

RS/6000
7014 Series



Model S00 Rack Installation and Service Guide

First Edition (October 1997)

This edition notice applies to the Model S00 Rack Installation and Service Guide.

The following paragraph does not apply to the United Kingdom or any country where such provisions are inconsistent with local law: THIS PUBLICATION IS PROVIDED "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some states do not allow disclaimer of express or implied warranties in certain transactions, therefore, this statement may not apply to you.

This publication could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new editions of the publication. The manufacturer may make improvements and/or changes in the product(s) and/or the program(s) described in this publication at any time, without notice.

It is possible that this publication may contain reference to, or information about, products (machines and programs), programming, or services that are not announced in your country. Such references or information must not be construed to mean that these products, programming, or services will be announced in your country. Any reference to a specific licensed program in this publication is not intended to state or imply that you can use only that licensed program. You can use any functionally equivalent program instead.

Requests for technical information about products should be made to your authorized reseller or marketing representative.

© **International Business Machines Corporation 1997. All rights reserved.**

Note to U.S. Government Users -- Documentation related to restricted rights -- Use, duplication or disclosure is subject to restrictions set forth in GSA ADP Schedule Contract with IBM Corp.

AIX and PowerPC are trademarks of International Business Machines Corporation.

Contents

Communications Statements	v
Federal Communications Commission (FCC) Statement	v
European Union (EU) Statement	vi
International Electrotechnical Commission (IEC) Statement	vi
United Kingdom Telecommunications Safety Requirements	vi
Avis de conformité aux normes du ministère des Communications du Canada	vii
Canadian Department of Communications Compliance Statement	vii
VCCI Statement	vii
Radio Protection for Germany	vii
Safety Notices	ix
Definitions of Safety Notices	ix
Safety Notice for Installing or Servicing	ix
About This Book	xi
How to Use This Book	xi
ISO 9000	xi
Related Publications	xi
Chapter 1. Reference Information	1-1
Power Distribution Systems	1-1
Power Distribution Bus	1-2
Power Distribution Panel	1-6
Circuit Breaker Panel	1-13
Mounting Rails	1-18
Specifications	1-19
External AC Power Cables	1-20
-48 V DC Power Cables	1-20
Chapter 2. System Installation	2-1
Observe These Safety Notices During Installation	2-1
Step 1. Position the Rack	2-3
Step 2. Level the Rack	2-3
Step 3. Attach the Stabilizer and Door Guide	2-4
Step 4. Bolt Down the Rack	2-8
Step 5. Attach the Convenience Outlet Mounting Plates (Optional)	2-16
Step 6. Connect the Power Distribution System	2-25
Step 6.1. Connect the Power Distribution Panel	2-25
Step 6.2. Connect the Circuit Breaker Panels	2-30
Step 6.3. Checking Customer AC Outlets	2-32
Step 6.4. Connect the Power Distribution Bus	2-34

Step 7. Connect Drawer and Device Cables	2-35
Step 8. Power-On and Check Out the System	2-35
Chapter 3. Service Inspection Guide	3-1
Chapter 4. Removal and Replacement	4-1
Safety Notices	4-1
System Shutdown Warning	4-2
Power-On Procedure with the Power Distribution Bus	4-2
Power-Off Procedure with the Power Distribution Bus	4-3
Power-On Procedure with the Power Distribution Panel	4-4
Power-Off Procedure with the Power Distribution Panel	4-8
Power Distribution Bus	4-9
Power Distribution Panel	4-11
Circuit Breaker	4-17
Circuit Breaker Panel	4-22
Front Door	4-26
Chapter 5. Maintenance Analysis Procedures (MAPs)	5-1
MAP 1530: Power Distribution Panel - Power MAP	5-2
MAP 1550: Power Distribution Bus - Power MAP	5-9
MAP 1570: Circuit Breaker Panel - Power MAP	5-17
Chapter 6. Parts Information (AC Rack)	6-1
Detail 1. Covers	6-2
Detail 2. Labels	6-4
Detail 3. Rails and Front Bezels	6-6
Detail 4. Power Distribution Bus	6-8
Detail 5. Cable Channel	6-10
Detail 6. Power Distribution Panel Assembly	6-12
Detail 7. Power Distribution Panel Interior	6-14
Detail 8. Circuit Breaker Box	6-16
Detail 9. Leveling Feet and Bolt Down Hardware	6-18
Detail 10. Accessory Electrical Outlet Mounting Plates	6-20
Detail 11. Power Cords	6-22
Index	X-1
Reader's Comments — We'd Like to Hear From You	X-3

Communications Statements

The following statement applies to this product. The statement for other products intended for use with this product appears in their accompanying documentation.

Federal Communications Commission (FCC) Statement

Note: The 7014 Model S00 been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult an authorized dealer or service representative for help.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. Proper cables and connectors are available from authorized dealers. Neither the provider nor the manufacturer are responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Responsible Party:

International Business Machines Corporation
New Orchard Road
Armonk, New York 10504
Telephone: (919) 543-2193

European Union (EU) Statement

This product is in conformity with the protection requirements of EU Council Directive 89/336/EEC on the approximation of the laws of the Member States relating to electromagnetic compatibility. The manufacturer cannot accept responsibility for any failure to satisfy the protection requirements resulting from a non-recommended modification of the product, including the fitting of option cards supplied by third parties. Consult with your dealer or sales representative for details on your specific hardware.

This product has been tested and found to comply with the limits for Class B Information Technology Equipment according to CISPR 22 / European Standard EN 55022. The limits for Class B equipment were derived for typical residential environments to provide reasonable protection against interference with licensed communication devices.

International Electrotechnical Commission (IEC) Statement

This product has been designed and built to comply with IEC Standard 950.

United Kingdom Telecommunications Safety Requirements

This equipment is manufactured to the International Safety Standard EN60950 and as such is approved in the UK under the General Approval Number NS/G/1234/J/100003 for indirect connection to the public telecommunication network.

The network adapter interfaces housed within this equipment are approved separately, each one having its own independent approval number. These interface adapters, supplied by the manufacturer, do not use or contain excessive voltages. An excessive voltage is one which exceeds 70.7 V peak ac or 120 V dc. They interface with this equipment using Safe Extra Low Voltages only. In order to maintain the separate (independent) approval of the manufacturer's adapters, it is essential that other optional cards, not supplied by the manufacturer, do not use main voltages or any other excessive voltages. Seek advice from a competent engineer before installing other adapters not supplied by the manufacturer.

Avis de conformité aux normes du ministère des Communications du Canada

Cet appareil numérique de la classe B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

Canadian Department of Communications Compliance Statement

This Class B digital apparatus meets the requirements of the Canadian Interference-Causing Equipment Regulations.

VCCI Statement

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に基づくクラスB情報技術装置です。この装置は、家庭環境で使用することを目的としていますが、この装置がラジオやテレビジョン受信機に近接して使用されると、受信障害を引き起こすことがあります。
取扱説明書に従って正しい取り扱いをして下さい。

The following is a summary of the VCCI Japanese statement in the box above.

This is a Class B product based on the standard of the Voluntary Control Council for Interference from Information Technology Equipment (VCCI). If this is used near a radio or television receiver in a domestic environment, it may cause radio interference. Install and use the equipment according to the instruction manual.

When used near a radio or TV receiver, it may become the cause of radio interference.

Read the instructions for correct handling.

Radio Protection for Germany

Dieses Gerät ist berechtigt in Übereinstimmung mit dem deutschen EMVG vom 9.Nov.92 das EG-Konformitätszeichen zu führen.

Der Aussteller der Konformitätserklärung ist die IBM Germany.

Dieses Gerät erfüllt die Bedingungen der EN 55022 Klasse B.

Safety Notices

Note: For a translation of this safety notice, see the *System Unit Safety Information* manual.

Definitions of Safety Notices

A *danger* notice indicates the presence of a hazard that has the potential of causing death or serious personal injury. *Danger* notices appear on the following pages:

2-1, 4-1, 5-3, 5-10, 5-18

A *caution* notice indicates the presence of a hazard that has the potential of causing moderate or minor personal injury. *Caution* notices appear on the following pages:

2-1, 2-4, 2-25, 2-30, 2-33, 2-34, 3-3, 4-1, 4-2, 4-4, 4-8, 4-11, 4-17, 4-22, 4-25, 5-3, 5-6, 5-10, 5-18

An *attention* notice indicates an action that could cause damage to a program, device, system, or data.

Safety Notice for Installing or Servicing

For safety checks when installing or servicing an Model S00 rack, refer to Chapter 2, System Installation, and Chapter 4, Removal and Replacement.

Note: Before connecting or removing any cables to or from the system, be sure to follow the steps in the system installation procedures specified in the installation and service guide for your system or device.

About This Book

How to Use This Book

This book contains maintenance information that is specific to the Model S00 rack. It also contains maintenance analysis procedures (MAPs) that are unique to this model.

MAPs that are common to all systems are contained in the *Diagnostics Information for Multiple Bus Systems*.

This book is used by the service representative to repair system failures.

ISO 9000

ISO 9000 registered quality systems were used in the development and manufacturing of this product.

Related Publications

The *Diagnostics Information for Multiple Bus Systems*, form number SA23-2765, contains reference information about adapters and devices, checkout procedures for problem determination, system verification by using the diagnostics, and cabling for the system units. This manual also contains the removal and replacement procedures for the logic boards on the disk drives and cabling information that can be used to isolate problems with customer cabling.

The *System Unit Safety Information* manual, form number SA23-2652, contains translations of danger and caution notices.

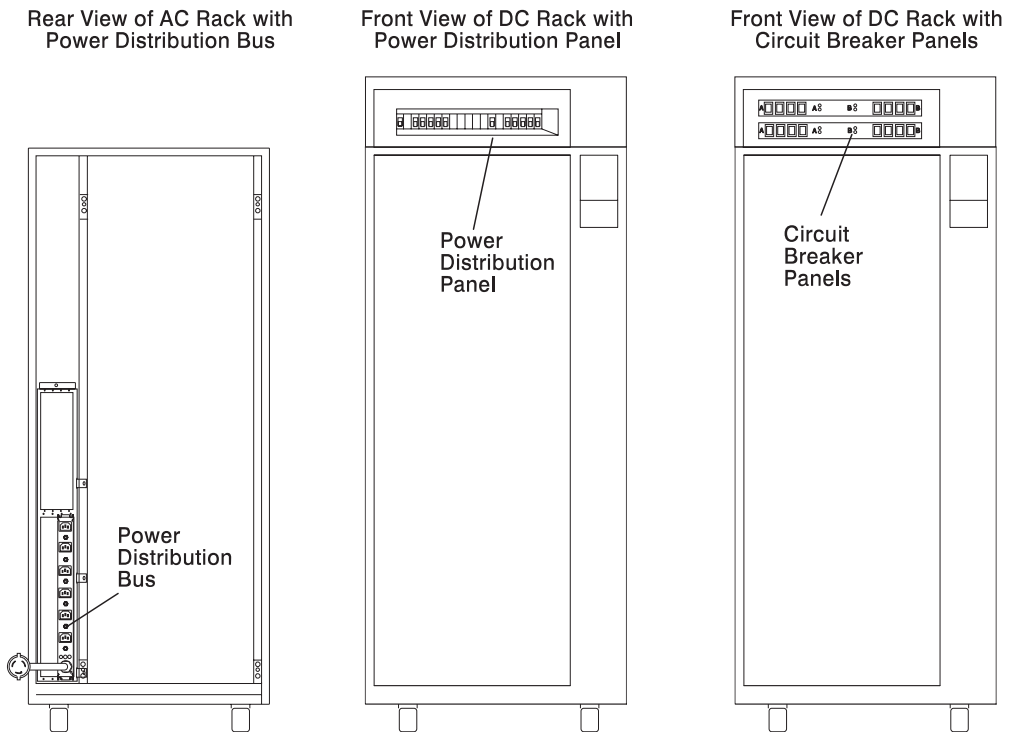
Chapter 1. Reference Information

This chapter contains information about the 7014 Model S00 rack. Included in this chapter are locations of rack features, power distribution, and rack specifications.

Power Distribution Systems

This section describes power components and how power is distributed in the Model S00 rack.

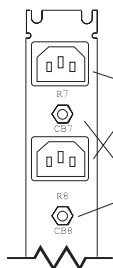
Power may be distributed to the devices and drawers in a Model S00 rack by a power distribution bus (PDB), a power distribution panel (PDP), or up to two circuit breaker panels.



Power Distribution Bus

A Model S00 rack may contain one or two power distribution busses (PDBs). A PDB contains eight unswitched 200 V to 240 V AC outlets for providing power to all the devices and drawers in the rack. Each outlet is connected to a separate circuit breaker for protection against excessive currents.

View of Power Distribution Bus Facing Front of Rack



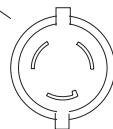
Outlets for Peripherals
(Two Facing Front of Rack)

Reset Buttons
(Two Facing Front of Rack)

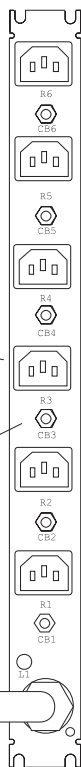
Outlets for Drawers
(Six Facing Front of Rack)

Reset Buttons
(Six Facing Front of Rack)

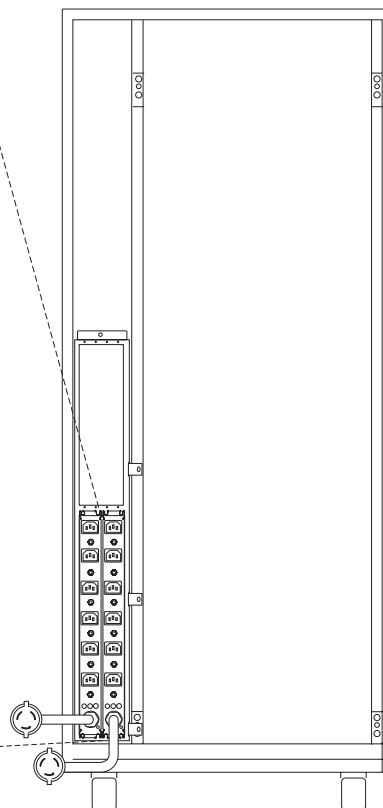
Power Cord
(Plug Configuration May Vary)



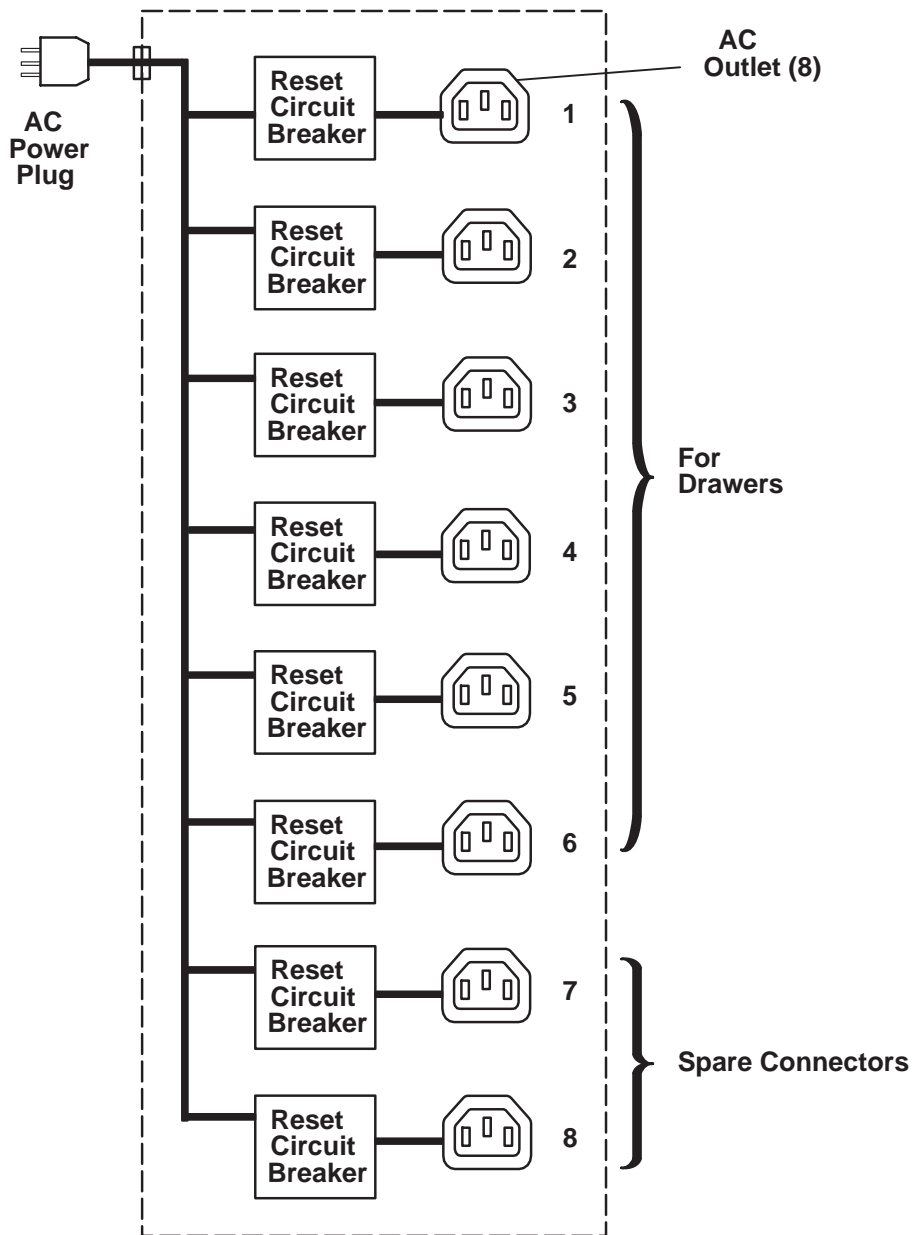
View of Power Distribution Bus Facing Rear of Rack



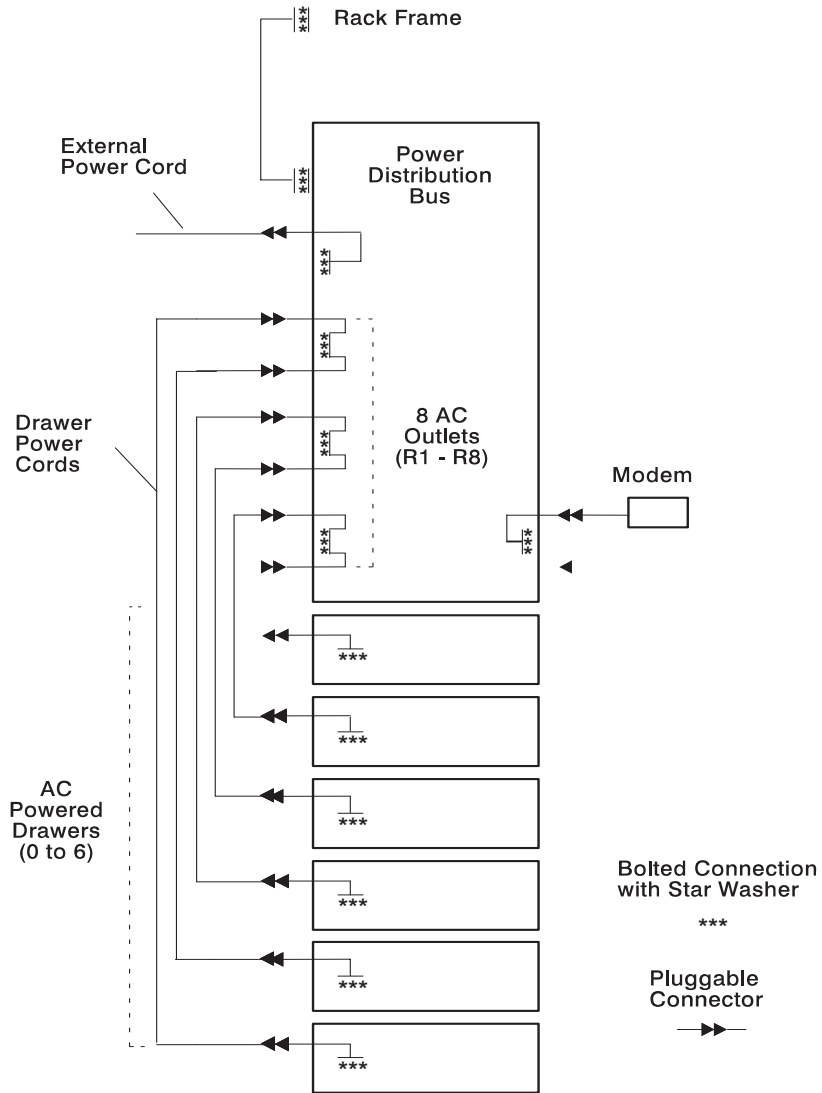
Rear View of Rack



Power Distribution with the Power Distribution Bus



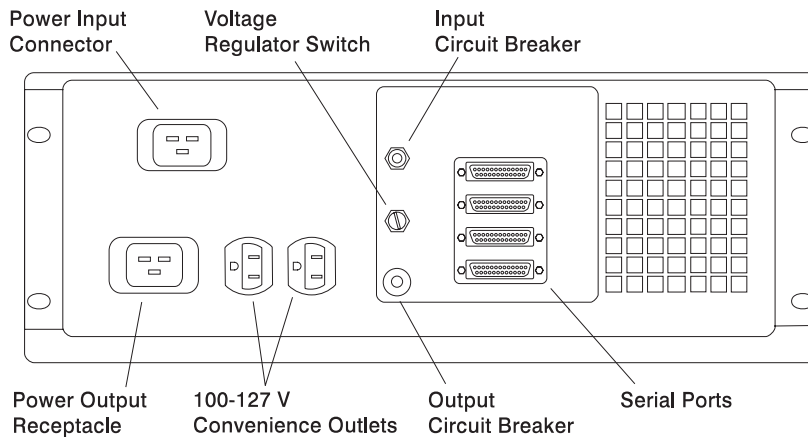
Grounding Diagram - Power Distribution Bus



Uninterruptible Power Source

An uninterruptible power source (UPS) may be installed in a Model S00 rack containing a power distribution bus. The UPS contains one power plug (in) and one power outlet (out) for connecting to the PDB.

Uninterruptible Power Source, Rear View



Power Distribution Panel

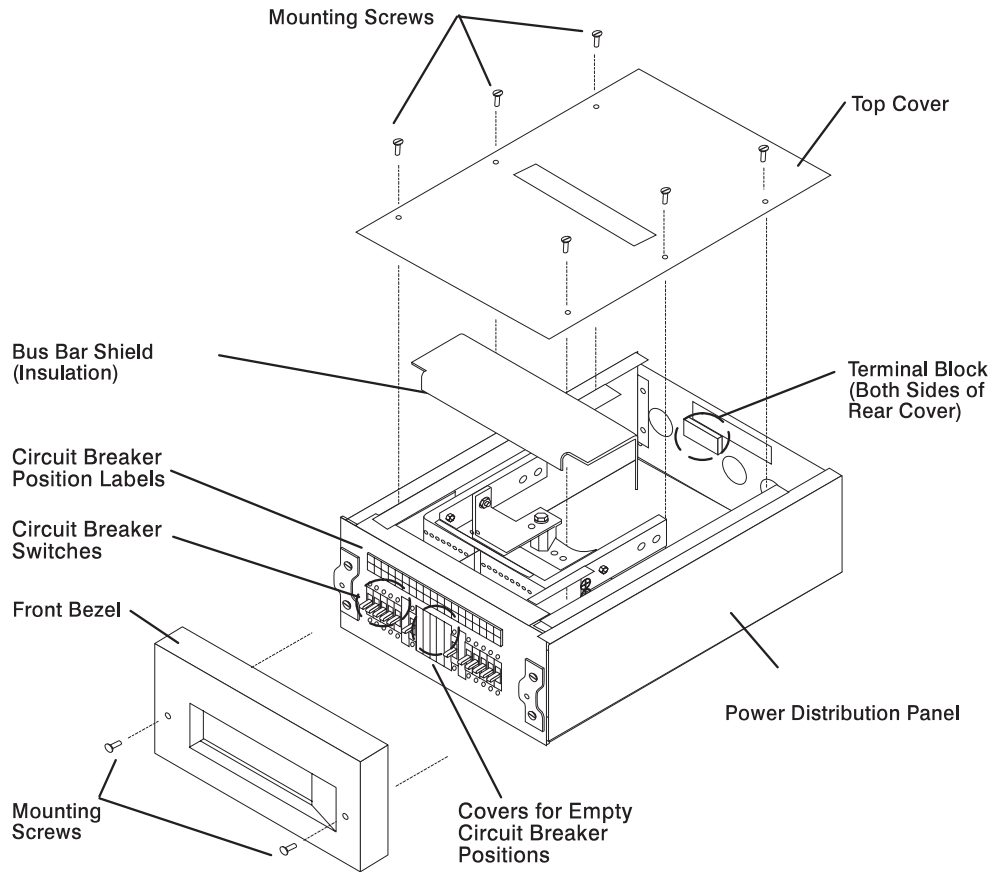
A power distribution panel (PDP) may be installed in a Model S00 rack to distribute -48 V DC power to the drawers and devices in the rack. The power distribution panel provides circuit breakers that protect each drawer in the rack from excess current and function as DC power switches for switching off power to the devices and drawers before servicing.

Note: The power distribution panel configurations shown in this manual are for example purposes only. The actual power distribution panel installed in the rack you are servicing may vary in terms of circuit breaker ratings, circuit breaker configurations, and connections to the customer's power source.

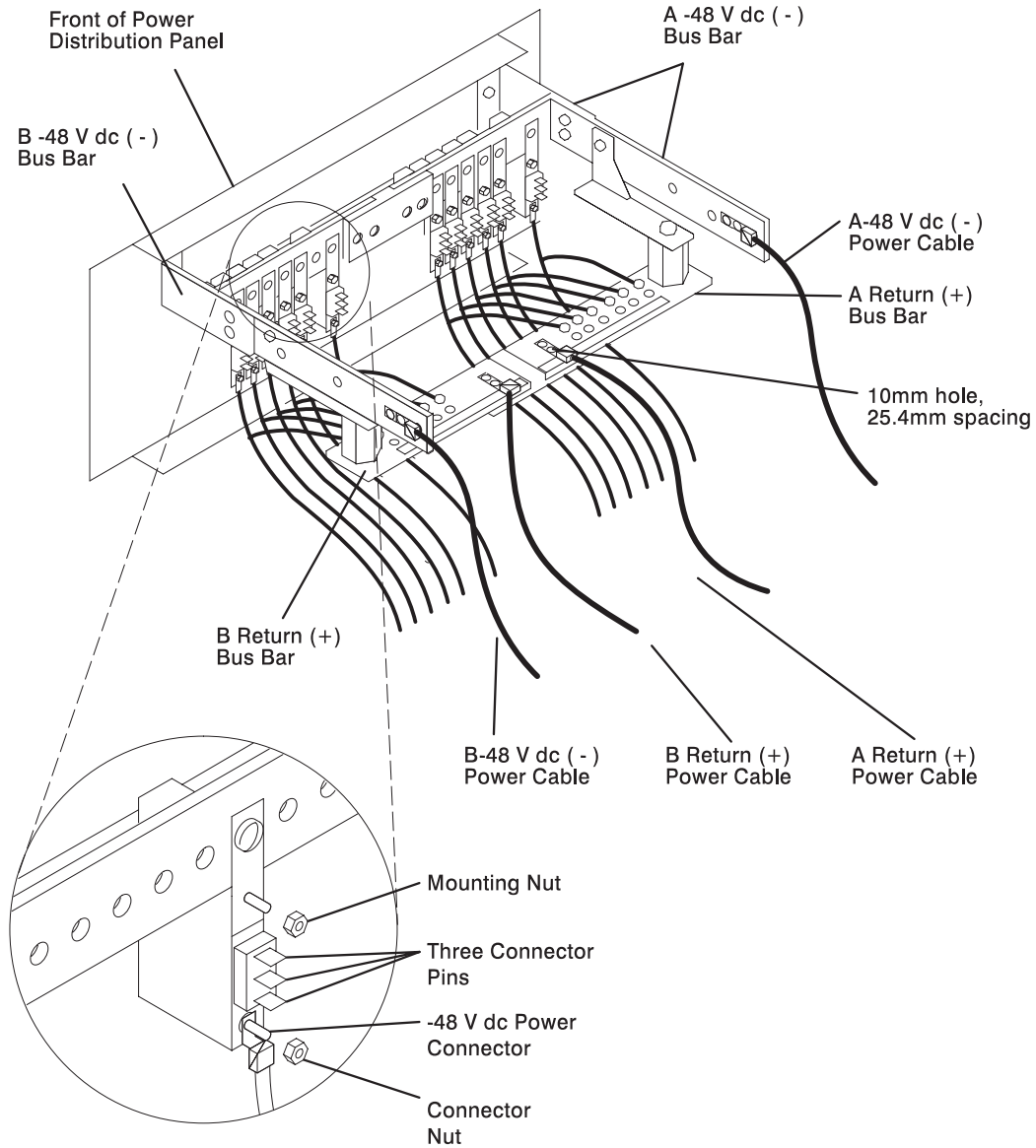
The PDP contains a connection location on the rear cover for attaching a customer supplied circuit breaker alarm. This alarm indicates when any circuit breaker is switched to the off position.

The circuit breaker switch is on when it is in the up position, and the switch is off when it is in the down position.

Power Distribution Panel (Front View)



Power Distribution Panel (Rear View)



Power Distribution with the Power Distribution Panel

Note: The -48 V DC Model S00 rack must be connected to a -48 V DC supply source which is electrically isolated from its AC power source. The -48 V DC power source must also be reliably grounded.

Note: The -48 V DC Model S00 rack may be connected to more than one power source.

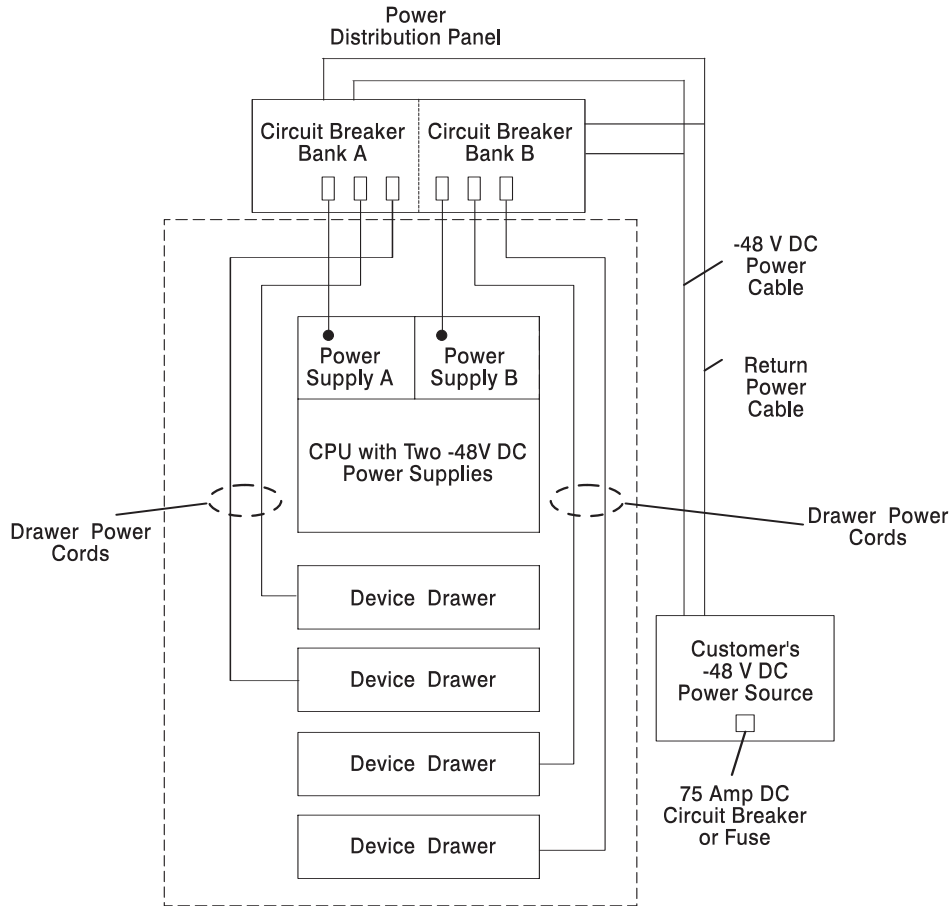
The circuit breakers in a power distribution panel are mounted on two power bus bars. The bus bars may be connected either to a common or to separate customer -48 V DC power sources.

Typically, a PDP connected to two customer power sources will contain two matching banks of circuit breakers. Each bank of circuit breakers is connected to a separate power source. The -48 V DC power supply in each drawer in the rack is then connected to one circuit breaker in each bank of the PDP. Thus, if one of the customer power sources were to fail, the devices in the rack would still receive power from the other source.

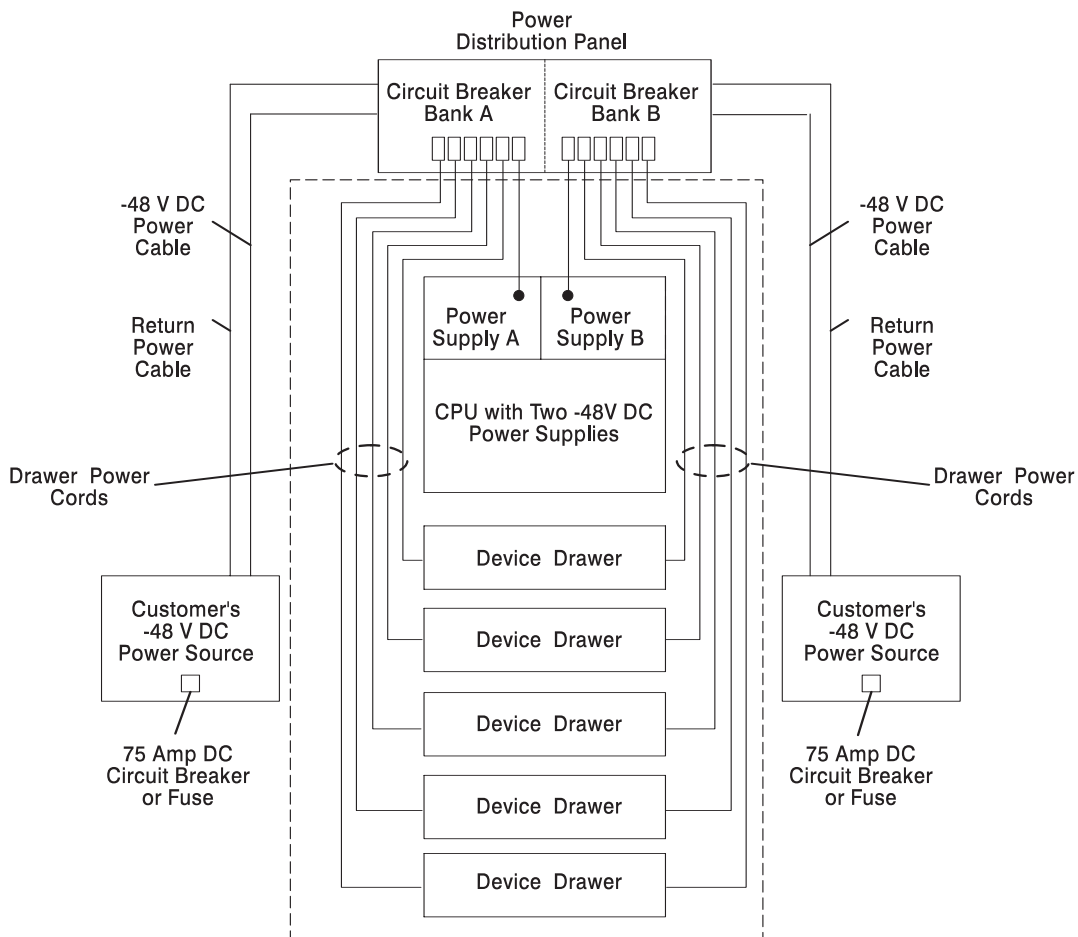
If a PDP is connected to only one customer power source, then the drawers in the rack will be connected to only one circuit breaker each.

The exact configuration of power distribution in a Model S00 rack with a power distribution panel depends on the particular configuration of drawers installed in the rack. The diagrams on the following pages illustrate several general examples of power distribution for a standalone Model S00 rack containing a CPU enclosure. When servicing the power distribution system in a -48 V DC Model S00 rack, take care to determine the exact configuration being used prior to servicing.

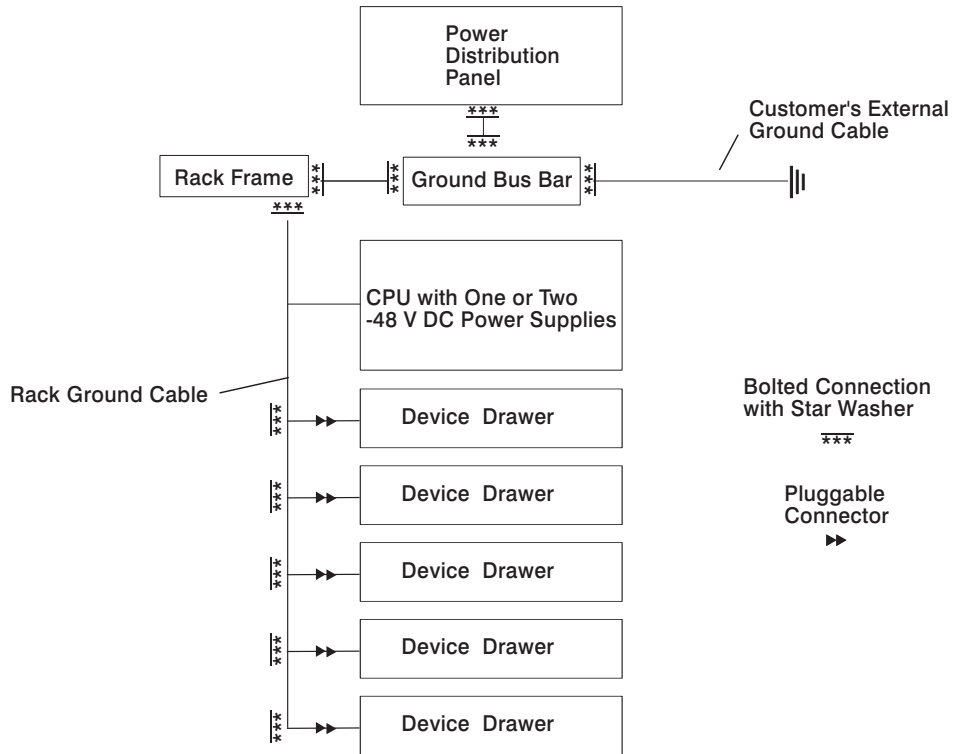
The following diagram shows power distribution in a typical Model S00 rack configuration connected to one customer supplied power source. Note how each power supply on the CPU enclosure is connected to a separate circuit breaker. Note also how both banks of circuit breakers in the PDP are connected to the same power source.



The following diagram shows power distribution in a typical Model S00 rack configuration connected to two customer supplied power sources. Note also how each bank of circuit breakers in the PDP is connected to a different power source. Note how each drawer in the rack is powered by each power source.



Grounding Diagram - Power Distribution Panel (-48 V DC)



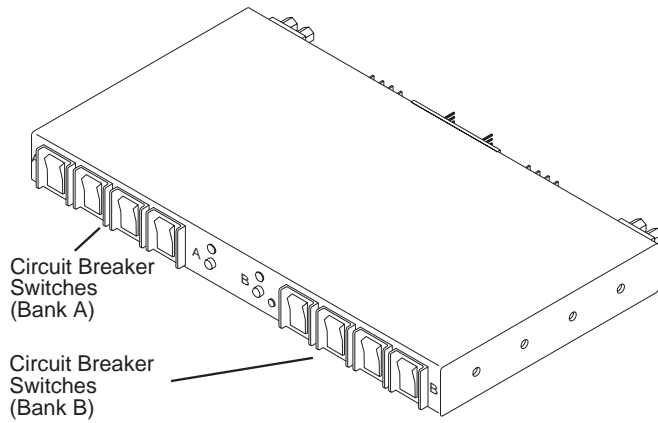
Circuit Breaker Panel

Up to two circuit breaker panels may be installed in a Model S00 rack to distribute -48 V DC power. Each circuit breaker panel provides 8 circuit breakers that protect each drawer in the rack from excess current and function as DC power switches for switching off power to the devices and drawers within a rack before servicing. Like the power distribution panel, each circuit breaker panel may be connected to one or two customer power sources.

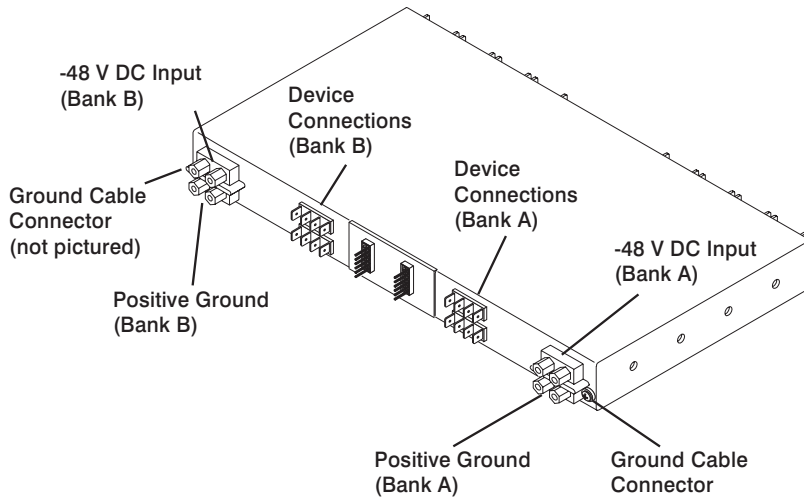
Two standard circuit breaker panels are available with the Model S00 rack. One circuit breaker panel contains 8 - 15A circuit breakers. The other circuit breaker panel contains four 20A and four 10A circuit breakers.

The circuit breaker switch is on when it is in the up position, and the switch is off when it is in the down position.

Circuit Breaker Panel (Front View)



Circuit Breaker Panel (Rear View)

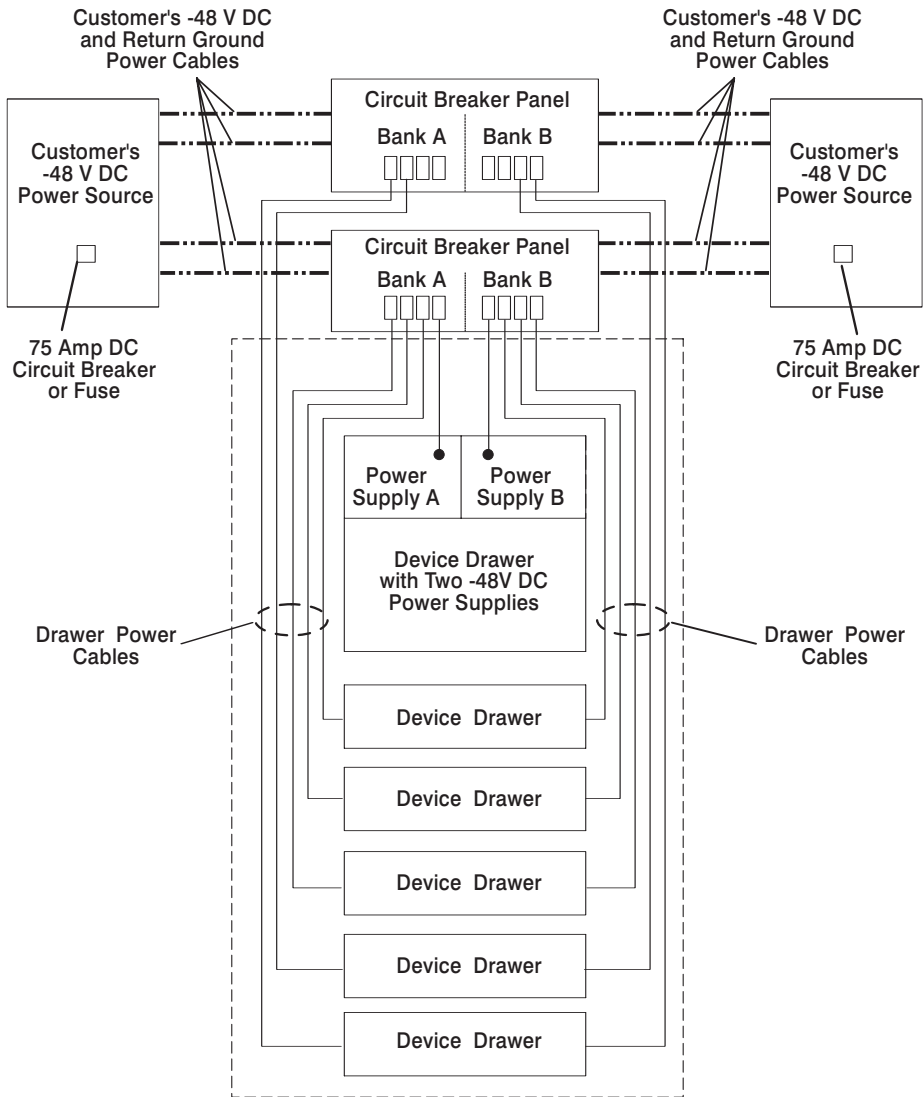


Power Distribution with the Circuit Breaker Panel

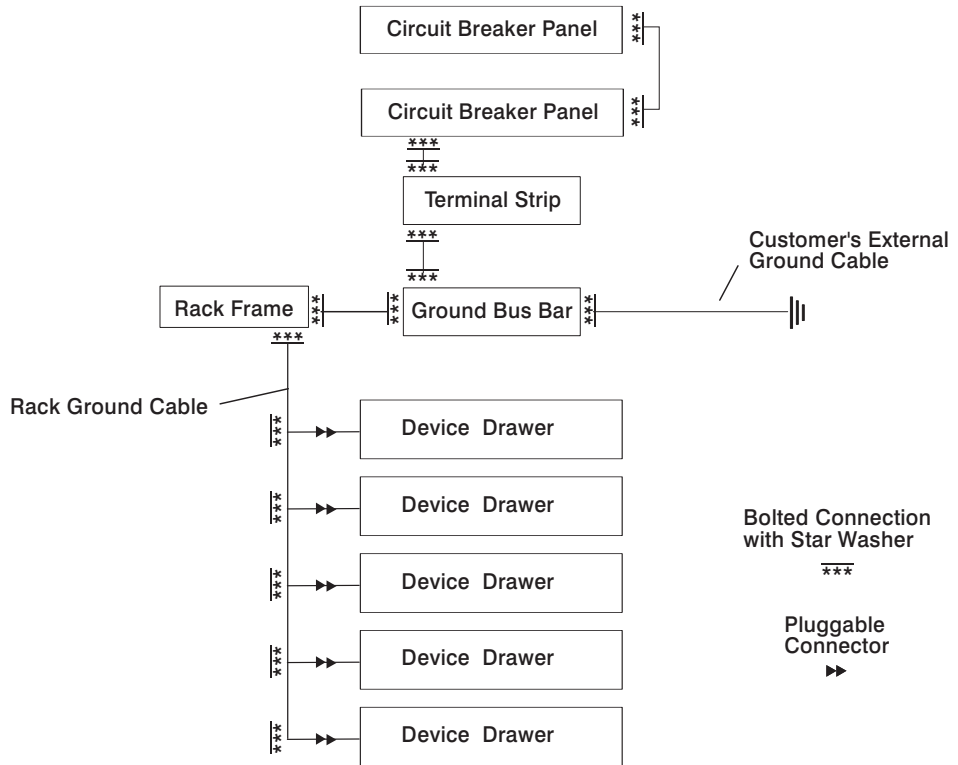
Note: The -48 V DC Model S00 rack must be connected to a -48 V DC supply source which is electrically isolated from its AC power source. The -48 V DC power source must also be reliably grounded.

In general, the power distribution and grounding strategies for a -48 V DC Model S00 rack equipped with a circuit breaker panel is similar to a rack equipped with a power distribution panel. Basically, the circuit breaker panels accept power from up to two customer power sources and distribute parallel power feeds to each device in the rack. Device power cables from a 15A circuit breaker panel are typically connected first to the terminal strips in the circuit breaker panel chassis, and then from the terminal strips to the devices.

The exact configuration of power distribution in a Model S00 rack with a circuit breaker panel depends on the particular configuration of drawers installed in the rack. The diagram below shows a general example of power distribution for a standalone Model S00 rack containing a CPU enclosure. When servicing the power distribution system in a -48 V DC Model S00 rack, take care to determine the exact configuration being used prior to servicing. Refer to the service guide for the system or devices in your rack for more information.



Grounding Diagram - Circuit Breaker Panel (-48 V DC)



Mounting Rails

The rails and mounting hardware for CPU enclosures and non-CPU enclosures are different. Refer to “Detail 3. Rails and Front Bezels” on page 6-6 in Chapter 6, Parts Information (AC Rack) for details of the required mounting hardware.

Specifications

Dimensions

Height: 1577 mm (62.0 inches)

Depth: 1019 mm (40.1 inches)

Depth (without doors): 887 mm (34.9 inches)

Width: 650 mm (25.5 inches)

Weight

Empty Rack: 158 kg (349 pounds)

Standard Configuration: 205 kg (450 pounds)

Maximum Configuration: 455 kg (1000 pounds)

Power

-48 V DC Model S00

Standard Configuration: 1.5 kVA

Maximum Configuration: 2.0 kVA

AC Model S00

Standard Configuration: 0.6 kVA

Maximum Configuration: 2.2 kVA

System Limit: 4.8 kVA

Operating Voltage: 200 to 240 V AC

Frequency: 50 or 60 Hz

Temperature Requirements

Operating: 10 to 40°C (50 to 104°F)

Nonoperating: 10 to 52°C (50 to 126°F)

Relative Humidity Requirements (Noncondensing)

8 to 80%

External AC Power Cables

To avoid electrical shock, the manufacturer provides a power cable with a grounded attachment plug. Use only properly grounded outlets.

Power cables used in the United States and Canada are listed by Underwriter's Laboratories (UL) and certified by the Canadian Standards Association (CSA).

These power cords consist of the following:

- Electrical cables, type ST
- Attachment plugs complying with National Electrical Manufacturers Association (NEMA) L6-30P
- Appliance couplers complying with International Electrotechnical Commission (IEC) Standard 320, Sheets C13 and C14.

Power cables used in other countries consist of the following:

- Electrical cables, type HD21 or HD22
- Attachment plugs approved by the appropriate testing organization for the specific countries where they are used
- Appliance couplers complying with International Electrotechnical Commission (IEC) Standard 320, Sheet C13 and C14.

Refer to “Detail 11. Power Cords” on page 6-22 of Chapter 6, Parts Information (AC Rack) to find the power cables that are available for the AC Model S00 rack.

-48 V DC Power Cables

The customer is responsible for providing power cables from the customer's power source to the power distribution panel (PDP). The -48 V DC Model S00 rack must be connected to a -48 V DC power source which is electrically isolated from its AC power source. In addition, the -48 V DC source is to be reliably grounded.

Note: The -48 V DC Model S00 rack may be connected to two separate -48 V DC power sources. Both power sources must be properly isolated and grounded.

Power cables used in the United States and Canada are listed by Underwriter's Laboratories (UL) and certified by the Canadian Standards Association (CSA).

These power cables have the following characteristics:

- Power cables and ground cables must be a minimum of 6 AWG stranded copper (or equivalent) for lengths up to 50 feet from the power source.
- All connectors must be the copper crimp type (compression). Connector metal must be compatible with the cable metal.

Chapter 2. System Installation

This chapter contains information about installing and preparing a Model S00 rack for system operations.

Observe These Safety Notices During Installation

Note: For a translation of this safety notice, see the *System Unit Safety Information* manual.

DANGER

An electrical outlet that is not correctly wired could place hazardous voltage on metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock.

Before installing or removing signal cables, ensure that the power cables for the system unit and all attached devices are unplugged.

When adding or removing any additional devices to or from the system, ensure that the power cables for those devices are unplugged before the signal cables are connected. If possible, disconnect all power cables from the existing system before you add a device.

Use one hand, when possible, to connect or disconnect signal cables to prevent a possible shock from touching two surfaces with different electrical potentials.

During an electrical storm, do not connect cables for display stations, printers, telephones, or station protectors for communication lines.

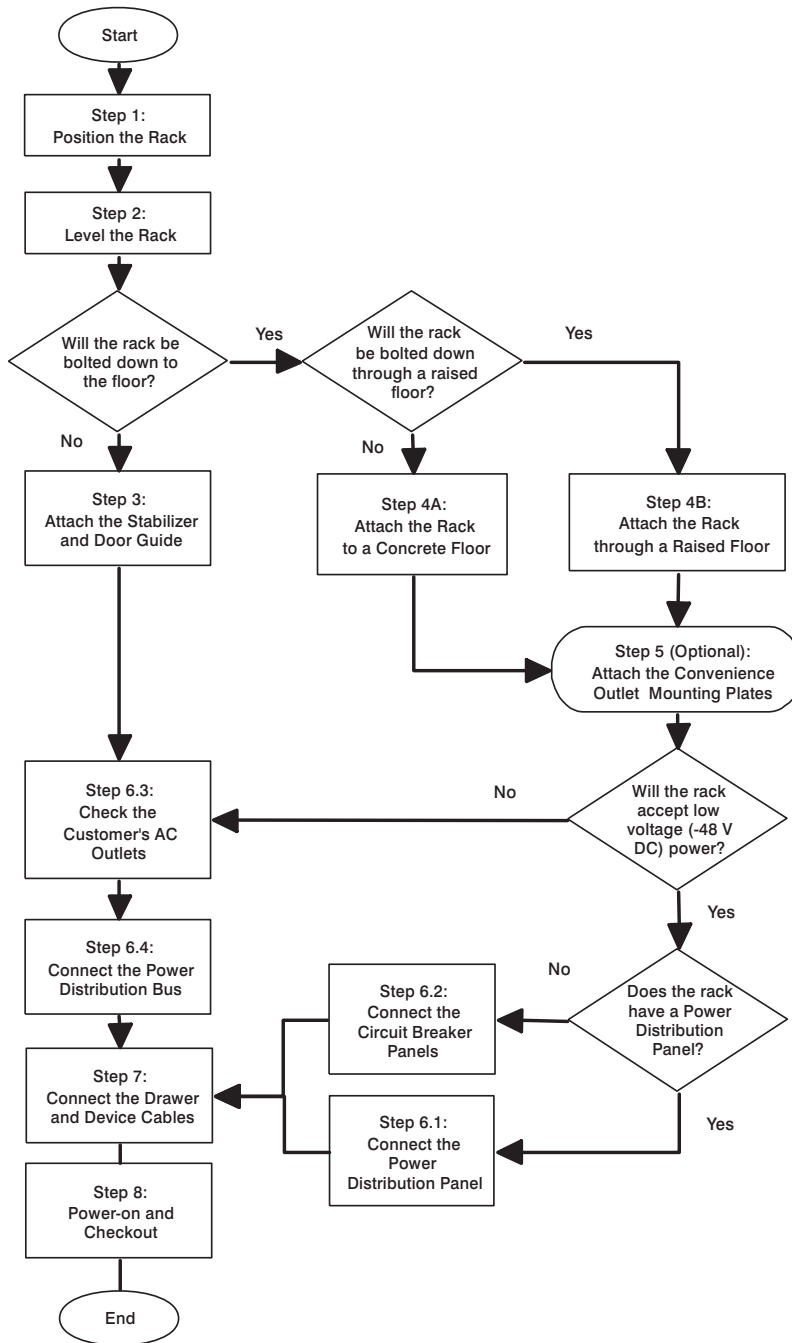
CAUTION:

This product is equipped with a 3-wire power cable and plug for the user's safety. Use this power cable in conjunction with a properly grounded electrical outlet to avoid electrical shock.

CAUTION:

This unit may have more than one power supply cord. To completely remove power, you must disconnect all power supply cords.

Installation Overview

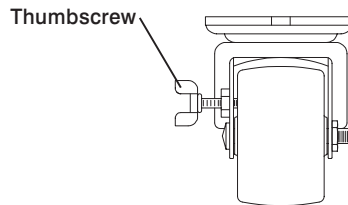


Step 1. Position the Rack

Note: It is the customer's responsibility to unpack the system unit and place it where it is to be installed. If this has not been done, consult the customer and the marketing representative as necessary.

Note: The -48 V DC Model S00 rack must be installed only in restricted access areas such as dedicated equipment rooms or equipment closets in accordance with Articles 110-16, 110-17, and 110-18 of the National Electrical Code, ANSI/NFPA No. 70.

1. If the customer has not unpacked the system unit, remove all packing and tape from the rack.
2. Position the rack according to the customer floor plan. If the rack has a front door installed, the rack should have a minimum of 3 to 5 inches of clearance on both the left and right sides of the rack for access to the front door handle.
3. Lock each caster wheel by tightening the thumbscrew on the caster.

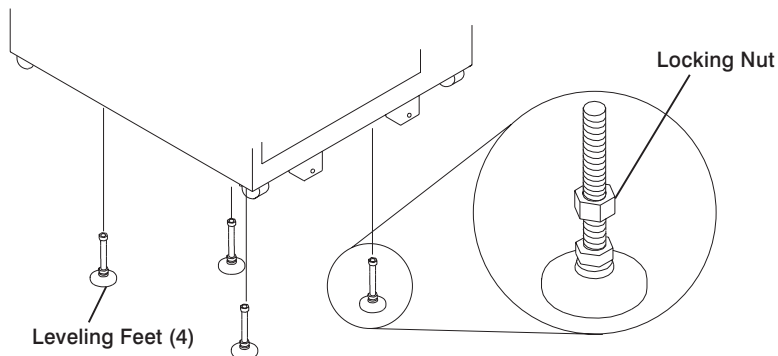


Step 2. Level the Rack

Adjust the leveling feet by doing the following:

1. Loosen the locking nut by turning the locking nut counter-clockwise (away from the bottom of the rack).
2. Adjust the height of the leveling feet by rotating the leveling feet either upward or downward according to the level of the surface on which the rack is placed. Repeat this for the remaining leveling feet as needed.

3. When the rack is level, tighten the locking nuts on all of the leveling feet.



Step 3. Attach the Stabilizer and Door Guide

Note: If the rack will be bolted down to a concrete floor, skip to “Step 4. Bolt Down the Rack” on page 2-8.

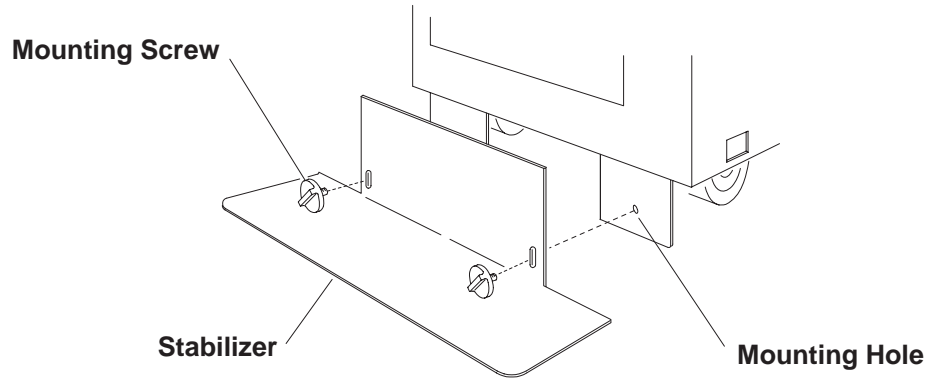
Note: For a translation of this safety notice, see the *System Unit Safety Information* manual.

CAUTION:

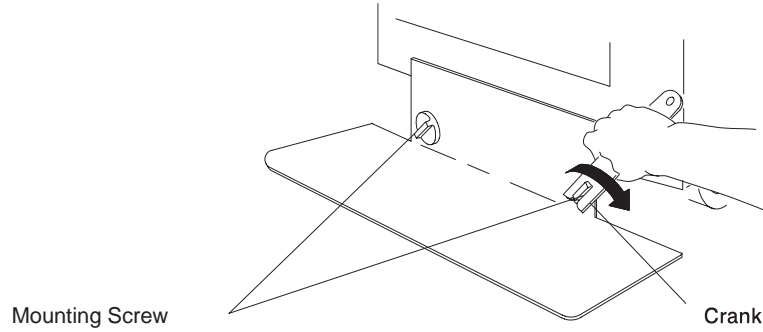
The stabilizer must be firmly attached to the bottom front of the rack to prevent the rack from turning over when the drawers are pulled out of the rack. Do not pull out or install any drawer or feature if the stabilizer is not attached to the rack.

1. Align the slots in the stabilizer with the mounting holes in the bottom front of the rack.
2. Ensure that the base of the stabilizer rests firmly on the floor.

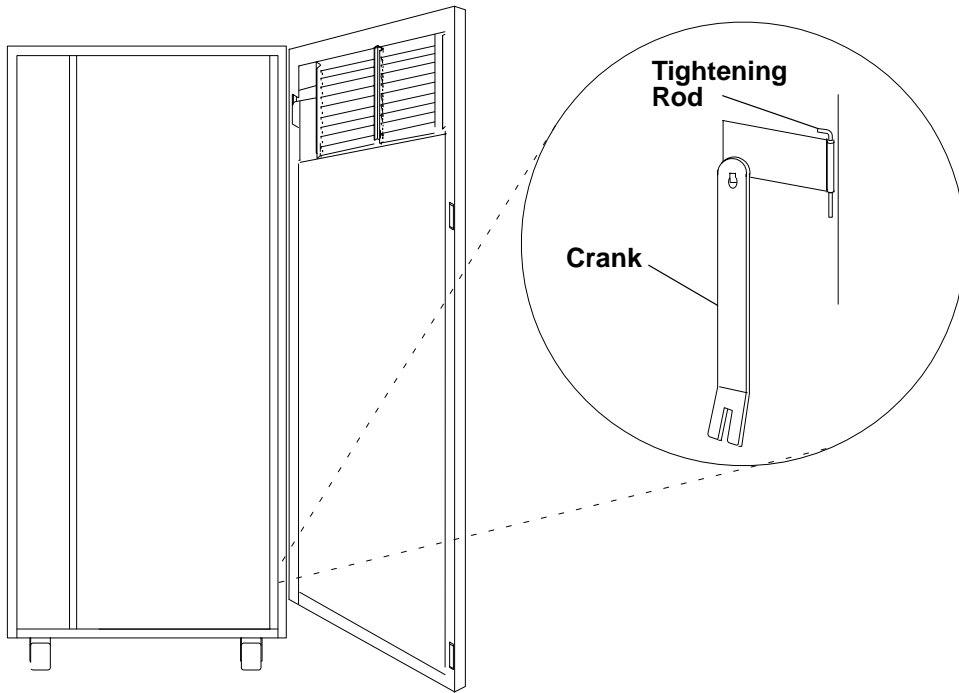
3. Install the two mounting screws and hand tighten.



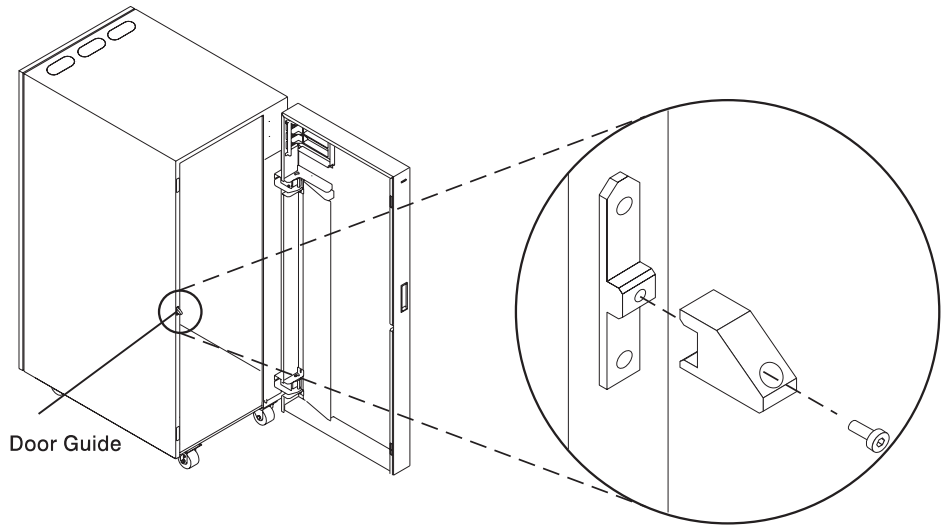
4. Use the crank supplied with the system unit to alternately tighten the mounting screws until they are firmly seated.



5. Hang the crank and tightening rod on the bracket near the bottom of the right wall inside the back of the rack.



6. If the rack has a front door, use a 3 millimeter allen wrench to install the door guide to the mounting bracket as shown below with the screw provided.



7. Skip to "Step 6.4. Connect the Power Distribution Bus" on page 2-34.

Step 4. Bolt Down the Rack

What do I do next?

The Model S00 rack is available with optional bolt-down hardware to secure the rack to a concrete floor, or to a concrete floor through a raised floor.

If the rack will be mounted to a concrete floor, perform “Step 4.1. Attaching the Rack to a Concrete Floor (Optional).”

If the rack will be mounted to a concrete floor beneath a raised floor, perform “Step 4.2. Attaching the Rack to a Concrete Floor Beneath a Raised Floor (Optional)” on page 2-12.

If the rack will not be bolted down, be sure you have attached the stabilizer and skip to “Step 6.4. Connect the Power Distribution Bus” on page 2-34.

Note: The customer is responsible for attaching the rack mounting plates to the concrete floor.

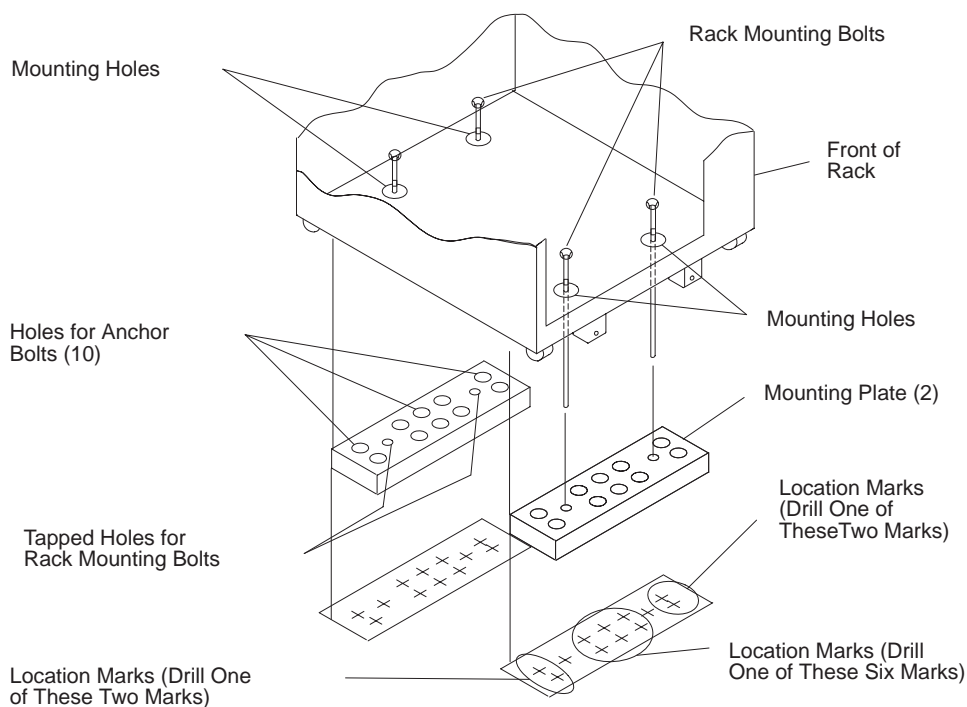
Step 4.1. Attaching the Rack to a Concrete Floor (Optional)

Note: Because of the long length of the four rack-mounting bolts, the drawer located in the bottom position of the rack must be removed to install the four rack-mounting bolts to the floor.

1. If a drawer is installed in the bottom position in the rack, remove the drawer. For information about removing the drawer from the rack, refer to the installation or service guide for the appropriate drawer.
2. Mark the floor around the edge of each leveling foot.
3. Place the two mounting plates in the approximate mounting locations under the rack.
4. To align the rack over the mounting plates, do the following:
 - a. Place the four rack-mounting bolts through the mounting holes at the bottom of the rack.
 - b. Position the mounting plates under the four rack-mounting bolts so that the mounting bolts are centered directly over the tapped holes.
 - c. Insert the rack-mounting bolts 3 to 4 rotations into the tapped holes.
5. Mark the floor around the edge of both mounting plates.
6. Remove the mounting bolts from the threaded holes.

7. To access the holes in the mounting plates, raise the four leveling feet, and then move the rack away from the mounting plates.
8. Mark the floor at the center of each hole in the mounting plate (including the tapped holes).
9. Remove the two mounting plates from the marked locations.
10. At the marked location of the tapped mounting holes, drill two holes approximately 1 inch deep to allow clearance for the ends of the two rack-mounting bolts. The ends of the rack-mounting bolts may protrude past the thickness of the mounting plate.

Note: A minimum of three anchor bolts for each mounting plate must be used to mount the plates to the concrete floor. Because some of the drilled holes may be aligned with concrete reinforcement rods below the surface of the concrete floor, some of the drilled holes may not be usable. For each mounting plate, select at least three usable holes, two that are on opposite sides and opposite ends of each other, and one hole at the center.

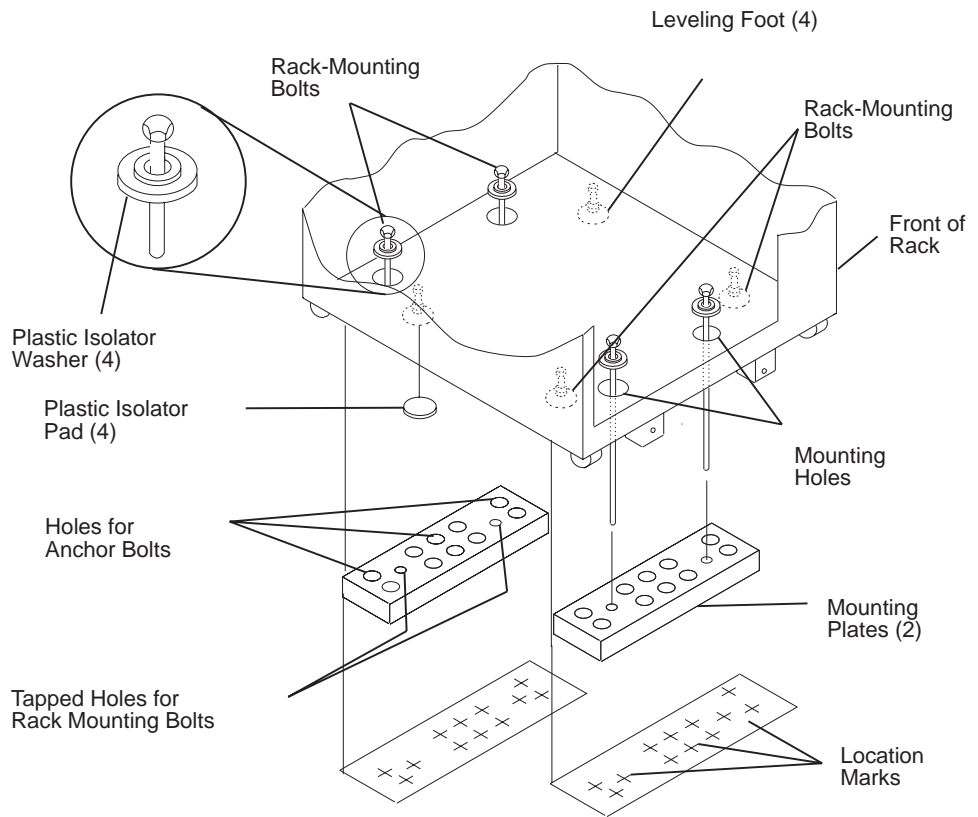


11. Drill one hole in each group of anchor bolt location marks as indicated on the marked floor.

12. Using at least three anchor bolts for each mounting plate, mount the two mounting plates to the concrete floor.
13. Using the location marks for the leveling feet as a guide, reposition the rack over the mounting plates.
14. Place the four rack-mounting bolts through the four metal washers, and then through the four plastic isolator washers. The flat side of the plastic isolator washer must be facing upward.
15. To further align the rack over the mounting plates do the following:
 - a. Place the four rack-mounting bolts (with the four plastic isolator washers) through the mounting holes in the bottom of the rack.
 - b. Align the four mounting bolts to the location of the four tapped holes in the two mounting plates.
 - c. Insert the rack-mounting bolts 3 to 4 rotations into the tapped holes.

Note: The bottom of the four leveling feet must be positioned over the four plastic isolator pads when the rack is leveled.

If you are installing an AC rack, do not use the four plastic isolator pads.
16. Place the four plastic isolator pads under the four leveling feet, and then level the rack using the four adjustable leveling feet.
17. Tighten the locking nuts on the leveling feet.

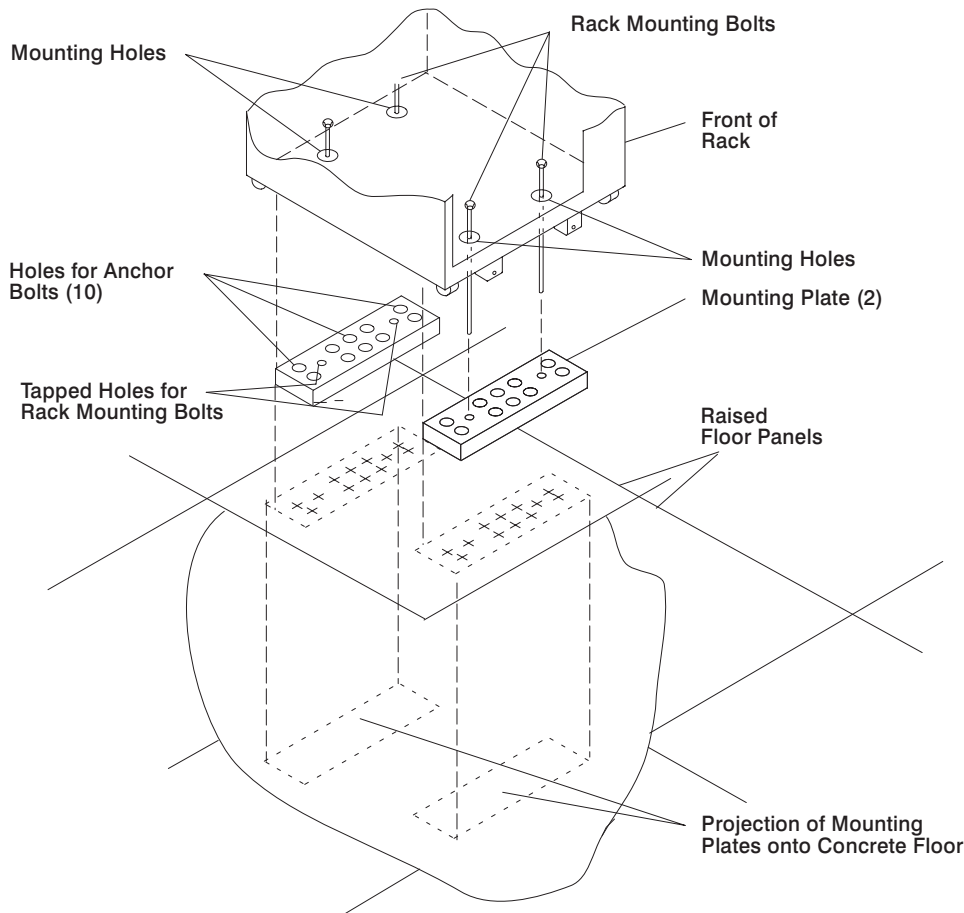


18. Tighten the four rack-mounting bolts into the two mounting plates.
19. Skip to “Step 5. Attach the Convenience Outlet Mounting Plates (Optional)” on page 2-16.

Step 4.2. Attaching the Rack to a Concrete Floor Beneath a Raised Floor (Optional)

Note: Because of the long length of the four rack-mounting bolts, the drawer located in the bottom position of the rack must be removed to install the four rack-mounting bolts to the raised floor.

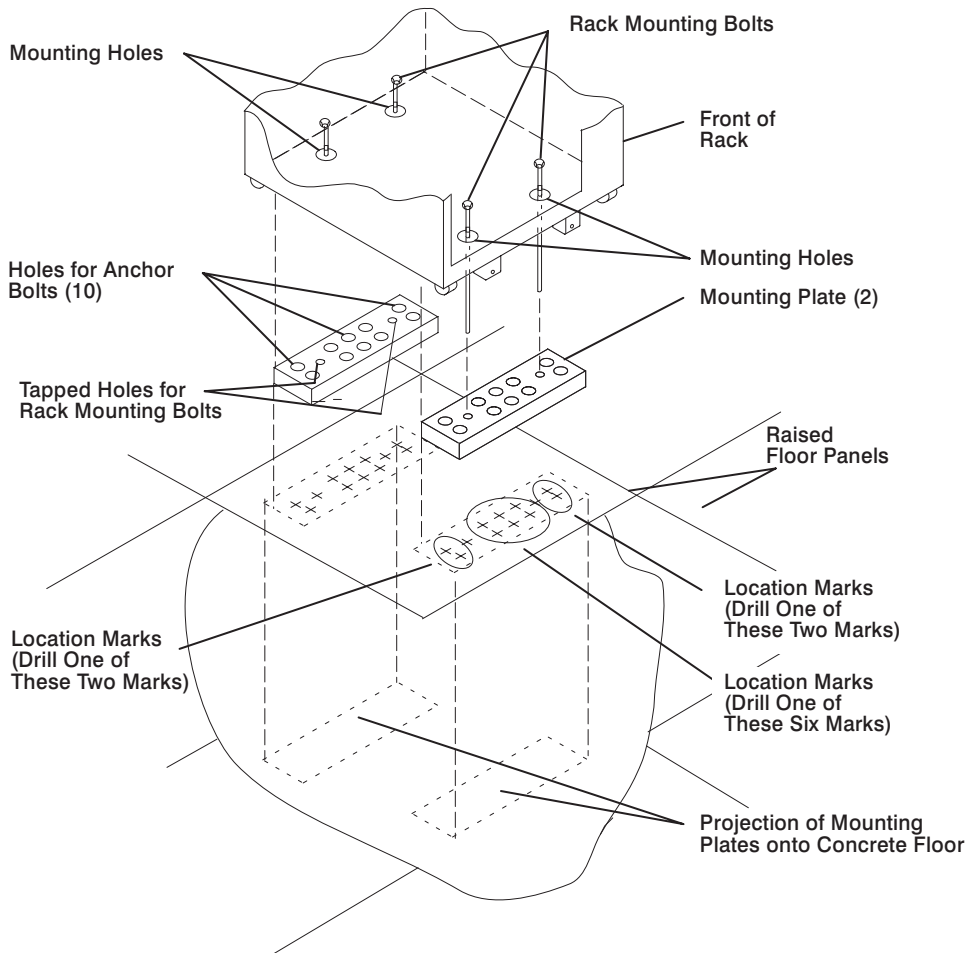
1. If a drawer is located in the bottom position of the rack, remove it now. For information about removing the drawer from the rack, refer to the the installation or service guide for the appropriate drawer.
2. Mark the floor locations around the edge of each leveling foot.
3. Place the two mounting plates in the approximate mounting locations under the rack.
4. To align the rack over the mounting plates, do the following:
 - a. Place the four rack-mounting bolts in the mounting positions at the bottom of the rack.
 - b. Align the tapped holes of the mounting plates with the location of the four rack-mounting bolts.
 - c. Insert the rack-mounting bolts 3 to 4 rotations into the tapped holes.
5. Mark the raised-floor panel around the edge of both mounting plates.
6. Remove the mounting bolts from the threaded holes.
7. To access the holes in the mounting plates, raise the four leveling feet, and then move the rack away from the mounting plates.
8. Mark the raised-floor panel at the center of each hole in the mounting plates (including the tapped holes).
9. Remove the two mounting plates from the marked locations.



10. At the marked location of the tapped mounting holes, drill two holes approximately 1 inch deep to allow clearance for the ends of the two rack-mounting bolts. The ends of the rack-mounting bolts may protrude past the thickness of the mounting plate.

Note: A minimum of three anchor bolts for each mounting plate must be used to mount the plates to the raised floor panel. For each mounting plate, select at least three usable holes, two that are on opposite sides and opposite ends of each other and one at the center.

11. Drill one hole in each group of anchor bolt location marks as indicated on the marked raised floor panel.
12. Ensure that the marks for the holes for the anchor bolts in the concrete floor align with the holes in the raised floor panel.
13. Drill the holes in the concrete floor for the anchor bolts.



14. Place the two mounting plates on the locations indicated on the marked raised-floor panel.
15. Using at least three anchor bolts for each mounting plate, mount the two mounting plates through the raised-floor panel to the concrete floor.
16. Using the location marks for the leveling feet as a guide, reposition the rack over the mounting plates.
17. Place the four rack-mounting bolts through the four metal washers and then through the four plastic isolator washers. The flat side of the plastic isolator washer must be facing upward.
18. To align the rack over the mounting plates, do the following:
 - a. Place the four rack-mounting bolts in the mounting positions at the bottom of the rack.

b. Align the tapped holes of the mounting plates with the location of the four rack-mounting bolts.

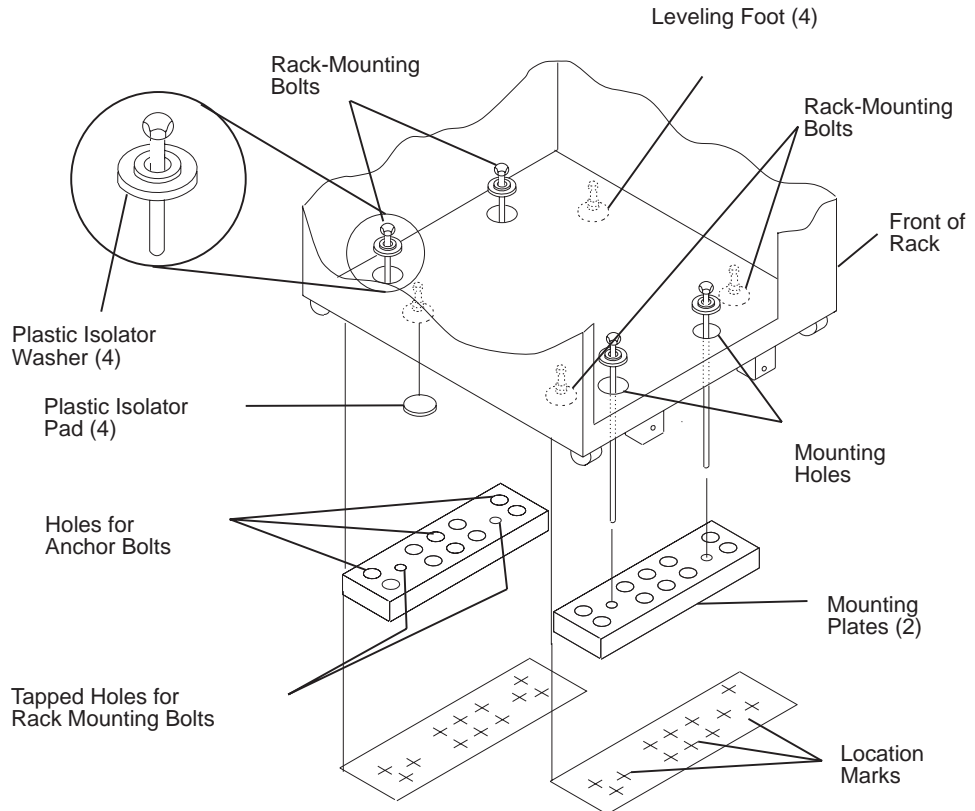
c. Insert the rack-mounting bolts 3 to 4 rotations into the tapped holes.

Note: The bottom of the four leveling feet must be positioned over the four plastic isolator pads when the rack is leveled.

If you are installing an AC rack, do not use the four plastic isolator pads.

19. Place the four isolator pads under the four leveling feet, and then level the rack using the four adjustable leveling feet.

20. Tighten the four rack-mounting bolts into the two mounting plates.



21. Tighten the locking nuts on the leveling feet.

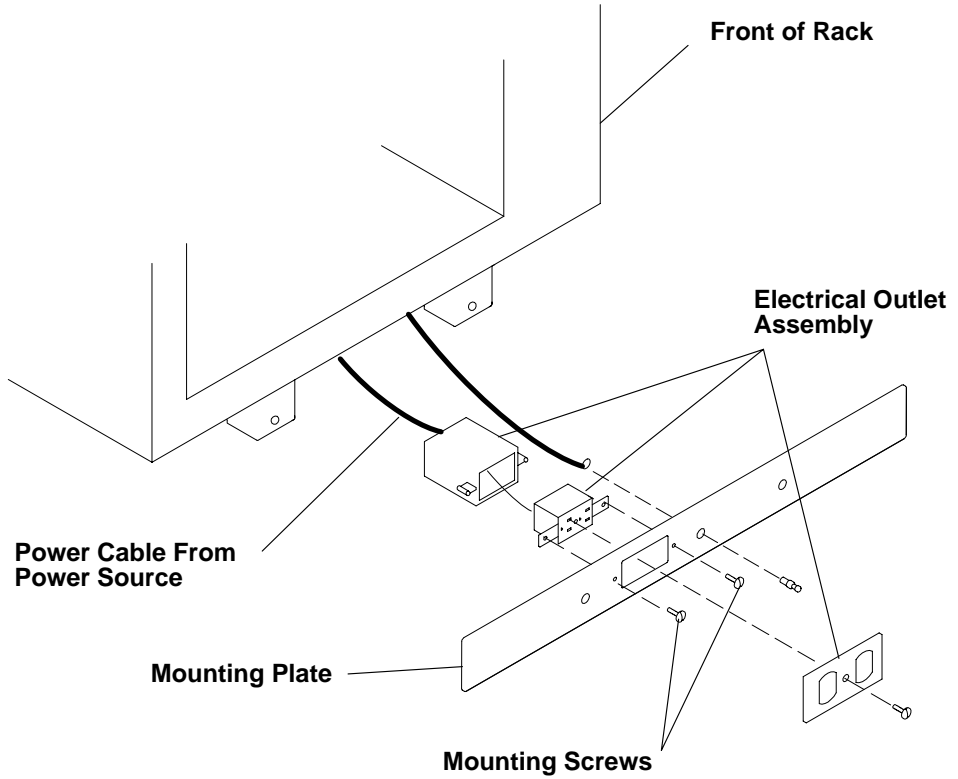
Step 5. Attach the Convenience Outlet Mounting Plates (Optional)

An optional feature of the -48 V DC Model S00 rack are mounting plates for customer installed convenience AC electrical outlets. These mounting plates may be installed at the base of the front and rear of the rack. In addition to providing a mounting location for an electrical outlet, each plate has a lug and ground cable for grounding the customer's test equipment.

Note: The customer is responsible for providing both the front electrical outlet assembly and the power cable from the customer power source to the front electrical outlet. The customer is also responsible for having the electrical outlet assembly properly connected by a professional electrician. These items are not field replaceable units.

1. If the customer does not want to connect an electrical outlet to the mounting plate at this time, but wants the mounting plate installed, skip to step 4 on page 2-17.
2. Remove the blank filler plate in the outlet opening on the mounting plate.

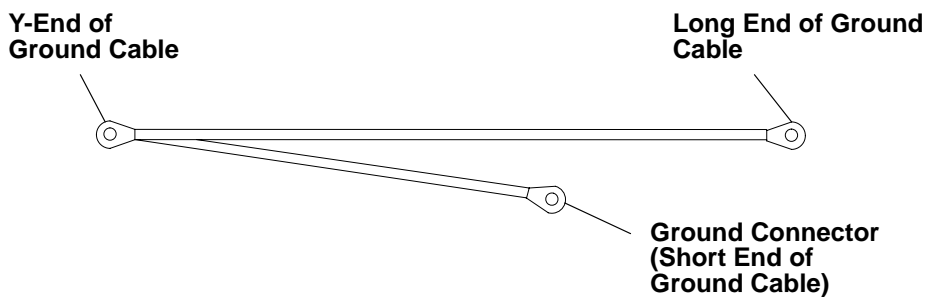
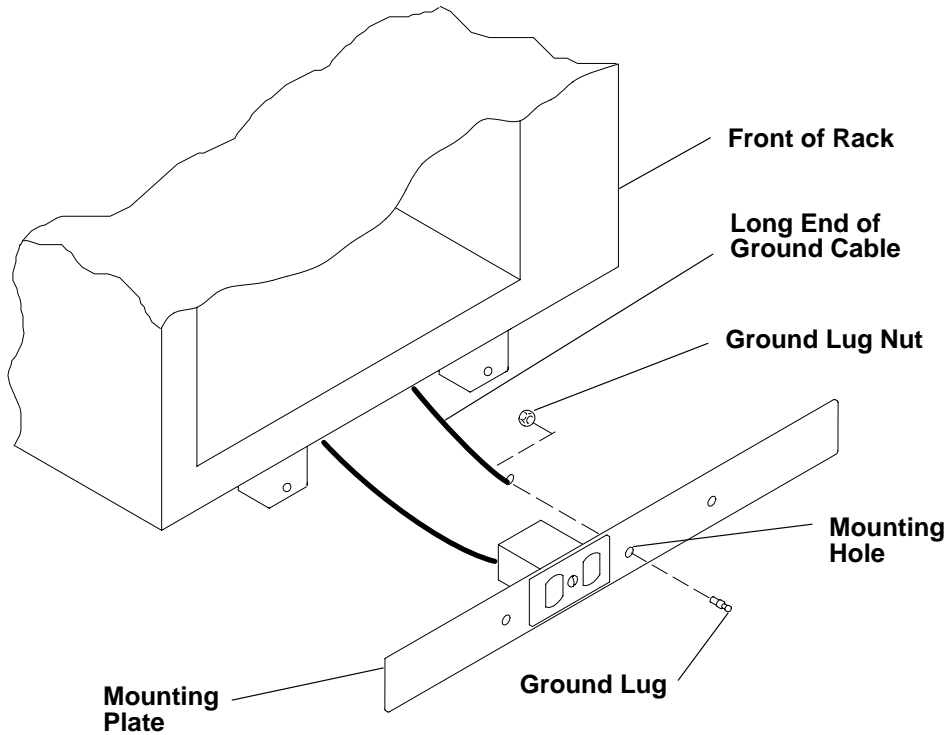
3. After the customer has connected the power cable from the customer power source to the electrical outlet assembly, mount the electrical outlet assembly to the mounting plate using the two mounting screws (provided by the customer).



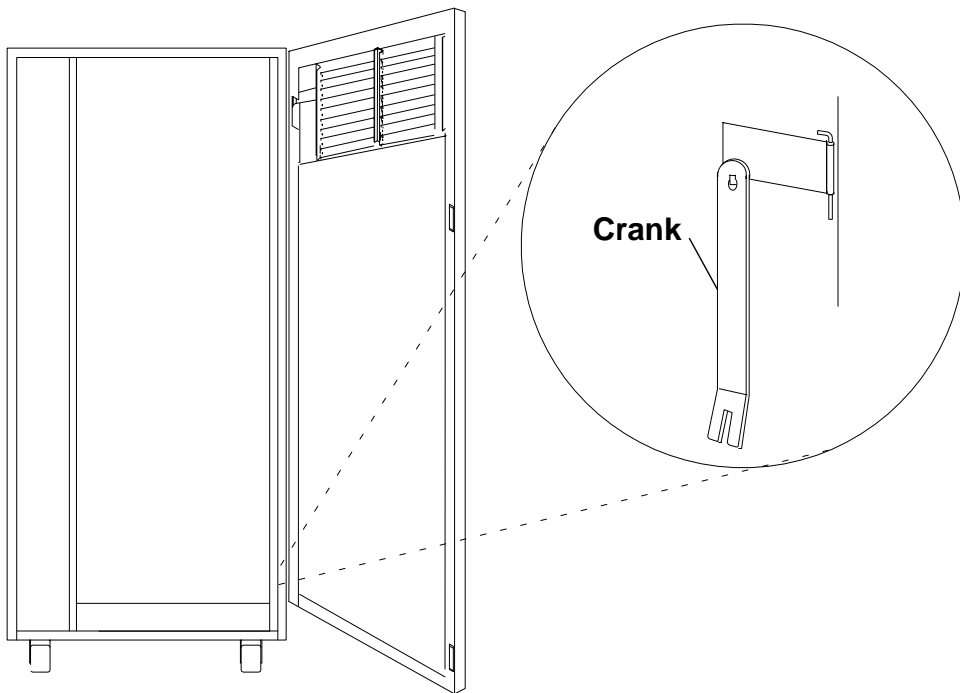
4. Place the ground cable lug through the mounting hole of the mounting plate.

5. Locate the Y-shaped grounding cable supplied with the mounting plates. Connect the long end of the ground cable to the threaded side of the ground cable lug (inside the mounting plate), and then install and tighten the ground lug nut. Feed the ground cable underneath the rack.

Note: The two remaining connectors of the ground cable are done in step 17 on page 2-24.

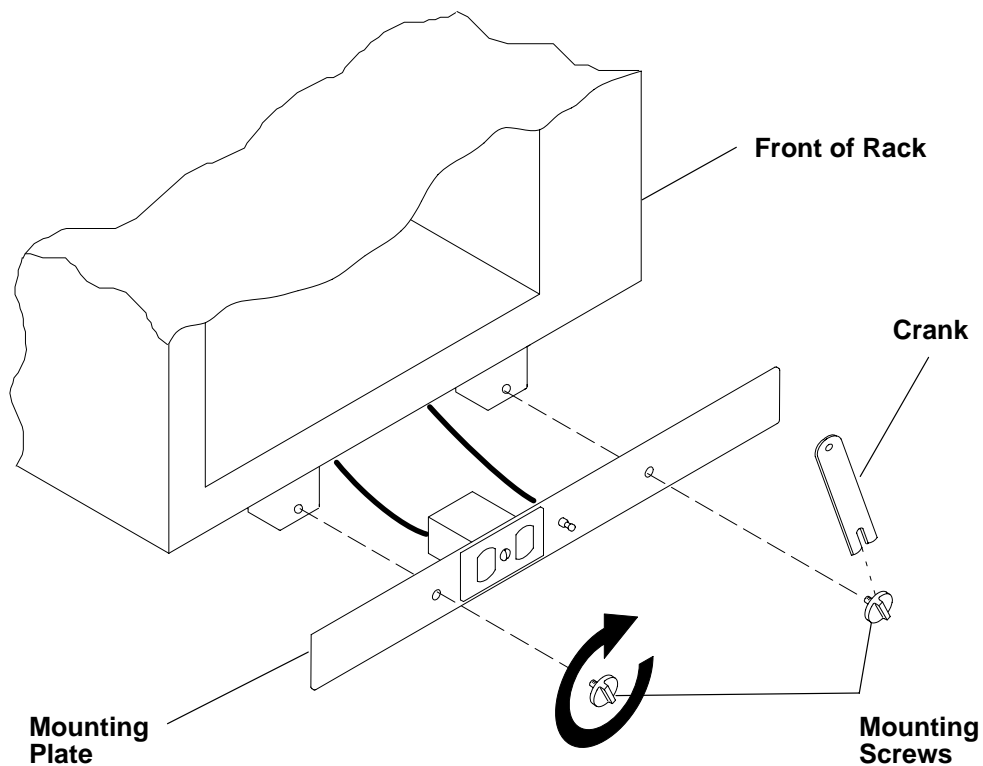


6. Find the crank (for installing the mounting screws) located inside the rear of the rack near the bottom of the right wall.



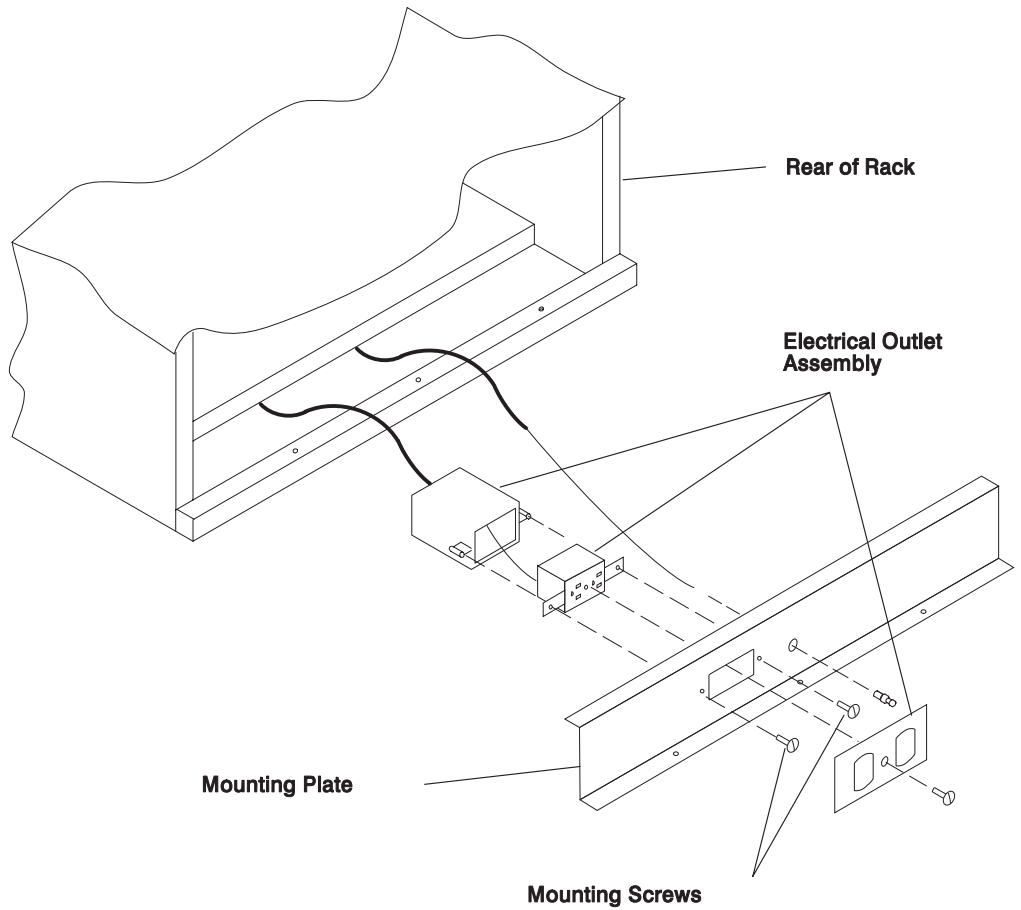
7. Align the holes of the mounting plate with the holes on the rack, and then install the two mounting screws.

8. Using the crank, tighten the two mounting screws.



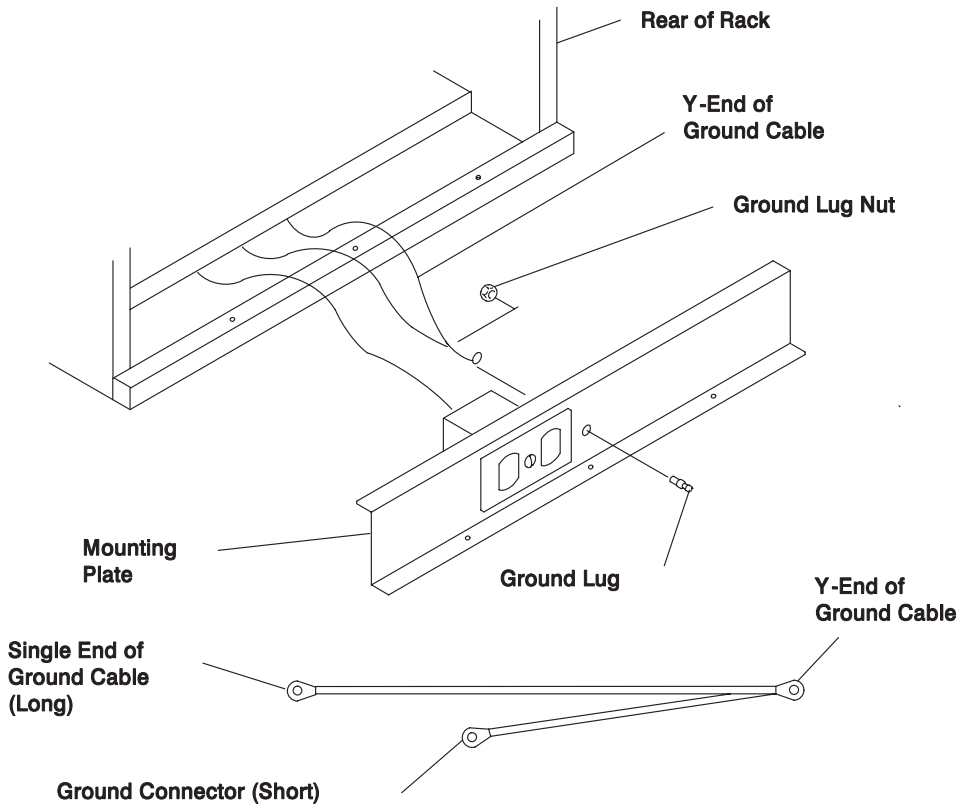
9. Store the crank inside the rear of the rack near the bottom of the right wall.
10. Open the rear door of the rack.
11. If the customer does not want to connect an electrical outlet to the mounting plate at this time, but wants the mounting plate installed, skip to step 14 on page 2-21.
12. If the customer wishes to install an outlet in the rear electrical mounting plate, remove the blank filler plate in the outlet opening.

13. After the customer has connected the power cable from the customer power source to the electrical outlet assembly, mount the electrical outlet assembly to the mounting plate using the two mounting screws (provided by the customer).

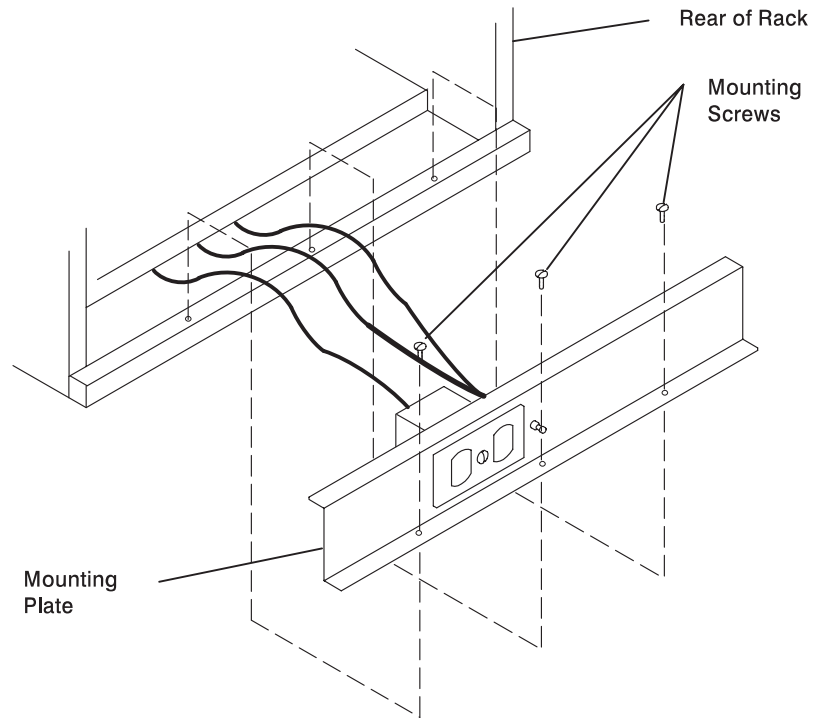


14. Place the ground cable lug through the mounting hole of the mounting plate.

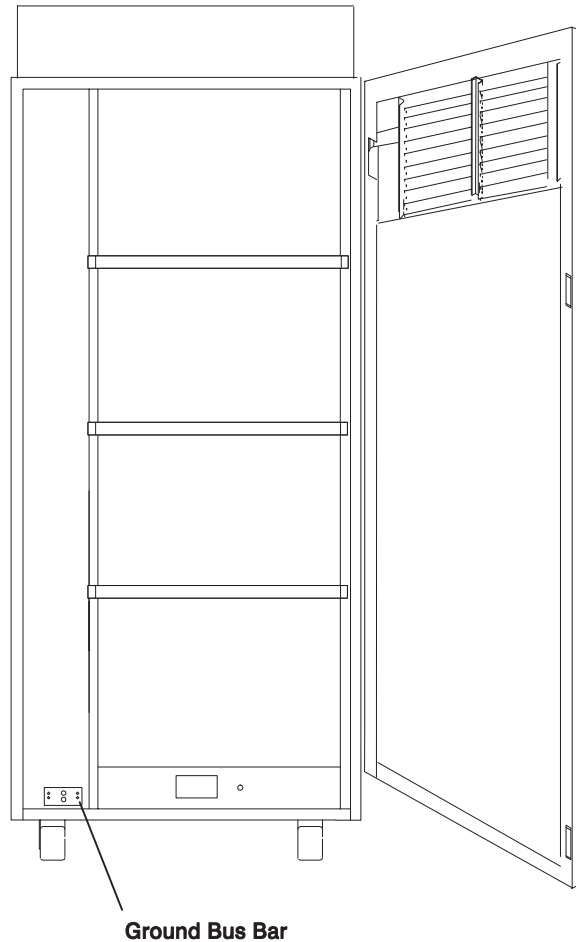
15. Find the ground cable that you fed underneath the rack in step 5 on page 2-18. Connect the Y-connector of the ground cable to the threaded side of the ground cable lug, and then install and tighten the ground lug nut. The remaining end of the ground cable will connect to the ground bus bar in step 17 on page 2-24.



16. Attach the mounting plate to the rack by installing and tightening the three mounting screws.



17. Connect the remaining connector of the ground cable to the ground bus bar.



18. If you removed any drawers from the bottom of the rack, reinstall them now. For information about installing drawers into the rack, refer to the installation or service manual provided with the drawer.

Step 6. Connect the Power Distribution System

What do I do next?

Three power distribution systems are available with the Model S00 rack: a power distribution panel (-48 V DC), circuit breaker panels (-48 V DC), or a power distribution bus (AC).

If a power distribution panel is installed on your rack, perform “Step 6.1. Connect the Power Distribution Panel.”

If a circuit breaker panel is installed on your rack, skip to “Step 6.2. Connect the Circuit Breaker Panels” on page 2-30.

If a power distribution bus is installed in the rack, skip to “Step 6.4. Connect the Power Distribution Bus” on page 2-34.

Step 6.1. Connect the Power Distribution Panel

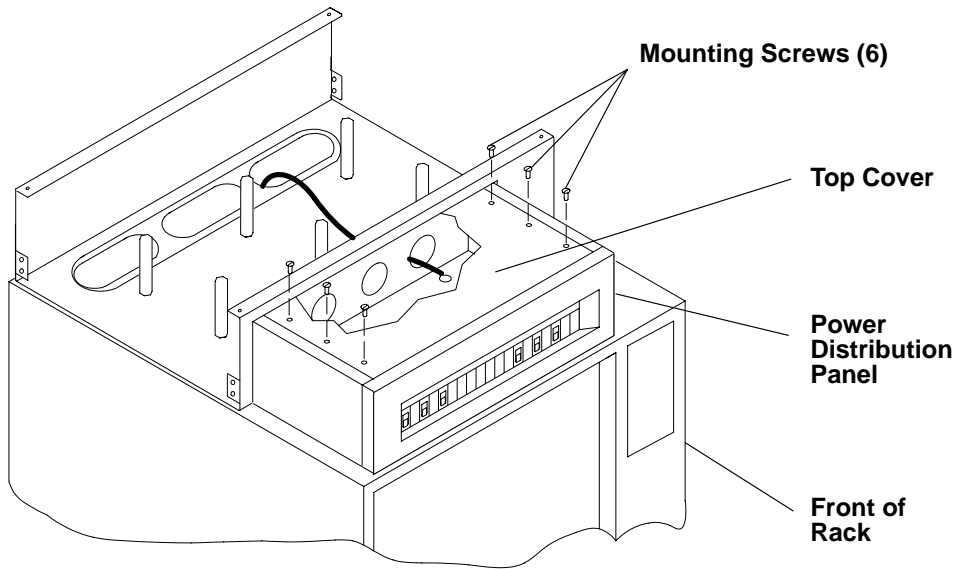
Note: The customer is responsible for providing and connecting the -48 V DC power cables and the return power cables from the customer's -48 V DC power sources to the power distribution panel (PDP) of the -48 V DC Model S00 rack. The customer is also responsible for connecting the customer-supplied ground cable to the rack frame.

CAUTION:

Energy hazard, remove power before servicing.

1. At the customer's -48 V DC power source, switch off all power for any -48 V DC power sources that will be connected to the power distribution panel (PDP).
2. After the customer's -48 V DC power sources are switched off, place a tag or label over the power source switches (or fuses) to indicate that the power sources are intended to be switched off.

3. Remove the six mounting screws from the top cover of the PDP, and remove the top cover.

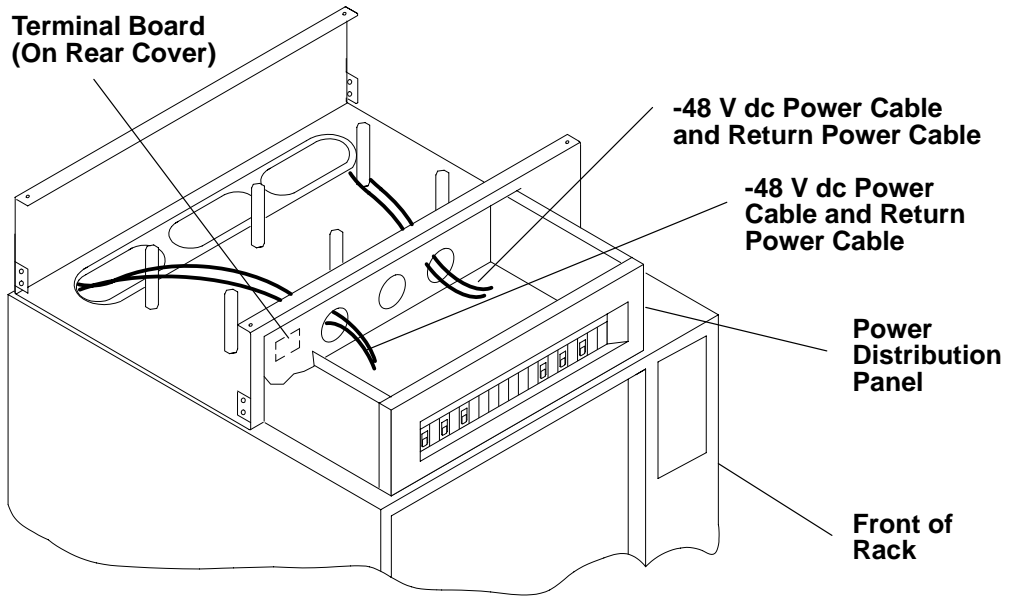


4. Remove the bus bar shield (insulator) from the PDP.

Attention: The bus bar shield must be properly reinstalled over the return bus bars to protect against injury when servicing the power distribution panel

5. Ensure that the customer properly installs the external -48 V DC power cables to the -48 V DC bus bars and the positive return ground cables to the return bus bars.

**Terminal Board
(On Rear Cover)**

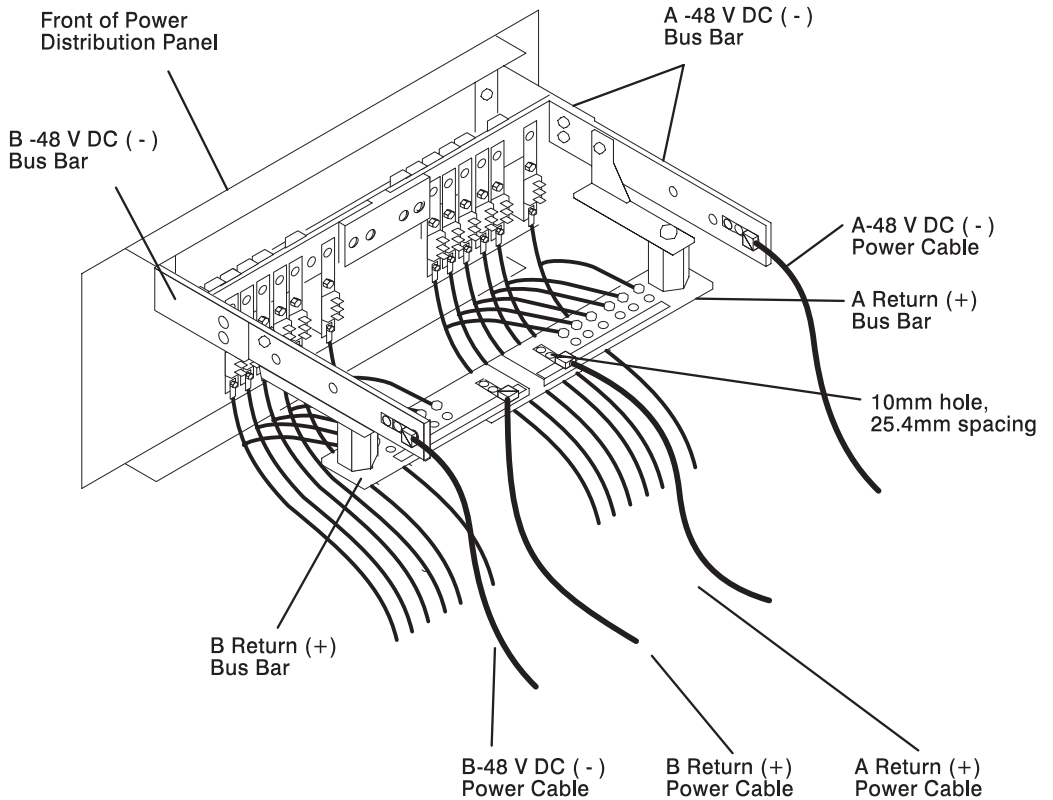


**-48 V dc Power Cable
and Return Power Cable**

**-48 V dc Power
Cable and Return
Power Cable**

**Power
Distribution
Panel**

**Front of
Rack**



**Front of Power
Distribution Panel**

**A -48 V DC (-)
Bus Bar**

**B -48 V DC (-)
Bus Bar**

**A-48 V DC (-)
Power Cable**

**A Return (+)
Bus Bar**

**10mm hole,
25.4mm spacing**

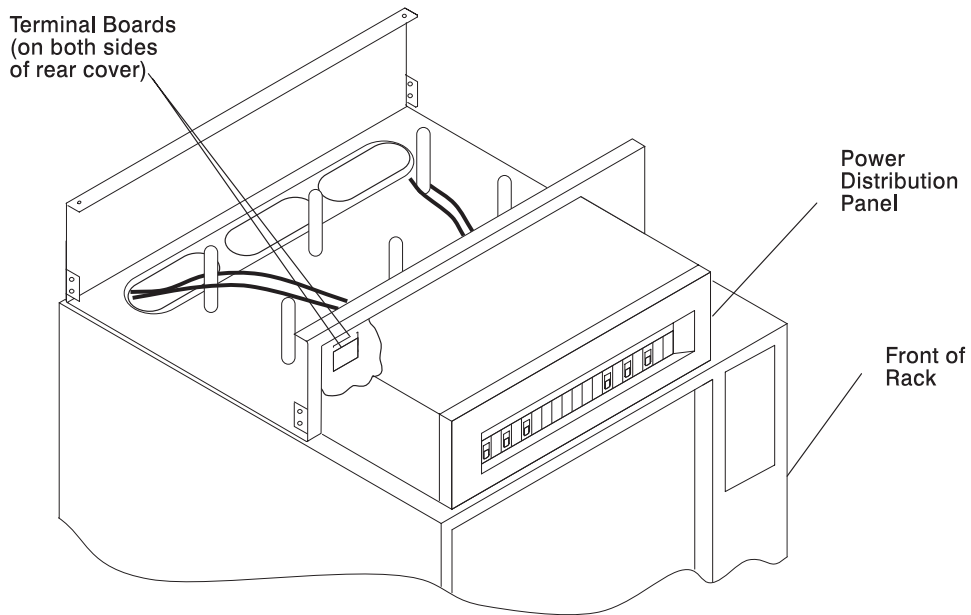
**B Return (+)
Bus Bar**

**B-48 V DC (-)
Power Cable**

**B Return (+)
Power Cable**

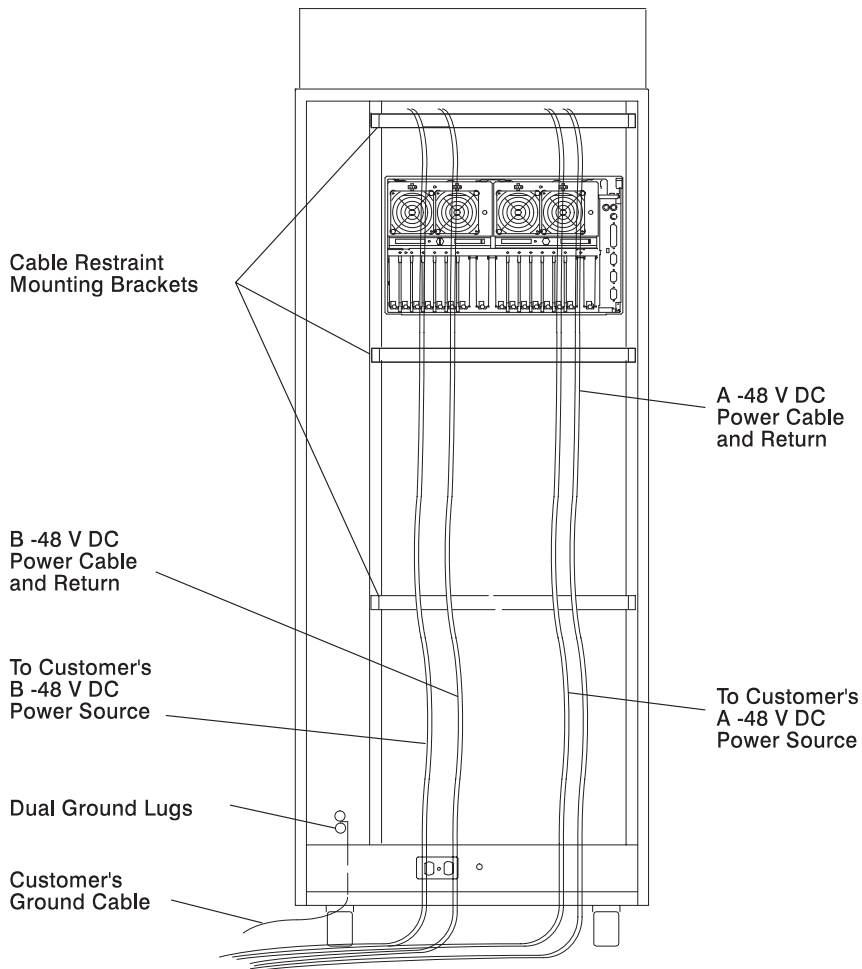
**A Return (+)
Power Cable**

6. Replace the bus bar shield (insulator).
7. Replace the top cover of the PDP.
8. If the customer wants to install a power status alarm, tell the customer to connect the alarm cable to the terminal board located on the rear cover of the power distribution panel now.



9. Connect the customer's ground cable to the dual ground lugs at the lower rear corner of the rack.
10. The customer's power cables are normally supplied to the rack from an overhead source. If the customer's power cables are supplied from the bottom of the rack, use the cable restraint straps to attach the -48 V DC power cables and return power cables to the cable restraint mounting brackets.
11. Skip to "Step 7. Connect Drawer and Device Cables" on page 2-35.

Rear View of Rack



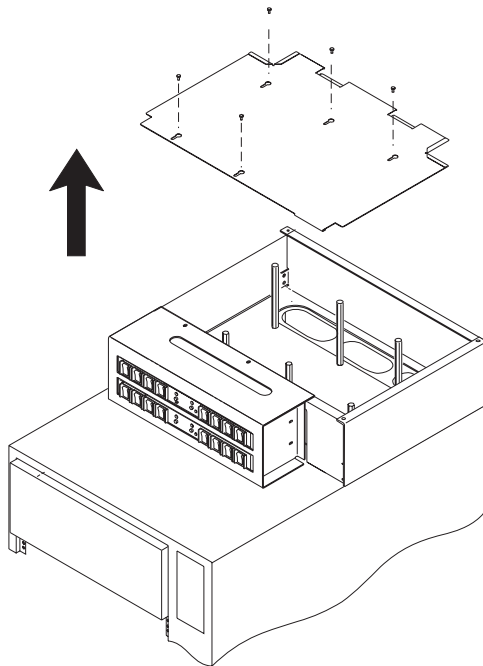
Step 6.2. Connect the Circuit Breaker Panels

Note: The customer is responsible for providing and connecting both the -48 V DC power cables and return power cables from the customer's -48 V DC power sources to the circuit breaker panels in the -48 V DC Model S00 rack. The customer is also responsible for connecting the customer-supplied ground cable to the rack frame.

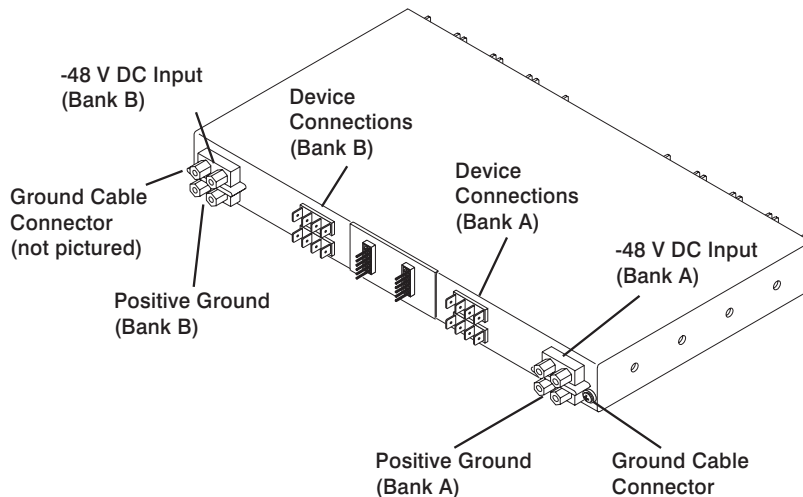
CAUTION:

Energy hazard, remove power before servicing.

1. At the customer's -48 V DC power sources, switch off all power from any -48 V DC power sources that will be attached to the circuit breaker panels.
2. After the customer's -48 V DC power sources are switched off, place a tag or label over the power source switches (or fuses) to indicate that the power sources are intended to be switched off.
3. Remove the five mounting screws from the top cover of the circuit breaker panel chassis, and remove the top cover.



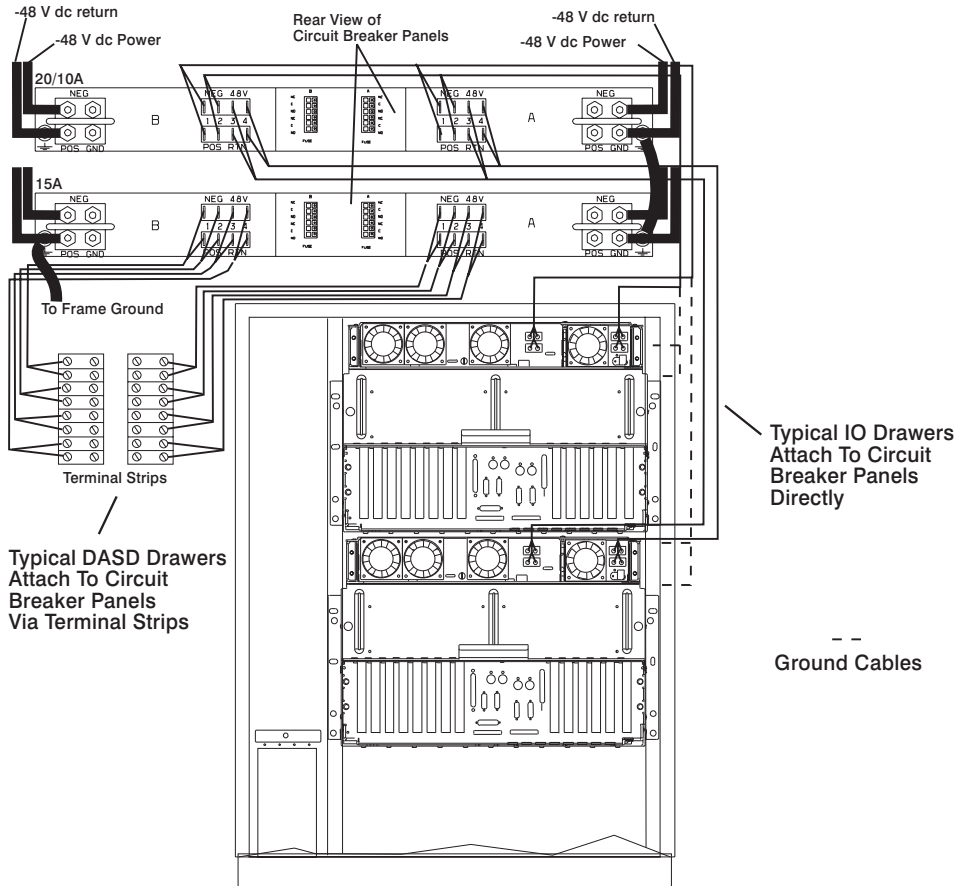
4. Ensure that the customer properly connects the external -48 V DC power cables and return power cables both to the customers -48 V DC power sources and to appropriate connectors on the circuit breaker panels.



5. Connect the customer's ground cable to the dual ground lugs on the rack.

- Replace the top cover of the circuit breaker panel chassis, taking care to feed the customer's power cables and return power cables through the openings at the rear corners of the top cover.

Typical Circuit Breaker Panel Cabling



Step 6.3. Checking Customer AC Outlets

If you are installing an AC rack, perform the following checks on the customer's AC power source.

If you are installing a -48 V DC, rack, the customer is responsible for checking the integrity and quality of the -48 V DC power sources. When installing a -48 V DC Model S00 rack, ensure that the customer has checked his -48 V DC power sources, then skip to “Step 1. Position the Rack” on page 2-3.

Note: For a translation of this safety notice, see the *System Unit Safety Information* manual.

CAUTION:

Do not touch the receptacle or the receptacle faceplate with anything other than your test probes before you have met the requirement in step 8.

1. Have the customer locate and turn off the branch circuit circuit breaker for the customer power outlet. Attach tag S229-0237 to the circuit breaker switch, which reads "Do Not Operate."

Note: All measurements are made with the receptacle faceplate in the normal installed position.

2. Some receptacles are enclosed in metal housings. On receptacles of this type, perform the following steps:
 - a. Check for less than 1 volt from the receptacle case to any grounded metal structure in the building, such as a raised-floor metal structure, water pipe, building steel, or similar structure.
 - b. Check for less than 1 volt from receptacle ground pin to a grounded point in the building.

Note: If the receptacle case or faceplate is painted, be sure the probe tip penetrates the paint and makes good electrical contact with the metal.

- c. Check the resistance from the ground pin of the receptacle to the receptacle case. Check resistance from the ground pin to the building ground. The readings should be less than 1.0 ohm, which indicates the presence of a continuous grounding conductor.
3. If any of the three checks made in substep 2 are not correct, ask the customer to remove the power from the branch circuit and make the wiring corrections; then check the receptacle again.

Note: Do not use a digital multimeter to measure grounding resistance.

4. Check for infinite resistance between the ground pin of the receptacle and each of the phase pins. This is a check for a wiring short to ground or a wiring reversal.
5. Check for infinite resistance between the phase pins. This is a check for a wiring short.

Note: For a translation of this safety notice, see the *System Unit Safety Information* manual.

CAUTION:

If the reading is other than infinity, do not proceed! Have the customer make necessary wiring corrections before continuing. Do not turn on the branch circuit circuit breaker until all the above steps are satisfactorily completed.

6. Have the customer turn on the branch circuit circuit breaker. Measure for appropriate voltages between phases. If no voltage is present on the receptacle case or grounded pin, the receptacle is safe to touch.
7. With an appropriate meter, verify that the voltage at the outlet is correct.
8. Verify that the grounding impedance is correct by using the ECOS 1020, 1023, B7106, C7106, or an appropriately approved ground impedance tester.

Note: Do not use the 120-volt convenience outlets inside a machine to power the tester.

9. Skip to “Step 6.4. Connect the Power Distribution Bus.”

Step 6.4. Connect the Power Distribution Bus

1. Most systems in Model S00 racks are preconfigured in the factory with all drawers and devices properly cabled and connected to the power distribution bus. If this is not the case, plug any unconnected drawer power cables into the outlets on the rear of the power distribution bus. For information about connecting drawer and device power cables, see the installation or service guide for the system or devices installed in your rack.
2. Plug the power distribution bus power cable into the customer's electrical outlet or power cable.
3. Skip to “Step 7. Connect Drawer and Device Cables” on page 2-35.

Step 7. Connect Drawer and Device Cables

1. If head protectors are installed, remove them from all diskette drives.
2. Most systems in Model S00 racks are preconfigured in the factory, with all drawer and device cables installed. If you need to install drawer and device cables:
 - a. Follow the power control cable installation instructions provided in the documentation for the appropriate system or device being installed in this rack.
 - b. Using the customer planning information, the *Diagnostics Information for Multiple Bus Systems*, or other information supplied by the customer, connect the drawer and device cables to the system interface board ports.
 - c. As needed, use the cable labels included in the ship group to label the cables. For additional information about labeling the cables, refer to the *Diagnostics Information for Multiple Bus Systems*.
3. Cable restraints are supplied with the rack and can be installed in the rack.
 - a. Open the cable restraint strap by pressing the release tab and then pulling the end of the cable restraint strap through the locking mechanism.
 - b. Place the cables within the cable restraint strap.
 - c. Close the strap by placing the end of the cable restraint strap through the locking mechanism, and then pull the end of the cable restraint strap to tighten the cables against the rack.

Step 8. Power-On and Check Out the System

1. Follow the power-on procedures in Chapter 4, Removal and Replacement for the power distribution systems installed in your rack.
2. Refer to the *Diagnostics Information for Multiple Bus Systems* and follow the instructions in the installation checkout procedure.

Chapter 3. Service Inspection Guide

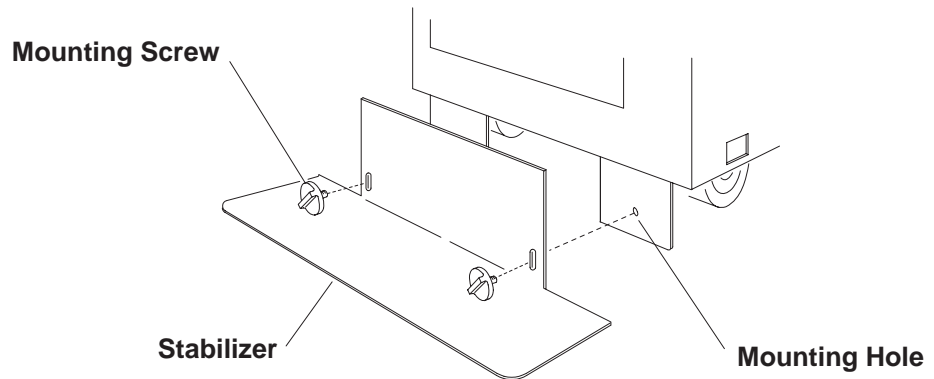
Perform a service inspection on the system when the following conditions occur:

- The system is inspected under a maintenance agreement.
- Service is requested and service has not recently been performed.
- An alterations-and-attachments review is performed.
- Changes have been made to the equipment that might affect the safe operation of the equipment.
- External devices with an attached power cord are connected to the system unit.

If the inspection indicates an unacceptable safety condition, the condition must be corrected before representatives service the machine.

Note: The correction of any unsafe condition is the responsibility of the owner of the system.

2. If the rack is not bolted down, ensure that the stabilizer is firmly attached to the bottom front of the rack.



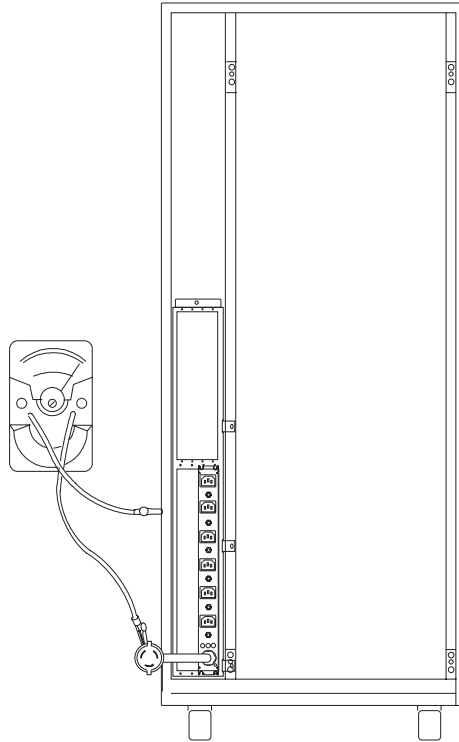
Note: For a translation of this safety notice, see the *System Unit Safety Information* manual.

CAUTION:

The stabilizer must be firmly attached to the front of the rack to prevent the rack from turning over when the drawers are pulled out of the rack. Do not pull out or install any drawer or feature if the stabilizer is not attached to the rack.

3. Check the covers for sharp edges and for damages or alterations that expose the internal parts of the rack.
4. Check the covers for a proper fit to the rack. They should be in place and secure.
5. Open the back door of the rack.
6. Perform the power-off procedure for the power distribution system installed in your rack. See Chapter 4, "Removal and Replacement" on page 4-1 for power off procedures.
7. Check for alterations or attachments. If there are any, check for obvious safety hazards such as broken wires, sharp edges, or broken insulation.
8. Check the internal cables for damage.
9. Check for dirt, water, and any other contamination within the rack.
10. Check the voltage label on the back of the system unit to ensure that it matches the voltage at the outlet.
11. Check the external power cable for damage.

12. If your rack is a -48 V DC rack, with the customer's ground cable connected to the system unit, check for 0.1 ohm or less resistance between the metal frame and the dual ground lugs on the rack.
13. If your rack is an AC rack,
 - a. With the external power cable connected to the system unit, check for 0.1 ohm or less resistance between the ground lug on the external power cable plug and the metal frame.



- b. Using the appropriate probe, check for 0.1 ohm or less resistance between the metal frame and the grounding pin on each of the power outlets on the power distribution bus (R1, R2, R3, ...).
- c. Check for the following conditions for each external device that has an attached power cord:
 - 1) Damage to the power cord.
 - 2) The correct grounded power cord.
 - 3) With the external power cord connected to the device, check for 0.1 ohm or less resistance between the ground lug on the external power cord plug and the metal frame of the device.

14. Close the rear cover of the rack.
15. Perform the power-on procedure for the power distribution system installed in your rack. See Chapter 4, Removal and Replacement for power-on procedures.

Chapter 4. Removal and Replacement

This chapter contains information about powering the system on and off, and removing and replacing components of a Model S00 rack.

Use the correct power-on and power-off procedure for the power distribution systems in your rack.

Safety Notices

This section contains safety notices that apply to all the procedures in this chapter. Review this section carefully before performing any power related operations.

Note: For a translation of this safety notice, see the *System Unit Safety Information* manual.

DANGER

An electrical outlet that is not correctly wired could place hazardous voltage on metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock.

Before installing or removing signal cables, ensure that the power cables for the system unit and all attached devices are unplugged.

When adding or removing any additional devices to or from the system, ensure that the power cables for those devices are unplugged before the signal cables are connected. If possible, disconnect all power cables from the existing system before you add a device.

Use one hand, when possible, to connect or disconnect signal cables to prevent a possible shock from touching two surfaces with different electrical potentials.

During an electrical storm, do not connect cables for display stations, printers, telephones, or station protectors for communication lines.

CAUTION:

This unit may have more than one power cable. To completely remove power, you must disconnect all power cables from the unit.

System Shutdown Warning

Before powering off the drawers or external devices, ask the customer about their system high availability requirements. Notify the customer if you are going to switch off power to any attached CPUs or drawers that are contained in this rack or any attached racks. Notify the customer that other attached systems might be affected by this procedure.

Before stopping the system unit, you must first shut down the operating system to prevent losing data.

Attention: Use the appropriate shutdown command before you stop the system unit; failure to do so may result in the loss of data. See your operating system documentation for information about the shutdown command.

Power-On Procedure with the Power Distribution Bus

1. Plug all drawer power cables into the outlets on the power distribution bus.
2. Make sure the power cable for the power distribution bus is plugged into the customer's power cable or outlet.

CAUTION:

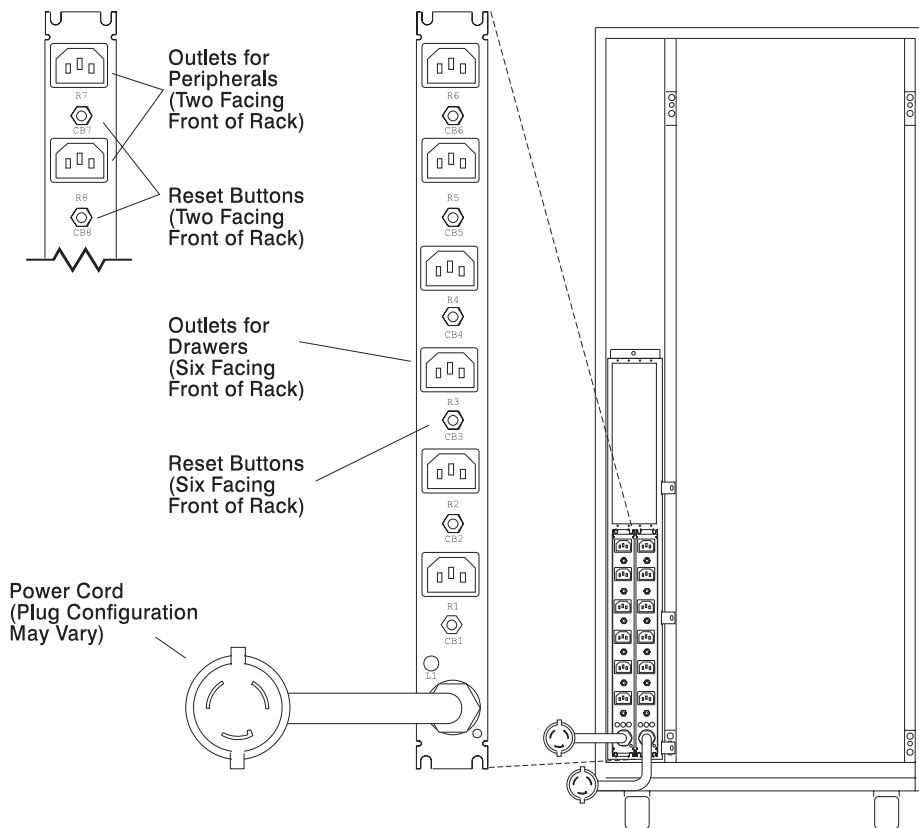
This product is equipped with a 3-wire power cable and plug for the user's safety. Use this power cable in conjunction with a properly grounded electrical outlet to avoid electrical shock.

Note: If two PDBs are installed in the rack, plug the power cables of both PDBs into the electrical outlets.

View of Power Distribution Bus Facing Front of Rack

View of Power Distribution Bus Facing Rear of Rack

Rear View of Rack



3. Follow the power-on procedure for the system installed in your rack to switch on power to the system installed in the rack and drawers installed in your rack. Refer to the service guide for the system installed in your rack for more information.
4. Close the back door of the rack.

Power-Off Procedure with the Power Distribution Bus

1. Follow the power-off procedure for the system installed in the rack to switch off both the system and all centrally controlled drawers. Refer to the service guide for the system installed in your rack for more information.

Note: Because many drawers or devices can be connected to the system unit, it may be impractical for you to switch off power to all the drawers or devices and unplug their power cables.

2. Open the rear door of the rack.

Note: If two power distribution busses (PDB) are installed in your rack and you are servicing only one of the PDBs, power-off the drawers connected to the PDB you are servicing, and then connect the power cables for those drawers to the second PDB. If the second PDB is not being serviced, you may want to power-on the drawers that you just connected to the second PDB.

3. Switch off power to all drawers or devices that are connected to the PDB you are servicing.

4. Unplug the drawer or device power cables from the electrical outlets on the PDB you are servicing.

5. If drawer or device power cables are not connected to the PDB you are servicing, unplug the PDB power cable from the customer's power cable or outlet.

Power-On Procedure with the Power Distribution Panel

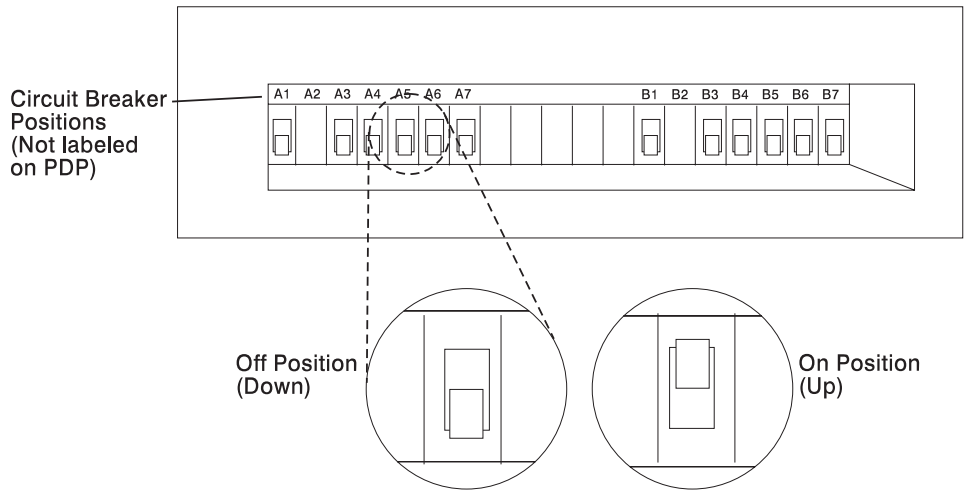
CAUTION:

Energy hazard, remove power before servicing. Disconnect two power supply cords.

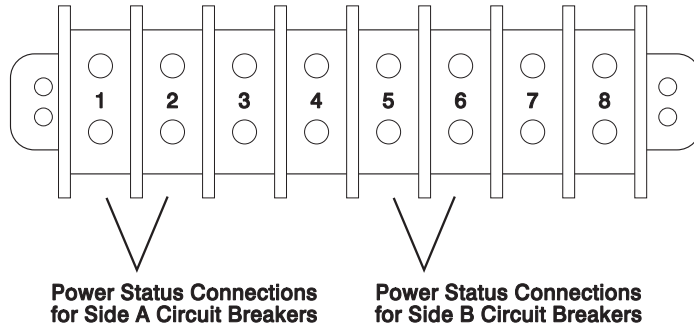
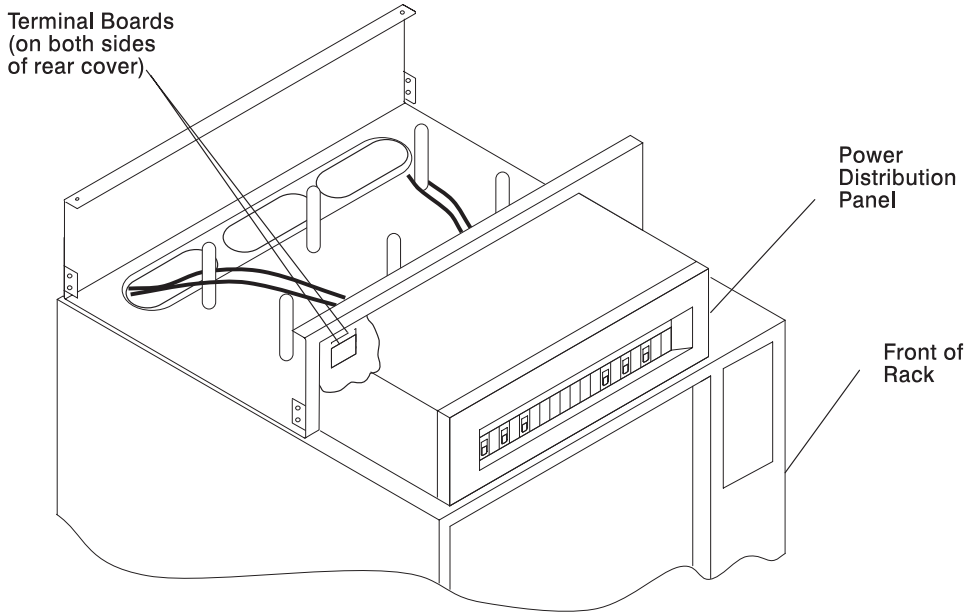
Note: It is the customer's responsibility to provide and have a qualified technician properly install both the -48 V DC power cables and return power cables from the customer's -48 V DC power sources to the power distribution panel in the -48 V DC Model S00 rack. The customer is also responsible for connecting the customer-supplied ground cable to the ground bus bar on the rack frame.

1. Ensure that all circuit breakers are on (circuit breaker switches in the up position).

Front View of Power Distribution Panel

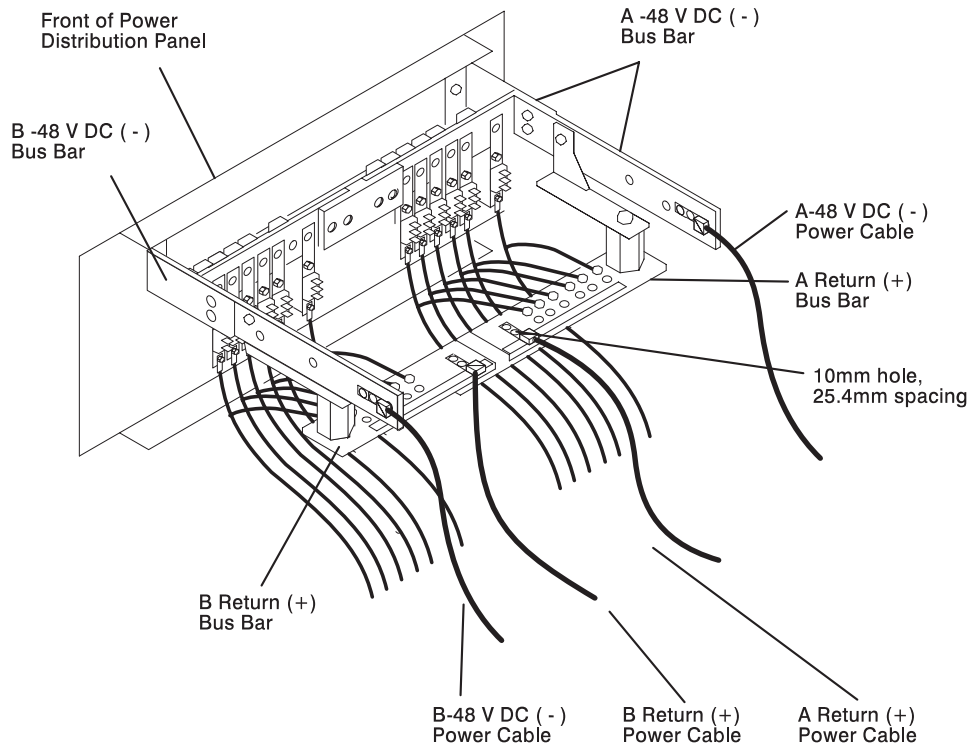


2. Locate terminal board 2 (TB2) located on the outside of the rear panel of the power distribution panel.



topmar="0.25i".

3. Using a polarity sensitive multimeter, ensure that the customer has properly connected the power cables (both -48 V DC (-) and return (+)) to the power distribution panel.
 - a. Measure for -40 to -60 V DC between positions one and two on terminal board 2 to test the power for side A.
 - b. Measure for -40 to -60 V DC between positions five and six on terminal board 2 to test the power for side B.



4. Plug all external device power cords into the electrical outlets.
5. Switch on power to all external devices attached to the system unit. Refer the the service guide for the drawers installed in your rack for more information.
6. Switch on power to all of the devices and drawers connected to the PDP. Refer the the service guide for the drawers installed in your rack for more information.
7. Switch on power to the system installed in the rack. Refer to the service guide for the CPU enclosure installed in your rack for more information.

Power-Off Procedure with the Power Distribution Panel

1. Switch off power to the system installed in the rack. Refer to the service guide for the CPU enclosure installed in your rack for more information.
2. Switch off power to all devices and drawers in the rack. Refer to the service guide for the drawers installed in your rack for more information.
3. Switch off power to all external devices attached to the system unit. Refer to the service guide for the drawers installed in your rack for more information.
4. Unplug the device power cords from the electrical outlets.

Note: If drawers in attached racks are connected to circuit breakers in this rack, power to the drawers in attached racks will be powered-off immediately when the controlling circuit breakers in this rack are set to off.

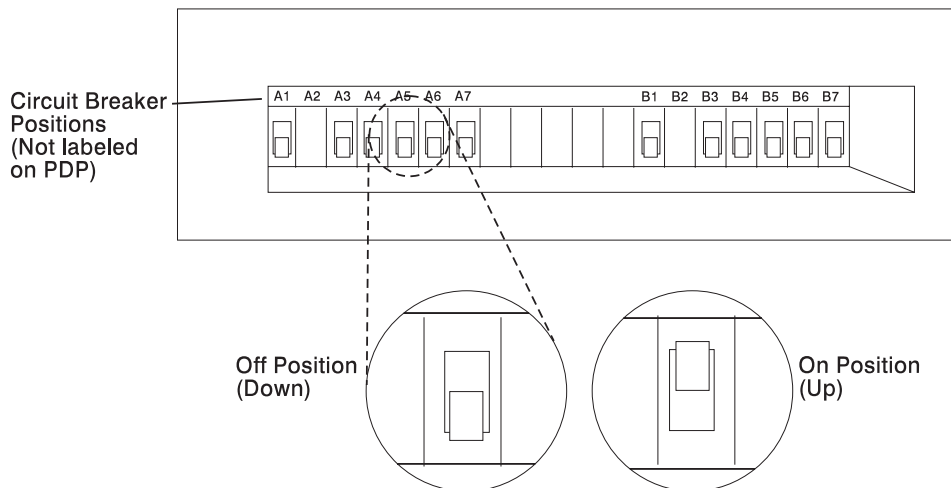
5. Except for circuit breakers in this rack that are connected to drawers in other racks, set all circuit breaker switches to the off position (down).

CAUTION:

Energy hazard, remove power before servicing. Disconnect two power supply cords.

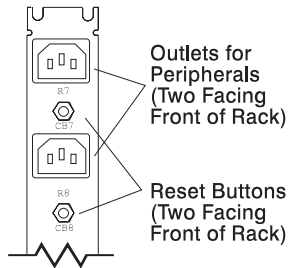
Note: Because a large number of external devices can be connected to the system unit, it may be impractical for you to switch off power to all the devices and unplug their power cords.

Front View of Power Distribution Panel

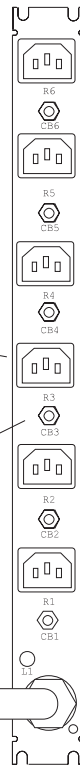


Power Distribution Bus

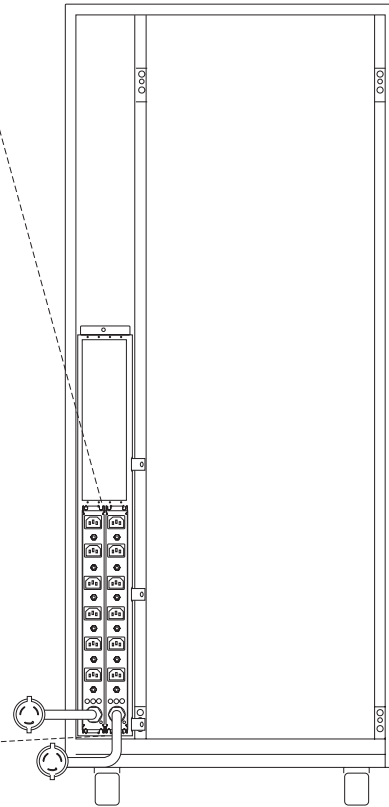
View of Power Distribution Bus Facing Front of Rack



View of Power Distribution Bus Facing Rear of Rack



Rear View of Rack



Power Distribution Bus Removal

1. Follow the “Power-Off Procedure with the Power Distribution Bus” on page 4-3.
2. Once you have switched off power and disconnected the power distribution bus from the customer's power cable, record the locations of the drawer power cables that are plugged into the power connectors on the power distribution bus.
3. Unplug the drawer power cables from the power distribution bus
4. Remove the four mounting screws from the power distribution bus, and pull the power distribution bus toward you to access the power connectors on the far side of the power distribution bus.

5. Unplug the power cords from the two power connectors on the side of the PDB facing the front of the rack.
6. Remove the power distribution bus from the rack.

Power Distribution Bus Replacement

1. Reconnect any power cables that you disconnected from the spare power connectors on the power distribution bus
2. Slide the power distribution bus into the housing.
3. Fasten the power distribution bus to the housing with the four mounting screws.
4. Reconnect any power cables that you disconnected from the power distribution bus into the correct power connectors.
5. Be sure to set the switches and plug the power cords into the locations that you recorded during the removal procedure.
6. Do the "Power-On Procedure with the Power Distribution Bus" on page 4-2.

Power Distribution Panel

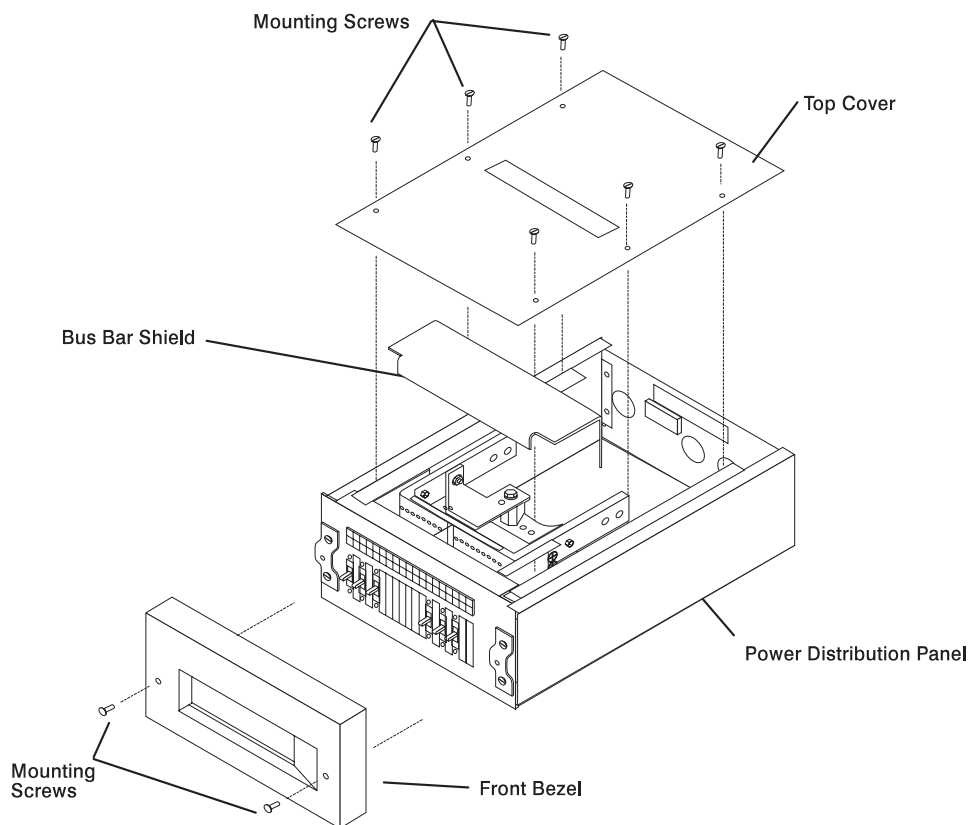
CAUTION:

Energy hazard, remove power before servicing. Disconnect two power supply cords.

Power Distribution Panel Removal

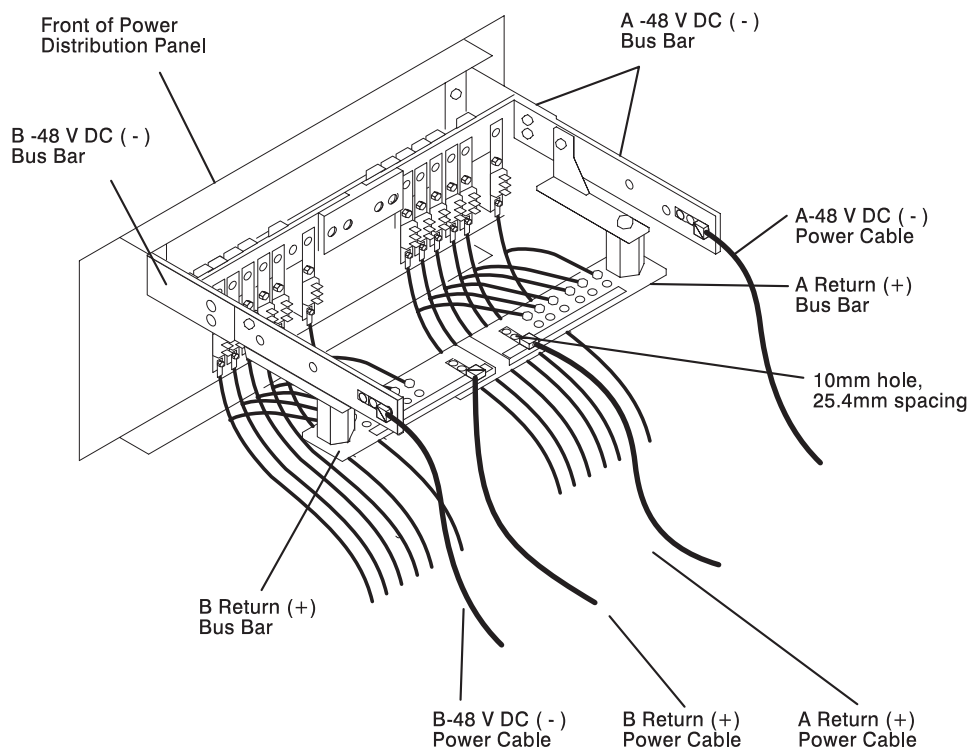
1. Do the "Power-Off Procedure with the Power Distribution Panel" on page 4-8.
2. Switch off power at the customer's -48 V DC power sources connected to the power distribution panel.
Note: Removing power to this power distribution panel does not remove power to drawers in this rack that are being powered by a power distribution panel of another rack.
3. Once the customer's -48 V DC power sources are switched off, ensure that a tag or label is positioned over the switches to indicate that the power sources are intended to be switched off.
4. Disconnect from the drawers all drawer power cables that are connected to the PDP.
5. Pull the drawer power cables up through the three holes in the top of the rack.

6. Remove the six mounting screws from the top cover of the PDP, and then remove the top cover.
7. Remove the bus bar shield (insulation) from the PDP.

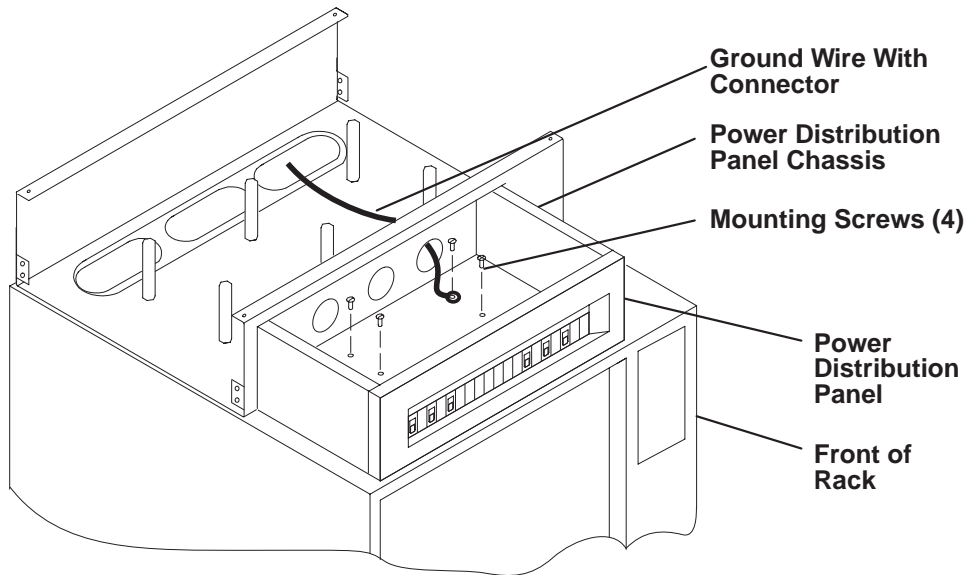


8. With a multimeter, verify that no power exists between the two -48 V DC bus bars (-) and the two return bars (+).
9. Record the locations of the two -48 V DC power cables and the two return power cables.

10. Ensure that the customer's technician completely disconnects the two -48 V DC power cables from the two -48 V DC bus bars, and the two positive return ground cables from the return bus bars. Ensure that the customer's technician also safely removes the power cables from the rack.



11. Remove the four mounting screws that attach the PDP chassis to the top of the rack.
12. Pull the ground bus bar wire out of the back of the power distribution panel.
13. Remove the PDP and all of the attached drawer power cables from the top of the rack.



Power Distribution Panel Replacement

1. If it is not already off, remove the top cover of the power distribution panel.
2. Place the power distribution panel on top of the rack, aligning the mounting holes in the bottom of the chassis with the mounting holes on the top of the rack.
3. Attach the ground bus bar cable to the power distribution panel the mounting screw as shown in the figure above.

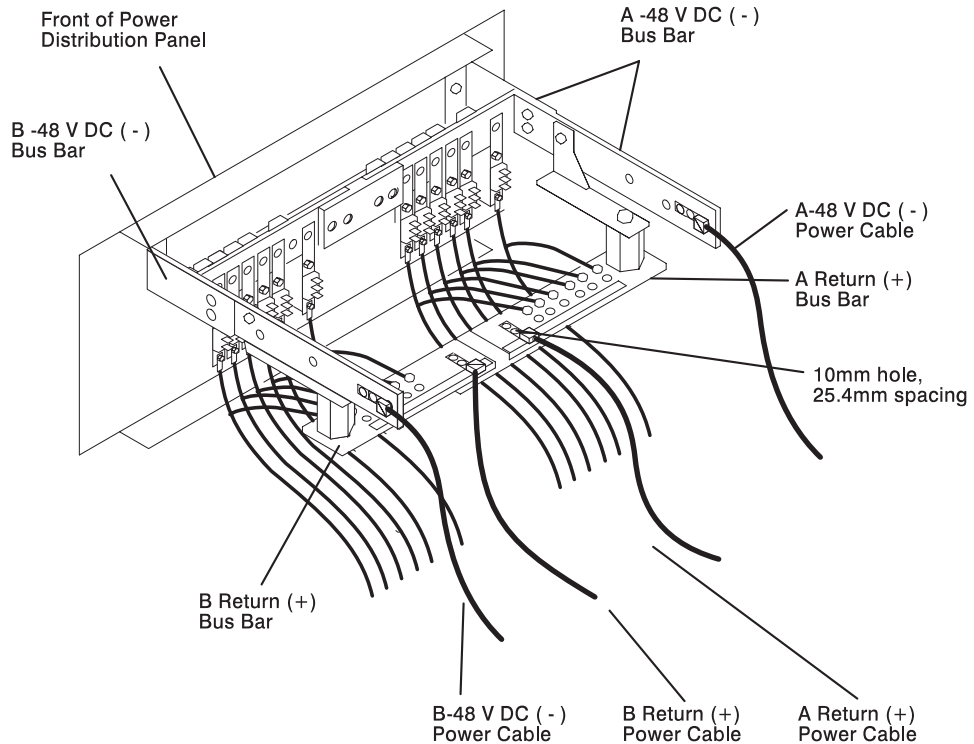
Note: The ground bus bar cable must be attached to an unpainted surface to ensure proper grounding of the electrical system.

4. Attach the power distribution panel chassis to the top of the rack with the remaining mounting screws provided (see figure above).
5. Ensure that the customer's power sources that will be connected to this power distribution panel are switched off.

Note: It is the customer's responsibility to provide and have a qualified technician install both -48 V DC power cables and return power cables

from the customer's -48 V DC power sources to the power distribution panel in the -48 V DC Model S00 rack, The customer's technician is also responsible for connecting the customer-supplied ground cable to the ground bus-bar on the rack frame.

6. Ensure that the customer's technician properly connects the -48 V DC power cables to the -48 V DC bus bars and the return power cables to the return bus bars.



7. Feed the drawer power cables that are attached to the power distribution panel through the holes in the top of the rack.
8. Replace the bus bar shield (insulation).
9. Replace the top cover of the power distribution panel with the six mounting screws provided.
10. Connect the drawer power cables to the correct drawers. Refer to the customer's planning information and the service guide for the system installed in your rack for more information on connecting drawer power cables.
11. Ensure that all circuit breakers in the power distribution panel are off.

12. Remove the warning tag or label from the customer's -48 V DC power source switch.
13. Switch on power at the customer's -48 V DC power source.
14. Do the "Power-On Procedure with the Power Distribution Panel" on page 4-4.

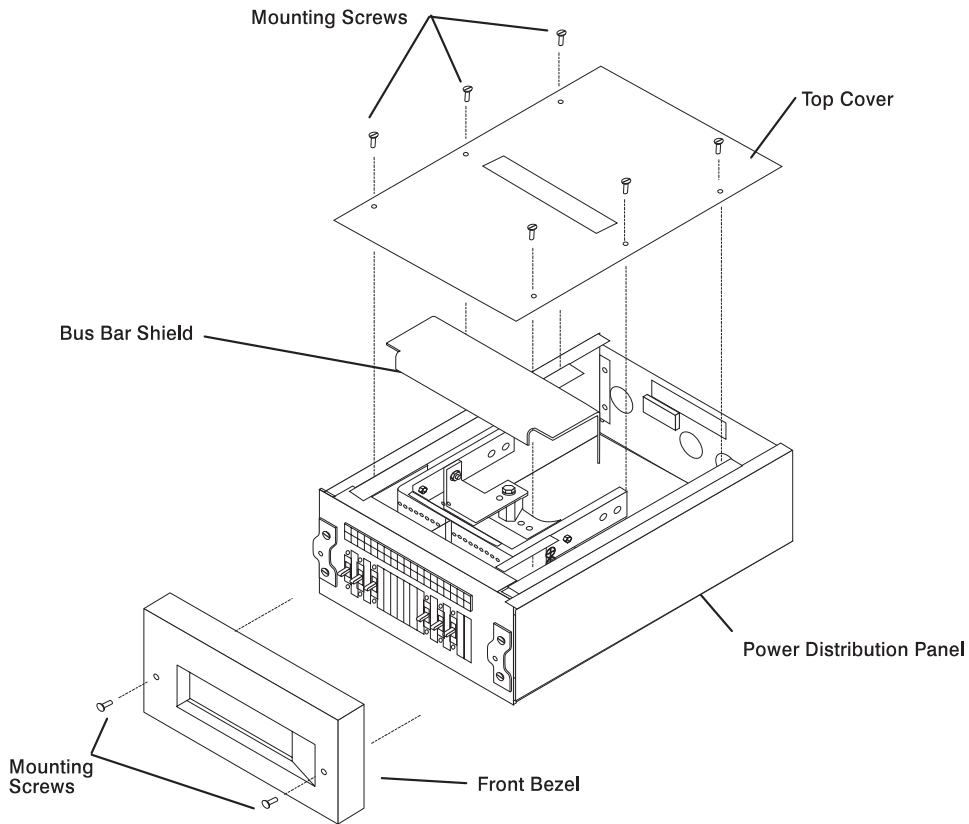
Circuit Breaker

CAUTION:

Energy hazard, remove power before servicing. Disconnect two power supply cords.

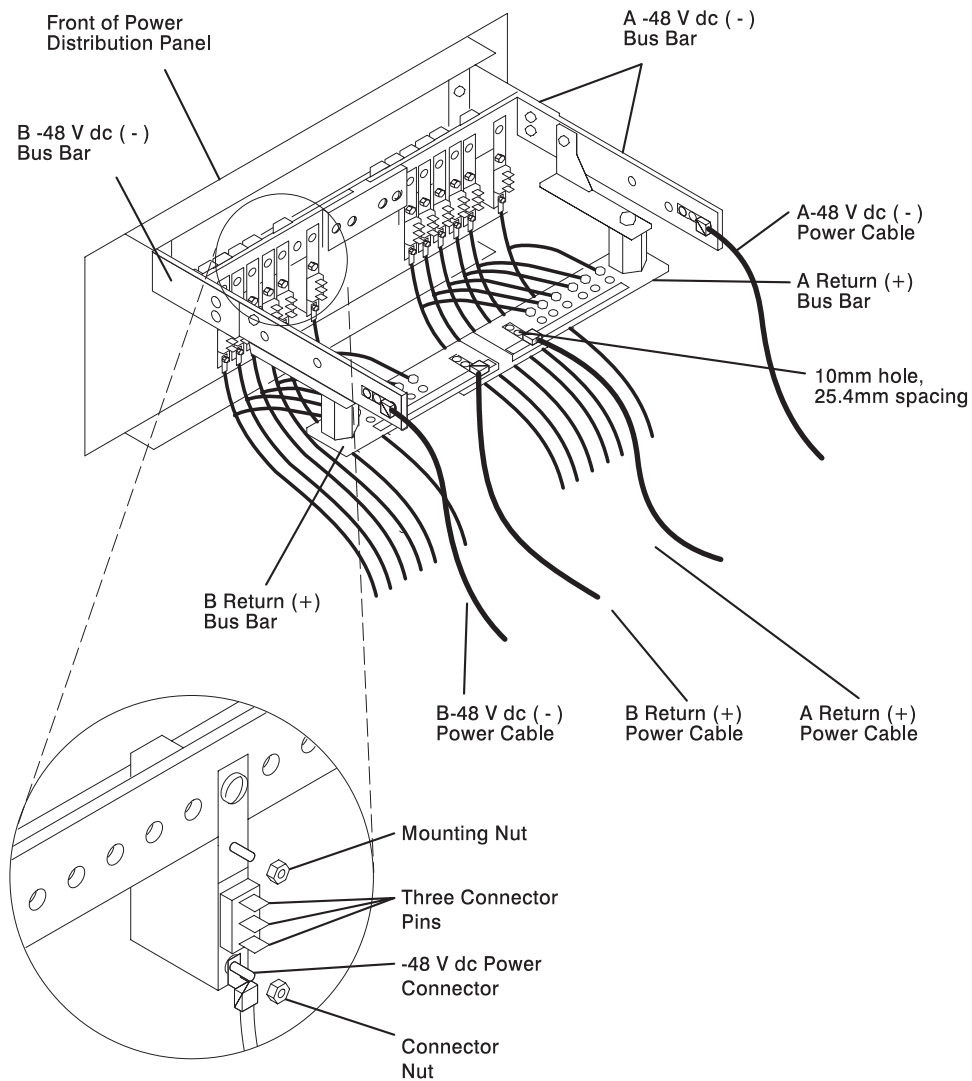
Circuit Breaker Removal

1. Do the "Power-Off Procedure with the Power Distribution Panel" on page 4-8.
2. Switch off power at the customer's -48 V DC power source to the power distribution panel (PDP).
Note: Once the customer's -48 V DC power sources are switched off, ensure that a tag or label is positioned over the switches to indicate that the power source is intended to be switched off.
3. Ensure that the customer's technician properly disconnects both -48 V DC power cables and both positive ground return cables from power distribution panel.
4. Remove the six mounting screws from the top cover of the PDP, and then remove the top cover.
5. Remove the bus bar shield from the PDP.
6. Remove the bezel from the front of the PDP by removing the two mounting screws.

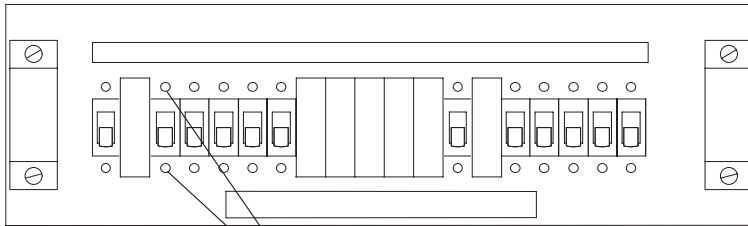


7. With a multimeter, verify that no power exists between each -48 V DC bus bar (-) and its return bar (+).
8. Record the locations of all cables or wires connected to the three connector pins on the circuit breaker to be removed and to the -48 V DC power connector.
9. Disconnect the three wires from the three connector pins. on the circuit breaker.
10. Disconnect the -48 V DC power cable from the circuit breaker. To disconnect the -48 V DC power cable, remove the connector nut, and then remove the cable.

11. Disconnect the mounting nut attaching the rear of the circuit breaker to the PDP.



12. Remove the two mounting screws holding the front of the circuit breaker to the PDP, and then remove the circuit breaker from the inside of the PDP.



Mounting Screws

Front View of Power Distribution Panel
(Without Bezel)

Circuit Breaker Replacement

1. If the PDP is not powered off or disassembled, perform steps 1 through 7 in “Circuit Breaker Removal” on page 4-17.
2. Attach the circuit breaker to the front of the PDP in the correct position using the two mounting screws.
3. Fasten the rear of the circuit breaker to the PDP with the mounting nut.
4. Connect the -48 V DC power cable to the circuit breaker using the connector nut.
5. Connect the three wires that were labelled in “Circuit Breaker Removal” on page 4-17 to the three connector pins on the rear of the circuit breaker.
6. If you are done replacing circuit breakers:
 - a. Replace the bus bar shield into the power distribution panel.
 - b. Ensure that the customer's technician properly connects the -48 V DC power cables to the -48 V DC bus bars and the return power cables to the return bus bars.
 - c. Replace the top cover of the power distribution panel and fasten with the six mounting screws.
 - d. Replace the front bezel of the power distribution panel and fasten with the two mounting screws.
 - e. Remove the warning tag or label from the switch at the customer's power source.
 - f. Switch on power at the customer's -48 V DC power source.

- g. Do the “Power-On Procedure with the Power Distribution Panel” on page 4-4.

Circuit Breaker Panel

CAUTION:

Energy hazard, remove power before servicing.

Circuit Breaker Panel Removal

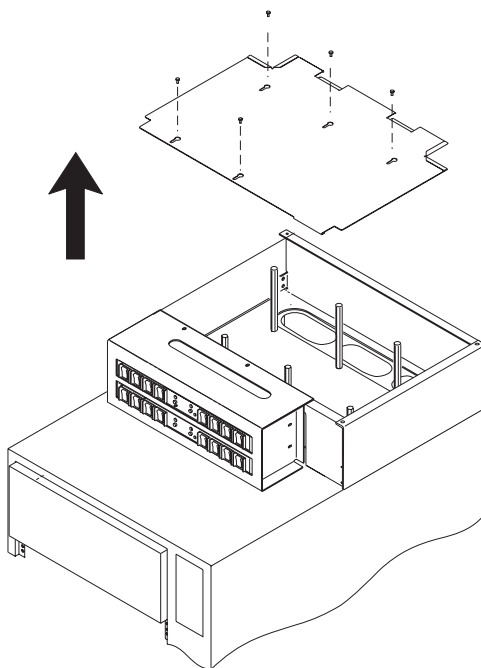
Attention: This unit may contain two circuit breaker panels. Both circuit breaker panels will need to be disconnected from the customer's power source in order to safely remove or service either circuit breaker panel.

Note: It is the customer's responsibility to have a qualified technician properly disconnect the circuit breaker panel from the customer's power sources. Ensure that the customer has properly disconnected the circuit breaker panel from their power sources prior to continuing.

1. Switch off power to all CPU enclosures, devices, and drawers attached to the circuit breaker panel. See the service guide for the CPU enclosure installed in your rack, service guide for the system installed in your rack, and service guide for the drawers installed in your rack for more information.

Note: Once the customer's power source is switched off, ensure that a tag or label is positioned over the switch to indicate that the power source is intended to remain switched off.

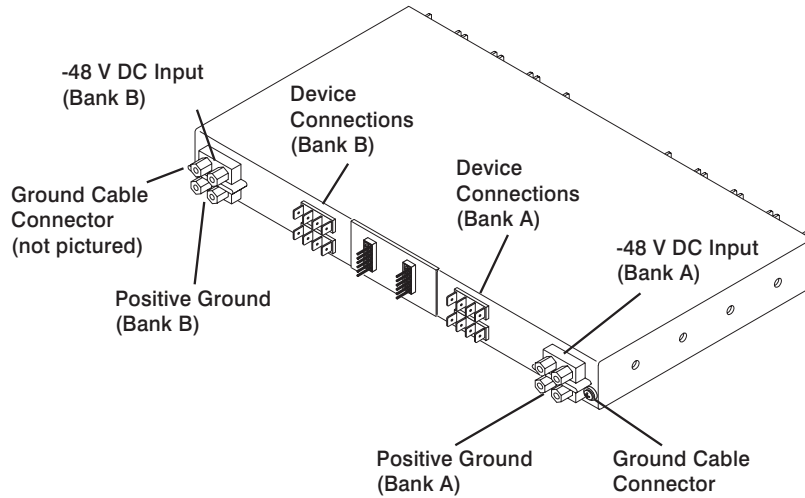
2. Remove the five mounting screws from the top cover of the circuit breaker panel chassis.
3. Remove the top cover of the circuit breaker panel chassis.



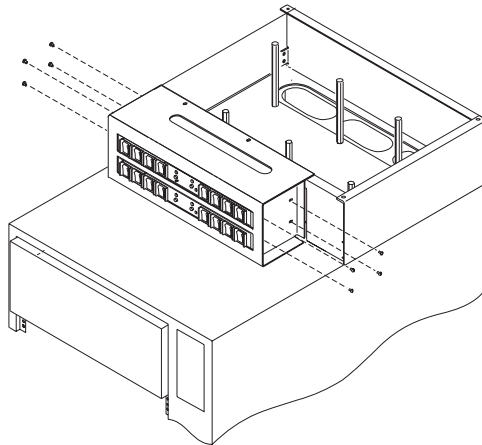
4. Ensure that the customer's technician completely disconnects both the -48 V DC power cables and the return power cables from both circuit breaker panels.

- Record and tag each cable that connects to the circuit breaker panel with its location so you can reinstall them correctly later.
- Disconnect all cables that connect to the circuit breaker.

Note: If you are removing the bottom circuit breaker panel, you may wish to tag and disconnect the cabling from the top circuit breaker panel to allow easier access.



- Remove two mounting screws from each side of the circuit breaker panel.



- Slide the circuit breaker panel out the front panel of the chassis.

Circuit Breaker Box Replacement

CAUTION:

Energy hazard, remove power before servicing. Disconnect two power supply cords.

1. If the top cover of the circuit breaker panel chassis is installed, remove the five mounting screws and remove the top cover.
2. Slide the circuit breaker panel into the front panel of the chassis.
3. Lift the back of the circuit breaker panel as needed to align the holes in the sides of the circuit breaker panel with the holes in mounting tray.
4. Install two mounting screws through the mounting tray into each side of the circuit breaker panel.
5. Using the tags on the cables or the customer's records as a guide, reinstall all device, drawer, and grounding cables to the rear of the circuit breaker panel.
6. Ensure that the customer's technician properly connects the -48 V DC power cables and return power cables to both circuit breaker panels.
7. Install the top cover of the circuit breaker panel chassis using the five mounting screws provided.
8. Remove the power-off warning tag or label from the switch for the customer's -48 V DC power source.
9. Switch on the customer's -48 V DC power source.
10. Switch on power to the devices and drawers in the rack. See the service guide for the CPU enclosure installed in your rack, service guide for the system installed in your rack, and service guide for the drawers installed in your rack for more information.

Front Door

It is possible that inspection and/or service procedures for certain drawers may require removing the front door for better access. If this is necessary, follow these instructions.

Removal

1. Open the front door of the system unit.
2. Remove the C-pin from the bottom end of both hinge pins.
3. Slide the hinge pin out from the bottom hinge first.
4. Slide the hinge pin out from the top hinge.
5. To remove the hinge bracket (if necessary), remove the mounting screws attaching the bracket to the rack.

Replacement

Replace in the reverse order, ensuring that the hinge bracket mounting screws are securely fastened.

Chapter 5. Maintenance Analysis Procedures (MAPs)

This chapter provides diagnostic steps for detecting power problems in the rack.

Note: If your rack has a power distribution panel, perform “MAP 1530: Power Distribution Panel - Power MAP” on page 5-2.

If your rack has a power distribution bus, perform “MAP 1550: Power Distribution Bus - Power MAP” on page 5-9.

If your rack has a circuit breaker panel, perform “MAP 1570: Circuit Breaker Panel - Power MAP” on page 5-17.

MAP 1530: Power Distribution Panel - Power MAP

Purpose of This MAP

Note: This MAP is not a start of call MAP. Use this power MAP only if you are directed here from a MAP step in the *Diagnostics Information for Multiple Bus Systems*.

This procedure is used to locate power problems in the power distribution panel (PDP). If a problem is detected, this procedure will help you to isolate the problem to the failing field replaceable unit (FRU).

Safety Notices

Observe the following safety notices during service procedures.

Note: For a translation of this safety notice, see the *System Unit Safety Information* manual.

DANGER

An electrical outlet that is not correctly wired could place hazardous voltage on metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock.

Before installing or removing signal cables, ensure that the power cables for the system unit and all attached devices are unplugged.

When adding or removing any additional devices to or from the system, ensure that the power cables for those devices are unplugged before the signal cables are connected. If possible, disconnect all power cables from the existing system before you add a device.

Use one hand, when possible, to connect or disconnect signal cables to prevent a possible shock from touching two surfaces with different electrical potentials.

During an electrical storm, do not connect cables for display stations, printers, telephones, or station protectors for communication lines.

CAUTION:

Energy hazard, remove power before servicing. Disconnect two power supply cords.

Step 1

1. Switch off power to the system installed in the rack. Refer to the service guide for the CPU enclosure installed in your rack for more information.
2. Switch off power to all devices and drawers in the rack. Refer to the service guide for the drawers installed in your rack for more information.
3. Switch off power to all external devices attached to the system unit. Refer to the service guide for the drawers installed in your rack for more information.
4. Remove the six screws attaching the PDP top cover to the PDP, and then remove the top cover.
5. Using a multimeter, attach the black multimeter cable lead to the return bus bar (+), and then attach the red multimeter cable lead to the -48 V DC bus bar (-).
6. Measure for -40 to -60 V dc between the -48 V DC bus bar (upper bar) and the return bus bar (lower bar) in the power distribution panel.

Was the correct voltage present?

NO Check the customer power source for the correct voltage, and check the external power cables (from customer's power source) for continuity.

YES Go to Step 2.

Step 2

(from Step 1)

1. Except for the circuit breaker for the CPU enclosure, (typically the 50-amp circuit breaker in position A1), set all of the circuit breaker switches to the Off position (switches in the down position).
2. Label and record the locations of the power cords from the CPU enclosure and the disk-drive-subsystem drawers to the power distribution panel.
3. Disconnect the power cables from the CPU enclosure.
4. Disconnect the power cables from the disk drive subsystem drawers.
5. Set all of the circuit breaker switches of the power distribution panel to the On position.
6. Locate terminal board 2 (TB2) on the outside of the rear cover of the power distribution panel.
7. Measure for -40 to -60 V dc on terminal board 2 (TB2) between positions one and two (side A circuit breakers) and between positions five and six (side B circuit breakers).

Is the voltage between -40 and -60 V dc?

NO Go to Step 3.

YES Before removing any circuit breakers, ensure that external power is not present in the rack.

Exchange each circuit breaker until all of the circuit breakers are exchanged or until -40 to -60 V dc is available. For information about removing circuit breakers, refer to the "Circuit Breaker" removal and replacement procedure on page 4-17.

If the symptom did not change and all of the circuit breakers are exchanged, replace the power distribution panel.

Go to Step 5.

Step 3

(from Step 2)

1. Start with the farthest circuit breaker to the left in the power distribution panel (typically the 50-amp circuit breaker for the CPU enclosure in position A1 of the power distribution panel). Set the circuit breaker switch to the Off position.
2. Plug the power cord for this circuit breaker into the correct device or drawer.
3. Set the circuit breaker switch to the On position.
4. Measure for -40 to -60 V dc on terminal board 2 (TB2) between positions one and two (side A circuit breakers) and between positions five and six (side B circuit breakers).

Is the voltage between -40 and -60 V dc?

NO Move to the next circuit breaker to the right, and repeat this step until all of the power cords are reconnected to the correct devices or drawers.

Once all power cords from the power distribution panel to the devices and drawers are reconnected, go to Step 4.

YES To test each FRU, exchange the FRUs in the following order:

CAUTION:

Energy hazard, remove power before servicing. Disconnect two power supply cords.

1. *The last circuit breaker set to on.* For information about removing circuit breakers, refer to the "Circuit Breaker" removal and replacement procedure beginning on page 4-17.
2. *The -48 V DC power supply for the device or drawer connected to the last circuit breaker turned on.* For information about removing the power supply, refer to the service guide for the device or drawer connected to this circuit breaker.

If the symptom did not change and all the FRUs are exchanged, go to "MAP 1520 -- Power MAP" in the service guide for the device or drawer connected to this circuit breaker.

Go to Step 5.

Step 4

(from Step 3)

1. Start with the device or drawer farthest to the top in the rack. Set the power switch of the device or drawer to the On position.
2. Measure for -40 to -60 V DC on terminal board 2 (TB2) between positions one and two (side A circuit breakers) and between positions five and six (side B circuit breakers).

Is the voltage between -40 and -60 V dc?

NO Repeat this step until the power switch of all the devices and drawers in the rack are set to the On position.

Go to Step 5.

YES Go to the startup MAP for the disk-drive-subsystem installed in your rack.

Step 5

(from Step 2, Step 3, and Step 4)

1. Set the power switch of all devices and drawers in the rack to the off position.
2. Set all the circuit breaker switches on the power distribution panel to Off.
3. Connect the power cables from all devices and drawers in the rack to the power distribution panel.
4. Set all of the circuit breaker switches on the power distribution panel to On.
5. This completes the repair. Go to "MAP 0410: Repair Checkout" in the *Diagnostics Information for Multiple Bus Systems*.

Purpose of This MAP

Note: This MAP is not a start of call MAP. Use this MAP only if you are directed here from a MAP step in the *Diagnostics Information for Multiple Bus Systems*.

If the rack contains more than one power distribution bus, use this MAP to test the power distribution bus that is connected to the failing drawer. If you cannot determine which power distribution bus is connected to the failing drawer, use this MAP to test the first power distribution bus, and then test the other power distribution bus until the problem is determined.

This procedure is used to locate power problems in the power distribution bus (PDB). If a problem is detected, this procedure will help you to isolate the problem to the failing field replaceable unit (FRU).

Safety Notices

Observe the following safety notices during service procedures.

Note: For a translation of this safety notice, see the *System Unit Safety Information* manual.

DANGER

An electrical outlet that is not correctly wired could place hazardous voltage on metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock.

Before installing or removing signal cables, ensure that the power cables for the system unit and all attached devices are unplugged.

When adding or removing any additional devices to or from the system, ensure that the power cables for those devices are unplugged before the signal cables are connected. If possible, disconnect all power cables from the existing system before you add a device.

Use one hand, when possible, to connect or disconnect signal cables to prevent a possible shock from touching two surfaces with different electrical potentials.

During an electrical storm, do not connect cables for display stations, printers, telephones, or station protectors for communication lines.

CAUTION:

This unit may have more than one power supply cord. To completely remove power, you must disconnect all power supply cords.

Step 1

If:

- an uninterruptible power source (UPS) is installed,
- the system is not receiving power,
- and the LEDs on the power distribution bus (PDB) are off,

then unplug the customer's power cable from the UPS, and then plug the customer's power cable into the PDB.

Are the LEDs on the PDB on?

NO Check the customer's power cable for continuity from the wall outlet to the PDB or UPS, and then go to Step 2.

YES

1. Replace the UPS if necessary. Refer to the maintenance and diagnostic information in the service guide for the uninterruptible power source installed in your rack.
2. Go to Step 10.

Step 2

(from Step 1)

The green LEDs located on the power distribution bus indicate that power is supplied from the customer's outlet, through the customer's power cable, and to the power distribution bus.

Are all of the LEDs on the power distribution bus on?

NO Check the customer's outlet for the correct voltage, and then check the customer's power cable for continuity. If both are correct, exchange the power distribution bus, and then go to Step 10.

YES Go to Step 3.

Step 3

(from Step 2)

1. Record the locations of all drawer power cords that are plugged into the power distribution bus, and then unplug all of the power cords from the power distribution bus.
2. Plug the CPU enclosure power cable into its original outlet on the power distribution bus.
3. Switch on power to the CPU enclosure. Refer to the service guide for the CPU enclosure installed in your rack for more information.

Did the CPU enclosure power light come on and stay on?

NO Go to Step 4.

YES Go to Step 8.

Step 4

(from Step 3)

Did the drawer power reset circuit breaker on the power distribution bus go to the Off position (pop out)?

NO Go to Step 5.

YES Go to Step 7.

Step 5

(from Step 4)

1. Plug the CPU enclosure power cable into another outlet on the power distribution bus.
2. Switch on power to the CPU enclosure.

Did the CPU enclosure power light come on and stay on?

NO Go to Step 6.

YES The first outlet is defective. Use the second outlet, or exchange the power distribution bus, and then go to Step 10.

Step 6

(from Step 5)

1. Plug the power cable of another device or drawer into the same outlet.
2. Switch on power to the device or drawer.

The green light near the AC plug on the rear of some drawers indicates only that power is reaching the drawer and not that the power supply is operating.

Did the drawer Power light come on and stay on, or are the fans operating?

NO Exchange the power distribution bus, and then go to Step 10.

YES The problem is probably located in the CPU enclosure. Go to "MAP 1520 -- Power MAP" in the service guide for the system installed in your rack.

Step 7

(from Step 4)

1. Plug the CPU enclosure power cable into another outlet on the power distribution bus.
2. Set the power button to on (button pushed in).

Did the circuit breaker go to the Off position (pop out)?

NO The first circuit breaker is probably defective. Use the second outlet, or exchange the power distribution bus, and then go to Step 10.

YES The drawer is overloading the circuit breaker. Exchange the CPU enclosure power cable or power supply, and then go to Step 10.

Step 8

(from Step 3)

1. Plug the power cable of another drawer into an outlet on the power distribution bus.
2. Switch on power to the drawer.

Did the Power light come on and stay on, or are the fans operating?

NO Go to Step 9.

YES Repeat this step until power is on in all of the drawers, and then continue with Step 10.

Step 9

(from Step 8)

1. Switch off power to the drawer.
2. Plug the power cable into another outlet on the power distribution bus.
3. Switch on power to the drawer.

Did the Power light come on and stay on, or are the fans operating?

NO The problem is probably located in this drawer. Go to "MAP 1520 -- Power MAP" in the service guide for this drawer.

YES The first circuit breaker is probably defective. Use the second outlet, or exchange the power distribution bus, and then go to Step 10.

Step 10

(from Step 1, Step 5, Step 6, Step 7, and Step 9,

1. Press the Power Off button.
2. Connect all drawer power cables to their original power outlets on the power distribution bus.
3. This completes the repair. Go to "MAP 0410: Repair Checkout" in the *Diagnostics Information for Multiple Bus Systems*.

MAP 1570: Circuit Breaker Panel - Power MAP

Purpose of This MAP

Note: This MAP is not a start of call MAP. Use this power MAP only if you are directed here from a MAP step in the *Diagnostics Information for Multiple Bus Systems*.

This procedure is used to locate power problems in the circuit breaker panel. If a problem is detected, this procedure will help you to isolate the problem to the failing field replaceable unit (FRU).

Safety Notices

Observe the following safety notices during service procedures.

Note: For a translation of this safety notice, see the *System Unit Safety Information* manual.

DANGER

An electrical outlet that is not correctly wired could place hazardous voltage on metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock.

Before installing or removing signal cables, ensure that the power cables for the system unit and all attached devices are unplugged.

When adding or removing any additional devices to or from the system, ensure that the power cables for those devices are unplugged before the signal cables are connected. If possible, disconnect all power cables from the existing system before you add a device.

Use one hand, when possible, to connect or disconnect signal cables to prevent a possible shock from touching two surfaces with different electrical potentials.

During an electrical storm, do not connect cables for display stations, printers, telephones, or station protectors for communication lines.

CAUTION:

Energy hazard, remove power before servicing. Disconnect two power supply cords.

Step 1

Note: The systems contained in a -48 V DC Model S00 rack may be high-availability systems. Discuss any high-availability requirements with the customer before servicing. Refer to the service guide for any system or devices contained in this rack for proper power down procedures as necessary.

1. Switch off power to the system installed in the rack. Refer to the service guide for the CPU enclosure installed in your rack for more information.
2. Switch off power to all devices and drawers in the rack. Refer to the service guides for the devices installed in your rack for more information.
3. Switch off power to all external devices attached to the rack. Refer to the service guide for the external devices attached to your rack for more information.
4. Set the switches for all circuit breakers in the circuit breaker panels to the off position (down).
5. Remove the five screws attaching the top cover to the circuit breaker panel chassis, and remove the top cover.

Step 2

Using a multimeter, measure for -40 to -60 V DC between the -48 V DC input connectors (upper connectors) and the return ground connectors (lower connectors) for both the A and B power sources on each circuit breaker panel. If both 20A/10A and 15A circuit breaker panels are installed, measure the A and B side of each.

Was the correct voltage present?

- NO** Check the customer power source for the correct voltage, and check the external power cables (from customer's power source) for continuity.
- YES** Go to Step 3a.

Step 3a

(from Step 2)

1. Set all of the circuit breaker switches in the circuit breaker panels in the 20A/10A circuit breaker panel to the On position.
2. Measure for -40 to -60 V dc between the -48 V DC supply and positive ground return connectors for each of the eight circuit breakers within the 20A/10A circuit breaker panel. Record and note any readings which are out of range.

Is the voltage between -40 and -60 V dc at each position?

NO Go to Step 4.

YES Go to Step 3b.

Step 3b

(from Step 3a)

1. Set all of the circuit breaker switches in the circuit breaker panels in the 20A/10A panel to the Off position.
2. Set all of the circuit breaker switches in the circuit breaker panels in the 15A panel to the On position.
3. Measure for -40 to -60 V DC between the -48 V DC supply and positive ground return connectors for each of the eight circuit breakers within the 15A circuit breaker panel. Record and note any readings which are out of range.

Is the voltage between -40 and -60 V DC at each position?

NO Go to Step 8.

YES Go to Step 7.

Step 4

(from Step 3a)

1. Set all circuit breaker switches in **both** circuit breaker panels in your rack to the Off position.
2. Carefully label the device power cables and return ground cables with device, polarity, and circuit breaker position information.
3. Disconnect all of the device and drawer -48 V DC power cables and positive return ground cables from the 20A/10A circuit breaker panel. Tape the ends of the disconnected cables to insulate them and lay them aside.
4. Set all circuit breaker switches in the 20A/10A circuit breaker panel to the On position.
5. As in Step 3a, measure for -40 to -60 V DC between the -48 V DC supply and positive ground return connectors for each of the eight circuit breakers in the 20A/10A circuit breaker panel

Is the voltage between -40 and -60 V dc at each position?

NO Replace the 20A/10A circuit breaker panel.

YES Go to Step 5.

Step 5

(from Step 4)

1. Set all circuit breaker switches in **both** circuit breaker panels to the Off position.
2. Reconnect all device power cables and return ground cables to the 20A/10A circuit breaker panel **except** for cables to those positions which were out of range in Step 3a.

Note: Visually check for shorts at the terminal lugs.

3. Set all circuit breaker switches in the 20A/10A circuit breaker panel to the On position.
4. As in Step 3a, measure for -40 to -60 V DC between the -48 V DC supply and positive ground return connectors for each of the eight circuit breakers in the 20A/10A circuit breaker panel **including** those positions which were out of range in Step 3a.

Is the voltage between -40 and -60 V DC at each position?

NO An intermittent problem may exist in the power distribution system.

YES Set all circuit breaker switches in the 20A/10A circuit breaker panel to the Off position, and go to Step 6.

Step 6

(from Step 5)

1. Set all circuit breaker switches in the 20A/10A circuit breaker panel to the Off position.
2. Reconnect the device power cables and return ground cables for those circuit breaker positions which were out of range in Step 3a.
3. Set the circuit breaker switches for the positions which were out of range in Step 3a to the On position.
4. Measure for -40 to -60 V DC between the -48 V DC supply and positive ground return connectors *for the circuit breakers in the 20A/10A circuit breaker panel that were out of range.*

Is the voltage between -40 and -60 V dc at each position?

- NO** The power problem is probably located in the attached device. Consult the service guide for the failing device for diagnostics.
- YES** There was probably an intermittent problem with the circuit breaker panel, or an intermittent short at the attached device or cable.

Step 7

(from Step 3b)

The circuit breaker panels are functioning properly. The power problem is probably located in the power supply for the system or devices installed in your rack. Refer to the service guide for the system installed in your rack or service guide for the drawers installed in your rack for diagnostics.

Step 8

(from Step 3b)

1. Set all of the circuit breaker switches in **both** circuit breaker panels to the Off position.
2. At the terminal strip, disconnect the cables from the terminal strip to the devices or drawers for every circuit breaker position that was out of range in Step 3b. Carefully label each pair, tape the ends to insulate the leads, and set the cables aside.
3. Set the circuit breaker switches on the 15A circuit breaker panel to the On position.
4. Measure for -40 to -60 V DC between the -48 V DC supply and positive ground return connectors at the circuit breaker panel for the circuit breakers in the 15A circuit breaker panel that were out of range.

Is the voltage between -40 and -60 V dc at each position?

NO Go to Step 9.

YES The problem is probably located in the device or drawer attached to the circuit breaker in question. Refer to the service guide for the drawers installed in your rack for diagnostics.

Step 9

(from Step 8)

1. Set all circuit breaker switches in **both** circuit breaker panels to the Off position.
2. At the terminal strip, disconnect the cables from the terminal strip to the circuit breaker panel for every circuit breaker position that was out of range in Step 3b. Carefully label each pair, tape the ends to insulate the leads, and set the cables aside.
3. Set the 15A circuit breaker switch associated with these cables to the On position.
4. Measure for -40 to -60 V DC between the -48 V DC supply and positive ground return connectors at the circuit breaker panel for the circuit breakers in the 15A circuit breaker panel that were out of range.

Is the voltage between -40 and -60 V DC?

NO Go to Step 11.

YES Go to Step 10.

Step 10

1. Set all circuit breaker switches on both circuit breaker panels to the Off position.
2. Using an ohmmeter, check the terminal strip to see if it is shorted.

Is the terminal strip shorted?

NO Possible intermittent short was made at the the terminal strip. Replace the cables and verify that the proper voltage is present.

If the proper voltage is not present, consult the service guide for the device or drawer attached to this position.

YES Replace the terminal strip.

Step 11

1. Set all circuit breaker switches on both circuit breaker panels to the Off position.
2. At the circuit breaker panel, disconnect both cables from the connectors for the circuit breaker in question.
3. Set the circuit breaker switch for the 15A circuit breakers in question to the On position.
4. Measure for -40 to -60 V DC between the -48 V DC supply and positive ground return connectors for the 15A circuit breakers in question.

Is the voltage between -40 and -60 V DC?

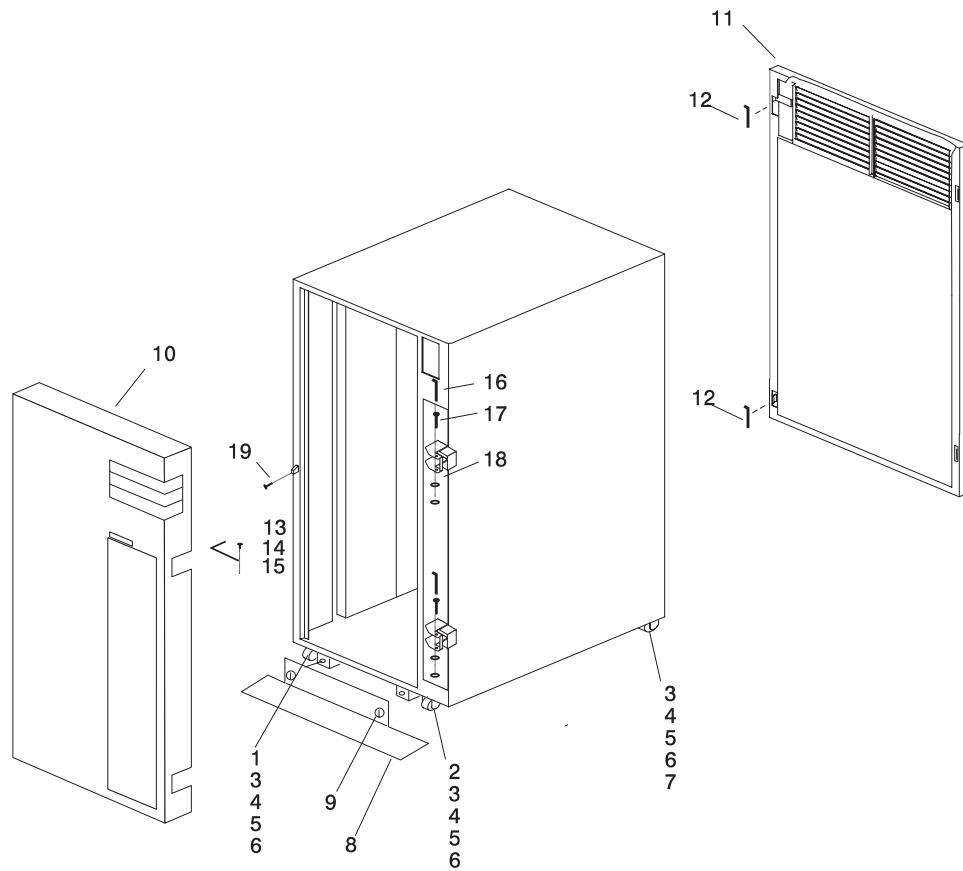
NO Replace the 15A circuit breaker panel.

YES Replace the cables connecting the circuit breaker to the terminal strip.

Chapter 6. Parts Information (AC Rack)

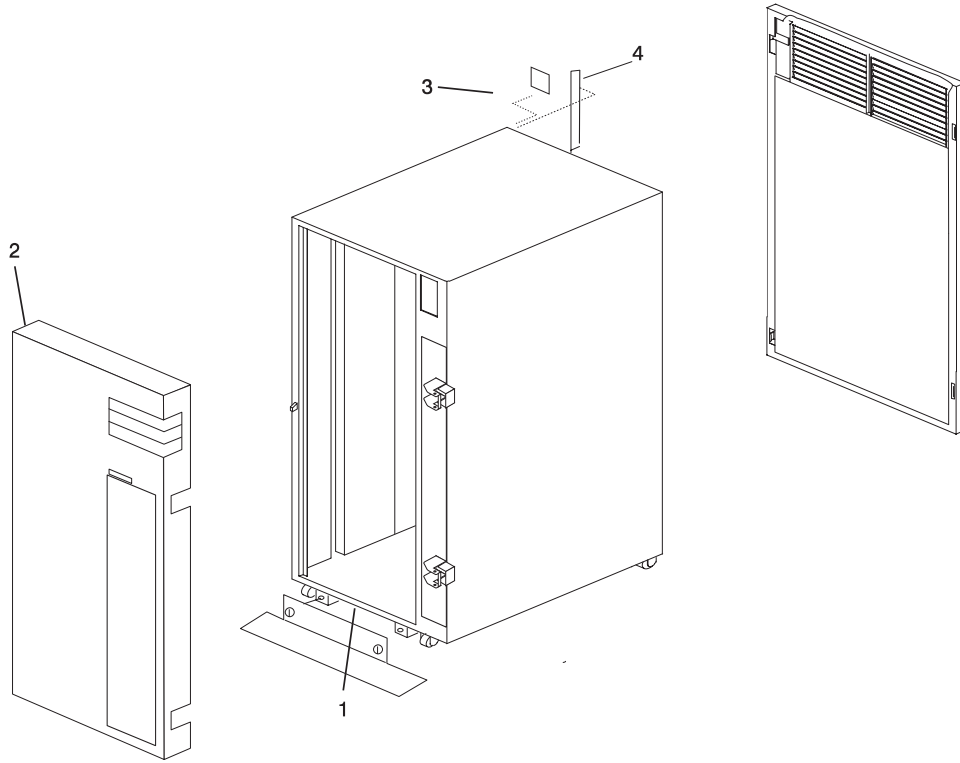
This chapter contains detailed drawings, FRU part numbers, and part descriptions for a 7014 Model S00 rack.

Detail 1. Covers



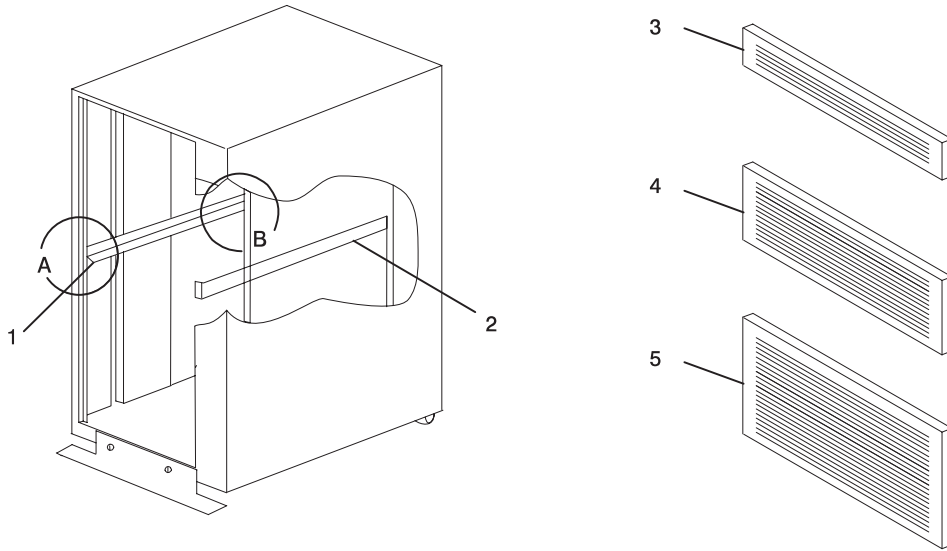
Index Number	Part Number	Units Per Asm	Description
1	89X2627	1	Caster, (offset) left
2	89X2628	1	Caster, (offset) right
3	1621823	16	Screw, hex Hd w/washer, self tap, M6 x 16
4	1622306	16	Washer
5	1622320	16	Lock washer
6	1621596	16	Screw
7	62X3601	2	Caster, Swivel
8	93H8181	1	Stabilizer
9	93H9182	2	Thumbscrews
10	93H7817	1	Front Door
11	93H8220	1	Rear Door
12	11F0118	2	Hinge pin, rear door
13	1621098	2	Screws
14	93H7378	1	Ground Strap
15	1622348	2	Star Washers
16	93H7372	2	Pins
17	93H7374	2	Bearings
18	27760	2	Washers
19	07L7168	1	Door Ramp Mounting Screw, M3 x 10

Detail 2. Labels



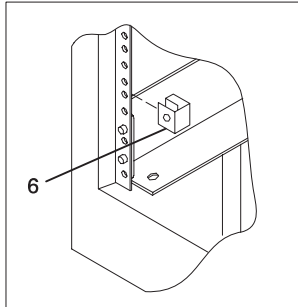
Index Number	Part Number	Units Per Asm	Description
1	69X1264	1	Label, safety (English)
1	62X3442	1	Label, safety (U.K./English)
1	62X3476	1	Label, safety (Spanish)
1	62X3477	1	Label, safety (Norwegian)
1	62X3478	1	Label, safety (Dutch)
1	62X3479	1	Label, safety (Finnish)
1	62X3483	1	Label, safety (Italian)
1	62X3493	1	Label, safety (German)
1	62X3531	1	Label, safety (Danish)
1	62X3532	1	Label, safety (French)
1	62X3533	1	Label, safety (French/Dutch)
1	62X3534	1	Label, safety (Japanese)
1	62X3538	1	Label, safety (Swedish)
1	69X1279	1	Label, safety (Portuguese)
1	69X1281	1	Label, safety (Italy/Germany/France)
1	69X1264	1	Label, safety (Canada/French)
2.	90H6340	1	Label
2	59F3003	1	Nameplate, U.S.
3	69X1262	1	Label, rack identifier
4	62X3561	1	Label, EIA identifier

Detail 3. Rails and Front Bezels

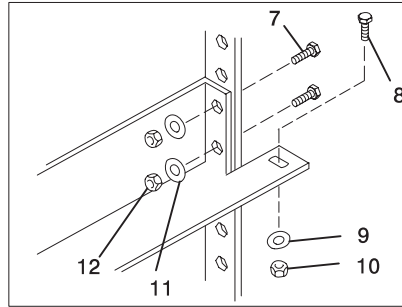


Mounting Hardware For CPU Enclosures

Detail A - Front of Rail

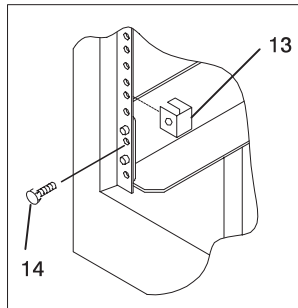


Detail B - Rear of Rail

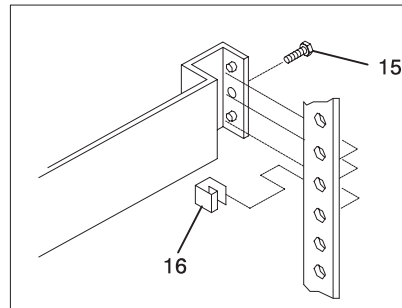


Mounting Hardware for Drawers Other Than CPU Enclosures

Detail A - Front of Rail

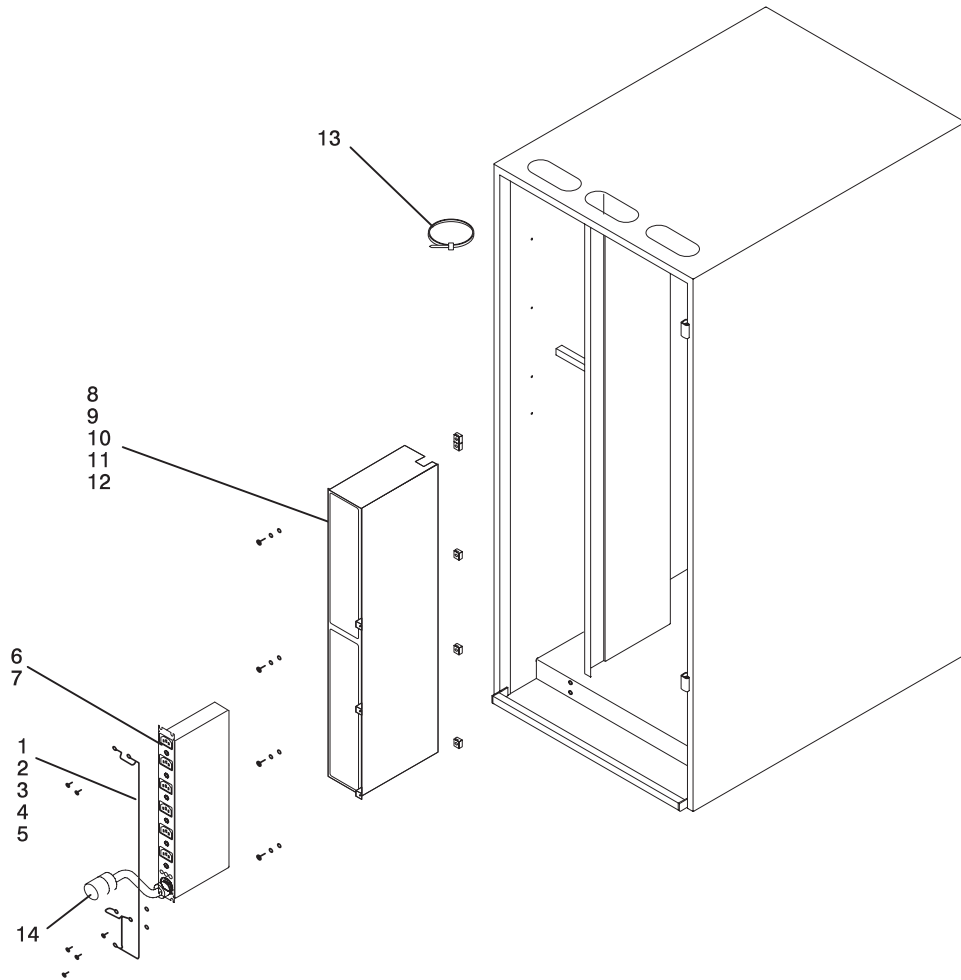


Detail B - Rear of Rail



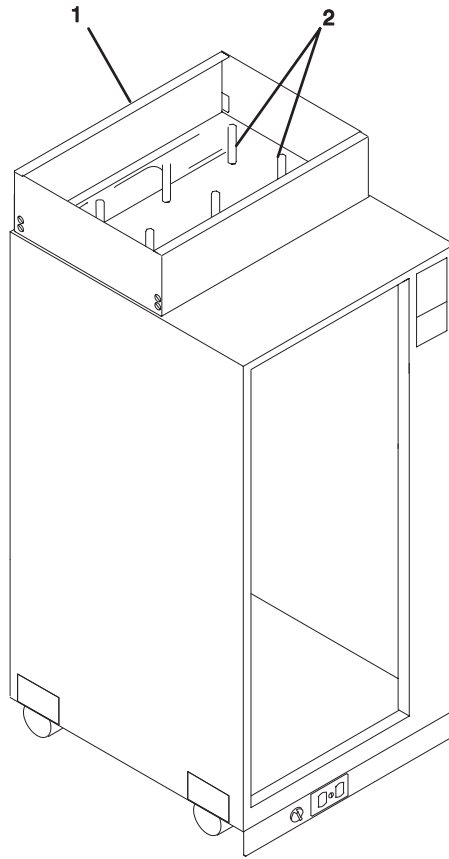
Index Number	Part Number	Units Per Asm	Description
1	02G7232	1	Rail, left (for CPU Enclosures)
1	375816	1	Rail, left (for non-CPU Enclosures)
2	02G7263	1	Rail, right (for CPU Enclosures)
2	375714	1	Rail, right (for non-CPU Enclosures)
3	97H9754	1	Front bezel (for empty drawer position), 1 EIA unit
4	97H9755	1	Front bezel (for empty drawer position), 3 EIA units
5	97H9756	1	Front bezel (for empty drawer position), 5 EIA units
6	0375867	4	Nut clip
7	02G7295	4	Screw, rail mounting
8	1624779	2	Screw, M5 x 14
9	1622319	2	Lock washer
10	1622404	2	Nut
11	1622320	4	Lock washer
12	1622405	4	Nut
13	1621210	2	Screw, pan head, M5 x 10

Detail 4. Power Distribution Bus



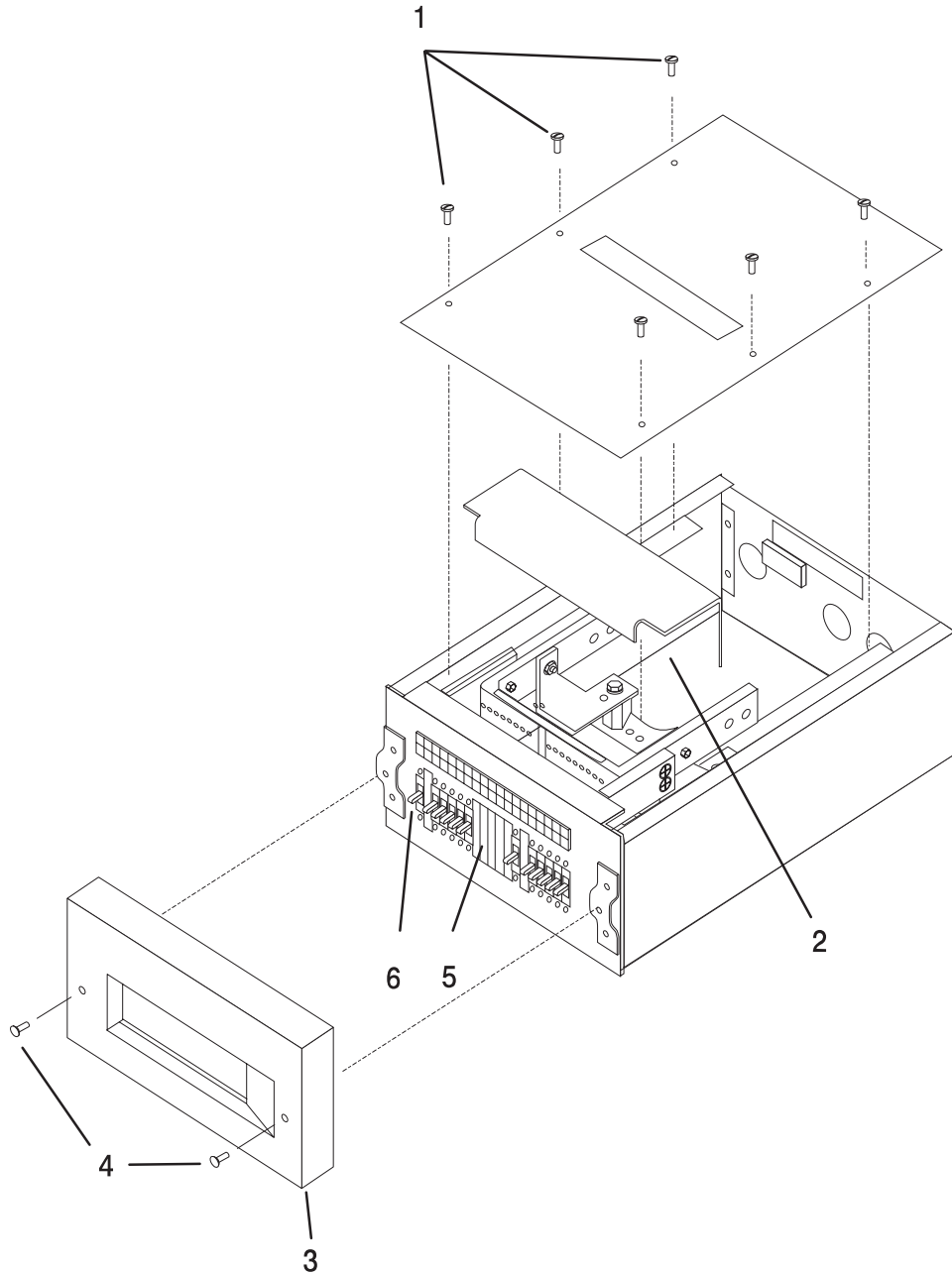
Index Number	Part Number	Units Per Asm	Description
1	88G0165	1	Ground wire harness
2	1624779	1	Screw
3	00G1268	1	Screw
4	1622347	1	Lock washer
5	1622346	1	Washer
6	93H6661	1	Power distribution bus - single phase, United States
	93H6451	1	Power distribution bus - single phase, outside United States
	93H6662	1	Power distribution bus - two phase
	93H6663	1	Power distribution bus - three phase (Switzerland)
7	1624779	4	Screw
8	52G6112	1	Enclosure
9	1624779	4	Screw
10	1622347	4	Lock washer
11	1622305	4	Washer
12	375867	3	Nut clip
13	32G0111		Cable restraint strap
14	varies	1	Linecord (see "Detail 11. Power Cords" on page 6-22 for FRU numbers)

Detail 5. Cable Channel



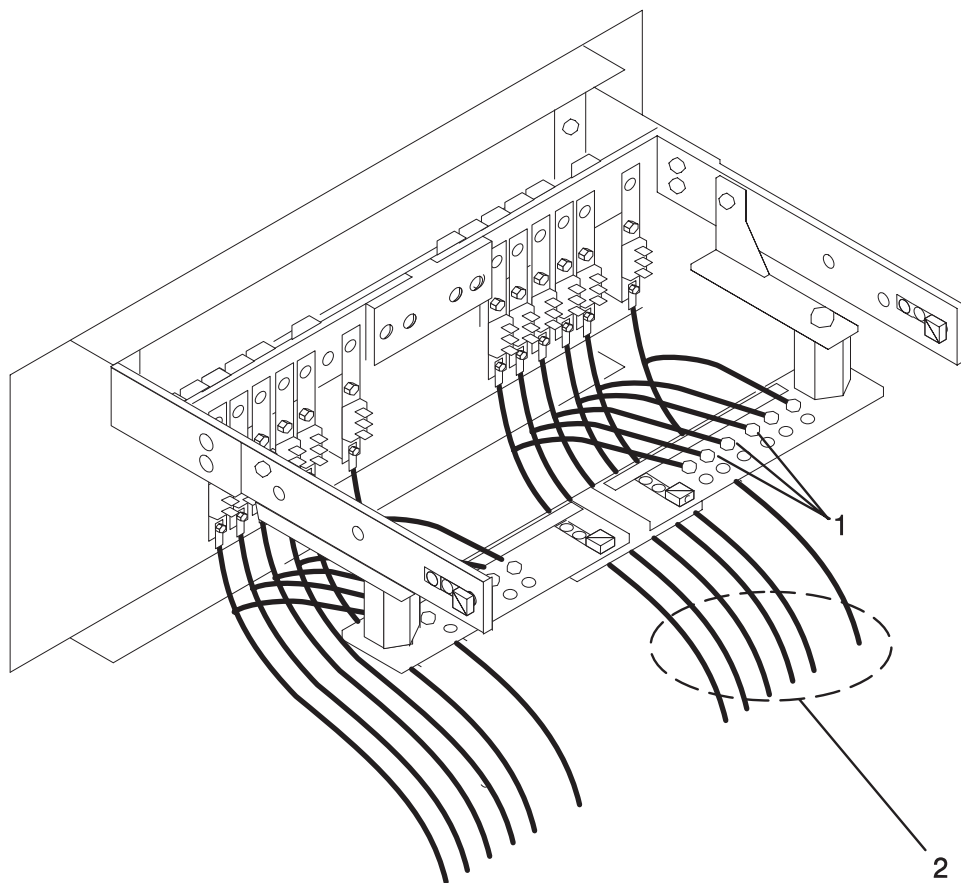
Index Number	Part Number	Units Per Asm	Description
1	94H0125	1	Cable channel
2	52G5654	6	Cable separators

Detail 6. Power Distribution Panel Assembly



Index Number	Part Number	Units Per Asm	Description
1	1621191	6	Screw, M4 x 10
2	88G4824	1	Bus Bar Shield
3	93H4918	1	Front Bezel
4	93H4919	2	Screws, 10-32 Button Head
5		varies	Filler Plate for Empty Circuit Breaker Positions
6	93H7601	varies	1 Amp Circuit Breaker
	93H7600	varies	5 Amp Circuit Breaker
	8185536	varies	10 Amp Circuit Breaker
	40H6997	varies	15 Amp Circuit Breaker
	93H6391	varies	30 Amp Circuit Breaker
	8185537	varies	50 Amp Circuit Breaker

Detail 7. Power Distribution Panel Interior

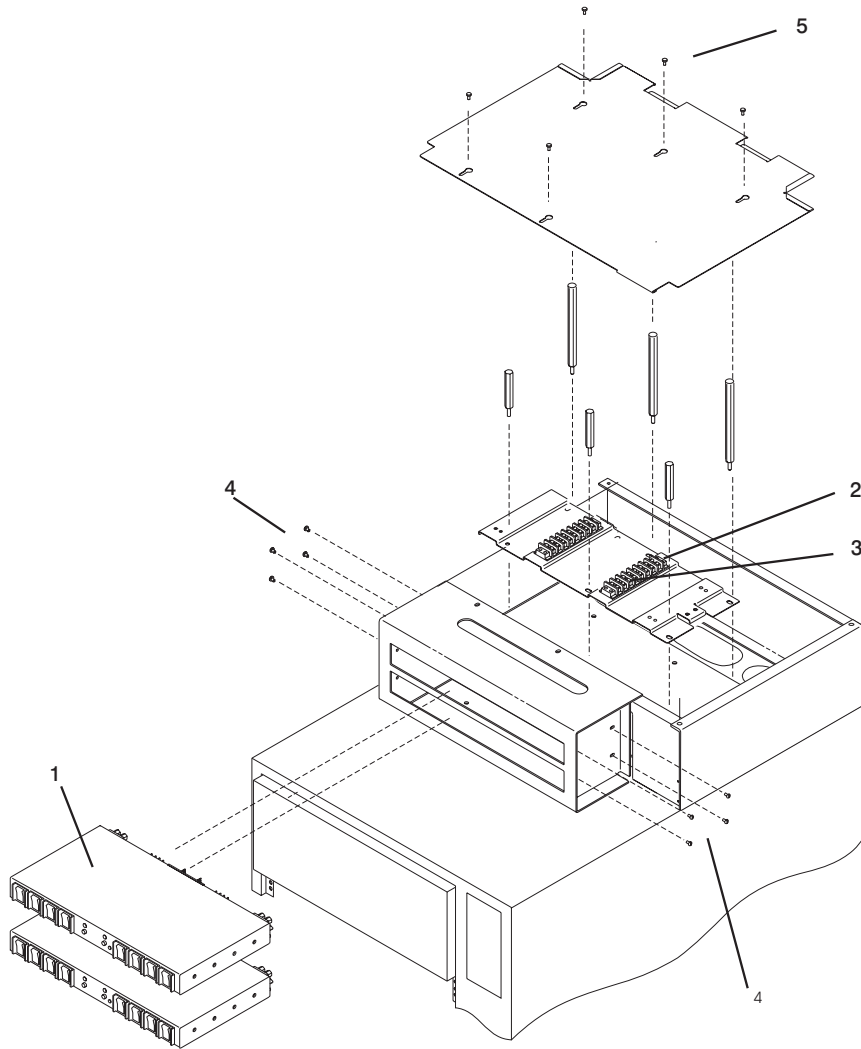


Index Number	Part Number	Units Per Asm	Description
1	see below	varies	Cable
2	438613	varies	Screw, 1/4 x 20

Table 6-1. Cable Assemblies. The FRU's for -48 V DC power cables vary with its rated amperage as well as which position it is connected to. Use the table below to determine FRUs for replacement PDP to drawer cables.

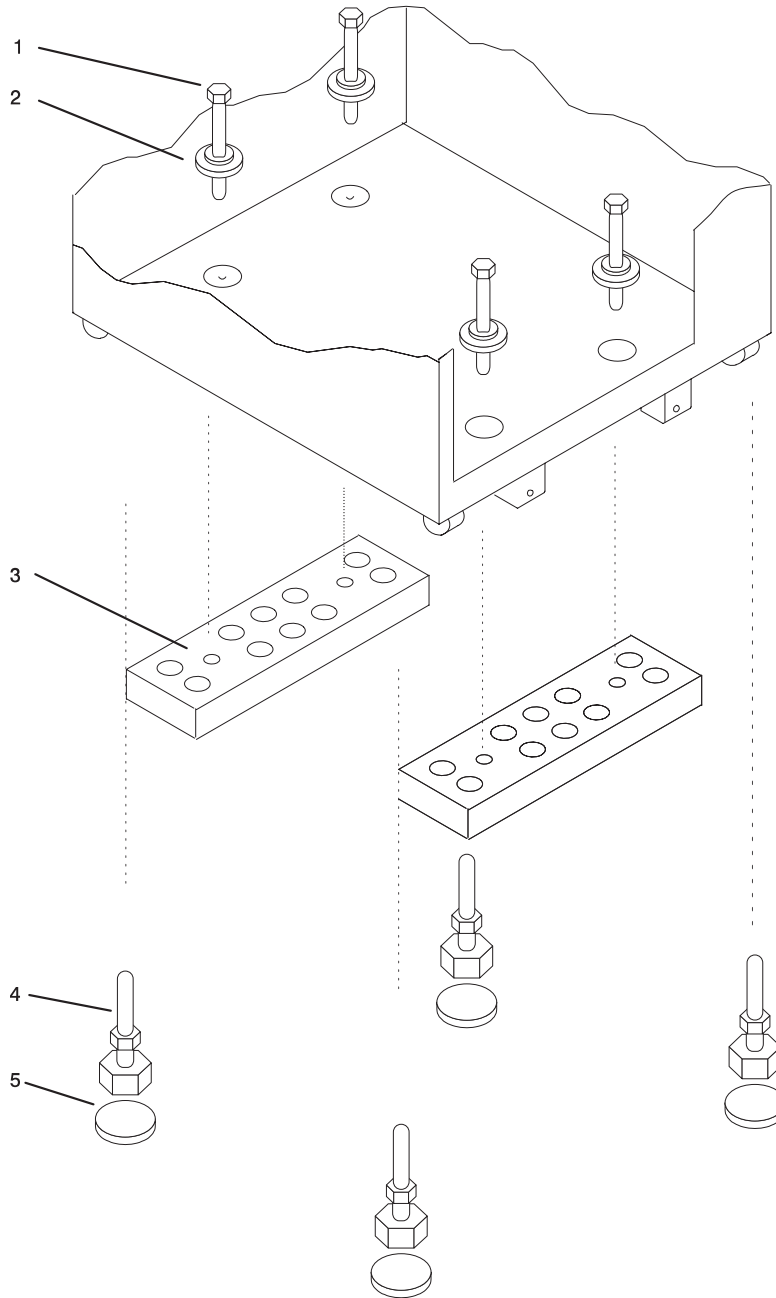
Circuit Breaker Position	Amperage					
	1 Amp	5 Amp	10 Amp	15 Amp	30 Amp	50 Amp
A or B 1	n/a	n/a	11H8318	n/a	11H8297	65G3494
A or B 2	n/a	93H7600	n/a	n/a	n/a	n/a
A or B 3	n/a	93H7600	11H8318 or 11H8316	93H8497	n/a	93H3484
A or B 4	n/a	93H7600	n/a	93H8498	n/a	n/a
A or B 5	n/a	93H7600	11H8317	40H7047 or 93H8499	n/a	n/a
A or B 6	n/a	93H7600	n/a	93H8500	n/a	n/a
A or B 7	n/a	93H7600	n/a	93H8501	n/a	n/a
A or B 8	n/a	93H7600	n/a	n/a	n/a	n/a
A or B 9	93H7601	n/a	n/a	n/a	n/a	n/a

Detail 8. Circuit Breaker Box



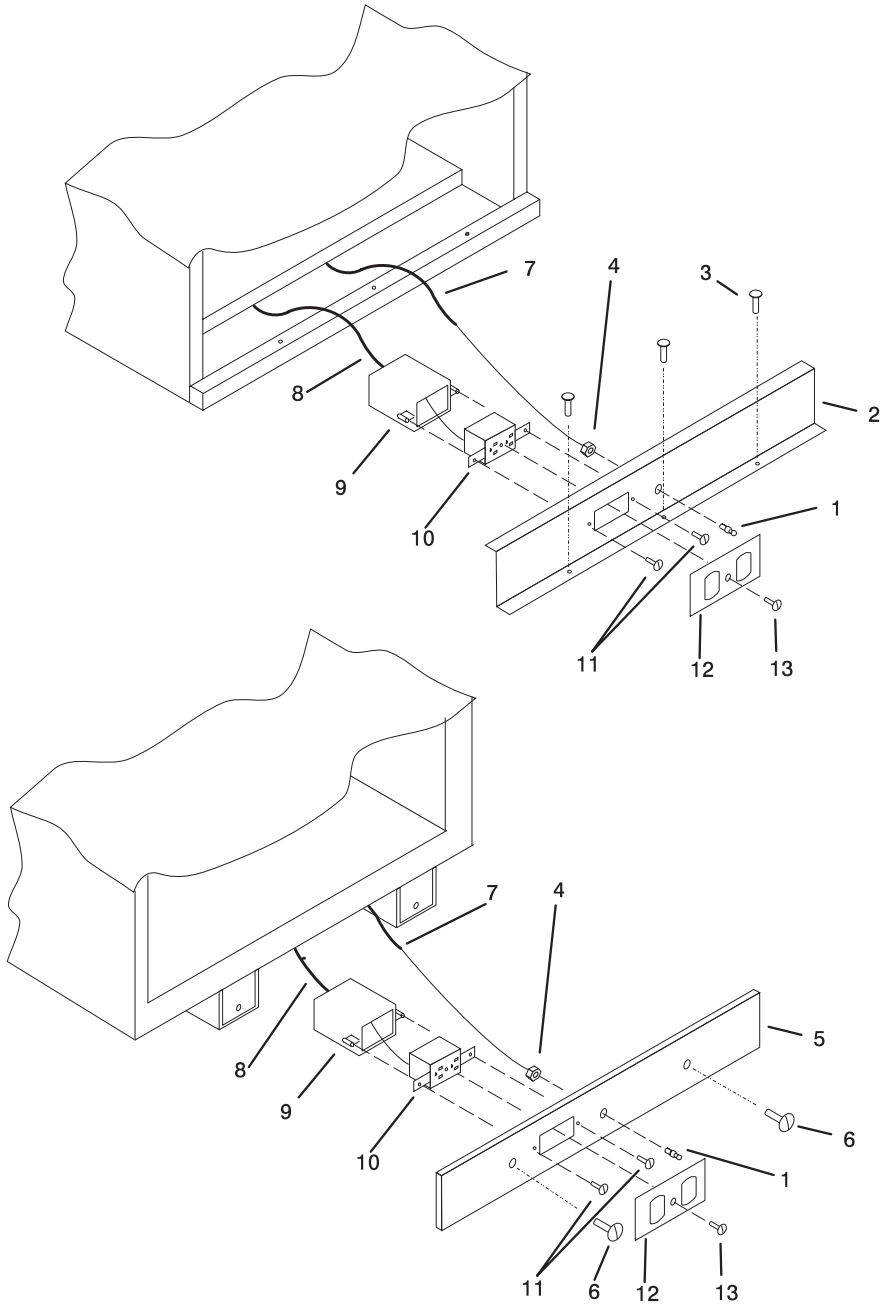
Index Number	Part Number	Units Per Asm	Description
1	07L6553		15A DC Circuit Breaker Box
1	07L6551		10A/20A DC Circuit Breaker Box
2	1621193	8	Mounting screws for terminal strips
3	07L6554	2	Terminal strips
4	1621239	8	Mounting screws for circuit breaker panel
5	1624779	5	Mounting screws for top cover

Detail 9. Leveling Feet and Bolt Down Hardware



Index Number	Part Number	Units Per Asm	Description
1	88G4725	4	Mounting Bolts
2	65G3593	4	Plastic isolator Washer, 15.8mm
3	52G5650	2	Mounting Plates
4	52G6058	4	Levelling Feet
5	88G4727	4	Plastic Isolator Pads

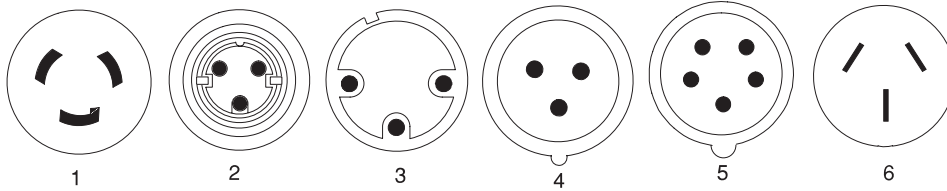
Detail 10. Accessory Electrical Outlet Mounting Plates



Index Number	Part Number	Units Per Asm	Description
1	52G5643	1 per plate	Clip Stud for Grounding Wire
2	94H0608	1	Rear Electrical Mounting Plate
3	1624779	3	M5 x 14mm Mounting Screws
4	1622403	1 per plate	M4 x 0.7 Nut for Grounding Wire
5	94H0609	1	Front Electrical Mounting Plate
6	93H9182	2	Thumbscrews
7	40H0455	1	Grounding Cable
8	n/a	1	Power Cable
9	n/a	1	AC Outlet Box
10	n/a	1	AC Outlet
11	n/a	2	AC Outlet Mounting Screws
12	n/a	1	AC Outlet Cover Plate
13	n/a	1	AC Outlet Cover Plate Mounting Screw

Note: Part numbers 8 through 13 in this diagram are customer supplied and maintained parts. These parts are not FRUs.

Detail 11. Power Cords



Index Number	Part Number	Units Per Asm	Country
1	11F0113	1	U.S. Standard, type 12 plug, L6-30P twist-lock connector, 14' cord. 30 A, Single Phase. U.S.A., Canada Anguilla, Antigua, Cape Verde Islands, Cayman Islands, French Polynesia, Honduras, Montserrat, St. Kitts & Nevis, Tortola
1	11F0114	1	U.S., Chicago, type 12 plug, L6-30P twist-lock connector, 6' cord. 30 A, Single Phase. Chicago, Illinois, U.S.A.
1	11F0115	1	AFE, type 12 plug, L6-30P twist-lock connector, 14' cord. 30 A, Single Phase. Afghanistan, Argentina, Aruba, Bahamas, Bangladesh, Barbados, Belize, Bermuda, Bolivia, Bonaire, Brunei, Caicos Islands, Chile, Colombia, Costa Rica, Curaçao, Dominican Republic, Ecuador, El Salvador, Guatemala, Hong Kong, Indonesia, Jamaica, Japan, Malaysia, Mexico, Myanmar, Netherlands Antilles, Nicaragua, Panama, Paraguay, Peoples Republic of China, Peru, Philippines, St. Martin, Singapore, Sri Lanka, Suriname, Taiwan, Thailand, Trinidad/Tobago, Turks Island, Uruguay, Venezuela
2	46F4594	1	3 pin waterproof connector, 14' cord. Type 40 plug, R&S 3750. 30 A, Single Phase. U.S.A., Canada (weatherproof)

Index Number	Part Number	Units Per Asm	Country
2	46F4593	1	3-pin waterproof connector, 6' cord. Type 40 plug, R&S 3750. 30 A, Single Phase. Chicago, Illinois, U.S.A.
3	11F0106	1	30 A, Single Phase, PDL connector Wilco WP, type PDL plug, 14' cord. Australia
3	11F0107	1	30 A, Single Phase, PDL connector Wilco WP, type PDL plug, right angle, 14'cord. New Zealand
4	21H7693	1	32 A, Single Phase, three pin connector IEC 309, type 46 connector (2 power + ground), 14' cord. Abu Dubai, Albania, Algeria, Angola, Armenia, Bahrain, Belarus, Belgium, Benin, Bosnia, Botswana, Brazil, Bulgaria, Burkina Faso, Burundi, Cambodia, Cameroon, Congo, Croatia, Cyprus, Djibouti, Dominica, Egypt, Equatorial Guinea, Ethiopia, France, French Guiana, Gabon, Gambia, Georgia, Germany, Ghana, Greece, Grenada, Grenadines, Guinea, Guinea-Bissau, Guyana, Haiti, Hungary, Iceland, India, Iran Iraq, Ireland, Italy, Ivory Coast, Jordan, Kazakhstan, Kenya, Kirhizia, Kuwait, Lesotho, Lebanon, Liberia, Libya, Luzembourg, Macao, Macedonia, Malawi, Mali, Malta, Martinique, Mauritania, Moldova, Monaco, Morocco, Mozambique, Namibia, Nepal, Netherlands, New Caledonia, Niger, Nigeria, North Yemen, Oman, Pakistan, Poland, Principe, Qatar, Reunion, Romania, Rwanda, St. Lucia, St. Vincent, Sao Thome Island, Saudi Arabia, Senegal, Serbia, Sierra Leone, Slovakia, Slovenia, Somalia, South Yemen, Spain, Sudan, Swaziland, Syria, Tanzania, Togo, Tunisia, Uganda, Ukraine, United Arab Emirates, United Kingdom, Vietnam, Western Samoa, Zaire, Zambia, Zimbabwe
5	88G4763	1	32 A, 2 of 3 Phase, five pin connector IEC 309, type 46 connector (3 power + neutral + ground), 14' cord. Austria, Czech Republic, Denmark, Estonia, Finland, Israel, Latvia, Liecchtenstein, Lithuania, Netherlands, Norway, Pakistan, Portugal, Russia, South Africa, Sweden, Turkey

Index Number	Part Number	Units Per Asm	Country
5	88G4764	1	16 A, 3 Phase, five pin connector IEC 309, type 46 connector (3 power + neutral + ground), 14' cord. Switzerland
6	87G6067	1	30 A, Single Phase Type KP connector, right angle, 14' cord. Korea

Index

A

about this book xi

C

circuit breaker
removal and replacement
procedures 4-17

circuit breaker panel
description 1-13
grounding 1-17
maintenance analysis procedure
(MAP) 5-17
power distribution 1-15
removal and replacement
procedures 4-22

E

electrical safety 4-1

F

front door
removal and replacement
procedures 4-26

G

grounding
circuit breaker panel 1-17
power distribution bus 1-4
power distribution panel 1-12

I

inspection 3-1
installation procedures 2-1

M

maintenance analysis procedures
(MAPs)
circuit breaker panel 5-17
power distribution bus 5-9
power distribution panel 5-2

P

parts information

power cables
high voltage (AC) 1-20
low voltage (-48 V DC) 1-20

power distribution
circuit breaker panel 1-15
power distribution bus 1-3
power distribution panel 1-9

power distribution bus
description 1-2
grounding 1-4
maintenance analysis procedure
(MAP) 5-9
power distribution 1-3
power-off procedure 4-3
power-on procedure 4-2
removal and replacement
procedures 4-9

power distribution panel
description 1-6
grounding 1-12
maintenance analysis procedure
(MAP) 5-2
power distribution 1-9
power-off procedure 4-8
power-on procedure 4-4
removal and replacement
procedures 4-11

- power distribution systems 1-1
 - circuit breaker panel 1-13
 - power distribution bus 1-2
 - power distribution panel 1-6
- power-off procedures
 - power distribution bus 4-3
 - power distribution panel 4-8
- power-on procedures
 - power distribution bus 4-2
 - power distribution panel 4-4
- preface xi

R

- rack installation 2-1
- rails
 - installation 1-18
- removal and replacement procedures
 - circuit breaker 4-17
 - circuit breaker panel 4-22
 - front door 4-26
 - power distribution bus 4-9
 - power distribution panel 4-11
 - safety notices 4-1

S

- safety notices 2-1, 2-4, 2-25, 2-30, 2-33, 2-34, 3-3, 4-1, 4-2, 4-4, 4-8, 4-11, 4-17, 4-22, 4-25, 5-3, 5-6, 5-10, 5-18
- service inspection guide 3-1
- specifications 1-19

U

- uninterruptible power source
 - description 1-5

Reader's Comments — We'd Like to Hear From You

Model S00 Rack Installation and Service Guide

Part Number: SA38-0550-00

Overall how satisfied are you with the information in this book?

	Very Satisfied	Satisfied	Neutral	Dissatisfied	Very Dissatisfied
Overall Satisfaction	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

How satisfied are you that the information in this book is:

	Very Satisfied	Satisfied	Neutral	Dissatisfied	Very Dissatisfied
Accurate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Complete	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Easy to find	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Easy to understand	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Well organized	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Applicable to your tasks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please tell us how we can improve this book:

Thank you for your response. May we contact you? Yes No

When you send comments to us, you grant us a nonexclusive right to use or distribute your comments in any way we believe appropriate without incurring any obligation to you.

Name

Address

Company or Organization

Phone Number

Cut or Fold
Along Line

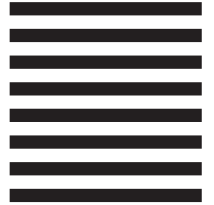
Fold and Tape

Please do not Staple

Fold and Tape



NO POSTAGE
NECESSARY
IF MAILED IN THE
UNITED STATES



BUSINESS REPLY MAIL

POSTAGE WILL BE PAID BY ADDRESSEE

Information Development
Department H6DS-9561
11400 Burnet Road
Austin, TX 78758-3493



Fold and Tape

Please do not Staple

Fold and Tape

Cut or Fold
Along Line



Part Number: 94H0513



Printed in the United States of America
on recycled paper containing 10%
recovered post-consumer fiber.

SA38-0550-00



94H0513

