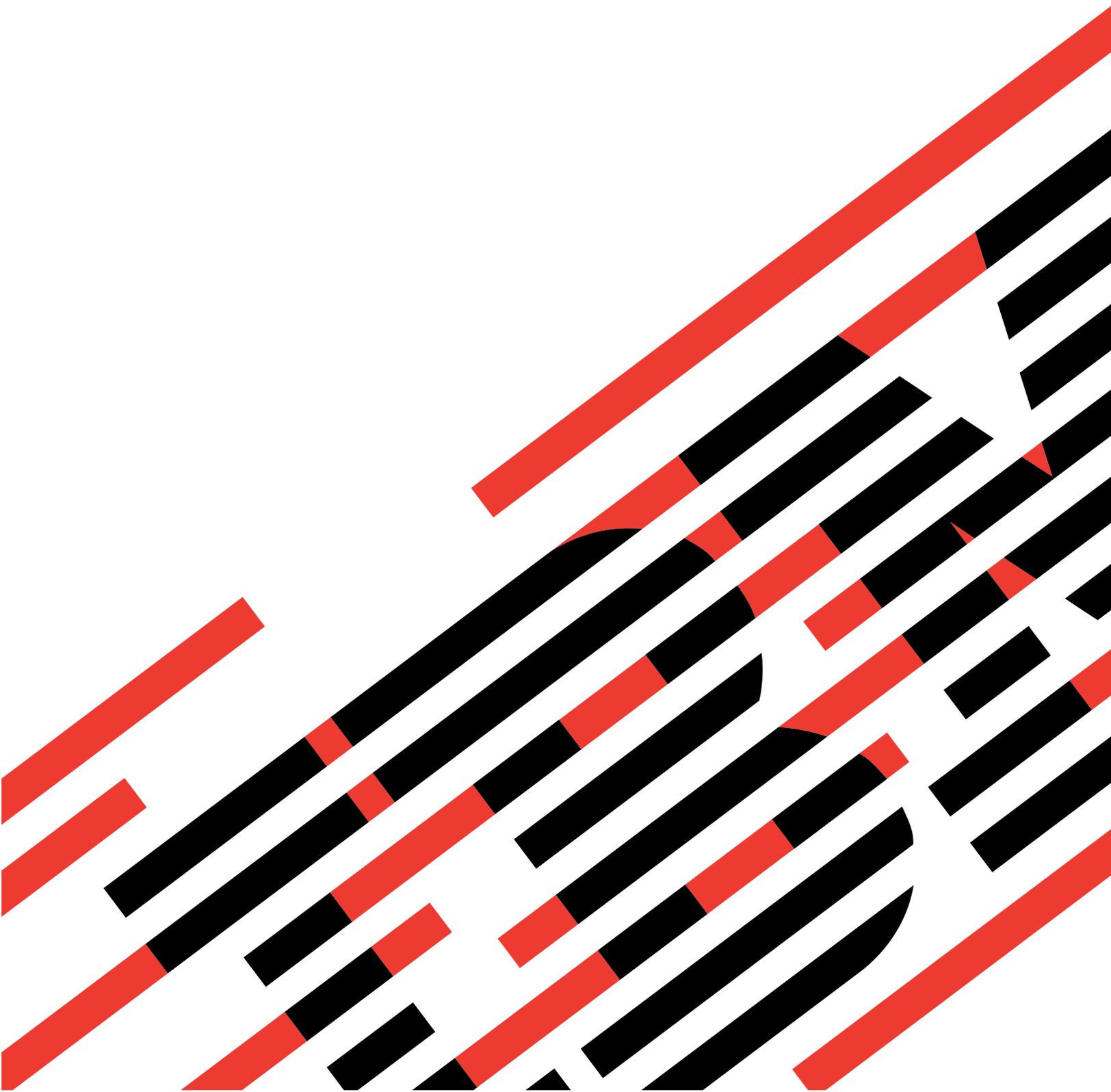




pSeries 655
Installation Guide

SA38-0616-01





@server

pSeries 655
Installation Guide

SA38-0616-01

Second Edition (November 2002)

Before using this information and the product it supports, read the information in “Safety Notices” on page vii, Appendix B, “Environmental Notices”, on page 53, and Appendix C, “Notices”, on page 55.

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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:

- vii
- viii
- 5
- 22

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:

- viii
- ix
- 5
- 11
- 39
- 41
- 43
- 44
- 46
- 47
- 93

For a translation of the safety notices contained in this book, see the *System Unit Safety Information*.

Electrical Safety

The following safety instructions appear throughout this document:

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.

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 communications lines.

D06

CAUTION:

This unit weighs between 32 kg (70.5 pounds) and 55 kg (121.2 pounds). Three persons are required to safely move it. Using less than three persons to move it can result in injury.

C05

CAUTION:

This product is equipped with a four-wire (three-phase and ground) power cable for the user's safety. Use this power cable with a properly grounded electrical outlet to avoid electrical shock.
C27

DANGER

This system has redundant power supply capabilities, meaning that it has the ability to have two power supplies running simultaneously in the same system unit. When instructed to disconnect the power source, ensure that all power cables have been unplugged.
D07

DANGER

To prevent electrical shock hazard, disconnect all power cables from the electrical outlet before relocating the system.
D01

CAUTION:

This unit has more than one power supply cord. Follow procedures for removal of power from the system when directed.
C28

CAUTION:

Energy hazard, remove power before servicing.
C22

CAUTION:

Energy hazard, remove all jewelry before servicing.
C29

CAUTION:

Do not touch the receptacle or the receptacle faceplate with anything other than your test probes before you have met the requirements in step 8.
C02

CAUTION:

If the reading is other than infinity, do not proceed! Have the customer make necessary wiring connections before continuing. Do not turn on the branch circuit CB until all the above steps are satisfactorily completed.
C03

DANGER

During an electrical storm, do not connect cables for display stations, printers, telephones, or station protectors for communications lines.
D12

CAUTION:

This unit weighs between 18 kg (39.7 pounds) and 32 kg (70.5 pounds). Two persons are required to safely move it. Using less than two persons to move it can result in injury.
C04

Laser Safety Information

CAUTION:

This product may contain a CD-ROM, DVD-ROM, or laser module on a PCI card, which are class 1 laser products.

C30

Laser Compliance

All Lasers are certified in the U.S. to conform to the requirements of DHHS21 CFR Subchapter J for class 1 laser products. Outside the U.S., they are certified to be in compliance with the IEC 60825 as a class 1 laser product. Consult the label on each part for laser certification numbers and/or approval information.

CAUTION:

All IBM laser modules are designed so that there is never any human access to laser radiation above a class 1 level during normal operation, user maintenance, or prescribed service conditions. Data processing environments can contain equipment transmitting on system links with laser modules that operate at greater than class 1 power levels. For this reason, never look into the end of an optical fiber cable or open receptacle. Only trained service personnel should perform the inspection or repair of optical fiber cable assemblies and receptacles.

C25, C26

Data Integrity and Verification

IBM computer systems contain mechanisms designed to reduce the possibility of undetected data corruption or loss. This risk, however, cannot be eliminated. Users who experience unplanned outages, system failures, power fluctuations or outages, or component failures must verify the accuracy of operations performed and data saved or transmitted by the system at or near the time of the outage or failure. In addition, users must establish procedures to ensure that there is independent data verification before relying on such data in sensitive or critical operations. Users should periodically check the IBM support websites for updated information and fixes applicable to the system and related software.

About This Book

This book provides information on how to set up and cable the system, install additional processors and subsystems, and verify system operation.

ISO 9000

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

Highlighting

The following highlighting conventions are used in this book:

Bold	Identifies commands, subroutines, keywords, files, structures, directories, and other items whose names are predefined by the system. Also identifies graphical objects such as buttons, labels, and icons that the user selects.
<i>Italics</i>	Identifies parameters whose actual names or values are to be supplied by the user.
Monospace	Identifies examples of specific data values, examples of text similar to what you might see displayed, examples of portions of program code similar to what you might write as a programmer, messages from the system, or information you should actually type.

Accessing Information

Documentation for the IBM @server pSeries is available online. Visit the IBM @server pSeries Information Center at http://publib16.boulder.ibm.com/pseries/en_US/infocenter/base.

- To access the pSeries publications, click **Hardware documentation**.
- To view information about the accessibility features of @server pSeries hardware and the AIX operating system, click **AIX and pSeries accessibility**.

References to AIX Operating System

This document may contain references to the AIX operating system. If you are using another operating system, consult the appropriate documentation for that operating system.

This document may describe hardware features and functions. While the hardware supports them, the realization of these features and functions depends upon support from the operating system. AIX provides this support. If you are using another operating system, consult the appropriate documentation for that operating system regarding support for those features and functions.

Related Publications

The following publications provide related information:

- The *System Unit Safety Information*, order number SA23-2652, contains translations of safety information used throughout this book.
- The *IBM Hardware Management Console for pSeries Installation and Operations Guide*, order number SA38-0590, provides information to system administrators on how to install and use a Hardware Management Console (HMC) to manage a system.
- The *IBM Hardware Management Console for pSeries Maintenance Guide*, order number SA38-0603, provides information to the service representative for repairing the HMC.
- The *@server pSeries 655 Service Guide*, order number SA38-0618, contains reference information, maintenance analysis procedures (MAPs), error codes, removal and replacement procedures, and a parts catalog.
- The *@server pSeries 655 User's Guide*, order number SA38-0617, contains information on how to use the system, use diagnostics, use service aids, and verify system operations.
- The *RS/6000 and @server Diagnostic Information for Multiple Bus Systems*, order number SA38-0509, contains diagnostic information, service request numbers (SRNs), and failing function codes (FFCs).
- The *RS/6000 and @server Adapters, Devices and Cable Information for Multiple Bus Systems*, order number SA38-0516, contains information about adapters, devices, and cables for your server. This manual is intended to supplement the service information found in the *Diagnostic Information for Multiple Bus Systems*.
- The *PCI Adapter Placement Reference*, order number SA38-0538, contains information regarding slot restrictions for adapters that can be used in this system.
- The *Site and Hardware Planning Information*, order number SA38-0508, contains information to help you plan your installation.
- The *Electronic Service Agent for pSeries and RS/6000 User's Guide*, order number LCD4-1060, contains information on using the Electronic Service Agent.
- The *61D and 61R Upgrade Installation Guide*, order number SA23-1281, contains information about how to install additional I/O drawers in a rack.
- The *AIX Installation Guide and Reference*, order number SC23-4389, describes how to install systems, to use a network server, and to install the operating system or diagnostics on systems connected to a network.
- The *AIX 5L Installation in a Partitioned Environment*, order number SC23-4390, provides information about installing AIX in a partitioned environment.
- The *@server Cluster 1600 Hardware Planning, Installation, and Service Guide*, order number GA22-7863 provides information for planning, installation and service for clustered system environments.

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- AIX
- AIX 5L Electronic Service Agent
- @server
- IBM
- pSeries
- RS/6000

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Chapter 1. Reference Materials

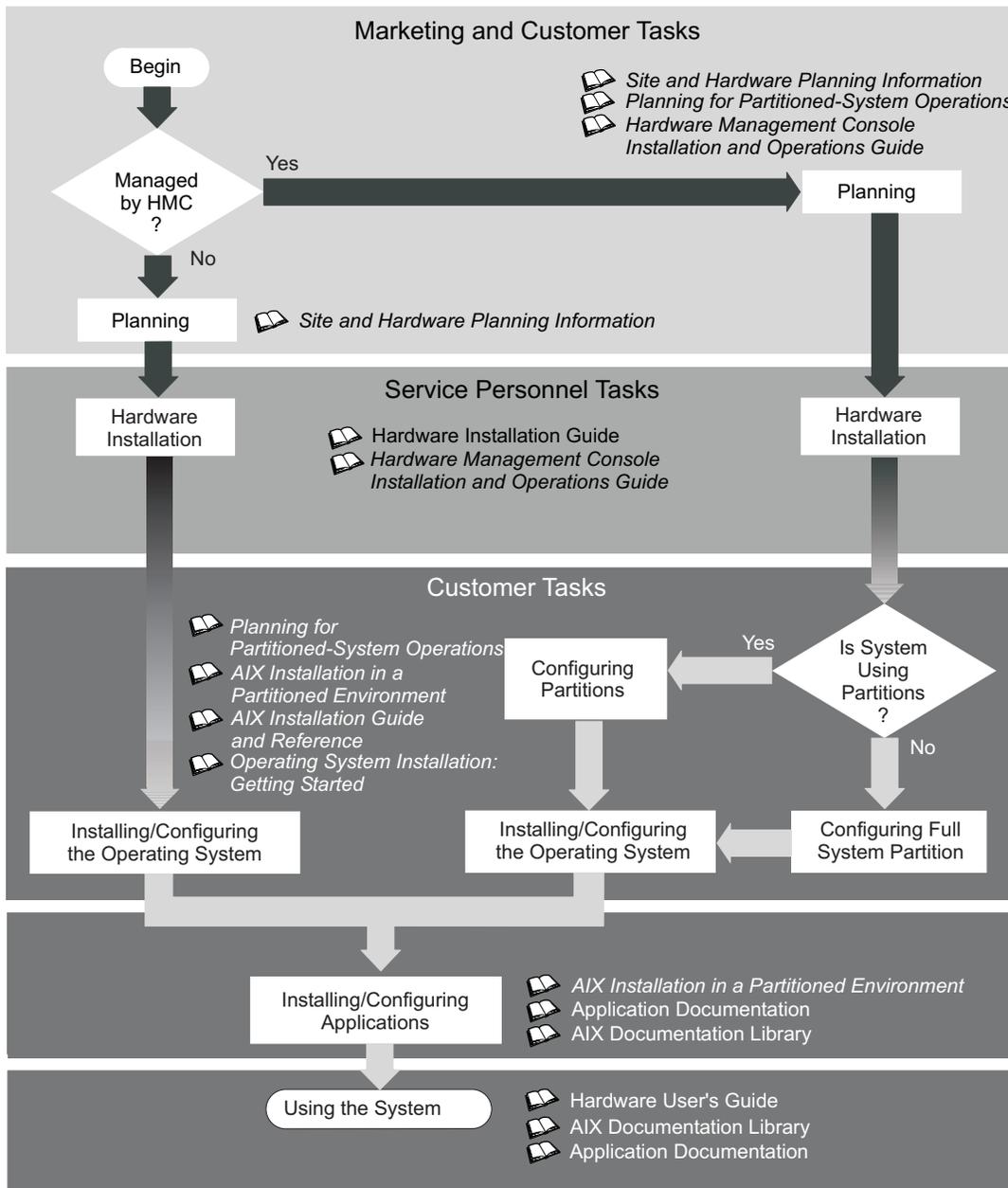
Note: This document may contain references to the AIX operating system. If you are using another operating system, consult the appropriate documentation for that operating system.

This document may describe hardware features and functions. While the hardware supports them, the realization of these features and functions depends upon support from the operating system. AIX provides this support. If you are using another operating system, consult the appropriate documentation for that operating system regarding support for those features and functions.

This chapter helps you get started with installing and configuring the @server pSeries environment. The following information is included in the chapter:

- @server pSeries Roadmap
- Documentation Overview - Brief description of the printed and softcopy documentation shipped including targeted audience

The following @server pSeries Roadmap helps you locate marketing, service, and customer task information. The roadmap guides you through the tasks and the publications that document those tasks.



The publications listed in this section are available online. To access the online books, visit our IBM @server pSeries Information Center at http://publib16.boulder.ibm.com/pseries/en_US/infocenter/base.

Documentation Overview

This section provides descriptions and target audience information for the @server pSeries and AIX 5L documentation libraries. Some of the documentation may only be available in printed form or in softcopy form. Based on the documentation content, the books are divided into the following categories: **Planning**, **Installing and Configuring**, and **Using the System**.

Table 1. Planning

Documentation Title	Description	Audience	Type
<i>Site and Hardware Planning Information</i>	Contains information to help plan for site preparation tasks, such as floor-planning, electrical needs, air conditioning, and other site-planning considerations.	Marketing, system administrators	softcopy
<i>Planning for Partitioned-System Operations</i>	Describes planning considerations for partitioned systems, including information on dynamic partitioning and Capacity Upgrade on Demand.	System administrators	printed and softcopy
<i>Hardware Management Console for pSeries Installation and Operations Guide</i>	Provides information on how to install, configure, and use a Hardware Management Console (HMC). Logical partition (LPAR) tasks, such as configuring and managing partitions on multiple host servers, are included.	System administrators	printed and softcopy

Table 2. Installing and Configuring

Documentation Title	Description	Audience	Type
Hardware Installation Guide	Provides information on how to install system hardware, cable the system, and verify operations.	Service personnel	printed and softcopy
<i>Planning for Partitioned-System Operations</i>	Describes planning considerations for partitioned systems, including information on dynamic partitioning and Capacity Upgrade on Demand.	System administrators	printed and softcopy
<i>Hardware Management Console for pSeries Installation and Operations Guide</i>	Provides information on how to install, configure, and use a Hardware Management Console (HMC). Logical partition (LPAR) tasks, such as configuring and managing partitions on multiple host servers, are included.	System administrators	printed and softcopy
<i>AIX Installation in a Partitioned Environment</i>	Provides information on how to install the AIX operating system in an LPAR environment.	System administrators	printed and softcopy
<i>AIX Operating System Installation: Getting Started</i>	Provides information on how to install and configure the AIX operating system on a standalone system using a CD-ROM device.	System administrators	printed and softcopy
<i>AIX 5L Installation Guide and Reference</i>	Provides information on installing the AIX 5L operating system on standalone systems, as well as on client systems using the Network Installation Management (NIM) interface.	System administrators	printed and softcopy
<i>PCI Adapter Placement Reference</i>	Outlines system-specific PCI adapter slot placement and adapter support configurations.	Service personnel	printed
<i>AIX 5L Release Notes</i>	Provides late-breaking information for a specific AIX release.	System administrators	printed and softcopy
<i>AIX 5L Documentation CD</i>	AIX documentation library (system management guides, user guides, application programmer guides, commands and files references, AIX man pages, and so on).	System administrators	softcopy

Table 3. Using the System

Documentation Title	Description	Audience	Type
<i>Hardware Management Console for pSeries Installation and Operations Guide</i>	Provides information on how to install, configure, and use a Hardware Management Console (HMC). Logical partition (LPAR) tasks, such as configuring and managing partitions on multiple host servers, are included.	System administrators	printed and softcopy
Hardware User's Guide	Provides using, problem determination, and service processor information.	System administrators	printed and softcopy
<i>Diagnostic Information for Multiple Bus Systems</i>	Combines operating instructions for hardware diagnostic programs with common MAPs and SRNs (Service Request Numbers).	Service personnel	printed and softcopy
<i>PCI Adapter Placement Reference</i>	Outlines system-specific PCI adapter slot placement and adapter support configurations.	Service personnel	printed
<i>Hardware Management Console for pSeries Maintenance Guide</i>	Contains MAPs, removal and replacement, error code, and parts information to help diagnose and repair the system.	Service personnel	printed and softcopy
<i>Adapters, Devices, and Cable Information for Multiple Bus Systems</i>	Provides information about adapters, devices, and cables that are attached to or used within the system.	System administrators	printed and softcopy
<i>System Unit Safety Information</i>	Contains the English version of safety notices, as well as translations of those safety notices into other languages.	System administrators, service personnel	printed and softcopy
<i>AIX 5L Documentation CD</i>	AIX documentation library (system management guides, user guides, application programmer guides, commands and files references, AIX man pages, and so on).	System administrators	softcopy

Chapter 2. Installing the pSeries 655

DANGER

This system has redundant power supply capabilities, meaning that it has the ability to have two power supplies running simultaneously in the same system unit. When instructed to disconnect the power source, ensure that all power cables have been unplugged.

D07

Customer Responsibility for Site Preparation

Attention: Before installing the system, refer to the *Site and Hardware Planning Information*. Observe the requirements in the *Site and Hardware Planning Information* relating to system weight, noise emissions, power, and cooling.

The customer is responsible for consulting with a qualified licensed structural engineer to determine if the building concrete subfloor can withstand the floor loading specified in the *Site and Hardware Planning Information*.

For detailed information about securing the rack at the installation site, refer to Appendix F, “Securing the Rack”, on page 73.

Service Representative Responsibilities for Installation

Service representatives should use the information presented in this chapter and Appendix D, “pSeries 655 Description and Overview”, on page 57 to become familiar with the pSeries 655 Model 651 processor subsystem (machine type 7039), referred to in this publication as the *processor subsystem*.

The procedures in this chapter describe how to:

- Set up the system
- Determine weight-reduction requirements to move the system to its installation site
- Determine the system configuration and whether weight reduction is required. (See Appendix D, “pSeries 655 Description and Overview”, on page 57 and “Weight Reduction” on page 6.)
- Connect and configure the Hardware Management Console (HMC) to the system(s) for use in the installation procedures.

Step 1. Observe this Safety Notice During Installation

CAUTION:

This unit weighs between 32 kg (70.5 pounds) and 55 kg (121.2 pounds). Three persons are required to safely move it. Using less than three persons to move it can result in injury.

C05

CAUTION:

This product is equipped with a four-wire (three-phase and ground) power cable for the user’s safety. Use this power cable with a properly grounded electrical outlet to avoid electrical shock.

C27

CAUTION:

This unit has more than one power supply cord. Follow procedures for removal of power from the system when directed.

C28

CAUTION:

Energy hazard, remove all jewelry before servicing.

C29

Step 2. Check the Prerequisites to Installing the System

Before installing the system, ensure that the following have been completed:

- The rack doors (front and rear) are available
- Planning procedures outlined in *Site and Hardware Planning Information* have been reviewed and implemented

Attention: If the system will weigh more than 1136 kg (2500 lbs.) at the installation location, the weight distribution plate must be installed on the rack. Refer to “Install the Weight Distribution Plate” on page 80 for installation instructions for the weight plate.

Weight Reduction

Certain system configurations may include a rack that weighs in excess of 1136 kg (2500 lbs.) (doors removed) as shipped from manufacturing. Some elevators have a weight restriction that prevents lifting these systems. To reduce the weight of affected systems to less than 1136 kg (2500 lbs.), service personnel must remove the integrated battery features (IBFs) and some processor subsystems and I/O subsystems installed in the system rack. This weight reduction is only required for these systems when the installation process requires the rack to be reduced temporarily to less than 1136 kg (2500 lbs.).

For instructions on removing and replacing the components, see Chapter 5, “Removal and Installation Procedures”, on page 39.

Configurations affected by this weight limitation consist of systems having the 7040 Model W42 frame with:

- Eight or more processor subsystems
- Three or more I/O subsystems
- Two or three IBFs

Recommended Order for Removing Components for Weight Reduction

The recommended order for removing components to reduce weight is as follows:

1. Remove all IBFs.
2. Remove processor subsystems or I/O subsystems starting from the top position and working down the rack.

Determine the Number of Components to Remove

Use the following tables to determine the number of IBFs and/or processor subsystems to remove to reduce system weight to a maximum of 1136 kg (2500 lbs.).

The following table lists the total weight for systems with the integrated battery feature and without doors.

		Number of Processor Subsystems															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
I/O	0	587 (1292)	642 (1412)	712 (1567)	879 (1934)	949 (2088)	1116 (2456)	1186 (2610)	1241 (2731)	1311 (2885)	1366 (3005)	1436 (3160)	1491 (3280)	1561 (3434)	1616 (3555)	N/A	N/A
	1	689 (1515)	744 (1636)	814 (1790)	981 (2157)	1051 (2312)	1218 (2679)	1288 (2833)	1343 (2954)	1413 (3108)	1468 (3229)	1538 (3383)	1593 (3504)	N/A	N/A		
	2		845 (1859)	1027 (2260)	1082 (2381)	1264 (2782)	1319 (2902)	1389 (3057)	1444 (3177)	1514 (3331)	1569 (3452)	N/A	N/A				
	3			1129 (2483)	1296 (2851)	1366 (3005)	1421 (3126)	1491 (3280)	1546 (3401)	N/A	N/A						
	4				1397 (3074)	1467 (3228)	1522 (3349)	N/A	N/A								
	5					N/A	N/A										

Note: Each weight is shown in kilograms (kg), followed by weight in pounds (lbs) enclosed in parenthesis.

The following table lists the total weight for systems without the integrated battery feature and without doors.

		Number of Processor Subsystems															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
I/O	0	499 (1097)	553 (1218)	623 (1372)	702 (1544)	772 (1698)	851 (1871)	921 (2025)	975 (2146)	1045 (2300)	1100 (2421)	1170 (2575)	1225 (2696)	1295 (2850)	1350 (2970)	1420 (3124)	1475 (3245)
	1	600 (1320)	655 (1441)	725 (1595)	803 (1768)	874 (1922)	952 (2094)	1022 (2249)	1077 (2369)	1147 (2523)	1202 (2644)	1272 (2798)	1327 (2919)	1397 (3073)	1404 (3090)		
	2		756 (1664)	850 (1870)	905 (1991)	999 (2197)	1054 (2318)	1124 (2472)	1178 (2593)	1248 (2747)	1303 (2867)	1373 (3021)	1428 (3142)				
	3			952 (2094)	1030 (2266)	1100 (2420)	1155 (2541)	1225 (2695)	1280 (2816)	1350 (2970)	1405 (3091)						
	4				1132 (2490)	1202 (2644)	1257 (2764)	1327 (2918)	1381 (3039)								
	5					1303 (2867)	1358 (2988)										

Note: Each weight is shown in kilograms (kg), followed by weight in pounds (lbs) enclosed in parenthesis.

Step 3. Unpack the System

Unpack the system and determine if weight reduction is required before moving the system to its installation site. If it is necessary to reduce the system weight to a maximum 1136 kg (2500 lbs.), refer to “Weight Reduction” on page 6 to calculate the number of subsystems to remove. Follow the recommended order for removing components.

After the system weight is reduced to less than 1136 kg (2500 lbs.), move the system to its installation location, and proceed to “Step 4. Check the Inventory”.

Step 4. Check the Inventory

Use the packing lists for each ship group to verify that you have all the items shipped with the system.

Other tools that might be needed for installation, but not shipped with the system, include:

- Electronic Service Multimeter
- Lift Tool

- Service Vacuum
- Service Ladder
- Stepladder
- Service Tool (used for performing service procedures on a processor subsystem)

Verify with the customer that the following items are available. You will need them to complete this installation.

- A floor plan, showing where to place each rack
- The items necessary for installing a modem, including the correct telephone jack, line cords, cables, and a power source

Note: These items are not necessary if there is an existing system that has an HMC managing the system resources.

For information on the HMC inventory, refer to the *IBM Hardware Management Console for pSeries Installation and Operations Guide*.

Rack Inventory

- Front and rear door for the rack
- Two power cords
- Display(s) and keyboard for the Hardware Management Console for pSeries (if an existing HMC is not already installed and available for the system being installed).

Hardware Management Console (If Not Installed)

- Hardware Management Console (HMC). One HMC is standard; a second HMC is optional.
- Power cords
- Display and keyboard

Asynchronous Adapters

- 8-port asynchronous adapters are required. One adapter is required for each HMC being installed. The 8-port asynchronous adapter connect the HMC to the Bulk Power Controllers (BPCs) through its connector box.
- 128-port asynchronous adapters may be installed depending upon the system configuration and the number of processor subsystems being installed. Numerous processor subsystems can be connected to the HMCs through 128-port asynchronous adapters and RANs.

Tool Kits

The following tool kits are shipped with the system:

- Processor subsystem tools (part number 44P1461, MFI 00P4635)
- I/O subsystem tools (part number 44P2629, MFI 00P4652)

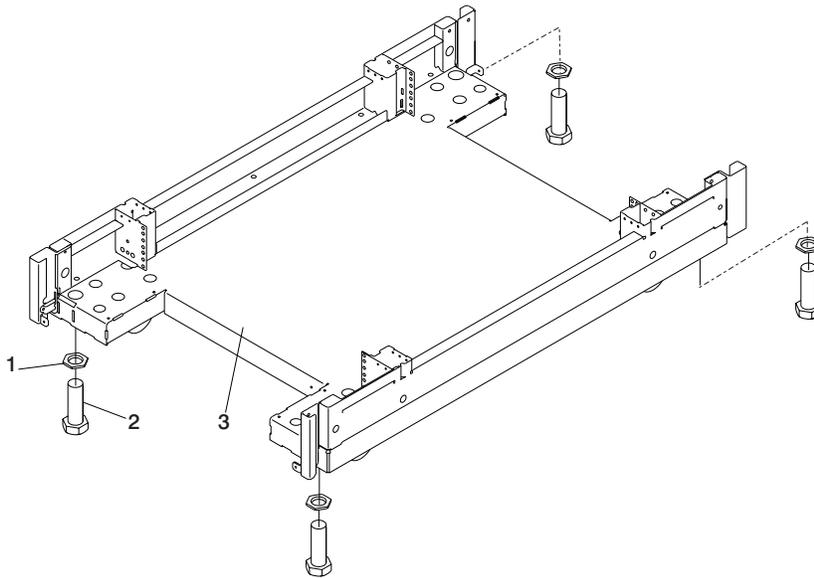
Ensure that these tools are placed in the rack toolbox located at the bottom front of the rack.

Step 5. Position and Level the Rack

To adjust the leveling feet on the rack, do the following:

1. Ensure the rack is positioned according to the customer plan.
2. Loosen the jam nut on each leveling foot by turning the nut counterclockwise (away from the bottom of the rack).
3. Rotate each leveling foot downward until it contacts the surface on which the rack is placed.

4. Adjust the leveling feet downward as needed until the rack is level. When the rack is level, tighten the jam nuts against the base by turning the nut clockwise (toward the bottom of the rack).



- 1 Jam Nut
- 2 Leveling Foot
- 3 Rack Base (Front)

If the customer plans to secure the rack to the floor, see Appendix F, “Securing the Rack”, on page 73.

Step 6. Reinstall Subsystems Removed for Rack-Weight Reduction

If subsystems were removed from the system rack to reduce weight to enable moving the rack to the installation location, perform this step. System weight may have been reduced because of either of the following conditions:

- Processor subsystems, I/O subsystems, integrated battery feature, and/or frame top extender were shipped separately.
- Processor subsystems, I/O subsystems, integrated battery feature, and/or frame top extender were removed to enable moving the system to its installation site.

To proceed with reinstallation of subsystems, do the following:

1. Reinstall all of the system components as described in Chapter 5, “Removal and Installation Procedures”, on page 39.
2. If the frame top extender was removed, reinstall the extender as described in Appendix H, “Removing and Installing the Rack Top Frame”, on page 93.

Step 7. Check the Cables

Cables may loosen during shipping. Check for loose cables before continuing the installation. Reconnect any cables that are loose or disconnected.

Step 8. Verify that the Unit Emergency Power Off (UEPO) Switch is in the Off Position

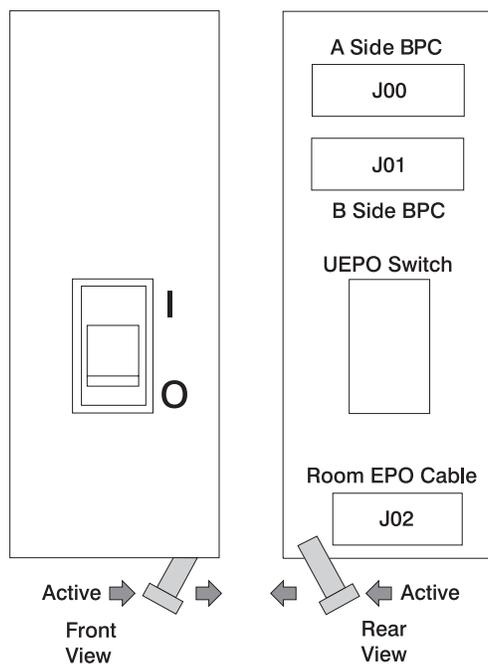
Note: *UEPO* refers to the red Unit Emergency Power Off switch located on the unit. *EPO* refers to the computer room Emergency Power off.

The unit emergency power off (UEPO) switch is located on the front of the system rack. When the switch is tripped, utility power is confined to the machine power compartment. All volatile data is lost.

Computer Room Emergency Power Off (EPO)

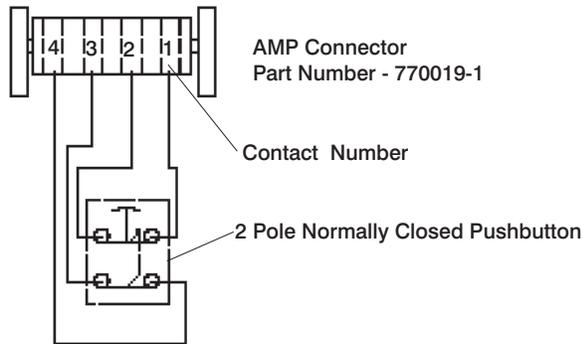
Attention: When the integrated battery feature (IBF) is installed and the room EPO is turned off, the batteries engage and the system continues to run. It is possible to attach the computer room EPO system to the machine UEPO. When this is done, turning off the room EPO disconnects all power from the power cords and the IBF unit. In this event, all volatile data is lost.

To incorporate the IBF into the room EPO, a cable connection must be made to connect to the back of the system UEPO panel. The following diagrams illustrate how to make the connection.



This figure illustrates the back of the machine UEPO panel with the room EPO cable plugging into the machine. The switch actuator located at the bottom of the UEPO must be switched to the "active" position. After the switch actuator is moved to "active" and makes the cable connection possible, the room EPO cable must be installed for the machine to power on.

The following figure shows the AMP connector (part number 770019-1) needed to connect to the system UEPO panel. For room EPO cables using wire sizes #20 AWG to #24 AWG, use AMP pins (part number 770010-4).



Step 9. Check Power Outlets and Source

CAUTION:

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

C02

Do the following to ensure that the customer has provided the correct power to the system:

1. This system is equipped to use 200-240 V / 380-415 V / 480 V ac, three-phase. Check that the correct power source is available.
2. Have the customer locate and turn off the branch circuit breaker and attach tag S229-0237, which reads “Do Not Operate.”

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

3. 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.

4. Check the resistance from the ground pin of the receptacle to the receptacle case. Check resistance from the ground pin to building ground. The reading should be less than 1.0 ohm, which indicates the presence of a continuous grounding conductor.

Note: If measured impedance is greater than 1 ohm and the test instrument used was a digital multimeter, verify that the grounding impedance is correct by using an appropriately approved ground-impedance tester.

5. If any of the checks made in substeps 2, 3 and 4 are not correct, ask the customer to remove the power from the branch circuit and make the wiring corrections; then check the receptacle again.
6. Check for infinite resistance between the phase pins. This is a check for a wiring short.

CAUTION:

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

C03

7. Have the customer remove tag S229-0237, which reads “Do Not Operate” and turn on the branch circuit breaker.

Note: If your power source does not have a standard receptacle, check for voltage using local procedures.

Measure for appropriate voltages between phases. If no voltage is present on the receptacle case or grounded pin, the receptacle is safe to touch.

8. With an appropriate meter, verify that the voltage at the outlet is correct.

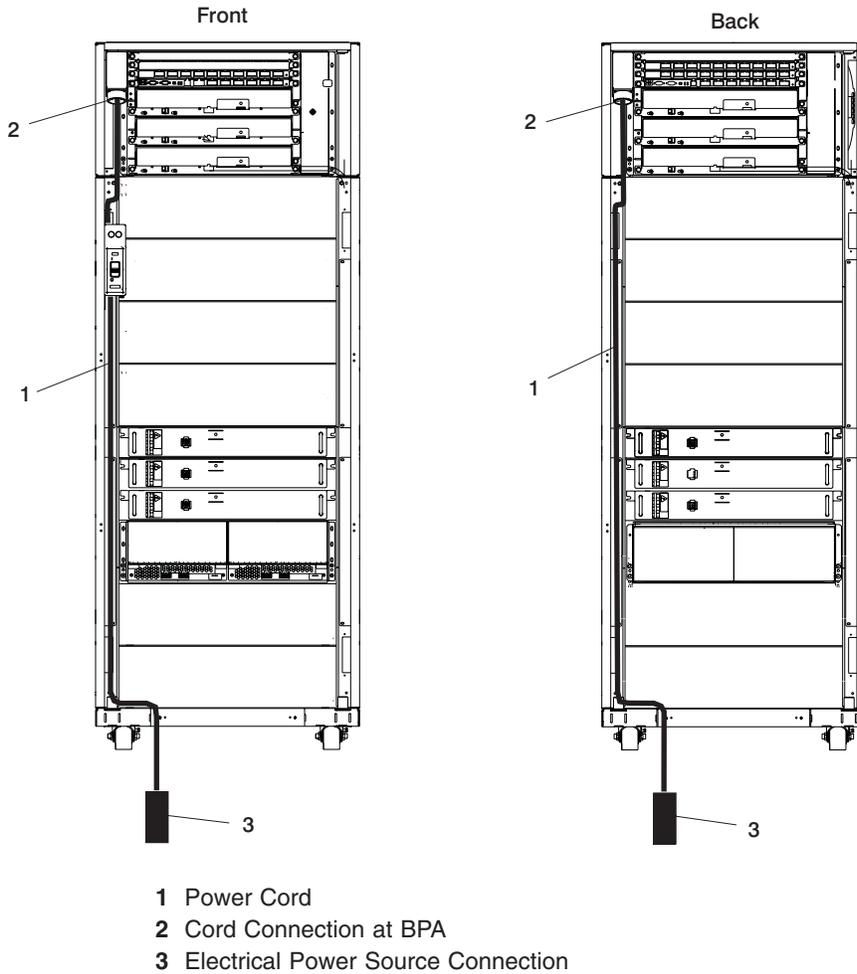
Note:

- For 200-240 V, the acceptable phase-phase voltage measurement range is 180-254 V.
 - For 380-415 V, the acceptable phase-phase voltage measurement range is 342-440 V.
 - For 480 V, the acceptable phase-phase voltage measurement range is 432-509 V.
9. Verify that the grounding impedance is correct by using the ECOS 1020, 1023, B7106, or an appropriately approved ground impedance tester.
 10. Have the customer turn off the branch circuit breaker and attach tag S229-0237, which reads "Do Not Operate."

Step 10. Route and Connect Power Cords to the System

The rack system has two power cords, one located on the front and one on the rear of the rack. These two power cords attach to the Bulk Power Assemblies (BPAs), are routed on the left side of the rack (at the front and back of the rack), and connect to an electrical power source.

The following illustration shows the power cord routing in the rack.



To route and connect the power cords, do the following:

1. Loosen or remove the cable retainers and filler plate located along the side and bottom of the frame. Refer to the following table for identifying the use of the brackets, filler plates, and cable ties for the rack.

Description	Recommended Usage
Cable Retention Bracket	Use in the base of the frame to retain cables leaving the frame. This bracket is used for large diameter cables.
Cable Retention Bracket	Use in the base of the frame to retain the cables leaving the frame. This bracket is used for medium diameter cables.
Cable Retention Bracket	Use in the base of frame to retain the cables leaving the frame. This bracket is used for small diameter cables.
Filler Plate (thin)	Use in the base of the frame to cover the openings. Install in the base of the frame after all of the cable retention brackets are installed.
Filler Plate (wide)	Use in the base of the frame to cover openings. Install in the base of the frame after all of the cable retention brackets are installed.
Soft Cable Ties (roll)	Use to organize the cables leaving frame.

2. On the front of the frame, loosen the screw on the brackets in the cable track on the left side only. Remove the UEPO switch.
3. Remove the toolbox from the bottom of the frame.
4. Route the power cords underneath the frame to the floor tile hole(s). For more information on floor cutouts, refer to the *Site and Hardware Planning Information*.
5. Route and secure the power cords in the frame channel, with the brackets from top to bottom.
6. Connect the plugs for the cords to the BPA.
7. Ensure that the dots are aligned on the cord plug and receptacle.
8. Replace the UEPO switch on the front of the frame.
9. Replace the toolbox in the bottom of the frame.

Step 11. Install the Hardware Management Console (HMC)

The Hardware Management Console (HMC) user interface provides the functions needed to control power to the subsystems, manage the frame resources, and create and maintain multiple-partitioned environments in the processor subsystems in the rack.

To install the HMC, follow the instructions described in *IBM Hardware Management Console for pSeries Installation and Operations Guide*.

Connect the HMC to the System

1. Connect the RS-422 serial cables from the 8-port asynchronous adapter connector box to the BPC (A side and B side). Refer to the following table for cable names and connections.

Cable Name	8-Port Connector Box	BPC Side and Connector
BPC A	Serial Port 0	BPC A (J00A) for primary HMC BPC A (J00B) for secondary (optional) HMC
BPC B	Serial Port 1	BPC B (J00A) for primary HMC BPC B (J00B) for secondary (optional) HMC

Note: Two ports on the 8-port asynchronous adapter must be configured as RS-422 ports and connected to the BPCs in the rack. To configure these two ports as RS-422 ports, refer to the

IBM Hardware Management Console for pSeries Installation and Operations Guide. Any remaining ports on the 8-port asynchronous adapter can be used as RS-232 connections to HMC ports on managed processor subsystems.

2. Connect the HMC serial cable to serial port HMC1 on the back of the processor subsystem. For two HMCs, connect the redundant HMC into serial port HMC2 on the processor subsystem.

The use of the second serial port on the HMC is not recommended because this port defaults to be used for the modem.

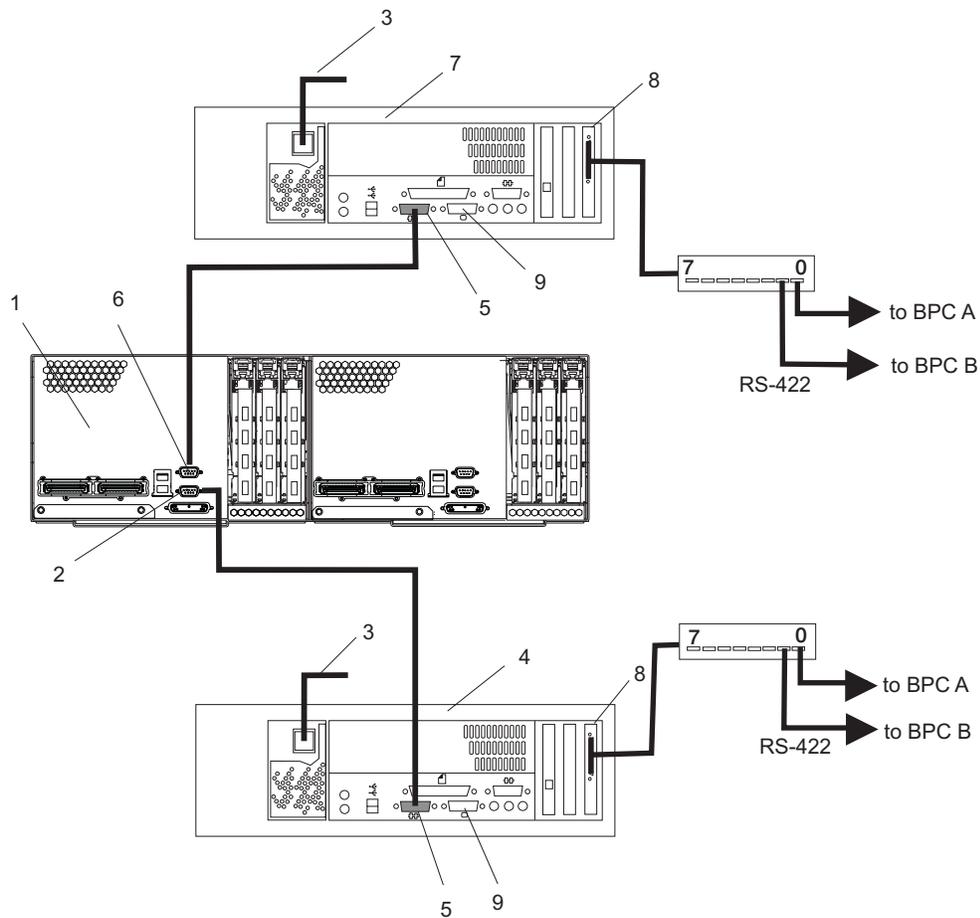
3. If you are connecting cables from the HMC to processor subsystems in the rack in more complicated configurations, refer to “System Cabling” on page 17 to determine cable connections and routing.

If you are connecting HMC(s) to the system using an 8-port asynchronous adapter, go to “Install and Configure the 8-Port Asynchronous Adapter” on page 19.

If you are connecting HMC(s) to the system using an 128-port asynchronous adapter, go to “Install and Configure the 128-Port Asynchronous Adapter” on page 21.

Note: The following illustration shows:

- A simplified configuration connecting a primary and secondary (optional) HMC to a processor subsystem
- The location of the serial ports on the back of the HMCs and the HMC connectors located on the processor subsystem
- The connection of 8-port adapters to the HMCs
- The connection of the 8-port adapters to the BPC (side A and side B) with an RS-422 cable

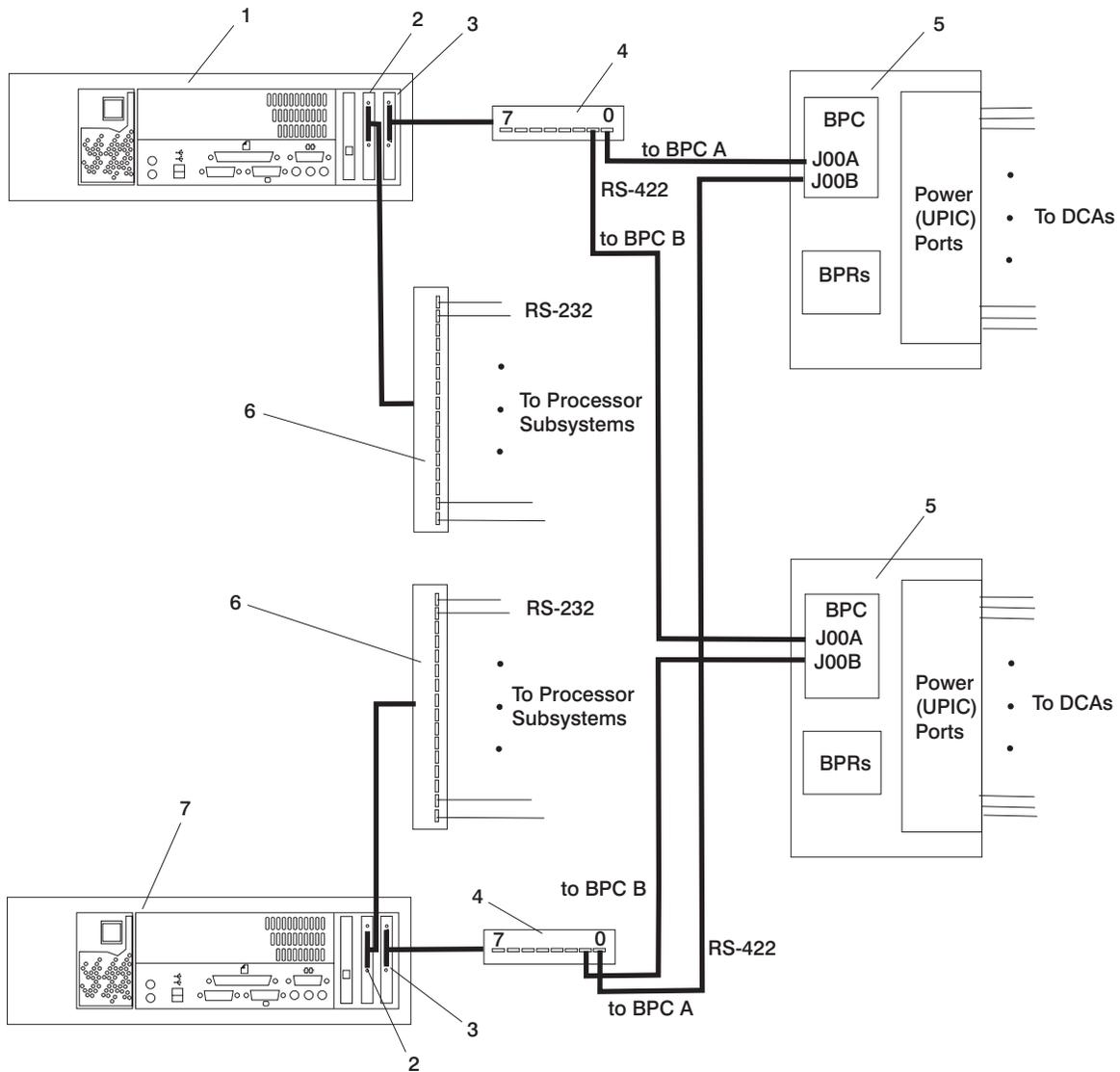


- | | |
|--|---|
| <ul style="list-style-type: none"> 1 pSeries 655 Processor Subsystem (rear view of connection on one processor subsystem) 2 HMC Connector 1 (connection for primary HMC) 3 Power Plug to External Power Source (wall plug) 4 Primary HMC 5 Serial Port on HMC | <ul style="list-style-type: none"> 6 HMC Connector 2 (connection for secondary HMC) 7 Secondary HMC (optional) 8 8-Port Asynchronous Adapter 9 Serial Port Reserved for Modem |
|--|---|

If you are connecting only the primary HMC to the processor subsystem, connect only the cables for the primary HMC as shown in the illustration.

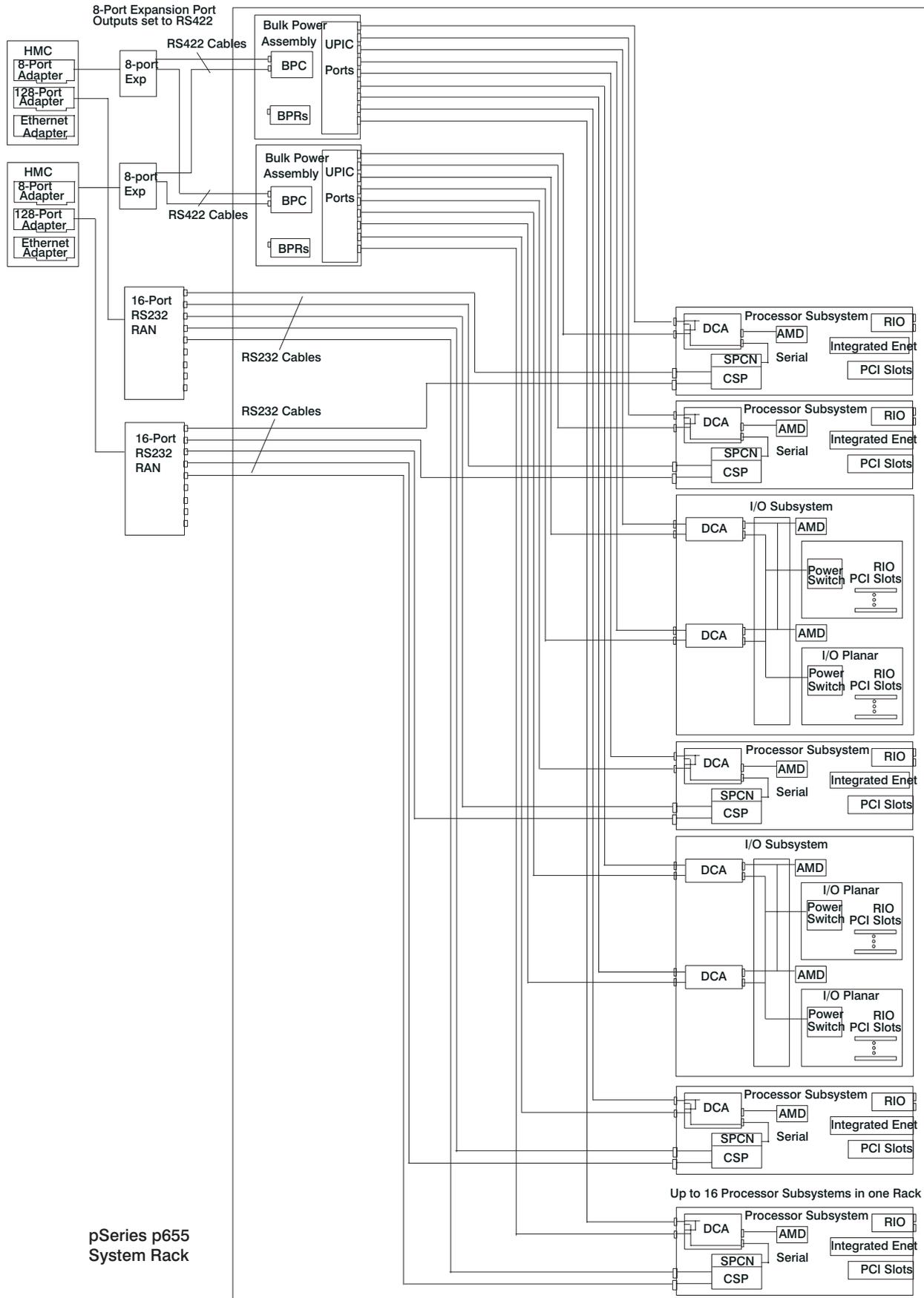
System Cabling

The following illustration shows the cabling of HMCs to the BPCs, 8-port connector boxes and 16-port RANs.



- | | |
|---------------------------------|-----------------------|
| 1 HMC 1 | 5 Bulk Power Assembly |
| 2 128-Port Asynchronous Adapter | 6 16-Port RAN |
| 3 8-Port Asynchronous Adapter | 7 HMC 2 |
| 4 8-Port Connector Box | |

The following illustration shows a comprehensive cable layout for a fully configured rack.



Install and Configure the 8-Port Asynchronous Adapter

To install and configure an 8-port asynchronous adapter, refer to the *IBM Hardware Management Console for pSeries Installation and Operations Guide*.

To connect the cables from the processor subsystem to the 8-port asynchronous adapter, use the following procedure.

Connecting the Processor Subsystem to the 8-Port Asynchronous Adapter

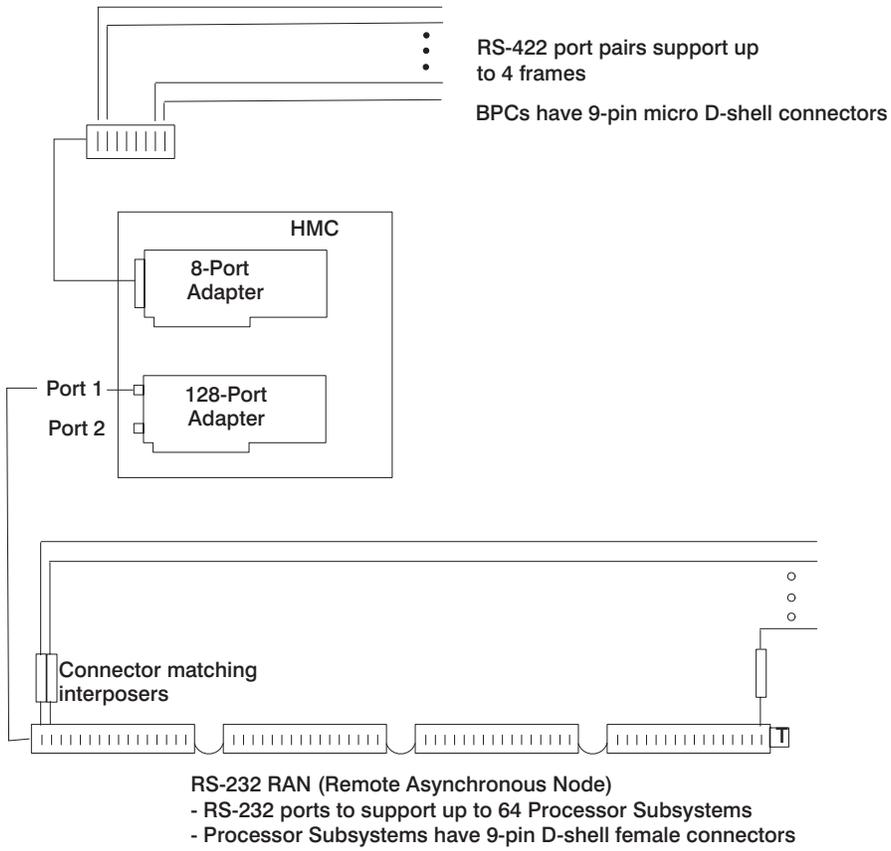
At least one 8-port asynchronous adapter is required. Up to two 8-port asynchronous adapters can be installed. The D-shell connector on the back of the adapter attaches to the 8-port expansion cable. The cable is approximately 3 feet long, and on the other end, has a slim box (8-1/2 inches x 3 inches x 1-1/2 inches) with 8 separate serial port connectors on it. The cable is labeled *ISA 8-Port Cable*. Serial cables can be connected from any of the ports on the 8-port expansion cable to the HMC ports on the managed systems.

If you are using a second, redundant HMC, connect cables from all of the processor subsystems HMC1 ports to the 8-port cable on one HMC, and connect all the processor subsystems HMC2 ports to the 8-port cable on the other HMC.

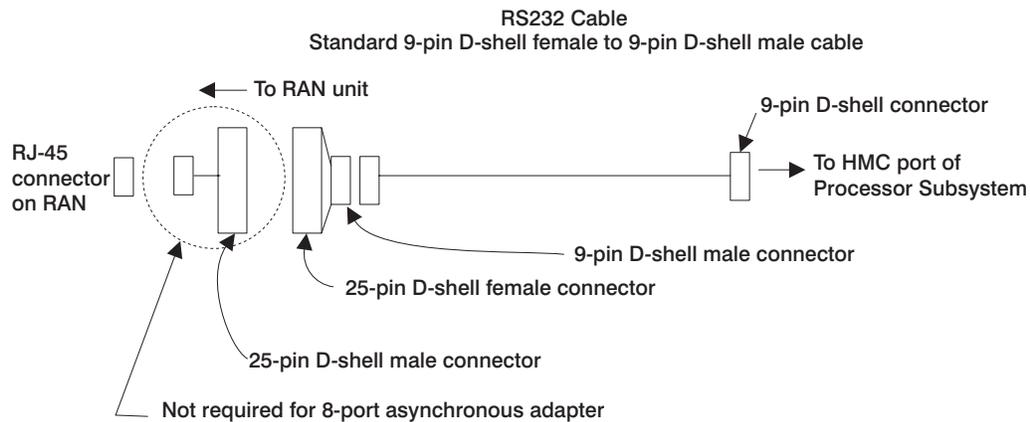
HMC to Processor Subsystem Cabling

The following illustration shows cabling for both the 8-port asynchronous adapter and 128-port asynchronous adapter to the HMC and the processor subsystems. The top portion of the illustration shows the 8-port adapter and the RS-422 cable to support up to four system frames. For smaller system configurations, the 8-port asynchronous adapter can be used for RS-232 connections.

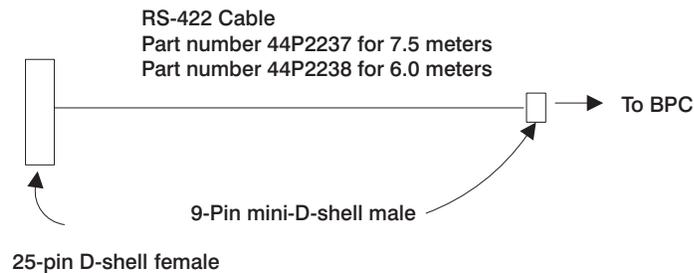
The bottom portion of the illustration shows the 128-port adapter and the RS-232 cables to support up to 64 processor subsystems.



Details for the RS-232 cables are shown in the following illustration.



Details for the RS-422 cables are shown in the following illustration.



Configuring Ports on the 8-Port Asynchronous Adapter

The default configuration for ports on the 8-port asynchronous adapter is for RS-232 ports. To use RS-422 cables on the adapter, the adapter must be configured to accommodate them. For configuration instructions, refer to the *IBM Hardware Management Console for pSeries Installation and Operations Guide*.

Install and Configure the 128-Port Asynchronous Adapter

The 128-port asynchronous adapter is an option for the HMC. It must be configured by the service representative when the HMC is installed. The 128-port asynchronous adapter software is installed in the HMC base software-installation package.

This adapter provides the control function and connectors to attach eight 16-port remote asynchronous nodes (RANs). When all eight RANs are attached, this combination provides 128 RS-232 or RS-422 communication ports.

Refer to the illustrations shown in “HMC to Processor Subsystem Cabling” on page 19 for cable information. The bottom portion of the illustration shows the 128-port adapter and the RS-232 cable pairs to support up to 64 processors. There are 16 RS-232 ports per RAN unit. Up to four RAN units can be daisy-chained on one 128-port asynchronous adapter. The RAN unit has Ethernet (RJ-45) connectors that connect to the 25-pin D-shell male connector on the RS-232 cable.

To install and configure the 128-port asynchronous adapter, refer to the *IBM Hardware Management Console for pSeries Maintenance Guide*. Installation of the adapter requires:

- Connecting cables
- Setting the RAN node number

- Configuring the adapter
- Updating the device driver

Connecting Additional 128-Port Asynchronous Adapters

Additional optional 128-port asynchronous adapters can be installed. The D-shell connectors on the back of the adapter attach to RANs. Serial cables can be connected from any of the ports on a RAN to the HMC1 ports on the managed systems.

If you are using a second, redundant HMC, connect cables from all the processor subsystem HMC1 ports to the RAN on one HMC, and connect all the processor subsystem HMC2 ports to the RANs on the other HMC.

To install and configure additional 128-port asynchronous adapters, refer to the *IBM Hardware Management Console for pSeries Maintenance Guide*.

Connect the External Modem

The external modem is used in conjunction with the HMC's Service Agent and Call Home features. To install the external modem, refer to the *IBM Hardware Management Console for pSeries Installation and Operations Guide*.

Connect the Ethernet LAN Cable

DANGER

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

D12

The customer is responsible for providing the Ethernet LAN cable. The Ethernet LAN cable is required because each active partition reports errors to the HMC's Service Focal Point application through the LAN network. To connect the LAN cable, refer to the *IBM Hardware Management Console for pSeries Installation and Operations Guide*.

Connect the HMC Power Cord

1. Connect the HMC power cord into the power receptacle on the back of the HMC.
2. Plug the power cords for the display, HMC, and modem (if applicable) into electrical outlets.

Step 12. Plug in the Power Cords

Plug in the power cords from the rack to the electrical power source.

Step 13. Turn on the IBF Breaker (If Present)

Turn on the Integrated Battery Feature (IBF) breaker.

Step 14. Have the Customer Activate the Designated Circuit Breakers

Have the customer activate the designated circuit breakers by doing the following:

1. Ensure that the tag S229-0237, which reads “Do Not Operate,” has been removed.
2. Reset the circuit breaker.

Note: The following steps should be performed only by the IBM service representative.

3. Turn the UEPO switch to the ON position.
4. Verify that the LEDs on the bulk power enclosure are on. The labels on the LEDs are as follows:
 - BPC - good
 - BPD - good
 - Power
 - Complete
 - Standby (flashes, then lights on solid)
 - BPR enabled
 - Power-in on processor subsystem(s)

Step 15. Power on the HMC

Attention: Ensure that all subsystems are correctly installed and cabled before performing this step.

To power on the HMC, refer to the *IBM Hardware Management Console for pSeries Installation and Operations Guide* for instructions. Ensure that the I/O subsystems are correctly installed and cabled before performing this step.

At HMC power on, the HMC performs an initialization to determine a frame's managed systems and resources. The rack (frame) may contain combinations of processor subsystems, I/O subsystems, and IBFs. For details of this initialization, refer to “Initializing a Frame's Managed Systems and Resources” in the *IBM Hardware Management Console for pSeries Installation and Operations Guide*.

Step 16. Verify HMC Code Level

1. Select **Help** on the HMC interface.
2. Select **About Hardware Management Console**. The code level installed on the HMC is displayed.

Note: The code level must be Release 3.1.2 or later.

3. If the code level is not Release 3.1.2, call service support for instructions on obtaining the required code level.

Step 17. Set the Console's Date and Time

The battery-operated clock keeps the date and time for the HMC. You may need to set the console date and time under the following circumstances:

- If the battery is replaced in the HMC
- If your system is physically moved to a different time zone

To set the console date and time, refer to *IBM Hardware Management Console for pSeries Installation and Operations Guide*.

Step 18. Configure the Asynchronous Adapters and Associated RANs

Configure 8-port and 128-port asynchronous adapters by following the procedures described in the *IBM Hardware Management Console for pSeries Maintenance Guide*.

Step 19. Verify Installation is Complete by Using the HMC Interface

Use the HMC system management environment to verify that the installation is successful and complete. Refer to the *IBM Hardware Management Console for pSeries Installation and Operations Guide* for the detailed procedures.

Step 20. Determine Firmware and Microcode Levels

Ensure that the latest firmware and microcode levels are installed on the system. The following firmware and microcode should be brought to the latest level:

- System firmware
- Frame (power subsystem) firmware
- Integrated SCSI controller microcode
- Integrated Ethernet microcode

To determine the current level of firmware and microcode, and how to perform updates, go to Processor Subsystem Firmware Updates in the *@server pSeries 655 User's Guide*.

Step 21. Your System is Now Set Up

Arrange your system unit and attached devices so that you can use them comfortably.

If an operating system has been preinstalled on your system, see the documentation provided with the operating system.

If you are installing the AIX operating system at this time, AIX can be installed from a Network Installation Management (NIM) server. For information about installing AIX from a NIM server, see the *AIX 5L Installation Guide and Reference*.

When installation of AIX is completed, return to this step.

Step 22. Verify the Basic Hardware Operation and Operating System

The hardware installation of the system is now complete. Proceed to verify hardware operation by running the following diagnostics procedure.

Note: Step 4 in this procedure sets the boot mode to slow boot.

To run the online diagnostics in service mode from the boot hard disk, do the following:

1. From the HMC, select **Partition Manager**.
2. Right-click on the mouse and select **Open Terminal Window**.
3. From the Service Processor Menu on the VTERM, select Option 2 **System Power Control**.
4. Select option 6. Verify that the state changes to currently disabled. Disabling fast system boot automatically enables slow boot.
5. Select Option 98 to exit the system power control menu.
6. Use the HMC to power on the managed system in a full system partition by selecting the managed system in the Contents area.
7. Right-click or select the desired system in the Contents area. Next, on the menu, choose **Selected**.

8. Select **Power On**.
9. Select the **Power on Diagnostic Stored Boot list** option (refer to “Full System Management Tasks” in the *IBM Hardware Management Console for pSeries Installation and Operations Guide*, for more information on full system partitions).
10. Enter any passwords, if requested.

Note: If you are unable to load the diagnostics to the point when the DIAGNOSTIC OPERATING INSTRUCTIONS display, go to “Running Standalone Diagnostics from a Network Installation Management (NIM) Server” on page 31.

Chapter 3. Using the Online and Standalone Diagnostics

Running diagnostics verifies system hardware operation. The diagnostics consist of online diagnostics and standalone diagnostics.

Note: The diagnostic procedures described in this chapter must be run for each processor subsystem installed in a rack.

Attention: The AIX operating system must be installed in a partition in order to run online diagnostics on that partition. If the AIX operating system is not installed, use the standalone diagnostic procedures.

Online diagnostics, when they are installed, reside with AIX in the file system. They can be booted:

- In single user mode (referred to as *service mode*)
- To run in maintenance mode (referred to as *maintenance mode*)
- To run concurrently with other applications (referred to as *concurrent mode*)

Standalone diagnostics must be booted before they can be run. If booted, the diagnostics have no access to the AIX error log or the AIX configuration data.

Online and Standalone Diagnostics Operating Considerations

Note: When possible, run online diagnostics in service mode. Online diagnostics perform additional functions compared to standalone diagnostics. Running online diagnostics in service mode ensures that the error state of the system that has been captured in NVRAM is available for your use in analyzing the problem. The AIX error log and certain SMIT functions are only available when diagnostics are run from the disk drive.

Consider the following items before using the diagnostics:

- Standalone diagnostics can run on systems configured for either a full (or single) system partition or a multiple partitioned system. When running in a partitioned system, the device from which you are booting standalone diagnostics must be made available to the partition dedicated to running standalone diagnostics. This may require moving the device from the partition that currently contains the boot device (for example, the network adapter connected to the Network Installation Management (NIM) server that has a standalone diagnostic image) to the partition used to run standalone diagnostics. If you move devices, reboot both partitions. For more information, see “Standalone Diagnostic Operation” on page 31.
- When diagnostics are installed, the device support for some devices might not get installed. If this is the case, that device does not display in the diagnostic test list when running disk-based diagnostics.
- When running diagnostics in a partitioned system, diagnostics function only with the resources that were assigned to that partition. You must run diagnostics in the partition containing the resource that you want to test.

Identifying the Terminal Type to the Diagnostics

When you run diagnostics, you must identify which type of terminal you are using. If the terminal type is not known when the FUNCTION SELECTION menu is displayed, the diagnostics do not allow you to continue until a terminal is selected from the DEFINE TERMINAL option menu. Choose the “vt320” selection when running diagnostics from an HMC.

Undefined Terminal Types

If you specify an undefined terminal type from the DEFINE TERMINAL option menu, the menu prompts the user to enter a valid terminal type. The menu redispays until either a valid type is entered or you exit the DEFINE TERMINAL option.

Resetting the Terminal

If you enter a terminal type that is valid (according to the DEFINE TERMINAL option menu) but is not the correct type for the HMC virtual terminal window being used, you may be unable to read the screen, use the function keys, or use the Enter key. Bypass these difficulties by pressing Ctrl-C to reset the terminal. The screen display that results from this reset depends on the mode in which the system is being run:

- Online Normal or Maintenance Mode - The command prompt displays.
- Standalone Mode or Online Service Mode - The terminal type is reset to dumb, the Diagnostic Operating Instruction panel displays, and you are required to go through the DEFINE TERMINAL process again.

Running Online Diagnostics

Consider the following when you run the online diagnostics from a server or a disk:

- The diagnostics cannot be loaded and run from a disk until the AIX operating system has been installed and configured.
- The diagnostics cannot be loaded on a system (client) from a server if that system is not set up to boot from a server over a network. When the system is set up to boot from a server, the diagnostics are run in the same manner as they are from disk.
- On full system partitions, if the diagnostics are loaded from disk or a server, you must shut down the AIX operating system before turning off the system unit to prevent possible damage to disk data. Do this in either of the following ways:
 - If the diagnostics were loaded in standalone mode, press the F3 key until DIAGNOSTIC OPERATING INSTRUCTIONS displays. Then press the F3 key once again to shut down the AIX operating system.
 - If the diagnostics were loaded in maintenance or concurrent mode, type the shutdown -F command.
- Under some conditions, the system might stop, with instructions displayed on attached displays and terminals. Follow the instructions to select a console display.

Online Diagnostics Modes of Operation

Note: When running online diagnostics on a partition in a partitioned system, diagnostics can be run only on resources that are allocated to that partition.

The online diagnostics can be run in the following modes:

- Service Mode (see “Service Mode”). Refer to “Running Online Diagnostics in Service Mode” on page 30 for instructions on how to run the diagnostics in service mode.
- Concurrent Mode (see “Concurrent Mode” on page 29). Refer to “Running the Online Diagnostics in Concurrent Mode” on page 30 for instructions on how to run the diagnostics in service mode.
- Maintenance Mode (see “Maintenance Mode” on page 29). Refer to “Running the Online Diagnostics in Maintenance Mode” on page 30 for instructions on how to run the diagnostics in service mode.

Service Mode

Service mode provides the most complete checkout of the system resources. This mode also requires that no other programs be running on the partition or system on a full system partition. All partitions or system on a full system partition resources, except the SCSI adapter and the disk drives used for paging, can be tested. However, note that the memory and processor are only tested during POST, and the results of the POST tests are reported by diagnostics.

Error-log analysis is done in service mode when you select the Problem Determination option on the DIAGNOSTIC MODE SELECTION menu.

Concurrent Mode

Use concurrent mode to run online diagnostics on some of the system resources while the system is running normal activity.

Because the system is running in normal operation, the following resources cannot be tested in concurrent mode:

- SCSI adapters connected to paging devices
- Disk drive used for paging
- Some display adapters and graphics related devices
- Memory (tested during POST)
- Processor (tested during POST)

The following levels of testing exist in concurrent mode:

- The **share-test level** tests a resource while the resource is being shared by programs running in the normal operation. This testing is mostly limited to normal commands that test for the presence of a device or adapter.
- The **sub-test level** tests a portion of a resource while the remaining part of the resource is being used in normal operation. For example, this test could test one port of a multiport device while the other ports are being used in normal operation.
- The **full-test level** requires the device not be assigned to or used by any other operation. This level of testing on a disk drive might require the use of the **varyoff** command. The diagnostics display menus to allow you to vary off the needed resource.

Error-log analysis is done in concurrent mode when you select the Problem Determination option on the DIAGNOSTIC MODE SELECTION menu.

To run the online diagnostics in concurrent mode, you must be logged in to the AIX operating system and have proper authority to issue the commands (if help is needed, see the system operator).

The **diag** command loads the diagnostic controller and displays the online diagnostic menus.

Maintenance Mode

Maintenance mode runs the online diagnostics using the customer's version of the AIX operating system. This mode requires that all activity on the partition running the AIX operating system be stopped so that the online diagnostics have most of the resources available to check. All of the system resources, except the SCSI adapters, memory, processor, and the disk drive used for paging, can be checked.

Error log analysis is done in maintenance mode when you select the **Problem Determination** option on the DIAGNOSTIC MODE SELECTION menu.

Use the **shutdown -m** command to stop all activity on the AIX operating system and put the AIX operating system into maintenance mode. The **diag** command is then used to invoke the diagnostic controller so you can run the diagnostics. After the diagnostic controller is loaded, follow the normal diagnostic instructions.

Documentation for the AIX operating system is available from the IBM @server pSeries Information Center at http://publib16.boulder.ibm.com/pseries/en_US/infocenter/base. Select **AIX documentation**. The *AIX Documentation CD* contains the base set of publications for the operating system, including system-management and end-user documentation.

Running Online Diagnostics in Service Mode

To run the online diagnostics in service mode from the boot hard disk, do the following:

1. From the HMC, select the **Partition Manager**.
2. Right-click on the mouse and select **Open Terminal Window**.
3. From the Service Processor Menu on the VTERM, select Option 2 **System Power Control**.
4. Select option 6. Verify that the state changes to currently disabled. Disabling fast system boot automatically enables slow boot.
5. Select Option 98 to exit the system power control menu.
6. Use the HMC to power on the managed system in a full system partition by selecting the managed system in the Contents area.
7. Right-click or select the desired system in the Contents area. Next, on the menu, choose **Selected**.
8. Select **Power On**.
9. Select the **Power on Diagnostic Stored Boot list** option (refer to “Full System Management Tasks” in the *IBM Hardware Management Console for pSeries Installation and Operations Guide*, for more information on full system partitions).
10. Enter any passwords, if requested.

Note: If you are unable to load the diagnostics to the point when the DIAGNOSTIC OPERATING INSTRUCTIONS display, go to “Running Standalone Diagnostics from a Network Installation Management (NIM) Server” on page 31.

11. Complete the installation by going to Chapter 4, “Completing the Installation”, on page 35.

Running the Online Diagnostics in Concurrent Mode

To run online diagnostics in concurrent mode, do the following:

1. Log in to the AIX operating system as root user or use CE Login.
2. Enter the **diag** command.
3. When the DIAGNOSTIC OPERATING INSTRUCTIONS display, follow the instructions to check out the desired resources.
4. When testing is complete, use the F3 key to return to the DIAGNOSTIC OPERATING INSTRUCTIONS. Press the F3 key again to return to the AIX operating system prompt. Be sure to vary on any resource that you had varied to off.
5. Press Ctrl-D to log off from root user or CE Login.
6. Complete the installation by going to Chapter 4, “Completing the Installation”, on page 35.

Running the Online Diagnostics in Maintenance Mode

To run the online diagnostics in maintenance mode, do the following:

1. Stop all programs running on the partition except the AIX operating system (if help is needed, see the system operator).
2. Log in to the AIX operating system as root user or use CE Login.
3. Type the shutdown -m command.
4. When a message indicates the system is in maintenance mode, enter the **diag** command.

Note: It might be necessary to set *TERM* type again.

5. When DIAGNOSTIC OPERATING INSTRUCTIONS screen displays, follow the displayed instructions to check out the desired resources.
6. When testing is complete, use the F3 key to return to DIAGNOSTIC OPERATING INSTRUCTIONS. Press the F3 key again to return to the AIX operating system prompt.

7. Press Ctrl-D to log off from root user or CE Login.
8. Complete the installation by going to Chapter 4, “Completing the Installation”, on page 35.

Standalone Diagnostic Operation

Use standalone diagnostics to test the system when the online diagnostics are not installed and as a method of testing the disk drives that cannot be tested by the online diagnostics.

Note: No error log analysis is done by the standalone diagnostics. The standalone diagnostics:

- Are resident on a Network Installation Management (NIM) server
- Provide a method to test the system when the online diagnostics are not installed or cannot be loaded from the disk drive
- Allow testing of the disk drives and other resources that cannot be tested by the online diagnostics
- Do not have access to the AIX configuration data
- Do not have access to the AIX error log
- Do not allow for running of error log analysis

Performing Slow Boot

To fully analyze all of the available information, perform the following steps before doing a hardware repair or replacement:

1. Record the 8-character error code (and location code if present) displayed as the operator panel value displayed on the HMC or that was reported by the customer.
2. Do a slow-mode boot in service mode. This boot can be specified using the System Power Control Menu on the service processor main menu. (A fast-mode boot skips much of the built-in diagnostic testing.) A slow-mode boot may yield a new 8-character error code displayed as an operator panel value on the HMC and new errors in the service processor error log. If a new error code is reported, use this code to continue problem analysis.

Partitioned System Considerations for Standalone Diagnostics

To run standalone diagnostics on a full system partition, you must reboot the entire system. However, for a partition in a partitioned system, you can boot standalone diagnostics either in a given partition or on the entire system (which is the same procedure as a full system partition). For a partitioned system, before running standalone diagnostics on a given partition, the user must move the device from the existing location where standalone diagnostics is booted (the network adapter connected to the NIM server, in the case of NIM boot of standalone diagnostics), to the partition that will run standalone diagnostics. Devices in a partitioned system are moved on an I/O-slot basis.

Running Standalone Diagnostics from a Network Installation Management (NIM) Server

A client system connected to a network with a NIM server can boot standalone diagnostics from the NIM server if the client-specific settings on both the NIM server and client are correct.

Notes:

1. All operations to configure the NIM server require root user authority.
2. If you replace the network adapter in the client, the network adapter hardware address settings for the client must be updated on the NIM server.
3. The **Cstate** for each standalone diagnostics client on the NIM server should be kept in the *diagnostic boot has been enabled* state.
4. On the client partition, the NIM server network adapter can be put in the bootlist after the boot disk drive. This allows the system to boot in standalone diagnostics from the NIM server if there is a

problem booting from the disk drive. Another option is to use the **Select Boot Options** function in the SMS menu to set up the network adapter that is connected to the NIM server for a one-time boot of standalone diagnostics.

NIM Server Configuration

Refer to the “Advanced NIM Configuration Tasks” chapter of the *AIX Installation Guide and Reference*, for information on doing the following:

- Registering a client on the NIM server
- Enabling a client to run diagnostics from the NIM server

To verify that the client system is registered on the NIM server and the diagnostic boot is enabled, run the command `lsnim -a Cstate -Z ClientName` from the command line on the NIM server. Refer to the following table for system responses.

Note: The *ClientName* is the name of the system on which you want to run standalone diagnostics.

System Response	Client Status
#name:Cstate: ClientName:diagnostic boot has been enabled:	The client system is registered on the NIM server and enabled to run diagnostics from the NIM server.
#name:Cstate: ClientName:ready for a NIM operation: or #name:Cstate: ClientName:BOS installation has been enabled:	The client is registered on the NIM server but not enabled to run diagnostics from the NIM server. Note: If the client system is registered on the NIM server but Cstate has not been set, no data will be returned.
0042-053 lsnim: there is no NIM object named "ClientName"	The client is not registered on the NIM server.

Client Configuration and Booting Standalone Diagnostics from the NIM Server

To run standalone diagnostics on a client from the NIM server, do the following:

1. Stop all programs including the AIX operating system (get help if needed).
2. If you are running standalone diagnostics in a full system partition, verify with the system administrator and system users that the system unit can be shut down. Stop all programs, including the AIX operating system. Refer to the AIX operating system documentation for **shutdown** command information.

Verify with the system administrator and system users using that partition that all applications on that partition must be stopped, and that the partition will be rebooted. Stop all programs on that partition, including the operating system.

3. If you are in a full system partition, power on the system unit to run standalone diagnostics. In a partitioned system, reboot the partition to run standalone diagnostics.
4. When the keyboard indicator is displayed (the word **keyboard** on an HMC virtual terminal window), press the number 1 key on the keyboard to display the SMS menu.
5. Enter any requested passwords.
6. Select **Setup Remote IPL (Initial Program Load)**.
7. Enter the client address, server address, gateway address (if applicable), and subnet mask.
8. If the NIM server is set up to allow pinging from the client system, use the **ping** utility in the RIPL utility to verify that the client system can ping the NIM server. Under the **ping** utility, choose the network adapter that provides the attachment to the NIM server to do the ping operation. If the ping returns

with an OK prompt, the client is prepared to boot from the NIM server. If ping returns with a FAILED prompt, the client cannot proceed with the NIM boot.

Note: If the ping fails, refer to the *Boot Problems* section of the *@server pSeries 655 Service Guide* and follow the steps for network boot problems.

To do a one-time boot of the network adapter attached to the NIM server network, do the following:

1. Exit to the SMS Main screen.
2. Select **Select Boot Options**.
3. Select **Install or Boot a Device**.
4. On the **Select Device Type** screen, select **Network**.
5. Set the network parameters for the adapter from which you want to boot.
6. Exit completely from SMS.

The system starts loading packets while doing a **bootp** from the network.

Follow the instructions on the screen to select the system console.

- If Diagnostics Operating Instructions Version x.x.x displays, standalone diagnostics have loaded successfully.
- If the AIX login prompt displays, standalone diagnostics did not load. Check the following items:
 - The network parameters on the client may be incorrect.
 - Cstate on the NIM server may be incorrect.
 - Network problems might be preventing you from connecting to the NIM server.

Verify the settings and the status of the network. If you continue to have problems, refer to the *Boot Problems* section of the *@server pSeries 655 Service Guide* and follow the steps for network boot problems.

Chapter 4. Completing the Installation

This chapter contains information on the final installation steps.

Attention: Complete the steps described in this chapter *after* you verify the hardware operation as described in Chapter 3, “Using the Online and Standalone Diagnostics”, on page 27.

For instructions on returning the crates, refer to the crate unpacking instruction shipped with the Model 651.

Step 1. Install the Doors

This step describes how to install the doors on the system rack. For more information on the doors, see “Step 2. Check the Prerequisites to Installing the System” on page 6.

Install the Front Door

To install the front door, refer to the illustration on page 36, and do the following:

Note: After installing the front and rear doors, it may be necessary to adjust the latch.

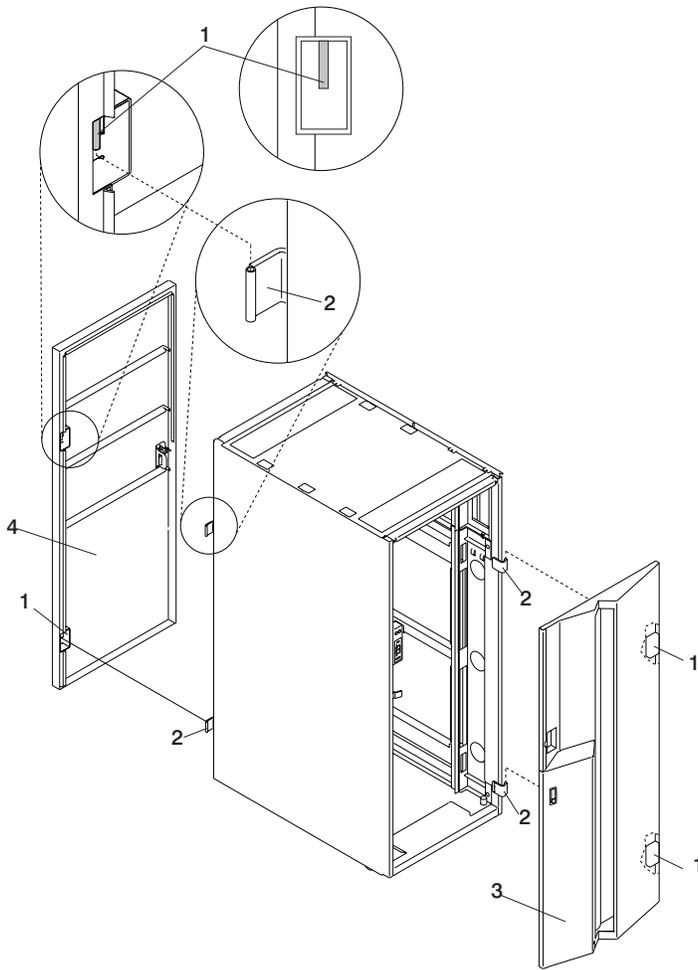
1. Position the door so that both the top and the bottom hinge pins partially engage the hinges.
2. Simultaneously slide the top and bottom hinge pins (1) on the front door into the top and bottom hinges (2) on the rack.
3. Close the front door, and engage the latch on the left side of the door.

Install the Rear Door

Note: There is no frame extender on the front of system rack. The rear of the rack has 4-inch deep extender at the top, bottom, left, and right.

To install the rear door, refer to the illustration on page 36, and do the following:

1. Position the door so that both the top and the bottom hinge pins partially engage the hinges.
2. Simultaneously slide the top and bottom hinge pins (1) on the rear door into the top and bottom hinges (2) on the rack.
3. Close the rear door, and engage the latch on the left side of the door.



- 1 Hinge Pin (Typical Front and Rear Door)
- 2 Rack Hinge (Typical Front and Rear Door)
- 3 Front Door
- 4 Rear Door

Step 2. Perform HMC Setup Tasks

Perform the following setup tasks on the HMC:

1. Configure the network for the HMC
2. Configure the Service Agent
3. Register the processor subsystems

To perform the setup tasks, refer to *IBM Hardware Management Console for pSeries Installation and Operations Guide*.

After the customer customizes the operating system and other software on the system, configure the Service Focal Point application. Refer to *IBM Hardware Management Console for pSeries Installation and Operations Guide* for the procedures to configure the Service Focal Point application.

Step 3. Complete System Records and Installation Procedure

Update the “System Records” in Appendix E, “System Records”, on page 63 to reflect the configuration of the system adapters and devices that are installed. After completing the records, deliver this book to the system administrator. The system administrator can proceed with installing and configuring the operating system.

Chapter 5. Removal and Installation Procedures

This chapter describes how to remove and reinstall processor subsystems, I/O subsystems, and the integrated battery feature (IBF). If individual subsystems were shipped separately to a customer's site to reduce weight, use the procedures contained in this chapter to assemble the system rack with the subsystems.

The procedures in this chapter can also be used to remove subsystems in order to reduce the weight of the system to enable it to be moved to the installation location at the customer's site.

Processor Subsystem

Attention: Installing a processor subsystem requires the use of a lift tool. This process requires:

- The use of a lift tool (part number 09P2481) and lift-plate assembly tool (part number 11P4369).
- The lift tool wheels must be chocked to prevent it from moving during the operation. The rack must not be on its casters. The leveling pads must be engaged to prevent the rack from moving during the operation.

Note: In the process of removing and installing processor subsystems for weight reduction, the outer chassis (frame cage) is always left in place in the rack.

This section describes how to install and remove a processor subsystem.

Processor Subsystem Installation

CAUTION:

This unit weighs between 32 kg (70.5 pounds) and 55 kg (121.2 pounds). Three persons are required to safely move it. Using less than three persons to move it can result in injury.

C05

Attention: Installing a processor subsystem requires the use of a lift tool. This process requires:

- The use of a lift tool (part number 09P2481) and lift-plate assembly tool (part number 11P4369).
- The lift tool wheels must be chocked to prevent it from moving during the operation. The rack must not be on its casters. The leveling pads must be engaged to prevent the rack from moving during the operation.

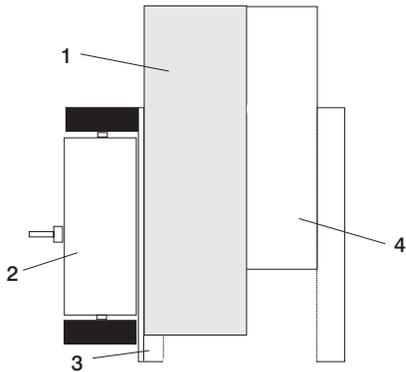
To replace the processor subsystem into the rack, do the following:

1. Position the lift tool near the processor subsystem so it can be lifted onto the lift plate.
2. Install the wheel chocks, and engage the brake on the lift tool.
3. Adjust the sliding part of the lift plate so that it can be moved toward the rack when the lift tool is positioned in front of the rack.

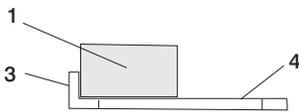
Note: The sliding part of the lift plate can be positioned to move in two directions.

4. Pull the release buttons on the lift plate and slide the lift-plate tray to the maximum distance.
5. Position the processor subsystem onto the lift plate with the back edge of the processor subsystem at the edge of the lift plate.
6. Tie the processor subsystem to the lift plate with tie-down straps.
7. At the front of the rack, ensure that the cover on the frame cage is lifted and locked in the open position.
8. Move the lift tool into position in front of the rack with the edge of the lift plate approximately 7 inches from the front of the rack. See the following illustration.

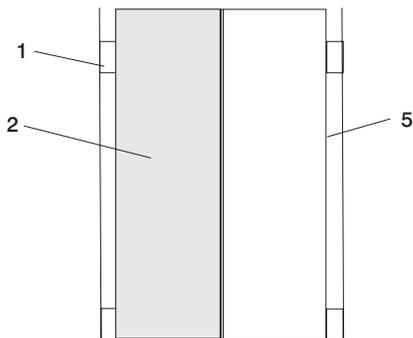
**Top View of Lift Plate
with Processor Subsystem Loaded
for Installation into the Frame**



**Front View of Lift Tool Lift Plate
Holding a Processor Subsystem**



**Top View of Frame
with Processor Subsystem
Pushed into the Frame**



- 1 Processor subsystem
- 2 Back of Lift Tool
- 3 "L"-shaped Edge of Lift Plate

- 4 Sliding Portion of Lift Plate
- 5 Frame Cage

Note: The lift-tool extension arms are not attached to the rack for this system.

9. Raise the lift plate to the frame cage in which the processor subsystem is being installed.

Note: The edge of the lift plate must be level with the edge of the frame cage.

10. Ensure that the front cover on the frame cage is raised and locked into the open position.

Note: When sliding the node into the chassis, lift the front cover to ensure that it does not catch on the memory card or PCI cassette handles.

11. Remove the tie-down straps, and slide the processor subsystem into the frame cage.
12. Remove the wheel chocks on the lift-tool casters, and disengage the lift-tool brake.
13. Move the lift tool from the front of the rack and lower the lift plate.
14. At the front of the rack, ensure that the front cover on the frame cage is lowered into closed position.

15. At the rear of the rack, tighten the two knurled captive screws at the bottom of the chassis, to hold the processor subsystem to the frame cage.
16. Route and connect all cables previously removed from the processor subsystem. These may include:
 - Power cables to the DCA units on the front of the subsystem
 - RIO cables at the rear of the subsystem
 - PCI adapter cables at the rear of the subsystem
 - Serial cables at the rear of the subsystem
 - Ethernet cables at the rear of the subsystem
17. If additional service is not being performed, close the rack doors.
18. Repackage the lift tool.

Processor Subsystem Removal

CAUTION:

This unit weighs between 32 kg (70.5 pounds) and 55 kg (121.2 pounds). Three persons are required to safely move it. Using less than three persons to move it can result in injury.

C05

Attention: Removing a processor subsystem for the rack requires the use of a lift tool. This process requires:

- The use of a lift tool (part number 09P2481) and lift-plate assembly tool (part number 11P4369).
- The lift tool wheels must be chocked to prevent it from moving during the operation. The rack must not be on its casters. The leveling pads must be engaged to prevent the rack from moving during the operation.

To remove the processor subsystem from the rack, do the following:

1. Ensure that power to the system is turned off.
2. Open the front and rear doors of the rack.
3. Prepare the lift tool for use as follows:
 - a. Unpack the lift tool and follow the assembly instructions included with the tool.
 - b. Inspect the tool for damage (do not perform the removal procedure with a damaged lift tool).
 - c. Read all safety instructions before performing this operation.
 - d. Replace the blue lift plate with the orange lift plate (part number 11P4369).
 - e. Orient the two round holes in the lift plate to the side of the lift tool that will be closest to the rack.
4. Label all cables and components, and record their locations at the front and the rear of the rack.
5. Disconnect all cables on the processor subsystem. These may include:
 - Power cables to the DCAs on the front of the subsystem
 - RIO cables at the rear of the subsystem
 - PCI adapter cables at the rear of the subsystem
 - Serial cables at the rear of the subsystem
 - Ethernet cables at the rear of the subsystem
6. At the rear of the rack, loosen the two knurled captive screws, at the bottom of the chassis, holding the processor subsystem to the frame cage.

Note: The nuts are on captive screws and are not removed from the chassis when removing the processor subsystem.

7. At the front of the rack, lift the front cover on the frame cage and lock it into the open position.
8. To remove the processor subsystem from the rack, use the lift tool, and do the following:

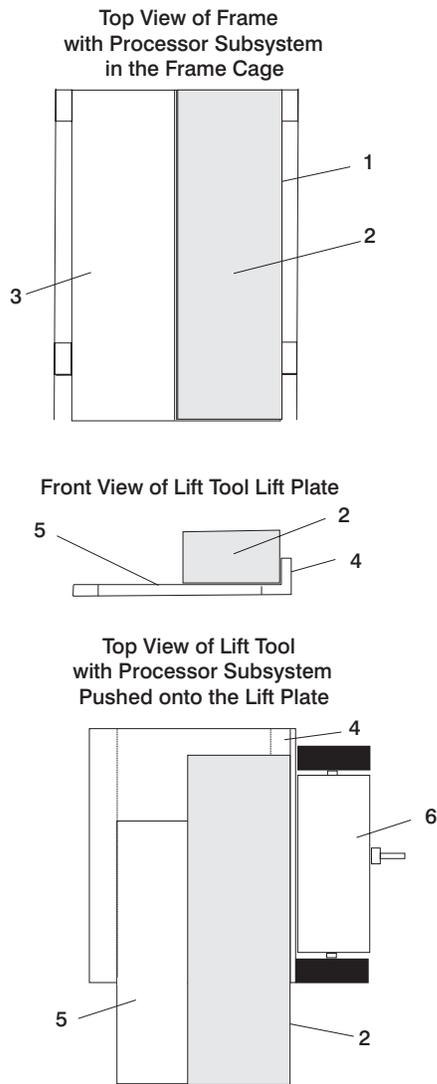
- a. Position the lift tool at the front of the rack, about 7 inches from the front of the rack.

Note: The lift-tool extension arms are not attached to the rack for this system.

- b. Raise and align the lift plate so that it is level with the bottom of the processor subsystem. Ensure that the edge of the lift plate is approximately 7 inches from the front of the rack, and with the "L"-shaped edge of the lift plate aligned with the side of the processor subsystem.

Note: The "L"-shaped edge of the lift plate must be maintained flush against the side of the processor subsystem as the processor subsystem is pushed onto the lift plate. If you are removing a processor subsystem located on the left side of the rack (as you face the front of the rack), the lift tool must be positioned in front of the rack and to the left so that the "L"-shaped edge of the lift plate will align with the right side of the processor subsystem that is being removed.

The following illustration shows the position of the lift tool for removing a processor subsystem on the right side of the rack (facing the rack).



- | | |
|---------------------------|-------------------------------------|
| 1 Frame Cage (right side) | 4 "L"-shaped Edge of Lift Plate |
| 2 Processor Subsystem | 5 Sliding Portion of the Lift Plate |
| 3 Frame Cage | 6 Back of the Lift Tool |

- c. Install wheel chocks on the lift tool casters, and engage the lift-tool brake.

- d. Adjust the sliding part of the lift plate so that it can move forward and away from the rack.

Note: The sliding part of the lift plate can be positioned to move in two directions.

- e. Pull the release buttons on the lift plate and slide the lift-plate tray to the maximum distance away from the rack.
- f. Carefully slide the processor subsystem out of the frame cage until the front of the processor subsystem is aligned with the edge of the lift-plate tray the is farthest from the rack.
- g. Check to ensure that the rear of the processor subsystem and the PCI adapter release handles are clear of the rack and frame cage.
- h. Tie the processor subsystem to the lift plate with tie-down straps.
- i. Check to ensure that you can safely lower the lift plate. If the processor subsystem will clear the frame cage and rack, lower the lift plate and release the lift-tool brake.

If you cannot safely lower the lift plate, do the following:

- 1) Remove the wheel chocks on the lift-tool casters, and disengage the lift-tool brake.
- 2) Move the lift tool away from the rack until you can safely lower the lift plate.
- 3) Install the wheel chocks, and engage the brake on the lift tool.
- 4) Lower the lift plate and release the lift-tool brake.

- j. Remove the processor subsystem from the lift-tool lift plate.

9. If other processor subsystems are not being removed from the rack, repackage the lift tool.

I/O Subsystems

This section describes how to install and remove I/O subsystems.

I/O Subsystem Installation

CAUTION:

This unit weighs between 32 kg (70.5 pounds) and 55 kg (121.2 pounds). Three persons are required to safely move it. Using less than three persons to move it can result in injury.

C05

Attention: Installing an I/O subsystem in the rack requires the use of a lift tool. This process requires:

- The use of a lift tool (part number 09P2481) and lift-plate assembly tool (part number 11P4369).
- The lift tool wheels must be chocked to prevent it from moving during the operation. The rack must not be on its casters. The leveling pads must be engaged to prevent the rack from moving during the operation.

To install an I/O subsystem in the rack, do the following:

1. Unpack the lift tool and follow the assembly instructions included with the tool.
2. Inspect the tool for damage (do not perform the installation procedure with a damaged lift tool).
3. Read all safety instructions before performing this operation.
4. Replace the blue lift plate with the orange lift plate (part number 11P4369).
5. Orient the two round holes in the lift plate to the side of the lift tool that will be closest to the frame.
6. Position the lift tool so that the I/O subsystem can be moved onto the lift plate.
7. Install the wheel chocks, and engage the brake on the lift tool.
8. Move the I/O subsystem onto the tool with the rear side toward the two holes of the lift plate. The side with the handles is considered the front side.

Note: Ensure that the I/O subsystem is in the center of the lift plate.

9. Remove the wheel chocks on the lift-tool casters, and disengage the lift-tool brake.

10. Position the lift tool as close as possible to the rack.
11. Install the wheel chocks, and engage the brake on the lift tool.
12. Raise the lift plate to a height so that it is just above the rails of the installation location. Release the pins on the lift plate and fully extend the center portion of the plate toward the frame. Lock the lift plate in place. Ensure that the lift tool is securely in place.

Notes:

- a. The lift-tool extension arms are not attached to the rack for this system.
- b. Ensure that the I/O subsystem is being installed in its original rack location.
13. Push the I/O subsystem into the frame. Adjust the height of the lift plate, as needed.
14. Remove the wheel chocks on the lift-tool casters, and disengage the lift-tool brake.
15. Lower the lift plate, and move the lift tool away from the rack.
16. Secure the I/O subsystem in the frame.
17. Connect the cables from the I/O subsystem to applicable processor subsystem(s). See Appendix G, "Cabling Information", on page 85.
18. If other subsystems are not being installed, repackage the lift tool.

I/O Subsystem Removal

CAUTION:

This unit weighs between 32 kg (70.5 pounds) and 55 kg (121.2 pounds). Three persons are required to safely move it. Using less than three persons to move it can result in injury.

C05

Attention: Removal of an I/O subsystem from the rack requires the use of the lift tool. This process requires:

- The use of a lift tool (part number 09P2481) and lift-plate assembly tool (part number 11P4369).
- The lift tool wheels must be chocked to prevent it from moving during the operation. The frame must not be on its casters. The leveling pads must be engaged to prevent the frame from moving during the operation.

To remove an I/O subsystem from the rack, do the following:

1. Unpack the lift tool and follow assembly instructions included with the tool.
2. Inspect the tool for damage (do not perform the installation procedure with a damaged lift tool).
3. Read all safety instructions before performing this operation.
4. Replace the blue lift plate with the orange lift plate (part number 11P4369).
5. Orient the two round holes in the lift plate to the side of the lift tool that will be closest to the frame.
6. Open the rack doors and remove them from the rack.
7. Label all cables and components, and record their locations at the front and the rear of the rack.
8. Remove the screws that attach the I/O subsystem to the rack.
9. Position the lift tool at the front of the rack. Align the lift tool so that I/O subsystem chassis will not be blocked (at the lip of the orange lift plate) from removal.

Note: The lift-tool extension arms are not attached to the rack for this system.

10. Install wheel chocks on the lift tool casters, and engage the lift-tool brake.
11. Raise the lift plate to a height so that the lift plate is just below the base of the I/O subsystem chassis you are removing.
12. Pull and guide the I/O subsystem chassis onto the lift plate. The I/O subsystem chassis must be removed far enough to clear the front face of the frame.
13. Lower the I/O subsystem to the bottom position of the lift tool.

14. Remove the wheel chocks on the lift-tool casters, and release the lift-tool brake.
15. Move the lift tool with the I/O subsystem to a staging area, and move the I/O subsystem from the lift plate.
16. Install wheel chocks on the lift tool casters, and engage the lift-tool brake.
17. Position the I/O subsystem on a sturdy and stable work surface.
18. If other subsystems are not being installed or removed, repackage the lift tool.

Integrated Battery Feature (IBF)

This section describes how to install and remove the integrated battery feature.

Integrated Battery Feature Installation

CAUTION:

This unit weighs between 32 kg (70.5 pounds) and 55 kg (121.2 pounds). Three persons are required to safely move it. Using less than three persons to move it can result in injury.

C05

Attention: Installing an integrated battery feature in the rack requires the use of a lift tool. This process requires:

- The use of a lift tool (part number 09P2481) and lift-plate assembly tool (part number 11P4369).
- The lift tool wheels must be chocked to prevent it from moving during the operation. The rack must not be on its casters. The leveling pads must be engaged to prevent the rack from moving during the operation.

To install an IBF, do the following:

1. Unpack the lift tool and follow assembly instructions included with the tool.
2. Inspect the tool for damage (do not perform the installation procedure with a damaged lift tool).
3. Read all safety instructions before performing this operation.
4. Replace the blue lift plate with the orange lift plate (part number 11P4369).
5. Orient the two round holes in the lift plate to the side of the lift tool that will be closest to the frame.
6. Position the lift tool so that the IBF can be moved onto the lift plate.

Note: The lift-tool extension arms are not attached to the rack for this system.

7. Install the wheel chocks, and engage the brake on the lift tool.
8. Move the IBF onto the tool with the rear side toward the two holes of the lift plate. The side with the handles is considered the front side.

Note: Ensure that the IBF is in the center of the lift plate.

9. Remove the wheel chocks on the lift-tool casters, and disengage the lift-tool brake.
10. Position the lift tool as close as possible to the rack.
11. Install the wheel chocks, and engage the brake on the lift tool.
12. Raise the lift plate to a height so that the lift plate is just above the rails of the slot you are installing it in.

Note: Ensure that the IBF is being installed in its original rack location.

13. Push the IBF into the frame. Adjust the height of the lift plate, as needed.
14. Lower the lift plate on the lift tool.
15. Fasten the IBF to the mounting rails, using the mounting screws.
16. Install the battery cable in the IBF cable connector.
17. Fasten the cable retaining clamp (closest to the cable's connector) to the frame, using the retaining clamp screw.
18. If other subsystems are not being installed, repackage the lift tool.

Integrated Battery Feature Removal

CAUTION:

This unit weighs between 32 kg (70.5 pounds) and 55 kg (121.2 pounds). Three persons are required to safely move it. Using less than three persons to move it can result in injury.
C05

Attention: Removing an integrated battery feature from the rack requires the use of a lift tool. This process requires:

- The use of a lift tool (part number 09P2481) and lift-plate assembly tool (part number 11P4369).
- The lift tool wheels must be chocked to prevent it from moving during the operation. The rack must not be on its casters. The leveling pads must be engaged to prevent the rack from moving during the operation.

To remove an IBF, do the following:

1. Unpack the lift tool and follow assembly instructions included with the tool.
2. Inspect the tool for damage (do not perform the installation procedure with a damaged lift tool).
3. Read all safety instructions before performing this operation.
4. Replace the blue lift plate with the orange lift plate (part number 11P4369).
5. Orient the two round holes in the lift plate to the side of the lift tool that will be closest to the frame.
6. Locate the IBF to be removed.
7. Remove the battery cable from the front of the IBF, and remove the screw (closest to the connector) holding the cable to the rack. This action allows the cable to move so the IBF can be removed.
8. Remove the two mounting screws from the top and bottom guide rails and retain for reuse.
9. Raise the lift plate to a height so that the lift plate is just below the base of the IBF you are removing.
10. Lock the lift plate in place.
11. Pull and guide the IBF onto the lift plate. The IBF must be removed far enough to clear the front face of the rack. Retract the extender arms and the center portion of lift plate.

Note: Ensure that the IBF is in the center of the lift plate.

12. Lower the IBF to the bottom position of the lift tool.
13. Remove the wheel chocks on the lift-tool casters, and release the lift-tool brake.
14. Move the lift tool with the IBF to a staging area.
15. Position the IBF on a sturdy and stable work surface.
16. If other subsystems are not being installed or removed, repackage the lift tool.

Appendix A. 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: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. Neither the provider nor the manufacturer is 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.

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 A Information Technology Equipment according to CISPR 22 / European Standard EN 55022. The limits for Class A equipment were derived for commercial and industrial environments to provide reasonable protection against interference with licensed communication equipment.

Attention: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

International Electrotechnical Commission (IEC) Statement

This product has been designed and built to comply with IEC 60950.

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 A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

Canadian Department of Communications Compliance Statement

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

VCCI Statement

この装置は、クラス A 情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。 V C C I - A

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

This is a Class A product based on the standard of the Voluntary Control Council for Interference by Information Technology Equipment (VCCI). If this equipment is used in a domestic environment, radio disturbance may arise. When such trouble occurs, the user may be required to take corrective actions.

Electromagnetic Interference (EMI) Statement - Taiwan

警告使用者：
這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，在這種情況下，使用者會被要求採取某些適當的對策。

The following is a summary of the EMI Taiwan statement above.

Warning: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user will be required to take adequate measures.

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 A. Für diese von Geräten gilt folgende Bestimmung nach dem EMVG:

Geräte dürfen an Orten, für die sie nicht ausreichend entstört sind, nur mit besonderer Genehmigung des Bundesministers für Post und Telekommunikation oder des Bundesamtes für Post und Telekommunikation betrieben werden. Die Genehmigung wird erteilt, wenn keine elektromagnetischen Störungen zu erwarten sind.

(Auszug aus dem EMVG vom 9.Nov.92, Para.3, Abs.4)

Hinweis

Dieses Genehmigungsverfahren ist von der Deutschen Bundespost noch nicht veröffentlicht worden.

Appendix B. Environmental Notices

Product Recycling and Disposal

This unit contains materials such as circuit boards, cables, electromagnetic compatibility gaskets and connectors which may contain lead and copper/beryllium alloys that require special handling and disposal at end of life. Before this unit is disposed of, these materials must be removed and recycled or discarded according to applicable regulations. IBM offers product return programs in several countries, for country specific instructions please refer to the following web site:
<http://www.ibm.com/ibm/environment/products/prp.phtml>

This product may contain a sealed lead acid battery(s) or nickel-cadmium battery(s). The battery(s) must be recycled or disposed of properly. Recycling facilities may not be available in your area. In the United States, IBM has established a collection process for reuse, recycling, or proper disposal of used sealed lead acid, nickel cadmium and nickel metal hydride batteries and battery packs from IBM equipment. For information on proper disposal of the batteries in this product, please contact IBM at 1-800-426-4333. For information on disposal of sealed lead acid or nickel cadmium batteries outside the United States, contact your local waste disposal or recycling facility.

Environmental Design

The environmental efforts that have gone into the design of this system signify IBM's commitment to improve the quality of its products and processes. Some of these accomplishments include the elimination of the use of Class 1 ozone-depleting chemicals in the manufacturing process and reductions in manufacturing wastes. For more information, contact an IBM account representative.

Acoustical Noise Emissions^(1, 2)

Product Configuration	Declared A-Weighted Sound Power Level, L_{WAd} (B)		Declared A-Weighted Sound Pressure Level, L_{pAm} (dB)	
	Operating	Idle	Operating	Idle
One @server pSeries 655 processor node (maximum 16 per system), nominal conditions, non-acoustical doors	7.2	7.2	55	55
One @server pSeries 655 processor node (maximum 16 per system) nominal conditions, acoustical doors	6.7	6.7	50	50
Typical configuration of @server pSeries 655 system (3 processor nodes, bulk power, 1 I/O drawer), nominal conditions, non-acoustical doors	8.1	8.1	63	63
Typical configuration of @server pSeries 655 system (3 processor nodes, bulk power, 1 I/O drawer), nominal conditions, acoustical doors	7.5	7.5	57	57
Maximum configuration of @server pSeries 655 system (16 processor nodes, bulk power), nominal conditions, non-acoustical doors	8.3 ⁽³⁾	8.3 ⁽³⁾	65 ⁽³⁾	69 ⁽³⁾
Maximum configuration of @server pSeries 655 system (16 processor nodes, bulk power), nominal conditions, acoustical doors	7.7 ⁽³⁾	7.7 ⁽³⁾	59 ⁽³⁾	59 ⁽³⁾
Notes: <ol style="list-style-type: none"> 1. L_{WAd} is the upper-limit A-weighted sound level; L_{pAm} is the mean A-weighted sound pressure level measured at the 1-meter bystander positions; 1 B = 10 dB. 2. All measurements made in conformance with ISO 7779 and declared in conformance with ISO 9296 3. Attention: Your server installation may be subject to government regulations (such as those prescribed by OSHA or European Community Directives) that cover noise-level exposure in the workplace. The 7040 Model W42 rack is available with an optional acoustical door feature that can reduce the likelihood of exceeding noise-level exposure limits for racks densely populated with pSeries 655 processor subassemblies. The actual sound-pressure levels in your installation will depend on a variety of factors, including the number of racks in the installation; the size, materials, and configuration of the room where the racks are installed; the noise levels from other equipment; the room ambient temperature, and employees' location in relation to the equipment. It is recommended that a qualified person, such as an industrial hygienist, be consulted to determine whether the sound-pressure levels to which employees may be exposed exceed regulatory limits. 				

Appendix C. Notices

This information was developed for products and services offered in the U.S.A.

The manufacturer may not offer the products, services, or features discussed in this document in other countries. Consult the manufacturer's representative for information on the products and services currently available in your area. Any reference to the manufacturer's product, program, or service is not intended to state or imply that only that product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any intellectual property right of the manufacturer may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any product, program, or service.

The manufacturer may have patents or pending patent applications covering subject matter described in this document. The furnishing of this document does not give you any license to these patents. You can send license inquiries, in writing, to the manufacturer.

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This information 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.

Information concerning products made by other than the manufacturer was obtained from the suppliers of those products, their published announcements, or other publicly available sources. The manufacturer has not tested those products and cannot confirm the accuracy of performance, compatibility or any other claims related to products made by other than the manufacturer. Questions on the capabilities of products made by other than the manufacturer should be addressed to the suppliers of those products.

Appendix D. pSeries 655 Description and Overview

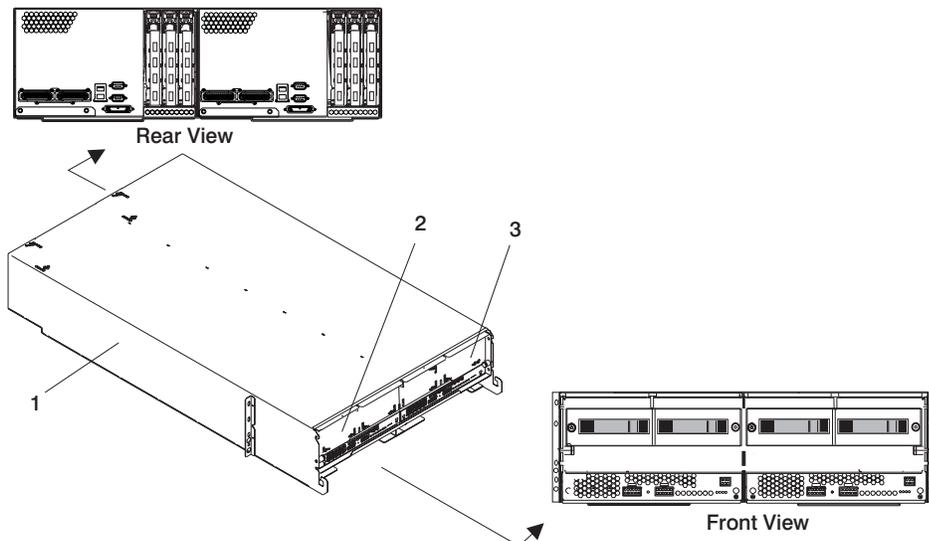
DANGER

This system has redundant power supply capabilities, meaning that it has the ability to have two power supplies running simultaneously in the same system unit. When instructed to disconnect the power source, ensure that all power cables have been unplugged.

D07

Processor Subsystem Description

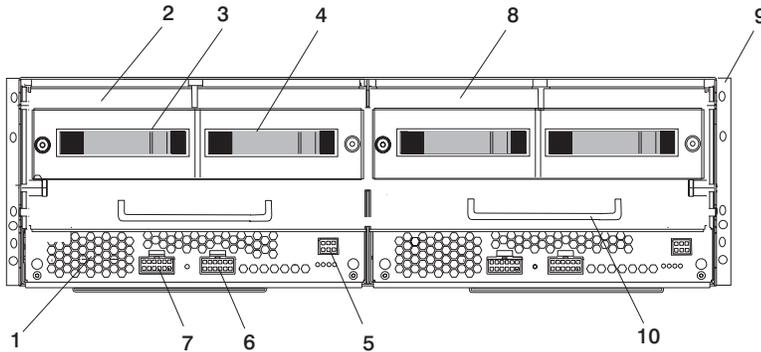
The pSeries 655 Model 651 Processor Subsystem (Machine type 7039) is a processor node installed in a frame-mounted chassis (frame cage). Each frame cage holds two processor subsystems. Multiple processor subsystems can be mounted in the rack as described in the following section (“Server Configurations” on page 59). The following illustration shows the chassis with two processor subsystems.



- 1 Frame Cage, shown with two processor subsystems (nodes)
- 2 First pSeries 655 Processor Subsystem
- 3 Second pSeries 655 Processor Subsystem

Front View

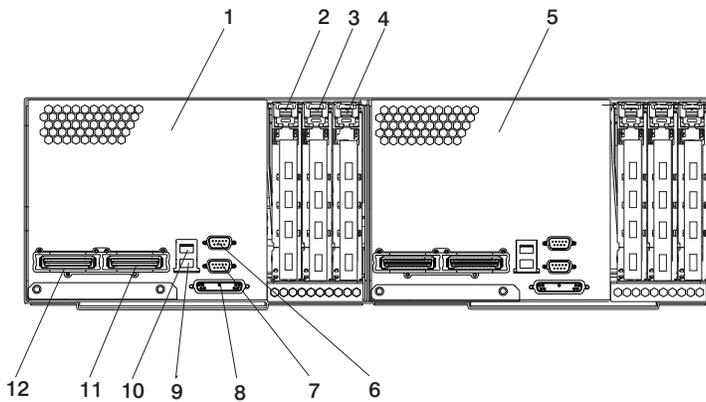
The following illustration shows the front view of processor systems in a frame cage. Two processor systems are contained in each frame cage in the rack drawer positions.



- | | |
|--------------------------------|---|
| 1 Outer Chassis (Frame Cage) | 6 DCA Power Connector (J1) |
| 2 First Processor Subsystem | 7 DCA Power Connector (J0) |
| 3 DASD Drive | 8 Second Processor Subsystem |
| 4 DASD Drive | 9 Outer Chassis (Frame Cage) |
| 5 Fan Assembly Power Connector | 10 Handle (on each Processor Subsystem) |

Rear View

The following illustration shows the rear view of processor systems in a frame cage. Two processor systems are contained in each frame cage in the rack drawer positions.



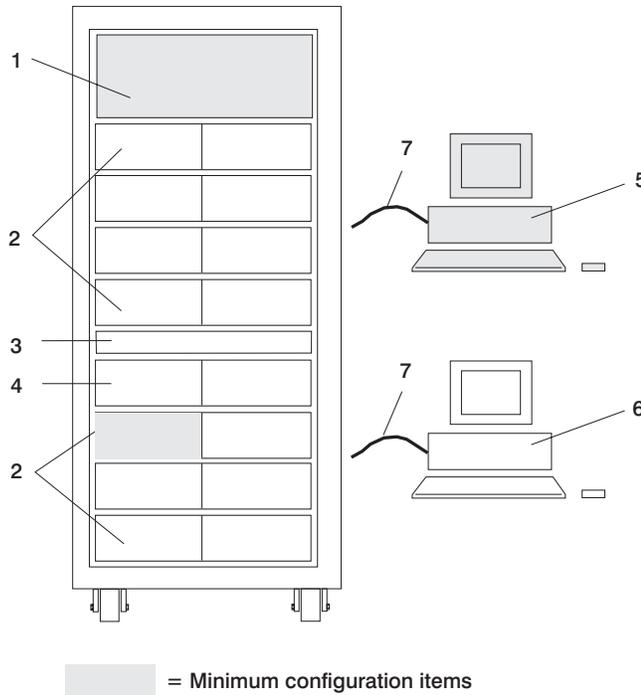
- | | |
|--|-------------------------|
| 1 Second Processor Subsystem | 7 HMC Connector 1 |
| 2 PCI Adapter Slot 1 (64-bit, 133 MHz PCI-X) | 8 Debug Connector |
| 3 PCI Adapter Slot 2 (64-bit, 133 MHz PCI-X) | 9 Ethernet Connector 1 |
| 4 PCI Adapter Slot 3 (64-bit, 133 MHz PCI-X) | 10 Ethernet Connector 2 |
| 5 First Processor Subsystem | 11 RIO Connector A0 |
| 6 HMC Connector 2 | 12 RIO Connector A1 |

Server Configurations

The following illustrations show some single-frame configurations available.

Typical Server Configuration

A typical server configuration can consist of 1 to 16 nodes and a 350 V bulk power subsystem. When options are installed (integrated battery feature and I/O subsystems), the number of nodes is reduced. Any rack position can be substituted with an I/O drawer. A maximum of five I/O subsystems can be installed. A maximum of six Integrated Battery Feature (IBF) units can be installed.

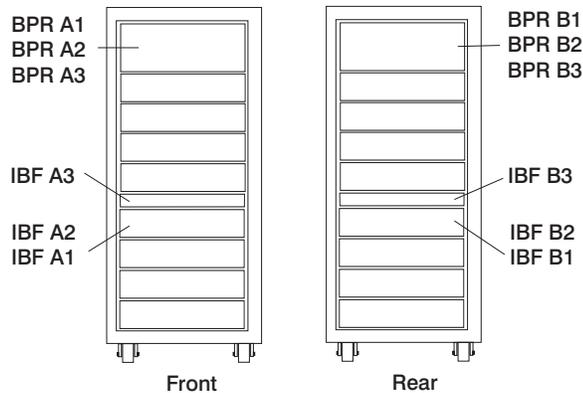


1	7040 Model W42 Bulk Power Subsystem	
2	pSeries 655 Processor Subsystems or 7040 Model 61D I/O Subsystem	<ul style="list-style-type: none"> • Various configurations are possible (16 processor subsystems maximum). • 5 or 6 processor subsystems maximum with 5 I/O drawers installed.
3	7040 Model W42 Integrated Battery Feature (IBF)	Fifth and sixth (optional) IBF. Drawer location for the IBF is fixed.
4	pSeries 655 Processor Subsystems OR 7040 Model 61D I/O Subsystem OR 7040 Model W42 Integrated Battery Feature (IBF)	This drawer may contain one or two processor subsystems OR One I/O subsystem OR One, two or four IBFs.
5 - 6	Hardware Management Console	One standard; one optional
7	Cables	<ul style="list-style-type: none"> • 16 RS-232 cables for each HMC. One cable from each HMC to each processor subsystems. A maximum of 32 RS-232 cables per rack is possible. • Two RS-422 cables for each HMC. Two RS-422 cables from each HMC attach to each Bulk Power Controller (BPC). A maximum of 4 RS-422 cables per rack.

It is recommended that an Ethernet network be connected to the system. Each HMC can connect to each processor subsystem to enable implementation of the service functions that are available. The Ethernet network is used for Service Focal Point (see the *IBM Hardware Management Console for pSeries Installation and Operations Guide* for detailed information).

Redundant Integrated Battery Feature (IBF)

For a redundant IBF, both the IBF A and B must be installed. IBF A is installed in the front of the rack. IBF B is installed in the rear of the rack. The IBFs attach to the corresponding bulk power regulators (BPRs) at the top of the rack. See the following illustration:



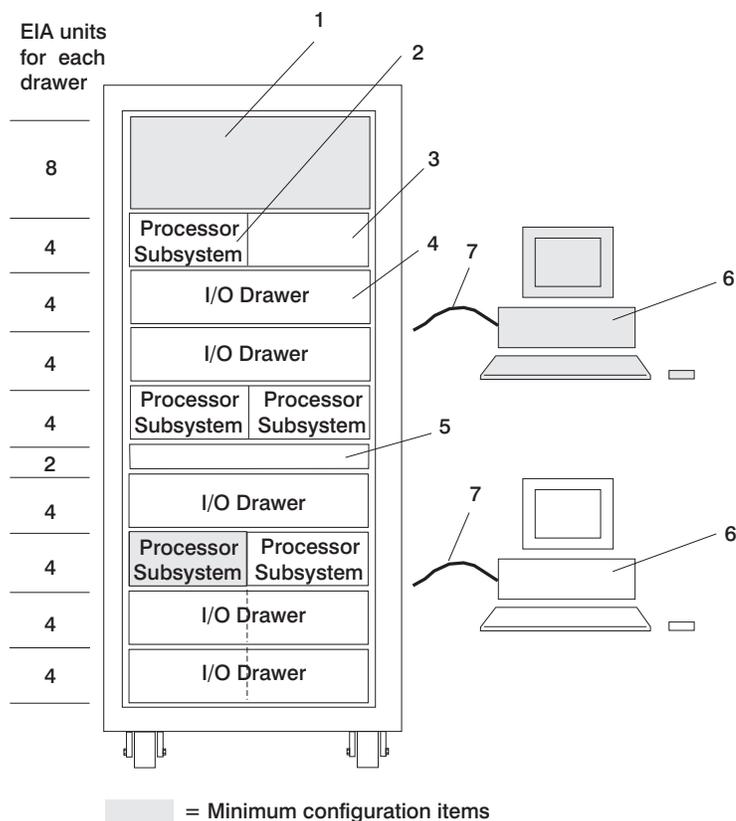
Nonredundant Integrated Battery Feature (IBF)

For a nonredundant IBF, only IBF A is installed in the front of the rack. See the previous illustration.

Maximum I/O Subsystem and Processor Subsystem Configuration

A maximum I/O drawer configuration consists of 5 I/O subsystems and 5 or 6 processor subsystems.

To get to the maximum configuration of 5 I/O subsystems, the IBF feature cannot be used. The drawer designated for the first and second IBFs may be used for a fifth I/O subsystem; therefore, the first and second IBFs could not be installed. The drawer locations for the fifth I/O subsystem, or two or four IBFs are U1.13 and U1.15. The 5 I/O subsystem configuration results in the third IBF never being installed, because the first and second IBFs are not installed.



1	7040 Model W42 Bulk Power Subsystem	
2	pSeries 655 Processor Subsystem	5 or 6 processor subsystems maximum with 5 I/O drawers.
3	May contain sixth pSeries 655 Processor Subsystem or may be empty	
4	7040 Model 61D I/O Subsystem	At least 4 I/O subsystems must be daisy-chained to processor subsystems to achieve the 5-drawer maximum.
5	Empty in this maximum I/O configuration	No IBF installed.
6	Hardware Management Console	One standard; one optional
7	Cables	<ul style="list-style-type: none"> • 5 RS-232 cables (one to each processor subsystem for the 5-processor configuration). • 6 RS-232 cables for the 6-processor configuration. • Two RS-422 cables from each HMC attach to each BPC. A maximum of 4 RS-422 cables per rack.

I/O drawers are ordered as a single unit, consisting of two identical functional halves. An entire I/O drawer can be cabled to a single processor subsystem when the two halves of the I/O drawer are daisy-chained together. Each half of an I/O drawer can also be cabled to a different processor subsystem.

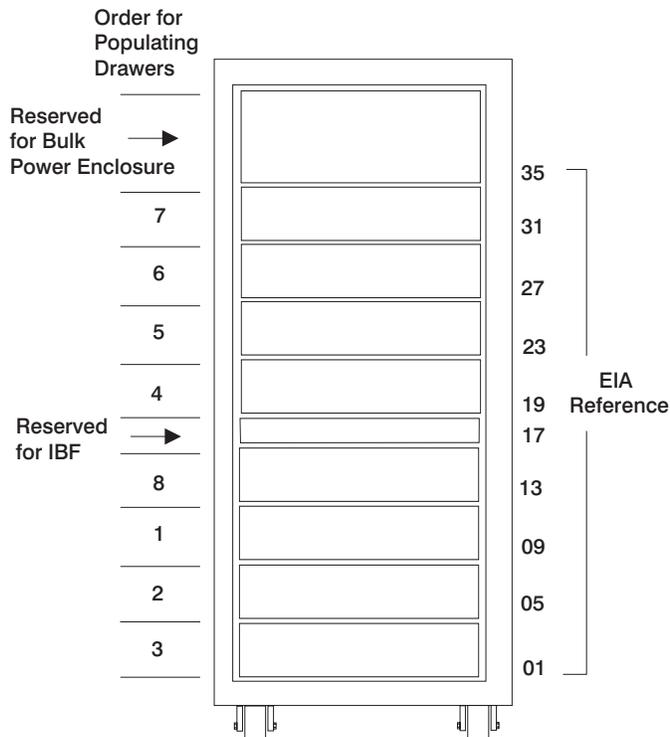
It is recommended that an Ethernet network be connected to the system. Each HMC can connect to each processor subsystem to enable implementation of the service functions that are available. The Ethernet network is used for Service Focal Point (see the *IBM Hardware Management Console for pSeries Installation and Operations Guide* for detailed information).

Subsystem Placement Rules

If the system was disassembled to reduce weight to enable movement to its installation site, the following subsystem placement rules must be followed when reassembling the components into the rack. Placement of processor subsystems, I/O subsystems, and IBFs in the rack must conform to the following rules:

- Processor subsystems and I/O drawers must be populated in a specified drawer order in a rack.
- Processor subsystems must be installed in each frame cage from left to right (facing the front of the rack).
- Drawer locations for the bulk power enclosure and IBFs are fixed.

The following illustration shows the order for populating drawers in a rack.



System Cables

Various cables connect the power, processor subsystem(s), battery, I/O subsystems, and the HMCs. These include:

- Universal Power Interface Controller (UPIC) cables are the power cables for the processor subsystem(s)
- Remote Input/Output (RIO) cables are the cables connecting the processor subsystem(s) with the I/O subsystems
- RS-232 cables connect the processor subsystems to the HMC port adapters. The connection is made directly in small configurations or through remote asynchronous nodes in large rack configurations.

For detailed information about cables, refer to Appendix G, “Cabling Information”, on page 85.

Multiple System Configurations

The system configuration may vary. Other configurations include the following:

- Multiple processor subsystems attached to one HMC. For more information on this configuration, see “Install and Configure the 8-Port Asynchronous Adapter” on page 19 and “Install and Configure the 128-Port Asynchronous Adapter” on page 21.
- Multiple IBF units, I/O subsystems, Bulk Power Jumpers (BPJ), and processor subsystems.

Appendix E. System Records

Use this appendix to keep a record of your system configuration.

Identification Numbers

The system configuration may contain various combinations of the following:

- Processor subsystems
- I/O subsystems
- Hardware Management Consoles
- Integrated battery features
- Bulk power jumpers

The following table can be used to record the serial numbers for subassemblies installed in a rack. Refer to the illustration in “Location Codes for Server Configurations” on page 64 for the subsystem location codes. If an I/O subsystem occupies a rack drawer, record the subsystem serial number in only one location designated for the drawer.

Subsystem Location Code	Description	Serial Number
U1.35-P1-X1	Unused	
U1.35-P1-X2	(Bulk Power Jumper, optional)	
U1.35-P1-X3		
U1.35-P1-X4		
U1.35-P1-V1		
U1.35-P1-V2		
U1.35-P1-V3		
U1.31		
U1.32		
U1.27		
U1.28		
U1.23		
U1.24		
U1.19		
U1.20		
U1.17 (reserved for IBF)		
U1.13		
U1.14		
U1.9		
U1.10		
U1.5		
U1.6		
U1.1		
U1.2		
HMC (standard)		

HMC (optional)		
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Location Codes for Server Configurations

The following illustration shows the location codes for a typical server configuration with the maximum of 16 processor subsystems. These codes are used to identify the major functional units in the system rack.

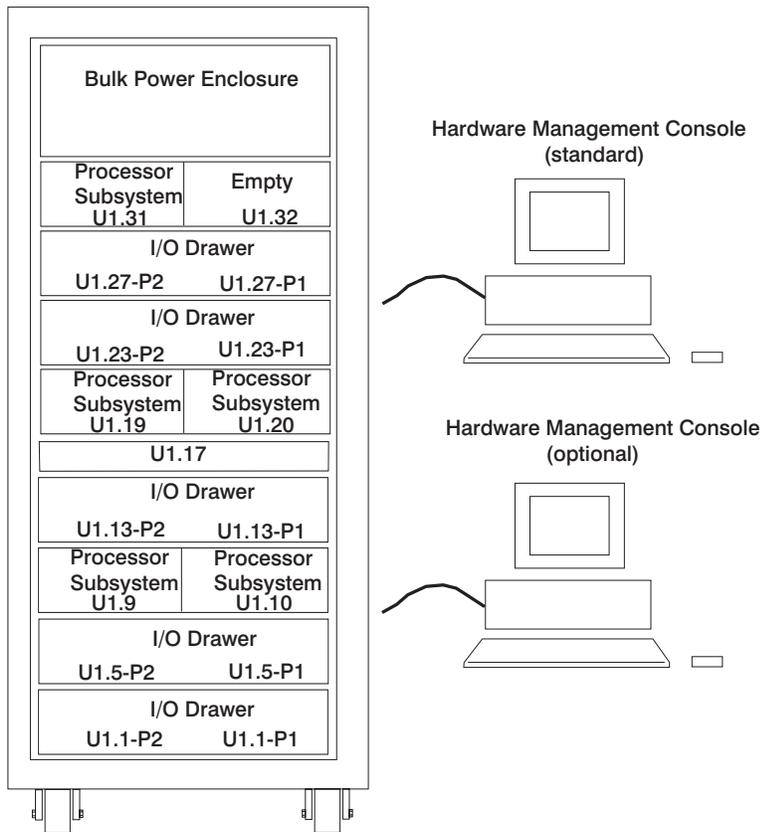
U1.35-P1-X1 (Unused)		U1.35-P1-F1
U1.35-P1-X2		
U1.35-P1-X3		
U1.35-P1-X4		
U1.35-P1-V1		
U1.35-P1-V2		
U1.35-P1-V3		
U1.31	U1.32	
U1.27	U1.28	
U.1.23	U1.24	
U.1.19	U1.20	
U1.17 (IBF)		
U1.13	U1.14	
U1.9	U1.10	
U1.5	U1.6	
U1.1	U1.2	

Front

U1.35-P2-X1 (Unused)		U1.35-P2-F1
U1.35-P2-X2		
U1.35-P2-X3		
U1.35-P2-X4		
U1.35-P2-V1		
U1.35-P2-V2		
U1.35-P2-V3		
U1.32	U1.31	
U1.28	U1.27	
U.1.24	U1.23	
U1.20	U1.19	
U1.17 (IBF)		
U1.14	U1.13	
U1.10	U1.9	
U1.6	U1.5	
U1.2	U1.1	

Rear

The following illustration shows the location codes for a maximum I/O configuration with five processor subsystems and five I/O drawers.



Notes:

1. A sixth processor subsystem may be installed in location U1.32, but an I/O subsystem is not available for this subsystem.
2. If IBFs are installed, placement in the rack must be as follows:
 - The first and second IBF must be installed in location U1.13-P1 and U1.13-P2
 - The third and fourth IBF must be installed in location U1.15-P1 and U1.15-P2
 - Location U1.17 is reserved for the fifth and sixth IBF. If only one to four IBFs are installed, location U1.17 remains empty.
3. The I/O drawers can be installed in any location that is open in the frame. There are no fixed locations for I/O subsystems. Install the I/O drawer as close as possible to the processor subsystem that it will be connected to, either above or below the processor subsystem.

RIO Ports

Each processor subsystem has two RIO ports located on the rear of the chassis. Use the following table to record the destination of the RIO cables attached to the ports.

Processor Subsystem (Serial Number)	RIO Port	
	RIO Port A0	RIO Port A1
	I/O Drawer	I/O Drawer
	I/O Connector	I/O Connector
	I/O Drawer	I/O Drawer
	I/O Connector	I/O Connector
	I/O Drawer	I/O Drawer
	I/O Connector	I/O Connector
	I/O Drawer	I/O Drawer
	I/O Connector	I/O Connector
	I/O Drawer	I/O Drawer
	I/O Connector	I/O Connector
	I/O Drawer	I/O Drawer
	I/O Connector	I/O Connector
	I/O Drawer	I/O Drawer
	I/O Connector	I/O Connector
	I/O Drawer	I/O Drawer
	I/O Connector	I/O Connector
	I/O Drawer	I/O Drawer
	I/O Connector	I/O Connector
	I/O Drawer	I/O Drawer
	I/O Connector	I/O Connector
	I/O Drawer	I/O Drawer
	I/O Connector	I/O Connector
	I/O Drawer	I/O Drawer
	I/O Connector	I/O Connector
	I/O Drawer	I/O Drawer
	I/O Connector	I/O Connector

Appendix F. Securing the Rack

This appendix contains information about installing the rack for the system. This procedure should be performed if the customer has ordered the appropriate hardware kits to bolt the system to the floor. For further information, refer to part number 44P2659 and the installation instructions for the frame tie-down (part number 44P2660).

Additional information about planning the site for installing the system is described in *Site and Hardware Planning Information*.

Position the Rack

Note: The customer should unpack the rack and position it in the room. If this has not been done, consult the customer and the marketing representative as necessary.

To unpack and position the rack, do the following:

1. Remove all packing and tape from the rack.
2. Position the rack according to the customer floor plan.
3. Lock each caster wheel.

Determine Your Next Step

Use the following to determine your next step:

- If the rack is being attached to a concrete (non-raised) floor, proceed to “Attach the Rack to a Concrete (Non-Raised) Floor” on page 74.
- If the rack is being attached to a raised floor, proceed to “Attach the Rack to a Low-Raised or High-Raised Floor” on page 77.
- If the rack is not being attached to the floor, proceed to “Step 5. Position and Level the Rack” on page 8.

Attach the Rack to a Concrete (Non-Raised) Floor

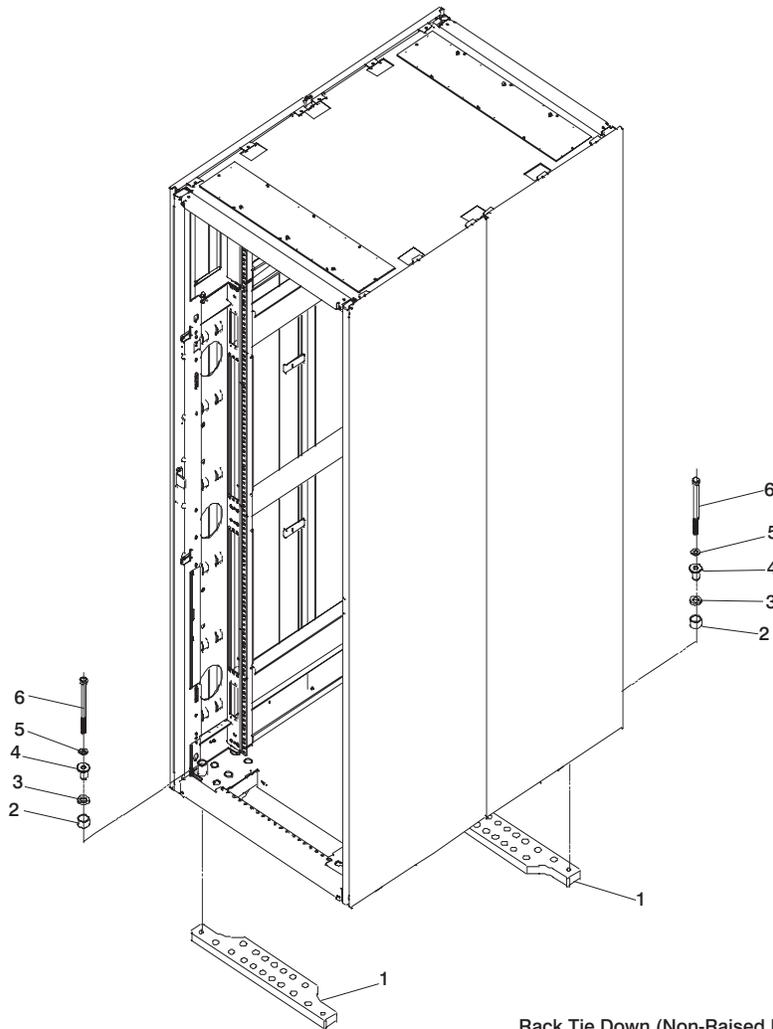
Customer Procedures

Use this procedure to attach the rack to a concrete (non-raised) floor.

Attention: It is the customer's responsibility to ensure the following steps are completed before the service representative performs the tie-down procedure.

Note: The customer should obtain the service of a qualified structural engineer to determine appropriate anchoring of the mounting plates. A minimum of three anchor bolts for each mounting plate must be used to secure 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, additional holes must be drilled. Each mounting plate must have at least three usable holes, two that are on opposite sides and opposite ends of each other, and one hole at the center. The mounting plates should be able to withstand 1136 kg (2500 lbs.) pulling force on each end.

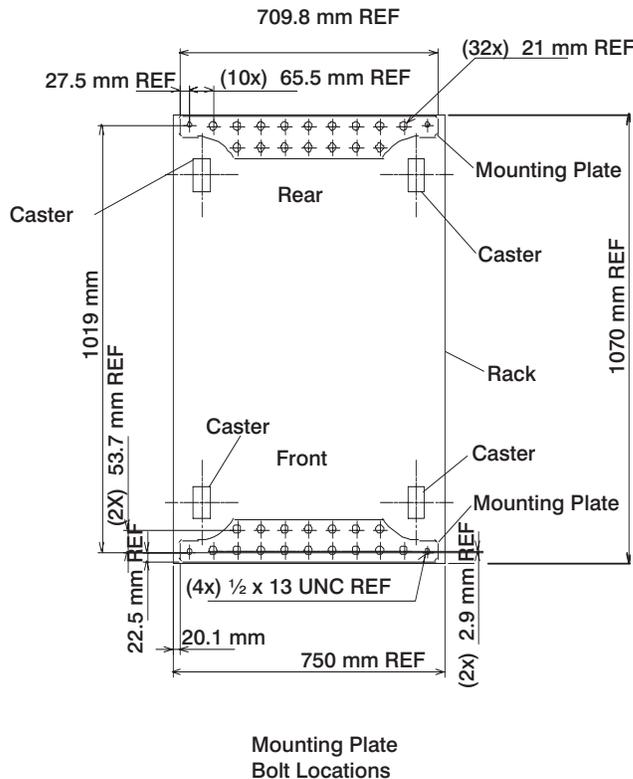
1. Be sure the rack is in the correct location.



Rack Tie Down (Non-Raised Floor)

2. Place the mounting plates (item 1 in illustration on page 74), front and rear, in the approximate mounting position under the system rack.
3. To align the mounting plates to the system rack, do the following:

- a. Place the four rack-mounting bolts (item 6 in illustration on page 74) through the plate assembly holes at the bottom of the rack. Install the bushings and washers (item 4 and 5 in illustration on page 74) to ensure bolt positioning.
 - b. Position the mounting plates (item 1 in illustration on page 74) under the four rack-mounting bolts (item 6 in illustration on page 74) so that the mounting bolts are centered directly over the tapped holes.
 - c. Turn the rack-mounting bolts (item 6 in illustration on page 74) three or four rotations into the tapped holes.
4. Mark the floor around the edge of the mounting plates, as shown in the following illustration:



5. Remove the mounting bolts from the threaded holes.
6. Move the rack away from the mounting plates.
7. Mark the floor at the center of each hole in the mounting plate (including tapped holes).
8. Remove the mounting plates from the marked locations.
9. At the marked location of the tapped mounting holes, drill two holes approximately 2.54 cm (1 in.) 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. Drill one hole in each group of anchor bolt location marks as indicated on the marked floor.
10. Using at least three bolts for each mounting plate, mount the mounting plates to the concrete floor.

Service Representative Procedures

Attention: It is the service representative's responsibility to complete the following steps.

1. Reposition the system rack over the mounting plates.
2. Place the four rack-mounting bolts through the plate assemblies with the D-washer positioned so that the straight side of the washer is facing inward toward the system rack.
3. Place the isolator bushing (item 4 in illustration on page 74) inside the leveling foot with a washer between the isolator bushing and the floor plate.

4. Turn the rack-mounting bolts three or four rotations into the tapped holes.
5. Turn the leveling foot of the plate assembly down until it contacts the mounting plate, and then level the rack using the four leveling feet.
6. Lock the leveling feet by tightening the lock nut.
7. Tighten the four rack-mounting bolts into the mounting plates.

Attach the Rack to a Low-Raised or High-Raised Floor

Attention: It is the customer's responsibility to ensure the following steps are completed before the service representative performs the tie-down procedure.

Note: To accommodate a floor with a depth of more than 40.6 cm (16 in.), a steel beam or a steel channel adapter for mounting the subfloor eyebolts is required. The customer must supply the floor eyebolts.

The customer is responsible for consulting with a qualified licensed structural engineer, to determine if the building concrete subfloor can withstand the floor loading specified in the *Site and Hardware Planning Information*.

A fully populated system can weigh up to 1705 kg (3750 lbs.) with a 568 kg (1250 lbs.) concentrated load acting on a caster. For multiple systems installation it is possible that one floor panel will have two casters from two adjacent systems inducing 1136 kg (2500 lbs.) concentration loads into the panel. The customer is responsible to consult the floor tile manufacturer to determine the load rating of the floor tile and the pedestal structure supporting the floor tiles in order to insure safe relocation and installation of the system. Depending on the type of raised floor and the floor panel type, additional panel supports (pedestals) may be required to restore structural integrity of the panel. It should be noted that cable cutouts on a panel will significantly reduce (up to 50 percent) the floor tile load rating. To avoid floor panel damage when moving a system to its final installed location, it may be necessary to place protective material on the floor.

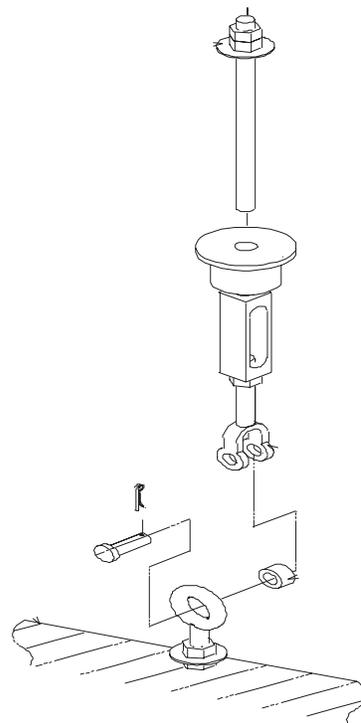
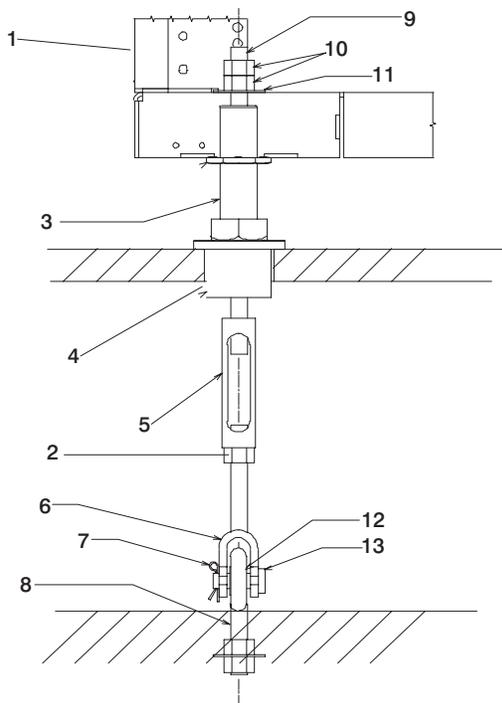
To install the eyebolts, do the following:

1. Obtain the service of a qualified structural engineer to determine the appropriate installation of the eyebolts.
2. Consider the following before installing the eyebolts:
 - Floor eyebolts must be securely anchored to the concrete floor.
 - The minimum height of the center of the internal diameter is 2.54 cm (1 in.) above the concrete floor surface.
 - The maximum height is 6.35 cm (2.5 in.) above the concrete floor surface. Higher than 6.35 cm (2.5 in.) can cause excessive lateral deflection to the tie-down hardware.
 - The eyebolt's internal diameter should be 2.8 cm (1-3/16 in.), and each eyebolt should be able to withstand 1227 kg (2700 lbs.). The customer should obtain the service of a qualified consultant or structural engineer to determine the appropriate anchoring method for these eyebolts and to ensure that the raised floor can support the floor-loading specifications provided in the *Site and Hardware Planning Information*.
3. Plan for installing four eyebolts positioned to match the dimensions given in *Site and Hardware Planning Information* for the rack designated to hold the pSeries 655 and associated subsystems.
4. Install the eyebolts to the floor.

To install the frame, do the following:

Attention: It is the service representative's responsibility to complete the following steps.

1. Before starting the installation, check all cable openings in the floor panel and location of the rubber bushing holes so that they match the dimensions given in *Site and Hardware Planning Information*.
2. Power off the system, and make sure all cables and connectors are disconnected and are not dangling around the frame. The frame should be free to roll.
3. The floor eyebolts should be already secured to the concrete floor. Verify the height of the center of the floor eyebolt to the concrete floor or the steel beam/channel adapter mounted to the concrete floor. Ensure that the turnbuckles can accommodate the total height of the raised floor.
4. Remove the floor tiles around the area where the frame(s) will be installed.
5. Remove the pin and the spacer from the lower jaw. See the following illustrations. The illustration with components identified with item numbers is accompanied with a three-dimensional view of the same components.



- 1 Frame
- 2 Jam Nut
- 3 Rack Leveler
- 4 Rubber Bushing
- 5 Turnbuckle (Short or Long)
- 6 Lower Jaw
- 7 Pin

- 8 Floor Eyebolt (customer-supplied)
- 9 Threaded Rod
- 10 Nut
- 11 Washer
- 12 Spacer
- 13 Shaft

Note: The difference between the two turnbuckle assemblies is the length of the turnbuckle.

The short turnbuckle assembly (part number 11P4755) is used for a 24.13 cm (9-1/2 in.) to 29.8 cm (11-3/4 in.) raised floor.

The long turnbuckle assembly (part number 11P4756) is used for an 29.8 cm (11-3/4 in.) to 40.6 cm (16 in.) raised floor.

6. Place the spacer inside the floor eyebolt, and place the floor eyebolt into the lower jaw. Reinstall the shaft, pin, and spacer.
7. Remove the threaded rod and rubber bushing from the turnbuckle assembly.
8. Install the floor tile that has the rubber bushing holes that are aligned with the eyebolt locations.
9. Install the rubber bushings in the floor tiles.
10. Move the frame so that the frame leveler is located over the rubber bushings.
Attention: To avoid a tipping hazard, make sure that the frame casters do not roll into the cable opening.
11. Turn the leveling foot of the plate assembly down until it contacts the bushing, and then level the rack using the four leveling feet by tightening the lock nuts.
12. Lock the leveling feet by tightening the lock nut.
13. Insert the threaded rod into the inner hole of the leveler and the rubber bushing.
14. Thread down the threaded rod until the tip of the rod is approximately 25.4 cm (1 in.) inside the turnbuckle.
15. Insert the nuts and hand-tighten the nuts.
16. Repeat the previous three steps so that all assemblies are completely installed, as shown in the previous illustration.
17. Tighten all the nuts to 54 N-m (40 ft-lbs.).

Install the Weight Distribution Plate

Attention: Refer to the *Site and Hardware Planning Information* before installing the system. Observe the requirements in the *Site and Hardware Planning Information* relating to system weight, noise emissions, power, and cooling.

The customer is responsible for consulting with a qualified licensed structural engineer, to determine if the building concrete subfloor can withstand the floor loading specified in the *Site and Hardware Planning Information*.

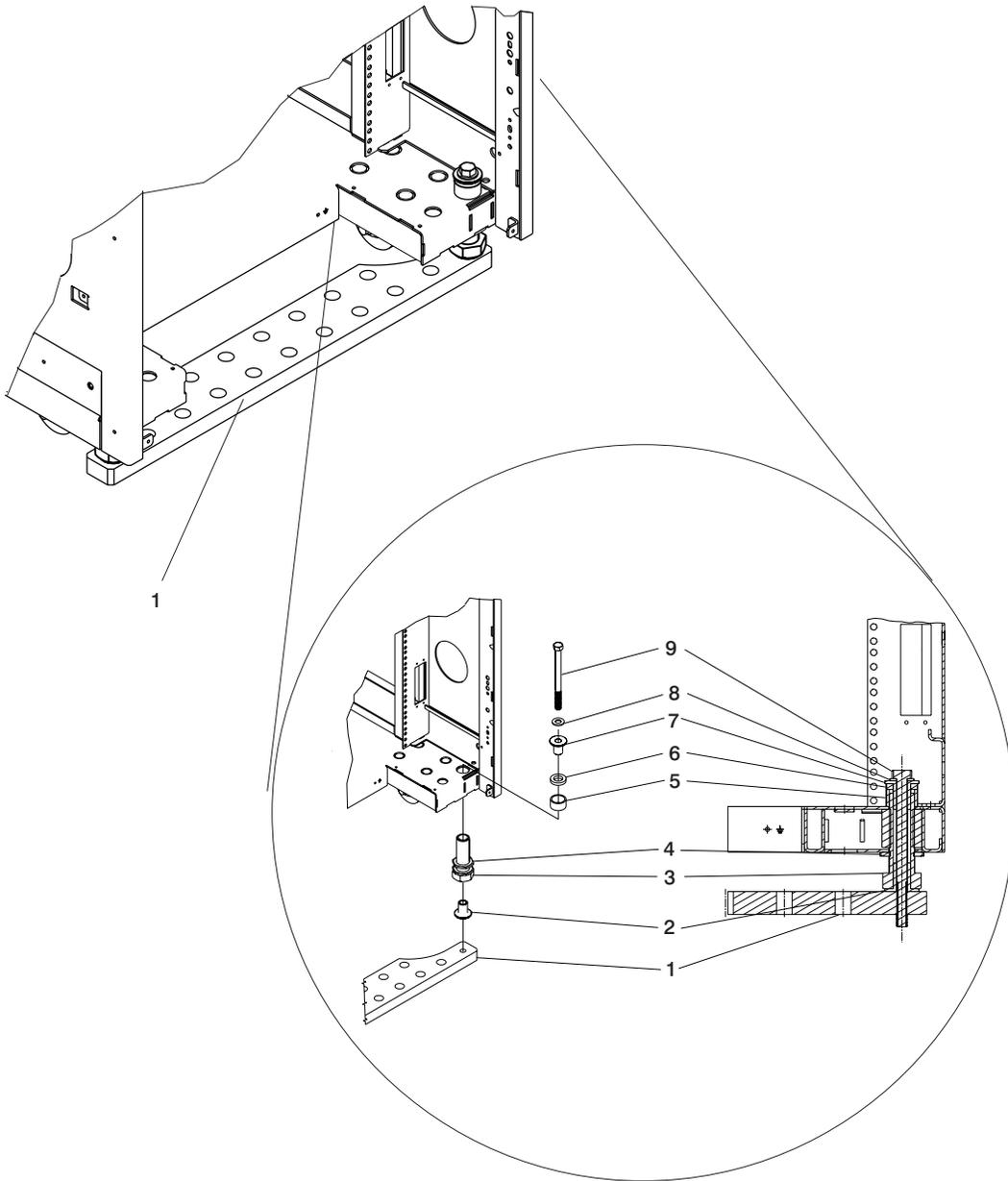
A fully populated system can weigh up to 1659 kg (3650 lbs.) with a 568 kg (1250 lbs.) concentrated load acting on a caster. For multiple systems installation it is possible that one floor panel will have two casters from two adjacent systems inducing 1136 kg (2500 lbs.) concentration loads into the panel. The customer is responsible to consult the floor tile manufacturer to determine the load rating of the floor tile and the pedestal structure supporting the floor tiles in order to insure safe relocation and installation of the system. Depending on the type of raised floor and the floor panel type, additional panel supports (pedestals) may be required to restore structural integrity of the panel. It should be noted that cable cutouts on a panel will significantly reduce (up to 50 percent) the floor tile load rating. To avoid floor panel damage when moving a system to its final installed location, it may be necessary to place protective material on the floor.

The weight distribution plate is intended for distributing load of a frame weighing more than 1136 kg (2500 lbs.) onto two floor panels. The weight distribution plate is designed for a raised-floor installation.

Note: Before performing the installation of the weight distribution, the rack must be located at its final installation location.

1. If the rack has not been unpacked, remove all packaging and tape from the rack.
2. Position the rack according to the customer floor plan. Avoid positioning the rack on floor tiles that have cut-outs for cables or other wiring.
3. Lock each caster wheel by tightening the screw on the caster.
4. Be sure the rack is in the correct location.

5. Place a weight distribution plate (part number 11P3528) at the front and the rear of the rack, in the approximate mounting position under the rack. Refer to the following illustration.



- | | |
|-----------------------------|-----------|
| 1 Weight Distribution Plate | 6 Washer |
| 2 Bushing | 7 Bushing |
| 3 Leveler Feet | 8 Washer |
| 4 Jam Nut | 9 Bolt |
| 5 Spacer | |

6. To align the plates to the system rack, do the following:
 - a. Install the spacers (item 5), washers (item 6) and bushings (item 2).
 - b. Place the four mounting bolts (item 9) and washers (item 8) through the plate assembly holes at the bottom of the rack.
 - c. Position the plates under the four mounting bolts so that the mounting bolts are centered directly over the threaded holes.

- d. Place the bushings under the leveler feet (item 3)
- e. Turn the mounting bolts three or four rotations into the threaded holes.
- f. Turn the leveling foot assembly down until it contacts the plate, and then level the rack using the four leveling feet.
- g. Lock the leveling feet by tightening the lock nut.
- h. Tighten the four rack-mounting bolts into the plate.

Installing the Frame Ground Strap

Attention: It is recommended that all pSeries 655 systems installed in 7040 Model W42 racks, are grounded. However, the ground strap is *required* for a switched clustered environment (for example, when in a scalable parallel (SP) Switch-2 connected clustered environment).

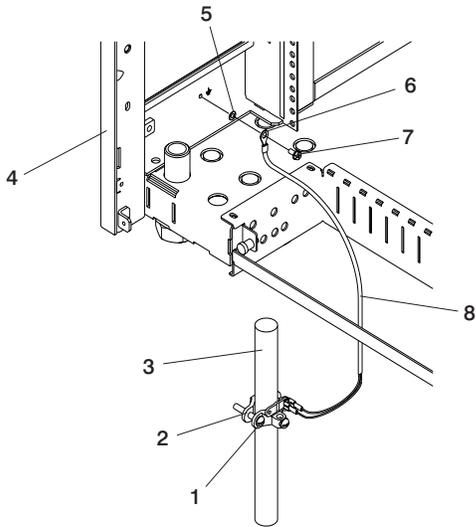
Raised-Floor Environments

Raised-floor environments can be low-raised or high-raised floors. For additional information on site planning for the system, refer to pSeries 655 information in Chapter 2 of the *Site and Hardware Planning Information*. The ground strap provided with the system is intended for use with a grounded raised floor. If the installation does not use a grounded raised floor, refer to the alternate grounding means in the pSeries 655 information in Chapter 2 of the *Site and Hardware Planning Information*.

Attention: If the site raised-floor has pedestals that are not grounded, refer the customer to consult with a certified electrical contractor to have the floor pedestals grounded or refer them to pSeries 655 information in Chapter 2 of the *Site and Hardware Planning Information* for an alternate solution if the installation site does not have a grounded raised floor.

To install the ground strap on a rack in a grounded raised-floor environment perform the following steps.

1. Ensure that the raised-floor is grounded. A grounded-raised floor has pedestals that are connected with ground wire so an electrical ground can be installed from equipment to pedestals, and then to an earth ground.
If the raised floor not grounded, stop, and request the customer to arrange to have the floor grounded, and to see pSeries 655 information in Chapter 2 of the *Site and Hardware Planning Information*.
If the raised-floor is grounded, go to the next step.
2. If the rear door on the rack is not open, open the door.
3. At the rear bottom left side of the rack, attach the lug end of the ground strap (part number 44P2814) to the ground connection symbol on the rack using a screw (part number 2665528) and optional lockwasher (part number 1623347, if provided). Tighten the screw using an 8 mm nutdriver. See the following illustration.



- | | |
|--|---|
| 1 Screw on Ground Clamp (for tightening the clamp) | 5 Lockwasher (optional) |
| 2 Grounding Clamp | 6 Lug on Ground Strap |
| 3 Metal Floor Pedestal | 7 Screw (for attaching lug to the rack) |
| 4 Rear Bottom Left Side of the Rack | 8 Ground Strap |

4. Position the ground strap clamp (part number 5457808) around a grounded floor pedestal.
5. Using a screw driver, tighten the ground strap clamp screw to secure the clamp to the floor pedestal.
6. Attach the other end of the ground strap to the ground strap clamp on the floor pedestal.
7. If no other service procedures are being performed at the rear of the rack, close the rack door.

Non-Raised Floor Environments

Determine if the ground strap is required (refer to the *Attention* in “Installing the Frame Ground Strap” on page 82). If the system is installed in a switched clustered environment (Switch-2 connected clustered environment), refer to pSeries 655 information in Chapter 2 of the *Site and Hardware Planning Information* for an alternate solution.

Appendix G. Cabling Information

This appendix provides information about the location of the pSeries 655 cables.

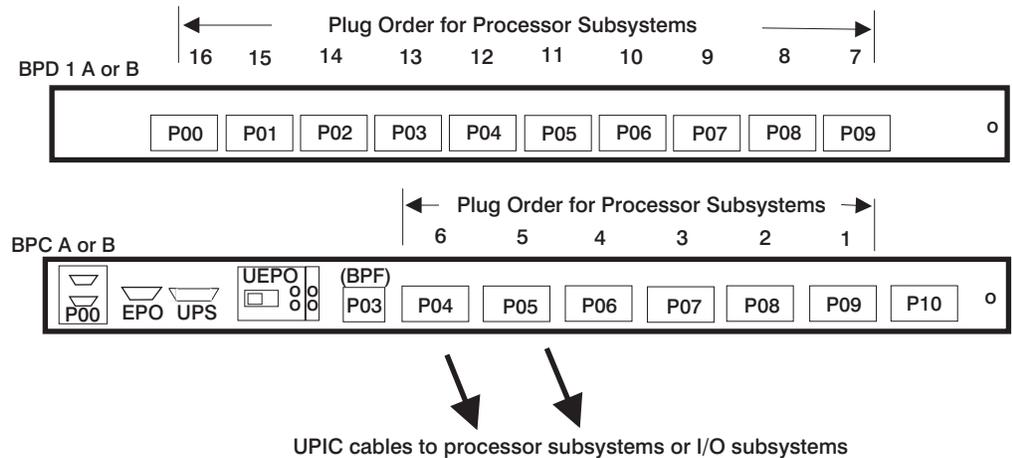
Note: The cables tied along the raceway may settle during shipment and might be tight when reconnecting to the BPA. The cable ties may need to be loosened and cable slack pulled back up in order to be reconnected.

Power Cabling

The following illustrations and table provide detailed information about power connectors and cables.

Bulk Power Subsystem Connector Locations

The following illustration shows front (A) and rear (B) connector locations on the BPD and BPC. The illustration also shows the order in which the connectors are to be plugged. To determine cable locations, connections, and part numbers, use this illustration, the illustration shown in “Rack Configuration Drawer Assignments”, and the table in “Power Cable Part Numbers” on page 86.

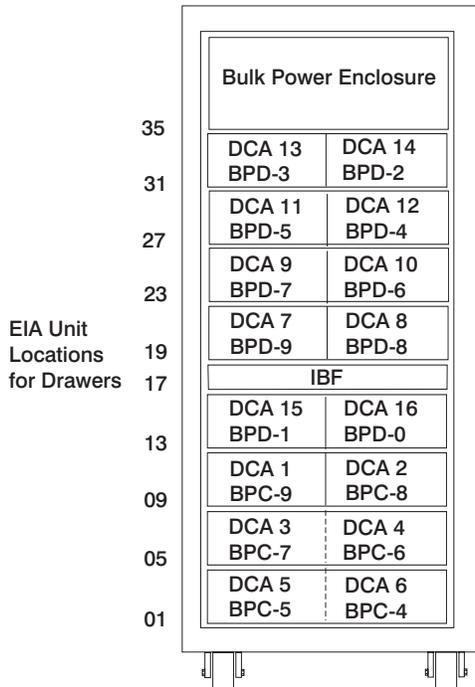


The designation shown in the illustration for BPD and BDC A or B indicates the A side (front) or B side (rear) of the BPD or BPC.

Power cables from the BPC and BPD connect to the processor subsystems DCAs or to the I/O subsystems. See “Power Cable Part Numbers” on page 86 for cable connections.

Rack Configuration Drawer Assignments

The following illustration shows the rack configurations, placement code sequence, and assigned BPC and BPD connections. Use this illustration and the following table to determine the part numbers for power cables and the required connections.



Power Cable Part Numbers

Cable from Power Subsystem Connector	Cable to Subsystem (Processor or I/O Location Code)	Power Subsystem Cable Part Number	Connector Description
P09	U1.9	44P1876	DCA 1 BPC (A-9) to Right DCA at EIA position 9
		44P1877	DCA 1 BPC (B-9) to Right DCA at EIA position 9
P08	U1.10	44P1878	DCA 2 BPC (A-8) to Right DCA at EIA position 9
		44P1879	DCA 2 BPC (B-8) to Right DCA at EIA position 9
P07	U1.5	44P2212	DCA 3 BPC (A-7) to Left DCA at EIA position 5
		44P2213	DCA 3 BPC (B-7) to Left DCA at EIA position 5
P06	U1.6	44P2212	DCA 4 BPC (A-6) to Right DCA at EIA position 5
		44P2213	DCA 4 BPC (B-6) to Right DCA at EIA position 5
P05	U1.1	44P2212	DCA 5 BPC (A-5) to Left DCA at EIA position 1
		44P2213	DCA 5 BPC (B-5) to Left DCA at EIA position 1

Cable from Power Subsystem Connector	Cable to Subsystem (Processor or I/O Location Code)	Power Subsystem Cable Part Number	Connector Description
P04	U1.2	44P2212	DCA 6 BPC (A-4) to Left DCA at EIA position 1
		44P2213	DCA 6 BPC (B-4) to Left DCA at EIA position 1
P09	U1.19	44P1888	DCA 7 BPD (A-9) to Left DCA at EIA position 19
		44P1889	DCA 7 BPD (B-9) to Left DCA at EIA position 19
P08	U1.20	44P1890	DCA 8 BPD (A-8) to Right DCA at EIA position 19
		44P1891	DCA 8 BPD (B-8) to Right DCA at EIA position 19
P07	U1.23	44P1898	DCA 9 BPD (B-7) to Left DCA at EIA position 23
		44P1899	DCA 9 BPD (B-7) to Left DCA at EIA position 23
P06	U1.24	44P1900	DCA 10 BPD (A-6) to Right DCA at EIA position 23
		44P1901	DCA 10 BPD (B-6) to Right DCA at EIA position 23
P05	U1.27	44P1902	DCA 11 BPD (A-5) to Left DCA at EIA position 27
		44P1903	DCA 11 BPD (B-5) to Left DCA at EIA position 27
P04	U1.28	44P1904	DCA 12 BPD (A-4) to Right DCA at EIA position 27
		44P1905	DCA 12 BPD (B-4) to Right DCA at EIA position 27
P03	U1.31	44P1906	DCA 13 BPD (A-3) to Left DCA at EIA position 31
		44P1907	DCA 13 BPD (B-3) to Left DCA at EIA position 31
P02	U1.32	44P1908	DCA 14 BPD (A-2) to Right DCA at EIA position 31
		44P1909	DCA 14 BPD (B-2) to Left DCA at EIA position 31
P01	U1.13	44P1910	DCA 15 BPD (A-1) to Left DCA at EIA position 13
		44P1911	DCA 15 BPD (B-1) to Left DCA at EIA position 13
P00	U1.14	44P1912	DCA 16 BPD (A-0) to Right DCA at EIA position 13
		44P1913	DCA 16 BPD (B-0) to Right DCA at EIA position 13

Cable from Power Subsystem Connector	Cable to Subsystem (Processor or I/O Location Code)	Power Subsystem Cable Part Number	Connector Description
--------------------------------------	---	-----------------------------------	-----------------------

Notes:

1. P10 connector is not used.
2. Cable clamp (part number 11P4606) is used with all cables.
3. Cable hook-and-loop fastener (part number 07H6655) is used with all cables.

RIO Cables

The following table lists the cables used to connect the RIO connectors on the processor subsystem to the I/O subsystem input/output connectors.

Part Number	Description
11P2355	RIO cable, 0.5 m
53P5242	RIO to RIO-G cable, 1.0 m
53P5243	RIO to RIO-G cable, 3.0 m

HMC to Processor Subsystem Cables

The following table lists the cables used to connect the HMC to the processor subsystem.

Part Number	Cable Length	Connector Description	Type of Cable
44P0205	6 m (19.7 ft)	9 Pin to 9 Pin	RS-232
44P0206	15 m (49.2 ft)	9 Pin to 9 Pin	RS-232
44P2237	6 m (19.7 ft)	25 Pin to 9 Pin mini D-Shell	RS-422
44P2238	6 m (19.7 ft)	25 Pin to 9 Pin mini D-Shell	RS-422
44P2239 (for BPCA)	15 m (49.2 ft)	25 Pin to 9 Pin mini D-Shell	RS-422
44P2240 (for BPCB)	15 m (49.2 ft)	25 Pin to 9 Pin mini D-Shell	RS-422

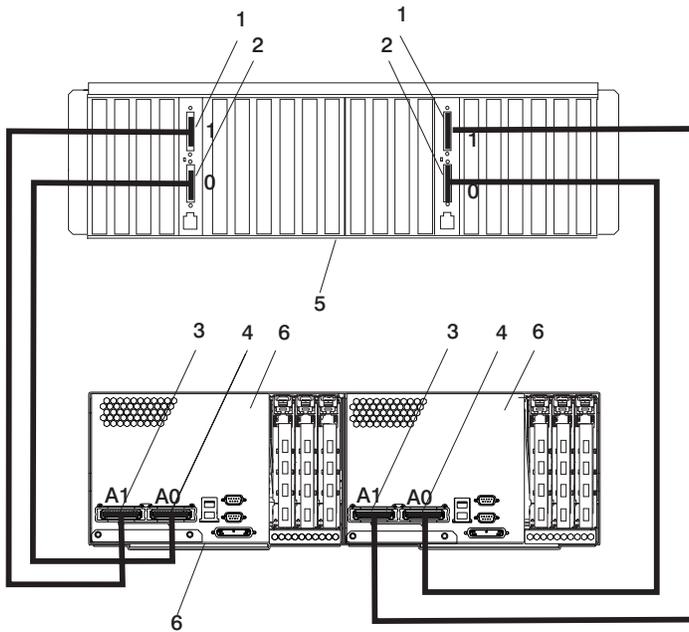
I/O Subsystem Cabling

The I/O drawers can be installed in any location open in the frame. There are no fixed locations for I/O subsystems. The I/O drawer should be installed as close as possible to the processor subsystem that it will be connected to, either above or below the processor subsystem.

The UPIC cables are connected to BPA A and B using the UPIC cable connections identified for the processor subsystem in the U location in the frame. For example, an I/O subsystem installed in frame location U19 will be identified as U1.19 and is attached to the BPA connections from DCA 1 to BPD1-A and BPD1-B connector P09, and from DCA 2 to BPD1-A and BPD1-B connector P08.

Example of I/O Cabling to Processor Subsystem (Not Looped)

The following illustration shows cabling from each side of an I/O subsystem to two processor subsystems.

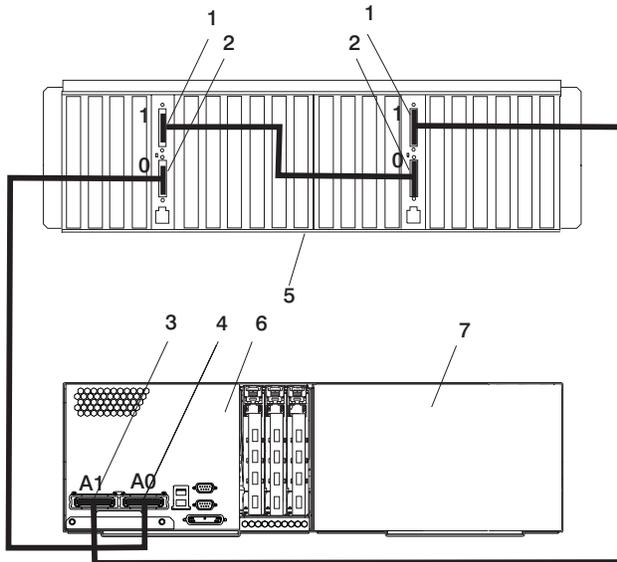


- 1 I/O Subsystem Port 1
- 2 I/O Subsystem Port 0
- 3 RIO Port A1

- 4 RIO Port A0
- 5 7040 Model 61D I/O Subsystem
- 6 Processor Subsystem

Example of I/O Cabling to Processor Subsystem (Looped)

The following illustration shows cabling to an I/O subsystem from one processor subsystem in a looped (daisy-chained) configuration.



- 1 I/O Subsystem Port 1
- 2 I/O Subsystem Port 0
- 3 RIO Port A1
- 4 RIO Port A0

- 5 7040 Model 61D I/O Subsystem
- 6 Processor Subsystem
- 7 Empty

Appendix H. Removing and Installing the Rack Top Frame

The following conditions warrant performing this procedure:

- Removing and installing the rack top frame for clearance through doorways
- Installing the rack top frame that was shipped unattached from the rest of the frame

Note: If the clearance is close (an interference of 1/2 inch or less), removing the side covers may be all that is required. For side cover removal, see “Side Cover Removal” on page 95.

For clearance procedures, go to “Remove the Rack Top Frame for Clearance Through Doorways” on page 97. For the reduced-height procedure, go to “Prepare for Rack Top-Frame Installation for the Reduced-Height Option” on page 102.

CAUTION:

This unit weighs between 18 kg (39.7 pounds) and 32 kg (70.5 pounds). Two persons are required to safely move it. Using less than two persons to move it can result in injury.

C04

The weights of components are listed in the following table:

Item	Weight
Rack Top Frame and Crate	210 kg (463 lbs.)
Rack top frame with power (4 BPRs and 2 BPDs)*	141 kg (310 lbs.)
BPR	14 kg (30 lbs.)
BCP	6 kg) 14 lbs.
BPD	6 kg (14 lbs.)
BPE	18 kg (40 lbs.)
BPJ	5 kg (10 lbs.)
Rack Top Frame without Rails	30 kg (66 lbs.)
Rack Top Frame with Rails	33 kg (73 lbs.)

Notes:

1. Maximum total weight can be up to 255 kg (561 lbs.).
2. * Can be shipped with up to 6 BPRs. Two BPDs per system are always provided.
3. For small configurations, only 2 BPRs are provided.
4. Two BPJs may be provided for large system configurations.

Required Tools

The following tools are necessary to remove or install the rack top frame:

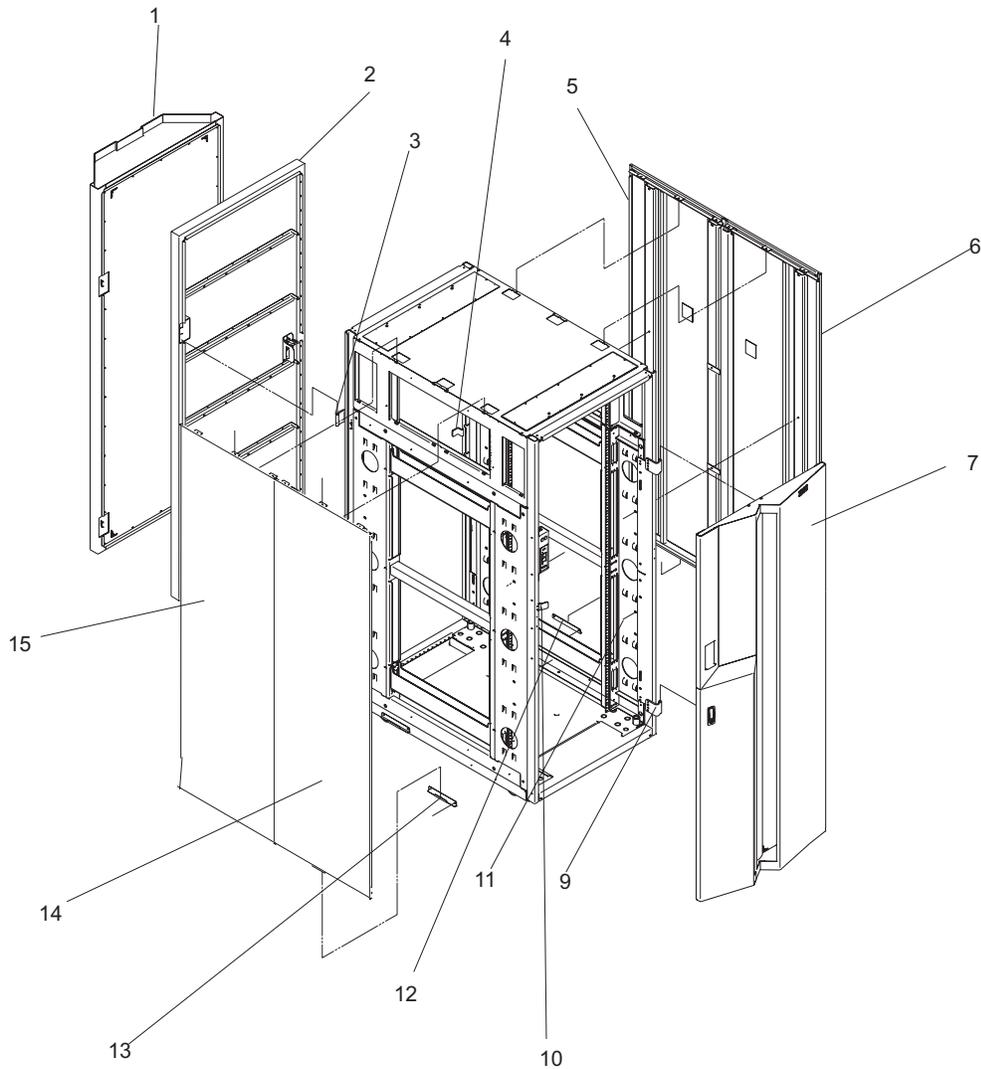
- Ladder
- Stepladder

Tool	Description
Ratchet	3/8-inch Square Drive
Ratchet Accessories	3/8-inch Drive, 6 inches Extension X2 (8-inch reach required)
Drive Socket	3/8-inch (10 mm)
Drive Ratchet	1/4-inch
Drive Socket	5/16-inch (8 mm)
Torque Tool (part number 6422789)	Included in the tool kit and used for various FRUs, such as the BPR, BPC, BPDs, and BPFs.

Remove the Covers

Note: There is no frame extender on the front of the system rack. The rear of the rack has a 4-inch extender on the top, bottom, left, and right.

This procedure describes how to remove the side covers of the pSeries 655 rack.

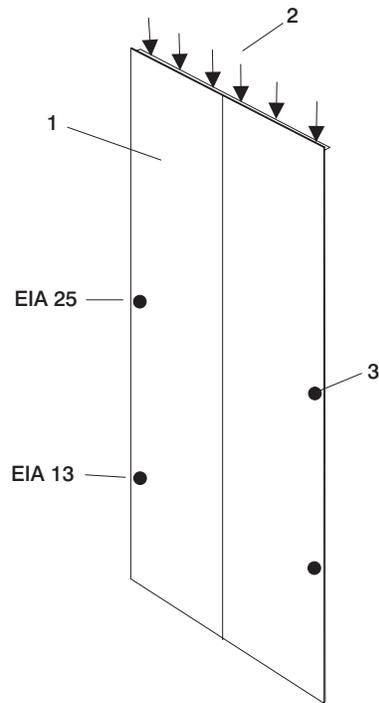


- | | |
|--|-------------------------------------|
| 1 Rear Cover | 9 Hinge and Screw |
| 2 Rear Cover | 10 Front Latch and Screw |
| 3 Hinge and Screw | 11 Washer, Side Cover, and Screw |
| 4 Rear Latch and Screw | 12 J Bracket, Screw, and Side Cover |
| 5 Right Cover and Screw | 13 J Bracket and Screw |
| 6 Left Cover and Screw | 14 Right Cover and Screw |
| 7 Front Cover (Slim Cover or Acoustic Cover) | 15 Left Cover and Screw |

Side Cover Removal

1. Always remove the right side cover first.
2. Remove the (2) screws and washers inside the frame on the front and the rear. See the following illustration for the location of screws to remove.

Note: Because of the number of cables routed on the inside of the rack, screws are difficult to locate.



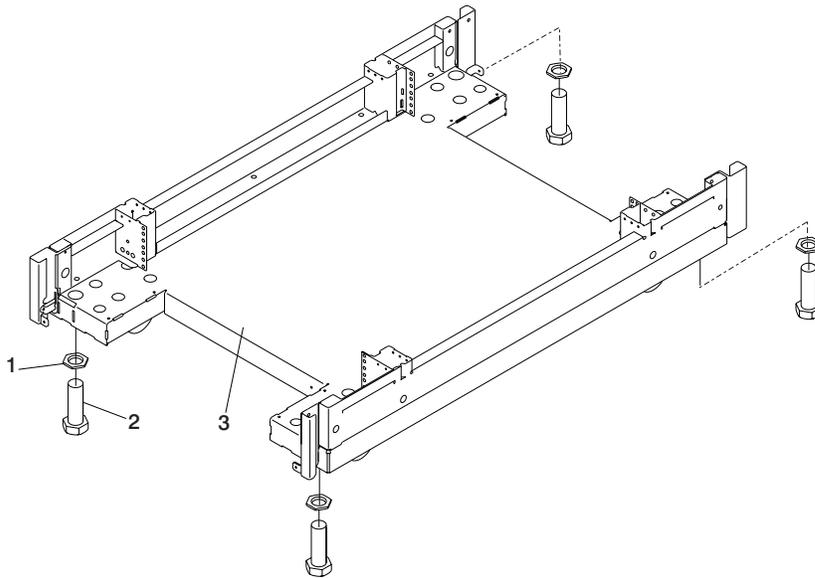
- 1 Outside of Side Cover
- 2 Locations of Screws at the Top of the Cover
- 3 Locations of Screws on the Side of the Cover (approximate EIA locations)

3. Remove the (3) screws at the top of the frame on each side of the frame side cover. The use of a stepladder is recommended for this procedure.
4. With all the screws removed, rock the cover to the right from the top. There are features built into the cover that lock it behind the left cover, and these features must be clear before you can lift the cover from the frame. To make lifting the cover easier, tilt the top of the cover away from the frame after the feature tabs have cleared the left cover.
5. To remove the left side covers, perform Steps 2 on page 95 and 3.
6. With all the screws removed from the cover, tilt the top of the cover away from the frame and lift off.

Remove the Rack Top Frame for Clearance Through Doorways

Use the following procedure to remove the rack top frame:

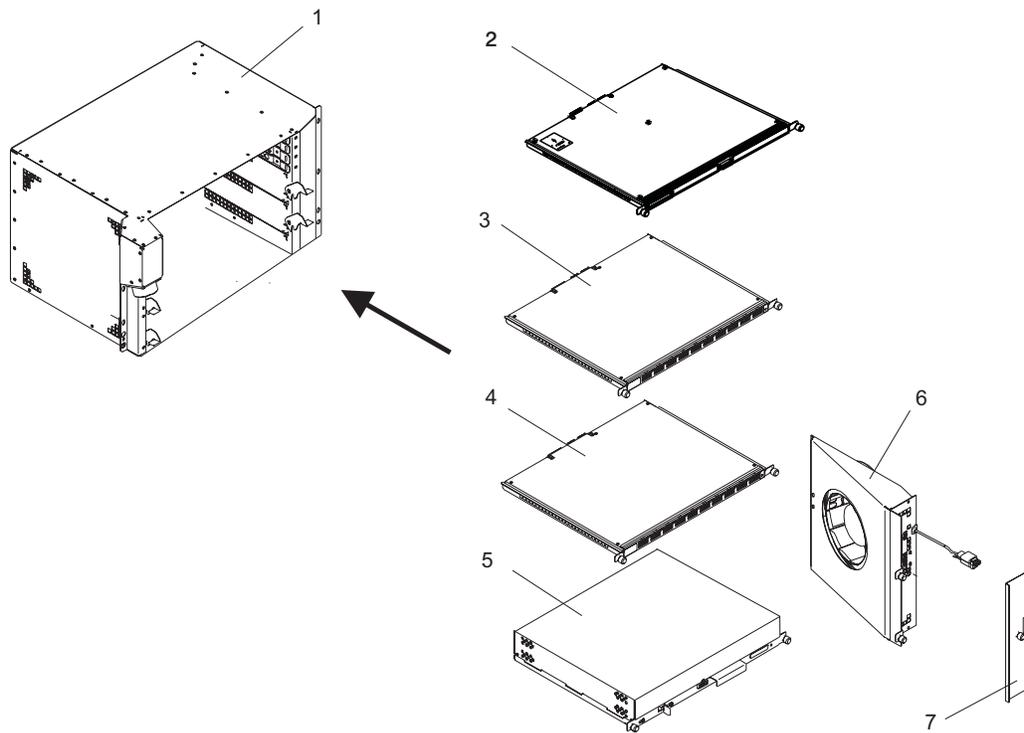
1. Use the jack screws to stabilize and lift the rack off the floor.
 - a. Loosen the jam nut on each leveling foot by turning the nut counter-clockwise.
 - b. Rotate each leveling foot downward until it contacts the surface on which the rack is placed.
 - c. Adjust the leveling feet downward as needed until the rack is level. When the rack is level, tighten the jam nuts against the base by turning the nut clockwise.



- 1 Jam Nut
- 2 Leveling Foot
- 3 Rack Base

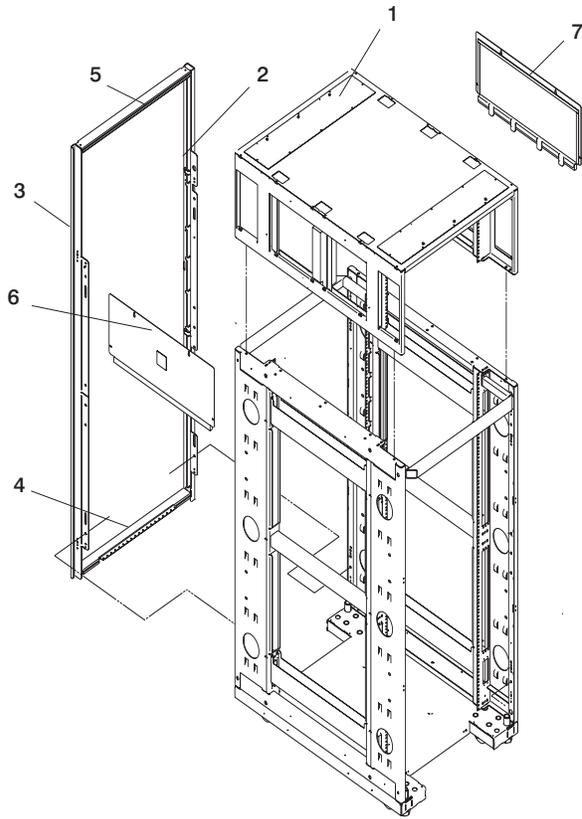
2. Disconnect cables from the BPDs.
3. Remove the front and rear BPRs, BPDs, BPCs, fan assemblies, and BPJs.

Attention: Make note of the location identification of the BPRs and BPEs for later reinstallation. If these components are not reinstalled in their original location, the system will not power on.



- | | |
|---------------------------|------------------------|
| 1 Bulk Power Enclosure | 5 Bulk Power Regulator |
| 2 Bulk Power Jumper | 6 Bulk Power Fan |
| 3 Bulk Power Distribution | 7 Fan Cover Plate |
| 4 Bulk Power Controller | |

- a. Remove the BPRs as follows:
 - 1) Make sure that the switch is in the UNLOCK/OFF position.
 - 2) Loosen the thumbscrew on each side of the BPR using the torque tool (part number 6422789).
 - 3) Rotate the release levers up on each side of the BPR. This will unseat the BPR.
 - 4) Pull the BPR straight out from the Bulk Power Enclosure (BPE).
 - 5) Repeat for the other BPRs. There can be up to six BPRs, with three in front and three in back.
- b. Remove the Bulk Power Controllers (BPCs) as follows:
 - 1) Loosen the thumbscrew on each side of the BPC using the torque tool (part number 6422789).
 - 2) Pull the BPC straight out from the Bulk Power Enclosure.
 - 3) Repeat for the other BPC. There are two BPCs, with one in front and one in back.
- c. Remove the BPDs, as follows:
 - 1) Loosen the thumbscrew on each side of the BPD, using the torque tool (part number 6422789).
 - 2) Pull the BPD straight out from the Bulk Power Enclosure (BPE).
 - 3) Repeat for the other BPDs. There can be up to four BPDs, with two in front and two in back.
4. Remove the top frame side covers as follows:
 - a. Loosen and remove the (2) screws at the top of each side panel.
 - b. Loosen and remove the (2) screws on the lower side of each side panel.
 - c. Lift up the panel from the top, and pull it away from the rack.
5. Remove the frame extenders as follows:
 - a. Remove the rear top and bottom frame extender by removing the two screws (one on each side).
 - b. Remove both rear frame extenders by removing the three bolts on each side.



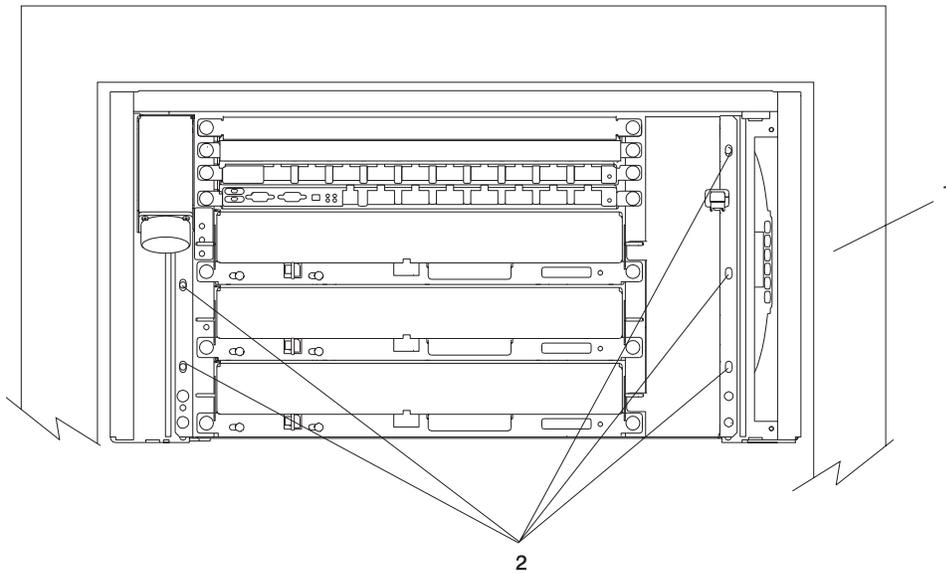
- 1 Rack Top Frame
- 2 Left Rear Frame Extender
- 3 Right Rear Frame Extender
- 4 Bottom Rear Frame Extender

- 5 Top Rear Frame Extender
- 6 Rack Top Frame Left Side Cover
- 7 Rack Top Frame Right Side Cover

Note: There is no frame extender on the front of the system rack. The rear of the rack has a 4-inch extender on the top, bottom, left, and right.

6. Remove the BPEs.

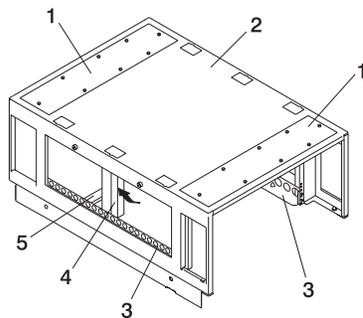
Attention: Two people are required to remove the BPEs.



1 Bulk Power Enclosure

2 Hex-Head Screw Locations

- a. Remove the five hex-head screws from the front BPE.
- b. Remove the five hex-head screws from the rear BPE.
7. To reduce the weight to the maximum two-person limit, do the following:
 - a. Remove the eight screws around the perimeter of the top panels at the front and rear of the rack top frame assembly. Remove the two top panels.



1 Front and Rear Rack Top Frame Top Panels

2 Rack Top Frame

3 Left and Right BPE Rails

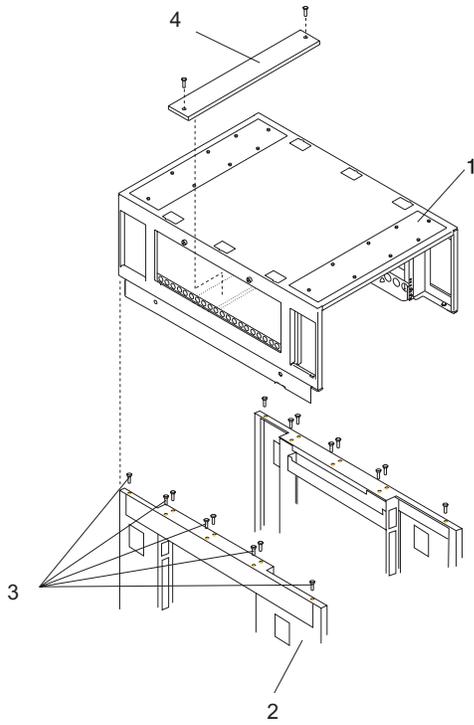
4 Foam and Metal Air Baffle

5 Rack Top-Frame Cross Brace

- b. Carefully note the orientation and position of the foam and metal air baffle at the middle left side of the rack top-frame assembly. Remove the screw, then tilt the baffle toward the front of the rack top frame.

Note: The foam and metal air baffle *must* be reinstalled on the left side in its original location. The foam baffle is a critical part for proper cooling of the BPEs.

- c. Remove the single screw at each end of the cross brace. Remove the cross brace.
- d. Remove the two screws at the front of the left BPE rail and remove the rail.
- e. Remove the two screws at the rear of the right BPE rail and remove the rail.



1 Rack Top Frame

2 Rack Chassis

3 Top Frame Bolts

4 Rack-to-Frame Cross Brace

8. Remove the (16) M8 by 20 mm bolts.
9. Lift the rack top frame off the locating pins and remove it.

Attention: Two people are required to lift and position the rack top-frame assembly.

Prepare for Rack Top-Frame Installation for the Reduced-Height Option

To prepare the rack top frame for the reduced-height option, do the following:

1. Unpack the frame.
2. Unpack the rack top frame.
3. Use the jack screws to stabilize and lift the rack off the floor.
 - a. Loosen the jam nut on each leveling foot by turning the nut counterclockwise.
 - b. Rotate each leveling foot downward until it contacts the surface on which the rack is placed.
 - c. Adjust the leveling feet downward as needed until the rack is level. When the rack is level, tighten the jam nuts against the base by turning the nut clockwise.
4. Remove the front and rear BPRs, BPDs, BPCs, fan assemblies and BPJs.

Attention: Make note of the location identification of the BPRs and BPEs for later reinstallation. If these components are not reinstalled in their original location, the processor subsystem will not power on.

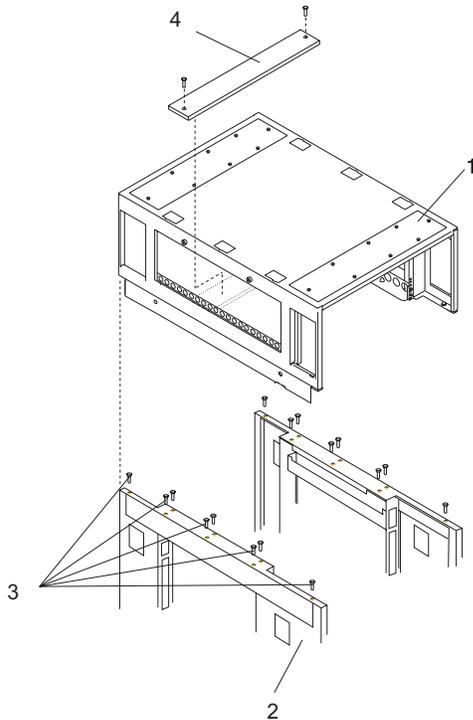
To identify unit locations, refer to the illustration on page 98.

- a. To remove the BPRs, do the following:
 - 1) Make sure the ON/OFF switch is in the UNLOCK/OFF position.
 - 2) Loosen the thumbscrew on each side of the BPR using the torque tool (part number 6422789).
 - 3) Rotate the release levers up on each side of the BPR. This will unseat the BPR.
 - 4) Pull the BPR straight out from the Bulk Power Enclosure (BPE).
 - 5) Repeat for the other BPRs. There can be up to six BPRs, with three in front and three in back.
- b. To remove the Bulk Power Controllers (BPCs), do the following:
 - 1) Loosen the thumbscrew on each side of the BPC, using the torque tool (part number 6422789).
 - 2) Pull the BPC straight out from the Bulk Power Enclosure.
 - 3) Repeat for the other BPC. There are two BPCs, with one in front and one in back.
- c. To remove the BPDs, do the following:
 - 1) Loosen the thumbscrew on each side of the BPD, using the torque tool (part number 6422789).
 - 2) Pull the BPD straight out from the Bulk Power Enclosure (BPE).
 - 3) Repeat for the other BPDs. There can be up to four BPDs, with two in front and two in back.
- d. To remove the BPF, do the following:

Note: A grille covers the fan on the front of the fan assembly.

- 1) Locate the BPF to be replaced.
- 2) Remove the fan cover plate.
- 3) Loosen the upper and lower fasteners using the torque tool (part number 6422789).
- 4) Pull the BPF straight out of the BPE.
- 5) Repeat for the other BPF. There are two BPFs, one in front and one in back.

5. To reduce the weight to the maximum two-person limit, do the following:



1 Front and Rear Rack Top Frame Top Panels

2 Rack Top Frame

3 Left and Right BPE Rails

4 Foam and Metal Air Baffle

5 Rack Top Frame Cross Brace

- a. Remove the two screws at the left and right of the top frame side covers.
- b. Lift off the covers.
- c. Remove the eight screws around the perimeter of the top panels at the front and rear of the rack top frame assembly. Remove the two top panels (item 1 in the illustration on page 103).
- d. Carefully note the orientation and position of the foam and metal upright air baffle (item 4 in the illustration on page 103) at the middle left side of the rack top frame assembly. Remove the screw, then tilt the baffle toward the front of the rack top frame.

Note: The foam and metal air baffle *must* be reinstalled on the left side in its original location. The foam baffle is a critical part for proper cooling of the BPEs.

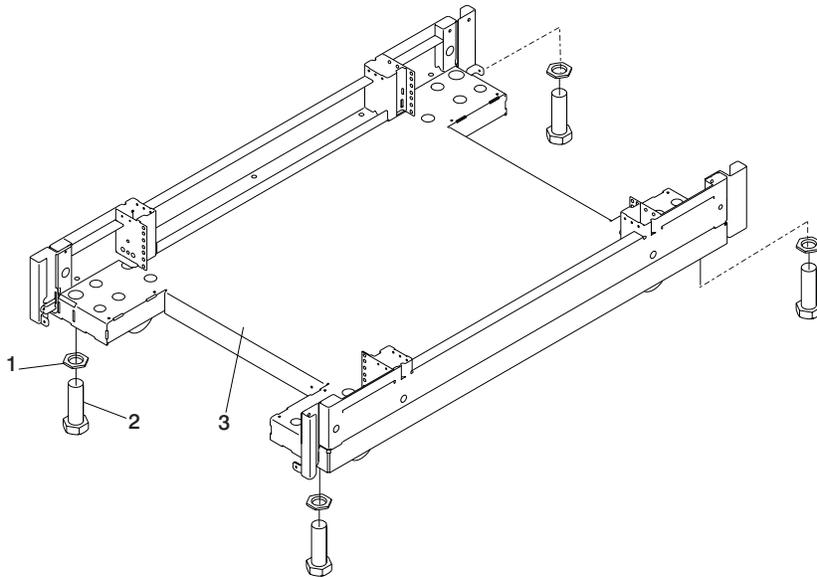
- e. Remove the single screw at each end of the cross brace (item 5 in the illustration on page 103). Remove the cross brace.
- f. Remove the two screws at the front of the left BPE rail and remove the rail (item 3 in illustration on page 103).
- g. Remove the two screws at the rear of the right BPE rail and remove the rail (item 3 in illustration on page 103).

Proceed to “Install the Rack Top Frame” on page 104.

Install the Rack Top Frame

If you removed the rack top frame to enable getting the rack through doorways, or to reduce weight, use the following instructions to reinstall the rack top frame.

1. If you have not done so, use the jack screws to stabilize and lift the rack off the floor, as follows:
 - a. Loosen the jam nut on each leveling foot by turning the nut counterclockwise.
 - b. Rotate each leveling foot downward until it contacts the surface on which the rack is placed.
 - c. Adjust the leveling feet downward as needed until the rack is level. When the rack is level, tighten the jam nuts against the base by turning the nut clockwise.

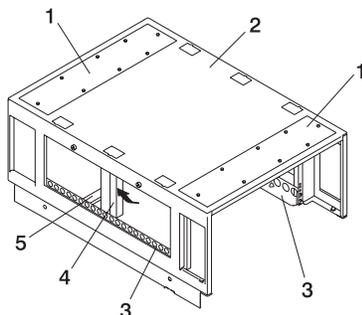


- 1 Jam Nut
- 2 Leveling Foot
- 3 Rack Base

2. Position the rack top frame on top of the rack by orienting the two front labels on the rack top frame assembly and the frame. As you are facing the frame, this label is on the right front of the frame. Refer to the illustration on page 101.

Attention: Two people are required to lift and position the top frame assembly. To assist with the installation, a stepladder and ladder are provided with the reduced-height option ship group.

- a. Align the rack top frame with the four alignment guides on top of the rack.
 - b. Fasten the rack top frame to the rack, using (16) M8 by 20 mm bolts. Tighten the bolts securely to ensure solid contact along the mating surfaces of the rack and the rack top frame.
3. Install the front and rear top panels (item 1 in the illustration on page 105) for the rack top frame.
 4. Install the left and right BPE rails, (item 3 in the illustration on page 105).



- 1 Front and Rear Rack Top Frame Top Panels
- 2 Rack Top Frame
- 3 Left and Right BPE Rails

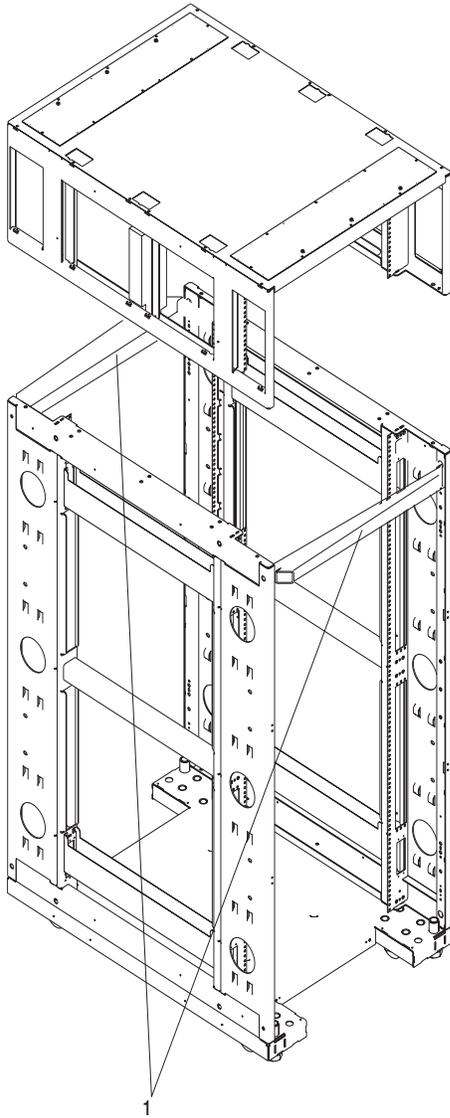
- 4 Foam and Metal Air Baffle
- 5 Rack Top Frame Cross Brace

5. Insert and align the foam and metal air baffle (item 4 in the illustration on page 105) to the left side of the rack top frame, securing it in place with a screw.
6. Install the rack top-frame cross brace (item 5 in the illustration on page 98).
7. Install the front and rear BPEs. Refer to the illustration on page 98.
8. Install the BPRs as follows:
 - a. Make sure the ON/OFF switch is in the UNLOCK/OFF position.
 - b. Push the BPR straight into the Bulk Power Enclosure (BPE).
 - c. Tighten the thumbscrew on each side of the BPR, using the torque tool (part number 6422789).
 - d. Rotate the release levers down on each side of the BPR.
 - e. Repeat for the other BPRs. There can be up to six BPRs, with three in front and three in back.
9. Install the Bulk Power Controllers (BPCs) as follows:
 - a. Push the BPC straight into the Bulk Power Enclosure (BPE).
 - b. Tighten the thumbscrew on each side of the BPC, using the torque tool (part number 6422789).
 - c. Repeat for the other BPCs. There are two BPCs, with one in front and one in back.
10. Install the BPDs as follows:
 - a. Push the BPD straight into the Bulk Power Enclosure (BPE).
 - b. Tighten the thumbscrew on each side of the BPD, using the torque tool (part number 6422789).
 - c. Repeat for the other BPDs. There can be up to four BPDs, with two in front and two in back.
11. Install the BPFs as follows:

Note: A grille covers the fan on the front of the fan assembly.

- a. Locate the BPF to be installed.
- b. Install the fan cover plate.
- c. Push the BPF straight out of the BPE.
- d. Tighten the upper and lower fasteners, using the torque tool (part number 6422789).
- e. Repeat for the other BPF. There are two BPFs, one in front and one in back.

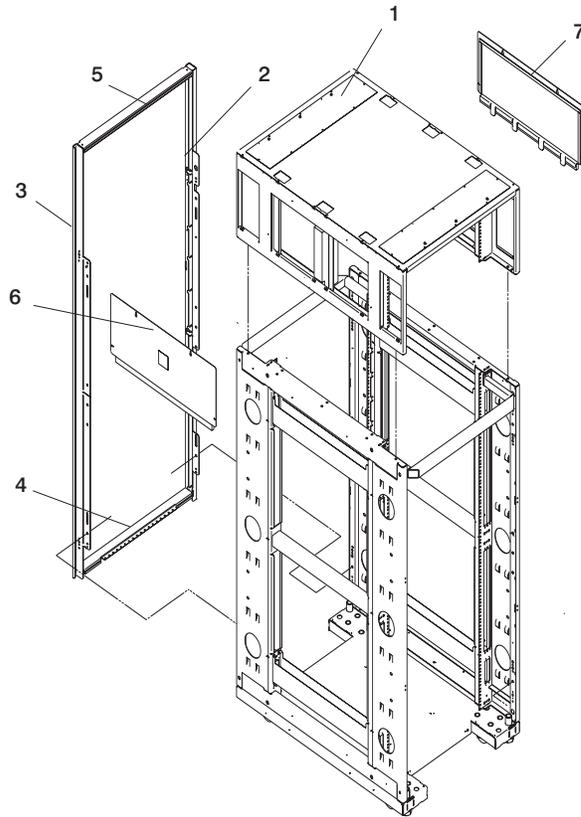
12. For the reduced-height option, remove the front and rear upper shipping bars (item 1 in the following illustration).



1 Shipping Bars

13. Install the left and right top-frame side covers (items 6 and 7 in the following illustration).
14. Attach all removed cables to the BPD. If an IBF exists, also attach all removed cables for the BPC and the BPR.

15. Install the frame extenders.



1 Rack Top Frame

2 Left Rear Frame Extender

3 Right Rear Frame Extender

4 Bottom Rear Frame Extender

5 Top Rear Frame Extender

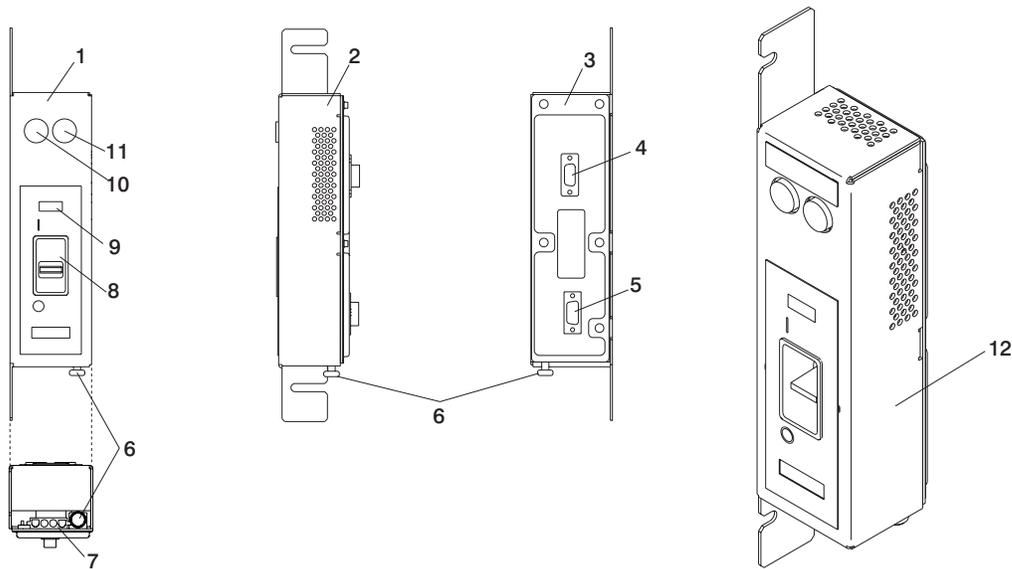
6 Rack Top Frame Left Side Cover

7 Rack Top Frame Right Side Cover

16. Install the UEPO switch by performing the following steps:

- a. Place the assembly over the two 8-mm M5 screws on the rack vertical rail.

- b. Slide the EPO switch to place the screws in the notches in the mounting bracket, and tighten the screws.



1	Simplified UEPO Front Panel	7	J02 Connector (White)
2	Simplified UEPO Side Panel	8	Power Switch
3	Simplified UEPO Rear Panel	9	System Fault LED
4	J00 Connector (Back)	10	Start Service Button (Green)
5	J01 Connector (Back)	11	Service Complete Button (White)
6	Room EPO Bypass Interlock	12	3-Dimensional View of UEPO Switch

- c. Install the external cable, if required, to connector J02 on the bottom of the EPO switch.
- If the external EPO connection is installed, the internal toggle switch is mechanically forced into the ROOM EPO ACTV position (to the right).
 - If there is no external EPO cable, manually set the internal toggle switch to the ROOM EPO BYPASS position.

To set this switch, pull the knob down, to the ROOM EPO BYPASS position, and release the knob (to the left).

- d. Ensure that the red UEPO switch is on (up position).
- e. Switch the UEPO BYPASS switches on both BPCs back to NORMAL mode.
- f. Press the **Service Complete** button (white) on the UEPO switch to indicate completion of this procedure.

Replace Covers

To complete the installation of the rack top frame and complete the assembly of the rack, do the following:

1. Examine the bottom of the frame side. There will be (2) "U" brackets installed at the bottom. These correspond to open slots in the bottom of the covers.
2. Always install the left side cover first.
3. Lift the cover and engage the slot into the "U" bracket, holding the cover at about a 30 degree angle, with the top away from the frame.
4. Install the top (3) screws. Use a stepladder for this procedure. Push against the top of the cover to compress the gasket to allow alignment with the tapped holes in the top of the frame.
5. Install the (2) inside screws and washers.
6. Install the right side cover into the "U" bracket while holding it at an angle, away from the frame.
7. Because the right side cover has tab features that engage behind the left side cover, the cover must be rocked to the right from the top to clear the left side cover. After clearing the cover with the tabs, push the cover against the frame while rocking it back to the left. The cover should rest on the "U" bracket. The top flange should rest on the frame, and the tabs should be positioned behind the left side cover.

Note: The covers should be flush in the middle with a small gap between them.

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Installation Guide

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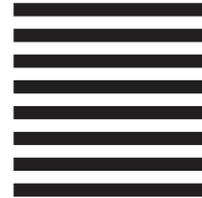
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