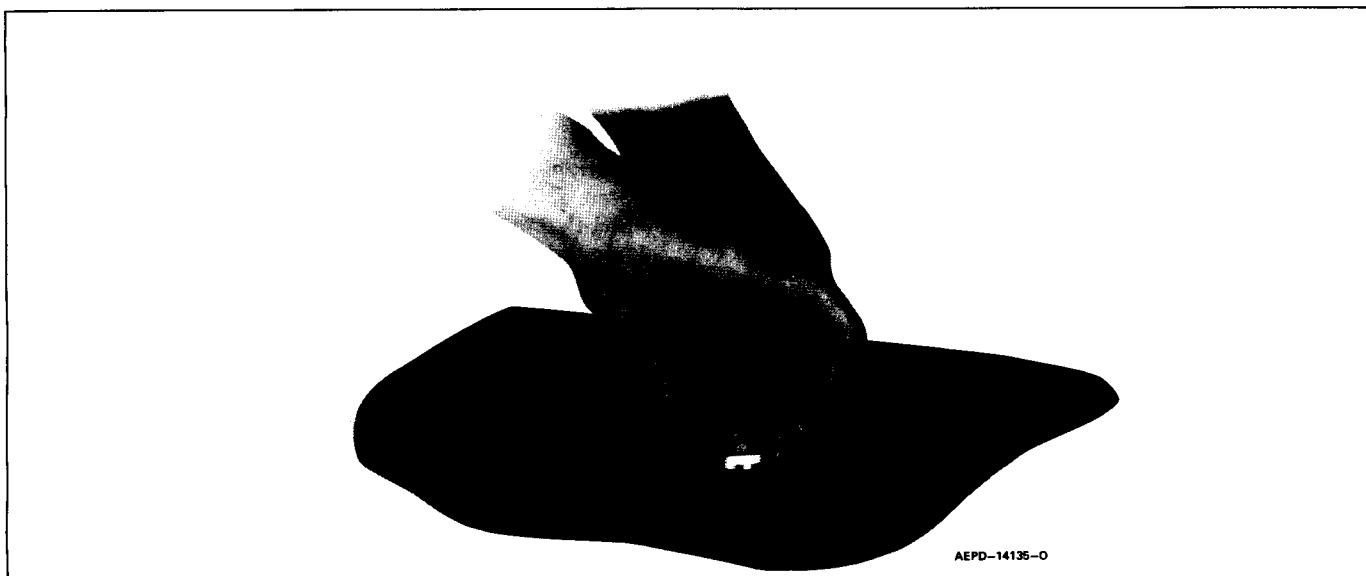


Figure 7. Locking Nut Positioning

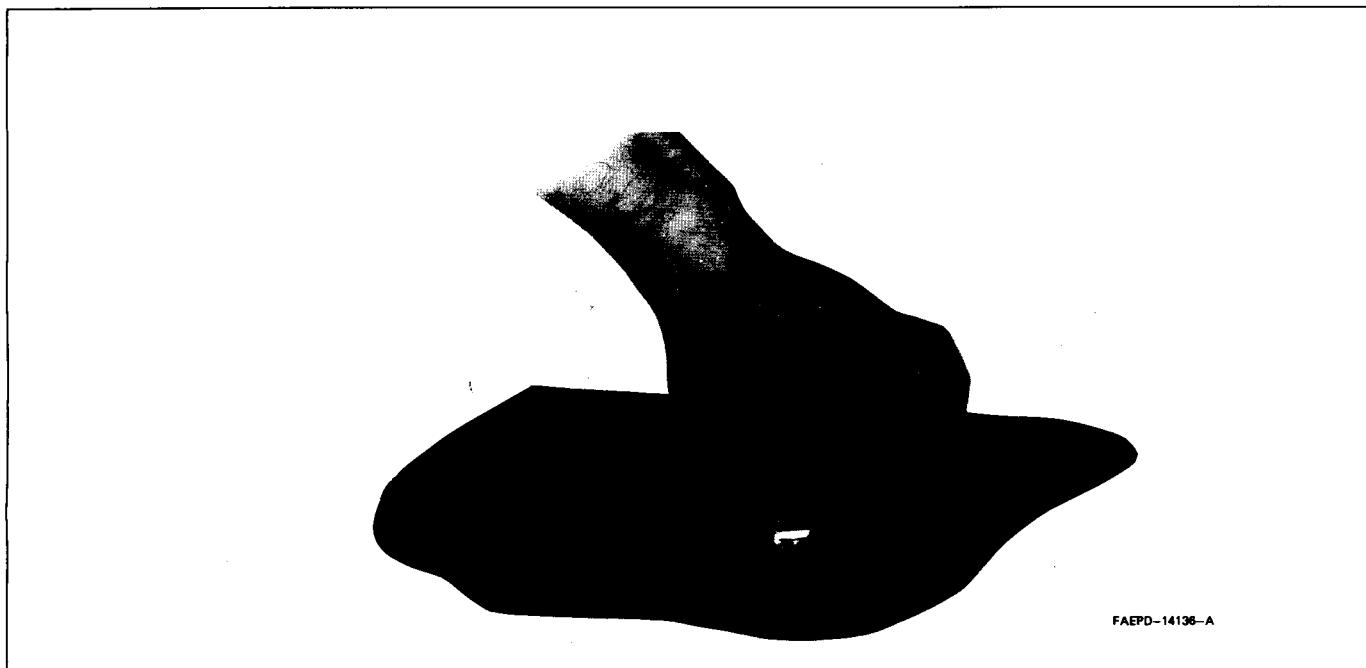


Figure 8. Locking Nut Tightening

2.1.3 Installation Procedure – Double Wall Construction

2.1.3.1 Vehicles With Dome Lights or Removable Headlining

Step 1. Remove the dome light from its mount or remove the headlining from the installation area.

Step 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.

Step 3. Using a $1\frac{1}{4}$ " diameter hole saw cut a hole in the inside layer of the metal.

Step 4. Remove the metal and filler from this $1\frac{1}{2}$ " diameter hole.

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

2.1.3.2 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:

Step 1. Locate the center of the roof and make sure the area beneath this point is clear to allow passage of a drill.

Step 2. With a $\frac{3}{4}$ " diameter hole cutting saw carefully cut a $\frac{3}{4}$ " 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.

Step 3. Remove any burrs and remove the filler separating the roof thickness for a distance of $\frac{1}{4}$ " back from the hole.

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

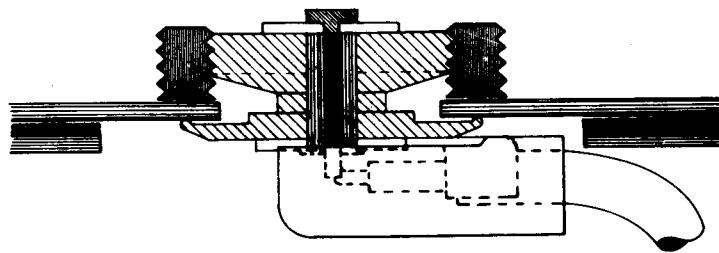


Figure 9. Roof Mount in Vehicle With Dome Light or Removable Headlining

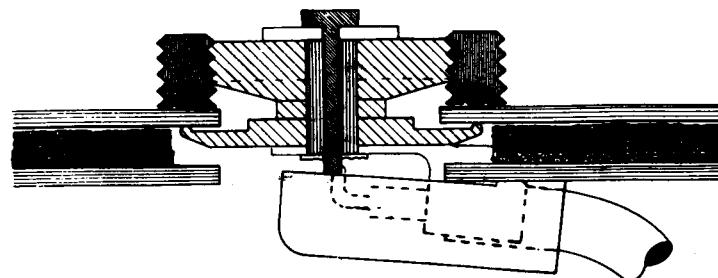


Figure 10. Roof Mount in Vehicle Without Dome Light

2.2 MOUNTING HARDWARE INSTALLATION – TRUNK LIP MOUNT

The antenna may be mounted on the top center lip of the trunk lid, or to the side to prevent the antenna from hitting the window when raising the trunk lid.

Step 1. Select the desired location for the antenna. Refer to Figure 11. The trunk lip mounting base may be installed at any one of the positions shown.

Step 2. Using the Allen wrench supplied, turn the two set screws counterclockwise until their threads are not visible on the underside of the clamp bracket.

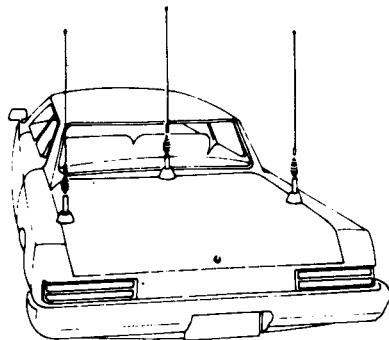
Step 3. Raise the trunk lid to pass the coaxial cable through; then tilt the mounting base slightly to hook the clamp bracket on the trunk lip. The coaxial cable, coming from under the the mounting base, may have to be bent down to accomplish this step. When the base is in position, the coaxial cable should not bind in any way, or be pinched under a set screw.

Step 4. Tighten the two set screws.

NOTE

The coaxial cable will normally not be harmed by opening and closing the trunk, although reasonable care should be exercised. The rubber molding around the trunk lid will prevent damage to the cable.

Step 5. Route the cable from the mounting base to the radio set. Rubber grommets should be used in any sheet metal holes through which the cable is routed. Insure that the cable will not be pinched during normal vehicle operation.



GAEPS-13094-0

Figure 11. Typical Mounting Locations

2.3 MINI-UHF CONNECTOR INSTALLATION

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

2.3.2 Installation Instructions

Step 1. Slip ferrule and collar onto cable. See Figure 13.

Step 2. Prepare cable to strip dimensions per Figure 14, which is also marked on the hand tool.

Step 3. Insert stripped cable into plug body until conductor is exposed (front end) and dielectric bottoms inside body. See Figure 13.

Step 4. Crimp center contact using proper crimp section of tool. See Figure 12 marked "CENTER CONTACT."

Step 5. Push collar forward onto plug assembly. Fit cable braid over the support sleeve of the connector. See Figure 13.

Step 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.

Step 7. The protruding center conductor should be trimmed flush with the end of the center contact.

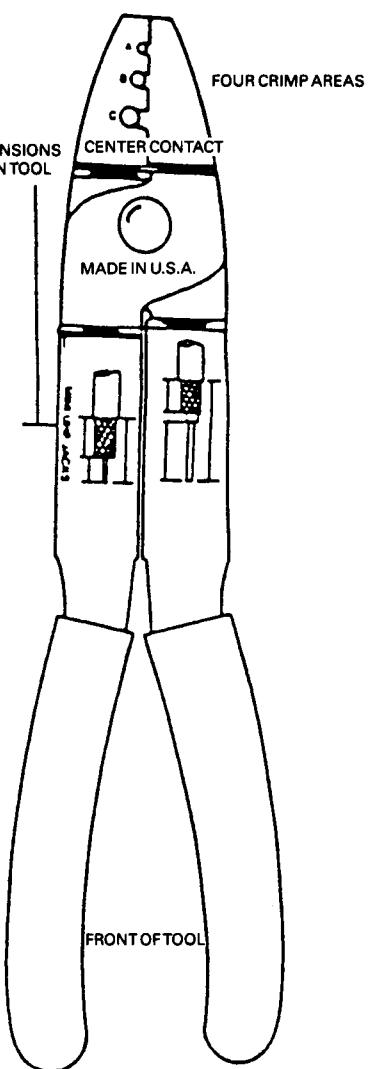


Figure 12.

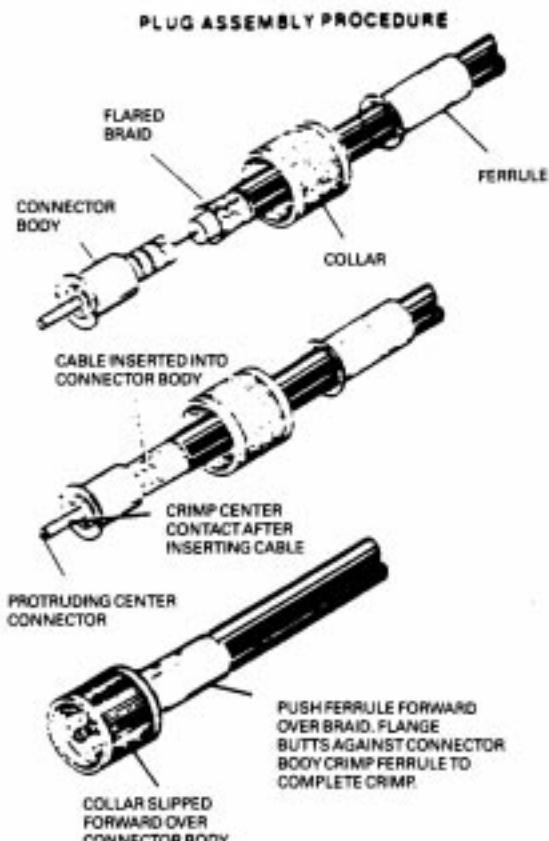


Figure 13. Plug Assembly Procedure

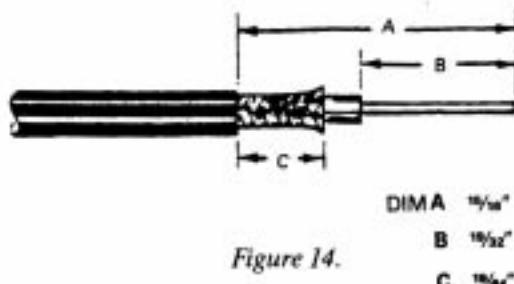


Figure 14.

3. FREQUENCY CONVERSION

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 3) 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 ship from the other ranges to the 136-150.8 MHz range, a spring washer must be installed in addition to changing the whip assembly.

MOTOROLA RECOMMENDATIONS FOR MOBILE ANTENNA LOCATION

Motorola recommends that mobile antennas be located as follows:

Standard metal

passenger car . . . 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

Other vehicles Contact your Motorola Field
Technical Representative.

(Gutter mount antennas are not recommended
for transmitters of more than 6 watts.)

Refer to the "Antenna Location" section for further information concerning RF safety and antenna installations.

Antenna Location

Mobile Antenna Installation

Mobile Radio Operation and EME Exposure

Observe the following caution and electromagnetic energy exposure (EME) statements when installing antennas:

CAUTION

Use caution when installing antennas with mobile radio equipment using transmitter power in excess of 7 watts.

NOTE

For low-power mobile radios (7 watts or less) there are no antenna type or installation restrictions.

To assure optimal radio performance and that human exposure to radio frequency electromagnetic energy is within the guidelines referenced in this document, transmit *only* when people inside and outside the vehicle are at least the minimum distance away from a properly installed, externally-mounted antenna.

Table 2 lists the minimum distance for several different ranges of rated radio power.

Selecting an Antenna Site

1. Install the vehicle antenna *external* to the vehicle and in accordance with the requirements of the antenna manufacturer/supplier

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.

5. If the vehicle is equipped with an electronic anti-lock braking system (ABS), and the antenna will be trunk mounted, then install the antenna on the side opposite to the braking modulator box. 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. Rated Power and Distance

Rated Power of Vehicle-installed Mobile Two-Way Radios	Minimum Distance from Transmitting Antenna
7 to 15 Watts	1 Foot (30.5cm)
16 to 50 Watts	2 Feet (61cm)
More than 50 Watts	3 Feet (91.5cm)