



MOTOROLA

INSTALLATION INSTRUCTIONS
FOR
ASTRO[®]/SPECTRA TO MCS 2000
CABLE ADAPTER SET



Safety Summary

Exposure to Radio Frequency Energy (National and International Standards and Guidelines)

Your Motorola two-way Radio, which generates and radiates radio frequency (RF) electromagnetic energy (EME), is designed to comply with the following national and international standards and guidelines regarding exposure of human beings to radio frequency electromagnetic energy:

- Federal Communications Commission Report and Order No. FCC 96-326 (August 1996)
- American National Standards Institute (C95-1-1992)
- National Council on Radiation Protection and Measurements (NCRP - 1986)
- International Commission on Non-Ionizing Radiation Protection (ICNRP - 1986)
- European Committee for Electrotechnical Standardization (CENELEC)
 - Env. 50166 - 1 1995E - Human Exposure to Electromagnetic Fields Low Frequency (0 Hz to 10kHz)
 - Env. 50166 - 2 1995E - Human Exposure to Electromagnetic Fields High Frequency (10kHz to 300Ghz)
 - Proceedings of SC211/8 1996 - Safety Considerations for Human Exposure to E.M.Fs from Mobile Telecommunications Equipment (M.T.E.) in the Frequency Range 30MHz - 6GHz (E.M.F - Electromagnetic Fields)

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

Table 1 below lists the minimum distance for several different ranges of rated radio power.

Table 1 Rated Power and Distance

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

Mobile Antenna Installation

Install the vehicle antenna *external* to the vehicle and in accordance with:

- The requirements of the antenna manufacturer/supplier
- Instructions in the Radio Installation Manual

Control Station Operation

When radio equipment is used to operate as a control station, it is important that the antenna be installed outside the building and away from places where people may be in close proximity.



Refer to Table 1 on page 2 for rated power and minimum distance values for transmitting antennas.

Airbag Warning

VEHICLES EQUIPPED WITH AIR BAGS

An air bag inflates with great force. DO NOT place objects, including communications equipment, in the area over the air bag or in the air bag deployment area. If the communications equipment is installed improperly and the air bag inflates, this can cause serious injury.

Installation of vehicle communication equipment should be performed by a professional installer/technician qualified in the requirements for such installations.

An air bag's size, shape and deployment area can vary by vehicle make, model and front compartment configuration (e.g., bench seat vs. bucket seats). Contact the vehicle manufacturer's corporate headquarters, if necessary, for specific air bag information for the vehicle make, model and front compartment configuration involved in your communication equipment installation.

LP Gas Warning

It is mandatory that radios installed in vehicles fuelled by liquefied petroleum gas conform to the National Fire Protection Association standard NFPA 58, which applies to vehicles with a liquid propane (LP) gas container in the trunk or other sealed off space within the interior of the vehicle. The NFPA58 requires the following:

- 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.
- Removable (outside) filling connections shall be used.
- The container space shall be vented to the outside.

Anti-Lock Braking System (ABS) and Anti-Skid Braking System Precautions



WARNING

Disruption of the anti-skid/anti-lock braking system by the radio transmitter may result in unexpected vehicle motion.

Motorola recommends the following radio installation precautions and vehicle braking system test procedures to ensure that the radio, when transmitting, does not interfere with operation of the vehicle braking system.

Installation Precautions

1. Always provide as much distance as possible between braking modulator unit and radio, and between braking modulator unit and radio antenna and associated antenna transmission line. Before installing radio, determine location of braking modulator unit in vehicle. Depending on make and model of vehicle, braking modulator unit may be located in trunk, under dashboard, in engine compartment, or in some other cargo area. If you cannot determine location of braking modulator unit, refer to vehicle service manual or contact a dealer for the particular make of vehicle.
2. If braking modulator unit is located on left side of the vehicle, install radio on right side of vehicle, and conversely.
3. Route all radio wiring including antenna transmission line as far away as possible from braking modulator unit and associated braking system wiring.
4. Never activate radio transmitter while vehicle is in motion and vehicle trunk lid is open.

Braking System Tests

The following procedure checks for the most common types of interference that may be caused to vehicle braking system by a radio transmitter.

1. Run vehicle engine at idle speed and set vehicle transmission selector to PARK. Release brake pedal completely and key radio transmitter. Verify that there are no unusual effects (visual or audible) to vehicle lights or other electrical equipment and accessories while microphone is NOT being spoken into.
2. Repeat step 1. except do so while microphone IS being spoken into.
3. Press vehicle brake pedal slightly just enough to light vehicle brake light(s). Then repeat step 1. and step 2.
4. Press the vehicle brake pedal firmly and repeat step 1. and step 2.
5. Ensure that there is a minimum of two vehicle lengths between front of vehicle and any object in vehicle's forward path. Then, set vehicle transmission selector to DRIVE. Press brake pedal just far enough to stop vehicle motion completely. Key radio

transmitter. Verify that vehicle does not start to move while microphone is NOT being spoken into.

6. Repeat step 5. except do so while microphone IS being spoken into.
7. Release brake pedal completely and accelerate vehicle to a speed between 15 and 25 miles/25 and 40 kilometers per hour. Ensure that a minimum of two vehicle lengths is maintained between front of vehicle and any object in vehicle's forward path. Have another person key radio transmitter and verify that vehicle can be braked normally to a moderate stop while microphone is NOT being spoken into.
8. Repeat step 7. except do so while microphone IS being spoken into.
9. Release brake pedal completely and accelerate vehicle to a speed of 20 miles/30 kilometers per hour. Ensure that a minimum of two vehicle lengths is maintained between front of vehicle and any object in vehicle's forward path. Have another person key radio transmitter and verify that vehicle can be braked properly to a sudden (panic) stop while microphone is NOT being spoken into.
10. Repeat step 9. except do so while microphone IS being spoken into.
11. Repeat step 9. and step 10. except use a vehicle speed of 30 miles/50 kilometers per hour.

POTENTIALLY EXPLOSIVE ATMOSPHERES

Turn off your two-way radio when you are in any area with a potentially explosive atmosphere, unless it is a radio type especially qualified for use in such areas (for example, Factory Mutual Approved). Sparks in a potentially explosive atmosphere can cause an explosion or fire resulting in bodily injury or even death.

Areas with potentially explosive atmospheres include fueling areas such as: below decks on boats; fuel or chemical transfer or storage facilities; areas where the air contains chemicals or particles, such as grain, dust or metal powders; and any other area where you would normally be advised to turn off your vehicle engine. Areas with potentially explosive atmospheres are often but not always posted.

To avoid possible interference with blasting operations, turn off your radio when you are near electrical blasting caps, in a blasting area, or in areas posted: "Turn off two-way radio". Obey all signs and instructions.

Introduction



The empty parentheses at the end of the kit numbers used throughout this publication stand for the alphabetical character (A, B, etc.) that denotes the revision level of the kit. The revision levels of the kits may change from time to time without affecting the validity of these installation instructions.

The ASTRO/Spectra to MCS 2000 Adapter Cable Kit (See Figure 1 on page 7) makes it possible to replace a Motorola ASTRO Digital Spectra or Spectra Mobile Radio, with a Motorola MCS 2000 Mobile Radio, without replacing the ASTRO Digital Spectra or Spectra remote cable assembly in the vehicle with a MCS 2000 remote cable assembly.

Hereafter in this publication, the ASTRO Digital Spectra and Spectra mobile radios are both referred to as the ASTRO/Spectra radio.

The ASTRO/Spectra to MCS 2000 Adapter Cable Set consists of Radio body Adapter Cable Kit HKN6134(), Control head Adapter Cable Kit HKN6135(), and this installation manual.

Radio body adapter cable kit HKN6134() consists of a 16-conductor cable that has an 18-pin connector on one end and a 25-pin connector on the other end. It adapts the 18-pin connector on the MCS 2000 radio body to the 25-pin radio body connector on the existing ASTRO/Spectra remote cable assembly. In addition, the cable has a pigtail lead protruding from one end. The pigtail lead has a connector pin for the MCS 2000 accessory plug crimped onto it. The pin inserts into location 15 of the MCS 2000 accessory plug.

Control head adapter cable kit HKN6135() also consists of a 16-conductor cable that has an 18-pin connector on one end and a 24-pin connector on the other end. It adapts the 18-pin connector on the MCS 2000 control head to the 24-pin control head connector on the existing ASTRO/Spectra remote cable assembly.

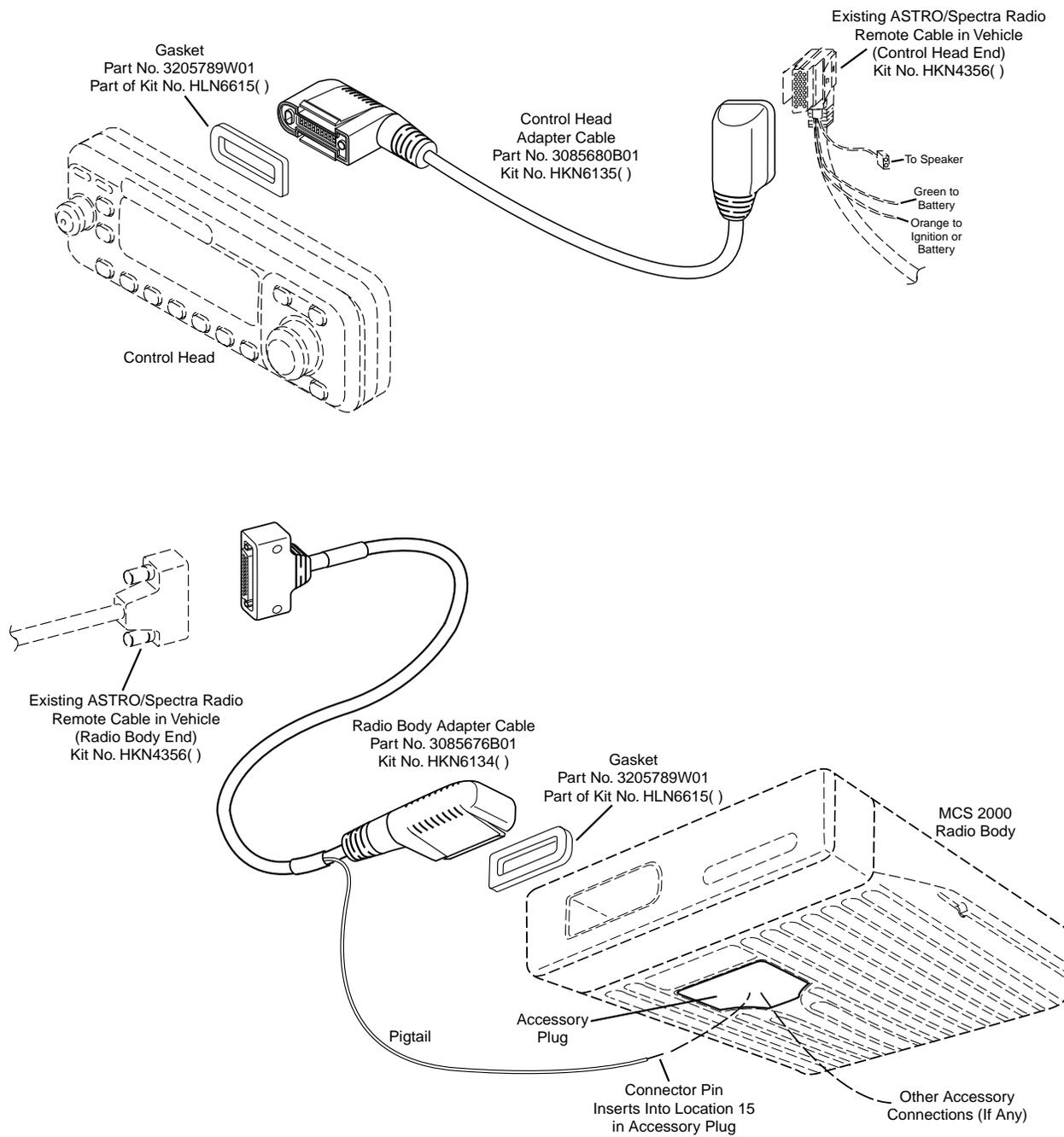
Each cable adapter kit includes two Tie Wraps to be used for adapter cable strain relief.

Reference Publications

GM 900, MC 900, GM 1200, MCX 1200, GM 2000, MCS 2000, MC 2100 Mobile Radios; Installation Instructions; All Frequency Ranges; Motorola Publication 68P02058U20 revision -E or higher.

Retrofit Instructions

To install an MCS 2000 mobile radio in place of a ASTRO/Spectra mobile radio, refer to Figure 1 on page 7 and follow the instructions on pages 8 through 13.



MAEPF-26470-O

Figure 1 ASTRO/Spectra to MCS 2000 Adapter Cable Set

Removing ASTRO/ Spectra Radio



When performing steps 1 through 7 below, *do not* disconnect loudspeaker from ASTRO/Spectra remote cable assembly or remove loudspeaker and/or ASTRO/Spectra remote cable assembly from vehicle.

1. Disconnect DC power cable connector from ASTRO/Spectra radio.
2. If a high power ASTRO/Spectra radio is being removed from vehicle or a high power MCS 2000 radio is being installed in vehicle, disconnect DC power cable from vehicle battery and remove DC power cable from vehicle.
3. Disconnect control head connector on ASTRO/Spectra remote cable assembly from ASTRO/Spectra control head. Then remove ASTRO/Spectra control head, control head trunnion, and all associated hardware from vehicle.
4. Disconnect radio body connector on ASTRO/Spectra remote cable assembly from ASTRO/Spectra radio body.
5. Disconnect RF connector on antenna cable from connector on ASTRO/Spectra radio body.



Before performing step 6 below, take note of whether radio accessories are connected to connector on ASTRO/Spectra control head or to connector on back of ASTRO/Spectra radio body. This information is needed later when reconnecting accessories.

6. Disconnect accessory plug from accessory connector on ASTRO/Spectra control head or ASTRO/Spectra radio body.
7. Remove ASTRO/Spectra radio body, ASTRO/Spectra radio body trunnion, and all associated hardware from vehicle.

Installing MCS 2000 Radio

Installing an MCS 2000 Mobile Radio into a vehicle from which a ASTRO/Spectra Mobile radio has been removed consists of:

1. Installing Radio Body
2. Installing Control Head
3. Interconnecting MCS 2000 Mobile Radio components
4. Connecting existing MCS 2000-compatible ASTRO/Spectra accessories (*if any*)
5. Connecting Antenna
6. Replacing (If Necessary) and Connecting DC Power Cable

Installing Radio Body



Do not connect any cabling or wiring to radio body until specifically directed to do so.

1. If radio is low or mid power version, refer to paragraph titled *Mounting Trunnion Installation* in chapter 3 of Installation Instructions manual 68P02058U20-(). Then, using trunnion 0705898V03 and associated hardware kit HLN6356(), install radio body in vehicle. Do not tighten attaching wing screws completely at this time.
2. If radio is high power version, refer to paragraph titled *Mounting Tray Installation* in chapter 3 of Installation Instructions manual 68P02058U20-(). Then, using mounting tray 1505946X03 and associated hardware kit HLN6546() install radio body in vehicle. Do not tighten attaching wing screws completely at this time.

Installing Control Head



Do not connect any cabling or wiring to control head until specifically directed to do so.

1. If radio is low or mid power version, refer to illustration in paragraph titled *Control Head Remote Mount Installation for Low and Mid Power Radios* in chapter 3 of Installation Instructions manual 68P02058U20-(). Then mount control head trunnion 0780127N02, kit HLN6615(), in vehicle and install control head into trunnion.
2. If radio is high power version, refer to illustration in paragraph titled *Control Head Remote Mount Installation for High Power Radios* in chapter 3 of Installation Instructions manual 68P02058U20-(). Then mount control head trunnion 0780127N02, kit HLN6615(), in vehicle and install control head into trunnion.

Interconnecting MCS 2000 Mobile Radio Components



Refer to Figure 1 on page 7 while performing the following steps.

1. Install connector gasket over connector on back of control head. Then plug control head connector on control head adapter cable HKN6135() onto connector on back of control head.
2. Plug connector on control head end of ASTRO/Spectra remote cable assembly into control head adapter cable HKN6135().
3. Install connector gasket over connector on front of radio body. Then plug radio body connector on radio body adapter cable HKN6134() onto connector on front of radio body.
4. Plug connector on radio end of ASTRO/Spectra remote cable assembly into adapter cable HKN6134().
5. Using supplied Tie Wraps, anchor adapter cables to a solid vehicle structure to prevent movement of adapter cables with respect to ASTRO/Spectra remote cable assembly and MCS 2000 radio components.

Connecting Existing MCS 2000-Compatible Accessories

1. Disassemble MCS 2000 accessory plug using disassembly procedure in section titled *Disassembling and Reassembling Accessory Plug* in Chapter 4 of Installation Instructions manual 68P02058U20-().
2. Insert connector pin on end of pigtail at radio body adapter cable HKN6134() into location 15 in accessory plug. (This is for ignition sense.)



Table 1 on page 11 lists the only ASTRO/Spectra mobile radio accessories that are compatible with and, therefore, function properly with, an MCS 2000 mobile radio.

3. Refer to table 1 on page 11 in this publication, and to table titled *2000 Series Accessory Connector Pin Functions* in Appendix A-1 in Installation Instructions manual 68P02058U20-().
4. If accessories were connected to control head of ASTRO/Spectra radio removed from vehicle, go to step 6.
5. If accessories were connected to radio body of ASTRO/Spectra radio removed from vehicle, replace connector pins on compatible accessories with the spare connector pins stored inside MCS 2000 accessory plug. Use an AMP 90405-1 crimping tool to attach pins to wires. Then go to step 7.
6. Disassemble ASTRO/Spectra accessory plug and carefully remove accessory wires from plug *without removing* pins from wires.

7. Insert connector pins on existing compatible ASTRO/Spectra mobile radio accessories to MCS 2000 accessory plug.
8. Reassemble MCS 2000 accessory plug using reassembly procedure in section titled *Disassembling and Reassembling Accessory Plug* in Chapter 4 of Installation Instructions manual 68P02058U20-().
9. Remove attaching wing screws and slide radio body carefully out of mounting trunnion or tray.
10. Plug accessory plug into accessory connector on bottom of MCS 2000 radio.
11. Slide radio body back into mounting trunnion or tray. Then insert attaching wing screws and tighten them securely.

Table 1 ASTRO/Spectra Radio Accessories Compatible with MCS 2000 Radio

Motorola Kit/Option No.	Function/Description
Kit HLN5113()	Emergency Foot Switch
Kit HLN5131	Emergency Pushbutton
Option W116AH	External Alarm Relay, Kit HKN4258()
Option W116AJ	External Alarms, Kit HKN4258()
Option W116AM	External Alarm Relay and Cable, Kit HKN4258()



Refer to Installation Instructions manual 68P02058U20-() for information regarding connection of other accessories to MCS 2000 radio.

Connecting Antenna



For mid power and high power VHF and UHF radios only, RF connector (miniature UHF) already connected to antenna cable must be replaced with Motorola approved RF connector supplied separately with radio. Failure to replace antenna connector with Motorola approved type before operating radio can result in permanent damage to radio and will void radio warranty.

1. If MCS 2000 radio is mid power or high power VHF or UHF version, refer to section titled *Instructions for Replacement of Antenna Connector* in chapter 4 of Installation Instructions manual 68P02058U20-(). Then replace RF connector on radio end of antenna cable with RF connector supplied with MCS 2000 radio.
2. Connect RF connector on end of antenna cable to antenna connector on rear of radio body.

Replacing (If Necessary) and Connecting DC Power Cable



Connector on a low power or mid power ASTRO/Spectra DC power cable *will* mate with DC power connector on a high power MCS 2000 radio. However, due to conductor size requirement, when replacing a low power or mid power ASTRO/Spectra radio with a high power MCS 2000 radio, it is mandatory to replace the ASTRO/Spectra DC power cable in the vehicle with a high power MCS 2000 DC power cable, Motorola Kit HKN6110().



Connector on a high power ASTRO/Spectra DC power cable *will not* mate with DC power connector on any MCS 2000 radio. Therefore, when replacing a high power ASTRO/Spectra radio with any MCS 2000 radio, it is necessary to replace the ASTRO/Spectra high power DC power cable in the vehicle with a low/mid power MCS 2000 DC power cable Motorola Kit HKN4192() or a high power MCS 2000 DC power cable, Motorola Kit HKN6110(), as appropriate.

1. If MCS 2000 radio is high power version, refer to section titled *DC Power Cable Installation* in chapter 3 of Installation Instructions manual 68P02058U20-(). Then install the high power DC power cable kit HKN6110() supplied with MCS 2000 radio into vehicle. Then go to step 3.

2. If MCS 2000 radio is low or mid power version, refer to section titled *DC Power Cable Installation* in chapter 3 of Installation Instructions manual 68P02058U20-(). Then install the low/mid power DC power cable kit HKN4192() supplied with MCS 2000 radio into vehicle.
3. Connect DC power connector on DC power cable to DC power connector on back of radio body.



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LIMITED WARRANTY

MOTOROLA COMMUNICATION PRODUCTS

I. WHAT THIS WARRANTY COVERS AND FOR HOW LONG:

MOTOROLA INC. ("MOTOROLA") warrants the MOTOROLA manufactured RNSG Subscriber Products listed below ("Product") against defects in material and workmanship under normal use and service for a period of time from the date of purchase as scheduled below:

HKN6134() Radio Cable Adapter **One (1) Year**

HKN6135() Control Head Cable Adapter **One (1) Year**

Motorola, at its option, will at no charge either repair the Product (with new or reconditioned parts), replace it (with a new or reconditioned Product), or refund the purchase price of the Product during the warranty period provided it is returned in accordance with the terms of this warranty. Replaced parts or boards are warranted for the balance of the original applicable warranty period. All replaced parts of Product shall become the property of MOTOROLA.

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

MOTOROLA cannot be responsible in any way for any ancillary equipment not furnished by MOTOROLA which is attached to or used in connection with the Product, or for operation of the Product with any ancillary equipment, and all such equipment is expressly excluded from this warranty. Because each system which may use the Product is unique, MOTOROLA disclaims liability for range, coverage, or operation of the system as a whole under this warranty.

II. GENERAL PROVISIONS:

This warranty sets forth the full extent of MOTOROLA'S responsibilities regarding the Product. Repair, replacement or refund of the purchase price, at MOTOROLA'S option, is the exclusive remedy. THIS WARRANTY IS GIVEN IN LIEU OF ALL OTHER EXPRESS WARRANTIES. IMPLIED WARRANTIES, INCLUDING WITHOUT LIMITATION, IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE LIMITED TO THE DURATION OF THIS LIMITED WARRANTY. IN NO EVENT SHALL MOTOROLA BE LIABLE FOR DAMAGES IN EXCESS OF THE PURCHASE PRICE OF THE PRODUCT, FOR ANY LOSS OF USE, LOSS OF TIME, INCONVENIENCE, COMMERCIAL LOSS, LOST PROFITS OR SAVINGS OR OTHER INCIDENTAL, SPECIAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OR INABILITY TO USE SUCH PRODUCT, TO THE FULL EXTENT SUCH MAY BE DISCLAIMED BY LAW.

III. STATE LAW RIGHTS:

SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, OR LIMITATION ON HOW LONG AN IMPLIED WARRANTY LASTS, SO THE ABOVE LIMITATIONS OR EXCLUSIONS MAY NOT APPLY.

This warranty gives specific legal rights, and there may be other rights which may vary from state to state.

IV. HOW TO GET WARRANTY SERVICE:

Purchaser must notify Motorola's representative or call Motorola's Customer Response Center at 1-800-247-2346 within the applicable warranty period for information regarding warranty service.

V. WHAT THIS WARRANTY DOES NOT COVER:

- A) Defects or damage resulting from use of the Product in other than its normal and customary manner.
- B) Defects or damage from misuse, accident, water, or neglect.
- C) Defects or damage from improper testing, operation, maintenance, installation, alteration, modification, or adjustment.
- D) Breakage or damage to antennas unless caused directly by defects in material workmanship.
- E) A Product subjected to unauthorized Product modifications, disassemblies or repairs (including, without limitation, the addition to the Product of non-Motorola supplied equipment) which adversely affect performance of the Product or interfere with Motorola's normal warranty inspection and testing of the Product to verify any warranty claim.
- F) Product which has had the serial number removed or made illegible.
- G) Rechargeable batteries if:
 - 1) any of the seals on the battery enclosure of cells are broken or show evidence of tampering.
 - 2) the damage or defect is caused by charging or using the battery in equipment or service other than the Product for which it is specified.
- H) Freight costs to the repair depot.
- I) A Product which, due to illegal or unauthorized alteration of the software/firmware in the Product, does not function in accordance with MOTOROLA'S published specifications or the FCC type acceptance labeling in effect for the Product at the time the Product was initially distributed from MOTOROLA.
- J) Scratches or other cosmetic damage to Product surfaces that does not effect the operation of the Product.
- K) Normal and customary wear and tear.

VI. PATENT AND SOFTWARE PROVISIONS:

MOTOROLA will defend, at its own expense, any suit brought against the end user purchaser to the extent that it is based on a claim that the Product or parts infringe a United States patent, and MOTOROLA will pay those costs and damages finally awarded against the end user purchaser in any such suit which are attributable to any such claim, but such defense and payments are conditioned on the following:

- A) that MOTOROLA will be notified promptly in writing by such purchaser of any notice of such claim;
- B) that MOTOROLA will have sole control of the defense of such suit and all negotiations for its settlement or compromise; and
- C) should the Product or parts become, or in MOTOROLA'S opinion be likely to become, the subject of a claim of infringement of a United States patent, that such purchaser will permit MOTOROLA, at its option and expense, either to procure for such purchaser the right to continue using the Product or parts or to replace or modify the same so that it becomes non-infringing or to grant such purchaser a credit for the Product or parts as depreciated and accept its return. The depreciation will be an equal amount per year over the lifetime of the Product or parts as established by MOTOROLA.

MOTOROLA will have no liability with respect to any claim of patent infringement which is based upon the combination of the Product or parts furnished hereunder with software, apparatus or devices not furnished by MOTOROLA, nor will MOTOROLA have any liability for the use of ancillary equipment or software not furnished by MOTOROLA which is attached to or used in connection with the Product. The foregoing states the entire liability of MOTOROLA with respect to infringement of patents by the Product or any parts thereof.

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