Installation Guide

CV30 Vehicle Power Supply

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Contents

Before You Begin

This section provides you with safety information, technical support information, and sources for additional product information.

Safety Information

Your safety is extremely important. Read and follow all warnings and cautions in this document before handling and operating Intermec equipment. You can be seriously injured, and equipment and data can be damaged if you do not follow the safety warnings and cautions.

This section explains how to identify and understand dangers, warnings, cautions, and notes that are in this document. You may also see icons that tell you when to follow ESD procedures and when to take special precautions for handling optical parts.

A warning alerts you of an operating procedure, practice, condition, or statement that must be strictly observed to avoid death or serious injury to the persons working on the equipment.

A caution alerts you to an operating procedure, practice, condition, or statement that must be strictly observed to prevent equipment damage or destruction, or corruption or loss of data.

Note: Notes either provide extra information about a topic or contain special instructions for handling a particular condition or set of circumstances.

Global Services and Support

Warranty Information

To understand the warranty for your Intermec product, visit the Intermec web site at www.intermec.com and click **Service & Support** > **Warranty**.

Web Support

Visit the Intermec web site at **www.intermec.com** to download our current manuals (in PDF). To order printed versions of the Intermec manuals, contact your local Intermec representative or distributor.

Visit the Intermec technical knowledge base (Knowledge Central) at **intermec.custhelp.com** to review technical information or to request technical support for your Intermec product.

Telephone Support

These services are available from Intermec.

Services	Description	In the USA and Canada call 1-800-755-5505 and choose this option
Order Intermec products	• Place an order. • Ask about an existing order.	1 and then choose 2
Order Intermec media	Order printer labels and ribbons.	1 and then choose 1
Order spare parts	Order spare parts	1 or 2 and then choose 4
Technical Support	Talk to technical support about your Intermec product.	2 and then choose 2.
Service	• Get a return authorization number for authorized service center repair. • Request an on-site repair technician.	2 and then choose 1
Service contracts	• Ask about an existing contract. • Renew a contract. • Inquire about repair billing or other service invoicing questions.	

Outside the U.S.A. and Canada, contact your local Intermec representative. To search for your local representative, from the Intermec web site, click **Contact**.

Who Should Read This Manual

This guide is written for trained Intermec service personnel familiar with forklift truck service and maintenance. You should be familiar with forklift truck service and maintenance.

1 Introduction

This chapter describes the installation and unique components of the installation kit.

Installation Guidelines

The installer should be familiar with the brands and models of equipment where this kit is installed. They should also be trained and experienced in vehicle electrical systems.

Installer must follow these guidelines and the installation procedures as well as those of the lift manufacturer to ensure a safe and reliable installation.

About the DC Power Supply Kit

The DC power supply kits include these items:

- Power supply
- Power supply input cable, 2.44 m (8 ft)
- Fused power cable, 46 cm (18 in)
- #10 terminal ring
- 3AB, 20A/250V fuse for 12V installations
- Insulated quick-connect tabs (2)

The power supply provides 12 VDC output that is filtered and regulated. It also provides over-current, over-voltage, over-temperature, shorted-output protection, and it supplies power to the heated display element.

Considerations

Note: This document assumes that you have already installed the vehicle mount computer on your vehicle and that you have the correct power supply and power supply input cable for your vehicle before you proceed with the installation.

Two different power converters (“supplies”) are available that should meet most electrical requirements. One is for low voltage, the second for high voltage. Verify that you have the correct supply for a particular installation before beginning.

One power supply accepts input voltage ranging from 6-60 V dc for use with vehicles using electrical systems running 12-60V. The other supply is rated for operation from 15-96V, and Intermec recommends it for use on electric vehicles running 60-96 volts. Both supplies provide 12 V dc output which is filtered and regulated and supplies power to the heated display element. Both supplies also provide short-circuit, over-voltage, and-over temperature protection.

You can distinguish between the two power 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.

Power Supply Identification

Intermec Part Number	Input Connector	Input Voltage
851-070-003	4-pin, keyed	6-60 V dc, 14 A
851-041-003	2-pin, keyed	15-96 V dc, 4.5 A

The power supply shall be mounted to the vehicle chassis, 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 838 to 1032 square cm (130 to 160 square inches which is approximately one square foot or more) of metallic surface. This location *should not* be in the vicinity of sources of vehicle-generated heat.

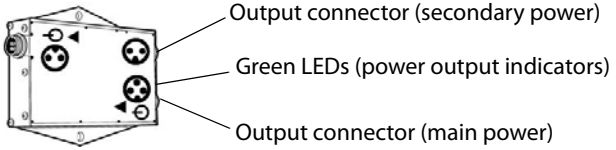
Use the hardware supplied in the kit, or equivalent, to mount the power supply. Do not use sheet metal screws or other less permanent or rugged mounting solutions.

A single or a pair of green light-emitting diodes (LEDs), located near the output connectors on the power supply, will be lit whenever voltage is supplied to the output power cable.

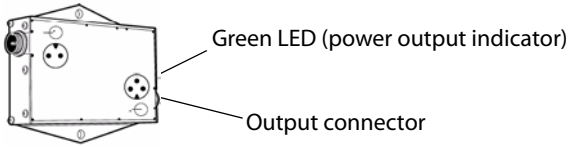
Mount the power supply in a location that allows easy visibility to LEDs for troubleshooting.

One LED indicates main power is OK (3-pin connector). The secondary power LED indicates the heater power (2-pin connector) is OK.

Note: If the secondary LED is not lit, the input power to the DC-DC converter is less than 9-10 volts. It will continue to provide 12v output power to the main power connector.



Power Supply (P/N: 851-070-003) 6-60V, 14A



Power Supply (P/N: 851-041-003) 15-96V, 4.5A

Input Power Cable

Note: The input power cable may be shortened as needed. It should not be extended on 12V or lower systems. On higher voltage systems, extensions should be kept to a minimum and should be of equivalent or lower gauge (larger diameter) wire. Keep the cable as short as possible. Extra cable picks up noise, adds power loss, and can snag on equipment.

The input power cable is approximately 2.74 m (9.0 ft) long. One end has a 4-pin connector, the other 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 catastrophic failure, 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 1-01/4") fast-blow fuse. Should it fail, diagnose the problem and correct it, then replace with exactly the same size/type fuse, or use the chart on the next page.

Note: The 20A fuse is fast-blow. Replacement, lower current rated fuses are to be slow-blow types.

Refer to this fuse chart for fuse ratings for CV30 installations. In general, smaller fuse ratings offer faster acting protection.

Fuse Ratings for CV30 Installations

Lift Voltage	Fuse Ratings	Description
12 V	20 A	Fast blow (ships with power supply)
24 V	10 A	Slow blow, minimum replacement size
36 V	6 A	Slow blow, minimum replacement size
48 V	5 A	Slow blow, minimum replacement size

Output Power Cable

Note: Ensure that you have the correct output power cables for the vehicle mount computers being installed in your location.

Output power cables are approximately 1.83 m (6.0 ft) to2.13 m (7.0 ft) long and have a durable 3-pin connector and/or a 2-pin connector to mate with the power supply. The connector on the far end of the cable is specific to the vehicle mount 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.

Note: Connect both connectors to the power supply. This prevents accidental damage, dirt accumulation, or unwanted electrical contact to the unused connector.

Note: Output cables used with P/N: 851-041-003 connect to the 3-pin output connector. There is only one connector per power supply.

Configuration Chart

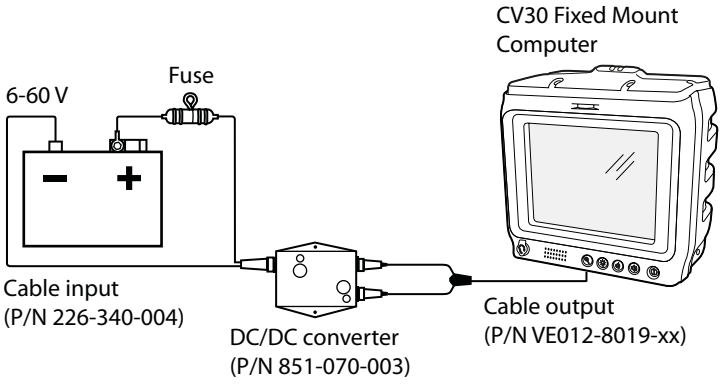
Use the configuration chart on these pages as a guide for your vehicle installation.

Cable and Power Supply Chart

Truck Voltage	Power Supply	Output Cable
12-60 V	851-070-003	VE012-8019-A0
60-90 V	851-041-003	VE011-8078-A0

All CV30s contain touch panel heaters.

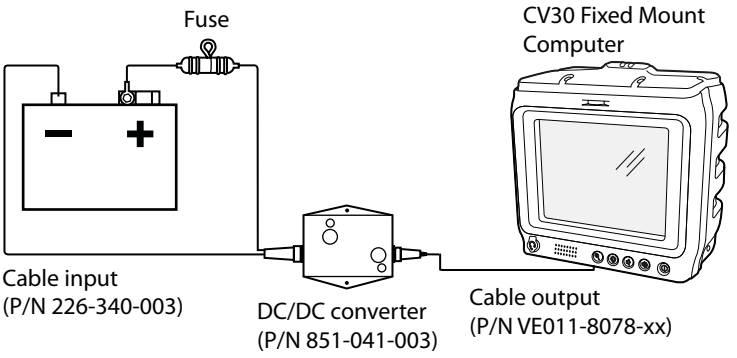
New Installations



Installing the CV30 with Power Supply P/N 203-804-002.

Contents of Vehicle Power Kit P/N 203-779-001

Part Number	Description
203-804-002	Installation kit, vehicle power supply
851-070-003	DC/DC converter, 6-60 Vin/Dual 12 Vout
VE012-8019-xx	Cable, 3-pin/2-pin to 5-pin Y-cable
932-007-001	*CV30 Vehicle Power Installation Guide*



Installing the CV30 with Power Supply P/N 203-804-001

Contents of Vehicle Power Supply Kit P/N 203-832-001

Part Number	Description
203-804-001	Installation kit, vehicle power supply
851-041-003	DC/DC converter, 15-96 Vin/Dual 12 Vout
VE011-8078-xx	Cable, 3-pin female to 5-pin female
932-007-001	*CV30 Vehicle Power Supply Installation Guide*

2 Installing the Vehicle Power Supply

This chapter outlines mechanical and electrical installation instructions.

About This Installation

Follow the instruction procedures as closely as possible while keeping the following in mind:

- 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 and be in line with Intermec equipment only.
- Keep cables as short as possible, and secure them at least every 46 cm (18 in).
- Installation must not violate fork lift manufacturer's requirements and should be done by trained professionals.

Installation Summary

Installation consists of these primary steps, which should be carried out in the following order:

1. Connect the input cable to the power supply.
2. Mechanically install and secure 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

- Common hand tools (screwdriver, pliers, and so on)
- Heat gun for heat shrink tubing
- Wire crimping and stripping tool
- Electric drill, drill bits
- DC Ohmmeter

Vehicle Power Supply Kit Parts List

Description	Part Number	Quantity
Power cable	226-340-004	1
Fuse holder assembly	315-075-003	1
Fuse, 20 A ceramic FB	315-074-003	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”	800-008-003	8
3/8” terminal ring	809-165-001	2
#10 terminal ring	809-083-009	3
Self-tapping screw #6 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”	803-100-001	2
Locking nut, 1/4-20	802-117-000	2
Lockwasher, 1/4”	803-042-001	2
Cable tie, locking	808-002-000	6
H/S tubing, black, 1/8” diameter	321-650-003	30.5 cm (12.0”)
H/S tubing, black, 3/8” diameter	321-650-006	15.2 cm (6.0”)
Ferrite bead	309-388-001	1

Before You Start

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.

Read the label on the power supply and verify that the input voltage rating is correct for the vehicle in which you will be installing the CV30. See Chapter 1 for identification information.

Remember that the supply with the lower input voltage rating (6-60 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.

Connecting the Power Input Cable

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

To connect the power input cable

1. Attach the corresponding cable connector to the power supply connector and make sure you slide the connecter in as far as possible.
2. Turn the cable connector collar clockwise to secure it.
3. Cut the cable at the unused connector end.
4. Discard the unused connector.

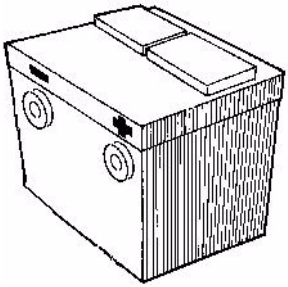
Mounting the Power Supply

The input power cable is approximately 2.74 m (9.0 ft) long and may be shortened if necessary. The output power cable is approximately 2.13 m (7.0 ft) long and should not be lengthened.

Note: Although you can shorten the input power cable if necessary, you should not extend the cable on 12V or lower systems. On higher voltage systems, extensions should be kept to a minimum and should be of equivalent or lower gauge (larger diameter) wire. Keep the cable as short as possible. Extra cable picks up noise, adds power loss, and is prone to snagging on equipment.

You should take these lengths and the intended location of your electronic equipment into consideration when choosing a mounting location for the power supply.

The mounting surface location must provide 838 to 1032 square cm (130 to 160 square inches) of metallic surface to sink heat generated by the power supply. This metallic mounting surface may be connected to, or actually part of, the vehicle chassis as long as the chassis is *not* electrically connected to the battery negative or positive.



Side-Mount Battery With View of Negative (-) and Positive (+)

If your vehicle connects the battery negative to the chassis of the vehicle, it is required in countries with CE Mark certification that the power supply be electrically isolated from the chassis.

Isolation of the power supply from the chassis of other vehicles may provide additional protection from other potential risks encountered on forklifts or vehicles.

See "Considerations" in Chapter 1 for more information. Smaller metallic surfaces may be adequate if good air flow is available or if the vehicle mount computer is to be used in a refrigerated area. Mounting in direct sun may require more heat sink area.

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 lock nut 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 thread to provide a secure and reliable mechanical installation.

Method A:

1. Mark and center punch the two mounting holes on the mounting surface.
2. Use a 1/4" 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 on the mounting surface.
2. Use a #7 drill bit (equal to a hole diameter of 5.11 cm) 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.

Installing the Power Cable

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

- Never work on a "hot" (powered) system.

- 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 a 1.43 cm or 9/16 inch 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.
- Ensure that cable routing does not invite damage to the cable.
- Secure the cables at least every 46 cm (18 in) throughout the cable run. Use adjustable clamps (see the last page in this chapter) or wire-tie to existing vehicle cable runs.

Warning: If this installation will be on a gas-powered vehicle, you MUST install either an On/Off switch (minimum 15A dc rating such as ITW P/N: 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 16602 (814.941.4100) manufactures a CHARGE GUARD™ device for this purpose.

These devices prevent discharge of the vehicle battery while the lift is off the holder.

Connecting the Power Cable to the Vehicle

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 wires must be connected to the negative side of the vehicle power source. In this installation, the shield wire must be connected to the metal surface on which the power supply is mounted. Prior to connecting power, recheck to make sure the fuse is connected to the positive connection on the DC/DC input, and that the negative lead connects to the return to the battery at a location not shared with motors, flyback diodes, or other sources of electrical noise.

Instructions are not included for connecting to various possible vehicle power sources. It is assumed that a trained professional installer, knowledgeable on the brands and models of vehicles he or she is working with, will do the installation. Both large and smaller terminal rings are provided to accommodate most installation needs.

This kit contains additional bolts, nuts, and washers should you need to connect the input power cable directly to a vehicle battery. Use for these parts is detailed in the instructions that follow.

Terminating the Cable

To terminate the power cable, you must follow these general guidelines:

1. 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.
2. Heat shrink tubing is furnished in this kit and must be slipped onto the cable or wires before terminating them.
3. Prepare the cable ends by installing the fuse holder in series with the positive wires and install a terminal ring on the negative wires.
4. Mechanically complete the connections to the vehicle power source or battery and electrically connect the shield wire to the vehicle chassis ground using a self-tapping screw and flat washer.

Cutting and Stripping the Power Cable

Follow this procedure to cut and strip the power cable for termination.

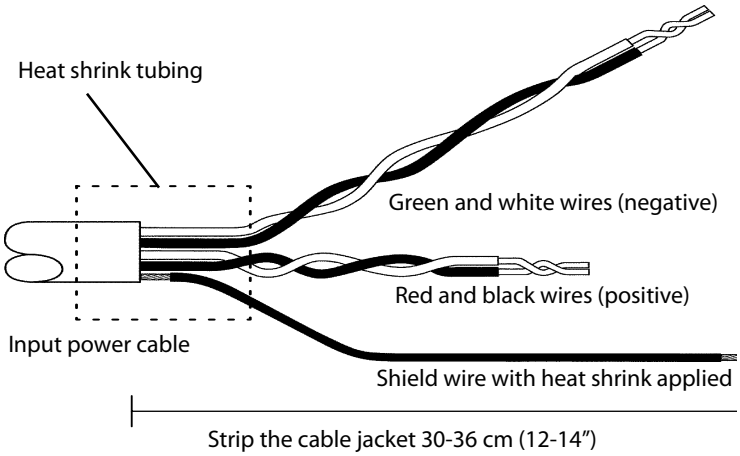
To cut and strip the power cable

1. Cut the power cable near the power source or battery.
2. Strip the cable jacket back 30 to 36 cm (12 to 14 in).
3. Slide heat shrink tubing over cable jacket.
4. Strip 0.6 cm (0.25 in) 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 on the 1/8 inch heat shrink tubing.

Note: See the warning on page 15 if you are installing on gas-powered vehicles.



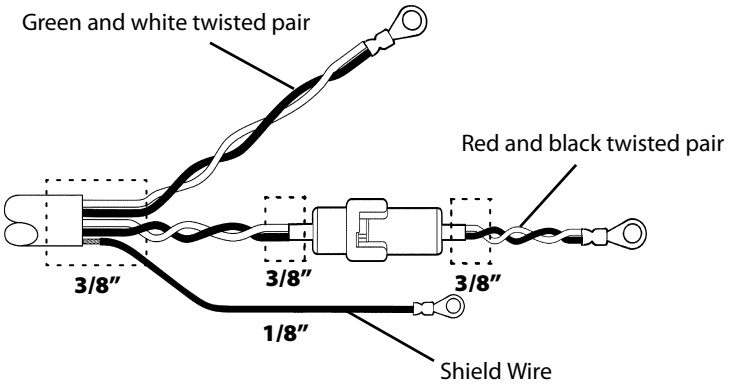
Sliding the Heat Shrink Tubing Onto Twisted Wires

Note: Make sure to verify the wire connections with an ohmmeter.

Note: Make sure that the wires that are to connect the negative input connect to pins 1 and 2 of the input connector. Then check that the other two wires connect to pins 3 and 4 of the input connector.

Attaching Heat Shrink Tubing

This kit contains a 15 cm (6 in) length of 0.95 cm (3/8 in) diameter heat shrink tubing which you will cut into three pieces, and a 30 cm (12 in) length of 0.32 cm (1/8 in) diamter heat shrink tubing for the shield wire. You must attach the heat shrink tubing before terminating the wire ends. Crimp terminal rings and fuse holder ends, then position all heat shrink tubing in the locations shown. Use a heat gun to shrink tubing.



Attaching Heat Shrink Tubing to the Wires

Note: Be sure to shield wire to the metal surface on which the power supply is mounted.

Preparing the Cable Ends

Both large and smaller 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 the vehicle chassis ground.

1. Crimp a terminal ring onto the white-green twisted pair (negative) of wires (see note on page 17).
2. Cut the red-black twisted pair (positive) of wires at the midpoint. Strip exposed ends (see note on page 17).
3. Position short lengths of heat shrink tubing as indicated in the illustration above.
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 heat shrink tubing onto this pigtail.
6. Crimp this positive pigtail to the fuse holder.
7. Securely crimp a terminal ring to the end of the positive pigtail from the fuse holder.

8 Slide heat shrink over crimps, shrink with heat gun.

Connecting to the Vehicle Battery

The next few 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. See the manufacturer's technical manual for the vehicle if necessary.

Your vehicle has either a side-mount battery with the terminals on the side; or a top-mount battery with the terminals on the top. Determine which battery is in your vehicle and proceed with the applicable instructions:

Connecting to Side-Mount Battery Terminals

Perform the following procedure to attach the vehicle battery cable to a side-mount battery terminal.

To connect the vehicle battery cable to a side-mount battery terminal

1 First, disconnect the negative battery cable, then disconnect the positive battery cable, and remove the bolts from each cable.

2 Screw a 3/8" nut as far as it will go onto a 3/8" x 1-1/2" bolt furnished in the kit, then slip a 3/8" washer onto the bolt.

3 Slide the positive (red wire with fuse link) terminal ring from the input power cable onto the bolt.

4 Slip a second 3/8" washer onto that bolt.

5 Slide the vehicle positive battery cable onto the bolt.

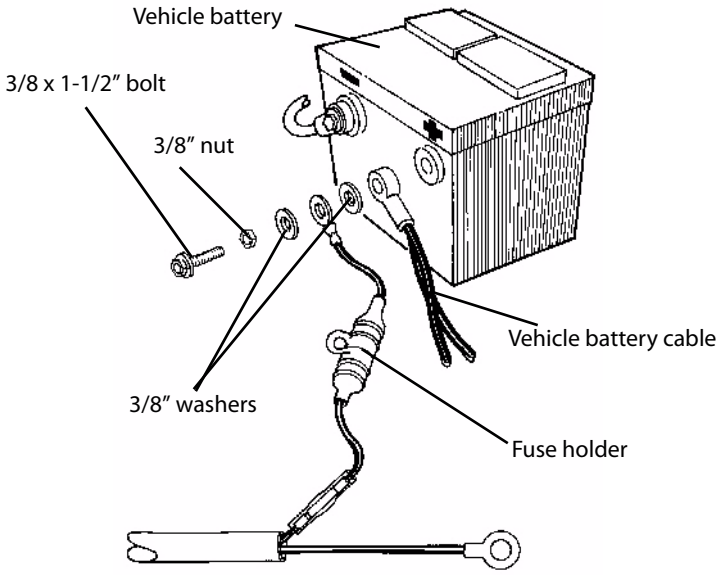
6 Thread the bolt assembly (steps 2 through 5, above) into the positive (+) battery terminal. Securely tighten the bolt until it bottoms out, but do not overtighten the bolt.

7 Tighten the nut securely against the washers and cables.

8 Use a self-tapping screw and flat washer to connect shield wire to the metal surface on which the power supply is mounted.

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

Note: See the warning on page 15 if you are installing on gas-powered vehicles.



Connecting the Vehicle Battery Cable to a Side-Mount Battery Terminal

Connecting to Top-Mount Battery Terminals

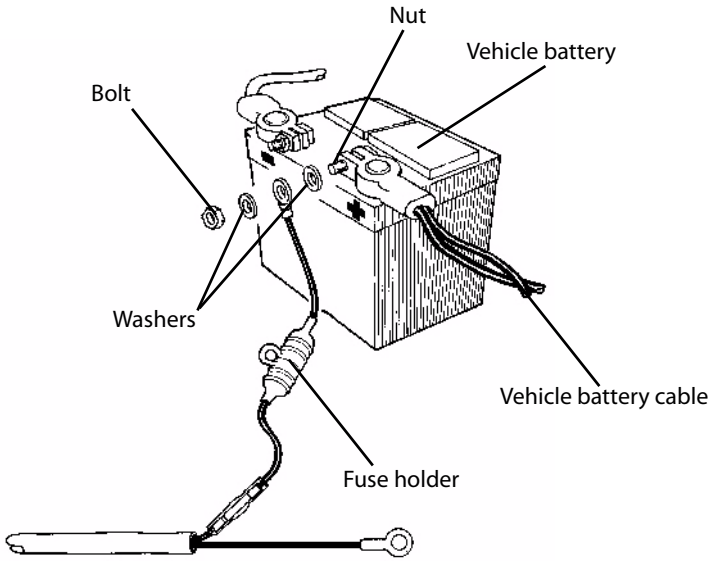
Perform the following procedure to attach the vehicle battery cable to a top-mount battery terminal .

To connect the vehicle battery cable to a top-mount battery terminal

1. First, disconnect the negative battery cable, then disconnect the positive battery cable.
2. Remove the bolts from the vehicle battery terminals.
3. Replace those bolts with 3/8” x 1-1/2” bolts and nuts from the installation kit. Tighten the nuts.
4. Reinstall the positive battery cable, and then tighten the nut securely.
5. Slip a 3/8” washer onto the extended end of each bolt.

6. Slide the positive (fuse link with red wire) terminal ring from the input power cable onto the positive (+) battery bolt.
7. Slip a second 3/8" washer onto the bolt.
8. Thread and tighten a second 3/8" nut onto the bolt.
9. Use a self-tapping screw and a flat washer to connect the shield wire to the metal surface on which the power supply is mounted.

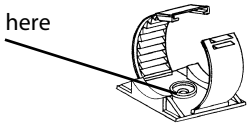
Repeat steps 6 through 8 for the negative battery cable wire (white-green pair) from the input power cable, connecting the wire to the negative (-) battery terminal.



Connecting the Vehicle Battery Cable to a Top-Mount Battery Terminal

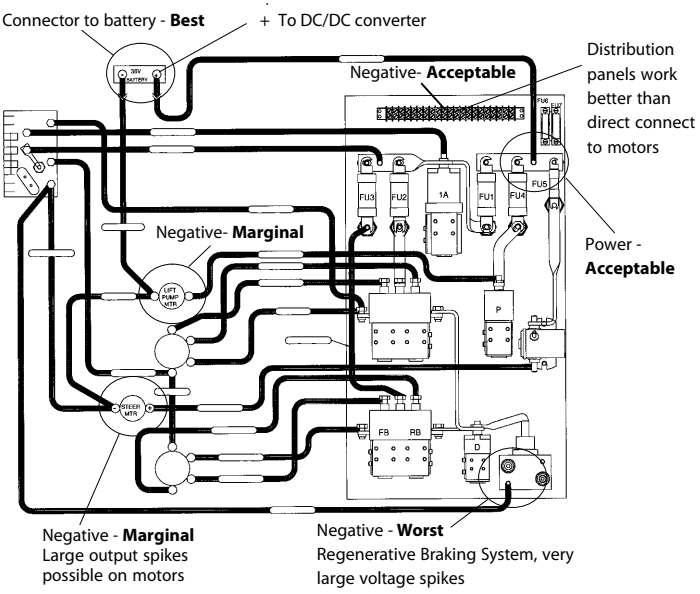
Securing the Battery Cable

Secure the cables every 46 cm (18 in) 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 (equal to a hole diameter of 3.73 mm). Use #6 sheet metal screws to permanently hold clamps in place.



Installation Recommendations

- Install the power cable at the vehicle power source if possible or at the point where the connection is first made to the lift.
- Keep the power cable length as short as possible.
- Connect the negative lead to a point on the lift that other electronic systems use.
- The wiring diagram below outlines several possible connections to the power source in a vehicle lift truck:



Recommended Grounding and Power Source Connections

- Review the lifts to install before you start. Design a bracket that would be common to multiple lifts with preattached devices to simplify the device installation and service.

  Designing a common bracket would reduce your installation time because the mounting bracket would be more straightforward and consistent. It would also simplify service because you can take the entire bracket down and replace it with another bracket while troubleshooting the system away from the lift.

Sample Installations

Here is an example of a clean installation:

- Easy access to power supply components, LED visibility is good.
- Power cables are not in the way and tied off, heatshrinking and air access for cooling is good, component service access is good.

Here is another example of an effective installation:

- Metal area contact is reduced, but access to moving air is good. No direct sunlight in this environment.

Here is an example of a less effective installation:

- Difficult access to power supply components, LED visibility in operation is impossible.
- Damage could occur to lift or power supply components if something fails.
- The installation is tedious, time-consuming, and difficult to work on.
- Troubleshooting problems will be as difficult.
- Enclosed environment will significantly reduce the air flow, raising the temperatures of all the components.

Making the 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.

To make the final connections

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.
4. After all connections are secure, connect power to the system.

Note: See page 30 for power fault diagnostic information.

3 Troubleshooting

This chapter contains troubleshooting information and connector pinouts.

Troubleshooting Procedures

Three basic procedures within this chapter identify and correct most power supply problems you may encounter during 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 Troubleshooting Charts will instruct you when to use a particular method.

Here are the basic diagnostic procedures to follow when troubleshooting the vehicle power supply installation:

1. Inspect the hardware.
2. Check the electrical measurements.
3. Substitute components.

Inspecting the Hardware

Always check the hardware first.

Inspecting the Power Supply

The power supply has one or two green light-emitting diode (LED) indicators near the output connector. The main output LED is lit when 12 V dc is present at the output connector. If you suspect a power failure, check for the following:

- If the LED is lit, and you suspect a power failure, check the output cable and its connections.
- If the LED is not lit, the power supply is not producing 12 Vdc output power. In this case, a fault can exist anywhere in the system. Use the tables starting on page page 30 to isolate, identify, and correct the fault.
- If the LED is flickering, the power supply has detected a fault condition related to temperature, voltage, or current. The LED will flicker until the problem is resolved. In some cases, you may have to remove power to reset the power supply.

Inspecting Cables and Connections

Visually inspect all cable connectors and connections to the vehicle power source. Correct any obvious faults. Use your hands to wiggle cable connectors to ensure they are not loose or disconnected. Again, correct any faults before proceeding.

Make sure cables are dressed to go around sharp edges, through holes without burrs, and do not run unprotected around the lift. The sheath of the power cable adds protection from accidental nicks and cuts. Additional sheathing may be beneficial to protect the cables in highly vulnerable locations.

Inspecting the 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 causes would be a shorted or miswired input cable, or faulty or (incorrect) power supply.

Checking the Electrical Measurements

You can measure the voltage or test for continuity to troubleshoot the battery cable.

Meauring the Voltage

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

Performing Continuity Testing

Caution: Cables MUST be disconnected at both ends before you conduct any continuity tests. Failure to disconnect cables completely may result in damage or destruction of your test equipment, or incorrect/misleading readings.

Thorough continuity testing takes longer 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 megohmmeter to check cables for high-resistance shorts between wires or between a wire and the cable shield. See the troubleshooting charts starting on page page 30 for more information.

Substituting Components

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

The disadvantage of substituting components is that you:

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

Follow the guidelines in the following troubleshooting charts, substituting only when directed to do so.

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

Troubleshooting Charts

The following troubleshooting chart assumes that your fixed mount 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 efficiency.

Some of the troubleshooting remedies tell you to reset the power supply. Use this procedure to reset the power supply.

To reset the power supply

- Disconnect the input power cable for 10 seconds and then reconnect it.

The power supply has automatic over-voltage, over-current, over-temperature, and short-circuit protection. If the problem persists, the LEDs will continue to flicker. Disable input power when these faults activate that protection.

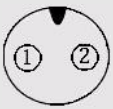
Troubleshooting Power Failure With the Main Output LED

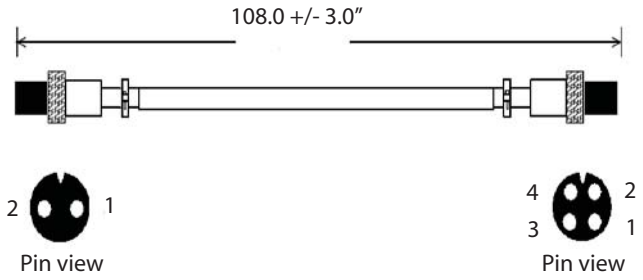
LED	Meaning	Possible Solution
Lit	The power supply is working.	Test or substitute output power cable.
Not lit	No output from the power supply.	Try the possible solutions in this order: • Disconnect the power output cable. • Reset the power supply. • Check the fuse.
Flickers	There is an intermittent main power connection.	Check connection to the main power source.
Flickers	The power supply detected an over-voltage condition.	The vehicle noise spikes are exceeding voltage rating for the power supply. Work with your forklift manufacturer to look for alternate power connection locations. Check to see whether they have any recommended inline filters or suppressors.
Flickers	The power supply detected an over-current condition.	Disconnect the output cable. If the flickering stops, check the cables and add downstream elements.
Flickers	The power supply detected an over-temperature condition.	Try the possible solutions in this order: • Check the case temperature of the power supply. If too hot to touch, provide better heatsink and more air flow. • Replace damaged cables. • Protect from direct sunlight and mount in the shade.

Troubleshooting Power Failures From Other Sources

LED/Voltage	Meaning	Test or Possible Solution
LED not lit	No output from the power supply.	Test for input voltage.
No output voltage, input normal	Power supply not working.	Replace power supply.
Voltage not present	No input power to the power supply.	Try the possible solutions in this order: • Replace inline fuse if voltage is not present at connector. • Replace input power cable if input voltage is still not present at connector.
The fuse is blowing, but no LED is lit	Power system is drawing too much current.	Have the forklift vendor recommend an inline filter and alternate connection point. Check cables for nicks, shorts, and so on.

Power Supply Pinouts

Connector	Negative	Positive	Case
Input power connector 	Pin 1 Pin2	Pin 3 Pin 4	NC
Secondary output power connector (heater) 	Pin 1	Pin 2	
Main output power connector 	Pin 3	Pin 2	Pin 1



Power Cable Assembly for P/N 226-340-003 and 226-340-004

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

Pin-Outs for Power Cable Assemblies P/N 226-340-003 and 226-340-004

Note: The cables in the installation kit may contain alternate wire colors. Refer to the following chart for the wire color equivalent.

Cable Wire Cable Equivalents

Wire Color	Alternate Color
Green	Blue
White	Gray
Red	Brown
Black	Red

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CV30 Vehicle Power Supply Installation Guide

P/N 932-007-001