HP PA-RISC Computer Systems

System Upgrade Guide

HP 3000 Model 9x9KS

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Electrostatic Discharge (ESD) Precautions

Electrostatic discharge can damage the integrated circuits on printed-circuit boards. To prevent such damage from occurring, observe the following precautions when unpacking and installing the board:

- Stand on a static-free mat.
- Wear a static strap to ensure that any accumulated electrostatic charge discharges from your body to ground.
- Connect all equipment together, including the static-free mat, static straps, routing nodes, and peripheral units.
- Keep uninstalled printed-circuit boards in their protective antistatic bags.
- Once you have removed the printed-circuit boards from their protective antistatic bags, handle them by their edges only.

Preface

This Upgrade manual is intended for Hewlett-Packard trained and experienced Field Service personnel. At the time of publication, this document covered the following HP 3000 computers:

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939KS/x00
959KS/x00
969KS/x00
979KS/x00
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Table of Contents

Appendix B. Power Options for Racked Systems
HP 3000 979KS

1

Introduction

This manual contains the information necessary to upgrade an HP 3000 9x9KS Class Computer system. The procedure in this manual are intended to be used by Hewlett-Packard Customer Engineers (CEs) and those service personnel who have successfully completed authorized HP training.

The installation and environmental requirements for the upgraded systems are the same as the original computer system. Observe all WARNING and CAUTION labels on the equipment or upgrade components. All upgrade work must be performed by qualified personnel.

Table 2-1 on page 2-2 lists the available upgrades and options

NOTE

Additional memory or internal peripherals are a separate upgrade products. If the customer has ordered any additional upgrade products, they should be added in while performing the system upgrade.

Electrostatic Discharge

CPU cards and computer systems contain assemblies and components that are sensitive to electrostatic discharge (ESD). Carefully observe the precautions listed in this section and use the ESD wrist strap, ESD sheet, and ESD foam pad provided in the ESD kit (part number A3024-80004). The following precautions can significantly reduce the risk of system failure or component damage due to ESD.

- Always wear a grounded wrist strap when working around a system or handling the CPU card.
- Treat all assemblies, components, cards, and connections as sensitive.
- When unpacking cards or components to the system, keep the item in it's conductive bag until it is ready to be installed.
- Keep body movement to a minimum, this generates static electricity that causes ESD.
- Avoid working in carpeted areas.
- Try to select a work area where potential static sources are minimized.

Unpacking and Inspection

The components and circuit cards involved in the upgrade may be shipped in more than one container. Check to ensure receipt of all the containers specified by the carrier's *Bill of Lading*. Inspect each container for any evidence of mishandling during transit. If any of the containers are damaged, request that the carrier's agent be present when the damaged containers are opened.

Unpack each shipping container and inspect each item for external damage. Look for damage such as broken connectors, or dented corners. If present, check rigid foam packing for signs of damage that could indicate rough handling in transit.

Unpack Upgrade Kit Components

Unpack the upgrade kit components as follows:

1. Open the carton.

2. Remove the component.

3. Remove the component from the anti-static packing (adhering to ESD guidelines) and visually inspect it for damage.

4. Put the component back into the anti-static packing until installation is performed.

If visual inspection reveals damage to a component, follow the instructions in the *Claims Procedures* section.

Claims Procedures

Notify the nearest Hewlett-Packard Sales and Support Office if the shipment is incomplete or damaged. If the damage occurred in transit, notify the carrier as well.

Hewlett-Packard will arrange for a replacement or repair without waiting for settlement of claims against the carrier. In the event of damage in transit, retain the shipping container and packing material for later inspection.

Repacking

The containers and shipping materials used in factory packaging should be used if reshipment of components becomes necessary. If these are not available, containers and shipping material identical to those used in the factory are available through the HP Sales and Service Office. Similar commercially available material can also be used for reshipment.

If the components are returned to the factory for servicing, attach a tag to the component specifying the required service, computer model number, and full serial number (found on the system label located inside the front door). In any subsequent correspondence, refer to the computer model number and full serial number of the system in question.

Be sure to mark the container **FRAGILE**. Whenever possible, arrange shipment with a qualified electronics equipment mover.

Storage

HP computer equipment can be stored or shipped in environments that are within the following limits:

Storage Temperature:	-40° C to 65° C (-40° F to 149° F) (without internal tape drive)
	-40° C to 45° C (-40° F to 113° F) (tape media specification)
Non-operating Humidity:	5% to 80% RH non-condensing, less than 30% RH/hr. rate of change

The components should be protected at all times from environmental extremes that can cause condensation within the component. When installing components or a new system, allow time before operation for the

temperature of the equipment to stabilize.

Returning Components

Once the upgrade is complete, certain replaced components resulting from the upgrade are the property of Hewlett-Packard. These components must be returned in the packing material supplied with the upgrade, using the return form and prepaid postage label included in the upgrade kit.

Other upgrade components and cards must also be returned. The additional return parts must be returned to the same address printed on the prepaid postage label.

NOTE

Prepaid return is not available in all countries. If the upgrade kit does not contain a country approved prepaid label, please ensure that all components are returned to the Ordering Processing Department of the local HP Sales Office.

Return Procedures:

1. Locate the return form and the prepaid postage label, or regular (non-prepaid) label included in the kit.

2. Fill in the required information on the return form, according to the instructions printed on the form.

3. Package the replaced parts, if possible, in the upgrade kit shipping materials. **Be sure to place the return form on the inside of the package**.

4. Affix the prepaid postage label or regular label over the shipping label on the original container.

5. Mail the return package.

NOTE

If the original packing containers and material are not usable, commercially comparable materials should be used.

2

Upgrade Procedures

This chapter provides a general outline for the procedures to perform a variety of upgrades, from the addition of a processor card to the changing of User License permissions.

CAUTION

Be sure to follow all Electrostatic Discharge (ESD) guidelines states in *Chapter 1*. Failure to do so could result in component damage an loss of system reliability.

NOTE

It is very important to determine what components are involved in the upgrade. Once the upgrade components are identified, the appropriate procedure can be followed to accomplish the upgrade.

Required Tools

- *HP PA-RISC Computer Systems Service Manual* (P/N A2375-90004)
- #10 Torx head driver
- #15 Torx head driver
- Small flat blade screw driver
- Anti-static protective mat
- Grounding wrist strap
- Chip removal tool (8710-1982)

If the computer being up graded is mounted in a rack cabinet, you need to refer to the appropriate rack manual for access to the components required for the upgrade.

Components

Table 2-1. on page 2-2 lists the components required for the system upgrades

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Table 2-1. Upgrades and Key Components

From	To	Upgrade Products[1]	Option	Components
939KS	959KS/x00	A3274A A3275A A3276A A3276A	850	Change Model String only[2]. Additional processor cards if required.
	969KS/x00	A3215A A3216A A3217A A3218A		• 969KS/xx0 System Board • 120MHz processor card(s) • Clock Oscillator Crystal (1813-1017) • Label Set
	969KS/x20	A3484A A3485A A3486A A3487A		• 969KS/xx0 System Board • Clock Oscillator Crystal (1813-1017) • 120MHz/1MB processor card(s) • Label Set
	979KS/x00[3]	A3618A A3619A A3620A A3621A		• 979KS System Board • Clock Oscillator Crystal (1813-1167) • 180MHz processor card(s) • Power Supply • Label Set
959KS/xx0	969KS/x00	A3215A A3216A A3217A A3218A	851 852 853 854	• 969KS/xx0 System Board • 120MHz processor card(s) • Clock Oscillator Crystal (1813-1017) • Label Set
	969KS/x20	A3484A A3485A A3486A A3487A		• 969KS/xx0 System Board • 120MHz/1MB processor card(s) • Clock Oscillator Crystal (1813-1017) • Label Set
	979KS/x00[3]	A3618A A3619A A3620A A3621A		• 979KS System Board • Clock Oscillator Crystal (1813-1167) • 180MHz processor card(s) • Power Supply • Label Set
969KS/x00	969KS/x20	A3484A A3485A A3486A A3487A	861 862 863 864	• 120MHz/1MB processor card(s) • Label Set
	979KS/x00[3]	A3618A A3619A A3620A A3621A		• 979KS System Board • Clock Oscillator Crystal (1813-1167) • 180MHz processor card(s) • Power Supply‘ • Label Set

Table 2-1. Upgrades and Key Components (Continued)

From	To	Upgrade Products[1]	Option	Components
969KS/x20	979KS/x00[3]	A3618A A3619A A3620A A3621A	871 872 873 874	• 979KS System Board • Clock Oscillator Crystal (1813-1167) • 180MHz processor card(s) • Power Supply • Label Set
979KS/x00	979KS/x00[3]	A3619A A3620A A3621A	881 882 883	• Add processor cards only

1. The sequence denote the same upgrade product for 1,2,3, and 4 processors, respectively. All upgrades from 9x9KS/1x0 to 9x9KS/2x0, 3x0, or 4x0 will require adding more processor cards to the system cabinet.
2. Model String change is required on all upgrades.
3. All upgrades from cabinet-racked systems to 979KS cabinet-racked systems require an additional upgrade to the power distribution unit. See Appendix B.

Common Upgrade Procedures

The following procedures are common to many of the system upgrades. Perform these procedures if indicated under the specific model upgrade.

Front Preparation

1. Shut the system down.
2. Unplug the power cord from the back of the system.
3. Remove the front bezel.
4. Loosen and pull the internal peripheral cage out approximately one inch.
5. Pull out the Power Monitor card.
6. Remove the front cover plate (bulkhead).
7. Pull out the front processor(s).
8. Pull out the memory carrier(s).

Back Preparation

1. Remove all I/O cables.
2. Remove all I/O cards from the computer.
3. Remove all I/O card guides and cover plates (if present) from the I/O section.
4. Remove the Core I/O card.
5. Remove the Power supply.
6. Remove the System board.
7. Remove the bulkhead covers from the rear processors and remove the processors.

System Board Preparation

If the Clock Oscillator Crystal has to be installed and the Frequency Select switch set., complete the following steps to prepare the system board for installation. Use Table 2-2 to determine the correct crystal part number and the correct frequency switch settings.

1. Carefully insert the Clock Oscillator Crystal into socket **XY1** (item 3 in Figure 2-1), so the locator tab matches the pin 1 dot on the board socket (see Figure 2-2).
2. Set the Frequency Select switch (item 1 in Figure 2-1) to the appropriate frequency as shown in Table 2-2.

Note

All system boards have a soldered-in crystal in the Y2 position (see Figure 2-1). Upgrades from 100MHz systems will have an additional socketed-in crystal at XY1.

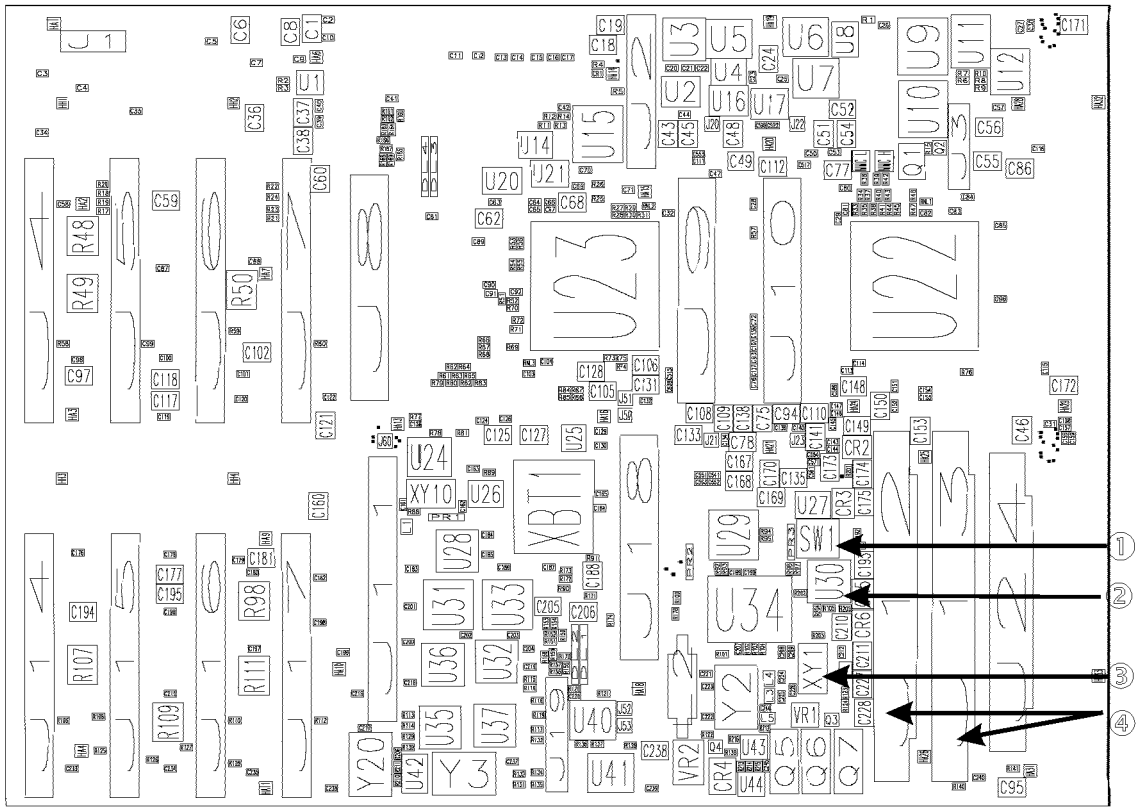


Figure 2-1 System Board Location Diagram

1- SW1 is the frequency select switch block.
2 - U30 is the PAL chip.
3 - XY1 is the Clock Oscillator Crystal socket.
4 - Connectors J12 and J13 are the power supply connectors.

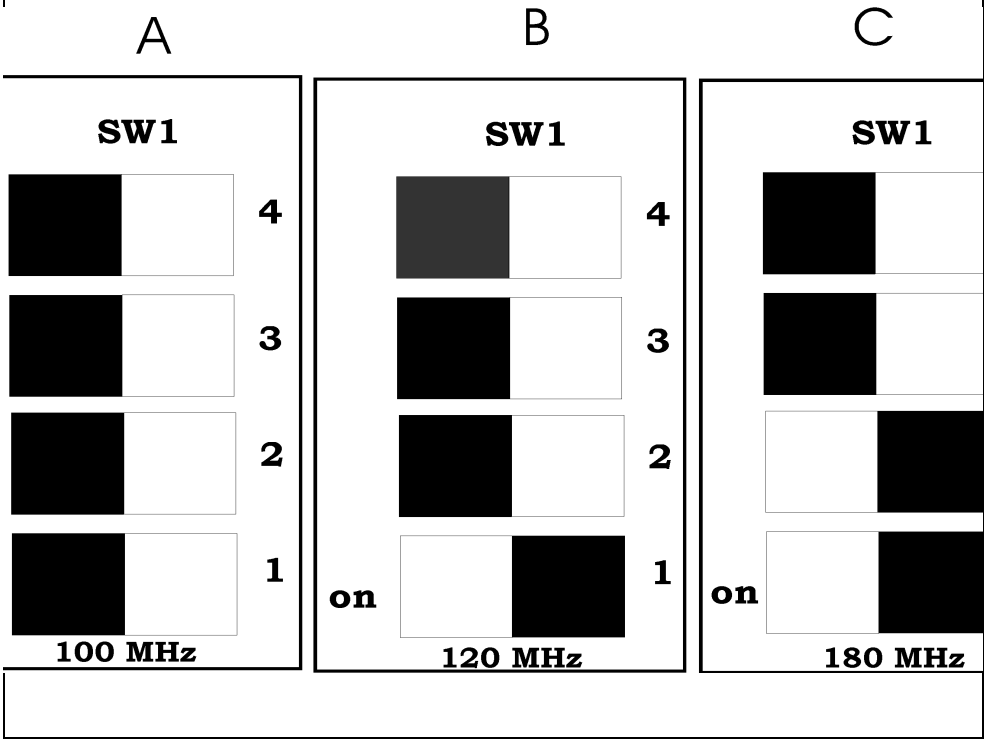
The following table identifies the oscillator crystals and the frequency switch settings to be used with each of the upgrade system boards

Table 2-2. Crystal and Frequency Switch Settings

System Board	959KS/x00	969KS/x00	969KS/x20	979KS/x00
A3453-60003 **Crystal:** **Switch Setting:**	**C1** **A**	**C2** **B**	**C2** **B**	
A3284-60005 **Crystal:** **Switch Setting:**				**C3** **C**

Crystals:
C1 = 50MHz (100 MHz processor), P/N = N/A (soldered-in)
C2 = 60MHz (120 MHz processor), P/N = 1813-1017
C3 = 45MHz (180 MHz processor), P/N = 1813-1167

Switch Settings:



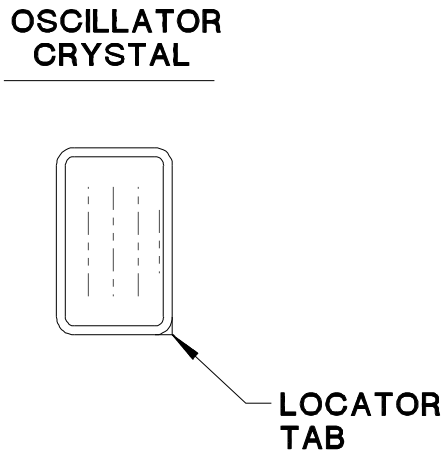


Figure 2-2 Crystal Locator Tab

PAL Chip Replacement

Remove the PAL chip from the old board (item 2 in Figure 2-1) and insert it on the upgrade board. See Figure 2-3. Align cut corner of the PAL chip with the cut corner of the socket (item 2 in Figure 2-3).

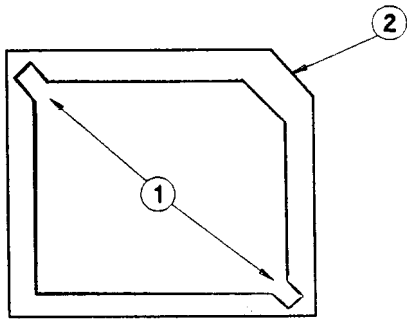


Figure 2-3 PAL Chip Socket

CPU Configuration Rules

The CPU configuration rules are as follows:

1. All CPUs must be installed in sequential order starting with slot 0 (0, 1, 2, and 3).

2. Slot 0 must always have a CPU installed.

CPU slots 0 and 1 are located in the front of the computer cabinet. CPU slots 2 and 3 are located in the back of the computer cabinet.

Model Upgrades

939KS to 959KS/x00 Upgrade

The system upgrade to change the model number from an HP 939KS/x00 to an HP 959KS/x00 involves changing the system from an 80 MHz SPU to a 100 MHz SPU. It may also include adding more processor cards to the system cabinet.

The upgrade to a 959KS/100 is accomplished by modifying the *Model String* using the *Stable Storage Configuration* Utility (SS_CONFIG). If you are unfamiliar with the SS_CONFIG utility, contact the Response Center (RC) for more information. In the case of upgrading to a 959KS/200/300 or /400, you will be adding additional processor cards.

Refer to the *CPU Configuration Rules* in Chapter 1 for the proper order of installing the processor cards. Refer to the Service Manual for the instructions for accessing the CPU slots.

939KS to 969KS/x00, 969KS/x20, or 979KS/x00 Upgrade

Upgrade Procedures

CAUTION

979KS upgrades include a new power supply which requires a dedicated 20amp circuit. Do not attempt to install these upgrades until the correct power is available.

1. Perform the **Front Preparation** and **Back Preparation** procedures as described on page 2-4.
2. Perform the **System Board Preparation** procedure as described on pages 2-4 to 2-7.
3. Replace the PAL chip as described on page 2-7.
4. Install the new System board into the computer cabinet.
5. Re-seat the Power Monitor card into the slot next to the Memory Carrier slots.
6. Seat the new processor card next to the Power Monitor card (CPU slot 0).
7. Re-seat the internal peripheral cage into the system board.
8. Install the CPU Cover Plate next to the power supply.
9. Install the HP-HSC cover plate next to the CPU cover plate.
10. Install the removed Core I/O card next to the HP-HSC cover plate.
11. Install the removed (or new) Power Supply in the back of the computer.
12. Install all removed I/O card guides and I/O cards into their original positions.
13. Install the new I/O card guides and cover plates.
14. Re-attach all I/O cables that were removed.
15. Update the system Label set. Refer to *Upgrade Labels* section.
16. Plug in the power cord.
17. Power up the system.

NOTE

All removed system boards must be returned to HP. Refer to the ***Returning Components*** section of Chapter 1.

The system now needs to be reconfigured for any new internal or external peripherals added. The new CPU and memory are automatically configured during the power on and selftest of the system.

Be sure to upgrade all appropriate system labels with the labels from the upgrade kit. Refer to *Upgrade Labels* for the specifics

959KS/x00 to 959KS/x00 Upgrade

This upgrade would include one processor card if the upgrade is to an HP 959KS/200, two processor cards if the upgrade is to an HP 959KS/300, or three processor cards if the upgrade is to an HP 959KS/400. Use the SS_CONFIG utility to modify the *Model String* appropriately.

Refer to the *CPU Configuration Rules* on page 2-7 for the proper order of installing the processor cards. Refer to the Service Manual for the instructions for accessing the CPU slots.

959KS to 969KS/x00, 969KS/x20 or 979KSUpgrade

1. Perform the ***Front Preparation*** and ***Back Preparation*** procedures listed on page 2-4.
2. Perform the ***System Board Preparation*** procedures listed on pages 2-4 to 2-6.
3. Replace the PAL Chip as shown on page 2-7.

Use the SS_CONFIG utility to modify the *Model String* appropriately.

Upgrade Procedures

CAUTION

979KS upgrades include a new power supply which requires a dedicated 20amp circuit. Do not attempt to install these upgrades until the correct power is available.

1. Install the new System board into the computer cabinet.
2. Install the Memory Carrier card in the appropriate memory slot .
3. Install the removed Power Monitor card.
4. Install the new processor card into (CPU slot 0).
5. Re-seat the internal peripheral cage into the system board.
6. Install the CPU Cover Plate.
7. Install the HP-HSC cover plate next to the CPU cover plate.
8. Install the removed Core I/O card.
9. Install the removed (or new) Power Supply in the back of the computer.
10. Install all removed I/O card guides and I/O cards into their original positions.
11. Re-attach all I/O cables that were removed.
12. Update the system Label set. Refer to ***Upgrade Labels*** section.
13. Plug in the power cord.
14. Power up the system.

NOTE

All removed system boards must be returned to HP. Refer to the ***Returning Components*** section of Chapter 1.

The system now needs to be reconfigured for any new internal or external peripherals added. The new CPU and memory are automatically configured during the power on and selftest of the system.

Be sure to upgrade all appropriate system labels with the labels from the upgrade kit. Refer to *Upgrade*

Labels for the specifics.

969KS/x00 to 969KS/x20 or 979KS Upgrade

1. Perform the ***Front Preparation*** and ***Back Preparation*** procedures listed on page 2-4.
2. Perform the ***System Board Preparation*** procedure shown on pages 2-4 to 2-7.
3. Replace the PAL chip as shown on page 2-7.

Use the SS_CONFIG utility to modify the *Model String* appropriately.

Upgrade Procedures

CAUTION

979KS upgrades include a new power supply which requires a dedicated 20amp circuit. Do not attempt to install these upgrades until the correct power is available.

1. Install the new System board into the computer cabinet.
2. Install the Memory Carrier card in the appropriate memory slot .
3. Re-seat the removed Power Monitor card.
4. Seat the processor card into (CPU slot 0).
5. Install the CPU Cover Plate.
6. Re-seat the internal peripheral cage into the system board.
7. Install the HP-HSC cover plate next to the CPU cover plate.
8. Install the removed Core I/O card.
9. Install the removed (or new) Power Supply in the back of the computer.
10. Install all removed I/O card guides and I/O cards into their original positions.
11. Re-attach all I/O cables that were removed.
12. Update the system Label set. Refer to ***Upgrade Labels*** section.
13. Plug in the power cord.
14. Power up the system.

The system now needs to be reconfigured for any new internal or external peripherals or users added. The new CPU and memory are automatically configured during the power on and selftest of the system.

Be sure to upgrade all appropriate system labels with the labels from the upgrade kit. Refer to *Upgrade Labels* for the specifics.

User License Upgrade

To increase the number of users for an upgrade (A3285A, A3286A, or A3287A), the Software Capability (SW_CAP) values have to be changed. These values are accessible with the *Stable Storage Configuration* Utility (SS_CONFIG). If you are unfamiliar with the SS_CONFIG utility, contact the Response Center (RC) or your local escalation center for more information.

This procedure needs to be performed when the options listed in Table 1-2 (located in *Chapter 1*) are part of the upgrade package. Otherwise, the Software Capability are pre-set at the factory.

Label Upgrade

The Information Label on the inside of the SPU door has to be updated to reflect the new product number and indicate that this computer is now an upgraded product. The upgrade kit should contain an upgrade label with the appropriate stick on labels to reflect the upgrade.

There should be a sticky label to show the new Model number, two sticky labels for the current product number, and there may be one sticky label to show the new user license number (number of users allowed on the system). Figures 2-4 and 2-5 show the locations of the upgrade labels.

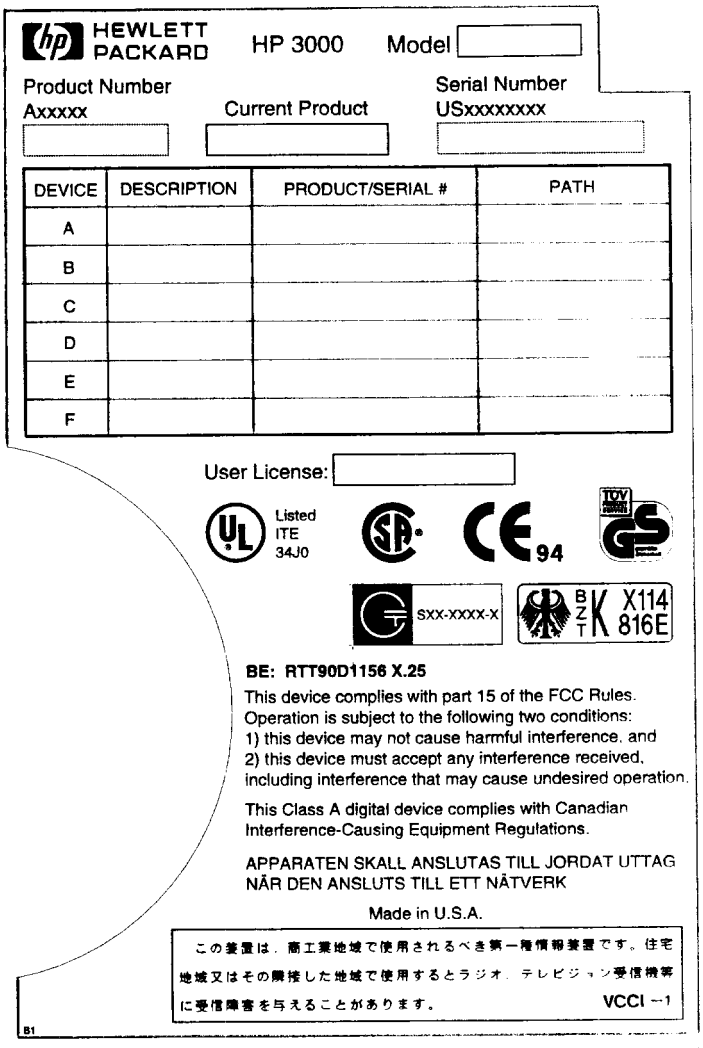


Figure 2-4 Information Label

Figure 2-5 Chassis Information Label

To access the chassis information label, you have to remove the front bezel. Refer to the *Service Manual* for instructions on removing and replacing the front bezel.

Verification

The additional processor cards installed in the computer are automatically configured into the system when the computer is powered on and boots up. Be sure the system boots the Operating System with no warning or fault messages.

If the customer has increased the number of users on the system, the system needs to be reconfigured to add all new users.

A

Memory Configuration Guidelines

Memory Configuration and SIMM Installation

Memory in HP 3000 systems can be added in many different megabyte combinations depending on your model, your use of existing memory, your memory upgrade goals, and what combination memory modules you install.

> **Note**
> Regardless of the availability of SIMM slots, the total amount of memory you can install is dependent on your system model and your operating system. Refer to your system's Owner's Guide.

The configuration guidelines presented in this chapter will successfully optimize most combinations of memory modules. It is still possible, however, when adding memory to already-configured memory on two extenders, to meet these guidelines and still generate a warning that your memory is not optimized. If that happens, remove *all* memory modules from both extenders and re-install them following the guidelines provided.

Configuring Memory for Optimum Performance

For OPTIMUM memory performance, memory must be installed in a particular slot sequence. This section provides an overview and then detailed procedures for both single- and dual-extender systems.

If your memory is not configured for optimum performance, the warning **Memory not optimized for performance** appears when you boot the system. Your memory will still work, but your system's performance may be degraded.

On HP3000 979KS systems, non-optimized memory has another impact. The firmware includes a new user-configurable flag called **auto start.** If the flag is set to **OFF**, the selftest will detect the performance degradation when you boot and will inhibit **autoboot** and **autosearch**. If you're not sure whether a warning was displayed (i.e., warnings may have scrolled off your console), you can re-display any warning messages. From the Information menu in the user interface, use the **warn** command to see any warning messages that came up during the boot.

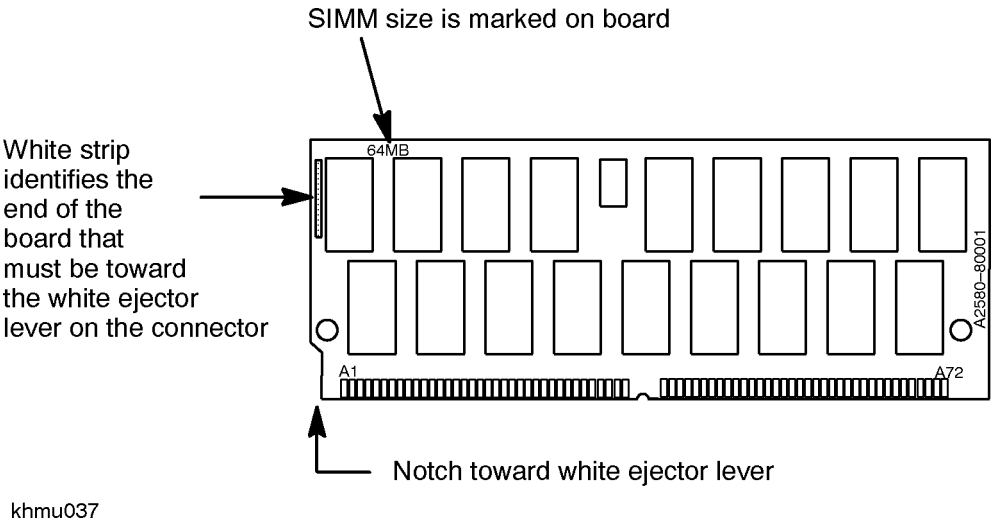
If you get the **Memory not optimized** warning, use the **me** command in the Information Menu of the user interface (the Boot Console Handler) to check your memory configuration. This command will not directly tell you whether your memory is installed for optimum performance; it will only tell you whether the modules are seated correctly and recognized as part of your system configuration. However, you can review the sequence of memory modules in the memory extenders. The most important memory optimization rule is that all pairs of modules of each memory size should be installed in lower-numbered slots before any single modules (see the procedures and examples in this appendix). If the display of your memory configuration shows any single modules installed before module pairs, you will need to reconfigure your memory using those procedures.

If the **Memory not optimized** warning does not appear, your memory is in an optimum configuration.

Before You Begin

Before you begin, you should understand the following definitions:

A *SIMM* (Single In-line Memory Module) is a single memory board. All memory SIMMs have their size marked on the board near the upper left corner.



A *module* is a pair of SIMMs of the same memory size (e.g., two 64MB SIMMs). Memory for your system is purchased and installed only in modules and in pairs of modules; **never install just one SIMM**.

128MB SIMM + 128MB SIMM	=	one 256MB[a] module
64MB SIMM + 64MB SIMM	=	one 128MB module
32MB SIMM + 32MB SIMM	=	one 64MB[a] module
16MB SIMM + 16MB SIMM	=	one 32MB module
A set of 2 same-size SIMMs	=	1 module
A set of 4 same-size SIMMs	=	1 pair of modules

a. 64MB modules and 256MB modules will be supported on HP3000/9x9KS systems beginning with MPE/iX Release 5.5 Power Patch 1 (C.55.01).

Memory Optimization Procedure for Single Memory Extenders — Overview

CAUTION

To prevent damage to memory boards and system components from electrostatic discharge, always wear a grounded wrist strap when working on or around the system, and when handling printed circuit boards.

Module Installation is a 6-step process:

1. Remove any currently installed *single* memory modules.
2. Combine the removed and new memory modules and organize them into three groups:
   - •256MB modules
   - •128MB modules and 64MB modules (combined in the same group)
   - •32MB modules
3. Divide each group into *pairs of modules* (4 SIMMs) and single modules, if any.
4. Identify each slot by its slot number and letter (0a, 0b, 1a, 1b, and so on) on the extender.
5. Install any pairs of modules as follows:
   A. Install from largest to smallest memory size.
   B. Install from lowest numbered to highest number slots.
6. When all pairs of modules have been installed, install any remaining old or new single modules:
   A. Install from largest to smallest memory size.
   B. Install from lowest numbered available slots to highest number slots.

Procedure for Single Memory Extenders — Detailed

Step 1. Remove any *single* (un-paired) modules from the memory extender.

Step 2. Combine the removed and new memory modules and organize them into three groups:
- •256MB modules
- •128MB modules and 64MB modules (combined in the same group)
- •32MB modules.

Note

Even though 128MB modules and 64MB modules are in the same group, the SIMMs for each module size cannot be mixed, i.e., **do not** combine a 64MB SIMM and a 32MB SIMM as one module.

Step 3. From each memory group, create as many *pairs of modules* (sets of 2 modules, or 4 SIMMs) as possible. A 128MB module and a 64MB module can be used as a pair of modules since they are from the same group. Set aside any remaining single modules of each size for installation last.

Remember, each module consists of 2 same-size SIMMs. Any remaining single SIMMs are "unusable."

Step 4. Locate and identify each available slot by its slot number and letter (e.g., 0a, 0b) on the memory extender. Identify the sequence of available slots from lowest to highest.

Step 5. Install any *pairs of modules* (sets of 2 modules) first.

A. Install pairs of modules in decreasing size: start with the largest memory size and end with the smallest. Within a mixed-group of 128MB and 64MB modules, install the 128MB modules first.

B. Install *pairs of modules* beginning with the lowest available slot number, then the next higher slot number. In an empty extender, for example, the first pair of modules will go in slots 0a/0b and 1a/1b; the next in 2a/2b and 3a/3b, and so on.

Step 6. Install any remaining *single modules*, starting with the largest memory size first.

Example — Installing New Memory in an Empty Extender

1. Four 128MB SIMMs = Two 256MB modules (one pair of 256MB modules)
2. Six 64MB SIMMs and two 32MB SIMMs = Three 128MB modules and one 64MB module (2 pairs of 128MB/64MB modules)
3. Two 16MB SIMMs = One 32MB module

Install. Order	Slots	Memory
First pair of modules	0a/0b	256MB module
	1a/1b	256MB module
Second pair of modules	2a/2b	128MB module
	3a/3b	128MB module
Third pair of modules	4a/4b	128MB module
	5a/5b	64MB module
Remaining single module	6a/6b	32MB module
	7a/7b	empty
Shaded boxes indicate pairs of modules		

Example — Adding Memory to a Single Extender with Existing Memory

CURRENT MEMORY: (3) 128MB modules and (2) 64MB modules					
TO BE ADDED: (1) 256MB module, (1) 128MB module, and (1) 32MB module					
BEFORE				**AFTER**	
Slots	**Memory Modules**			**Slots**	**Memory Modules**
0a/0b	128MB	1. Remove the single 64MB module from slot 4a/4b.		0a/0b	128MB
1a/1b	128MB	2. Combine the removed module and the new modules into groups: 1 256MB module 1 128MB module and 1 64MB modules (one pair of modules) 1 32MB module		1a/1b	128MB
2a/2b	128MB			2a/2b	128MB
3a/3b	64MB			3a/3b	64MB
4a/4b	64MB	3. Add the largest *pair of modules* (the only pair is the 128MB/64MB modules) to the lowest available slots (4a/4b and 5a/5b).		4a/4b	128MB
5a/5b	empty			5a/5b	64MB
6a/6b	empty	4. Add the single 256MB module to the next slot		6a/6b	256MB
7a/7b	empty	5. Add the single 32MB module to the next slot		7a/7b	32MB
Shaded boxes indicate pairs of modules					

Memory Optimization Procedure for Dual Memory Extenders — Overview

Module Installation is a 6-step process:

1. Remove any currently installed *single* memory modules.
2. Combine the removed and new memory modules and organize them into three groups:
   - 256MB modules
   - 128MB modules and 64MB modules (combined in the same group)
   - 32MB modules
3. Divide each group into *pairs of modules* (4 SIMMs) and single modules, if any.
4. Identify each available slot by its slot number and letter (e.g., 0a, 0b, 1a, 1b and so forth) on each memory extender.
5. Install any pairs of modules as follows:
   A. Install from largest to smallest memory size.
   B. Install memory by alternating *pairs of modules* between extenders.
   C. Install from lowest numbered available slots to highest number slots on the extender with the most slots available.
6. Install any remaining single modules (2 SIMMs), filling in the lowest-numbered slots on the extender with the most available slots.

Note

In the examples that follow, the extenders are labeled "first extender" and "second extender." It is also useful to refer to these as "Extender 0" and "Extender 1", corresponding to the lower and upper extender slots in the system memory bay.

Note — Adding A Memory Extender

If you are adding a new memory extender at the same time you are adding memory, you will likely need to remove and re-sequence all the memory modules from your current memory extender. Review these optimization procedures for dual memory extenders to understand the need for balancing pairs of memory modules across the two extenders.

Procedure for Dual Memory Extenders — Detailed

1. You must remove any *single* modules from each memory extender.

   If you have only one pair of memory modules in your system, and that pair has been split across the two memory extenders, you will get a "Memory not optimized" warning when you boot your system. Remove the module from one extender and add it to the module on the other extender (see Step 5 below).

Step 2. Combine the removed and new memory modules and organize them into three groups:

- •256MB modules
- •128MB modules and 64MB modules (combined in the same group)
- •32MB modules.

Note

Even though 128MB modules and 64MB modules are in the same group, the SIMMs for each module size cannot be mixed, i.e., **do not** combine a 64MB SIMM and a 32MB SIMM as one module.

Step 3. From each memory group, create as many *pairs of modules* (sets of 2 modules, or 4 SIMMs) as possible. A 128MB module and a 64MB module can be used as a pair of modules since they are from the same group. Set aside any remaining single modules of each size for installation last.

Remember, each module consists of 2 same-size SIMMs. Any remaining single SIMMs are "unusable."

Step 4. Locate and identify each available slot by its slot number and letter (e.g., 0a, 0b) on each memory extender. Identify the sequence of slots from lowest to highest.

Step 5. Install any *pairs of modules* first as follows:

A. Install modules in decreasing size: start with the largest memory size and end with the smallest. Within a mixed-group of 128MB and 64MB modules, install the 128MB modules first.

B. Install *pairs of modules* beginning with the lowest available slot number on the extender with the most slots open.

If both extenders are empty, the first pair of modules would go in slots 0a/0b and 1a/1b on the first extender; the second pair of modules would go in slots 0a/0b and 1a/1b on the second extender; the next pair of modules would go in slots 2a/2b and 3a/3b on the first extender, and so on.

Install all pairs of modules before installing single modules.

Step 6. Install any remaining individual modules, beginning with the largest memory size, filling in the

lowest available slot numbers on the extender with the most slots available.

Example - Installing new memory to two empty extenders.

1.	14 128MB SIMMs	=	Seven 256MB modules (three pairs of modules and one single 256MB module)
2.	6 64MB SIMMs and 2 32MB SIMMs	=	Three 128MB modules and one 64MB module (two pairs of 128MB/64MB modules)
3.	6 16MB SIMMs	=	Three 32MB modules (one pair of 32MB modules and one single 32MB module)

1. Start with the pairs of largest memory (three pairs of 256MB modules):
   First pair in first extender (Extender 0), slots 0a/0b and 1a/1b.
   Second pair in second extender (Extender 1), slots 0a/0b and 1a/1b.
   Third pair in first extender, slots 2a/2b and 3a/3b.
2. Now install the pairs of next-largest memory (two pairs of 128MB/64MB modules):
   First pair in the lowest slots of the extender with the most available slots: second extender, 2a/2b and 3a/3b.
   Second pair in the first extender, slots 4a/4b and 5a/5b.
3. Now install the pairs of the next-largest memory (one pair of 32MB modules) in the lowest slots of the extender with the most available slots: second extender, slots 4a/4b and 5a/5b.
4. Now install the largest single module (256MB) in the next slot in sequence: first extender, slots 6a/6b.
5. Now install the last single module (32MB) in the next slot in sequence: second extender, slots 6a/6b.

First Extender		**Second Extender**	
Install. Order	Slots - Memory	Install. Order	Slots - Memory
1	0a/0b - 256MB modules	2	0a/0b - 256MB module
	1a/1b - 256MB module		1a/1b - 256MB module
3	2a/2b - 256MB module	4	2a/2b - 128MB module
	3a/3b - 256MB module		3a/3b - 128MB module
5	4a/4b - 128MB module	6	4a/4b -32MB module
	5a/5b - 64MB module		5a/5b - 32MB module
7	6a/6b - 256MB single module	8	6a/6b - 32MB single module
	7a/7b - empty slot		7a/7b - empty slot
Shaded boxes indicate pairs of modules			

Example - Adding Memory to Two Extenders with Existing Memory	
Current Memory:	**5 256MB modules** **4 128MB modules** **1 32MB module**
Memory to be added:	**1 256MB module** **1 128MB module** **1 64MB module** **1 32MB module**

	First Extender		Second Extender	
	Slot	Memory	Slot	Memory
BEFORE	0a/0b	256MB modules	0a/0b	256MB module
	1a/1b	256MB module	1a/1b	256MB module
	2a/2b	128MB module	2a/2b	128MB module
	3a/3b	128MB module	3a/3b	128MB module
	4a/4b	256MB single module	4a/4b	32MB single module
	5a/5b - 7a/7b	empty	5a/5b - 7a/7b	empty
	Shaded boxes indicate pairs of modules			

1. Remove the single 256MB module from the first extender, slots 4a/4b. Remove the single 32MB module from the second extender, slots 4a/4b.
2. Add the removed modules to the new modules to form the following groups:
   •(2) 256MB modules (one pair of modules)
   •(1) 128MB module and (1) 64MB module (one pair of modules)
   •(2) 32MB modules (one pair of modules)
3. Install the largest-size (256MB) pair of modules in the lowest-numbered available slots (4a/4b and 5a/5b) on the extender with the most available slots. Since both extenders have the same available slots, install them on the first extender.
4. Install the next-largest (mixed 128MB/64MB) pair of modules on slots 4a/4b and 5a/5b of the second extender.
5. Install the remaining (32MB) pair of modules on the first extender in the remaining slots, 6a/6b and 7a/7b.

The final configuration is shown on the page following.

	First Extender		Second Extender	
	Slot	Memory	Slot	Memory
AFTER	0a/0b	256MB modules	0a/0b	256MB module
	1a/1b	256MB module	1a/1b	256MB module
	2a/2b	128MB module	2a/2b	128MB module
	3a/3b	128MB module	3a/3b	128MB module
	4a/4b	256MB module	4a/4b	128MB module
	5a/5b	256MB module	5a/5b	64MB module
	6a/6b	32MB module	6a/6b	empty
	7a/7b	32MB module	7a/7b	empty
	Shaded boxes indicate pairs of modules			

PageA-10 contains blank memory configuration tables that can be used for laying out your own memory configuration changes.

If You Still Get Warning Messages...

The configuration guidelines presented in this chapter will successfully optimize most combinations of memory modules. It is still possible, however, when adding memory to already-configured memory on two extenders, to meet these guidelines and still generate a warning that your memory is not optimized. If that happens, remove *all* memory modules from both extenders and re-install them following the guidelines provided.

If the **Memory not optimized** warnings persist, contact your HP Support representative if assistance is required.

Blank Memory Configuration Tables

Extender 0		Extender 1	
Slot	Memory	Slot	Memory
0a/0b		0a/0b	
1a/1b		1a/1b	
2a/2b		2a/2b	
3a/3b		3a/3b	
4a/4b		4a/4b	
5a/5b		5a/5b	
6a/6b		6a/6b	
7a/7b		7a/7b	

Extender 0		Extender 1	
Slot	Memory	Slot	Memory
0a/0b		0a/0b	
1a/1b		1a/1b	
2a/2b		2a/2b	
3a/3b		3a/3b	
4a/4b		4a/4b	
5a/5b		5a/5b	
6a/6b		6a/6b	
7a/7b		7a/7b	

B

Power Options for Racked Systems
HP 3000 979KS

Power Requirements

Changes have be made to the Power Distribution Unit (PDU) associated with the A1884A 1.6 meter cabinet to accomodate power requirements for HP3000 979KS systems. A new 20 amp receptacle has been added to accomodate the new power cord for the 979KS.

A retrofit kit (A3693A) is available for systems already installed in cabinets without the new PDU.

The matrix of PDU options and installation kits is shown in Table B-1.

All options are 200-240V.

Table B-1. PDU Option/Kit Matrix

OPT.	A3693A Field Retrofit	E4456B PDU Upgrade	E4457B PDU Upgrade	E5929 PDU Upgrade	A1884A Cabinet
ABA	Switched PDU w/ L620P 8120-6884 pwr cord	Switched PDU w/ L620P	N/A	N/A	Switched PDU w/ L620P
ABB	Switched PDU w/ pigtail cord	N/A	Switched PDU w/ pigtail cord	N/A	Switched PDU w/ pigtail cord
021	8120-6884 power cord 8120-6884 cord for PDU to UPS	N/A	N/A	Non-switched PDU w/ C19 8120-6884 cord for PDU to UPS	8120-6884 cord for PDU to UPS
022	8120-6884 power cord 8120-8351 cord for PDU to UPS	N/A	N/A	Non-switched PDU w/ L630P 8120-8351 cord for PDU to UPS	8120-8351 cord for PDU to UPS
023	8120-6884 power cord 8120-6357 cord for PDU to UPS	N/A	N/A	Non-switched PDU w/ pigtail 8120-6357 cord for PDU to UPS	8120-6357 cord for PDU to UPS
Install. Kit	E7685 (ABA/ABB) E7686A (021/ 022/ 023)	E7685A	E7685A	E7686A	Pre-installed

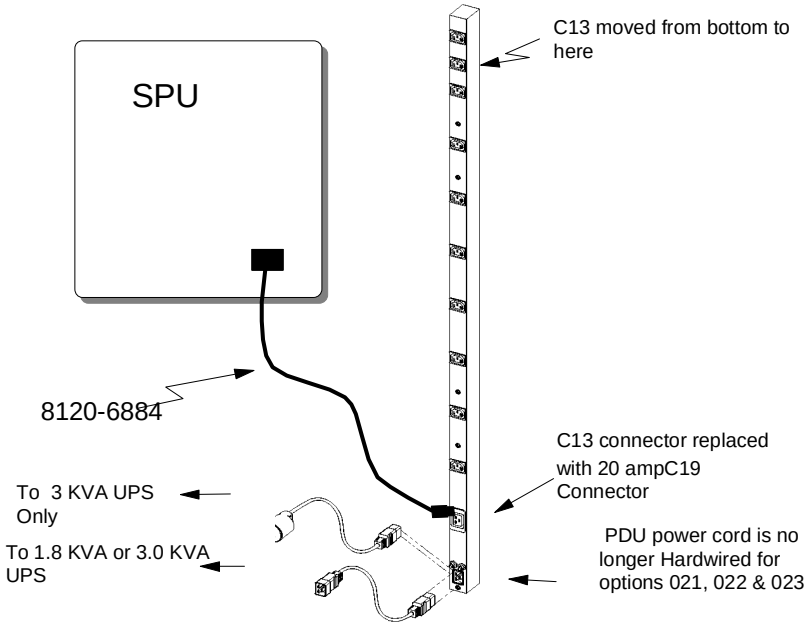


Figure B-1 PDU for Options 021, 022, 023

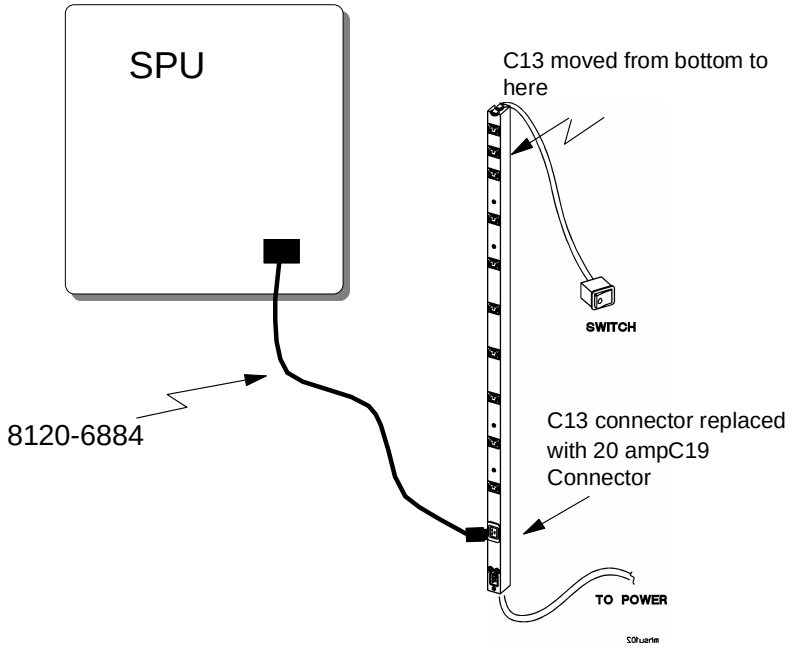


Figure B-2 PDU for Options ABA, ABB

Installation Instructions

General Information

The PDU Installation Kit enables you to mount a Hewlett-Packard Power Distribution Unit (PDU) in a computer cabinet or instrument rack. This kit is required if the rack is not already equipped with an HP PDU, or if you want to install a switched PDU in a rack containing an unswitched UPS PDU. Each Installation Kit allows the installation of up to two PDUs. Computer cabinets are designed to house two PDUs only.

Tools Needed

To install the Power Distribution Unit Kit, you will need the following tools:

•T25 Torx® tool (P/N 8710-1817).
•Wrench or nutdriver to fit 0.375" hex nut

Note

Installation of a first PDU requires the purchase of any one PDU installation kit, P/N E4472A/E7685A/E7686A. This kit provides hardware and rack components required to complete the installation. Installation of a second PDU does not require this kit.

E4456B, E4457B, and E5929A Kit Contents

The E4456B, E4457B, and E5929A PDU Kits contain the following:

Table B-2. Kit Contents

Item #	Qty	Description	Kit Number	Part Number
1	1	PDU–1.6 m, 200-240V L6-20P w/IEC rept. PDU–1.6 m, 200-240V European w/IEC rept. PDU–1.6 m UPS, 120/240V Universal *	E4456B E4457B E5929A	E4456-63001 E4457-63001 E5929-63001
2	3	Screw, Machine Torx® T25—10-32 x 0.5"		2680-0278
3	2	Washer–External Tooth, #10		2190-0565
4	1	Nut–Hex w/Ext. Tooth Lockwasher, 10-32		2740-0003
5	1	Cable Assembly–Ground		C2786-60065
6	1	Installation Guide–PDU		5957-8464
7	1	Warning Sheet for E5930A-5933A UPS-PDU		5957-8456

See Table B-1 for the correct type of power cords to be used.

General Installation Information

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

Table B-3.

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

A shaded cell means that the step applies.

Installation Procedure

Step		A	B	C	D	E	F
1	Turn off power to the cabinet or rack and disconnect the power cord from the PDU.						

WARNING

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

Step		A	B	C	D	E	F
2	Remove the two screws securing the Top Cap to the frame at the rear of the cabinet or rack, slide the Top Cap towards the rear, and lift off the Top Cap completely. See Figure B-3.						

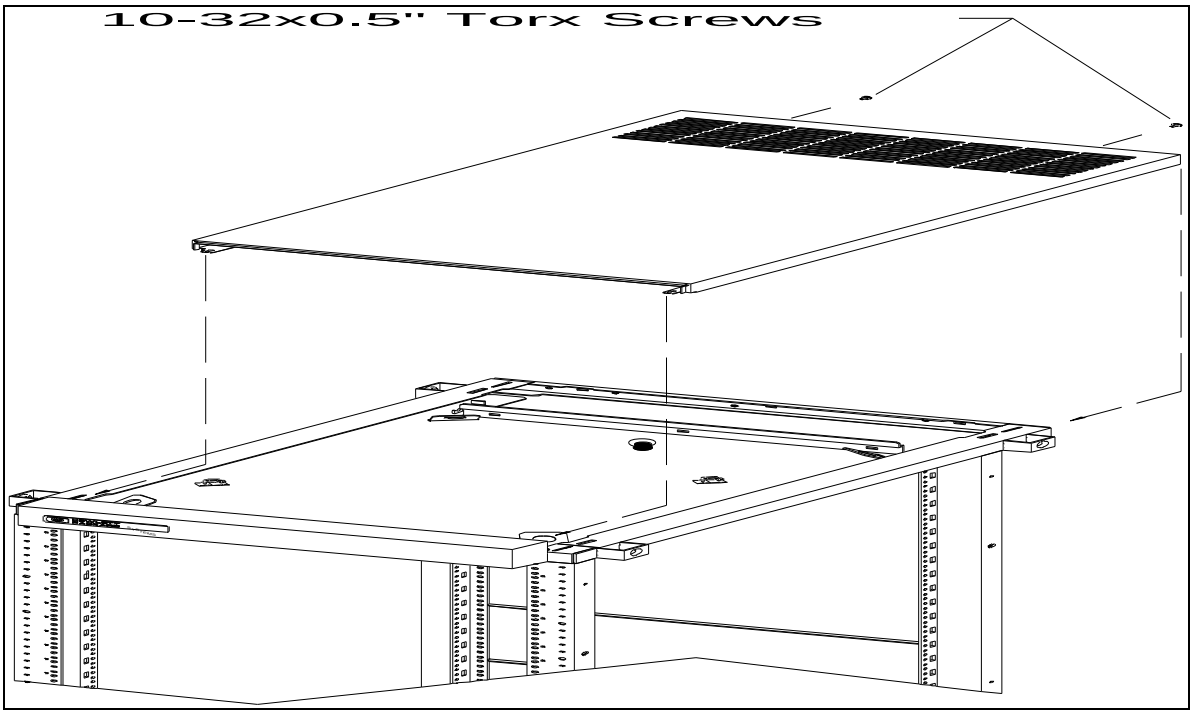


Figure B-3 Removing the Top Cap

Step		A	B	C	D	E	F
3	If your cabinet or rack is configured with a rear door, open the door and remove the four screws securing the Side Cover to the Rear Door Hinges.						

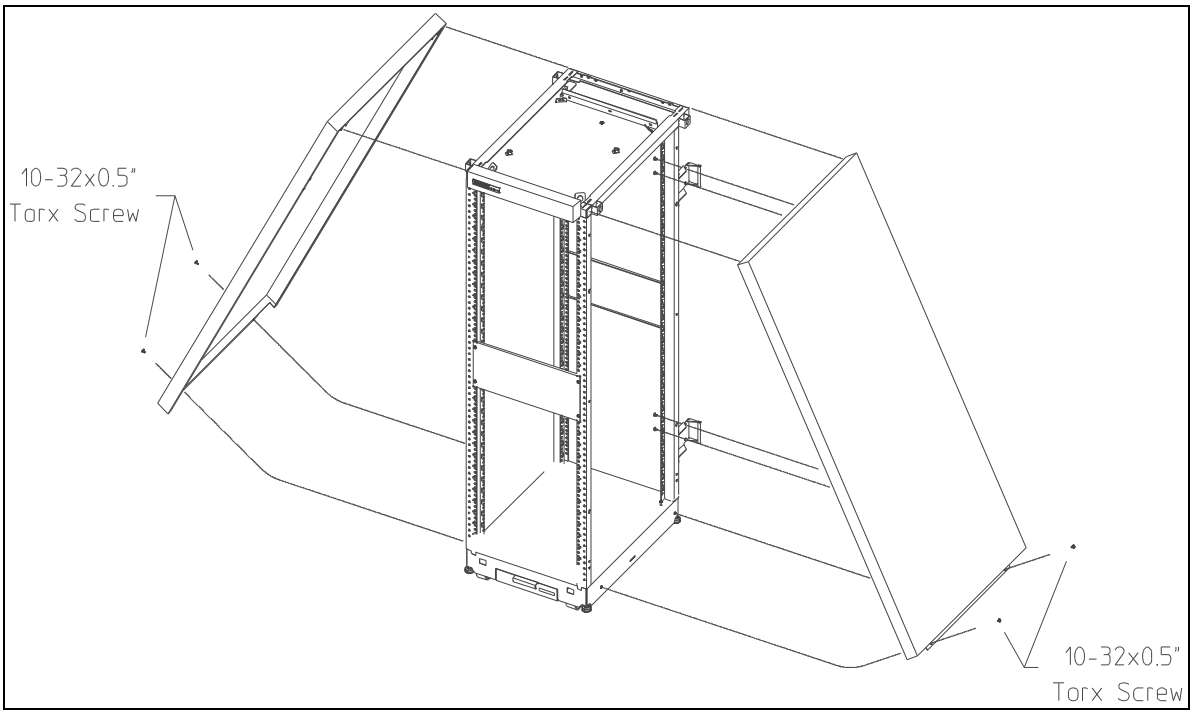


Figure B-4 Removing the Side Covers

Step		A	B	C	D	E	F
4	Remove the two screws securing the Side Cover at the base of the cabinet or rack. Lift the Side Cover slightly up and remove completely. See Figure B-4						

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 B-5.						

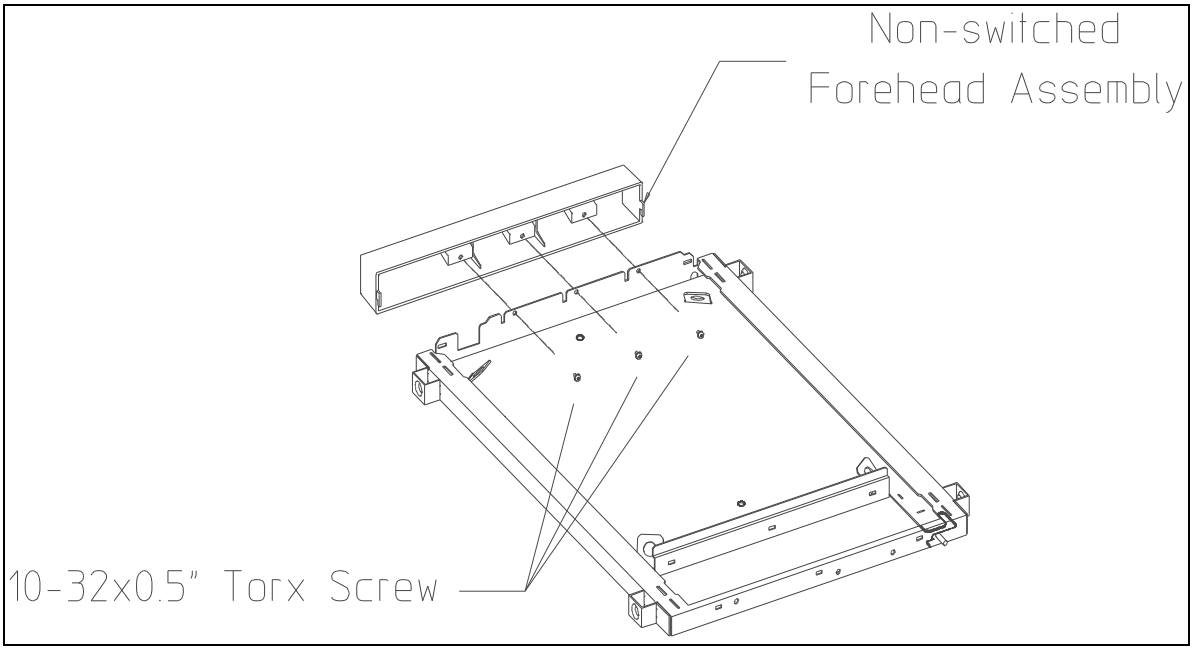


Figure B-5 Removing the Forehead Assembly

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 tables below). Attach the two PDU Brackets using four 10-32 x 0.5" machine screws. See Figure B-6 and Figure B-7. Use Table B-4. on page B-8 for the correct placement of the Tinnerman nuts (clip nuts).						

Table B-4. Tinnerman Placement

Tinnerman Placement			
Kit	**Top PDU Bracket**	**Bottom PDU Bracket**	**Door Catch**
E7685A	7th Increment Mark	25th Increment Mark	13th Increment Mark
E7686A	10th Increment Mark	25th Increment Mark	13th Increment Mark

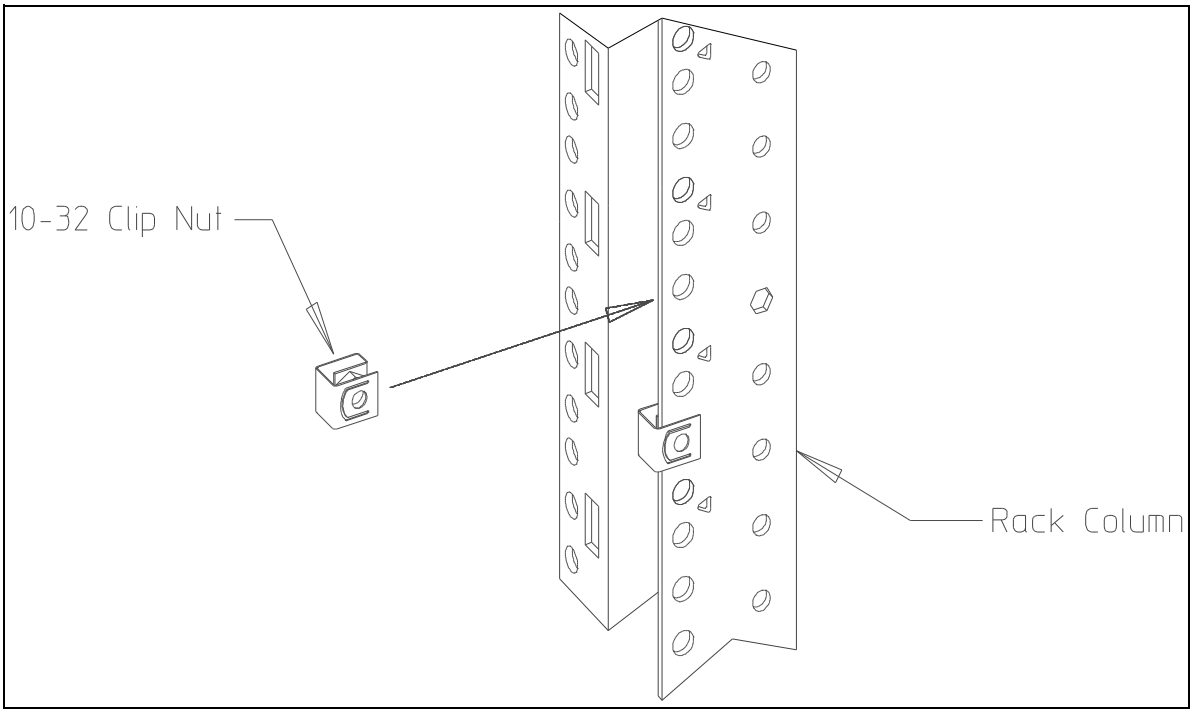


Figure B-6 Attaching Sheet Metal Nuts to the Column

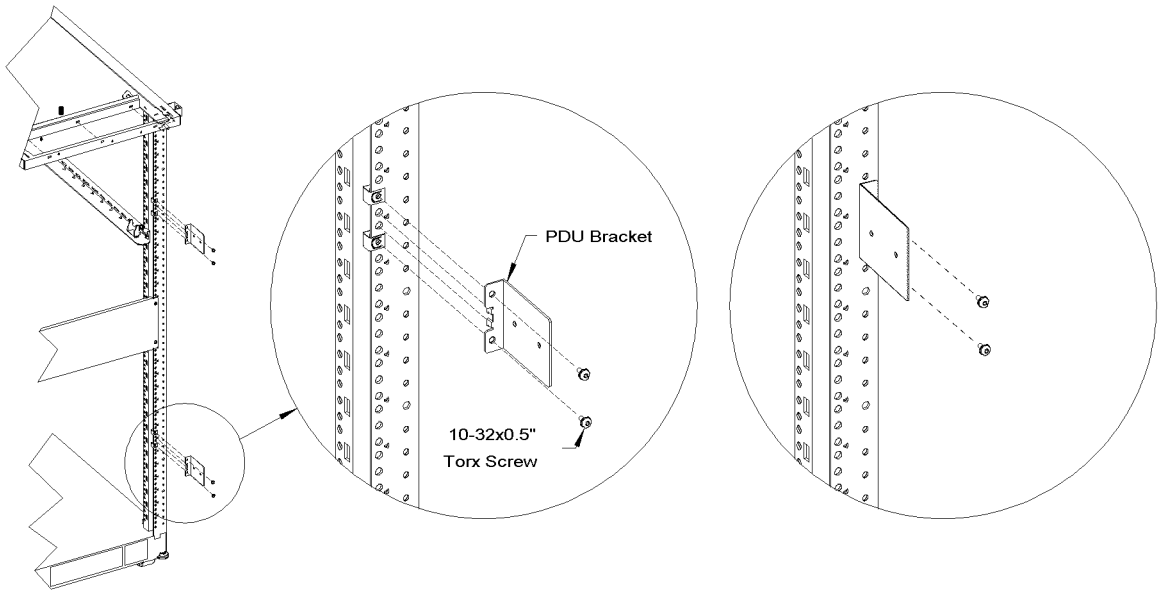


Figure B-7 Attaching the PDU Brackets

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 or 10-32 Pozi screws with hex nuts and supplied washers from your PDU kit (E7686A). 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 or 10-32 Pozi screws with hex nuts and supplied washers from your PDU kit (E7686A). See Figure B-8.						

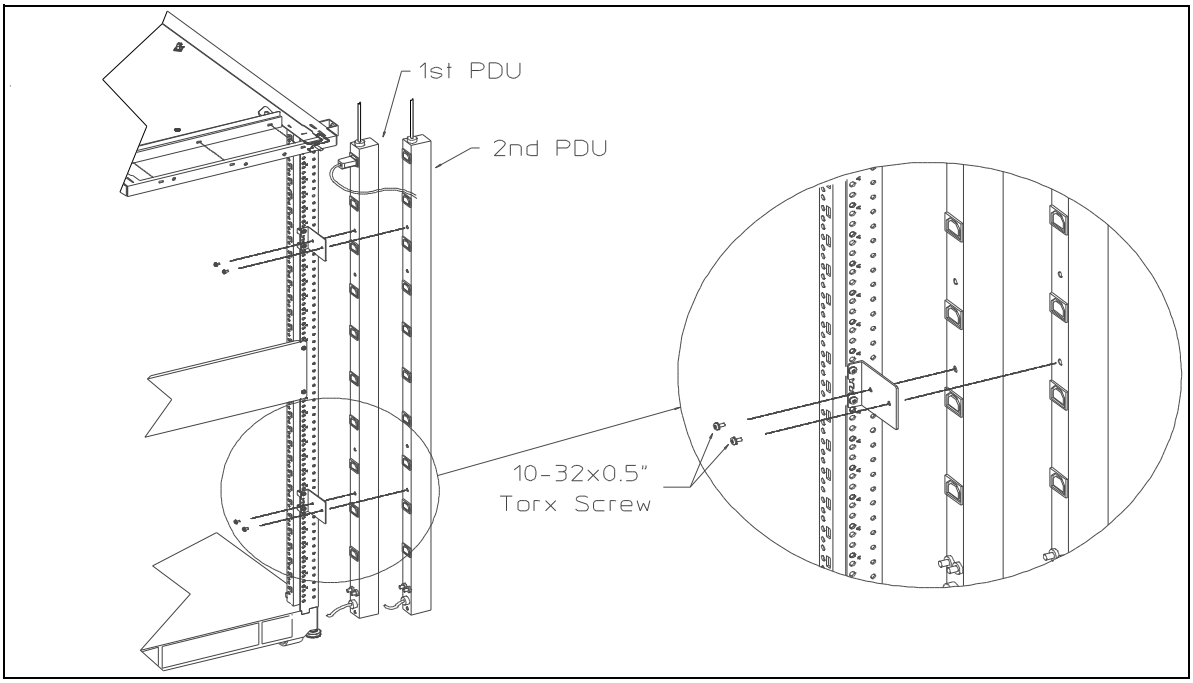


Figure B-8 Attaching the PDUs

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 No. 10 External Tooth Starwasher and one 10-32 x 0.5" machine screw. Make sure the washer is between the PDU and the connector of the cable assembly. Ensure the cable does not block the PDU receptacles and that the cable is not pinched. See Figure B-9.						

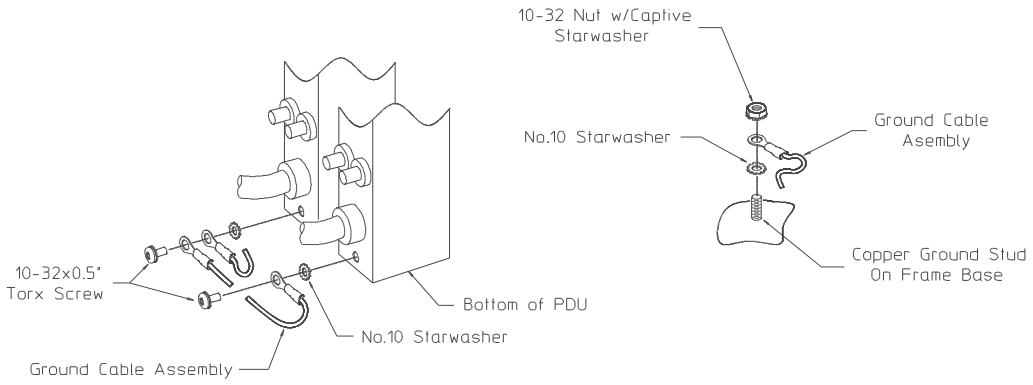


Figure B-9 Attaching the Ground Cable Assembly

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.

Attention

For E5929A only; use the GripTie (velcro) to loop the tie around the power cord above the C-19 outlet plug, then loop the rest of the velcro around the PDU. Use the second GripTie to secure the cord to the PDU.

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 cabinet or rack (there are four located on the base). Use a 10-32 Nut with an external tooth captive washer and a No. 10 External Tooth Starwasher to secure the cable assembly to the ground stud. Again, the No. 10 Starwasher 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 B-9.)						

Step		A	B	C	D	E	F
10	Route the PDU Switch Cable Harness up through the provided channel at the top of the cabinet or rack and secure the cable harness with the pre-mounted cable clips. See Figure B-10.						

Step		A	B	C	D	E	F
11	Take the PDU Power Switch that was provided in your PDU Kit and align the switch so that the green LED is toward the right side (if viewed from the front), and snap it into the Forehead Assembly that was provided in the PDU Installation Kit. See Figure B-10.						

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

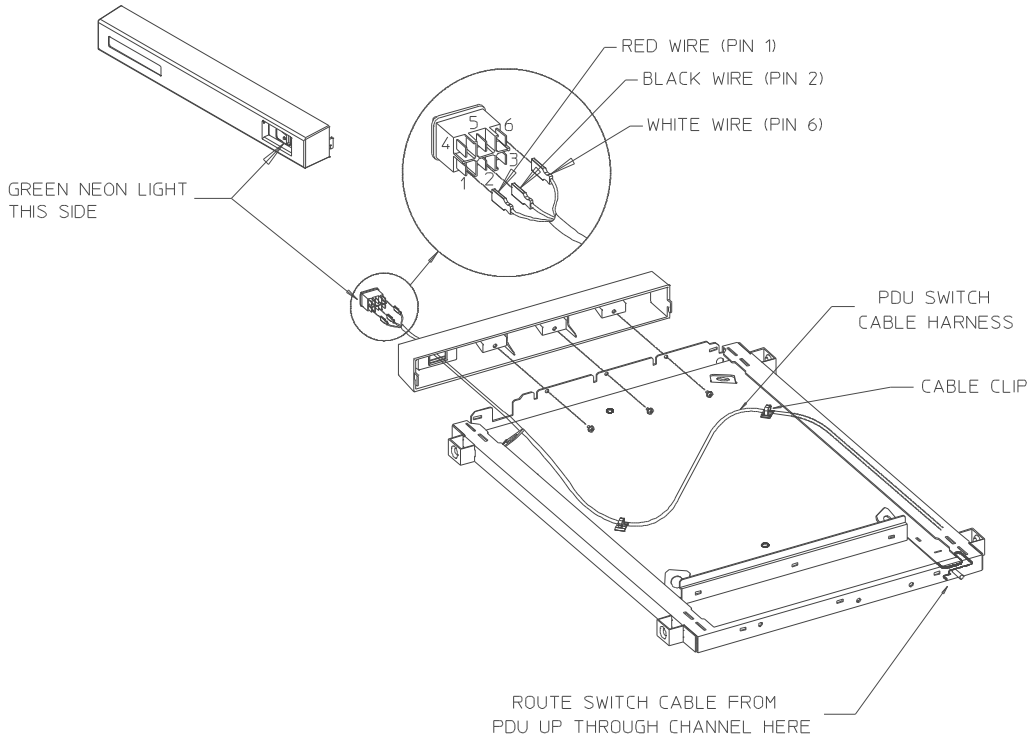


Figure B-10 Configuring the Forehead Assembly

Step		A	B	C	D	E	F
13	Connect the PDU Switch Cable Harness to the PDU Power Switch. Make sure the connectors slide completely onto the spade terminals on the back of the switch. See Figure B-11.						

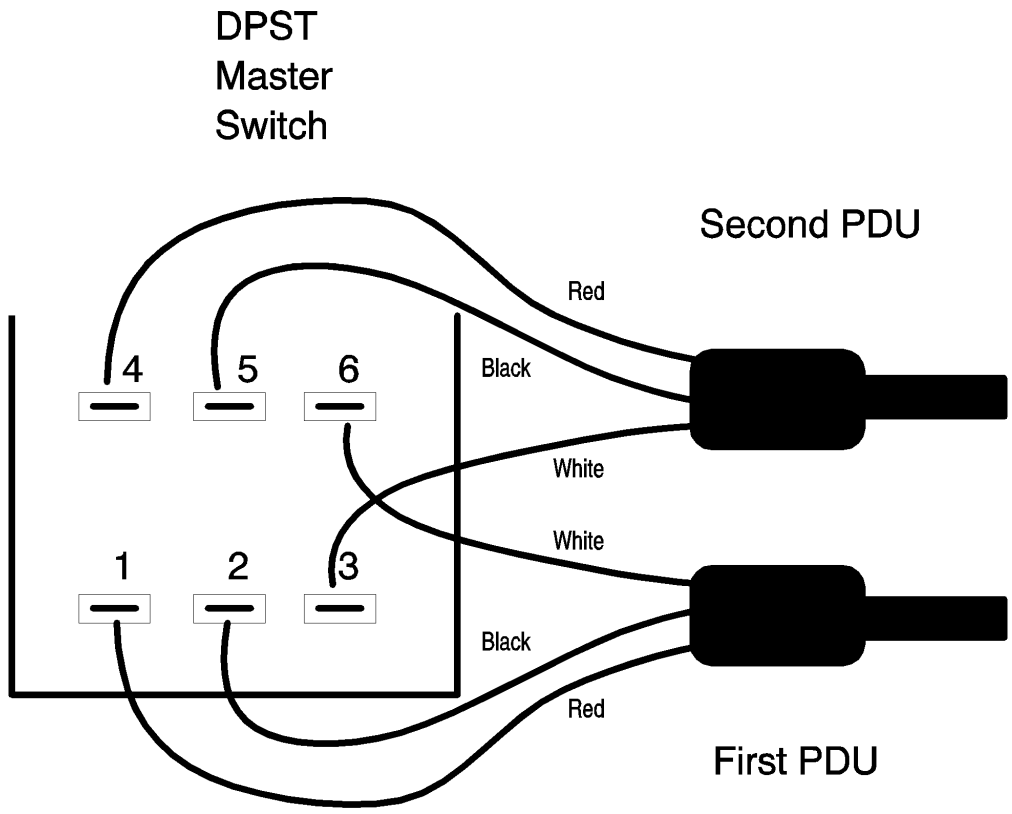


Figure B-11 Main Power Switch Connection

CAUTION

Connections from 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.

Step		A	B	C	D	E	F
14	Reassemble the cabinet or rack 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 cabinet or rack.						

This completes installation of the Power Distribution Unit Kit.