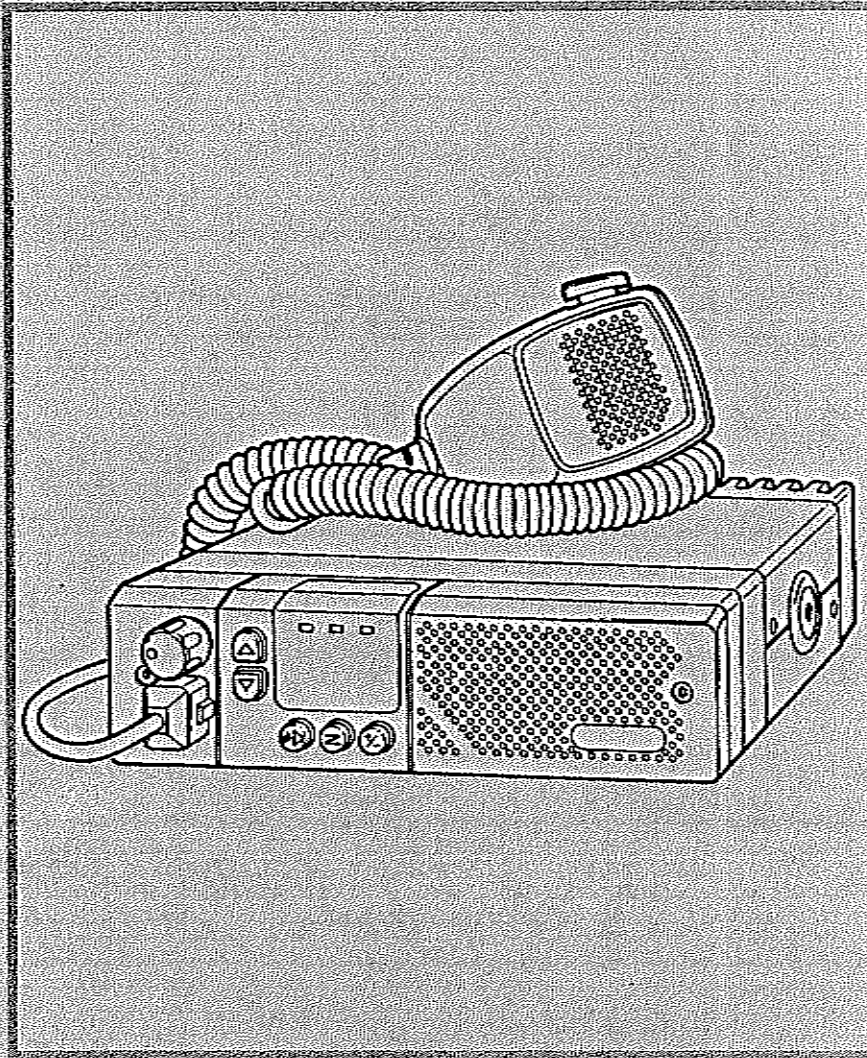


# Radius® GM300

## Mobile Radios Operating Instructions



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## Computer Software Copyrights

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## Introduction

Welcome to the Radius mobile family! Your choice of a Radius mobile means you have selected the highest of standards in design, quality, and performance. This manual is designed to acquaint you with all the features, care, and installation of the Radius mobile to better serve all your communication needs.

### **Radius Mobile Features**

The following features are standard in all models:

- Synthesized, Wide-Band Operation
- Multiple Coded Squelch (Private-Line and Digital-Private Line) Capability
- Operator Selectable Channel Scan
- Field Programming Capability at Dealer
- Mil-Spec 810 C, D and E Performance
- Radius High Performance Compact Microphone with Hardware
- Non-Locking Trunnion with Hardware
- 10 Ft. Power Cable
- 12 V DC Negative Ground
- 3 Watt Internal Speaker
- Rotary Volume Control
- Time-Out Timer
- On-Hook Monitor Capability
- Mini-UHF Antenna Connector
- Operator's Card and Owner's Manual

### **Radio Self-Check**

Every time the radio is turned on, it performs a functional self-check and if necessary, will sound a 5 second warning tone unlike the chirp tone normally heard at power-up. This is an indication that the radio is no longer operating at the exact parameters set in the factory or by a Motorola Radius dealer and should be serviced immediately.

### **Service**

Because this unit contains a radio transmitter, most local governments prohibit anyone from making any internal adjustments to the transmitter unless specifically licensed to do so by government regulations. If your radio fails to operate or any operational difficulties should arise, contact your local Motorola Radius dealer.

Proper repair and maintenance procedures will assure efficient operation and long life for this radio.

## Dealer Programmable Features

### Field Programming Capabilities

The Radius GM300 mobile uses non-volatile memory to store customer unique information. If a frequency, squelch code or channel-slaved scan list needs to be changed, it can be done at a service location with Radio Service Software (RSS). The time-out timer can be disabled or changed without having to open the radio for reprogramming.

Scanning radios can also be programmed to enable Talkback Scan or the Priority Sample Rate can be changed. Finally, 16 channel radios are provided with RapidCall Signalling and Expanded Accessory Connector and can be programmed to include a wide variety of features and accessories.

### RapidCall Signalling

16 Channel GM300 mobiles are available with RapidCall, a selective signalling package. Radios can be programmed with an impressive variety of features to improve your efficiency as radio users. These features include: Push-to-Talk Identification (PTT-ID), Emergency, Call Alert, Horn/Lights, Voice Selective Call, and Radio Check.

RapidCall mobiles can be made capable of sending a unit ID or Emergency Alert to a control unit or receiving a Call Alert, Horn/Lights, Voice Selective Call or Radio Check from a control unit.

Mobile radios can also be made capable of the control unit functions: receiving and displaying the incoming ID or Emergency and sending a Call Alert, Horn/Lights, Voice Selective Call or Radio Check.

In addition, RapidCall mobiles have an expanded accessory connector, providing greater flexibility in adding external hardware such as Public Address. Ask your Radius Representative for more information.

### Time-Out-Timer

All models have a Time-Out Timer (TOT) that will terminate your transmission if you hold the PTT button down for 60 seconds (default setting). To warn the user, an alert tone will sound from the speaker about 4 seconds before the transmission is cut. The Time-Out Timer can be disabled or changed in duration from 1-255 seconds. See your local Motorola Radius dealer for more details.

## Accessories

Radius offers several accessories to increase communications efficiency. Many of the accessories available are listed below, but for a complete list, consult your Radius dealer.

### Antennas:

HAD4006_R	VHF 136-144 MHz, 1/4 wave roof mount
HAD4007_R	VHF 146-150.8 MHz, 1/4 wave roof mount
HAD4008_R	VHF 150.8-162 MHz, 1/4 wave roof mount
HAD4009_R	VHF 162-174 MHz, 1/4 wave roof mount
HAD4014_R	VHF 146-172 MHz, 3dB gain roof mount
HAE4003_R	UHF 450-470 MHz, 1/4 wave roof mount
HAE4004_R	UHF 470-512 MHz, 1/4 wave roof mount
HAE4002_R	UHF 403-430 MHz, 1/4 wave roof mount
HAE4010_R	UHF 406-420 MHz, 3.5dB gain roof mount
HAE4011_R	UHF 450-470 MHz, 3.5 dB gain roof mount
HAE4012_R	UHF 470-512 MHz, 3.5dB gain roof mount
HAE4013_R	UHF 494-512MHz, 3.5dB gain roof mount
HAE4019_R	UHF 450-470 MHz, 3.5 dB gain roof mount

### Microphones:

HMN3596_R	Compact Palm Microphone with 7 foot cord
HMN1035_R	Heavy Duty Palm Microphone with 10.5 ft. cord
HMN1037_R	Touch-code Microphone with Hang-up Clip
HMN3141_R	Handset with Hang-up Cup
HLN9559_R	7 ft. Coil Cord for Compact and Heavy Duty Microphones
HLN9560_R	10.5 ft. Extended Coil Cord for Compact and Heavy Duty Microphones
HLN9073_R	Microphone Hang-up Clip (all microphones)

### Installation Accessories:

HKN4137_R	VHF/UHF/800 MHz Low Power Cable
HKN9557_R	PL259/Mini-U Antenna Adapter - 8 inch cable
HLN5282_R	Mini-U Connector (all bands)
HLN8027_R	Mini - UHF to BNC Antenna Adapter
HLN9100_R	Three Point Mounting Bracket (for use with HLN9450)
HLN9027_R	In-dash Bezel Mounting Kit
HLN9284_R	Key Lock Mount
HLN5189_R	Non-locking Bracket
HLN5226_R	Extra Stability Mount (use with HLN5189)
HLN9450_R	45 - 60 Degree Floor Mount Wedge (requires HLN9404)
HLN9404_R	Sleeve Mounting Bracket
HLN8097_R	Removable Slide Mount Tray Package
HLN8098_R	Radio Slide Mount Tray
HLN8099_R	Vehicle Slide Mount Tray
HLN3007_R	Remote Mount Kit (18 ft. length) (with 20 ft. power cable)
HLN8144_R	Remote Mount Kit (8 ft. length) (used with radio supplied power cable)
HLN8413_R	Slide Mount Tray Bracket

**Control Station Accessories:**

HKN9088_R	Mini-U Antenna Adapter with 8 ft. cable (WSAPD)
HLN5292_R	Base Tray for Control Station
HMN1038_R	Desk Microphone (beige)
HMN3000_R	Desk Microphone (black)
HKN4139_R	Low Power Control Station Power Cable (1-10 W/10-25 W models)
HKN9455_R	High Power Control Station Power Cable (25-45 W models)
HPN4001_R	Power Supply and Cable (25-40 W models)
HPN4002_R	Power Supply and Cable (1-10 W/10-25 W models)

**Accessories / Kits Interfacing with the 16 Pin Connector:**

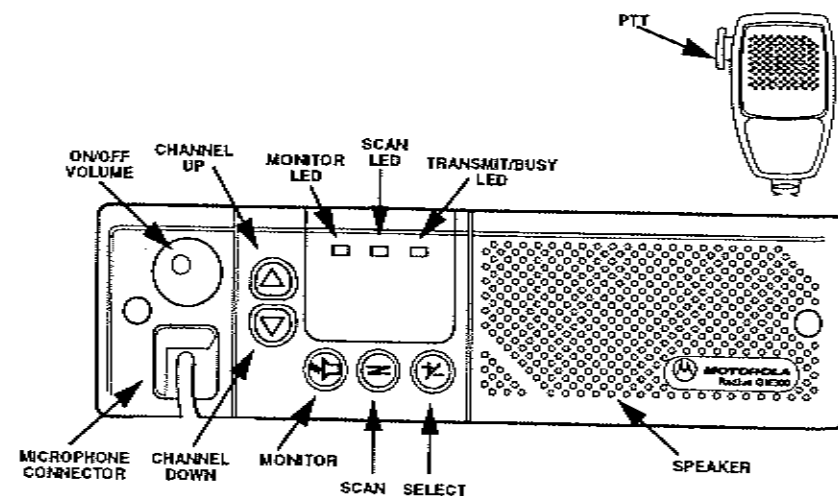
HKN9327_R	Ignition Switch Cable
HSN8145_R	7.5 Watt External Speaker (for receiver audio)
HKN9969_R	Accessory for Repeater Interface Communications Kit (additional 3 foot, 16 conductor cable for connection to other accessories)
HLN3333_R	Repeater Interface Communications Kit (includes interface box, mounting bracket, and two 16 conductor cables) (8 & 16 channel limited capability)
HLN9457_R	Hardware Kit (includes 16 conn. pins, (9) 8" wires with pins & extra housing)
TDN8300	DC Remote Adapter and Service Manual - 16 Channel only - 2 channel operation (order desktop controller separately)
TDN8301	Tone Remote Adapter and Service Manual - 16 Channel only - 2 channel operation (order desktop controller separately)

**Public Address Accessories: 8 & 16 Channel Models:**

HLN3145_R	Public Address Kit (requires HSN1000 accessory) (includes 2 cables for mobile connection to Public Address box to speaker cables)
HSN1000_R	6 W Amplified External Speaker - for Public Address (minimum 1 required)
HKN9324_R	15 ft. Public Address/Speaker Cable (one required for each HSN1000)

**Manuals:**

6880902Z26	Operator's card - 8 channel radios
6880902Z32	Service manual
6880902Z41	Operator's card - 16 channel radios
6880902Z43	DTMF Operator's card
TDN8198	i50X Radio-Telephone interconnect service manual
TDN8448	DC Remote adapter manual
TDN8449	Tone remote adapter manual

**Operating Instructions****8 Channel Operating Instructions****To Turn The Radio On**

Turn the ON/OFF VOLUME knob to the right until it clicks. The LED lights will show the last status of the radio and a start-up tone will be heard.

**To Receive**

Set the volume by turning the ON/OFF VOLUME knob clockwise.

Select the channel by pressing the UP/DOWN button [▲/▼]. Continued pressing of the button will scroll through the channels.

To monitor a channel, press the MONITOR button [⊕] or take the microphone off hook. When in the monitor mode, the amber MONITOR LED will light steadily.

To unsquelch the radio, press and hold the MONITOR button [⊕] for 2 seconds.

To leave the unsquelched mode, press the MONITOR button [⊕] again. This will return the radio to the coded squelch (PL/DPL) mode.

A short beep tone will be heard whenever a valid keypress is made.

**To Transmit**

When the channel is clear, press and hold down the Push-to-Talk (PTT) button on the side of the microphone and speak slowly and clearly. The TRANSMIT/BUSY LED will remain red until the PTT button is released to indicate that you are "on-the-air".

The red TRANSMIT/BUSY LED will flash whenever there is another carrier on the selected channel.

**NOTE**

If your radio has the Time-Out-Timer function activated, transmission will terminate if you hold down the PTT button for over 60 seconds or the preprogrammed time period. When this occurs, an alert tone sounds 4 seconds before the transmission is cut. To resume transmitting, release the PTT button and push again.

**Channel Scan**

The 8 channel GM300 mobile may have a single user scan list which can be programmed from the front panel.

**To Turn Scan On or Off**

Press the SCAN button [⊖]. The radio will only scan when the microphone is on-hook.

The green scan LED will turn on and display segments will light to indicate that scan is functional.



When an active channel is detected, the channel number will be displayed and you will hear the call. To leave scan, press the SCAN button [⊖].

**To Delete a Nuisance Channel**

While receiving an undesired transmission, hold down the SELECT button [⊕] for 2 seconds and the nuisance channel will be temporarily deleted (until scan is exited or the radio is turned off). Priority channels and the home channel cannot be deleted.

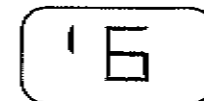
**To Respond to Scanned Channel Activity**

When the microphone is lifted off-hook, the radio will suspend scanning and return to the channel displayed before entering scan. If you wish to transmit on another channel, press the UP/DOWN button [⬆/⬇] to reach the desired channel. Scan will resume after replacing the microphone on-hook.

**To Create or Modify the User List**

Hold the SCAN button [⊖] for 2 seconds until you hear a second chirp tone and the channel number flashes. The displayed channel can be added or deleted from the user scan list by pressing the SELECT button [⊕].

A vertical segment in the upper left corner of the display will light and flash, alternating with the channel number, to indicate that the flashing channel has been added to the scan list. The segment will disappear when the channel is deleted.



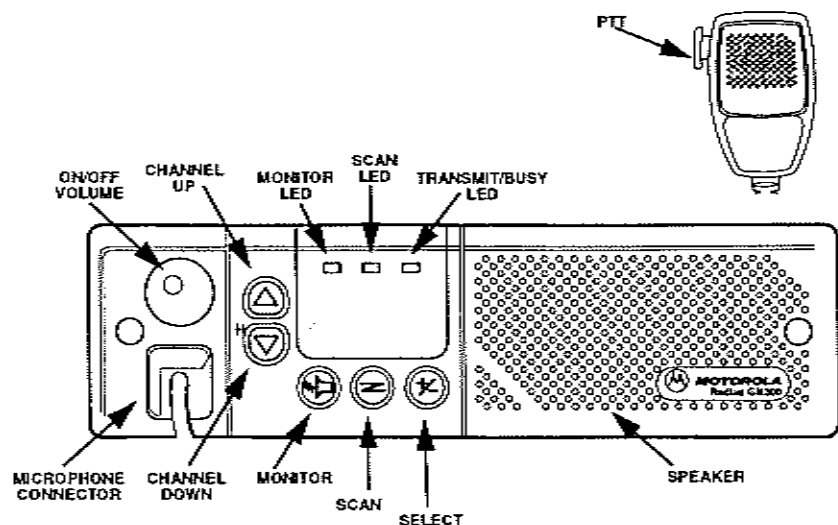
Use the UP/DOWN and SELECT buttons [⬆/⬇, ⊕] to add or delete other desired channels in the user list.

**To Select Priorities for The User List**

Go to the desired channel and hold the SELECT button [⊕] down for 2 seconds. The scan LED will flash to indicate that this is the first priority channel. Repeat the process to select a second priority channel. Priority Two will be indicated by a steady light on the scan LED.

The Priority One channel must be programmed first, followed by the Priority Two channel. Deleting either priority channel will delete both channels simultaneously.

## 16 Channel Operating Instructions



### To Turn The Radio On

Turn the ON/OFF VOLUME knob to the right until it clicks. The LED lights will show the last status of the radio and a start-up tone will be heard.

### To Receive

Set the volume by turning the ON/OFF VOLUME knob clockwise.

Select the channel by pressing the UP/DOWN button [▲/▼]. Continued pressing of the button will scroll through the channels.

To monitor a channel, press the MONITOR button [⊕] to take the microphone off hook. When in the monitor mode, the amber MONITOR LED will light steadily.

To unsquelch the radio, press and hold the MONITOR button [⊕] for 2 seconds.

To leave the unsquelched mode, press the MONITOR button [⊕] again. This will return the radio to the coded squelch (PL/DPL) mode.

A short beep tone will be heard whenever a valid keypress is made.

### To Transmit

When the channel is clear, press and hold down the PTT button on the side of the microphone and speak slowly and clearly. The TRANSMIT/BUSY LED will remain red until the PTT button is released to indicate that you are "on-the-air".

The red TRANSMIT/BUSY LED will flash whenever there is another carrier on the selected channel.

### NOTE

The radio has a Time-Out-Timer that will terminate your transmission if you hold down the PTT button for over 60 seconds. When this occurs, an alert tone sounds for 4 seconds before the transmission is cut. To resume transmitting, release the PTT button and push again.

### Channel Scan

The 16 channel GM300 mobile may have a preprogrammed scan list for each active channel and a single user scan list which can be programmed from the front panel.

### To Turn Scan On or Off

Press the SCAN button [⊖]. The radio will only scan when the microphone is on-hook.

Green display segments will light to indicate that scan is functional. Use the SELECT button [⊗] to advance through the various scan types:

Scan	User Scan	Priority User Scan	Priority Scan
Pri User — Scan	Pri — User — Scan	— Pri — User — Scan	— Pri — User — Scan

### NOTE

The first and last displays apply to the preprogrammed scan lists and will be the only types of scan available until a user list is programmed.

When an active channel is detected, the channel number will be displayed and you will hear the call. To leave scan, press the SCAN button [⊖].



### To Respond to Scanned Channel Activity

When the microphone is lifted off-hook, the radio will suspend scanning and return to the channel displayed before entering scan. If you wish to transmit on another channel, press the UP/DOWN button [▲/▼] to reach the desired channel. Scan will resume after replacing the microphone on-hook.

### To Delete a Nuisance Channel




While receiving an undesired transmission, hold down the SELECT button [⊗] for 2 seconds and the nuisance channel will be temporarily deleted (until scan is exited or the radio is turned off). Priority channels and the home channel cannot be deleted.

## To Create or Modify the User List


Hold the SCAN button [  ] for 2 seconds until you hear a second chirp tone and the channel number flashes. The displayed channel can be added or deleted from the user scan list by pressing the SELECT button [  ].

A vertical segment in the upper left corner of the display will light and flash, alternating with the channel number, to indicate that the flashing channel has been added to the scan list. The segment will disappear when the channel is deleted.



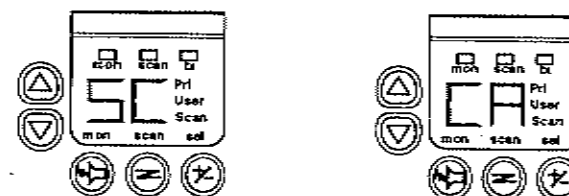
Use the UP/DOWN and SELECT buttons [  ] / [  ], [  ] to add or delete other desired channels in the user list.

## To Select Priorities<sup>N</sup> for The User List

Go to the desired channel and hold the SELECT button [  ] down for 2 seconds. The scan LED will flash to indicate that this is the first priority channel. Repeat the process to select a second priority channel. Priority Two will be indicated by a steady light on the scan LED.

The Priority One channel must be programmed first, followed by the Priority Two channel. Deleting either priority channel will delete both channels simultaneously.

## 16 Channel RapidCall Operating Instructions Mobile (Field Unit) Selective Signalling



The Monitor LED remains lit in normal operation to indicate monitor mode. To indicate an incoming select call, the Monitor LED will flash and the display will show the appropriate letter abbreviations.

### Receiving a Voice Selective Call

When a Voice Selective Call is received a one-time 2 beep alert tone will sound, the amber Monitor LED will flash and the display will show "SC".


The radio will unmute and a voice message will follow. After the transmission is completed, the radio returns to normal operation.

### Receiving a Call Alert

When a Call Alert is received the amber Monitor LED will flash and a series of 4 alert tones will sound. The display will show "CA". Depending on the signalling format used, a voice message may follow.

A Call Alert "leaves a message" for the mobile operator. The Monitor LED will continue to flash, the "CA" will remain on the display and the alert tones will repeat every 10 seconds until the PTT or any other button is pressed. The radio will then return to normal operation.

### Receiving an External Alarm (Horn or Lights)

The External Alarm, Horn, or Lights function requires an alarm relay cable. To enable an incoming Call Alert to turn on the horn and/or lights, press the SELECT button [  ] and the display will show "HL". The duration of the external alarm is 6 seconds.

There will be a slight delay before the horn or lights relay is closed. An operator in or near the vehicle who sees or hears the Call Alert indication will have the opportunity to turn off the External Alarm before it sounds. This is done by pressing any button or taking the microphone off-hook.



## Mobile (Field Unit) Selective Signalling

### Sending an Identification Number

Every time the PTT button is pressed, the radio automatically transmits a unit identification (ID) number. While holding the PTT button, a tone may be heard while the unit ID number is being sent out. Do not begin talking until the tone is over.

### Sending an Emergency Alarm

Emergency alarm requires the press of an external footswitch or pushbutton to send the emergency call.

If programmed for STANDARD EMERGENCY, the following will occur:

- The operator will hear a single alert tone when the Emergency is sent by the radio and the transmit LED will light.
- The letters "EE" will appear on the display.
- Five alert tones will sound to indicate the Control unit has received and acknowledged the Emergency. The "EE" will then disappear from the display.
- Messages will be heard over the radio's speaker during the Emergency.
- Monitor and Busy LEDs will function normally during the Emergency.
- The only way to cancel the emergency is by pressing the PTT button. No other button press will function normally except Monitor.

If programmed for EMERGENCY REVERT, the radio will automatically change (revert) to an emergency channel to send the call. The channel display will show the emergency channel after the "EE" clears.

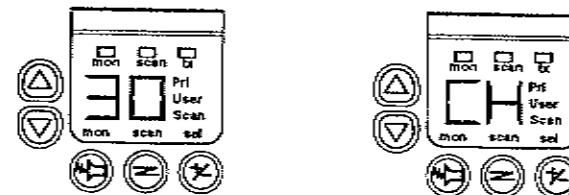
If programmed for SILENT EMERGENCY, there will be no audio or visual indication that the emergency call was sent and the radio will remain muted. The operator must press the PTT button to initiate a voice message and begin receiving again.

### Signalling and Channel Scan

Signalling and scan are compatible. However, during scan operation, a selective call on a particular channel could be missed since the radio may not be checking that channel when the selective call is sent.

We recommend that priority scan be selected and the signalling channel be designated a priority channel to improve the likelihood that the selective call will be received.

## Control Unit Select Signalling



### Display of Incoming Identification Numbers

Whenever an operator in the system presses the PTT button, the unit identification number (ID) will be shown on the display for 10 seconds or less if another incoming ID is received.

### Activating the Call List for Sending Selective Messages

Pressing the SELECT button [⊕] will activate the Call List. The most recently used ID number and the call letters will alternately be displayed. The following call letters may be displayed when using a call list.

**SC** – Voice Selective Call: Call a particular unit or group with a voice message.

**CA** – Call Alert: Select a unit or group and leave a "call-back" indicator.

**CH** – Radio Check: Check to see if a unit is turned on and within range.

These letters will alternate on the display with the unit or group ID number.

### Choosing Call List Letters and ID Numbers

Each press of the SELECT button [⊕] causes the display to move down the list of call letters which have been programmed in the unit.

Pressing the UP/DOWN buttons [⬆]/[⬇] will change the ID numbers. All Call List ID numbers will be displayed with each set of call letters. However, some ID's may not be compatible with certain call types. For example, a group ID cannot be Radio Checked. In such cases, pressing the PTT button will result in a low pitched tone to indicate that the function is not available.

### Sending a Signalling Message

Once the desired call letters and ID numbers have been selected, pressing the PTT button will send the message. The display will revert to the preprogrammed transmit channel to send the signalling message and the channel will be briefly displayed while the message is being transmitted.

## Receiving an Acknowledgment

Depending on the signalling format used, the sending radio may look for an acknowledgment from the receiving unit on Call Alert and Radio Check calls.

The sending radio will show an "A" and 4 alert tones will sound if the target unit received and acknowledged the call. If no acknowledge is received, the sending unit will make another 4 tries. If unsuccessful, a "-A" will be displayed and a low pitched tone will sound to indicate no acknowledge.

## Exiting the Call List

The SELECT button [⊗] is used to exit the signalling call list. Repeated pressing of the SELECT button [⊗] takes you through the sequence of call letters to the channel display for normal operations.

## Receiving an Emergency Alarm

When an emergency alarm is received by the control unit, an alert tone will sound. The display will alternate "EE" and the ID number of the radio sending the emergency.

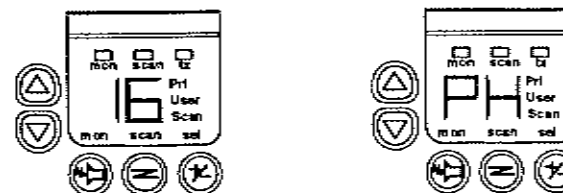
Five different emergency ID's can be queued. However, the first ID to be received will be displayed until it is cleared. Then the next ID in the queue will be displayed until each has been displayed and cleared. Press the PTT button to respond to the emergency alert.

If the sending radio has been programmed for silent emergency it will remain muted and no messages will be heard. However, other radios using the channel will receive transmissions.

## Clearing an Emergency Alarm

To prevent accidentally losing an incoming emergency, the clearing of an emergency alarm has been designed as a two step process. First, the alert tone must be cleared by pressing any button on the radio. Second, press an external switch, such as the footswitch or pushbutton. The Emergency display will then clear.

## DTMF ANI Phone Access Operating Instructions



Radio is in normal operating mode.

Check the Busy LED to be sure the channel is free before pressing the SELECT button [⊗]. See Note 1.

Press the SELECT button [⊗]. The DTMF access code will automatically be transmitted and "PH" will appear on the display. See Note 2.

A call can be manually dialed using the standard Touch Code microphone. The radio will be in carrier squelch mode.

Press SELECT button [⊗] after the call is completed to send the deaccess code. The radio returns to normal operating mode and its prior monitor or coded squelch state. See Note 3.

### NOTE

1. If you press the SELECT button [⊗] when the channel is busy you will hear a low pitched tone. The radio will revert to monitor mode so you can listen for a free channel. Press the Select button again to send the Access code.

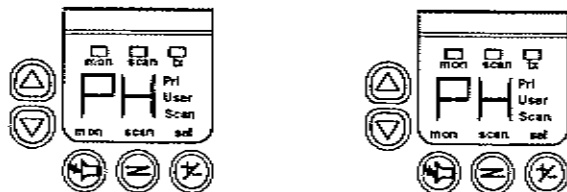
### NOTE

2. If the patch missed the Access code when it was sent, the user would have to press the SELECT button [⊗] twice to reaccess the patch: once to deaccess and again to access. The same case is true for Deaccess.

### NOTE

3. If the radio reverted to monitor mode because of a busy channel for Access, it will return to monitor after Deaccess. Otherwise the radio will return to coded squelch.

## Phone Memory List



Up to 16 telephone numbers can be programmed by the dealer. One or two digit identifiers will then be used to represent these phone numbers.

Press the SELECT button [⊗] to enter Phone mode. Select the Phone Memory List by using the UP/DOWN buttons [▲/▼]. The first press of the UP/DOWN button [▲/▼] will recall the last phone number dialed. (This is not saved if the radio has been turned off.)

Subsequent or extended presses of the UP/DOWN buttons [▲/▼] will step through the list.

Press the PTT button to send a call to the selected number from the list. Radio reverts back to Phone mode after memory dialing is complete.

## Licensing And Safety Information

Your Radius radio operates on FM radio communication frequencies and is subject to the Rules and Regulations of the Local Communications Governing Agencies. These agencies may require that all operators using Private Land Mobile or General Mobile Radio frequencies obtain a radio license before operating their equipment. The operator receives a license for use of the radio equipment under a specific eligibility and on a particular frequency or set of frequencies. To determine eligibility for use of Private Land Mobile Service frequencies contact your local communications governing agency. They will be able to supply information required to properly obtain and complete the license application form.

**Agency addresses for several countries are listed below:**

### In the United States contact:

Federal Communications Commission  
Consumer Assistance  
Branch License Division  
Gettysburg, PA 17326  
Tel (717) 337-1212

### In Canada contact:

Head Equipment Approval Unit  
Department of Communications  
1241 Clyde Avenue  
Ottawa, Ontario K2C-1Y3  
Canada  
Tel (613) 998-5968

### In the United Kingdom contact:

Radio communications Agency  
P.O. Box 20  
London  
SE1 8TZ  
Tel 71 215 2152

### In Mexico contact:

Secretaria De Comunicaciones Y Transportes  
Direccion General De Politicas  
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**Safety Standards**

The FCC, with its action in General Docket 79-144, March 13, 1986, has adopted a safety standard for human exposure to radio frequency electromagnetic energy emitted by FCC regulated equipment. Motorola subscribes to the same safety standard for the use of its products. Proper use of this radio will result in exposure below government limits.

**The following precautions are recommended:**

- **DO NOT** operate the transmitter of a mobile radio when someone outside the vehicle is within two feet (0.6 meter) of the antenna.
- **DO NOT** operate the transmitter of a fixed radio (base station, microwave, the rural telephone RF equipment) or marine radio when someone is within two feet (0.6 meter) of the antenna.
- **DO NOT** operate the transmitter of any radio unless all RF connectors are secure and any open connectors are properly terminated.
- **DO NOT** operate the equipment near electrical blasting caps or in an explosive atmosphere.
- All equipment must be properly grounded according to Motorola installation instructions for safe operation.
- All equipment should be serviced only by a qualified technician.

**Safety Guidelines****Installation Safety Warning**

Consider the occupants' safety when you choose a location for the radio. Do not mount the radio overhead or on a side wall unless you take special precautions.

If someone were to remove the radio and fail to replace it properly, road shock could bump the radio loose, and the falling radio could, in some circumstances, cause serious injury to the driver or a passenger. In a crash, even when properly installed, the radio could break loose and become a dangerous projectile.

If you must mount the radio overhead or on a side wall, give it the added protection of a retaining strap.

**Operational Safety Warnings****WARNING**

For vehicles equipped with electronic anti-skid systems, see "ANTI-SKID BRAKING PRECAUTIONS" Publication, Motorola Number 68P81109E34.

**WARNING**

For vehicles equipped with electronic ignition systems, check the service manual for warnings about the use of two-way radio equipment in the vehicle.

**WARNING**

It is mandatory that radio installations in vehicles fueled by liquefied petroleum gas conform to the following standard:

National Fire Protection Association standard NFPA 58 applies to radio installations in vehicles fueled by liquefied petroleum (LP) gas with LP gas container in the trunk or other sealed-off space within the interior of the vehicles. This standard requires that:

1. Any space containing radio equipment shall be isolated by a seal from the space in which the LP-gas container and its fittings are located.
2. Remote (outside) fitting connections shall be used.
3. The container space shall be vented to the outside.

**CAUTION****INSTALLATION OF ANTENNAS WITH MOBILE RADIO EQUIPMENT WITH 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.

**Non-Metallic Body Vehicles** - In non-metallic body vehicles with transmitters at any frequency having a power output in excess of 7 watts, do not install any type of antenna closer than 2 feet in distance from any occupant of the vehicle. Failure to follow this procedure may result in the exposure of the vehicle occupants to radio frequency energy levels higher than recommended by the American National Standards Institute (ANSI).

**Metal Body Vehicles** - In metal body vehicles with transmitters at any frequency having a power output in excess of 7 watts, it is mandatory that when using a glass mount antenna the installation instructions covering the location of the antenna at the top of the front or rear window and the cable routing be followed exactly as described. Failure to follow this procedure may result in the exposure of the vehicle occupants to radio frequency energy exposure levels higher than recommended by the American National Standards Institute (ANSI).

For other antenna types follow the existing installation instructions. The best location for the antenna is at the center of vehicle roof. A good alternate location is at the center of the trunk lid.

**IMPORTANT** - If installations different from these recommendations have already taken place, immediately notify your local Service Representative so that appropriate corrective action can be taken.

**CAUTION****UNSAFE USE OF CONVERTED MOBILE EQUIPMENT FOR PORTABLE APPLICATIONS.**

Motorola two-way radio products which have been designed for mobile operation should not be used as battery operated portable units. In such use there is the danger that the user or other persons will be exposed to excessive radio frequency energy levels. This warning applies to all two-way radio equipment radiating in excess of seven (7) watts RF power. Motorola strongly recommends that any product which converts high power equipment for portable operation not to be used.

**Installation Planning And Procedures****Testing and Maintenance**

Your radio is completely adjusted, tested, and inspected before shipment. However, local governmental regulations may state that a station license be obtained for each radio installation (mobile or base) by the owner of the equipment. The station licensee is responsible for ensuring the transmitter power, frequency, and deviation are within the limits permitted under the station license.

No technician's license is required for installing and maintaining radio equipment. However, the frequency and deviation of the transmitter must be checked on installation and at least once yearly.

**Power Protection Circuitry**

The Radius mobile you are installing has been tested for proper transmitter power output before leaving the factory. Each radio is set to the proper output power level while connected to an accurate 50 ohm load impedance. Once the power level has been set, the internal power control/protection circuitry will reduce the power output whenever it senses a load impedance significantly different from 50 ohms. This protection circuitry significantly enhances the radio's reliability with minimal performance degradation.

If you check transmitter output power levels during installation, be sure you are using a good 50 ohm load, with a minimum of adapters and using short test cables. Any load variation from 50 ohm may cause an apparent reduction in output power due to the normal operation of the control/protection circuitry. If power seems to be unusually low (greater than can be explained by the normal calibration differences you experience), check your test set-up. If power output goes up as you improve the quality of the load impedance (be sure to de-key when making any changes in load), the control/protection circuitry is performing normally.

Typical mismatches in the load impedance (greater than 1.2:1 VSWR) may result in a 10-20% variation in the actual measure power output. Within these limits, the radio operates normally and you should not attempt to service it.

**Installation Planning**

Planning is the key to fast, easy radio installation. Before a hole is drilled or a wire is run, 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.

**Installation Planning - Base/Control Stations**

The base/control station option provides the radio with a desk microphone and power supply for use at a fixed location. All operations are the same as the mobile, except for the desk microphone.

Choose a location for your base/control station as close as possible to where the antenna cable enters the building. Be sure 117V AC, 60 Hz power is available. Make sure sufficient air can flow around the radio to permit adequate cooling.

### **Recommended Tools for Installation**

The following tools are recommended for proper installation of your new radio:

- Portable Drill
- Hammer
- Center Punch
- 5/16" Hex Nut Driver
- 1/4" Hex Nut Driver
- Phillips #1 Screwdriver
- Phillips #2 Screwdriver
- 3/16" Blade Screwdriver
- 3/8" Diameter Drill Bit
- 5/16" Diameter Drill Bit
- 5/32" Diameter Drill Bit

### **Antenna Mounting**

The best mounting location for the antenna is in the center of a large, flat conductive surface. In almost all vehicles, these requirements are best satisfied by mounting the antenna at the center of the roof. Some vehicles have a large trunk lid that provides a good antenna location. If the trunk lid is used, connect grounding straps between the trunk lid and vehicle chassis to insure the trunk lid is a chassis ground. See the instruction manual supplied with the antenna for complete installation information.

## **Radio Mounting**

### **Non-Locking Trunnion**

The standard non-locking trunnion allows the radio to be mounted to a variety of mounting surfaces. Be sure the mounting surface is able to adequately support the weight of the radio. Allow sufficient space around the radio for free air flow for cooling. Be sure the unit is close enough to the vehicle operator to permit easy access to operating controls. Although the trunnion can be mounted to a plastic dashboard, it is recommended that the mounting screws be located so they penetrate the supporting metal frame of the dashboard.

### **Floor Mount**

A floor mount wedge (HLN9450) is available, which allows the radio to be tilted at either 45 or 60 degrees. (HLN9404 - Sleeve mounting bracket is also required).

### **Quick Disconnect Slide Mount**

The quick disconnect slide mount option is provided to allow the easy removal and installation of the radio. This may be desired by the operator for security reasons or to allow the use of one radio in multiple vehicles. This mount securely mounts the radio and makes all electrical connections, including the antenna connection.

### **Extra Stability Mounting Tray**

The optional extra stability mounting tray is used in conjunction with the non-locking trunnion. If the radio is mounted on a rounded surface, you may need to supply and install shim washers (not provided) between the bracket and the mounting surface. Shims are necessary to tilt the radio because the heavy duty bracket blocks the standard trunnion adjustments. Follow instruction provided with the option.

### **Locking Trunnion**

The optional locking trunnion consists of a two-piece trunnion type mounting bracket equipped with a key lock and associated mounting screws and is designed to facilitate easy removal. The locking trunnion may be mounted on either metal or plastic surfaces, provided the mounting surface adequately supports the weight of the radio. Follow instructions provided with the option.

Before attempting to install the locking trunnion, examine the vehicle for suitable mounting locations. This bracket requires a flat mounting surface, 8" X 2" minimum with adequate clearance for inserting the radio. The chosen location should be convenient to the vehicle operator and provide access to the power and the antenna connectors. Be careful to choose a location that permits the locking trunnion to be removed from the mounting bracket. Vehicle operation should never be impaired by the location of the trunnion or radio.

**NOTE**

Overhead mounting is not recommended.

**Remote Mount Capability**

The remote mount kit provides the necessary equipment to detach the front panel controls of the GM300 from the transceiver. This allows for the installation of the transceiver box in the vehicle's trunk or under the seat.

**Begin Installation**

**DC Power Cable Installation**

This radio must be operated only in negative ground electrical systems. Reverse polarity does not damage the radio; however, radio protection circuits cause the cable fuse to open. Check the vehicle ground polarity before you begin installation to prevent wasted time and effort.

The 10 foot DC power cable shipped with the radio is long enough for installation in most vehicles. Begin the power cable installation in the following manner:

1. Determine a routing plan for the power cable with reference to where the radio is to be mounted.
2. Locate an existing hole with a grommet in the vehicle fire wall, or drill a 3/8" access hole at the location for passing the power cable into the engine compartment. Install a grommet with 1/4" I.D. in the access hole to avoid damage to the cable.

**CAUTION**

HIGH DEGREE OF CARE SHOULD BE EXERCISED NOT TO DAMAGE ANY EXISTING VEHICLE WIRES.

3. From inside the vehicle, feed the red and black leads (without lugs attached) through the access hole and into the engine compartment. See Figure 1.
4. Locate the nearest available vehicle chassis ground mounting point and shorten the black lead to remove excess cable length.
5. Install ring lugs (supplied) onto stripped end of power cable black lead, and onto stripped end of red lead on fuse holder as shown in Figure 2.
6. Locate the fuse holder as close to the battery as possible and away from any hot engine component. Mount the fuse holder using the provided mounting hole and dress wires as necessary. Connect the fuse holder red adapter lead plug to the mating receptacle on the red lead of the power cable as shown in Figure 2.
7. Connect the power cable black lead directly to the vehicle chassis ground.
8. Connect the power cable red lead from the fuse holder to the positive (+) battery terminal. Make sure the adapter cable is connected to the main power cable red lead.
9. Plug fuse into in-line fuse holder as shown in Figure 2.

**NOTE**

Failure to mount the red lead of the power cable kit directly to the battery may result in severe alternator whine interference and cause radio to revert to mode 1 each time the power is turned off.

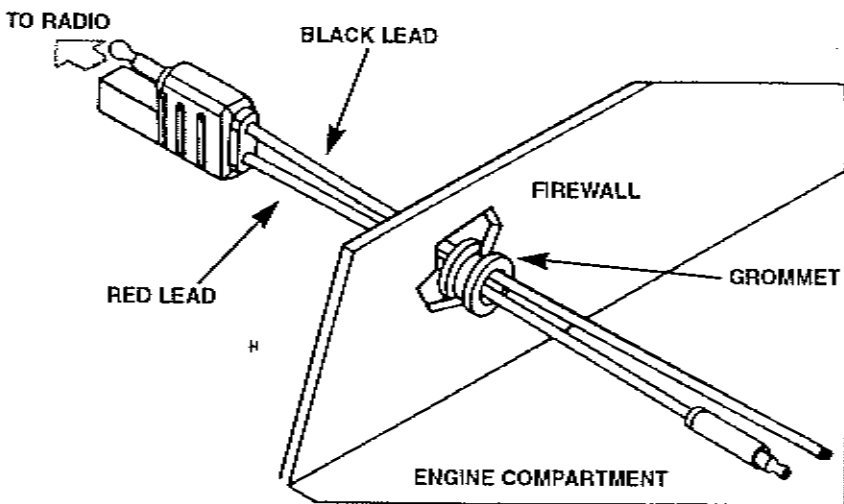


Figure 1. Power Cable Routing Into Engine Compartment

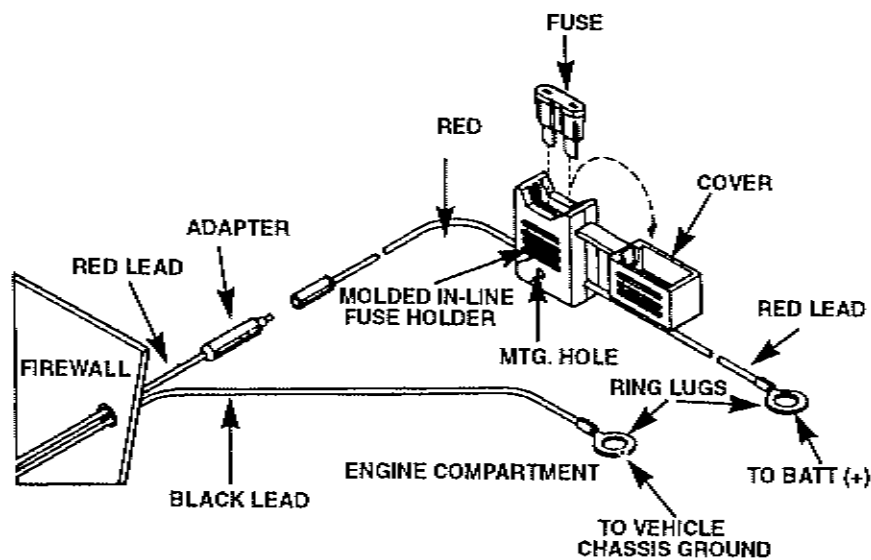


Figure 2. Power Cable Assembly

### Non-locking Trunion Installation

(See Figure 4)

1. Select the location to mount your radio either on the **Transmission Hump** or **Under the Dash** (see Figure 4).
2. Using the trunion 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 outermost holes for a flat surface such as under the dash.
3. Center-punch the spots you have marked and drill a 5/32" hole at each.
4. Secure the trunion mounting bracket and secure it with the two thumb screws provided.
5. To complete your radio installation plug the power cable into the radio power connector (see Figure 3).
6. Mount the antenna using the instructions provided with the antenna kit. Run the coaxial cable to the radio mounting location. If necessary, cut off the access cable and install the cable connector.
7. Connect the antenna cable connector to the radio antenna connector on the rear of the radio (see Figure 3).
8. Mount the microphone clip. Follow instructions provided with the microphone clip.
9. Plug the Microphone into the front panel connector. Your microphone has a telephone type connector at the end of its cord. Connect and disconnect your Radio Microphone in the same manner you connect and disconnect your telephone handset.

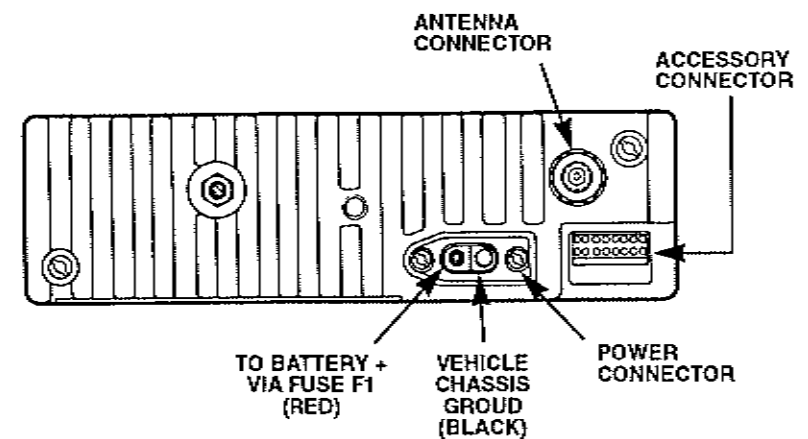


Figure 3. Connection to Radio Rear Panel



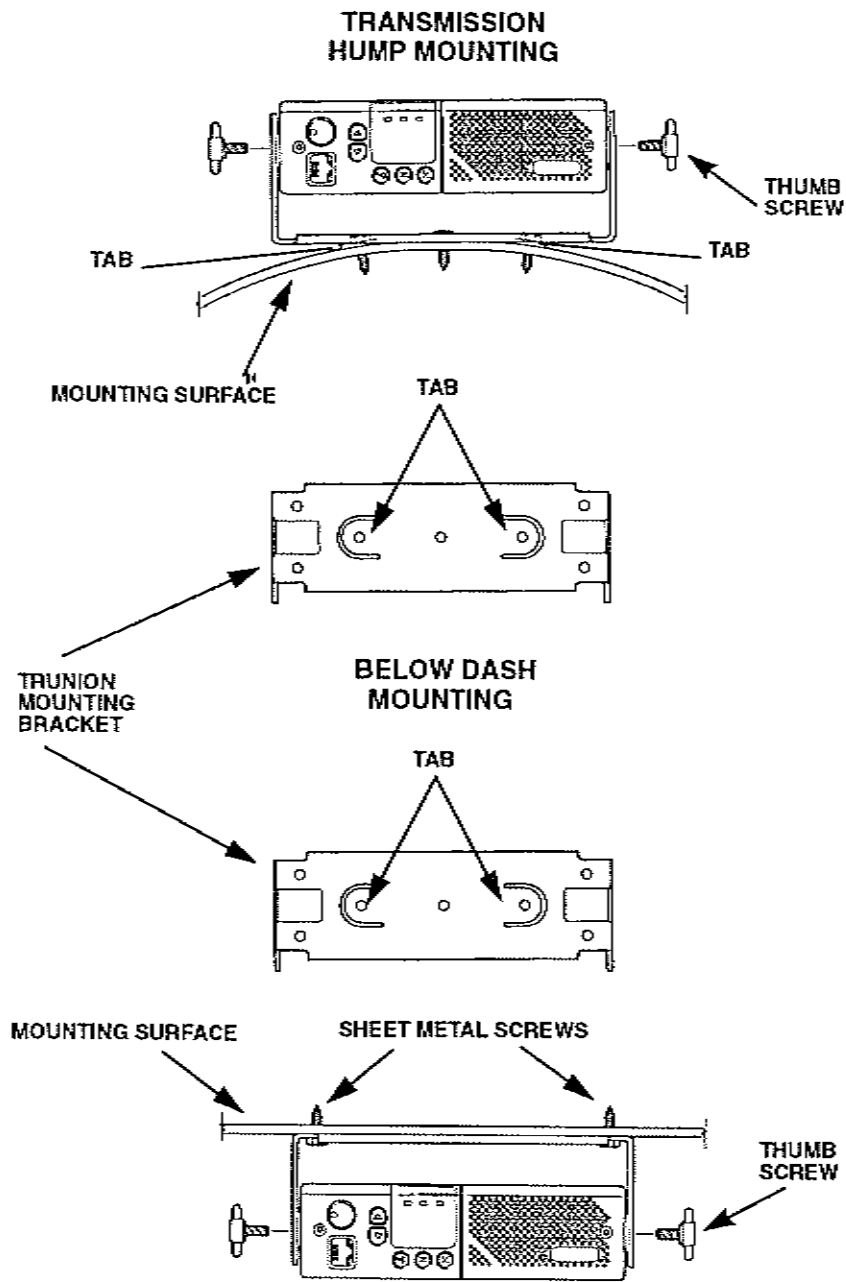


Figure 4. Trunnion Mount for Radio

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