



*Vehicle Power Supply*  
**INSTALLATION GUIDE**

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# CONTENTS

## SECTION 1

### General Information

About This Manual .....	1-1
Installation Practices .....	1-1
Considerations .....	1-1
Power Supplies .....	1-1
Input Power Cable .....	1-4
Inline Fuse .....	1-4
Output Power Cable .....	1-4

## SECTION 2

### Installation Procedures

About this Installation .....	2-1
Installation Summary .....	2-1
Tools Required .....	2-2
Before you Begin .....	2-3
Power Supplies .....	2-3
Connect Power Input Cable .....	2-3
Mount the Power Supply .....	2-4
Power Cable Installation .....	2-5
Power Cable Connections .....	2-6
Cable Termination .....	2-6
Cut and Strip the Power Cable .....	2-7
Heatshrink Tubing .....	2-8
Prepare the Cable Ends .....	2-9
Power Source Connections .....	2-9
Direct to Battery Connections .....	2-10
Side-mounted Battery Terminals .....	2-10
Connection to Top-mounted Terminals .....	2-12
Cables Clamps .....	2-14
Final Connections .....	2-14

**SECTION 3**

**Troubleshooting Information**

Procedures .....	3-1
Basic Diagnostic Procedures .....	3-1
Inspection .....	3-1
Power Supply .....	3-1
Cables, Connections .....	3-2
Fuse .....	3-2
Electrical Measurements .....	3-2
Voltage .....	3-2
Continuity .....	3-2
Substitution .....	3-3
Advantages .....	3-3
Disdvantages .....	3-3
When to substitute .....	3-3
Trouble Charts .....	3-3
Power supply reset .....	3-3

**FIGURES**

Figure 1-1 Power Supplies .....	1-3
Figure 2-1 Cut and Strip Cable Ends .....	2-7
Figure 2-2 Heatshrink Locations .....	2-8
Figure 2-3 Side-Mount Battery Terminals .....	2-11
Figure 2-4 Top-Mount Battery Terminals .....	2-13
Figure 2-5 Cable Clamp .....	2-14
Figure 3-1 Input Power Cable .....	3-7

**TABLES**

Table 1-1 Power Supply Identification .....	1-2
Table 2-1 Parts List .....	2-2
Table 3-1 Power Failure Trouble Chart I .....	3-4
Table 3-2 Power Failure Trouble Chart II .....	3-5
Table 3-3 Power Supply Pinouts .....	3-6

# Section 1

## General Information

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### *About This Manual*

This manual is divided into three sections. Section One describes installation practices and unique components in this kit. Section Two contains mechanical and electrical installation instructions. Section Three contains basic troubleshooting information and pin-outs for connectors.

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### *Installation Practices*

Installers should be familiar with the particular brands and models of equipment where this kit is installed. They should be trained and experienced on vehicle electrical systems.

Installers must follow these guidelines and the Installation Procedures precisely to ensure a safe and reliable installation. Failure to follow *all of the instructions* herein can result in damaged or destroyed equipment, degraded equipment performance, premature failures, and void the warranty.

### *Considerations*

#### Power Supplies

Two power converters (“supplies”) are available that should meet most electrical requirements. Verify that you have the correct supply for a particular installation before beginning. One power supply accepts input voltages ranging from 6-36

V dc (typically gas-powered vehicles: 12 & 24 volts) and the other accepts 15-96 V dc (typically electric-powered vehicles: 24, 36, 48, & 72 volts). Both supplies provide 12 V dc output which is filtered and regulated. Both supplies also provide short circuit, over voltage, and over temperature protection.

You can distinguish between the two supplies in several ways. Each supply displays the international symbologies for input and output connectors, including voltage information. In addition, the table below provides other means of identification.

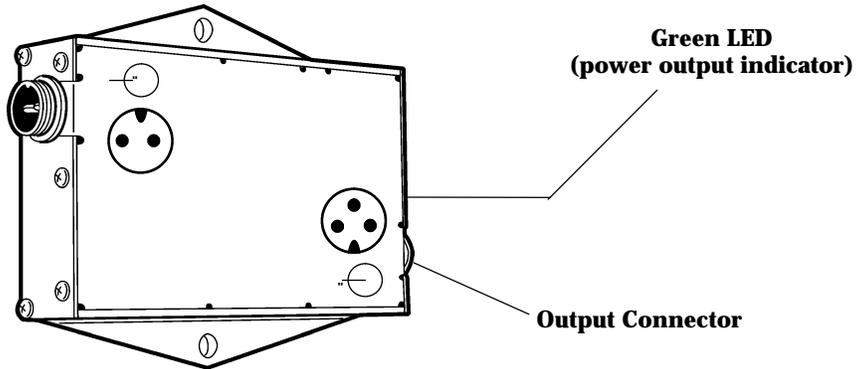
*Table 1-1  
Power Supply Identification*

<b>Model Number</b>	<b>Part Number</b>	<b>Input Connector</b>	<b>Input Voltage</b>
851-040-001	066776-01	4-pin, keyed	6-36 V dc
851-041-001	066777-01	2-pin, keyed	15-96 V dc

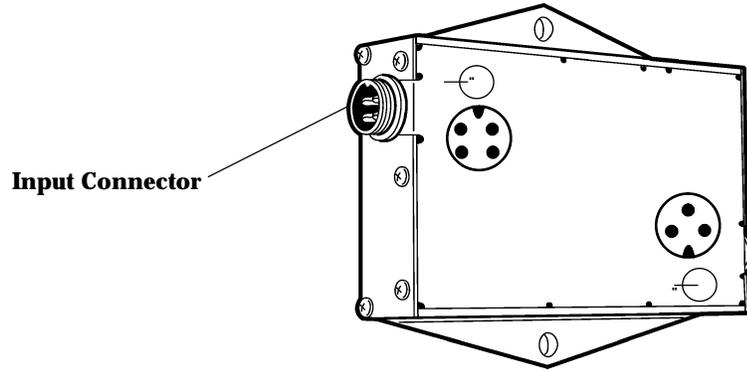
The power supply shall be mounted to the vehicle chassis ground, or connected (electrically) via external wire to the vehicle chassis. Chassis ground to the computer or other equipment is then established via the power supply *output cable*.

Since the power supply will produce heat, it is advisable to mount it on a minimum of 130-160 square inches (approximately one square foot or more) of metallic surface. This location *should not be* in the vicinity of sources of vehicle-generated heat. Use **only the hardware supplied in the kit** to mount the power supply; *do not use sheet-metal screws*.

A green light-emitting diode (LED) indicator, located near the output connector on the power supply, will be lighted whenever voltage is supplied to the output power cable.



**Model: 851-041-001 P/N: 066777-01**  
**15-96 V; 3,5 A**



**Model: 851-040-001 P/N: 066776-01**  
**6-36 V; 10 A**

*Figure 1-1*  
*Power Supplies*

### Input Power Cable

**NOTE:** *The input power cable may be shortened as needed. It SHOULD NOT be extended under any circumstances.*

The input power cable is approximately 9 feet long. One end has a 4-pin connector, the other end has a 2-pin connector. By cutting off the unneeded connector, a single cable can meet either low or high voltage input-range power supply requirements. The cut end is then terminated for connection to the vehicle power source.

### Inline Fuse

A snap-twist inline fuse holder is furnished as part of this kit. It must be connected as close as possible (electrically *and* physically) to the vehicle power source. It provides short-circuit protection for the entire input power cable and the power supply input. The fuse holder contains a 3AB, 20 ampere/250 V dc ( $1/4$ " x  $1-1/4$ "") fuse. Should it fail, diagnose the problem and correct it, then replace with exactly the same size and type fuse.

### Output Power Cable

**NOTE:** *Ensure that you have the correct output power cable for the computer(s) being installed in your location.*

Output power cables are approximately 6 feet long and have a durable 3-pin connector to mate with the power supply. The connector on the far end of the cable is specific to the terminal (computer) or docking device in your particular installation. These rugged connectors have heavy duty metal housings and enhanced strain relief to provide added reliability in the mobile environment.

## Section 2

# Installation Procedures

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### *About this Installation*

Follow the procedures in this section as closely as possible while keeping the following as primary considerations:

- Power Supply must be securely mounted.
  - Mounting surface must be sturdy.
  - Mounting surface must be able to sink power supply heat.
  - Fuse must be close to vehicle power source.
  - Keep cables as short as practical.
  - Secure cables at least every 18 inches.
- 

### *Installation Summary*

Installation consists of five (5) primary steps, which should be undertaken in the following order:

1. Connect the input cable to the power supply.
2. Mechanically install the power supply.
3. Route and secure the power cable.
4. Shorten cable as appropriate, then crimp the fuse holder to the joined RED and BLACK wires (positive). Crimp a terminal ring to the joined WHITE and GREEN wires (negative). Insulate as instructed.
5. Make final connections to the vehicle power source.

## Tools Required

- Wire Crimping and stripping tool.
- Electric drill, drill bits.
- Common hand tools.
- Heat gun for shrink sleeve tubing.

*Table 2-1  
Parts List*

<b>Description</b>	<b>NPN</b>	<b>Qty</b>
power cable	226-340-001	1
fuse holder assembly	315-075-001	1
fuse, 20 A ceramic FB	315-074-001	1
bolt, 3/8-16 X 1-1/2"	800-099-001	2
washer, 3/8"	803-099-001	4
nut, 3/8-16	802-099-001	4
adjustable wire clamps	808-011-001	8
self-tap screw #6 X 5/8"	800-008-001	8
3/8" terminal ring	809-165-001	2
#10 terminal ring	809-083-009	3
self-tap screw #8 X 5/8"	800-012-000	1
#8 flat washer	803-084-000	1
snap-in bushing	807-065-003	1
screw, m/s 1/4-20 x 1-1/4"	801-194-002	2
flat washer, 1/4"	801-100-000	2
locking nut, 1/4-20	802-117-000	2
lockwasher, 1/4"	803-042-001	2
cable tie, locking	808-002-001	6
h/s tubing, blk, 1/8" dia.	321-042-000	12 in.
h/s tubing, blk, 3/8" dia.	321-143-001	6 in.
ferrite bead	309-388-001	1

---

## Before you Begin



**WARNING:** Equipment failure or damage will result if the vehicle power source voltage does not fall within the input voltage rating of the power supply furnished to you.

### Power Supplies

Read the nomenclature on the power supply and verify that the input voltage rating is correct for the vehicle you will be installing it in. See Section One for identifying information.

Remember that the supply with the lower input voltage rating (6-36 V dc) has a 4-pin input connector while the power supply with the higher input voltage rating (15-96 V dc) has a 2-pin input connector.

---

## Connect Power Input Cable

Only one of the input connectors will fit the power supply:

1. Mate the corresponding cable connector to the power supply connector.
2. Slide the cable connector *IN* as far as it will go.
3. Turn the cable connector collar *clockwise* to secure it.
4. Clamp the ferrite bead onto the input cable near the power supply. Make sure tabs are fully engaged.
5. Cut cable at the *unused* cable connector.  
*Discard this connector.*

## Mount the Power Supply

The input power cable is approximately 9 feet long and can be shortened as needed. **It must NOT be extended under any circumstances.** The output power cable is approximately 6 feet in long and *cannot be shortened*. You must take these lengths and the intended location of your electronic equipment into consideration when choosing a mounting location for the power supply.

The mounting location must provide 130-160 square inches of metallic surface to sink heat generated by the power supply. This metallic mounting surface must be connected to the vehicle chassis electrically. In rare instances, you may have to fabricate a flexible wire or braid to bond the mounting surface to vehicle chassis ground.

Appropriate hardware is furnished in this installation kit for mounting the power supply. Use mounting Method A in situations where you can easily access the back side of the mounting location to install a locknut and washer.

Use Method B where the back side of the mounting location is inaccessible. Note that this method requires that the mounting plate be thick enough to accept and retain sufficient threads to provide a secure and reliable mechanical installation.

### **Method A:**

1. Mark and center punch the two mounting hole locations.
2. Use a 1/4-inch drill bit to make the two mounting holes.
3. Use 1/4" hex bolts with flat washers and locking nuts to install the power supply.

### **Method B:**

1. Mark and center punch the two mounting hole locations.
2. Use a #7 drill bit to make the mounting holes.

3. Use a 1/4-20 tap to thread the mounting holes.
4. Place a lockwasher on each bolt.
5. Insert the bolt/lockwasher assemblies through the power supply holes and into the threaded mounting holes.

---

## Power Cable Installation

Follow these guidelines and other instructions closely when installing power cables.

- " Completely install power cables *before* making connections to equipment.
- " Route the power cables *from* the general area where the power supply will be mounted.
- " Use a snap-in bushing (requires 9/16" hole) if the power cable passes through a firewall or other sheet-metal.
- " Make sure that cable routing does not interfere with other equipment or vehicle controls.
- " Make sure that cable routing does not invite damage to the cable.
- " Secure the cables at least every 18 inches throughout the cable run: use adjustable clamps (see last page in this section) or wire-tie to existing vehicle cable runs.

### NOTE:

*If this installation will be on a gas-powered vehicle, we recommend installing either an On/Off switch (minimum 15 A dc rating, such as ITW part number 163-900-034), or an automatic shut-off device, in series with the in-line fuse holder. Charge-Guard, Inc., 400 Highland Avenue, Altoona, PA 16002 (1-800-458-4310) manufactures a "CHARGE GUARD®" device for this purpose.*

## Power Cable Connections

The fuse holder from the input power cable must be connected as close (physically and electrically) as possible to the *positive side* of the vehicle power source. The remaining colored wire(s) must be connected to the negative side of the vehicle power source. *In this installation, the shield wire must be connected to the vehicle chassis.* Instructions are *not included* for connecting to various possible vehicle power sources. It is assumed that the trained professional installer will be knowledgeable on the brands and models of vehicles he is working with. Both large (3/8-inch) and smaller terminal rings are provided to accommodate most installation needs. This kit contains additional bolts, nuts, and washers in the event you will connect the input power cable directly to a vehicle battery. The intended use for these parts is detailed in the instructions that follow.

### Cable Termination

You must cut the cable to length, cut off a portion of the outer cable jacket and strip the individual wire ends of the cable as instructed. Heatshrink tubing is furnished in this kit and *must be slipped onto the cable or wires before terminating them.* Then, you must install the fuse holder in series with the positive wires and install a terminal ring on the negative wires. Finally, you must mechanically complete the connections to the vehicle power source or battery and electrically connect the shield wire to vehicle chassis ground using a self-tapping screw and flatwasher.

## Cut and Strip the Power Cable

1. Cut the power cable near the power source or battery.
2. Strip the cable jacket back 12-14 inches.
3. Slide heatshrink tubing over cable jacket.
4. Strip 1/4" of insulation from individual wires.
5. Twist the white and green (*negative*) wires together.
6. Twist the red and black (*positive*) wires together.
7. Twist the shield wire and slide the 1/8" heatshrink tubing onto it.

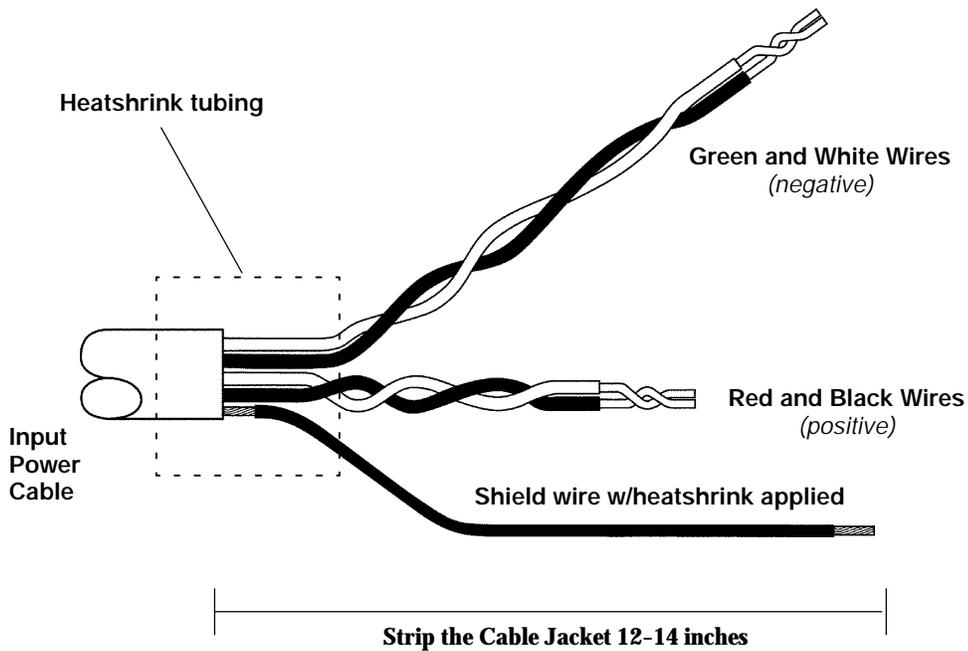
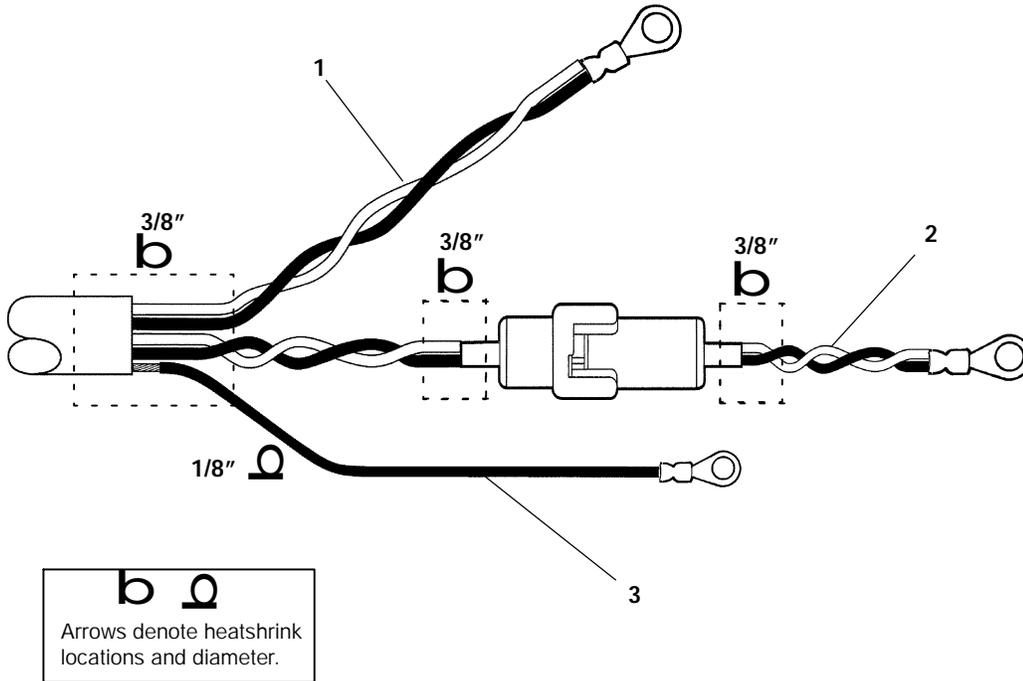


Figure 2-1  
Cut and Strip Cable Ends

**NOTE:** See "Note" on page 2-5 when installing on gas-powered vehicles.

Heatshrink Tubing

This kit contains a 6 inch length of 3/8" heatshrink tubing which you will cut into three pieces, and a 12 inch length of 1/8" heatshrink tubing for the shield wire. Tubing must be in place *before terminating wire ends*. Crimp terminal rings and fuse holder ends, then position all heatshrink tubing in the locations shown. Use a heat gun to shrink tubing.



- 1. Green and White twisted pair
- 2. Red and Black twisted pair
- 3. Shield wire, twisted

Figure 2-2  
Heatshrink Locations

**NOTE:** See "Note" on page 2-5 when installing on gas-powered vehicles.

### Prepare the Cable Ends

Both large (3/8 inch) and smaller (#10) terminal rings are provided for your selection and use in the following steps. A small (#10) terminal ring should be crimped to the shield wire and then fastened to vehicle chassis ground.

1. Crimp a terminal ring onto the white-green twisted pair (negative) of wires.
2. Cut the red-black twisted pair (positive) of wires at the midpoint. Strip exposed ends.
3. Position short lengths of heatshrink tubing as in indicated in Figure 2-2.
4. Crimp the fuse holder to the positive wires from the cable.
5. Shorten the remaining positive wires (pigtail) if desired and position a short length of heatshrink tubing onto this pigtail.
6. Crimp this positive pigtail to the fuse holder.
7. Securely crimp a terminal ring to end of the positive pigtail from the fuse holder.
8. Slide heatshrink over crimps, shrink with heatgun.

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## Power Source Connections

The next four pages show you the intended purpose of nuts, bolts, and washers that are included in this kit if you will be connecting the power cable directly to a vehicle battery.

Additional hardware *is not provided* in this kit for connecting the power cable to other vehicle power sources. Refer to the manufacturer's technical manual for the vehicle if necessary.

## *Direct to Battery Connections*

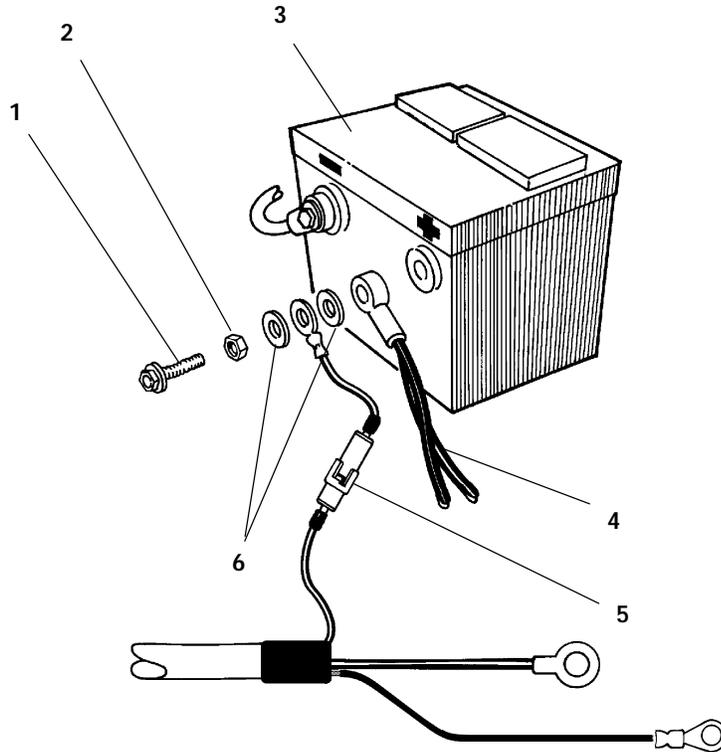
### Side-mounted Battery Terminals

1. Remove both terminal screws from the vehicle battery.
2. Screw a 3/8" nut as far as it will go onto a 3/8" X 1-1/2" bolt furnished in kit.
3. Slip a 3/8" washer onto the bolt.
4. Slide the *positive* (fuse holder) terminal ring onto the positive battery terminal bolt.
5. Slip a second 3/8" washer onto the bolt.
6. Slide the vehicle *positive* battery cable onto the bolt.
7. Thread the bolt assembly (steps 1-6, above) into the positive battery terminal. Tighten the bolt until it bottoms out but *do not overtighten the bolt*.
8. Tighten the nut securely against the washers and cables.
9. Use self-tapping screw and a flat washer to connect shield wire to vehicle chassis ground.

*Repeat steps 2 through 8 for the negative (white-green pair) wire from the input power cable, hooking up the negative cables to the negative (-) battery terminal.*

**NOTE:**

*See "Note" on page 2-5 when installing on gas-powered vehicles.*



- 1. Bolt
- 2. Nut
- 3. Vehicle battery
- 4. Vehicle battery cable
- 5. Fuse holder
- 6. Washers

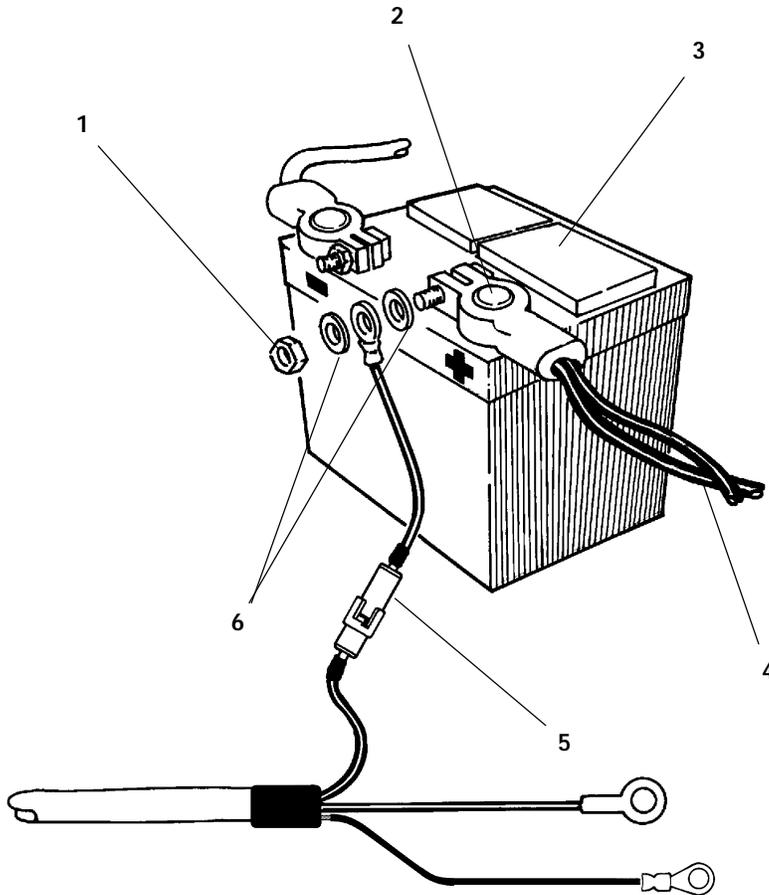
*Figure 2-3*  
*Side-Mount Battery Terminals*

**NOTE:** See "Note" on page 2-5 when installing on gas-powered vehicles.

#### Connection to Top-mounted Terminals

1. Remove the bolts from the vehicle battery terminals.
2. Replace those bolts with 3/8" × 1-1/2" bolts and nuts from the installation kit. Tighten the nuts.
3. Slip a 3/8" washer onto the end of each bolt.
4. Slide the *positive* (fuse holder red wire) terminal ring onto the positive battery bolt.
5. Slip a second 3/8" washer onto that bolt.
6. Thread a second 3/8" nut onto that bolt. Tighten the nut.
7. Use self-tapping screw and a flat washer to connect shield wire to vehicle chassis ground.

*Repeat steps 3 through 6 for the negative wire (white-green pair) from the input power cable, connecting the wire to the negative (-) battery terminal.*



- 1. 3/8" nut
- 2. 3/8" X 1-1/2" bolt
- 3. Vehicle battery
- 4. Vehicle battery cable
- 5. Fuse holder
- 6. 3/8" washers

*Figure 2-4  
Top-Mount Battery Terminals*

**NOTE:** See "Note" on page 2-5 when installing on gas-powered vehicles.

## Cables Clamps

Secure the cables every 18 inches using locking wire ties or adjustable cable clamps. Remove the paper backing from a clamp and stick the clamp in place while drilling a pilot hole with a #26 drill bit. Use #6 sheet-metal screws to permanently hold clamps in place.

#6 Sheet-metal  
Screw Goes Here

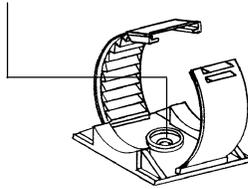


Figure 2-5  
Cable Clamp

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## Final Connections

Once the computer, dock, or other device is mechanically installed, you can connect the output power cable between the power supply output and the device. Connectors are keyed and operate the same as the input power connector:

1. Mate the cable connector to the power supply and to the device connectors.
2. Slide the cable connector *IN* as far as it will go.
3. Turn the cable connector collar *clockwise* to secure it.

**NOTE:** See Section Three for power fault diagnostic information.

## Section 3

# Troubleshooting Information

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### Procedures

Three basic procedures contained in this section allow you to identify and correct most power supply problems you may encounter in the foregoing installation. Connector pin-out information is also furnished for your convenience. Recommended diagnostic procedures are listed below and — in general — should be followed in the order given. The Trouble Charts will instruct you when to use a particular method.

#### Basic Diagnostic Procedures

1. Inspection
2. Voltage and Continuity Measurements
3. Component Substitution

### Inspection

#### Power Supply

The power supply has a green light-emitting diode (LED) indicator near the output connector. This LED is lighted whenever 12 V dc is present at the output connector. Anytime you suspect a power failure, check to see if the LED is lighted. If this LED *is lighted* and you believe there is a power failure, the failure is either in the output power cable or downstream from it.

If the LED *is not lighted*, the power supply is not producing 12 V dc output power. In this case a fault can exist anywhere in the system. Table 3-1 will help isolate and identify and correct the failure.

#### Cables, Connections

Visually inspect all cable connectors and the connections to the vehicle power source. Any obvious faults should be corrected. Use your hands to jiggle cable connectors to ensure these are not loose or disconnected. Again, correct any faults before proceeding.

#### Fuse

Open the twist-lock fuse holder and remove the fuse for a continuity test. If you substitute a new fuse and it also blows, the most likely cause(s) would be a shorted or miswired power input cable, or a faulty (or incorrect) power supply.

### *Electrical Measurements*

#### Voltage

Connector pin-out information is provided to allow you to measure voltage at the input power cable connector and at either end of the power output cable.

#### Continuity

**CAUTION:**

***Cables MUST be disconnected at both ends before conducting continuity tests. Failure to disconnect cables completely is likely to result in damage or destruction of your test equipment.***

Thorough continuity testing will take longer, in most cases, than either substitution or taking voltage measurements. An ohmmeter is sufficient to diagnose simple opens or shorts.

If fuses blow sporadically, or power supply shut down occurs at random, you may want to use a megger to check cables for high-resistance shorts between wires or between a wire and the cable shield.

## *Substitution*

### Advantages

Component substitution is the most expedient and certain troubleshooting technique. It is especially valuable when trying to resolve intermittent problems.

### Disdvantages

You must either have spare parts (power supply and both cables in this instance) on hand, or be prepared to "borrow" components from another, working installation.

### When to Substitute

Follow the guidelines in the Trouble Charts that follow, substituting only when directed to do so.

If an installation suffers intermittent input power cable fuse failures, or if the power supply shutdowns without good cause, do not hesitate to substitute a known-good power supply.

## *Trouble Charts*

The following trouble chart assumes that your computer or other equipment does not work, and that the problem is caused by the power supply or its associated cables. Follow the procedures in the tables in the order they are shown for maximum troubleshooting efficiency.

### Power Supply Reset

Where the trouble chart tells you to "reset the power supply" you must disconnect the *input* power cable for 10 seconds, then reconnect it. The power supply has automatic over-voltage, over-current, over-temperature, and shorted-output protection and must be reset by disabling input power whenever any of these faults activates that protection.

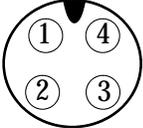
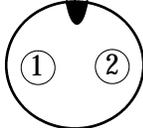
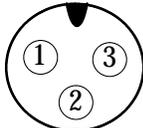
*Table 3-1  
Power Failure Trouble Chart I*

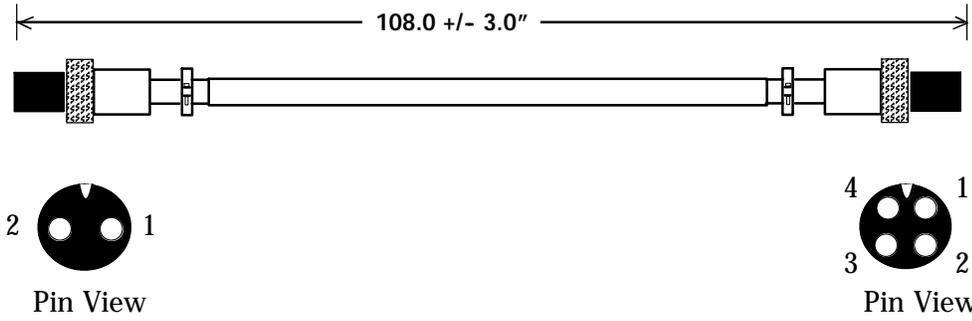
<b>Observe</b>	<b>Result</b>	<b>Meaning</b>	<b>Remedy</b>
LED	Lighted	Power Supply is working.	Test or substitute output power cable.
LED	NOT lighted	No output power from supply.	Reset the power supply.
LED	NOT lighted	No output from power supply.	Disconnect power OUTPUT cable, <i>then reset the power supply.</i>
LED	Lighted (now)	Power supply is working.	Substitute power output cable.

**Table 3-2**  
**Power Failure Trouble Chart II**  
*(assumes steps in Chart I have been followed)*

<b>Observe</b>	<b>Result</b>	<b>Meaning</b>	<b>Test or Remedy</b>
LED	NOT lighted	No output from power supply.	Test for input voltage.
Voltage	Normal	Power Supply not working.	Replace power supply.
Voltage	NOT present	No input power to the power supply	Replace in-line fuse if voltage is NOT present at connector.  Replace input power cable if input voltage is still not present at connector.

**Table 3-3**  
Power Supply Pinouts

<b>Connector</b>	<b>Negative</b>	<b>Positive</b>	<b>Case</b> <i>(chassis gnd.)</i>
<p>Input Power conn. (LV)</p> 	<p>Pin 1</p> <p>Pin 2</p>	<p>Pin 3</p> <p>Pin 4</p>	<p>NC</p>
<p>Input Power conn. (HV)</p> 	<p>Pin 1</p>	<p>Pin 2</p>	<p>NC</p>
<p>Output Power Connector</p> 	<p>Pin 3</p>	<p>Pin 2</p>	<p>Pin 1</p>



Note: During installation, you will cut and discard one of these cable connectors.

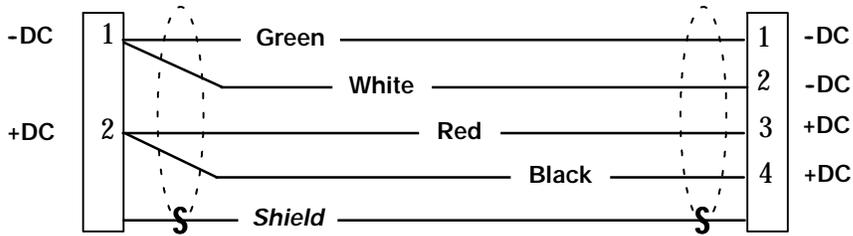


Figure 3-1  
Input Power Cable

