

# MaxTrac 100™/MaxTrac 300™ Mobile Radios

operating instructions

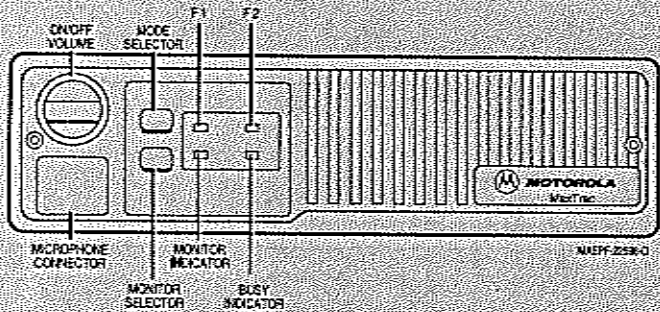
MaxTrac 100/300



 **MOTOROLA**



## Operating Instructions for MaxTrac 100™ Conventional Mobile Radio



### Turning the Radio On

To turn the radio on, rotate the **On/Off Volume** knob clockwise until it clicks. A short chirp tone will be heard if the radio passes the radio self-check test. The last channel used before the radio was turned off will be displayed. The radio is now in standby mode and ready to receive or transmit.

**Note:** The radio should be turned off whenever the engine is off to avoid draining the vehicle battery.

### Standard Receive Operation

#### Setting the Volume Level

Set the volume by turning the **On/Off Volume** knob clockwise. Use voice traffic or unsquelch the radio to set the volume to a comfortable listening level.

#### Selecting a Channel

Select the channel by pressing the **Mode** button. The selected channel indicator LED (**F1** or **F2**) will light. An extended hold of the **Mode** button will allow you to switch between channels.

#### Monitoring a Channel

If you wish to monitor a channel, press the **Monitor** button to disable coded squelch. You may also enable the monitor function by taking the microphone off-hook. When in the monitor mode, the monitor (**Mon**) LED will light steadily.

#### Unsquelching the Radio

To unsquelch the radio, press the **Monitor** button for 2 seconds (for a low-band radio, release button after two chirps). This unmutes the speaker and the busy (**Bsy**) LED will flash. If necessary, reset the volume to a comfortable listening level. To leave the unsquelched mode, press the **Monitor** button. This will return the radio to the squelch operating mode.

#### Low Band Extender Feature

Low-band radios include an extender circuit, whose function is to blank out interfering noise pulses commonly found in the low-band frequency range. This is also known as a "noise blanker." The extender is always enabled when the radio is turned on. It can be disabled with an extended hold (four seconds, three chirps) of the monitor button. To enable the extender function again, press the **Monitor** button as before (four seconds, three chirps).

### Standard Transmit Operation

#### Transmitting

Do not transmit if anyone else is using the channel. The busy (**Bsy**) LED will flash if there is another carrier on the channel. If the channel is clear, press the **PTT** (push-to-talk) button on the side of the microphone. The channel indicator LED (**F1** or **F2**) will turn red to indicate that you are "on the air."

## MaxTrac 100™/MaxTrac 300™ Mobile Radios

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## Introduction

Welcome to the MaxTrac™ mobile radio family! Your choice of a MaxTrac mobile radio 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 your MaxTrac mobile radio (henceforth referred to as radio) in order to better serve all your communication needs.

### MaxTrac 100™ and MaxTrac 300™ Features

The following features are standard on all models (except as noted in the next two sections):

- Synthesized, Wide-Band Operation
- Multiple-Coded Squelch (Private-Line® and Digital Private-Line™) Capability
- Field Programming Capability
- MIL-Standard B10C/D Performance (optional extra-stability mounting required on some models)
- MaxTrac High Performance Compact Microphone with Hardware
- Non-Locking Trunnion or Sleeve-Mounting Bracket with Hardware
- 10-Foot Power Cable
- 12Vdc Negative Ground
- 3-Watt Internal Speaker
- Rotary Volume Control
- Time-Out Timer
- On-Hook Monitor Capability
- Mini-UHF Antenna Connector

### MaxTrac 300™ 32-Channel Features

The MaxTrac 300 32-channel radios operate identically to the 16-channel MaxTrac with Channel Scan™. The 32-channel standard model comes equipped for selective signalling and includes the expanded accessory connector. The radio operation for selective signalling and expanded accessory connector is identical to correspondingly equipped existing 6-channel and 16-channel MaxTrac 300 models.

## Signalling Types

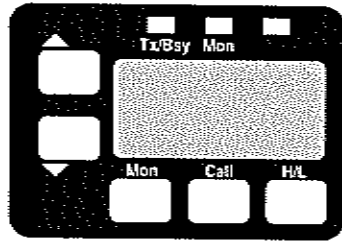
### MaxTrac 300™, 900MHz Features

The MaxTrac 300 900MHz radios have incorporated a few minor changes from the existing (non-900MHz) conventional MaxTrac 300 models. These changes are described below:

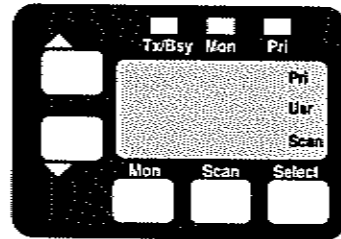
The front panel of the 900MHz MaxTrac 300 6-channel model with the selective signalling option differs from the corresponding non-900MHz MaxTrac 300 6-channel model as follows:

- a **Call** button replaces the **Exit** button
- an **H/L** button replaces the **Select** button

The front panel of the 900MHz MaxTrac 300 16-channel model is the same as the corresponding non-900MHz MaxTrac 300 16-channel model.



900MHz MaxTrac 300  
(6-Channel)



900MHz MaxTrac 300  
(16-Channel)

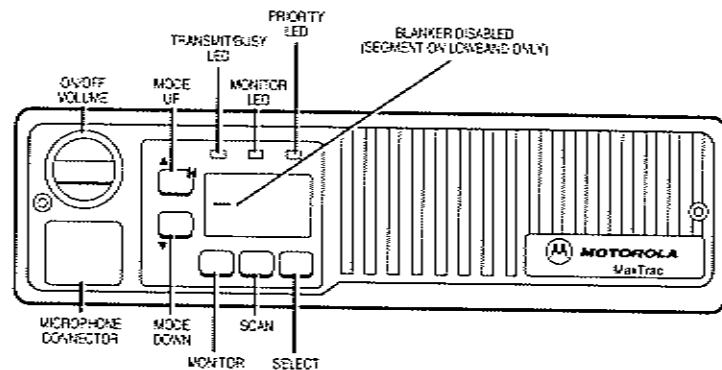
On 900MHz MaxTrac 300 6-channel models with the selective signalling option, to send a selective call encode, a Call Alert™ encode, or a radio check, the **Call** button is pressed once, twice, or three times, respectively. (Identical to the way the **Select** button is used on the other models.) The **H/L** button is pressed once to enable the external alarm (horn/lights) feature; pressing the **H/L** button again (or pressing the **Call** button) will turn the external alarm feature off. (On other models, the **Select** button is used to enable this feature; the **Select** and/or **Exit** button is used to turn it off.)

Other operational differences for the 900MHz models are as follows. For 900MHz models, only, the emergency encode feature can now be cancelled by any button press or by taking the microphone off-hook. (On other non-900MHz models, the microphone PTT must be pressed to clear the emergency.) After exiting a Call Alert decode state by pressing any button, PTT, or by taking the microphone off-hook, 900MHz models will return to the "HL" (external alarm armed) state if this was enabled before the call. (Non-900MHz models always return to dispatch operation after the Call Alert decode is cleared.)

All other radio operations are identical for corresponding 900MHz and non-900MHz models, as described in the operating instructions.

There are three signalling packages that are available for conventional MaxTrac radios. They are MDC-1200™, Quik-Call II™, and DTMF decode. These signalling packages include features such as Call Alert™ with external alarm capability. DTMF decode must be ordered as an option on all models; MDC-1200 and Quik-Call II signalling packages are optional on all models except for 32-channel models. The 32-channel models ship standard from the factory with Quik-Call II signalling enabled. On signalling-equipped models, the radio service software (RSS) can be used to enable and disable different features. Contact your Motorola representative or contact your local Motorola service center for additional information.

## MaxTrac 100/300 Operation



MaxTrac 300 (16-Channel) Model

### Turning the Radio On

To turn the radio on, rotate the **On/Off Volume** knob clockwise until it clicks. A short chirp tone will be heard if the radio passes the radio self-check test. The last channel used before the radio was turned off will be displayed. The radio is now in standby mode and ready to receive or transmit.

**Note:** The radio should be turned off whenever the engine is off to avoid draining the vehicle battery.

### Radio Self-Check

Every time the radio is turned on (power-up), it performs a functional self-check and, if necessary, will sound a 5-second warning tone instead of the short 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 field and should be serviced immediately.

## Standard Receive Operation

### Setting the Volume Level

Set the volume by turning the **On/Off Volume** knob clockwise. Use voice traffic or unsquelch the radio to set the volume to a comfortable listening level.

### Selecting a Channel

- **MaxTrac 100 Radio** — Select the channel by pressing the **Mode** button. The selected channel indicator LED (**F1** or **F2**) will light. An extended hold of the **Mode** button will allow you to switch between channels.
- **MaxTrac 300 Radio** — Select the channel by pressing either the **Up** (**▲**) or **Down** (**▼**) button. The selected channel number will be displayed. An extended hold of either button will allow you to scroll through all active channels in ascending and descending order.

### Monitoring a Channel

If you wish to monitor a channel, press the monitor button (**Monitor** on MaxTrac 100 radio or **Mon** on MaxTrac 300 radio) to disable coded squelch. You may also enable the monitor function by taking the microphone off the hook. When in the monitor mode, the monitor (**Mon**) LED will light steadily.

### Unsquelching the Radio

To unsquelch the radio, press the monitor button (**Monitor** on MaxTrac 100 radio or **Mon** on MaxTrac 300 radio) for 2 seconds (for low-band radio, release after two chirps). This unmutes the speaker and the busy LED (**Bsy** on MaxTrac 100 radio or **Tx/Bsy** on MaxTrac 300 radio) will flash. If necessary, reset the volume to a comfortable listening level.

To leave the unsquelched mode, press the monitor button. This will return the radio to the squelch operating mode.

### Low-Band Extender Feature

Low-band radios include an extender circuit, whose function is to blank out interfering noise pulses commonly found in the low-band frequency range. This is also known as a "Noise Blanker." The extender is always enabled when the radio is turned on. It can be disabled with an extended hold (four seconds, three chirps) of the monitor button. On a MaxTrac 300 radio the display will indicate the extender is disabled with a dash (—). To enable the extender function again, press the monitor button as before (four seconds, three chirps).

### Standard Transmit Operation

#### Transmitting

Do not transmit if anyone else is using the channel. The busy LED (**Bsy** on MaxTrac 100 radio or **Tx/Bsy** on MaxTrac 300 radio) will flash if there is another carrier on the channel. If the channel is clear, press the PTT (push-to-talk) button on the side of the microphone. On the MaxTrac 100 radio, the channel indicator LED (**F1** or **F2**) will turn red to indicate that you are "on the air." On the MaxTrac 300 radio, the transmit LED (**Tx/Bsy**) will light steadily to indicate that you are "on the air."

Hold the microphone about 2 inches from your mouth and speak at a normal voice level. DO NOT SHOUT. It will not make your transmission clearer.

#### Time-Out Timer Feature

All models have a time-out timer (TOT) that will terminate your transmission if you hold the **PTT** button down for 30 seconds (default setting). To warn the user, an alert tone will sound from the speaker for about 4 seconds before the transmission is terminated. The time-out timer can be disabled or changed in duration (up to 255 seconds) via radio service software (RSS).

### Signalling Operation

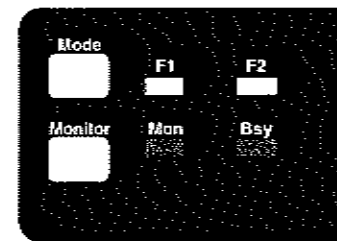
**Note:** Signalling and Channel Scan™ are compatible. However, during scan operation, a selective call on a particular channel could be missed since the radio may not be checking that channel when the selective call is sent.

It is recommended that priority scan is selected and the signalling channel be designated a priority channel to improve the likelihood that the selective call will be received.

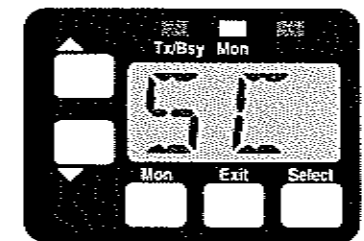
#### Receiving a Voice Selective Call

When a voice selective call is received, a one-time, two-beep alert tone will sound; the busy and monitor LEDs will flash. On a MaxTrac 300 radio, the display will also show "SC" or calling ID.

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



MaxTrac 100



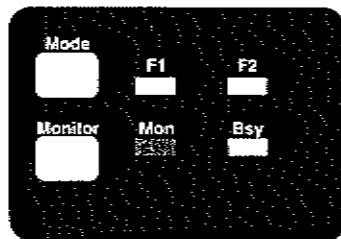
MaxTrac 300  
(6-Channel)



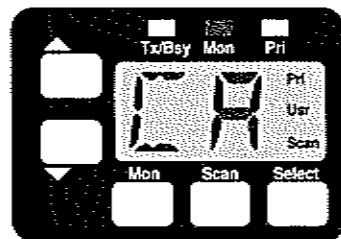
### Receiving a Call Alert™

When a Call Alert is received, the monitor (**Mon**) LED will flash and a series of four alert tones will sound. On a MaxTrac 300 radio, the display will also show "CA" or calling ID). If it is a Call Alert voice message, a voice message will follow. To return to the squelch operating mode, press the monitor button.

A Call Alert "leaves a message" for the mobile operator. The **Mon** LED will continue to flash; the "CA" or calling ID will remain on the display; and the alert tones will repeat every 10 seconds until the push-to-talk (PTT) or any other button is pressed. The radio will then return to normal operation (on 900MHz models, the radio returns to the external alarm armed mode, if enabled).



MaxTrac 100

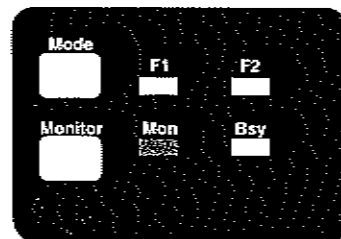


MaxTrac 300 (16-/32-Channel)

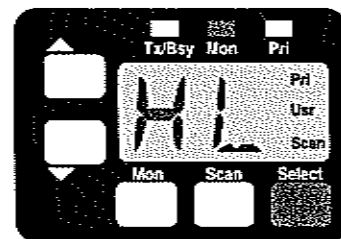
### Receiving an External Alarm (Horn or Lights)

The external alarm (horn or lights) feature requires an alarm relay cable. To enable this feature, press the **Select** button on a MaxTrac 300 radio (H/L button on 900MHz 6-channel radio) or turn the external switch on the alarm relay cable to the ON position on a MaxTrac 100 radio. On a MaxTrac 300 radio, the display will show "HL." To disable this feature, press the **Select**, **Call**, **Exit**, or H/L button.

When the external alarm feature is enabled, an incoming Call Alert will activate the alarm. There will be a slight delay before the horn or lights turn on. During this delay, the monitor (**Mon**) LED will flash and an alert tone will sound. An operator, in or near the vehicle, who sees or hears the Call Alert indication will have the opportunity to deactivate the alarm before it goes off. This is done by pressing any button or taking the microphone off-hook.



MaxTrac 100



MaxTrac 300 (16-/32-Channel)

### Sending an Identification Number

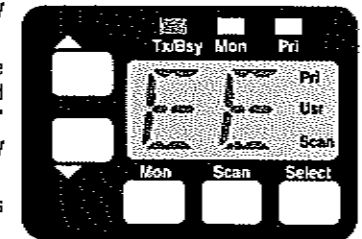
Every time the PTT key is pressed, the radio automatically transmits a unit identification (ID) number. While holding the PTT key, a tone may be heard while the unit ID number is being sent out. Do not begin talking until the tone is over.

### Sending an Emergency Alert

To send an emergency alert, press the external footswitch or pushbutton.

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 (Tx/Bsy) LED will light.
- The letters "EE" will appear on the display (MaxTrac 300 radio only).
- Five alert tones will sound to indicate the control unit has received and acknowledged the emergency. The "EE" will then disappear from the display (MaxTrac 300 radio only).
- 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 push-to-talk (PTT). No other button press will function normally except monitor button.

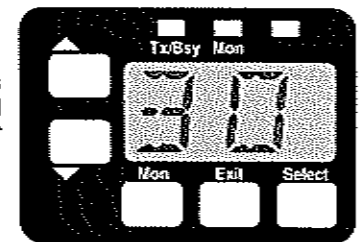


If programmed for EMERGENCY REVERT, the radio will automatically change (revert) to an emergency channel to send the call. The channel display will show the emergency channel after the "EE" clears (MaxTrac 300 radio only).

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.

### Display of Incoming Identification Numbers

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



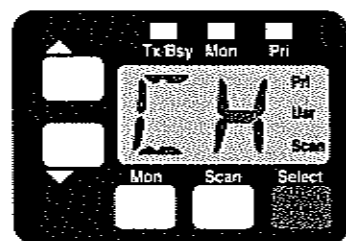
MaxTrac 300

### Activating the Call List for Sending Selective Messages

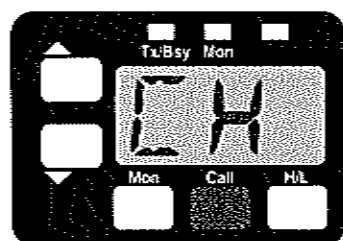
Pressing the **Select** button (**Call** button on 900MHz 6-channel model) will activate the call list. The most recently used ID number and the call letters will alternately be displayed. The following call letters may be displayed:

- 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.

**Note:** The first time the call list is activated after power-up, the first ID on the call list will be displayed.



MaxTrac 300



900MHz MaxTrac 300  
(6-Channel)

### Selecting Call-List Letters and ID Numbers

Each press of the **Select** button (**Call** button on 900MHz 6-channel model) causes the display to move down the list of call letters which have been programmed in the radio.

Pressing the **Up** (▲) or **Down** (▼) buttons will scroll through the ID numbers. All call list ID numbers will be displayed with each set of call letters. However, some IDs 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 an invalid operation.

### 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 pre-programmed transmit channel to send the signalling message, and the channel will be briefly displayed while the message is being transmitted.

### Receiving an Acknowledgement

Depending on the signalling format used, the sending radio may look for an acknowledgement from the receiving field unit on Call Alert and radio check calls.

The sending radio will show an "A" and four alert tones will sound if the field unit received and acknowledged the call. It will try to reach the field unit five times and, if unsuccessful, a "-A" will be displayed and a low tone will sound to indicate no acknowledgement.

### Exiting the Call List

The **Select** or **Call** button can be used to exit the signalling call list. Repeated pressing of the **Select** or **Call** button takes one through the sequence of call letters to the channel display for normal operations.

Six channel radios also have an **Exit** or **H/L** button. A single press of the **Exit** or **H/L** button will take the radio out of signalling and return to the channel display at any time.

### 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 IDs 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.

### 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 any button press on the radio.

The second step requires the use of an external push button or footswitch. Only a press of the external switch will clear the emergency display.



## Channel Scan™ Feature (MaxTrac 300 16-/32-Channel Radios Only)

### Description

If your radio is the MaxTrac 300 16-channel or 32-channel model, it includes Channel Scan monitoring. The radio may come with **pre-programmed scan** lists dedicated to every active channel (channel-slaved). The user selects a particular channel and turns on scan, choosing either "scan" or "priority scan."

The radio user can also program one unique **user-programmable scan** list from the front panel of the radio, which is retained in memory until changed or deleted by the user. To access this list, choose either "user scan" or "priority user scan."

Both types of scan operate in either non-priority or priority modes. Non-priority scan means that every channel on the scan list is monitored equally. However, with priority scan, certain channels have "priority" over others and are checked more frequently. If you are scanning with priority, the radio will continually check for activity on your priority channels, even when you are listening to a message on another channel, and there may be short gaps in the audio. The radio will continue to check priority one even while receiving a call on priority two.

With pre-programmed scan, the channel you have selected is always the priority one channel. The priority two channel is pre-programmed and is the same for every scan list. With user-programmable scan, the priority channels are designated by the operator.

### Operation

To turn scan on or off, press the **Scan** button. The radio will only scan when on-hook. The channel display will blank, and a green, horizontal segment(s) will light to indicate which type of scan is functional. For your convenience, the display will indicate the most recently selected scan status.

Use the **Select** button to advance through the scan types:

**Note:** The first and last displays apply to the pre-programmed (channel-slaved) scan lists and will be the only ones operational until the operator programs a user scan list into the radio.

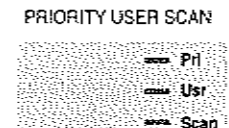
When an active channel with the correct signalling code is detected, the channel number will be displayed, and you will hear the call. If you have pressed the monitor (**Mon**) button, the scan will disregard squelch codes and scan for all activity on each channel in the scan list.

If you are in the scan mode when the power is turned off, the radio will return to the scan mode when powered up again. To leave scan, press the **Scan** button.

To respond to scanned channel activity, lift the microphone off-hook. The radio will suspend scanning and return to the channel displayed before entering scan. If you wish to respond to a transmission on another channel, you must use the **Up** (▲) or **Down** (▼) buttons to reach that channel. To resume scanning, replace the microphone on-hook.

**Note:** If the "talk-back" scan feature is enabled, your radio will remain on the active channel when the microphone is taken off-hook instead of returning to the selected (home) channel. This allows you to respond or "talk-back" to a transmission received on a scanned channel.

In **priority scan**, the green priority (**Pri**) LED will flash to indicate activity on priority one and light steady for priority two. When receiving an active channel, the radio will continue to check the priority channels. The display will momentarily revert to the scan type and there may be a short gap in the audio.



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## Pre-Programmed Scan

Each active channel in the radio can have a pre-programmed scan list dedicated to it. Through the use of radio service software (RSS) and a computer at a service location, any combination of sequential frequencies may be programmed into each active list.

Priority one is always assigned to the selected channel. Priority two can be designated by the servicer or deleted altogether. However, the radio can only have one designated priority-two channel. Therefore, priority two must be the same channel in each scan list. For example, if channel three has been programmed as the second priority in a scan list, channel three will be the second priority channel in the remaining active scan lists.

The MaxTrac 300 16-channel and 32-channel radio scans at a rate of approximately 250 milliseconds per channel. Therefore, scanning more than eight frequencies is not recommended.

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## User-Programmable Scan

A single user-scan list (one per radio) can be programmed from the front panel by the operator and will be retained in memory until changed or deleted. This is separate from the scan lists pre-programmed to each active channel.

To create or modify the user-scan list, hold the **Scan** button down for 2 seconds until you hear a second chirp tone. The channel number will flash. Add or delete this channel from the list by pressing the **Select** button.



A vertical segment in the upper left corner of the display will light to indicate that the flashing channel has been added to the user-scan list. It will disappear when the channel is deleted.

Use the **Up** (▲)/**Down** (▼) and **Select** buttons to add or delete 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 priority (**Pri**) LED will flash to indicate that the displayed channel is designated as the priority one channel. Repeat the process to select a priority two channel, if desired, which will be indicated by a steady light on the priority (**Pri**) LED.

It's important to note that the priority-one channel is programmed first followed by the priority-two channel. To set different priorities, deleting either one will delete both priority channels at the same time. Then, reset priority channels as described above.

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## Talk-Back Scan

In addition to changing pre-programmed (channel-slaved) scan lists and the second priority channel, the radio service software (RSS) also provides the capability for "talk-back" scan. If this feature is enabled, the radio will remain on the active channel when the microphone is taken off-hook instead of returning to the selected (home) channel. This allows the user to respond or "talk-back," to a transmission received on a scanned channel.

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## Nuisance-Channel Delete Feature

Each of the MaxTrac 300 16-channel and 32-channel radio scan types have the nuisance-channel delete feature. If a channel in a scan sequence is at times in heavy use by another operator causing the radio to be continually monitoring that channel, you may wish to temporarily eliminate that channel from the scan list without reprogramming the radio. When receiving a transmission on that channel, simply hold down the **Select** button for 2 seconds and the nuisance channel will be temporarily deleted until that scan mode is changed or exited. Priority channels and the home channel cannot be deleted.

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## Scan Rates

The radio service software (RSS) also provides the ability to change the frequency with which a priority channel is checked. When the Channel Scan is stopped on a non-priority channel, it periodically "checks" the priority channel for activity. The rate at which this occurs is the priority sample rate. There are two rates available: fast is 0.5 seconds and slow is 1.5 seconds. Although the fast rate provides more assurance that a message won't be missed, it is, in effect, interrupting the current reception more often. Therefore, the radio is normally programmed for slow.

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## Field Programming Capabilities

The radio 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 to any duration from 1 to 255 seconds. The default setting is 30 seconds. Scanning radios can also be programmed to enable talk-back scan or the priority sample rate can be changed. Finally, radios ordered with selective signalling and 16-pin expanded accessory connector can be programmed to include a wide variety of features and accessories. It is not necessary to open the radio for reprogramming.

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## FCC Licensing Information

Your MaxTrac radio operates on FM radio communication frequencies and is subject to the rules and regulations of the Federal Communications Commission (FCC). The FCC requires that all operators using private land mobile or general mobile radio frequencies obtain a radio license before operating their equipment. Application for your FCC license is made on FCC Form 574 for low-band, high-band, and UHF frequencies. For a license in the 800MHz or 900MHz band, you must complete the Form 574 and 574-A Supplemental Form. These forms, as well as a booklet entitled "Form 574 Instructions," can be obtained from:

FCC Supply Section  
Administrative Services Division  
1919 M St., NW  
RM B-10  
Washington, D.C. 20554  
telephone 202-632-7272

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, see FCC Rules and Regulations, Part 90. These may be found in the Code of Federal Regulations (CFR) at 47 C.F.R. Part 90. The following subparts describe general eligibility requirements:

Subpart B: Public Safety Radio Services  
Subpart C: Special Emergency Radio Services  
Subpart D: Industrial Radio Services, which include, among others, Business, Manufacturers, and Special Industrial Services  
Subpart E: Land Transportation Radio Service

Eligibility for use of the general mobile radio service frequencies is found under Part 95 of the Rules and Regulations, 47 C.F.R. 95, subpart A.

Frequency coordination is now required for operation on most frequencies in the private land mobile radio services. Once the license application form is completed, it must be forwarded to the appropriate frequency coordination agency, which is determined by the operator's eligibility classification. The coordination agency assigns a frequency, or frequency pair, to the application and forwards it to the FCC for final processing. There is a frequency coordination fee, which must be included with the license application. Current fee charges can be obtained by calling your appropriate frequency coordination agency. See Communication Agencies section.

An exception to the requirement for frequency coordination in the private land mobile radio services is licensing for use of itinerant frequencies. Itinerant operation is defined by the FCC as operation of a radio station at unspecified locations for varying periods of time. Those applications do not need frequency coordination and may be sent directly to the FCC. Frequency coordination is also NOT required for licenses in the general mobile radio service; these applications are also sent to the FCC. See Communication Agencies section.

The FCC charges a processing fee for all new, modified, or renewal license applications. This fee is payable by check or money order made out to the "Federal Communications Commission" and MUST be enclosed with the application. Any application without a check will be returned. (Exception: Applicants who are governmental entities and all applicants in any public safety or special emergency radio service are exempt from the FCC license fee.) Applications requiring coordination must have the FCC check, as well as the coordinator's check, attached when mailed to the coordinating agency. The coordinating agency will remove their check and will forward the coordinated application and FCC check to the FCC Licensing Division. Upon grant, the FCC will mail your radio station license to the address shown on your application Form 574.

#### Communication Agencies

If your eligibility is within the business radio service, contact the National Association of Business and Education Radio (NABER) for the NABER fee schedule and supplemental form to be completed and forwarded with Form 574 to:

NABER Frequency Coordination  
1501 Duke St., Suite 200  
Alexandria, VA 22314  
telephone 703-739-0300

The business radio service itinerant frequencies are 27.49MHz, 35.04MHz, 151.625MHz, 464.500/469.500MHz pair and 464.550/469.550MHz pair. Complete Form 574 and send to:

FCC-Business Radio Service  
P.O. Box 360291-M  
Pittsburgh, PA 15251-6291  
telephone 717-337-1212

If your eligibility is within the special industrial radio service, contact the Special Industrial Radio Service Association (SIRSA) for the SIRSA fee schedule. Complete Form 574 and send to:

SIRSA Frequency Coordination Dept.  
1700 N. Moore St., Suite 910  
Rosslyn, VA 22209  
telephone 703-528-5115

The special industrial radio service itinerant frequencies are 43.04MHz, 151.505MHz, 158.400MHz, and 451.800/456.800MHz pair. Complete Form 574 and send to:

FCC-Other Industrial Services  
P.O. Box 360354-M  
Pittsburg, PA 15251-6354  
telephone 717-337-1212

If your eligibility is within the manufacturer radio service, contact Manufacturers Radio Frequency Advisory Committee (MRFAC) for the MRFAC fee schedule and supplemental form to be completed and forwarded with Form 574 to:

MRFAC, Inc.  
6269 Leesburg Pike, Suite 304  
Falls Church, VA 22044  
telephone 703-532-7459

If you want to operate on general mobile radio service frequencies, complete Form 574 and send to:

FCC-General Mobile Radio Service  
P.O. Box 360373-M  
Pittsburg, PA 15251-6373  
telephone 717-337-1212

For information on other frequency coordinating agencies or additional licensing information, contact:

FCC  
2025 M St., NW  
Washington, D.C. 20554  
telephone 202-632-7272.

## Safety Information

### Safety Standard

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 MaxTrac radio when someone outside the vehicle is within 2 feet (0.6 meter) of the antenna.
- DO NOT operate the transmitter of a fixed radio (base station, microwave, rural telephone RF equipment) or marine radio when someone is within 2 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.
- TURN THE RADIO OFF when 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.

Refer to the appropriate section of the product service manual for additional pertinent safety information.

### Installation Safety Warnings

Consider the occupants' safety when you choose a location for the radio. Do not mount the radio overhead or on a sidewall 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 sidewall, give it the added protection of a retaining strap.

**CAUTION:** Installation of antennas with mobile radio equipment with transmitter power in excess of 7 watts.

**Note:** For low-power MaxTrac 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 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 FCC.

**Metal-Body Vehicles** — In metal-body vehicles with transmitters at any frequency having a power output in excess of 7 watts, it is mandatory, when using a glass-mount antenna, that 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 FCC.

For other antenna types, follow the existing installation instructions. The best location for the antenna is at the center of the 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.**

## Installation Planning and Procedures

### Testing and Maintenance

Your MaxTrac radio is completely adjusted, tested, and inspected before shipment. However, FCC regulations state that a station license must be obtained for each radio installation (radio 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 radio 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 ohms may cause an apparent reduction in output power due to the normal operation of the control/protection circuitry. These variations in power with other than 50-ohm load impedance will be most pronounced in the 800MHz and 900MHz bands since cables, meters, connectors, etc. have larger effects in those bands. However, the factors are still significant at UHF and VHF and considerable care should be exercised at these frequencies. If output power seems to be unusually low (greater than can be explained by the normal calibration differences you experience), check your test setup. If output power 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 [voltage standing-wave ratio]) may result in a 10-20% variation in the actual measured power output. Within these limits, the radio operates normally, and you should not attempt to service it.

### Operational Safety Warnings

#### WARNING:

- For vehicles equipped with electronic anti-skid systems, see "ANTI-SKID BRAKING PRECAUTIONS" publication, Motorola part number 68PB1109E34.
- For vehicles equipped with electronic ignition systems, check the service manual for warnings about the use of two-way radio equipment in the vehicle.
- 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 a 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:** Unsafe use of converted mobile radio equipment for portable applications:

Motorola two-way radio products that 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 that converts high-power equipment for portable operation not be used.



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## Installation Planning - Mobile Radios

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.

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## 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 radio, 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 117Vac, 60Hz power is available. Make sure sufficient air can flow around the radio to permit adequate cooling.

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## 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 #2 Screwdriver
- TORX® Screwdriver, T25
- 3/8" Diameter Drill Bit
- 5/16" Diameter Drill Bit
- 5/32" Diameter Drill Bit

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## 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 at chassis ground. See the instruction manual supplied with the antenna for complete installation information.

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## Radio Mounting

### Non-Locking Trunnion/High-Power Sleeve

The standard, non-locking trunnion (or sleeve used on low-band, 35-watt 800MHz or 30-watt 900MHz models) 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 is available which allows the radio to be tilted at either 45 or 60 degrees. The sleeve-mounting hardware, which is standard with low-band, 35-watt 800MHz, and 30-watt 900MHz models, mates with this wedge. If the wedge is to be used with other models, the sleeve must be ordered separately.

### 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 instructions provided with the option.

**Note:** The extra-stability mounting tray is not necessary for low-band, 35-watt 800MHz, or 30-watt 900MHz models as the sleeve mounting already provides maximum stability.

### 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.

## Begin Installation

### DC Power Cable Installation

This MaxTrac 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" internal diameter in the access hole to avoid damage to the cable.

**CAUTION:** A 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.

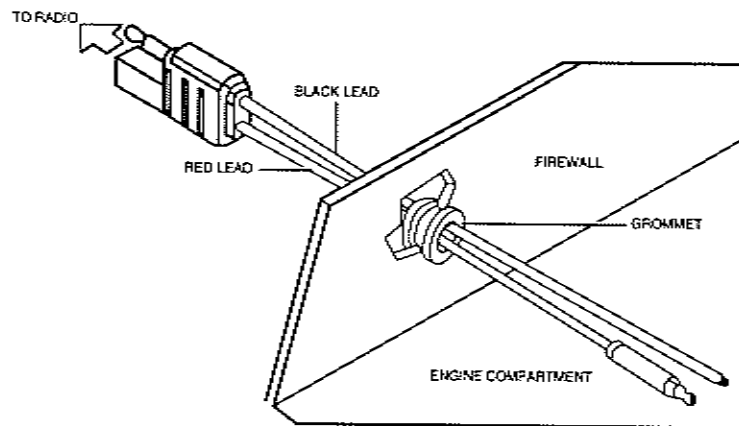


Figure 1. DC Power Cable Routing into Engine Compartment

- (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 the stripped end of the power cable black lead. Also install a ring lug onto the stripped end of the red lead on the 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.

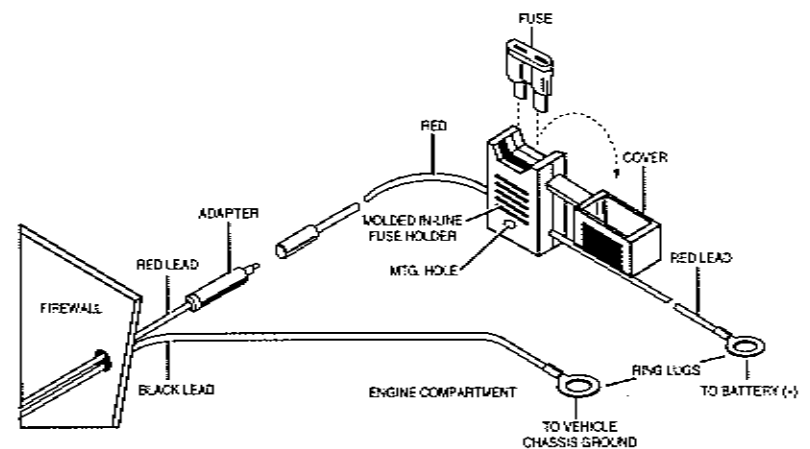


Figure 2. DC Power Cable Assembly

- (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.

**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 the radio to revert to mode one each time the power is turned off.

## Non-Locking Trunnion Installation

- (1) Select the location to mount your radio either on the TRANSMISSION HUMP OR BELOW THE DASH (see Figure 4).
- (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 outermost holes for a flat surface such as under the dash.
- (3) Centerpunch the spots you have marked and drill a 5/32" hole at each.
- (4) Secure the trunnion-mounting bracket to the surface with the four (10-16x3/4") screws provided.
- (5) Place the radio in the trunnion-mounting bracket and secure it with the two thumb screws provided.
- (6) To complete your radio installation, plug the power cable into the radio power connector [see Figure 3].
- (7) 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 excess cable and install the cable connector.

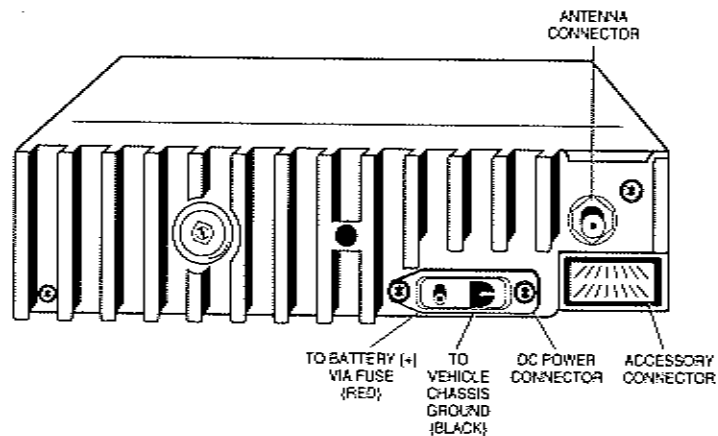


Figure 3. Connections to Rear Radio Panel

- (8) Connect the antenna cable connector to the radio antenna connector on the rear of the radio (see Figure 3).
- (9) Mount the microphone clip. Follow instructions provided with the microphone clip.

- (10) 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.

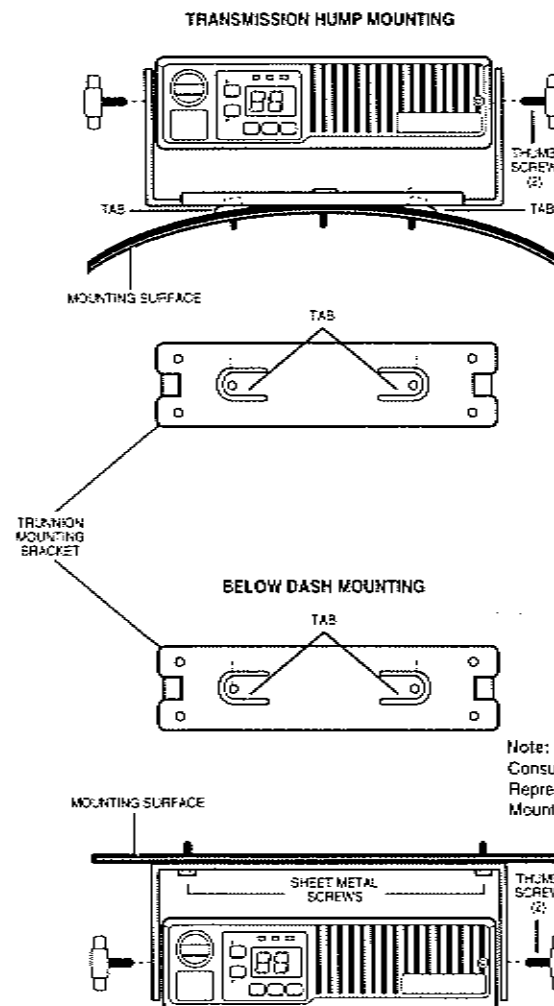


Figure 4. Trunnion Mount for Radio

Note:  
Consult your Motorola  
Representative for Overhead  
Mounting Precautions

## Sleeve-Mounting Bracket Installation

Your low-band, 35-watt 800MHz, and 30-watt 900MHz radios utilize a specially designed three-point sleeve mounting bracket for on or below dash mounting. To mount your radio on the floor, an optional accessory, the mounting wedge, is available (Motorola kit number HLNS450).

Dash mount your radio as follows:

- (1) Select the location to mount your radio either **ON THE DASH** or **BELOW THE DASH** (see Figure 5).
- (2) Using the sleeve-mounting bracket as a template, mark the positions of the holes on the mounting surface.
- (3) Centerpunch the spots you have marked and drill a 5/32" hole at each.
- (4) Secure the sleeve mounting bracket to the surface with the four (10-16 x 3/4") screws provided.
- (5) If there is sufficient room in the rear of the bracket to install the M5 x 0.8 x 10mm screw, proceed with step (7).
- (6) Install the tapered stud and nut in the rear hole of the sleeve-mounting bracket as shown in Figure 5.
- (7) Insert the radio into the sleeve-mounting bracket guiding the tapered pin into the hole in the rear of the heat sink. Secure it with the two thumb screws provided. If you have skipped step 6 above, install the M5 x 0.8 x 10mm TORX® screw in the rear of the bracket to secure the radio.
- (8) To complete your radio installation, plug the power cable into the radio power connector. 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 excess cable and install the cable connector.
- (9) Connect the antenna cable connector to the radio antenna connector on the rear of the radio.
- (10) Mount the microphone clip. Follow instructions provided with the microphone clip.
- (11) 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 a telephone handset.

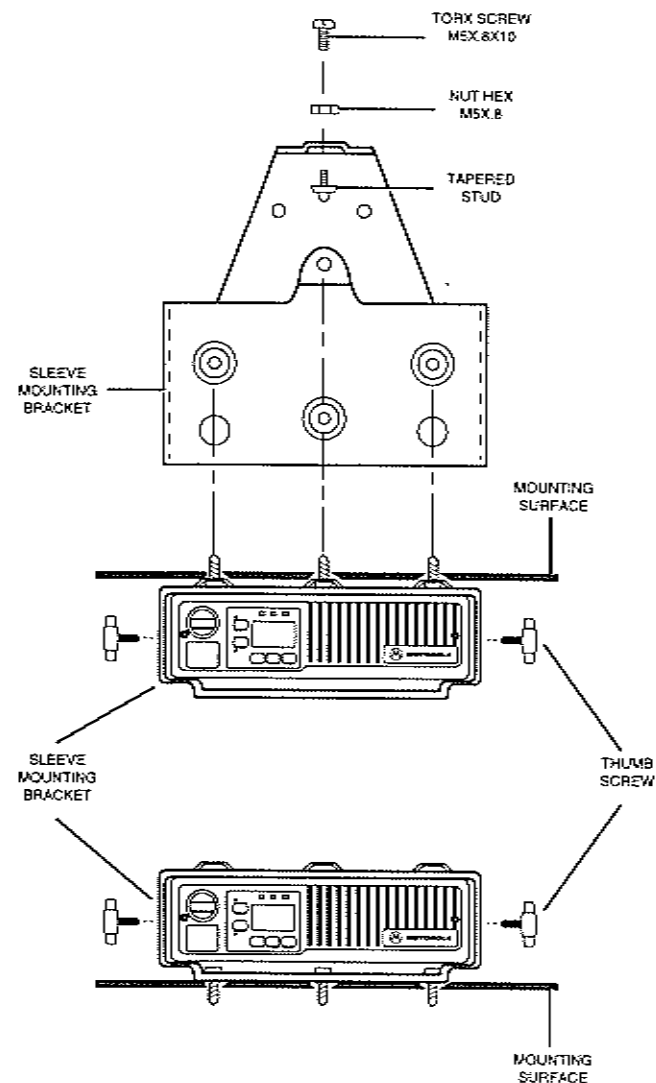


Figure 5. Sleeve Mount for Radio

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## Service

Proper repair and maintenance procedures will assure efficient operation and long life for this product. A Motorola maintenance agreement will provide expert service to keep this and all other communication equipment in perfect operating condition. A nationwide service organization is provided by Motorola to support maintenance and installation program. Motorola makes available the finest service to those desiring reliable, continuous communications on a contract basis.

Motorola Customer Service Division is the largest service organization specializing in mobile communications. It includes over 900 authorized or company-owned stations. In addition, our products are serviced throughout the world by a wide network of company or authorized independent distributor service organizations. For a contract service agreement, please contact your nearest Motorola service representative, authorized Motorola dealer, or Motorola sales representative. If you suspect a radio problem, check the following items before requesting service.

1. *Radio Checks:*

- Be sure the radio is turned on and passes the radio self-check.

2. *Operating Instructions:*

- Review your operation instructions to ensure proper radio use.

3. *Problem(s) Not Solved:*

- After following steps 1 and 2, if your radio still exhibits a problem, review your service agreement and call the applicable Motorola service representative.
- If you do not have a service agreement on your radio, contact your nearest authorized Motorola service shop for guidance toward a prompt and expedient evaluation and/or repair.

### For Service Information

If any questions arise, please call Florida Product Services.

1-800-523-4007 or 1-305-475-6170

TELEX: 441464 MDTC UI

FAX: 1-305-475-6006

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## Related Publications

MaxTrac™ Two-Way FM Radio Detailed Service Information Manual.....	68P80102W84
MaxTrac™ 100/300 Conventional Radio 12-Watt RF Power 900MHz.....	68P029B0G40

*Contact your Motorola representative to order additional manuals.*

## Commercial Warranty (Standard)

Motorola radio communications products ("equipment") are warranted against defects in material and workmanship under normal use and service for a period of ONE (1) YEAR, except for crystal devices, channel elements, high-stability oscillators (other than reference oscillators used for frequency synthesis) and crystal filters, which are warranted for a period of ten (10) years, from the date of shipment. Parts, including crystals and channel elements, will be replaced free of charge for the full warranty period, but the labor to repair or replace defective parts within the original shipped item of equipment plus travel costs for work on non-movable installed equipment items will be provided for one hundred twenty (120) days from the date of shipment. After said one hundred twenty (120) days, customer must pay for the labor involved in repairing or replacing defective parts at Motorola's then current prevailing rates together with any travel or transportation charges to and/or from the place where warranty service is provided. This express warranty is extended by Motorola Communications and Electronics Inc., 1301 E. Algonquin Road, Schaumburg, Illinois 60196, to the original customer only, and only to those purchasing solely for commercial, industrial, or governmental use.

This warranty is given in lieu of all other warranties express or implied which are specifically excluded including, without limitation, warranties of merchantability or fitness for a particular purpose. In no event shall Motorola be liable for damages in excess of the price stated on the order for the warranted item of equipment, or for any loss of use, loss of time, inconvenience, commercial loss, lost profits or savings, or other incidental, special or consequential damages to the full extent such may be disclaimed by law, even if Motorola has been advised of the possibilities of such damage, because each equipment system is unique, Motorola disclaims liability for range, coverage, or operation of the system as a whole under this warranty except by a separate written agreement signed by an officer of Motorola.

Except for batteries, in the event of a defect or failure to conform to specifications established by Motorola for the item of equipment, or if appropriate, to specifications accepted by Motorola in writing, during the applicable periods stated above, Motorola, at its option, will either repair or replace the item of equipment or refund the purchase price thereof, and such action on the part of Motorola shall be the full extent of Motorola's liability hereunder, and customer's exclusive remedy.

This warranty does not cover defects or damages to the equipment resulting from:

- (a) use of equipment in other than its normal and customary manner;
- (b) misuse, accident or neglect;
- (c) improper disassembly, testing, operation, maintenance, installation, modification, adjustment, alteration, or repair;

This warranty extends only to individual items or equipment; frequency sensitive components, towers, vidicon tubes and test equipment, and batteries sold for use on citizen band or marine products are excluded but carry their own separate warranty. Non-Motorola Inc. manufactured equipment is excluded from this warranty (unless bearing a Motorola part number in the form of an "alphanumeric number," for example, TDEEGGB), but such equipment may be subject to a warranty provided by such equipment manufacturer(s), and a copy(ies) of which will be supplied to customer on specific written request.

Any claim for breach of this warranty shall be waived unless customer notifies Motorola's marketing representative or Motorola at the above address, Attention: Quality Assurance Department, within the applicable warranty period.

This warranty applies only within the fifty (50) United States and the District of Columbia.

## Computer Software Copyrights

The Motorola equipment described in this manual may include copyrighted Motorola computer programs stored in semiconductor memories or other media. Laws in the United States and other countries preserve for Motorola certain exclusive rights for copyrighted computer programs, including the exclusive right to copy or reproduce in any form the copyrighted computer program. Accordingly, any copyrighted Motorola computer programs contained in the Motorola equipment described in this manual may not be copied or reproduced in any manner without the express permission of Motorola. Furthermore, the purchase of Motorola equipment shall not be deemed to grant either directly or by implication, estoppel, or otherwise, any license under the copyrights, patents or patent applications of Motorola, except for the normal nonexclusive, royalty free license to use that arises by operation of law in the sales of a product.





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