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Agilent Power Distribution Unit (PDU)

Installation Guide

For use with Agilent PDU kits and PDU installation kits for Agilent instrument racks

Agilent Technologies

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Safety and Regulatory Information

For your protection, this product has been tested for conformance to various national and international regulations and standards. The scope of this regulatory testing includes electrical and mechanical safety, electromagnetic emissions, immunity, ESD, acoustics, and hazardous materials.

Where required, certifications are obtained from third party test agencies. Certification marks appear on the product label. In addition, various regulatory bodies require information under the headings below.

Please refer to the *Safety Information* guide provided with the Power Distribution Unit (PDU) for additional important information.

This product and related documentation must be reviewed for familiarization with safety markings and instructions before operation.

WARNING The WARNING sign denotes a hazard. It calls attention to a procedure, practice, or situation which, if not done correctly or adhered to, could result in injury. Do not proceed beyond a WARNING sign until the indicated conditions are fully understood and met.

CAUTION The CAUTION sign denotes a hazard. It calls attention to an operating procedure, practice, or situation which, if not done correctly or adhered to, could damage or destroy part or the entire product. Do not proceed beyond a CAUTION sign until the indicated conditions are fully understood and met.

Safety Warnings

The following warnings and cautions are applicable to all Agilent PDUs. Please observe all safety precautions and warnings.

This product has not been evaluated for connection to an IT power system, an AC distribution system having no direct connection to earth (ground), according to EN60950.

Grounding

WARNING This is a safety class I product and has a protective earthing (grounding) terminal. There must be an uninterruptible safety earth ground from the main power source to the product's input wiring terminals, power cord, or supplied cord set. Whenever it is likely that the protection has been impaired, disconnect the power cord until the ground has been restored.

Leakage Current

WARNING Due to types of products that can be connected to the PDU, there is a risk of high leakage current (3.5 mA). Reliable ground circuit continuity is vital for safe operation of this product. To reduce the risk of electric shock, earth (ground) connection is essential before connecting the power supply. Never operate the PDU with the ground conductor disconnected.

No Replaceable Parts

WARNING Do not attempt to open or repair the Power Distribution Unit (PDU). There are no replaceable parts inside the PDU. If the power cord or switch cord is frayed, cut, or damaged, replace the entire PDU.

Power Limitations

CAUTION To reduce the risk of overload, do not load any single PDU with more than a maximum of 16 Amperes. In addition, do not load a single NEMA 5-15 or IEC-320 receptacle with more than 15 Amperes.

Intended Use of Equipment

The Agilent Power Distribution Units (PDU) described in this manual are intended to be installed and used in the Agilent E3661B, E3662B, and E7590A Instrument Racks in accordance with the procedures in this manual.

NOTE The Agilent PDUs are designed to be installed in the current Agilent E3661B, E3662B, and E7690A products, as well as previous versions of the Agilent EIA 19-inch Instrument Rack System products. For information about rack accessories compatibility, see the Web page and *Agilent Enclosures Solutions Product Catalog* at **www.agilent.com/find/racks**, or contact your Agilent Sales Representative.

Cleaning

Disconnect the power from the PDU before cleaning. Use only a damp cloth to clean the surfaces of the PDU.

General Information

The Agilent E7685A PDU Installation Kit enables you to mount an Agilent Power Distribution Unit (PDU) in an Agilent instrument rack. This kit is required if the rack is not already equipped with a PDU, or if you want to install a switched PDU in a rack containing an unswitched PDU. Each PDU installation kit allows the installation of up to two PDU kits. Instrument racks are designed to house two PDU kits only. The voltage of a second PDU must match that of the installed PDU for correct operation of the illuminated switch.

To support worldwide power requirements, four Agilent PDU kits are available. The Agilent E7685A PDU Installation Kit allows the installation of any of the following PDU kits:

Kit Number	Description
E4451-67000	PDU - 1.3m, North America (100-120V) (NEMA receptacles)
E4453-67000	PDU - 1.3m, International (200-240V) (IEC receptacles)
E4455-67000	PDU - 1.6m/2.0m, North America (100-120V) (NEMA receptacles)
E4457-67000	PDU - 1.6m/2.0m, International (200-240V) (IEC receptacles)

The above-listed PDU kits are intended to be used only in the following Agilent rack enclosures: E3661B, E3662B, and E7590A.

E7685A PDU Installation Kit Contents

The Agilent E7685A PDU Installation Kit contains the following:

Item	Quantity	Description	Part Number
1	1	Forehead Assembly - with switch cutout	5061-8750
2	2	PDU Support Bracket	C2786-00021
3	4	Sheet Metal Nuts (10-32)	0590-0804
4	4	Machine Screw, Torx® T25 10-32x0.5inch	2680-0278

NOTE The installation of a first PDU requires the purchase of the Agilent E7685A PDU Installation Kit. This kit provides hardware and rack components required to complete the installation. The installation of a second PDU does not require an additional kit. However, you will need the kit‘s switch and hardware if the first PDU was not switched, and you are adding a switched PDU.

The voltage of a second PDU must match that of the installed PDU for correct operation of the illuminated switch.

When the remote switch is not utilized, the plug is considered to be the disconnect device. When the plug is the disconnect device the socket-outlet shall be installed near the equipment and shall be readily accessible.

Tools Required

To install the PDU kit, you will need the following tools:

- T25 Torx® driver.
- Wrench or nut driver to fit 3/8 inch hex nut.

PDU Kit Contents

The four Agilent PDU kits contain the following:

PDU Kit Number	Item Number	Quantity	Description
1.3m Kit: E4451-67000 E4453-67000 **1.6m Kit:** E4455-67000 E4457-67000	1	1 PDU	**1.3m PDU:** 100-120V North American (NEMA receptacles) 200-240V International (IEC receptacles) **1.6m PDU:** 100-120V North American (NEMA receptacles) 200-240V International (IEC receptacles)
All	2	3	Machine Screw, Torx® T25, 10-32x0.5 inch (p/n 2680-0278)
All	3	2	Washer-external tooth, #10 (p/n 2190-0565)
All	4	1	Nut-Hex w/Ext. tooth lock washer, 10-32 (p/n 2740-0003)
All	5	1	Cable assembly, ground (p/n C2786-60065)

PDU Specifications

The specifications for the customer orderable PDUs are given in the following table:

Model Number	E4451-67000	E4453-67000	E4455-67000	E4457-67000
Input	100-120V, 50/60 Hz	200-240V, 50/60 Hz	100-120V, 50/60 Hz	200-240V, 50/60 Hz
Output	100-120V, 50/60 Hz, 16A 1-IEC 320 C13 Receptacle 5-NEMA 5-15R Receptacles	200-240V, 50/60 Hz, 16A 6-IEC 320 C13 Receptacles	100-120V, 50/60 Hz, 16A 1-IEC 320 C13 Receptacle 9-NEMA 5-15R Receptacles	200-240V, 50/60 Hz, 16A 1-IEC 320 C19 Receptacle 10-IEC 320 C13 Receptacles
Operating Temperature	0° C to 55° C	0° C to 55° C	0° C to 55° C	0° C to 55° C
Operating Humidity	5% to 80% RH, non-condensing	5% to 80% RH, non-condensing	5% to 80% RH, non-condensing	5% to 80% RH, non-condensing
Operating Environment	Indoor Location	Indoor Location	Indoor Location	Indoor Location

NOTE 100-120V, 50/60 Hz PDUs (E4451-67000 and E4455-67000) are supplied with a power cord terminated with a NEMA 5-20P plug to fit a 20A receptacle.

200-240V, 50/60 Hz PDUs (E4453-67000 and E4457-67000) are supplied without a power plug—the PDU power cord is un-terminated. The installer must install the correct plug for the country of installation.

All PDUs (100-120V or 200-240V) must be connected to a dedicated 20A circuit.

The following table gives the specifications for the E4456-67000 PDU. *This PDU is not customer orderable and is used in Agilent-integrated systems only. Customers should order part number E4457-67000 instead.*

Model Number	E4456-67000
Input	200-240V, 50/60 Hz
Output	200-240V, 50/60 Hz, 16A 1-IEC 320 C19 Receptacle 10-IEC 320 C13 Receptacles
Operating Temperature	0° C to 55° C
Operating Humidity	5% to 80% RH, non-condensing
Operating Environment	Indoor Location

General Installation Information

Use the following table to select the type of installation you are doing.

Type of PDU Installation	
A	First PDU-Switched *
B	First PDU-Unswitched *
C	Second PDU-Switched (first one was also switched)
D	Second PDU-Unswitched (first one was switched)
E	Second PDU-Switched (first one was unswitched) *
F	Second PDU-Unswitched (first one was also unswitched)

* Needs PDU Installation Kit

In the following tables, use the legend shown below to determine if the steps are required for items A-F above:

A shaded cell means that the step applies.

A non-shaded cell means that the step does not apply.

Installation Procedure

Step		A	B	C	D	E	F
1	Turn off power to the rack and disconnect AC power.						

Warning!

Failure to disconnect AC power could result in a severe electric shock causing injury or death!

Note: When the remote switch is not utilized, the plug is considered to be the disconnect device. When the plug is the disconnect device the socket-outlet shall be installed near the equipment and shall be readily accessible.

Step		A	B	C	D	E	F
2	Remove the two screws securing the top cap to the frame at the rear of the rack. Slide the top cap towards the rear, and lift off the top cap completely. See Figure 1.						

Step		A	B	C	D	E	F
3	If your rack is configured with a rear door, open the door and remove the four screws securing the side cover to the rear door hinges.						

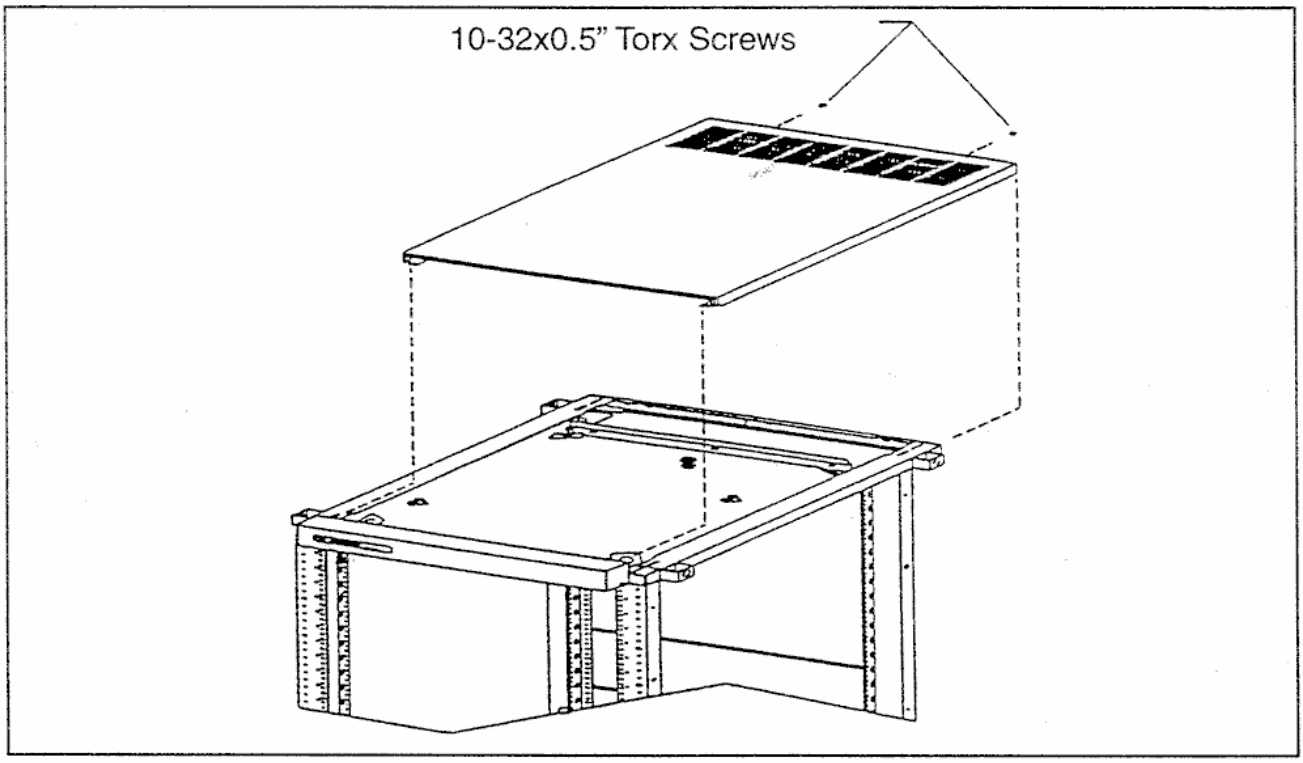


Figure 1. Removing the Top Cap

Step		A	B	C	D	E	F
4	Remove the two screws securing the side cover to the base of the rack enclosure. Lift the side cover slightly up and remove completely. See Figure 2.						

Step		A	B	C	D	E	F
5	Remove the three screws used to secure the non-switchable forehead assembly at the frame top and remove the forehead assembly completely. Retain the three screws as they will be re-used in step 12. See Figure 3.						

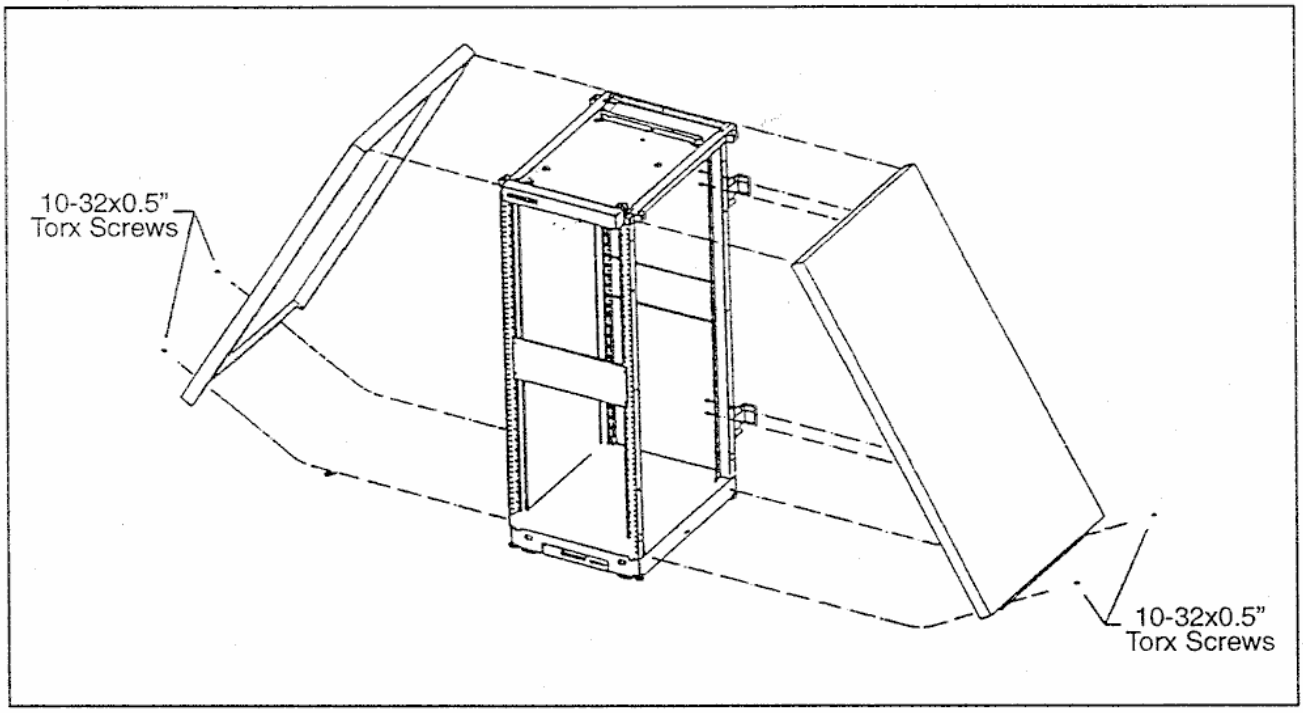


Figure 2. Removing the Side Covers

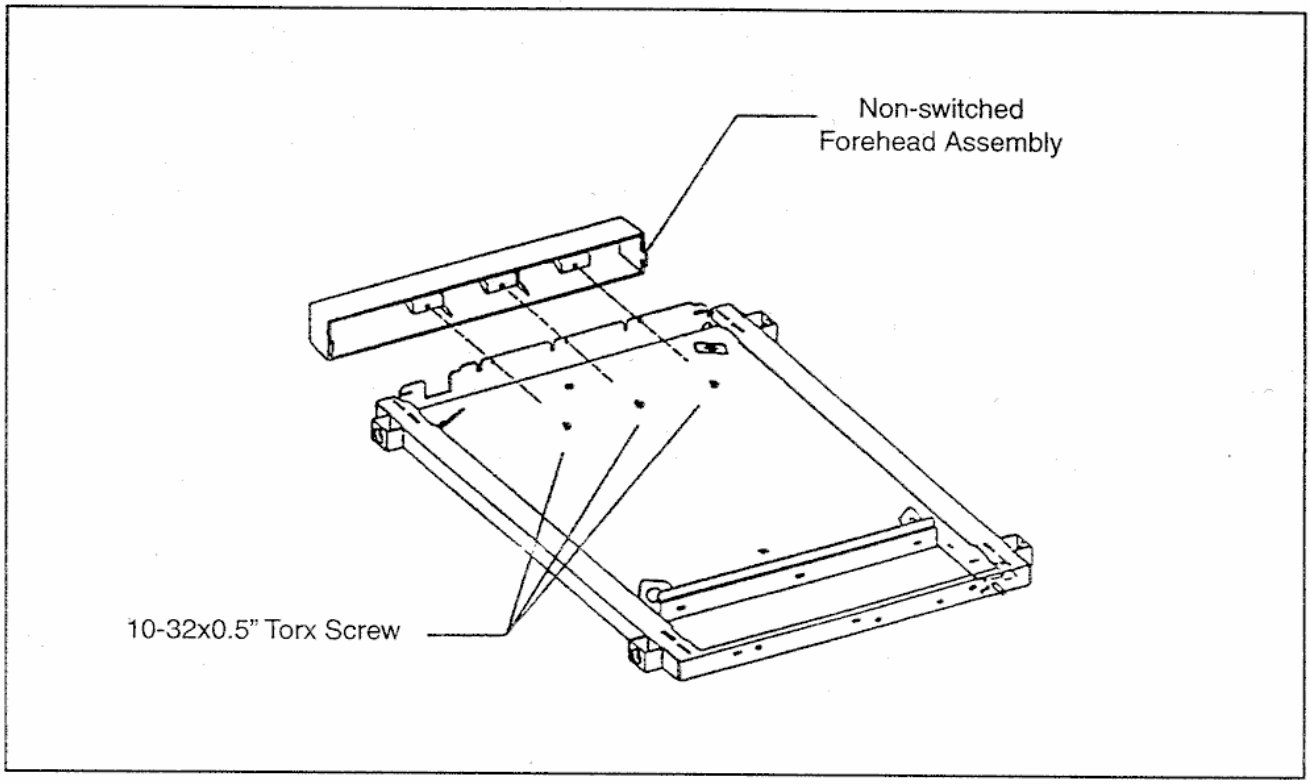


Figure 3. Removing the Forehead Assembly

Step		A	B	C	D	E	F
6	Snap four sheet metal nuts onto the column in the appropriate locations for the PDU brackets (see the table below). Attach the two PDU brackets using four 10-32 x 0.5 inch machine screws. See Figures 4 and 5.						

Tinnerman Placement

Rack Size	Top PDU Bracket	Bottom PDU Bracket	Door Catch
1100 mm	4th Increment Mark	16th Increment Mark	1st Increment Mark
1300 mm	7th Increment Mark	26th Increment Mark	4th Increment Mark
1600 mm	7th Increment Mark	25th Increment Mark	13th Increment Mark
2000 mm	16th Increment Mark	34th Increment Mark	22nd Increment Mark

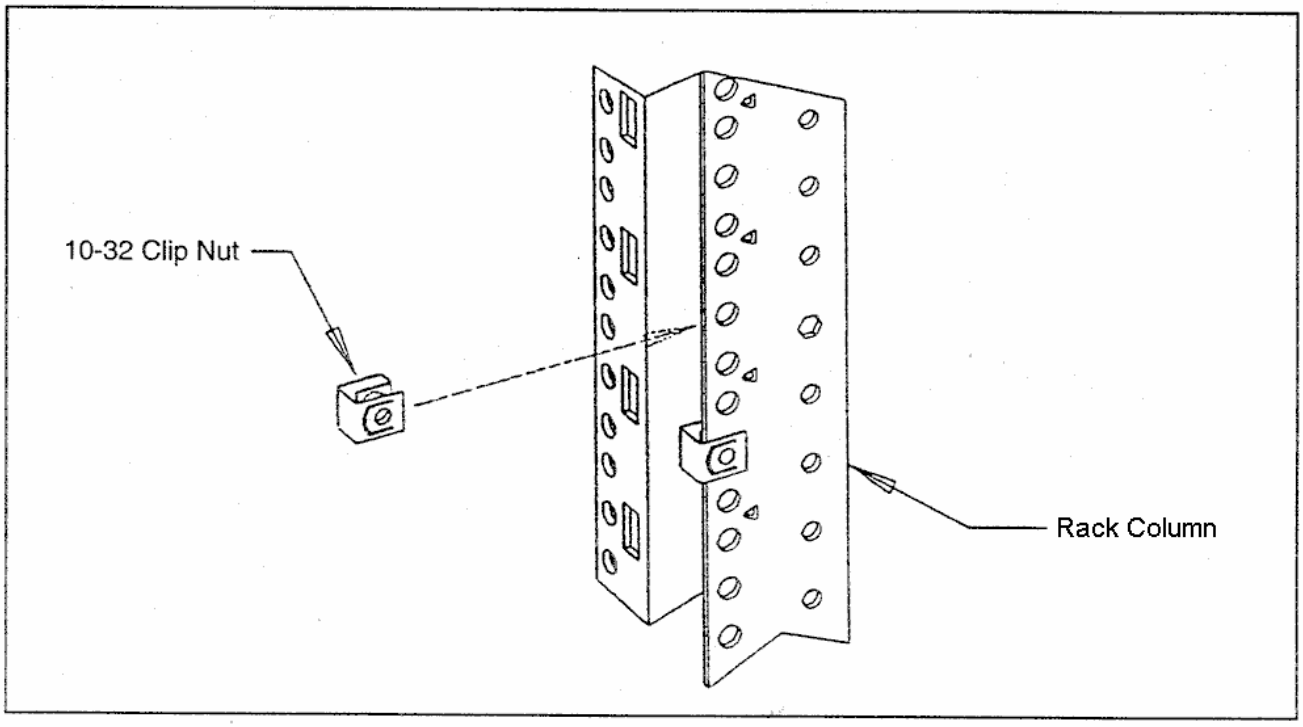


Figure 4. Attaching Sheet Metal Nuts to the Column

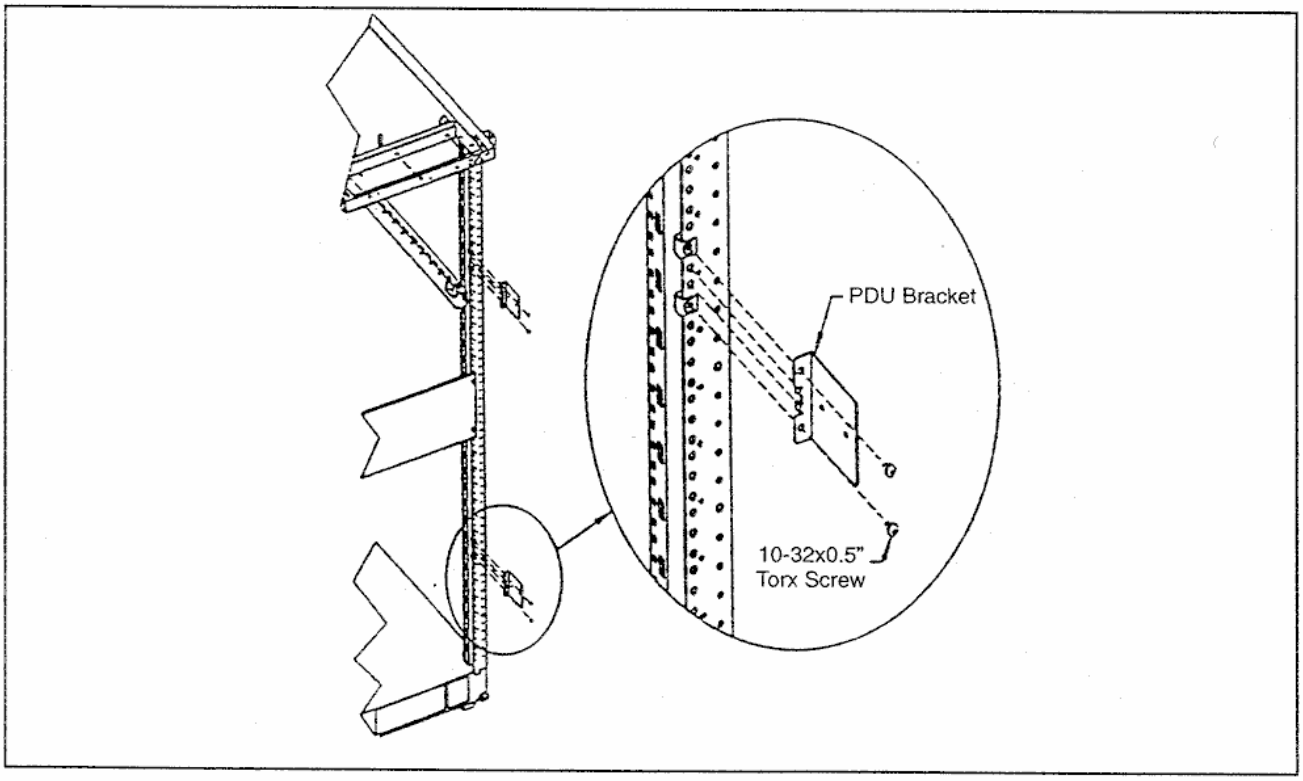


Figure 5. Attaching the PDU Brackets

Step		A	B	C	D	E	F
7	Position the first PDU by placing it against the PDU brackets and align the inner holes that are closest to the column on the brackets to the mounting holes in the PDU. Secure the PDU using two 10-32 x 0.5" machine screws from your PDU kit. If you are installing a second PDU, place the second PDU against the PDU brackets and align the outer holes on the brackets with the mounting holes of the PDU. Secure using two 10-32 x 0.5" screws from your PDU kit. (See Figure 6.)						

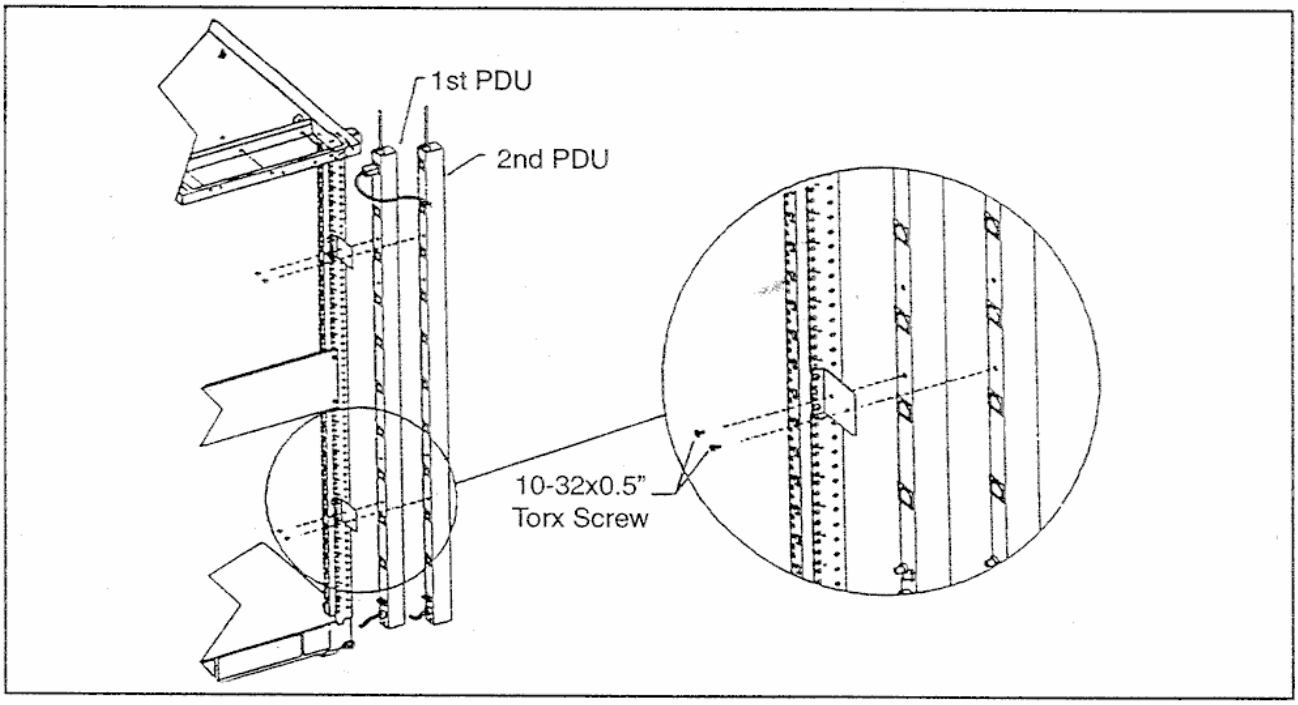


Figure 6. Attaching the PDUs

Step		A	B	C	D	E	F
8	Attach one end of the PDU ground cable assembly to the PDU at the bottom of the PDU using one #10 ext. tooth star washer and one 10-32 x 0.5" machine screw. Make sure the washer is between the PDU and the connector of the cable assembly. Make sure that the cable does not block the PDU receptacles and the cable is not pinched. See Figure 7.						

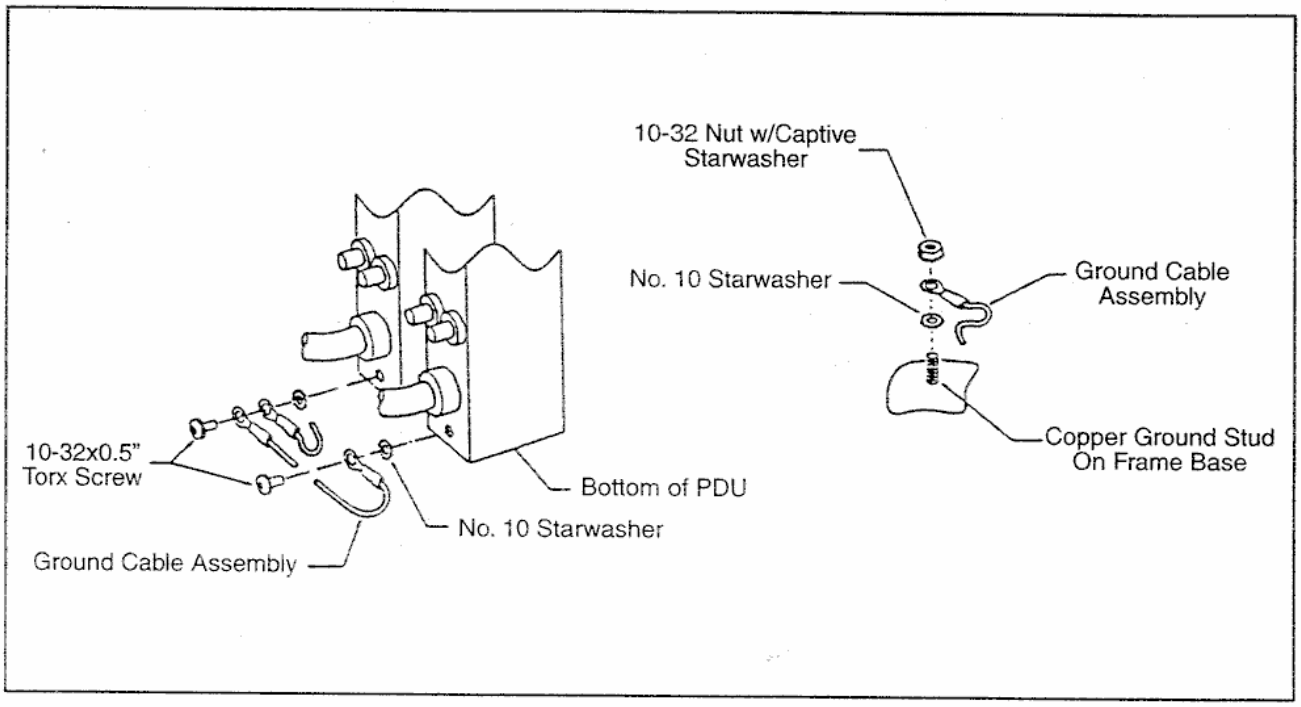


Figure 7. Attaching the Ground Cable Assembly

Warning

The PDU/rack combination is a safety Class 1 product and has a protective earthing (grounding terminal).

The PDU ground strap must be attached to the PDU and rack column with supplied hardware. Failure to do so can result in a severe hazard and/or personal injury in the event of equipment failure or product misuse.

Additionally, there must be an uninterruptable safety earth ground from the main power source to the product's input wiring terminals, power cord, or supplied cord set. Whenever it is likely that the protection has been impaired, disconnect the power cord until the ground has been restored.

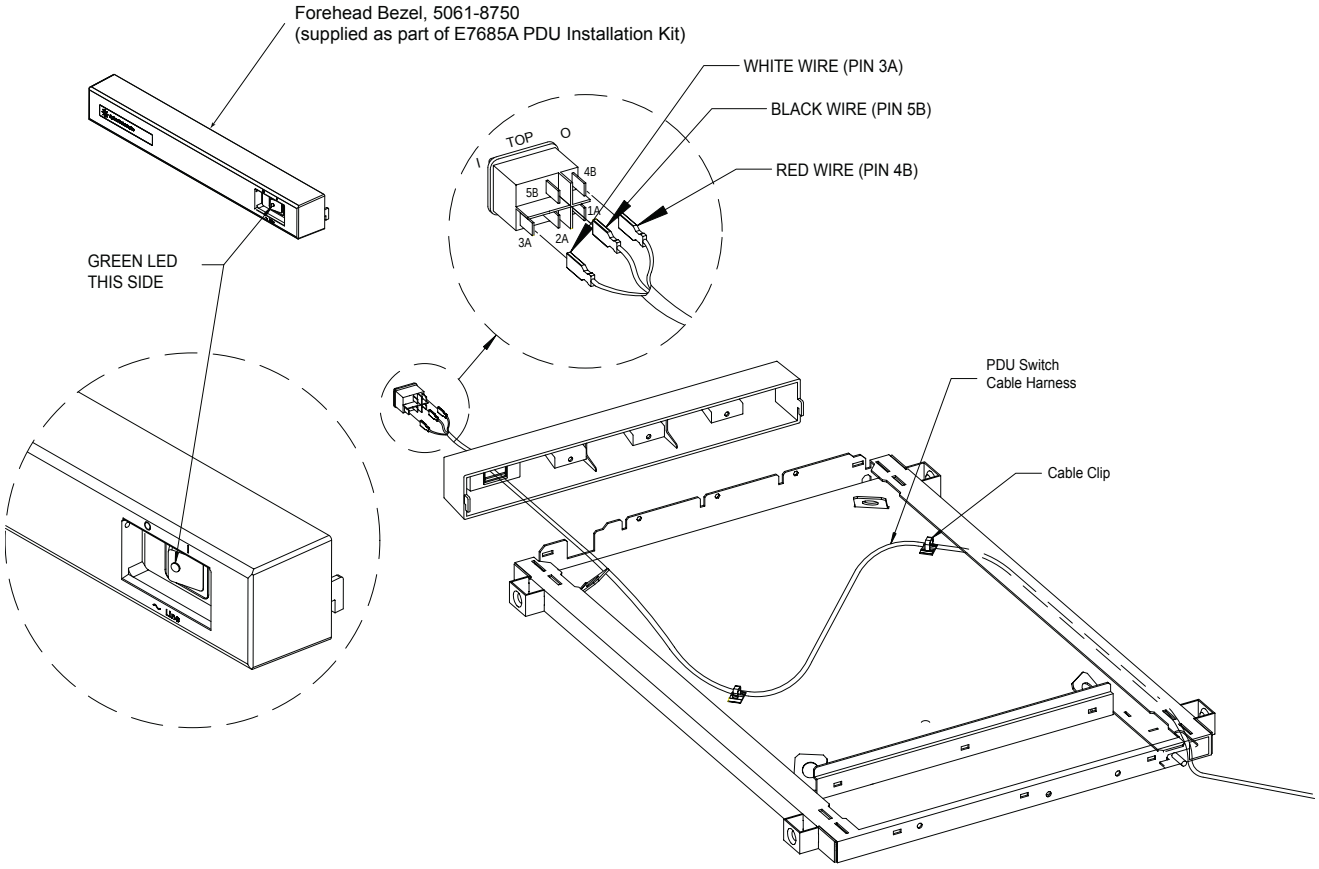
Step		A	B	C	D	E	F
9	Attach the other end of the PDU ground cable assembly to the nearest copper ground stud on the frame base of the rack enclosure (there are four located on the base). Use a 10-32 nut with an external tooth captive washer and a #10 ext. tooth star washer to secure the cable assembly to the ground stud. Again, the #10 star washer must be placed between the frame base and the connector of the cable assembly. To ground the second PDU, attach the PDU ground cable assembly to the bottom of the PDU as described earlier. Attach the other end either in the same manner or to the first PDU as shown. (See Figure 7.)						

Step		A	B	C	D	E	F
10	Route the PDU switch cable harness up through the provided channel at the top of the rack enclosure and secure the cable harness with the pre-mounted cable clips. See Figure 8.						

Step		A	B	C	D	E	F
11	Install the power switch supplied with your PDU Installation Kit.* Align the switch so that the LED indicator is toward the left side (if viewed from the front), and snap it into the forehead assembly provided in the PDU installation kit. See Figure 8.						

Step		A	B	C	D	E	F
12	Align the switched forehead assembly to the top of the rack enclosure, and attach it using the same three 10-32 x 0.5" screws used to hold the non-switchable forehead assembly. Tighten the screws to 20-inch pounds. See Figure 8.						

* The power switch supplied is black, and has five terminals. If you have an older installation with a white, six terminal switch, see "Connecting the Old Style Switch" on page 18.



Note: When the remote switch is not utilized, the plug is considered to be the disconnect device. When the plug is the disconnect device the socket-outlet shall be installed near the equipment and shall be readily accessible.

Figure 8. Configuring the Forehead Assembly

Step		A	B	C	D	E	F
13	Connect the PDU switch cable harness to the dual power switch. Make sure the connectors slide completely onto the spade terminals on the back of the switch. See Figure 9.*	■		■		■	

Caution

Connections form the PDU front panel switch harness and the switch in the forehead must be made correctly to ensure normal PDU operation. Failure to do so can result in PDU failure or inconsistent PDU operation.

* The power switch supplied is black, and has five terminals. If you have an older installation with a white, six terminal switch, see "Connecting the Old Style Switch" on page 18.

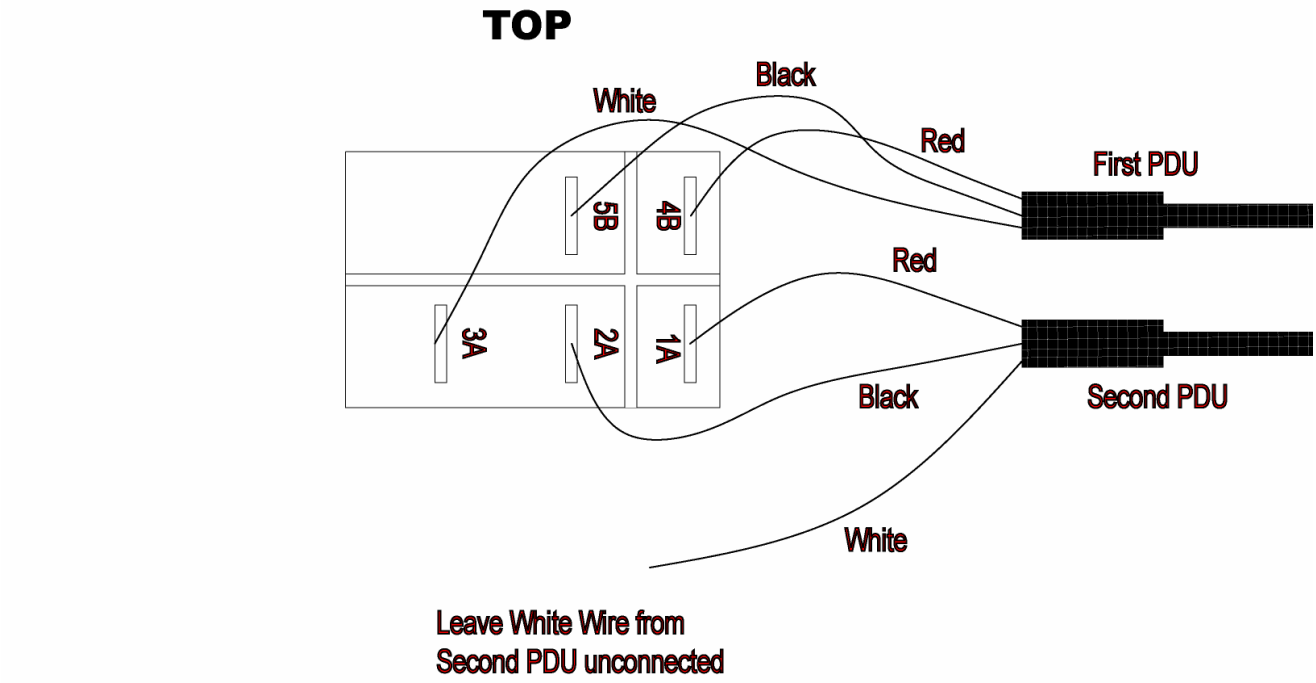


Figure 9. Main Power Switch Connection (new-style switch)*

Step		A	B	C	D	E	F
14	Reassemble the rack enclosure by following steps 1-4, but in reverse order. Make sure no wires or electrical cords are pinched.						

Step		A	B	C	D	E	F
15	Reconnect AC power to the rack enclosure.						

Verify that the PDU is functioning correctly. The LED lamp on the rocker switch should light up when the switch is in the On (1) position. The lamp should remain unlit when the switch is in the Off (0) position.

This completes the installation of the Power Distribution Unit (PDU).

Place this Guide with your rack documentation.

* The power switch supplied is black, and has five terminals. If you have an older installation with a white, six terminal switch, see “Connecting the Old Style Switch” on page 18.

Connecting the Old Style Switch

The PDU Installation Kit and current-production instrument racks contain a **black** switch with five terminals on the back. This switch has a green LED indicator that should appear on the left when the switch is installed (see figure 8). However, if you are installing a new PDU in an older rack installation, it may have the older, **white** switch with six terminals on the back. This switch has the indicator light on the right side when installed. If your system has this older, white six-terminal switch, the correct wiring connections are as shown in figure 10 below.

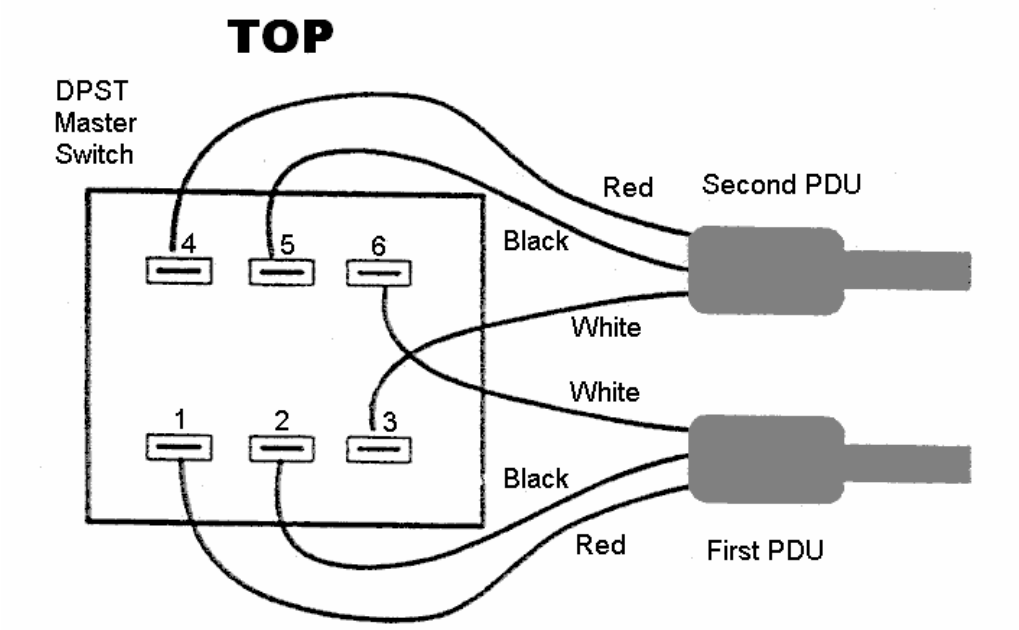


Figure 10. Main Power Switch Connection (old-style switch)

Note: If you replace the old six-terminal switch in your rack installation with the new five-terminal switch provided in the PDU Installation Kit, you must of course wire the PDU(s) as shown in figure 9.

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