HARRIS
assuredcommunications®

Operator/Installation Manual

AE/LZT 123 3257/1
Rev. M, Jan/10

Enhanced Vehicular Charger

BML 161 67/12
BML 161 67/32
BML 161 67/72
BML 161 67/172

M-RK™
Prism™ HP/LPE-200™/LPE-50
JAGUAR™ 700P/Pi/P7100IP
JAGUAR 700P/Pi/P7100IP

MANUAL REVISION HISTORY

REV	DATE	REASON FOR CHANGE
G	Feb/06	Updated Remote Control Unit Installation Diagram.
H	Mar/07	Updated rapid and trickle charging information and safety symbol conventions.
J	Oct/07	Added support for P7200 and P5200 radios.
K	Mar/09	Added warning regarding proper charger use.
L	Aug/09	Harris conversion.
M	Jan/10	Removed references to P7200 and P5200 radios, updated warranty.

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1 SAFETY SYMBOL CONVENTIONS

The following conventions are used to alert the user to general safety precautions that must be observed during all phases of operation, service, and repair of this product. Failure to comply with these precautions or with specific warnings elsewhere violates safety standards of design, manufacture, and intended use of the product. Harris Corporation assumes no liability for the customer's failure to comply with these standards.

The WARNING symbol calls attention to a procedure, practice, or the like, which, if not correctly performed or adhered to, could result in personal injury. Do not proceed beyond a WARNING symbol until the conditions identified are fully understood or met.

The **CAUTION** symbol calls attention to an operating procedure, practice, or the like, which, if not performed correctly or adhered to, could result in a risk of danger, damage to the equipment, or severely degrade the equipment performance.

The **NOTE** symbol calls attention to supplemental information, which may improve system performance or clarify a process or procedure.

The **ESD** symbol calls attention to procedures, practices, or the like, which could expose equipment to the effects of **E**lectro-**S**tatic **D**ischarge. Proper precautions must be taken to prevent ESD when handling circuit modules.

WARNING - The electrical hazard symbol indicates there is an electrical hazard present.

2 SAFETY INFORMATION

The operator of any mobile radio should be aware of certain hazards common to the operation of vehicular radio transmissions. A list of several possible hazards is given:

1. **Explosive Atmospheres** - Just as it is dangerous to fuel a vehicle with the motor running, similar hazards exist when operating a mobile radio, be sure to turn the power to the radio **OFF** while fueling the vehicle. Do not carry containers of fuel in the trunk of the vehicle if the radio is mounted in the trunk.

2. **Interference to Vehicular Electronics Systems** - Electronic fuel injection systems, electronic anti-skid braking systems, electronic cruise control systems, etc., are typical electronic systems that may malfunction due to the lack of protection from radio frequency energy present when transmitting. If the vehicle contains such equipment, consult the dealer and enlist their aid in determining the expected performance of electronic circuits when the radio is transmitting.

3. **Electric Blasting Caps** - To prevent accidental detonation of electric blasting caps, **DO NOT** use two-way radios within 1000 feet of blasting operations. Always obey the "Turn Off Two-Way Radios" signs posted where electric blasting caps are being used. (OSHA Standard: 1926.900)

4. **Radio Frequency Energy** - To prevent burns or related physical injury from radio frequency energy, do not operate the transmitter when anyone outside of the vehicle is within two feet of the antenna.

5. **Liquefied Petroleum (LP) Gas Powered Vehicles** - Mobile radio installations in vehicles powered by liquefied petroleum gas with the LP gas container in the trunk or other sealed-off space within the interior of the vehicle must conform to the **N**ational **F**ire **P**rotection **A**ssociation standard **(NFPA) 58** requiring:

   a. The space containing the radio equipment shall be isolated by a seal from the space containing the LP gas container and its fittings.

   b. Outside filling connections shall be used for the LP gas container.

   c. The LP gas container shall be vented to the outside of the vehicle.

2.1 SAFE DRIVING RECOMMENDATIONS FOR USERS OF MOBILE RADIOS RECOMMENDED BY AAA

- Read the literature on the safe operation of the radio.
- Keep both hands on the steering wheel and the microphone in its hanger whenever the vehicle is in motion.
- Place calls only when vehicle is stopped.

- When talking from a moving vehicle is unavoidable, drive in the slower lane. Keep conversations brief.
- If a conversation requires taking notes or complex thought, stop the vehicle in a safe place and continue the call.
- Exercise caution whenever using a mobile radio.

2.2 OPERATING RULES AND REGULATIONS

Two-way FM radio systems must be operated in accordance with the rules and regulations of the Federal Communications Commission (FCC). As an operator of two-way radio equipment, you must be thoroughly familiar with the rules that apply to your particular type of radio operation. Following these rules helps eliminate confusion, assures the most efficient use of the existing radio channels, and results in a smoothly functioning radio network. When using your two-way radio, remember these rules:

1. It is a violation of FCC rules to interrupt any distress or emergency message. As your radio operates in much the same way as a telephone **"party line,"** always listen to make sure that the channel is clear before transmitting. Emergency calls have priority over all other messages. If someone is sending an emergency message - such as reporting a fire or asking for help in an accident - ***KEEP OFF THE AIR!***
2. The use of profane or obscene language is prohibited by Federal law.
3. It is against the law to send false call letters or false distress or emergency messages. The FCC requires that you keep conversations brief and confine them to business. To save time, use coded messages whenever possible.
4. Using your radio to send personal messages (except in an emergency) is a violation of FCC rules. You may send only those messages that are essential for the operation of your business.
5. It is against Federal law to repeat or otherwise make known anything you overhear on your radio. Conversations between others sharing your channel must be regarded as confidential.
6. The FCC requires that you identify yourself at certain specific times by means of your call letters. Refer to the rules that apply to your particular type of operation for the proper procedure.
7. No changes or adjustments shall be made to the equipment except by an authorized or certified electronic technician.

IMPORTANT

Under U.S. law, operation of an unlicensed radio transmitter within the jurisdiction of the United States may be punishable by a ***fine of up to $10,000, imprisonment for up to two years, or both.***

2.3 OPERATING TIPS

The following conditions tend to reduce the effective range of two-way radios and should be avoided whenever possible:

- Operating the radio in areas of low terrain, or while under power lines or bridges.
- Obstructions such as mountains and buildings.

In areas where transmission or reception is poor, some improvement may be obtained by insuring that the antenna is vertical. Moving a few yards in another direction or moving to a higher elevation may also improve communication.

3 INTRODUCTION

The ***Enhanced Vehicular Charger (EVC)*** is designed to be vehicle mounted. The EVC, product numbers BML 161 67/12, BML 161 67/32, and BML 161 67/72, charges Nickel Cadmium (NiCd) type battery packs for all models of the Prism HP™, LPE-200™, LPE-50™, M-RK™, JAGUAR™ 700P/Pi, and P7100IP radios. The EVC, product number BML 161 67/172, charges Nickel Cadmium (NiCd) and Nickel Metal Hydride (NiMH) batteries for the JAGUAR 700P/Pi, and P7100IP radios.

The following actions could trigger unusual Enhanced Vehicular Charger behavior and is not a proper use of the equipment as designed:

- Do not turn the portable radio on and put it into the EVC and then start the vehicle.
- Do not leave the portable radio on with the portable in the EVC and turn the vehicle off.

The EVC model BML 161 67/172 contains a Dual Position feature which has two sets of battery charging contacts. If a speaker/microphone is attached to the radio before being inserted into the EVC, the radio is configured in the First Position mode, which charges the radio battery through the first set of battery charging contacts. The radio remains operational while charging using the radio antenna and the speaker/microphone.

The upper position (i.e., radio with speaker/mic attached) is designed for battery charging only. The radio may be on and receiving calls, but TX is not allowed. If an attempt is made to transmit during battery charging in the upper position, the charge cycle may be terminated early (battery incompletely charged). If this occurs, the charge must be restarted by removing and re-inserting the radio into the charger.

Use only speaker/microphones KRY 101 1617/185, KRY 101 1617/186 or KRY 101 1617/385 or equivalent with EVC model BML 161 67/172. Using any other speaker or microphone attached to the radio will cause severe damage to the charger, radio, and/or speaker/microphone.

If a speaker/microphone is not attached to the radio before being inserted into the EVC (BML 161 67/172), the radio is configured in the Second Position mode and the second set of battery charging contacts allows the radio to operate and function like EVC BML 161 67/12, BML 161 67/32, and BML 161 67/72, which allow the EVC to latch directly to the UDC of the radio.

EVC, product numbers BML 161 67/12, BML 161 67/32, BML 161 67/72, and BML 161 97/172 (Second Position mode only), can be configured to

convert the portable radio into a "*pseudo*" mobile radio. This is accomplished by transferring the PTT, microphone and speaker function on the portable radio to an external microphone and speaker. The antenna input on the portable radio is switched to an external antenna located on the outside of the vehicle. Refer to Table 3-1 for specific radio support information.

In some applications, a control unit is installed and used to operate the radio while the radio is inserted in the charger. Full radio display and keypad functionality are available from the control unit. The control unit can be used to place and receive calls while the radio battery is charging. Refer to Table 3-1 for specific radio support information.

Table 3-1: Supported Types

Radio Type	Supported Flash Code versions	
	"Pseudo" Mobile Operation	Remote Control Head Operation
M-RK I[1]	G22 or higher	G22 or higher
M-RK II/Scan[1]	G13 or higher	G13 or higher
LPE-200/50[2]	R8A or higher	Not Supported
JAGUAR 700P/Pi (KRD 103 161 Models)	R2A or higher	R2A or higher
JAGUAR 700P/Pi (RU101219V1 &V2 Models)	R1A or higher	R1A or higher
P7100^{IP}	R1A or higher	R1A or higher

Four models of the EVC are available and differentiated by the type of insert provided. The insert *(or sleeve)* is the part of the charger where the radio is placed to charge the battery pack. See Table 3-2 below for a list of the available Enhanced Vehicle Chargers.

Table 3-2: Product Numbers

CHARGER PART #	USED FOR
BML 161 67/12	M-RK Radios
BML 161 67/32	Prism HP/LPE-200/LPE-50 Radios
BML 161 67/72	JAGUAR 700P/Pi/P7100^{IP} Radios
BML 161 67/172	JAGUAR 700P/Pi/P7100^{IP} Radios Dual Position

[1] M-RK I, II, Scan models 256k and 512k support only (128k is not supported)

[2] LPE-200/50 radios do not support Remote Head Control operation.

3.1 FEATURES

- **Selectable Charge Rate** – Charge rate can be adjusted through a dip switch setting (750 milliamps or 1.5 amps).
- **Optimal Charging Without Overcharging** – Microprocessor controlled charging for long battery life and maximum battery performance.
- **Protective Circuitry** – Prevents damage to battery resulting from charging batteries which are not within the required temperature or voltage range.
- **Auto-Restart Charging** – Constantly monitors the battery while in the charger and will start charging the battery as soon as the battery falls approximately seventy-five percent below capacity.
- **Vehicular Repeater Enable/Disable Circuit** – Activates repeater, if installed, when the radio is removed from the charger.
- **Positive Latch** – Ensures the radio is securely in place while in the charger.
- **Radio Quick Release** – Disengages the radio from the charger for quick removal.
- **Versatile Mounting Options** – Enable the charger to easily fit different mounting applications.
- **Transmit/Busy, Charge and Ready Indicator Lights**
- **Switched or Ignition Sense Power**
- **ON/OFF Volume Knob**
- **10 Watt Audio Amplifier and Speaker**
- **Mobile Microphone**
- **TNC Antenna Connector**
- **Option 1 and Option 2 Buttons**
- **Dead Battery Operation**

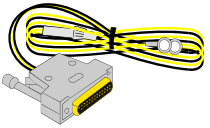
3.2 UNPACK AND CHECK THE EQUIPMENT

Before starting the installation, carefully unpack the equipment and inspect the equipment for damage. If there is any damage, file a claim with the carrier immediately. Although the speaker and microphone are boxed separately, all of the parts in the table below are included with the Enhanced Vehicular Charger package:

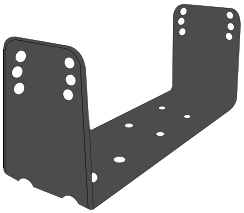
Enhanced Vehicular Charger

BML 161 67/12 (M-RK)
BML 161 67/32 (Prism HP/LPE-200/LPE-50)
BML 161 67/72 (JAGUAR 700P/Pi/P7100^{IP})
BML 161 67/172 (Dual Position JAGUAR 700P/Pi/P7100^{IP})

Standard Power Cable
RPM 113 2864/1



Mounting Bracket
SXA 120 4492/1



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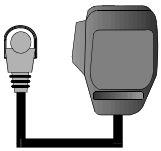
Mounting Hardware

- (4) four machine screws
- (4) four lock washers
- (6) six sheet metal screws
- tie wrap

Microphone MC101616V1
Microphone Hanger 344A4678P1
Label 344A3826P1



Speaker
19A149590P11 or equivalent

"Up-Side-Down"
Volume/Control panel label for alternate mounting/viewing options

4 INSTALLATION

4.1 STEP 1 - LOCATE THE TOOLS REQUIRED

- Electric Drill
- No. 28 Drill Bit
- Hole Saw
- Phillips and Flat-Blade Screw drivers

4.2 STEP 2 - PLAN THE INSTALLATION

Before work actually begins, the installation of the EVC should be carefully planned. The procedures in this section provide a guideline for installing the vehicular charger. In some applications, it may be necessary to deviate from the recommended procedure and order in which the equipment is installed.

It is recommended the unit be installed by one of the many Authorized Service Centers located throughout the United States. Personnel at these centers are experienced in installations of this type and can provide a safe, neat, and functional installation.

4.3 STEP 3 - CONFIGURE THE CHARGER

The EVC is equipped with a dip switch bank. The dip switch bank configures the charger for each application. There are eight (8) dip switches on the bank. Table 4-1 provides a list of all the dip switches along with the factory default setting.

4.3.1 Accessing the Dip Switches

1. Locate the dip switch access panel located on the bottom of the charger.
2. Using your finger (or a flat blade screwdriver), bend the locking tab toward the front of the charger and then pull up on the locking tab to remove the access panel.

Table 4-1: Factory Default DIP Switch Settings

SWITCH	DEFAULT SETTINGS	BRIEF DESCRIPTION
1	OFF	Ignition A+
2	ON	A+
3	ON	On/Off
4	ON	UDC Sense
5	OFF	UDC Sense
6	OFF	UDC Sense
7	ON	Charge Rate Select
8	OFF - Prism HP/LPE-200/LPE-50/JAGUAR 700P/Pi/P7100[IP] ON - M-RK	Radio Select

4.3.2 Switch 1: Ignition A+

To enable the ignition sense line, set switch 1 to the ON position and set switch 2 to the OFF position, as shown in Table 3-1. When the ignition sense line is enabled, the vehicle ignition switch and the ON/OFF knob on the charger control power to the audio circuits and the remotely installed control unit. When the ignition switch is in the Accessory or Run position, power is available for the audio circuits and the remote control unit. When the ignition switch is OFF, the audio circuits and the remote control unit will not power ON, regardless of the charger ON/OFF knob setting. See Figure 4-16 for wiring details.

The charging circuits are powered at all times due to a direct connection to the battery. This enables the user to charge the battery regardless of the ignition switch position.

NOTE

When switch 1 is in the ON position, switch 2 must be in the OFF position. Likewise, when switch 2 is in the ON position, switch 1 must be in the OFF position.

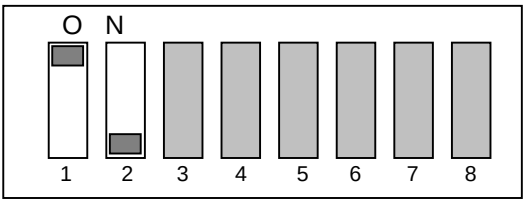


Figure 4-1: Power Controlled By Vehicle Ignition Switch

4.3.3 Switch 2: A+

To power the audio circuits and the remote control unit regardless of the vehicle ignition switch position, set switch 2 as shown in Figure 4-2. In this configuration, the charger ON/OFF knob controls power to the audio circuits. The charger ON/OFF knob or the control unit ON/OFF knob will control power to the remote control unit.

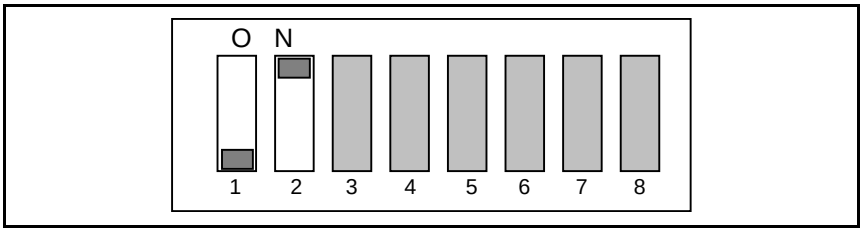


Figure 4-2: Power at All Times

NOTE

When switch 2 is in the ON position, switch 1 must be in the OFF position. Likewise, when switch 1 is in the ON position, switch 2 must be in the OFF position.

4.3.4 Switch 3: On/Off Knob Enable/Disable

Switch 3 enables or disables the ON/OFF/Volume knob on the front of the charger. When this switch is in the ON position, the knob is enabled. Unless there is a remote control unit attached, this switch should be in the ON position as shown in Figure 4-3.

When a remote control unit is attached, switch 3 can be set in the ON or OFF position. The OFF position, as shown in Figure 4-4, is recommended. When this switch is in the ON position, the user may power the control unit (ON or OFF) with the charger ON/OFF knob or the control unit ON/OFF knob. When this switch is in the OFF position, only the control unit ON/OFF knob will power the control unit (ON or OFF).

NOTE

In remote control unit application, volume changes to the optional speaker must be made with the control unit ON/OFF/Volume knob.

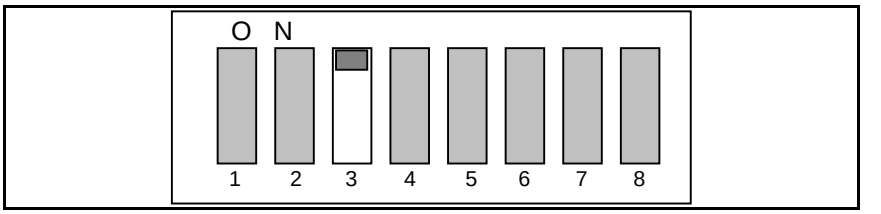


Figure 4-3: ON/OFF/Volume Knob Enabled

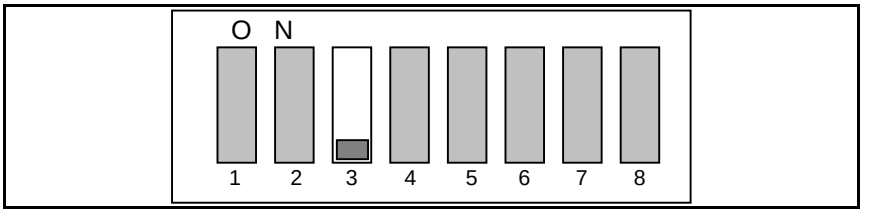


Figure 4-4: ON/OFF/Volume Knob Disabled

4.3.5 Switch 4 - Switch 6: UDC Sense

Switches 4-6 configure the UDC sense resistor. The radio senses the resistor value on pin 8 of the UDC. The resistor value is based on the setting of switches 4-6. At least one but only one of these switches should be in the ON position. The radio operates according the resistor value sensed on pin 8 of the UDC. There are three different resistor values the charger will place on pin 8 of the UDC. The resistor values are selectable by placing switch 4, 5 or 6 in the ON position.

NOTE

At least one **but only one** of switches 4-6 should be in the ON position.

- To enable the radio to sense the **EVC and provide a NORMAL display**, move switch 4 to the ON position. This switch applies to M-RK radios only. See Figure 4-5.
- To enable the radio to sense the **EVC and provide an INVERTED display**, move switch 5 to the ON position. This switch applies to M-RK radios only. See Figure 4-6.
- To enable the radio to sense the **EVC and a remote control unit**, move switch 6 to the ON position. See Figure 4-7.

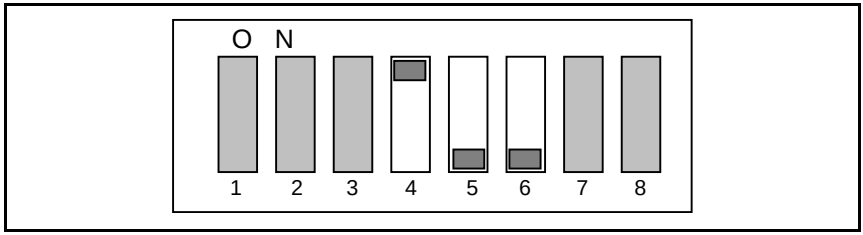


Figure 4-5: Radio Senses Charger and Provides NORMAL Display

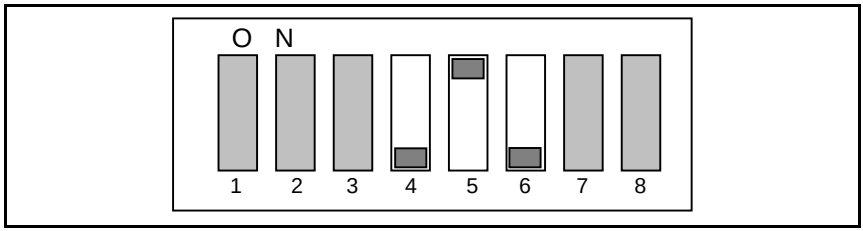


Figure 4-6: Radio Senses Charger and Provides INVERTED Display

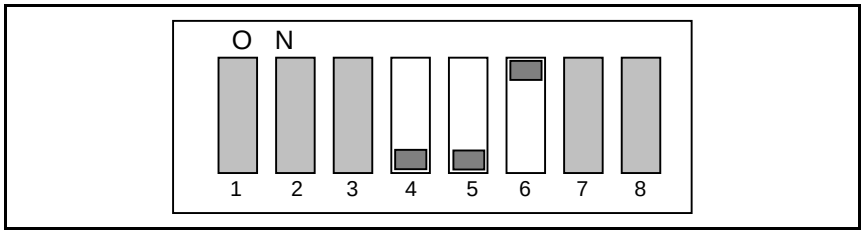


Figure 4-7: Radio Senses Charger and Control Unit

4.3.6 Switch 7: Charge Rate

Switch 7 configures the charge rate. The EVC can be configured to charge at 750 milliamps or 1.5 amps. By default, switch 7 is set in the ON position as shown in Table 3-2 and Figure 4-8. This configures the charger to rapid charge at a rate of 1.5 amps. The 1.5 amp charge rate is the preferred rapid charge rate for most applications.

When the battery is placed in the charger, the fast or "rapid" charge feature is normally applied immediately. When the rapid charge is applied to the battery repeatedly in a short period of time, a high internal battery temperature may result. This high battery temperature prevents the battery from charging and may reduce battery life. In applications where the battery is removed from and inserted in the charger repeatedly within a short period of time, the 750-milliamp charge rate is available. For a 750-milliamp-charge rate, set switch 7 to OFF as shown in Figure 4-9. For more information on charging the battery and battery life, see Section 5.8.

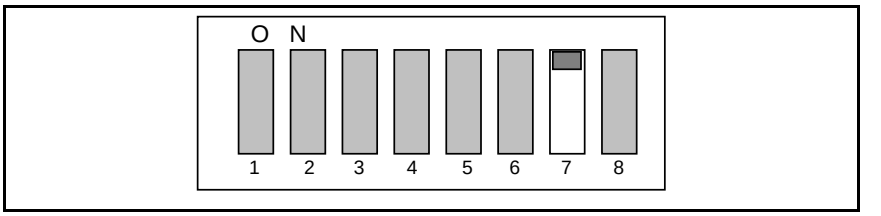


Figure 4-8: 1.5 Amp Charge Rate

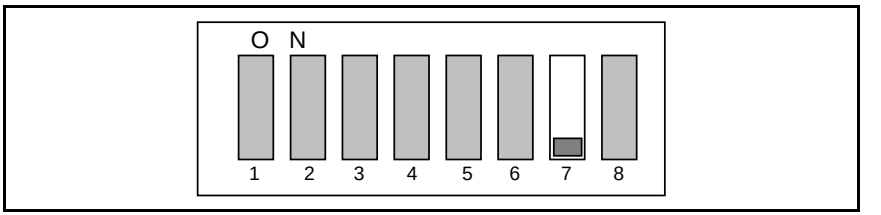


Figure 4-9: 750 Milliamp Charge Rate

4.3.7 Switch 8: Radio Select

The Enhanced Vehicular Chargers can be used with Prism HP/LPE-200/LPE-50, M-RK, JAGUAR 700P/Pi. or P7100^{IP} radios. Switch 8 defines the type of radio that will be used with this charger. The type of radio is also physically or mechanically dependent on the insert or sleeve installed in the charger. The sleeve is the part of the charger the radio is placed in to be charged. From the factory, this switch is set according to the sleeve installed. The sleeves are interchangeable, therefore if the sleeve type is changed, the dip switch must also be changed.

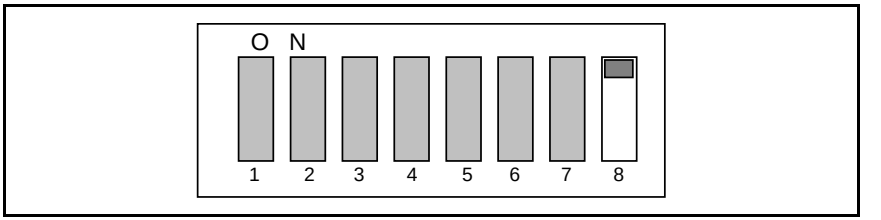


Figure 4-10: Setting for M-RK Radios

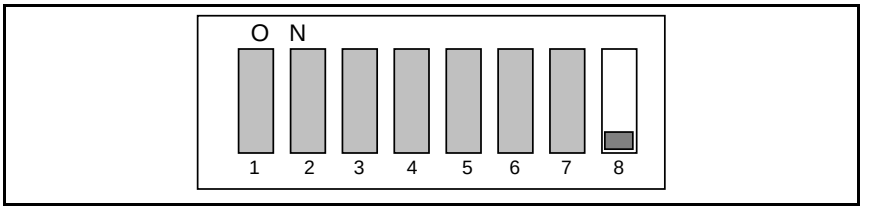


Figure 4-11: Setting for Prism HP/LPE-200/LPE-50/ JAGUAR 700P/Pi/P7100^{IP} Radios

4.4 STEP 4 – CONFIGURE THE RADIO

There are two option buttons on the front of the charger labeled **OPT1** and **OPT2**. Configuration for the functionality of these two buttons is described in the following sections.

4.4.1 OPT1

The function for the Enhanced Vehicular Charger **OPT1** button is defined in the radio personality. Radio personalities are created and modified using radio programming software. **ProGrammer**™ is the current radio programming software for Prism HP/LPE-200/LPE-50, M-RK. Radio Personality Manager (RPM) is the current radio programming software for JAGUAR 700P/Pi, and P7100^{IP} radios. Within ProGrammer, the ***Vehicular Charger*** control, located on the JAGUAR 700P/P7100/M-RK/Prism HP Options dialog box or the Jaguar 700P/P7100/P5100 Options dialog box defines the functionality for the **OPT1** button. See Figure 4-12. Within RPM, the Portable Options dialog box defines this functionality. By default, **Clear/Monitor** is selected for the **OPT1** button. The following is a list of the functions that can be programmed for the **OPT1** button:

- **No Function**
- **Clear/Monitor**
- **Option**
- **Scan**
- **Encrypt/Clear**
- **Talk Around**
- **High/Low**
- **Ramp UP**

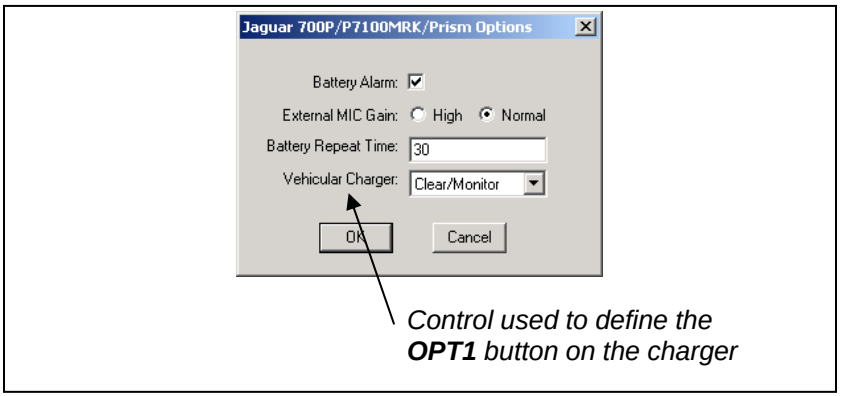


Figure 4-12: ProGrammer JAGUAR 700P/P7100^{IP}/M-RK/Prism HP Options Dialog Box

NOTE

The Options dialog varies depending on the type and version of programming software used.

4.4.2 OPT2

For Prism HP/LPE-200/LPE-50, JAGUAR 700P/Pi and P7100^{IP} radios, the function for the Enhanced Vehicular Charger **OPT2** button is programmable, but is the function defined for the radio Option 2 button. The radio Option 2 button is the top button on the side of the radio. In **ProGrammer**, this button is defined in the Prism HP, JAGUAR 700P or P7100^{IP} Keypads or Jaguar 700P/P7100/P5100 Keypads dialog box. In **RPM**, this button is defined in the Portable Radios Keypads dialog box.

NOTE

For M-RK radios, the Enhanced Vehicular Charger OPT2 button always functions as an Emergency button and this function cannot be changed.

4.5 STEP 5 - MOUNT THE EQUIPMENT

Mechanical installation guidelines include mounting the equipment:

- In a location that is safe for the operator and any passengers in the vehicle.
- In a location that is convenient for the operator to use.
- In a location that allows proper clearance for cables.
- In a location that is convenient for removal for servicing.

4.5.1 Procedure

1. Using the mounting bracket as a template, mark at least three (3) screw hole locations on the mounting surface.

NOTE

Failure to use the supplied mounting bracket can result in improper mounting forces applied to the charger. Using an alternate mounting bracket or method may cause improper operation and can damage the charger and/or radio.

2. Using the No. 28 drill bit, drill holes into the mounting surface at the marked locations.

NOTE

Before drilling a hole in the vehicle mounting surface, careful consideration should be given to the bottom or backside of the mounting surface. This will prevent damage to the vehicle.

3. Using at least three (3) sheet metal screws, secure the mounting bracket to the mounting surface. There are three short sheet metal screws and three long sheet metal screws provided for various installations.
4. Using the four machine screws and lock washers, secure the unit to the mounting bracket. The charger can be fastened in any of three different

positions: parallel to the mounting surface or tilted ± 20 degrees from the parallel position. See Figure 4-13.

NOTE

Do not install the machine screws into the charger without the mounting bracket in place.

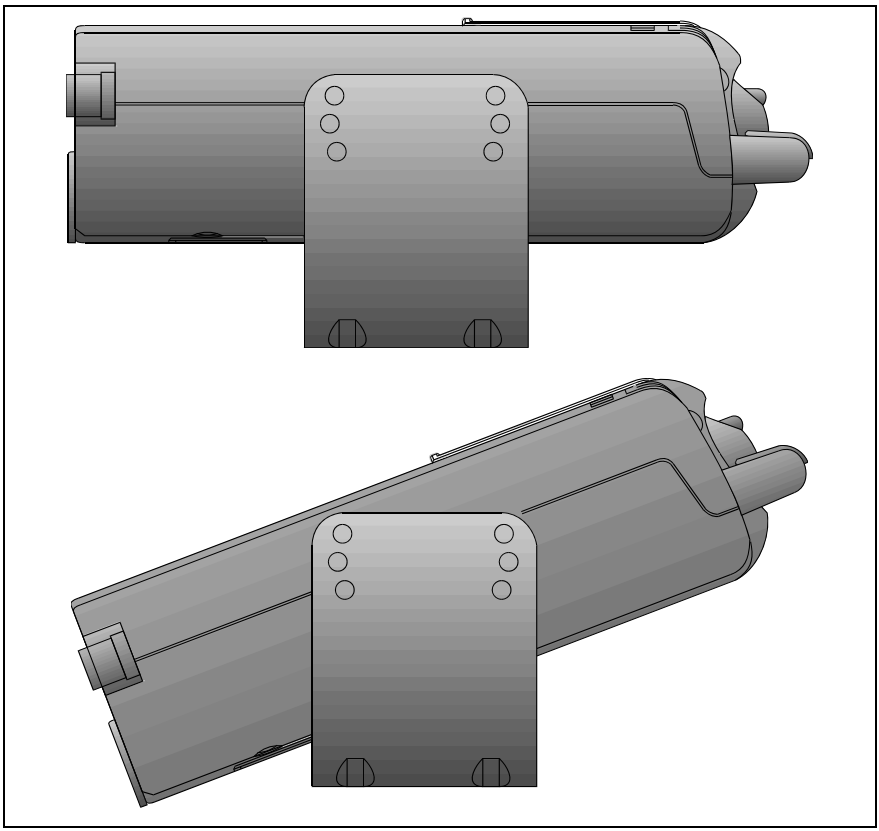


Figure 4-13: Mounting the Charger

4.6 STEP 6 - INSTALL CABLES

The Enhanced Vehicular Charger can be installed with the standard power cable (RPM 113 2864/1) or with the remote control unit power cable (RPM 113 2864/2). The standard power cable is included with the Enhanced Vehicular Charger. The remote control unit power cable is included with the control unit that is ordered as a separate option. For applications with a remote control unit installed, the remote control unit power cable must be used. Regardless of the power cable, the installer must consider the following:

- Will the ignition sense line be utilized?

- Is there a vehicular repeater installed?
- Will there be a microphone?
- Will there be a remote speaker?

There are two cable installation procedures described in the following sections. There is a cable installation procedure for the standard power that includes all applicable cables and accessories. There is also a cable installation procedure for the remote mount control power cable that includes all applicable cables and accessories.

4.6.1 Standard Power Cable Installation Procedure

4.6.1.1 Description

The Standard Power Cable (RPM 113 2864/1) supplied with the charger, is approximately eight (8) feet long and consists of a DB-25 connector with two power leads and two speaker leads. The YELLOW (positive) lead includes a fuse holder and 5-ampere fuse located near the battery end. See Figure 4-14. The YELLOW positive lead must be connected to the vehicle's battery. The vehicle must have a negative-ground electrical system.

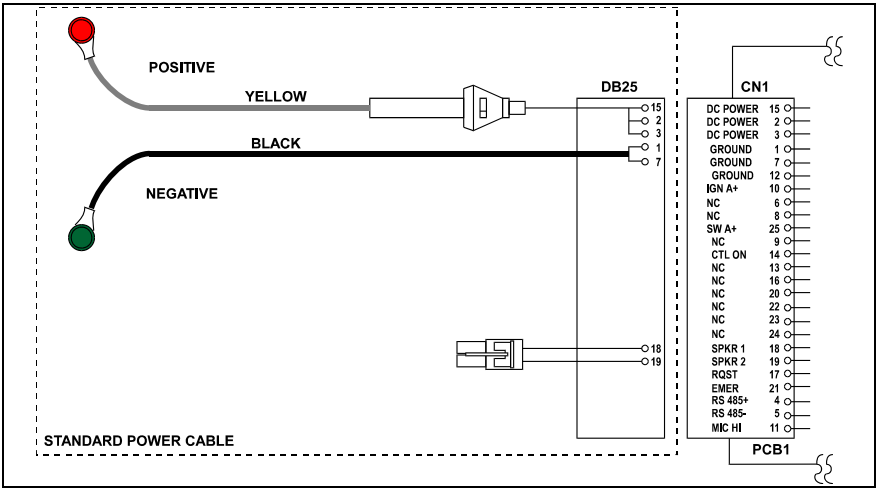


Figure 4-14: Standard Power Cable (RPM 113 2864/1)

4.6.1.2 Connect to Battery

1. Plug the DB-25 connector into the back of the Vehicular Charger as shown in Figure 4-15.
2. When the charger is wired directly to the vehicle's battery, it is necessary to route the yellow power lead through the vehicle's firewall. If an existing hole is not conveniently located in the firewall, drill a small hole and install an appropriately sized rubber grommet before routing the leads through the firewall. This grommet is required to prevent lead chaffing. Additional grommets may be required if the leads must pass through shields or guards in the engine compartment between the firewall and battery.

   Route the lead away from high heat sources in the engine compartment that may cause lead damage and introduce a fire hazard. In addition, the lead should not be routed near electrical noise sources such as electronic ignition modules or cruise control modules.
3. Connect the BLACK lead to the vehicle chassis. Connect the lead as close to the vehicular charger as possible. DO NOT connect the BLACK lead to the "NEG" or "-" battery post. Connect the YELLOW lead to the positive power source "POS" or "+" battery post. See Figure 4-15.

The power source must have current supply capability of 3 amps.

4.6.1.3 Connect Speaker

Connect the two black wires with the Molex® connector to the speaker cable as shown in Figure 4-15.

4.6.1.4 Connect Microphone

Plug the microphone cable into the connector on the back of the charger as shown in Figure 4-15. Secure with a flat blade screwdriver.

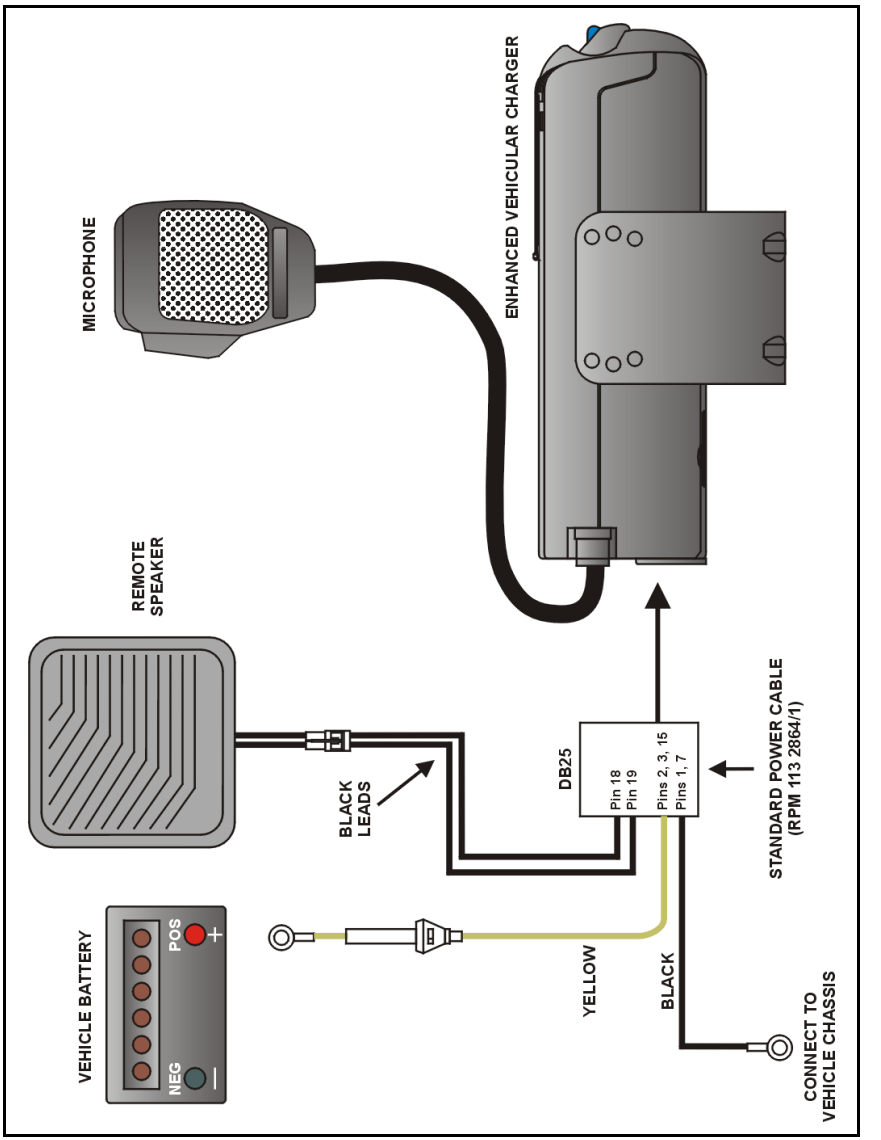


Figure 4-15: Standard Power Cable, Speaker and Microphone Installation Diagram

4.6.1.5 Connecting to a Switched Power Source

Installations that require the audio circuits to power ON/OFF with the vehicle ignition switch, must utilize the ignition sense line. When the ignition sense line is enabled, the vehicle ignition switch and the ON/OFF knob on the charger control power to the audio circuits. When the ignition switch is in the Accessory or Run position, power is available for the audio circuits. When the

ignition switch is OFF, the audio circuits will not power ON, regardless of the charger ON/OFF knob setting.

To enable the ignition sense line, the charger must be configured correctly. See Section 4.3.2 for more information.

To connect the charger to a switched power source, an #18 AWG wire (not supplied by Harris) must be installed between the DB-25 connector and the ignition switch power. Install the wire as described in the following instructions:

1. Using a small Phillips head screwdriver, disassemble the DB-25 Power Cable connector.
2. Solder one end of the #18 AWG wire to Pin 10 of the DB-25 connector. Make sure enough lead is provided to make the connection.
3. Reassemble the connector.
4. Connect the other end of the wire to an ignition "ON" sense point (preferably an "Accessory" point in the vehicle fuse panel) that is switched ON when the vehicle ignition switch is in the ACCESSORY and RUN positions. This lead should be connected so the vehicle fuse protection is used. See Figure 4-16.

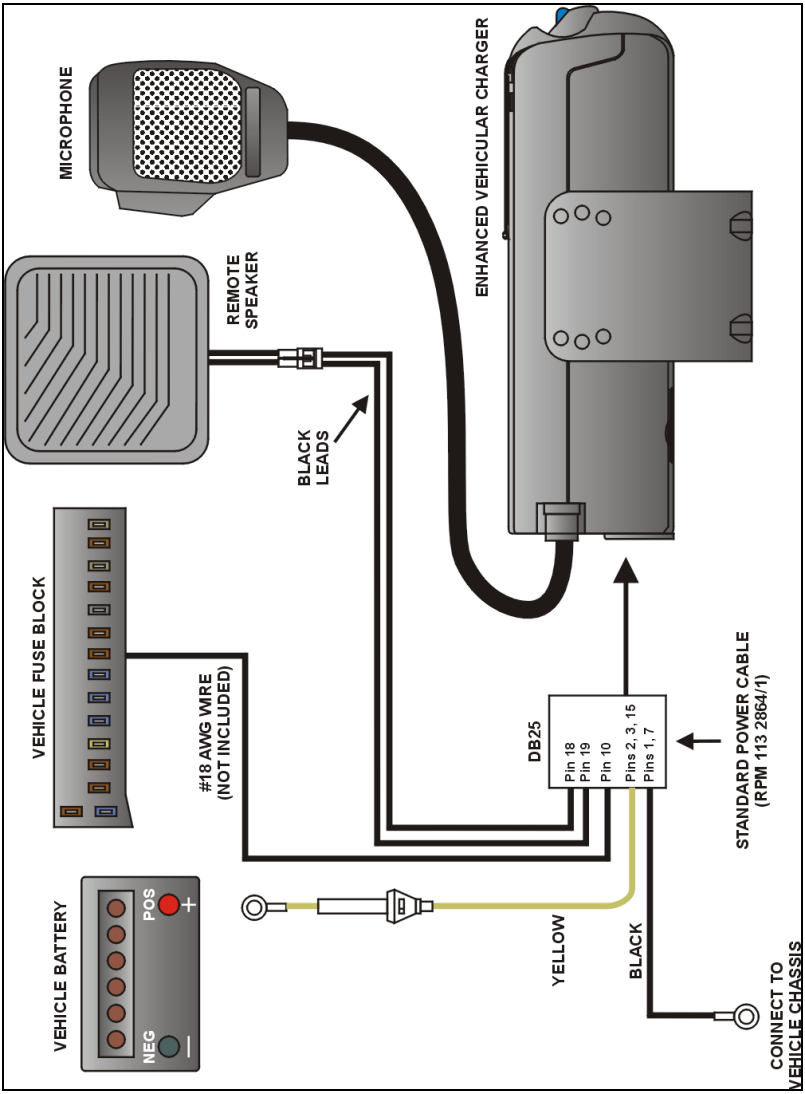


Figure 4-16: Switched Power Supply Installation Diagram

4.6.1.6 Vehicular Repeater Enable/Disable

The Enhanced Vehicular Charger contains an enable/disable circuit for a separately installed vehicular repeater. For this feature, a modification to the power cable is required. The Vehicular Repeater is enabled (TTL high) at the DB-25 connector, pin 6, when the radio is out of the Enhanced Vehicular Charger. The vehicular repeater enable/disable line is a logic line and cannot supply a large current.

To enable/disable a separately installed Vehicular Repeater, an #18 AWG wire (not supplied by Harris) must be installed between the DB-25 connector and the vehicular repeater. Install the wire as described in the following instructions:

1. Using a small Phillips head screwdriver, disassemble the DB-25 Power Cable connector.
2. Solder one end of the #18 AWG wire to Pin 6 of the DB-25 connector. Make sure enough lead is provided to make the connection.
3. Reassemble the connector.
4. Connect the other end of the wire to the Vehicular Repeater. See the appropriate manual for the Vehicular Repeater.

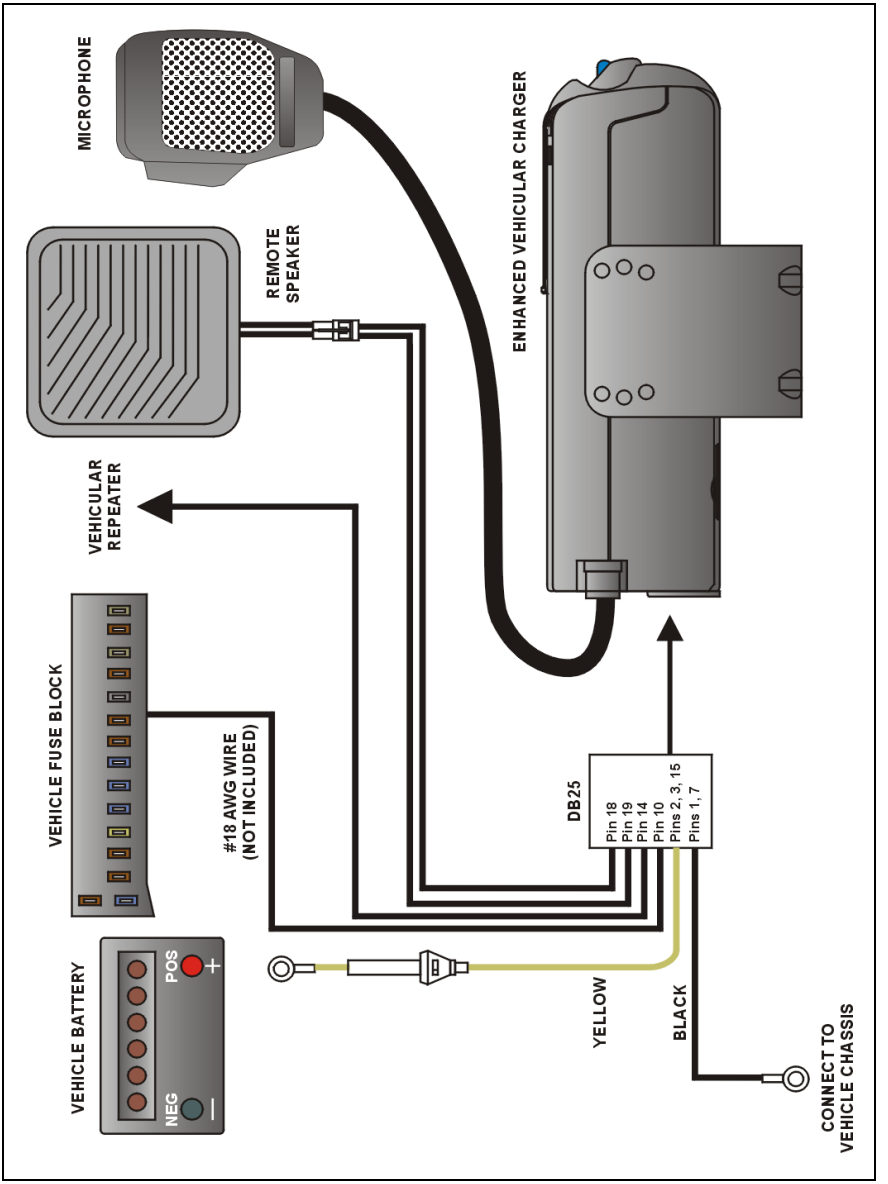


Figure 4-17: Vehicular Repeater Installation Diagram

4.6.2 Remote Control Unit Installation

The Enhanced Vehicular Charger is designed to interface with a remotely installed control unit. This allows the user to operate the charging radio with the control unit. For this feature to work, the radio must be latched in the charger. The remote control unit is purchased as a separate option and includes the necessary cables to interface with the vehicular charger. The standard power cable is replaced with the following cables that are included with the control unit option:

- RPM 113 2864/2 (Remote Control Unit Cable)
- 19B801358P2 (Power Cable)

The following procedure provides the necessary steps to connect all the cables and equipment.

4.6.2.1 Connect to Battery

1. Using the remote control unit cable included with the control unit (RPM 113 2864/2), plug the DB-25 (male) connector into the back of the Vehicular Charger as shown in Figure 4-19.

   The 19B801358P2 Power Cable plugs into P3 on the remote control unit cable. The ORANGE lead on the power cable is routed and connects to the vehicle battery. The BLACK lead should be connected to the vehicle chassis. The RED lead is used for the ignition sense line. If the ignition sense line is used, the RED lead must be partially separated from the cable to allow the RED lead to connect to the vehicle fuse block. See Section 4.6.1.5.

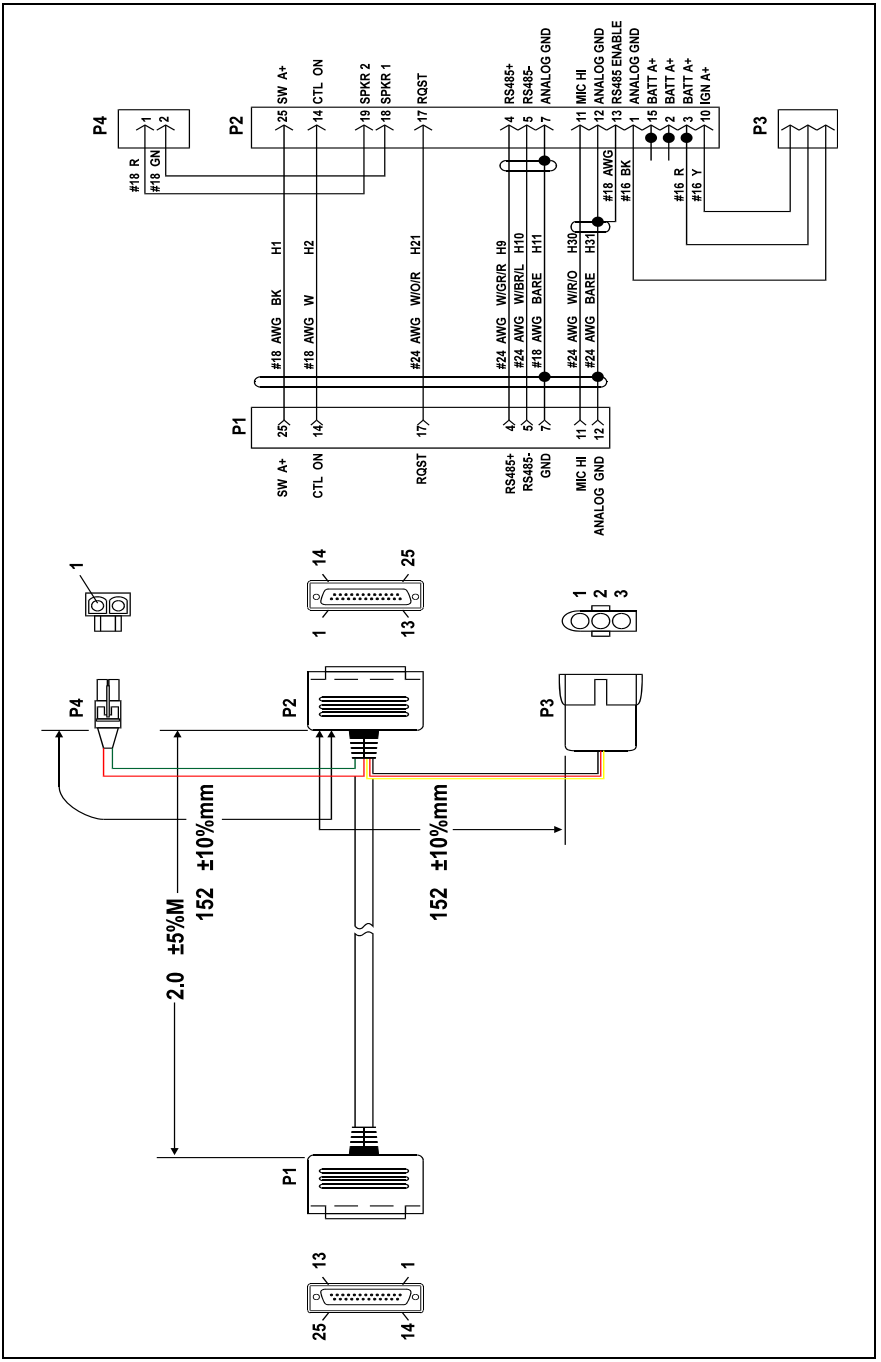


Figure 4-18: Remote Control Cable Diagram (RPM 113 2864/2)

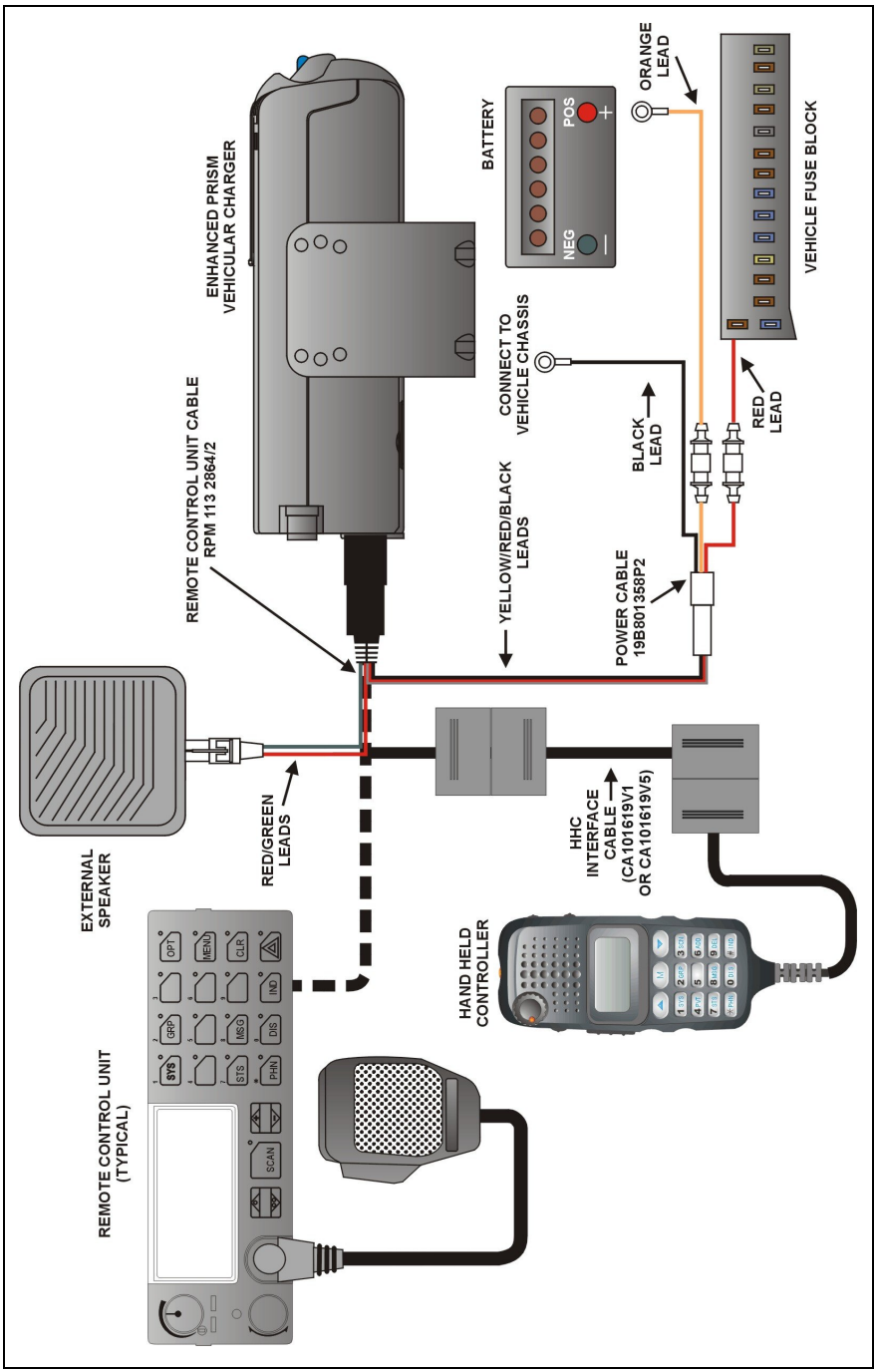


Figure 4-19: Remote Control Unit Installation Diagram

2. When the charger is wired directly to the vehicle battery, it is necessary to route the power leads through the vehicle firewall. If an existing hole is not conveniently located in the firewall, drill a small hole and install an appropriately sized rubber grommet before routing the leads through the firewall. This grommet is required to prevent lead chaffing. Additional grommets may be required if the leads must pass through shields or guards in the engine compartment between the firewall and battery.

3. Using the 19B801358P2 Power Cable, route the ORANGE lead from the remote control unit cable, through the firewall to the vehicle battery. Route the power lead away from high heat sources in the engine compartment that may cause lead damage and introduce a fire hazard. In addition, the leads should not be routed near electrical noise sources such as electronic ignition modules or cruise control modules.

4. Connect the BLACK lead to the vehicle chassis. Connect the lead as close to the charger as possible. DO NOT connect the BLACK lead to the negative ("NEG" or "-") battery post. Connect the ORANGE lead to the positive terminal ("POS" or "+" battery post). Ring terminals and a fuse must be installed on the power cable. Prepare the power using the instructions provided with the control unit.

The power source must have current supply capability of 3 amps.

4.6.2.2 Connecting to a Switched Power Source

Installations that require the audio circuits on the charger and the remote control unit to power ON/OFF with the vehicle ignition switch must utilize the ignition sense line. When the ignition sense line is enabled, the vehicle ignition switch and the ON/OFF knob on the control unit (and charger) control power to the audio circuits and the control unit. When the ignition switch is in the Accessory or Run position, power is available for the audio circuits and the control unit. When the ignition switch is OFF, the audio circuits and the control unit will not power ON, regardless of the control unit (and charger) ON/OFF knob setting.

The charging circuits are powered at all times. This enables the user to charge the battery regardless of the ignition switch position.

1. To connect the charger to a switched power source, route the RED lead from the 19B801358P2 power cable to the vehicle fuse block.
2. Connect the end of the wire to an ignition "ON" sense point (preferably an "Accessory" point in the vehicle fuse panel) that is switched on when the vehicle ignition switch is in the ACCESSORY and RUN positions. This lead should be connected so the vehicle fuse protection is used. See Figure 4-19.

NOTE

To enable the ignition sense line, the charger must be configured correctly. See Section 4.3.2 on page 14 for more information.

4.6.2.3 Connect Speaker

Connect the Molex connector from the remote control cable (RED and GREEN wires) to the speaker cable as shown in Figure 4-19.

4.6.2.4 Connect Microphone

Plug the microphone cable into the connector on the front of the control unit as shown in Figure 4-19. Secure with a flat blade screwdriver.

5 OPERATION

The ***Enhanced Vehicular Charger (EVC)*** is designed to be vehicle mounted. The EVC, product numbers BML 161 67/12, BML 161 67/32, and BML 161 67/72, charges Nickel Cadmium (NiCd) type battery packs for all models of the Prism HP, LPE-200, LPE-50, M-RK, JAGUAR 700P/Pi, P7100^{IP}, and P5100 radios. The EVC, product number BML 161 67/172, charges Nickel Cadmium (NiCd) and Nickel Metal Hydride (NiMH) batteries for the JAGUAR 700P/Pi, P7100 ^{IP}, and P5100 radios.

The EVC model BML 161 67/172 contains a Dual Position feature which has two sets of battery charging contacts. If a speaker/microphone is attached to the radio before being inserted into the EVC, the radio is configured in the First Position mode, which charges the radio battery through the first set of battery charging contacts. The radio remains operational while charging using the radio antenna and the speaker/microphone.

Use only speakers/microphones KRY 101 1617/185, KRY 101 1617/186, KRY 101 1617/385, or equivalent with EVC model BML 161 67/172. Using any other speaker or microphone attached to the radio will cause severe damage to the charger, radio and/or speaker/microphone.

If a speaker/microphone is not attached to the radio before being inserted into the EVC (BML 161 67/172), the radio is configured in the Second Position mode and the second set of battery charging contacts allows the radio to operate and function like EVC BML 161 67/12, BML 161 67/32, and BML 161 67/72, which allows the EVC to latch directly to the UDC of the radio.

EVC, product numbers BML 161 67/12, BML 161 67/32, BML 161 67/72, and BML 161 97/172 (Second Position mode only), can be configured to convert the Prism HP, LPE-200, LPE-50, M-RK, JAGUAR 700P/Pi, or P7100^{IP} radio into a "*pseudo*" mobile radio. This is accomplished by transferring the PTT, microphone and speaker function on the portable radio to an external microphone and speaker. The antenna input on the portable radio is switched to an external antenna located on the outside of the vehicle. Refer to Table 3-1 for specific radio support information.

In some applications, a control unit is installed and used to operate the radio while the radio is inserted in the charger. Full radio display and keypad functionality are available from the control unit. The control unit can be used to place and receive calls while the radio battery is charging. Refer to Table 3-1 for specific radio support information.

5.1 UNDERSTANDING THE LED INDICATORS AND CONTROLS

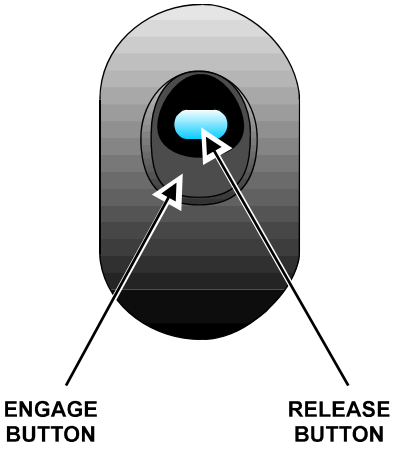


Figure 5-1: Engage and Release Buttons

Engage Button - The Engage Button secures the radio in place while the radio is charging. The charger engages the UDC on the radio when this button is depressed.

Release Button - The Release Button releases the radio so the radio can be removed from the charger.

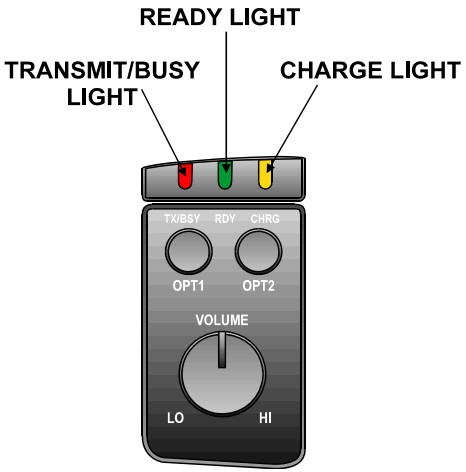


Figure 5-2: Indicator LEDs

There are three LED indicators on the left front panel of the charger (see Figure 5-2) labeled **TX/BSY, RDY** and **CHRG**.

TX/BSY *(Red)* - This LED is ON when the PTT switch is pressed and the radio is transmitting.

RDY *(Green)* - This LED lights when the radio battery is 90 to 95 percent charged and the charger is in trickle charge mode. At this time the charger switches to a slow or "trickle" charge rate for between 1 and 2.5 hours, depending on battery composition, and completes the charge.

CHRG *(Amber)* - When the radio is inserted in the charger, this LED flashes for 3-5 seconds, then lights steady to indicate the battery is rapid charging. When the internal battery temperature or voltage is outside the operating window, this LED flashes. See Section 5.8.

OPT1 – The function of the Enhanced Vehicular Charger **OPT1** button is programmable and defined in the radio personality. For more information on configuring this button, refer to Section 4.4.

OPT2 – For Prism HP/LPE-200, JAGUAR 700P/Pi, or P7100^{IP} radios, the function of the Enhanced Vehicular Charger **OPT2** button is programmable. This function is identical to the function programmed for the radio Option 2 button. Refer to **ProGrammer On-Line Help** or **RPM On-Line Help** for a list of available functions.

For M-RK radios the Enhanced Vehicular Charger **OPT2** button is an Emergency button and not programmable.

ON/OFF/Volume Knob - This knob powers the charger ON/OFF and to control the volume level of the external speaker. Rotating the knob counterclockwise turns the volume down. Rotating the knob clockwise turns the volume up. Rotating the knob counterclockwise until it clicks and stops powers the charger OFF. In applications with a remote control unit, this knob can be disabled. If the knob is not disabled, the knob serves only as an ON/OFF switch for the control unit. Volume control resides with the control unit ON/OFF/Volume knob.

5.2 POWERING THE CHARGER

The charging circuits are powered at all times, regardless of the ON/OFF/Volume knob position and the ignition switch position. The charger dip switch configuration determines how the audio circuits (transmit and receive) and the remote control unit are powered ON/OFF.

The audio circuits and the remote control unit can be configured to power ON all the time or to follow the vehicle ignition switch. For more details read the Section 4.3. In both configurations the charger and/or remote control unit ON/OFF/Volume knob must be in the ON position. Refer to the section **ON/OFF/Volume Knob**.

5.2.1 Summary on Power

5.2.1.1 Power for the Charging Circuits

The charging circuits are powered at all times. This enables the user to charge the battery regardless of the vehicle ignition switch.

5.2.1.2 Power for the Audio Circuits

- If the charger is configured to follow the ignition switch, the vehicle ignition switch must be in the Accessory or Run position and the charger ON/OFF/Volume knob must be in the ON position.
- If the charger is configured without ignition sense, the charger ON/OFF/Volume knob powers the audio circuits ON and OFF at all times.

5.2.1.3 Power for the Remote Control Unit

- If the charger is configured to follow the ignition switch, the vehicle ignition switch must be in the Accessory or Run position to power the control unit ON. In addition, the charger ON/OFF/Volume knob or the remote control unit ON/OFF/Volume knob must be in the ON position. Both knobs power the control unit ON and OFF unless the charger ON/OFF/Volume knob is disabled.
- If the charger is configured without ignition sense, the charger ON/OFF/Volume knob or the remote control unit ON/OFF/Volume knob powers the control unit on and off at all times unless the charger knob is disabled.

NOTE

In all remote control unit applications, the ON/OFF/Volume knob on the control unit must be used to adjust the volume level of the external speaker.

5.3 INSERTING THE RADIO

CAUTION

Carefully insert the radio into the EVC, avoiding impact with the EVC UDC assembly.
The UDC cover must be removed from the radio prior to placing the unit into the charger.

The bottom of the radio or battery is inserted first with the back of the radio facing down. When the radio is inserted in the charger, the **CHG** LED flashes for 3-5 seconds and then lights steady to indicate the battery is rapid charging. When the internal battery temperature or voltage is outside the operating window, this LED flashes. See Section 5.1 on page 35 for more information.

NOTE

To avoid damage to the radio/charger interface connectors, the radio should be perpendicular to the front of the charger during insertion.

When the battery is 90 to 95 percent charged, the charger is in trickle charge mode. At this time, the charger switches to a slow or "trickle" charge rate and the **RDY** LED lights. Allow the battery to continue charging for between 1 and 2.5 hours, depending on battery composition, to complete the charge.

NOTE

The battery cannot be inserted into the charger unless the battery is attached to the radio. The charger secures the battery by engaging and latching to the radio UDC.

5.4 SECURING OR LATCHING RADIO

Using your thumb or a finger, press the (black) Engage button until the button clicks and latches in the depressed position. See Figure 5-3. This secures the radio in the charger while the battery is charging by engaging the UDC.

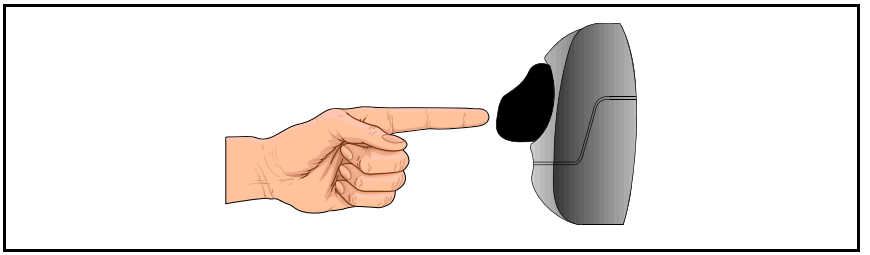


Figure 5-3: Latch Radio/Battery in Charger

5.5 RELEASING/REMOVING RADIO

Using your thumb or a finger, press the *(blue)* Release button until the button clicks (see Figure 5-4). This releases the Latch button and disengages the UDC on the radio. Pull the radio straight out of the charger.

NOTE

To avoid potential intermittent operation, the user should ensure the radio and charger contacts are free from dirt and oil contamination.

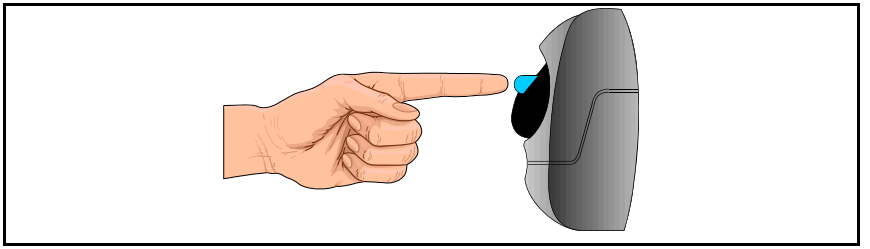


Figure 5-4: Release Radio/Battery from Charger

5.6 OPERATING THE RADIO IN THE CHARGER

The purpose of the dead battery power supply is to place 7.5 Vdc across the handheld portable battery so that the radio can transmit if the radio is initially inserted into the charger with a discharged battery. The dead battery power supply is turned ON by the PTT signal from the radio, which means the dead battery power supply is activated every time the radio transmits and battery voltage is < 7.5V. The dead battery power supply is only effective until the battery voltage becomes greater than 7.5 volts *(battery voltage during charge is typically 8 to 9 volts).*

The vehicular charger can be used to transmit and receive calls while the radio is charging:

1. Insert the radio in the charger and latch the radio by pressing the engage button.
2. Rotate the charger ON/OFF/Volume knob to the ON position. If the ignition sense line is used, the vehicle ignition switch must be in the ACCESSORY or RUN position to power the audio circuits.
3. Turn the power to the radio ON and select the appropriate System/Group/Channel.

The charger can be configured so M-RK radios can automatically INVERT the radio display while inserted in the charger. This aids in viewing the radio display while in the charger. See Section **4.3**.

4. Transmit calls using the microphone attached to the charger. Receive audio can be heard through the attached external speaker.
5. Adjust charger volume knob for the appropriate volume level.

5.7 OPERATING THE RADIO USING A REMOTE CONTROL UNIT/HAND HELD CONTROLLER

In some applications, a control unit or Hand Held Controller (HHC) is installed and used to operate the radio while the radio is inserted in the charger. Full radio display and keypad functionality are available from the control unit. The control unit/HHC can be used to place and receive calls while the radio battery is charging:

1. Insert the radio in the charger and latch the radio by pressing the engage button.
2. Rotate the remote control unit/HHC ON/OFF/Volume knob to the ON position. If the ignition sense line is used, the vehicle ignition switch must be in the ACCESSORY or RUN position to power the audio circuits.

In remote control unit/HHC applications, the control unit ON/OFF/Volume knob must be used to adjust the volume control to the external speaker. Both the control unit/HHC ON/OFF/Volume knob and the charger ON/OFF/Volume knob can be used to power the control unit ON and OFF. To simplify operation, it is recommended to disable the charger ON/OFF/Volume knob and use the control unit ON/OFF/Volume for all functions. For more information, see Section 4.3.

3. Turn the power to the radio ON.
4. Use the control unit/HHC to select the appropriate System/Group/Channel. Transmit calls using the microphone attached to the control unit. Receive audio should be heard through the attached external speaker. Full radio keypad functionality is available from the control unit.
5. Adjust control unit volume knob for the appropriate volume level.

5.8 BATTERY CHARGER DETAILS

When battery is placed in the EVC, the battery is subjected to a trickle charge current of 45 milliamps for about 3-5 seconds. During this time period the **CHRG** LED flashes ON and OFF. In addition, during this time period the battery is checked to determine if the battery is within the proper voltage and temperature window.

EVC, product numbers BML 161 67/12, BML 161 67/32, and BML 161 67/72 charge Nickel Cadmium (NiCd) type battery packs for all models of the Prism HP, LPE-200, LPE-50, M-RK, JAGUAR 700P/Pi, P7100^{IP}, and P5100 radios. EVC, product number BML 161 67/172, charges Nickel Cadmium (NiCd) and Nickel Metal Hydride (NiMH) batteries for the JAGUAR 700P/Pi, P7100^{IP}, and P5100 radios.

5.8.1 Temperature Window

Minimum: 0° C (+32° F) ±5°C

Maximum: +45° C (+113° F) ±5°C

5.8.2 Voltage Window

Minimum: 5.8 VDC ±0.25 VDC

Maximum: 10.8 VDC ±.0.25 VDC

If the battery is within the temperature and voltage ranges, the rapid charge begins. The amber **CHRG** LED glows continuously until the battery nears a full charge (between 90% and 95%). At this point, a -ΔV is detected and the charger switches to a "trickle" charge rate. During the "trickle" charge, the

green **RDY** LED is illuminated. Allow the battery to continue charging for between 1 and 2.5 hours, depending on battery composition, to complete the charge. .

If the battery temperature and/or voltage is outside the operating window, the **CHRG** LED continues to flash on and off. When the temperature and/or voltage returns to the operating window, the EVC automatically switches to the rapid charge mode and the **CHRG** LED glows continuously. If the **CHRG** LED continues to flash, the EVC unit is trickle charging the battery. Several factors may cause this to occur. The most common problems are:

- Battery temperature is outside the desired temperature window.
- The battery has been deeply discharged and may require several minutes at the trickle charge rate before switching to the rapid charge mode.

If the battery is deeply discharged, the radio must be powered OFF when inserted into the charger.

In addition, the battery may be defective or the battery contacts may be dirty. Dirty battery contacts prevent the battery from making a reliable connection with the EVC.

In a vehicular application with high ambient temperature inside the vehicle, the automatic charging control prevents rapid charging or limits the time of rapid charging.

In other applications where the operator inserts and removes the radio many times during a short period of time, the automatic control will sense a high internal battery temperature. This prevents further rapid charging of the battery until the internal temperature of the battery stabilizes within the acceptable range.

6 WARRANTY

Please register this product within 10 days of purchase. Registration validates the warranty coverage, and enables Harris to contact you in case of any safety notifications issued for this product.

Registration can be made on-line at www.pspc.harris.com/CustomerService or by contacting Harris Warranty Administration at the following:

U.S. & Canada:
Phone Number: 1-800-368-3277, Option 4 (toll free)
Fax Number: 1-434-455-6821
E-mail: mailto:Jerri.Wilmouth@Harris.com

International:
Phone Number: 1-434-455-6403
Fax Number: 1-434-455-6676
E-mail: Jerri.Wilmouth@Harris.com

A. Harris Corporation, a Delaware Corporation, through its RF Communications Division (hereinafter "Seller") warrants to the original purchaser for use (hereinafter "Buyer") that Equipment manufactured by or for the Seller shall be free from defects in material and workmanship, and shall conform to its published specifications. With respect to all non-Seller Equipment, Seller gives no warranty, and only the warranty, if any, given by the manufacturer shall apply. Rechargeable batteries are excluded from this warranty but are warranted under a separate Rechargeable Battery Warranty (ECR-7048).

B. Seller's obligations set forth in Paragraph C below shall apply only to failures to meet the above warranties occurring within the following periods of time from date of sale to the Buyer and are conditioned on Buyer's giving written notice to Seller within thirty (30) days of such occurrence:

1. for fuses and non-rechargeable batteries, operable on arrival only.
2. for parts and accessories (except as noted in B.1) sold by Seller's Service Parts Operation, ninety (90) days.
3. for P7300, P7200, P7100^{IP}, P5400, P5300, P5200, P5100, P3300, M7300, M7200 (including V-TAC), M7100 ^{IP}, M5300 and M3300 radios, two (2) years, effective 10/01/2007.
4. for Unity^{TM} XG-100P, three (3) years.
5. for all other equipment of Seller's manufacture, one (1) year.

C. If any Equipment fails to meet the foregoing warranties, Seller shall correct the failure at its option (i) by repairing any defective or damaged part or parts thereof, (ii) by making available at Seller's factory any necessary repaired or replacement parts, or (iii) by replacing the failed Equipment with equivalent new or refurbished Equipment. Any repaired or replacement part furnished hereunder shall be warranted for the remainder of the warranty period of the Equipment in which it is installed. Where such failure cannot be corrected by Seller's reasonable efforts, the parties will negotiate an equitable adjustment in price. Labor to perform warranty service will be provided at no charge during the warranty period only for the Equipment covered under Paragraph B.3 and B.4. To be eligible for no-charge labor, service must be performed at Seller's factory, by an Authorized Service Center (ASC) or other Servicer approved for these purposes either at its place of business during normal business hours, for mobile or personal equipment, or at the Buyer's location, for fixed location equipment. Service on fixed location equipment more than thirty (30) miles from the Service Center or other approved Servicer's place of business will include a charge for transportation.

D. Seller's obligations under Paragraph C shall not apply to any Equipment, or part thereof, which (i) has been modified or otherwise altered other than pursuant to Seller's written instructions or written approval or, (ii) is normally consumed in operation or, (iii) has a normal life inherently shorter than the warranty periods specified in Paragraph B, or (iv) is not properly stored, installed, used, maintained or repaired, or, (v) has been subjected to any other kind of misuse or detrimental exposure, or has been involved in an accident.

E. The preceding paragraphs set forth the exclusive remedies for claims based upon defects in or nonconformity of the Equipment, whether the claim is in contract, warranty,

tort (including negligence), strict liability or otherwise, and however instituted. Upon the expiration of the warranty period, all such liability shall terminate. The foregoing warranties are exclusive and in lieu of all other warranties, whether oral, written, expressed, implied or statutory. NO IMPLIED OR STATUTORY WARRANTIES OF MERCHANTABILITY OR FITNESS FOR PARTICULAR PURPOSE SHALL APPLY. IN NO EVENT SHALL THE SELLER BE LIABLE FOR ANY INCIDENTAL, CONSEQUENTIAL, SPECIAL, INDIRECT OR EXEMPLARY DAMAGES.

This warranty applies only within the United States.

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