RS/6000 SP

Maintenance Information Volume 1, Installation and Relocation

RS/6000 SP

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> **Note!**
>
> Before using this information and the product it supports, be sure to read the general information under "Notices" on page xv.

Second Edition (February 1999)

This book is a major revision of GA22-7375-00.

This edition applies to Version 3 Release 1 of the IBM Parallel System Support Programs for AIX (PSSP), which runs on the IBM RS/6000 SP, and to all subsequent releases and modifications until otherwise indicated in new editions.

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Safety Notices (in English)

For general information concerning safety, refer to *Electrical Safety for IBM Customer Engineers* (S229-8124). For a copy of this publication, contact your IBM marketing representative or the IBM branch office serving your locality.

The following notices, which appear in *RS/6000 SP: Maintenance Information* Volumes 1, 2, 3, and 4, describe the safety practices you must observe while working on this equipment. The notices are shown here in English only. See Appendix D, "Translated Safety Notices" on page D-1 for translated notices.

DANGER

> **Do not attempt to open the covers of the power supply. Power supplies are not serviceable and are to be replaced as a unit**

DANGER

> **An electrical outlet that is not correctly wired could place hazardous voltage on metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock.**
>
> **Before installing or removing signal cables, ensure that the power cables for the system unit and all attached devices are unplugged.**
>
> **When adding or removing any additional devices to or from the system, ensure that the power cables for those devices are unplugged before the signal cables are connected. If possible, disconnect all power cables from the existing system before you add a device.**
>
> **Use one hand, when possible, to connect or disconnect signal cables to prevent a possible shock from touching two surfaces with different electrical potentials.**
>
> **During an electrical storm, do not connect cables for display stations, printers, telephones, or station protectors for communications lines.**

DANGER

> **In the U.S., Canada, and Japan, this product has a 4-wire power cable with a 4-prong plug. Use this power cable with a correctly grounded power receptacle to prevent possible electric shock.**

DANGER

> Before you connect the power cable of this product to ac power, verify that the power receptacle is correctly grounded and has the correct voltage.

DANGER

> During an electrical storm, do not connect or disconnect any cable that has a conductive outer surface or a conductive connector.

DANGER

> Switch off power and unplug the machine power cable from the power receptacle, before removing or installing any part that is connected to primary power.

DANGER

> To prevent possible electrical shock during machine installation, relocation, or reconfiguration, connect the primary power cable only after connecting all electrical signal cables.

DANGER

> High voltage present. Perform "Lockout/Tagout Procedure for PDU" or "Lockout/Bagout Procedure for PDU" to remove primary power to the frame.

DANGER

> High voltage present. Perform "Lockout/Tagout Procedure for PDU" or "Lockout/Bagout Procedure for PDU" to remove primary power to the frame (and high-voltage transformer if present).

DANGER

> High voltage present at test points. Use high voltage test probes.

DANGER

> High energy present. Do not short 48V to frame or 48VRtn. Shorting will result in system outage and possible physical injury.

DANGER

> If a unique power module fails, all LEDs will be off. The high voltage LED will be off even though the high voltage is still present.

DANGER

> The remaining steps of the procedure contain measurements that are taken with power on. Remember that hazardous voltages are present.

DANGER

> The frame main circuit breaker and the controller must not be switched on again now.
>
> Before disconnecting the power cables from the power receptacles, ensure that the customer's branch distribution circuit breakers (customer power source circuit breakers) are Off and tagged with DO NOT OPERATE tags, S229-0237. Refer to the "Lockout/Tagout" procedures in *RS/6000 SP: Maintenance Information, Volume 2*, **before proceeding.**

DANGER

> Before connecting AC power cords to electrical outlets, ensure that:
>
> - The customer's branch distribution circuit breakers (customer power source circuit breakers) are off and tagged with DO NOT OPERATE tags, S229-0237 (or national language equivalent).
> - The activities in "Performing the Customer 50/60 Hz Power Receptacle Safety Check" have been performed on all customer power source outlets and cable connectors.

DANGER

> Ensure that the customer's branch distribution circuit breakers (customer power source circuit breakers) to the AC power outlets are off and tagged with DO NOT OPERATE tags, S229-0237 (or national language equivalent).

DANGER

> Both the SEPBU power chassis and the PDU 48V power chassis are field replaceable units (FRUs) which contain NO serviceable parts; they are labeled as such. Do not attempt to isolate or repair these components, since doing so may result in severe injury or even death.

CAUTION:

The weight of the PDU assembly, 48 V dc power chassis, and the SEPBU power chassis is greater than 18 Kg (40 lbs). Be careful when removing or installing. Remove all 48 V dc power supplies from the power chassis before removing or installing the power chassis.

CAUTION:

The unit weight exceeds 18 Kg (40 lbs) and requires two service personnel to lift.

CAUTION:

The covers are to be closed at all times except for service by trained service personnel.

CAUTION:

When the unit is being serviced, the covers should not be left off or opened while the machine is running unattended.

CAUTION:

Due to weight of each thin node (under 18 Kg [40 lbs]), use care when removing and replacing thin nodes above shoulder height.

CAUTION:

The wide node weight may exceed 32 Kg (70.5 lbs).

CAUTION:

Do not open more than one wide node or switch assembly drawer at a time.

CAUTION:

Make sure the stability foot and wheel chocks are installed on the frame. These are required to maintain frame balance and position during service operations.

CAUTION:

Outer edges of chassis may be sharp. Care must be taken when removing and installing chassis.

CAUTION:

The ground strip may have sharp edges.

CAUTION:

Do not remove wide nodes or switch assemblies from the mounting slides. Caution must be observed when working with mounting slides to prevent pinched fingers or accidental release of the unit.

CAUTION:

Do not remove the drawer case mounting screws at the bottom of both sides.

CAUTION:

Once the latch is released, push the drawer closed. Do not pull, as the drawer may disengage from the rails, creating a safety hazard.

CAUTION:

Due to the weight of each wide node, use care when sliding and closing wide processor nodes above shoulder height.

CAUTION:

- **When moving frames into position, team members should work together. Using one person on each corner of the frame can prevent strain.**
- **In raised floor installations, mechanically safe moldings should be installed around floor cutouts. Extreme caution should be used when moving frames during installation or removal because of the proximity of floor cutouts to casters.**

CAUTION:

A Johnson bar (J-bar) or similar device must not be used at any time to lift or move frames.

CAUTION:

When using step ladder or step stool, be sure that the work surface is level and the step ladder or step stool is in good working order.

CAUTION:

Portable ladders present a serious safety hazard if not used properly. Follow these general guidelines:

- **Make sure the ladder is firm and steady, and has no defective rungs or braces.**
- **Work only on a level surface.**
- **Never use a metal ladder near electrical power lines.**
- **Never overreach. Instead, move the ladder.**

Be as careful on a short ladder as on a 30-foot extension ladder. False security can lead to carelessness and falls which can cause painful injuries.

Personal ESD Requirements

The processor uses FRUs that are known to be sensitive to electrostatic discharge (ESD). To prevent ESD damage to FRUs or to prevent system failures, observe the following procedures:

- Keep the FRU in its original static-dissipative shipping container until the FRU is ready to be installed in the system. Move the static-dissipative container near the location where the FRU is to be installed (within ESD wrist strap distance). If the FRU must be put down for any reason, first place it in its static-dissipative container or place it on the static-dissipative mat.

- Open only the covers that are necessary to complete the task. Any time a cover is open the service representative and all people in the area must be ESD-safe. If power is switched on, or if removing or exchanging any FRU, always use the ESD kit (part 93F2649).

    1. Put on the ESD wrist strap.
    2. Attach the ESD cord to the wrist strap.
    3. Attach the ESD mat to the wrist strap, if required.
    4. Attach the insulated clip to the ESD cord.

5. Attach the insulated clip to the frame holes labeled **ESD**. If the frame holes are not available, use a grounding point on the frame.

Electronic Emissions Notices

Federal Communications Commission (FCC) Statement

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. IBM is not 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.

United Kingdom Telecommunications Safety Requirements

Notice to Customers

This apparatus is approved under approval number NS/G/1234/J/100003 for indirect connection to public telecommunications systems in the United Kingdom.

Industry Canada Compliance Statement

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

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

For Installations in Japan:

この装置は、情報処理装置等電波障害自主規制協議会（ＶＣＣＩ）の基準に
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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。

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)

<u>Hinweis</u>

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

About This Book

This book is to help you, as a customer engineer:

- Identify RS/6000 SP frame types and the standard and optional components in this system
- Perform RS/6000 SP installation procedures
- Perform relocation procedures for the RS/6000 SP system
- Perform maintenance agreements and qualifications.

This book is to be used with:

- *IBM RS/6000 SP: Maintenance Information, Volume 2, Maintenance Analysis Procedures* (GA22-7376), (referred to, throughout this publication, as *RS/6000 SP: Maintenance Information, Volume 2*). Volume 2 contains information to help you isolate RS/6000 SP failures.

- *IBM RS/6000 SP: Maintenance Information, Volume 3, Locations and Service Procedures* (GA22-7377), (referred to, throughout this publication, as *RS/6000 SP: Maintenance Information, Volume 3*). Volume 3 contains information to help you perform isolation and verification tests, identify field replaceable unit (FRU) locations, and remove and replace FRUs.

- *IBM RS/6000 SP: Maintenance Information, Volume 4, Parts Catalog* (GA22-7378), (referred to, throughout this publication, as *RS/6000 SP: Maintenance Information, Volume 4*). Volume 4 contains a list of RS/6000 SP parts and FRUs with corresponding figures that contain indexed descriptions and part numbers.

For a list of other SP books and related information, see the bibliography in the back of this book.

Who Should Use This Book

This book is intended for the product-trained Customer Engineer (CE). The installation procedures for RS/6000 SP and feature components described in this book represent a part of the overall support structure of the RS/6000 SP product. This book is intended to support the RS/6000 SP product and SP1/SP2 coexistence systems, in which SP2 code is utilized. The SP1 version of this book (*IBM 9076 Scalable POWERparallel Systems: Maintenance Information*, SY66-0299) should be used for ordering SP1 parts, or if SP1 code is utilized.

User's Responsibilities

Before calling the IBM customer engineer, the system administrator should use the problem determination section of the *IBM Parallel System Support Programs for AIX: Diagnosis Guide*, SC23-3866 for initial problem determination. If there is nothing wrong with the customer operating procedures, customer-supplied cables, or power source, the customer should call an IBM customer engineer.

How to Use This Book

When performing RS/6000 SP maintenance, follow the "Maintenance Analysis Procedures" in *RS/6000 SP: Maintenance Information, Volume 2* (GA22-7376).

Beginning with the "Start" Map in *RS/6000 SP: Maintenance Information, Volume 2*, isolate the problem to one or more of these RS/6000 SP components:

- Supervisor Subsystem
- Processor Node
- Power Subsystem
- High Voltage Transformer (World Trade)
- Ethernet Local Area Networks (LANs)
- High-Performance Switch
- Micro Channel or PCI Adapter.

If you cannot determine the failure's cause, you should request the assistance of the RS/6000 SP Field Support Center.

Getting More Information

This book and other RS/6000 SP hardware and software documentation are available both on-line and in hardcopy from:

- The RS/6000 website at **http://www.rs6000.ibm.com**

- The Resource Center on the PSSP product media.

- The Service Information Library (SIL)

- Hardcopy and CDROM versions orderable from IBM

- IBM internal use versions available on MKTTOOLS.

For details, see the bibliography in the back of this book.

Summary of Changes

GA22-7375-00

This edition replaces GC23-3903-08 and makes it obsolete. Changes found in this edition include:

- Added SP-attached server (RS/6000 7017 Models S70 and S7A) information.

- The Maintenance Information manuals, Volumes 1, 2, and 3, (GC23-3903 and GC23-3904) were reorganized into 4 volumes:

  - *IBM RS/6000 SP: Maintenance Information, Volume 1, Installation and Relocation*, GA22-7375-00

  - *IBM RS/6000 SP: Maintenance Information, Volume 2, Maintenance Analysis Procedures*, GA22-7376-00

  - *IBM RS/6000 SP: Maintenance Information, Volume 3, Locations and Service Procedures*, GA22-7377-00

  - *IBM RS/6000 SP: Maintenance Information, Volume 4, Parts Catalog*, GA22-7378-00

GA22-7375-01

This edition replaces GA22-7375-00 and makes it obsolete. Changes found in this edition include:

- Added POWER3 Symmetric MultiProcessor (SMP) thin and wide node information.

Chapter 1. The RS/6000 SP System

This chapter provides an overview of the IBM RS/6000 Scalable POWERparallel Systems (RS/6000 SP) and describes its frame models, expansion frame features, plus the standard and optional hardware.

For detailed information see *IBM RS/6000 SP: Planning, Volume 1, Hardware and Physical Environment* and *IBM RS/6000 SP: Planning Volume 2, Control Workstation and Software Environment*.

The IBM RS/6000 SP Systems

The IBM RS/6000 SP System (SP) is IBM's family of scalable, parallel computing solutions. The SP provides a state-of-the-art parallel computing system and industry-leading application enablers and applications.

The RS/6000 SP system runs the AIX operating system and the Parallel System Support Programs (PSSP) system software on the control workstation and all processor nodes.

The SP's scalable architecture, high performance communication, POWER3, POWER2, and PowerPC Architecture give you the power to handle data-intensive, compute-intensive and I/O-intensive jobs with ease. You can execute both serial and parallel applications simultaneously, while managing your system from a single workstation. For scientific and technical applications, the SP delivers the power and connectivity for rapid turnaround, from structural analysis and seismic modeling to circuit simulation and molecular modeling. Multiple users can run complex queries against very large amounts of data and obtain results interactively. This makes the SP an ideal solution for database query, on-line transaction processing, business management, and batch business applications.

The IBM software offerings for the SP provide an interlocking set of licensed programs designed to address a wide range of system and application needs. The open architecture, based on the AIX operating system (IBM's implementation of UNIX), enables you to easily integrate the SP into your existing environments. The software architecture is closely tuned to the SP hardware design for maximum usability and performance.

The SP family continues the AIX and RS/6000 policy of adherence to open systems standards. Connection to I/O devices, networks of workstations, and mainframe networks is a key element of the SP offering. Ethernet, HIPPI, SCSI, FDDI, Token-Ring, ATM, SSA, ESCON, BMCA and Fibre Channel 266 and 1 GB interfaces are supported by the SP.

In addition to the standard network interface cards, the IBM RS/6000 SP system now offers a versatile, high speed network connections using extension nodes. Also, the SP System now offers an optional e-business interface using the IBM RS/6000 7017 Enterprise Server as an SP-attached server.

Hardware

The basic components of the RS/6000 SP system are:

- Processor nodes (includes SP-attached servers)
- Frames with integral power subsystem
- Switches
- Extension nodes
- A control workstation (a high availability option is also available)
- Network connectivity adapters

- External disk drives

These components connect to your existing computer network through a local area network (LAN), making the RS/6000 SP system accessible from any network-attached workstation.

Processor Nodes

The IBM RS/6000 SP System is scalable from one to 128 processor nodes, which may be contained in multiple SP frames. Up to 16 processor nodes may be mounted in a tall frame while a short frame will hold up to 8 processor nodes. SP systems comprised of more than 128 processor nodes are available. Consult your IBM representative for more information.

There are four basic types of RS/6000 SP processor nodes:

- Thin nodes
- Wide nodes
- High nodes
- SP-attached servers

Thin Nodes: Thin nodes are available in a Symmetric MultiProcessor (SMP) configuration and in a uniprocessor configuration. All SMP thin nodes have Peripheral Component Interconnect (PCI) architecture, while uniprocessor configurations have Micro Channel Architecture (MCA).

SMP Thin Nodes

POWER3 Symmetric MultiProcessor (SMP) F/C 2052

332 MHz Symmetric MultiProcessor (SMP) F/C 2050

Uniprocessor Thin Nodes

160 MHz Uniprocessor F/C 2022

Wide Nodes: Wide nodes are available in a Symmetric MultiProcessor (SMP) configuration and in a uniprocessor configuration. All SMP wide nodes have Peripheral Component Interconnect (PCI) architecture, while uniprocessor configurations have Micro Channel Architecture (MCA).

SMP Wide Nodes

POWER3 Symmetric MultiProcessor (SMP) F/C 2053

332 MHz Symmetric MultiProcessor (SMP) F/C 2051

Uniprocessor Wide Nodes

135 MHz Uniprocessor F/C 2007

High Nodes

200 MHz Symmetric MultiProcessor (SMP) F/C 2009

SP-Attached Servers: The SP-attached server is an IBM RS/6000 7017 Enterprise Server configured to operate with an RS/6000 SP System. These servers are available as either an S70 Enterprise Server or the S70 Advanced Server. Each is a high-end PCI based 64-bit SMP unit that supports concurrent 32-bit and 64-bit applications.

Like a standard SP processor node, the SP-attached server can perform most SP processing and administration functions. However, unlike a standard SP processor node, the SP-attached server is housed in its own frame. Because of that, the SP-attached server has both node-like characteristics and frame-like characteristics.

Frames

IBM RS/6000 SP tall frames and all SEPBU power subsystems have been redesigned to accoodate the newest hardware features. These innovations were introduced through a simplified list of options for ordering SP frames. This listing has a total of five main frame options:

1. Tall model frames

2. Tall expansion frames

3. Short model frames

4. Short expansion frames

5. SP switch frames

Withdrawn From Production

With the introduction of the redesigned RS/6000 SP frames, all previous frame feature codes have been withdrawn from production.

The redesigned frames and power subsystems are completely compatible with all existing SP hardware.

Note: Although the redesigned frames are completely compatible with all existing hardware, some hardware offerings **are not** compatible with the High Performance series of switches. These hardware items are:

- SP-attached servers

- POWER3 SMP wide nodes

- POWER3 SMP thin nodes

- 332 MHz SMP wide nodes

- 332 MHz SMP thin nodes

- SP Switch Routers

- SP Switches

If you are planning a system upgrade that includes any of these items, you must replace High Performance Switches with SP Switches.

Switches

Switches provide a message passing network that connects all processor nodes with a minimum of four paths between any pair of nodes. The SP series of switches can also be used to connect the SP system with optional external devices. A switch feature code provides you with a switch assembly and the cables to support node connections. The number of cables you will receive depends on the type of switch you ordered.

There are two basic switch types:

1. SP Switches

2. High Performance Switches

SP Switches: The SP Switch is available as either the 16-port SP Switch or the 8-port SP Switch-8.

SP Switch F/C 4011, 16-port switch

SPS-8 Switch F/C 4008, 8-port switch

High Performance Switches: The High Performance Switches are being phased out and are only available for MES upgrades to existing systems. These switches are available as either the 16-port High Performance Switch or the 8-port HiPS LC-8 switch.

High Performance Switch F/C 4010, 16-port switch

HiPS-LC8 F/C 4007, 8-port switch

Note: High Performance switches are being phased out and are not available for new systems, however, they will still be available (through MES upgrade orders only) for existing systems that are already equipped with High Performance switches.

Extension Nodes

Extension nodes are nonstandard nodes that extend the SP system's capabilities but cannot be used in all of the same ways as standard SP processor nodes.

Note: Extension Nodes **require** a system that is operating at PSSP 2.3 or later.

Dependent Nodes: One type of extension node is a dependent node. A dependent node depends on SP nodes for certain functions, but implements much of the switch related protocol that standard nodes use on the SP Switch. Typically, dependent nodes consist of four major components. They are:

1. A physical dependent node — The hardware device requiring SP processor node support.

2. A dependent node adapter — A communication card mounted in the physical dependent node. This card provides a mechanical interface for the cable connecting the physical dependent node to the SP system.

3. A logical dependent node — Made up of a valid, unused node slot and the corresponding unused SP switch port. The physical dependent node logically occupies the empty node slot by using the corresponding SP switch port. The switch port provides a mechanical interface for the cable connecting the SP system to the physical dependent node.

4. A cable — To connect the dependent node adapter with the logical dependent node. It connects the extension node to the SP system.

SP Switch Router: A specific type of dependent node is the IBM 9077 SP Switch Router. The 9077 is a switched IP router that is a licensed version of the Ascend GRF that has been upgraded for direct connection to the SP Switch. These optional external devices can be used for high speed network connections or system scaling using HIPPI backbones or other communications subsystems such as ATM or 10/100 Ethernet.

Control Workstations

The control workstation can viewed as a server to the SP system applications. The subsystems running on the control workstation are the SP server applications for the SP nodes. The nodes are clients of the control workstation server applications. The control workstation server applications provide configuration data, security, hardware monitoring, diagnostics, a single point of control service, and, optionally, job scheduling data and a time source.

Network Communication

SP systems have certain communication requirements, including the following::

- All SP systems require an SP Ethernet LAN for system administration.

- Switch-configured systems require a frame to frame switch cable network.

- SP systems connected to external networks (or with networks between SP system partitions) require additional communication adapters.

The required SP Ethernet LAN that connects all nodes to the control workstation is needed for system administration and should be used exclusively for that purpose. If you attempt to route non-administrative traffic over the SP Ethernet and it interferes with administrative traffic, you will have to reroute the non-administrative traffic. Further network connectivity is supplied by various adapters, some optional, that can provide connection to I/O devices, networks of workstations, and mainframe networks. Ethernet, FDDI, token-ring, HIPPI, SCSI, FCS, and ATM are examples of adapters that can be used as part of an RS/6000 SP system.

On boot/install server nodes, some adapters will be needed to support systems that contain nodes running on different PSSP release levels.

See *IBM RS/6000 SP: Planning, Volume 1, Hardware and Physical Environment* and *IBM RS/6000 SP: Planning Volume 2, Control Workstation and Software Environment* for more information.

PCI Communication Adapters: Use of PCI communication adapters is limited to nodes using PCI bus architecture. These nodes are:

- POWER3 SMP wide nodes

- POWER3 SMP thin nodes

- 332 MHz SMP wide nodes

- 332 MHz SMP thin nodes

Also, the SP-attached server uses the same PCI adapters as the listed nodes.

If you plan to connect either your entire SP system (or partitions within your SP system) to external networks, you must install communication adapters. If you have an SP system with multiple system partitions, you can enhance system performance by using optional network adapters (instead of the SP Switch network) for communication between partitions.

MCA Communication Adapters: Use of MCA communication adapters is limited to nodes using MCA subsystems. These nodes are:

- 200 MHz SMP high nodes
- 135 MHz uniprocessor wide nodes
- 160 MHz uniprocessor thin nodes

If you are planning to connect either your entire SP system (or partitions within your SP system) to external networks, you must install communication adapters. If you have an SP system with multiple system partitions, you can enhance system performance using optional network adapters rather than the SP Switch network, for communication between partitions.

SP Switch Router Adapters: The IBM RS/6000 SP Switch Router is a licensed version of the Ascend GRF switch router that has been upgraded for direct connection to the SP Switch. Network connections through SP nodes are typically slower than network connections through an SP Switch Router. Also, network connections through a node may not have the availability of those through an SP Switch Router.

Connections between your SP system and the SP Switch Router require an SP switch mounted in the SP system and an SP Switch Router **Adapter** mounted in the SP Switch Router. A switch cable is also required to complete the connection between the SP switch and the SP Switch Router Adapter.

SP-attached Server Adapters: The SP-attached server is an IBM RS/6000 7017 Enterprise Server configured to operate with an RS/6000 SP System. For SP attachment, the Enterprise Server requires the installation of several SP specific cables and communications adapters.

Direct Access Storage Devices (DASD)

Direct Access Storage Devices (DASD) are either:

- Internal (contained inside the node)
- External (mounted outside the node in separate frames)

Internal DASD: Internal DASD are installed in a node's internal DASD bays. If a node does not use an external boot device, it must be configured with internal DASD. In this configuration, a node has a minimum requirement and a maximum limit for DASD.

External DASD: Previously, external DASD were used to extend the storage capacity of processor nodes. However, some newer nodes may now be configured with external DASD only.

Some nodes can also use external DASD as a source of boot information. In these applications, external DASD are called external boot disks

Chapter 2. RS/6000 SP Installation Instructions

Use this chapter to physically install a RS/6000 SP (these tasks assume that you have performed the planning steps outlined in *IBM RS/6000 SP: Planning Volumes 1 and 2*).

Installing the Control Workstation and Enabling Service Director

Control Workstation installation is required for the SP to be fully functional. SP installation is not considered complete until this is done.

Service Director registration is critical to IBM. It is required to improve Customer Support.

Service Code 20 complete can not be claimed until the Control workstation is completely installed and functional.

Service Code 20 complete should not be claimed for any installation until Service Director has been installed and registered.

Service Director automatically reports hardware problems to IBM Support and aids in problem determination through error analysis.

Instructions for installing the modem and service director application are provided in *Service Director for RS/6000 CE Information Guide*, ZA38-0383 (part number 11J5158). Install the modem and register Service Director using the instructions provided in that document.

The modem, cable, and the guide are provided in the ship group. The customer must provide a serial port on the control workstation or any RS/6000 on the net to install the modem. Also, an analog phone line must be provided by the customer.

Begin Installation

Table 2-1 (Page 1 of 2). Installation Task Overview		
Step	**Section**	**Page**
__1	**Pre-installation Tasks for RS/6000 SP Components** Tasks that can be performed when the RS/6000 SP system has arrived but before the physical installation begins. These tasks verify that the site is ready for the installation and everything required for a successful installation is available.	**2-2**
__2	**Performing the Customer 50/60-Hz Power Receptacle Safety Check** Information to help you verify the input power and grounding.	**2-4**
__3	**Installation Tasks** These tasks end in the completion of the physical placement of the RS/6000 SP frame.	**2-8**
__4	**Installing the High-Voltage Transformer Feature** These tasks help you cable the high-voltage transformer feature. (For 380-415 V ac with PDU only.)	**2-17**
__5	**Installing ac Power Cords and Cables** Step-by-step tasks for routing all cables (raised and non-raised floor applications).	**2-18**
__6	**Installing Skirts, Frame Covers, and Main Power Switch** Instructions for installing frame hardware. This is done after cable routing to reduce interference.	**2-23**

Step	Section	Page
	Table 2-1 (Page 2 of 2). Installation Task Overview	
—7	**Performing RS/6000 SP System Power-On and Verification** Information on the initial setup of the hardware, and on verifying the RS/6000 SP system using the CE Installation Aid or customer hardware.	**2-25**
—8	**Connecting RS-232 and Ethernet LAN Cables to Customer's Hardware** Information for connecting the RS-232 and Ethernet cables from the RS/6000 SP frame to the customer's hardware.	**2-33**
—9	**Installing the High Availability Control Workstation (HACWS)** This section helps you install the optional High Availability Control Workstation (HACWS).	**2-36**
—10	**Reconfiguring Ethernet LANs** Information to help you install RF shunt assemblies if a customer needs to reconfigure their Ethernet LANs.	**2-37**
—11	**Attaching the 9077 SP Switch Router (Dependent Node)** Perform the procedure, "Installing GRF Hardware for use as an SP Dependent Node" in the *SP Switch Router Adapter Guide*.	**C-28**
—12	**RS/6000 SP Power Control Interface Function** This section discusses the power control interface card on the SEPBU power unit.	**2-38**
—13	**Post-Installation Tasks** These tasks include safety check, cleanup, and acquisition of system Vital Product Data (VPD). The last task requires interaction with a functional system.	**2-39**
End	Signature:	Date/Time:	
Note: Repeat the pre-installation and installation tasks to install additional frames.		

Pre-installation Tasks for RS/6000 SP Components

Pre-installation Reminders

Be especially concerned for the personal safety of all team members and the very real installation safety exposures such as:

- Frames tipping while being positioned over floor cutouts
- Shock hazard during initial power-on if a power connector or cable is not wired correctly.
- Fingers wedged between frames and covers.

Doorway Clearance Considerations

Outside of the shipping container, the current tall SP frame is 1.93 m (75.8 inches) in height and 749 mm (29.5 inches wide without the side covers. Older tall SP frames are 2.01 m (79 inches) in height and 711 mm (28 inches) wide (without the side covers). All short SP frames are 1.25 m (49 inches) in height and 711 mm (28 inches) wide. **Make certain** that the SP can clear all doorways or other obstructions between your receiving dock and its final setup location.

If there are height or width restrictions, you **must** contact a commercial mover to bring (tilt) the SP through the doorway or past the obstruction. Keep in mind that a fully populated SP frame can weigh 760 kg (1670 pounds); proper consideration must be given to the mass and delicacy of the equipment involved.

Return Instructions for the Wooden Frame/Cover Containers

Note: In the US these instructions conform with **Instruction Part Number 7334490**. The unpacking and packing instructions are included in the event that the containers are still at the customer site.

The wooden shipping containers are reusable. Upon completion of delivery and unpacking of the containers at their final destination, the following steps should be taken to return the containers:

1. Ensure the containers are empty of any machine-related components. However, container components such as ramps and supports should be placed in the bottom of the container.

2. Secure front and rear doors with Klimp fasteners.

3. In the US only, return the container to the following address (found on the ARBO box label):

   Atlantic Metal Products
   21 Fadem Road
   Springfield, New Jersey 07081
   Attn: B. Santoriello

   Ship the container(s) via common carrier (based on consolidation center location).

   Outside the US, dispose of the containers according to local procedures.

4. Bill charges to the third-party listed below:

   IBM-922
   STI
   P.O. Box 4093
   Iselin, NJ 08830

Installer Responsibilities

These tasks, normally the CE responsibility, should be done after the frame arrives, but before beginning the physical installation:

1. Check with System Engineer to determine whether to order the RS/6000 SP CE Installation Aid. The Installation Aid is optional; however, it is recommended for installations where the customer hardware and RS/6000 SP required software is not installed. Refer to "Ordering RS/6000 SP CE Installation Aid" on page 2-4 for more information.

   - If you have not already done so, open or update a PMH for this installation.

2. Put the shipping group packing lists in front of this manual.

3. If an Exception Letter accompanies the system, read it, mark changes to this manual, if necessary, then file the Exception Letter with this manual.

   Note: The Exception Letter and Configuration Data are packaged in a gray envelope.

4. Review the Configuration Data to ensure that you have received the proper frame configurations.

5. Review this manual before the start of the installation.

6. Check that all system frames have been completely unpacked and inventoried against the shipping group bill of materials and the customer's order.

7. Check that the installation planning representative (IPR) has verified that the site is correctly prepared and that all facilities are available for the successful installation of this system.

8. Review any available pre-installation checklists (see *IBM System/360, System/370, 9300, 9370, and ES/9000 Processor Input/Output Equipment Installation Manual — Physical Planning*, GC22-7064 and

Systems Assurance Process Review (available from Systems Assurance Advisor [SAADVISOR in HONE], SA93-017.

9. Take an inventory of all of the RS/6000 SP shipping groups and compare it to each shipping group bill of material before beginning the installation.

   Note: Report any missing cables or hardware to the team leader so that a replacement part can be obtained before the physical installation begins.

10. Check the "Standard Ship Group" listed in *IBM RS/6000 SP: Maintenance Information, Volume 4, Parts Catalog*

Installing RS/6000 SP CE Installation Aid Tape on Control Workstation: To use the control workstation and CE Installation Aid Tape (from the system ship group) to test the system, load the software on the control workstation prior to physical installation. This eliminates, or reduces, your wait time for softwatre installation (which takes about 60–90 minutes). Refer to "Configuring Control Workstation as CE Installation Aid" on page 2-25 to begin installing software. **Read all "Attention" and "Notes" at the beginning of the procedure.**

Ordering RS/6000 SP CE Installation Aid: The RS/6000 SP CE Installation Aid contains a portable computer with preconfigured software, allowing the frame hardware to be verified without the customer-supplied control workstation. It should be ordered prior to beginning the physical installation.

The Account Team/CE should contact the support center approximately 1 week prior to the scheduled install date.

- In U.S.A, contact the Poughkeepsie LSSC, telephone number 1-800-426-2472, entering "9076" for machine type. The LSSC will open a RETAIN PMH to keep track of the installation kit location. The kit will then be shipped overnight delivery to the address requested by the CE.
- In EMEA and world trade, contact the country support center. There is a coordinator in each country support center responsible for shipping the RS/6000 SP CE Install Aid to the install location.

When the Account Team/CE receives the installation kit, the portable computer should be powered up to verify that it is functional.

After installation is completed, SC20 CIA=1, the installation kit must be returned as soon as possible for reuse on future installs. Please ensure all contents received in the kit are included in the return.

Note: The customer-supplied control workstation can be used by the CE to run the diagnostics to verify the RS/6000 SP hardware is operating correctly after installation; however, this requires that the RS/6000 SP system support programs be installed and configured before verification of the RS/6000 SP hardware.

Performing the Customer 50/60-Hz Power Receptacle Safety Check

Note: Refer to *IBM RS/6000 SP: Planning, Volume 1, Hardware and Physical Environment* for power requirements and phase information.

The 50/60-Hz power receptacle safety check contains the procedures you follow when a customer power cable receptacle is used for the first time or when doubt exists that a cable receptacle is wired correctly. You must do this power receptacle safety check procedure for a new machine installation or when a machine is relocated and a new power receptacle cable is used. Refer to *Electrical Safety for IBM Customer Engineers* (S229-8124), for additional information.

- Read the whole procedure before starting the power receptacle safety check.
- Remain alert and use all possible safety precautions.

Check with the customer or the IBM installation planning representative (IPR) to locate a reliable building ground (such as an electrical conduit, a water pipe, or another correctly grounded IBM machine). For your safety, use an IBM-approved tester with insulated test probes that can measure ac voltage and ac impedance.

If any problems are encountered at a procedure step, switch off primary power, stop the installation, and notify the customer. When the customer has corrected the problem, **repeat** the power receptacle safety check and perform the procedures described in the following section.

50/60-Hz Power Receptacle Safety Check Procedure (200 - 240, 380 - 415 Volts ac)

Have the customer locate the branch distribution circuit breakers that supply the processor unit 50/60-Hz power receptacle.

DANGER

> **Ensure that the customer's branch distribution circuit breakers (customer power source circuit breakers) to the ac power outlets are off and tagged with DO NOT OPERATE tags, S229-0237 (or national language equivalent).**

1. Set the tester to the highest volt ac range. Using the pair of high-voltage test probe tips (part number 93F2731), check for 0 volts ac between the building ground (the building ground is any grounded metal structure, water pipe, building steel, and so forth) and the three receptacle voltage contacts and the receptacle ground contact.
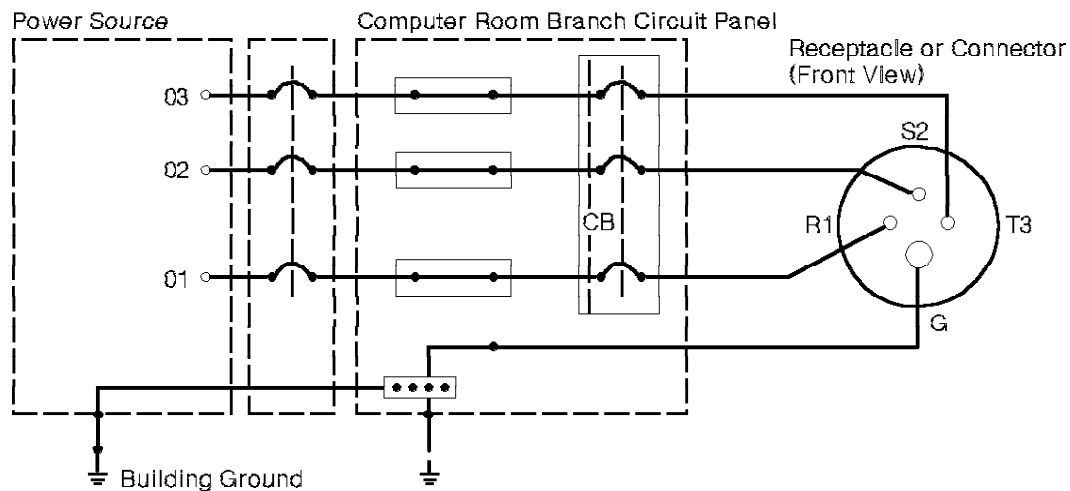
Figure   2-1. Sample Customer Power Wiring Diagram (Three-Phase Power)

Plug

Connector

Receptacle
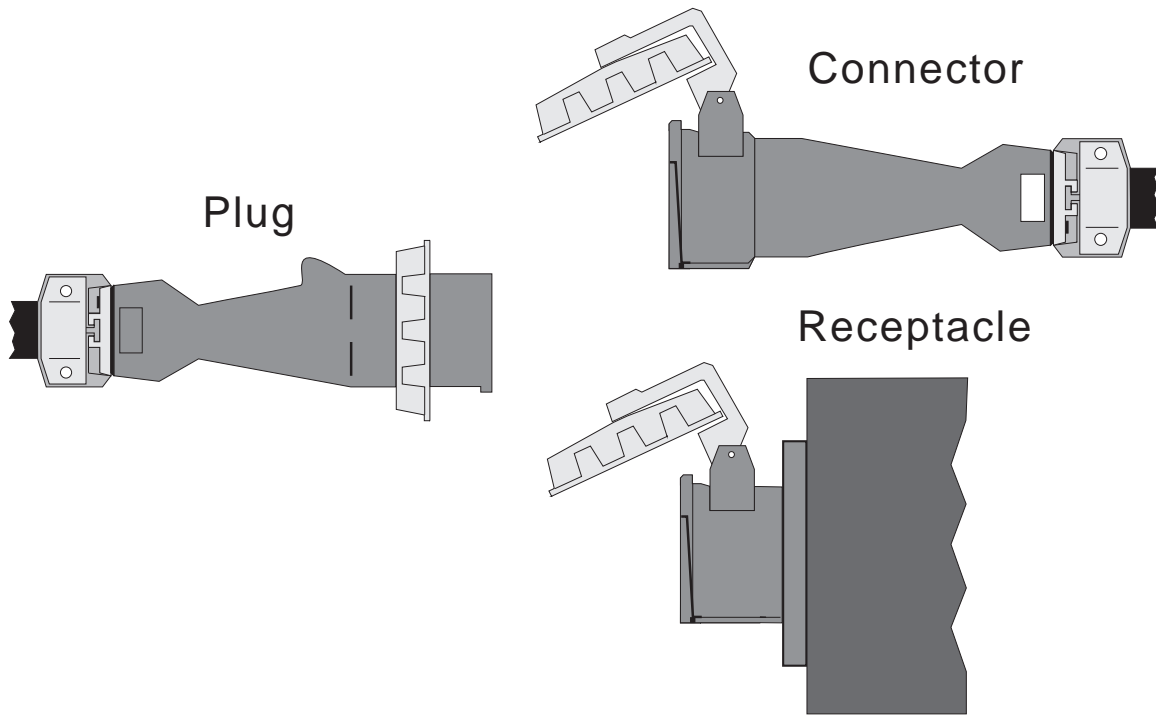
Figure   2-2. Three-Phase Power Connectors (U.S.)

Power Source

Computer Room Branch Circuit Panel

Receptacle or Connector
(Front View)

02

01

G
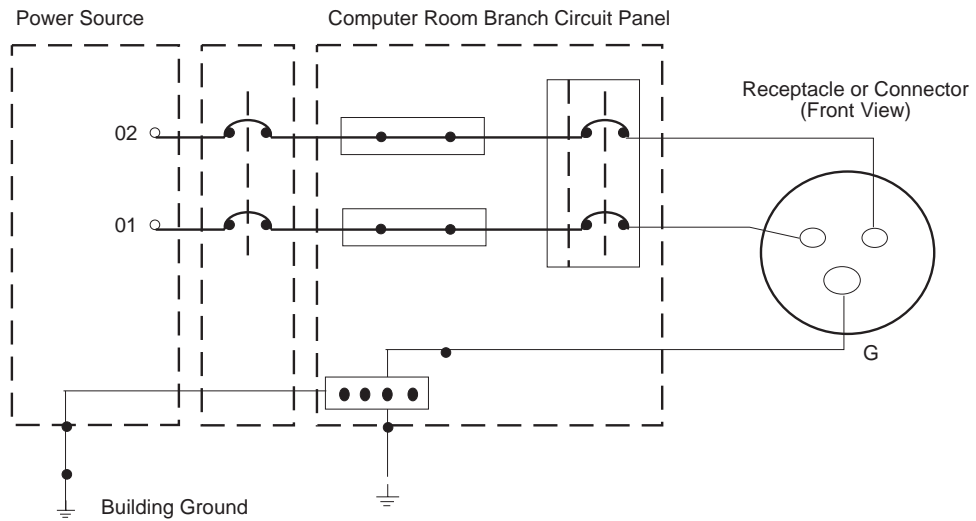
Building Ground

Figure   2-3. Sample Customer Power Wiring Diagram (Single-Phase Power)

Connector

Plug
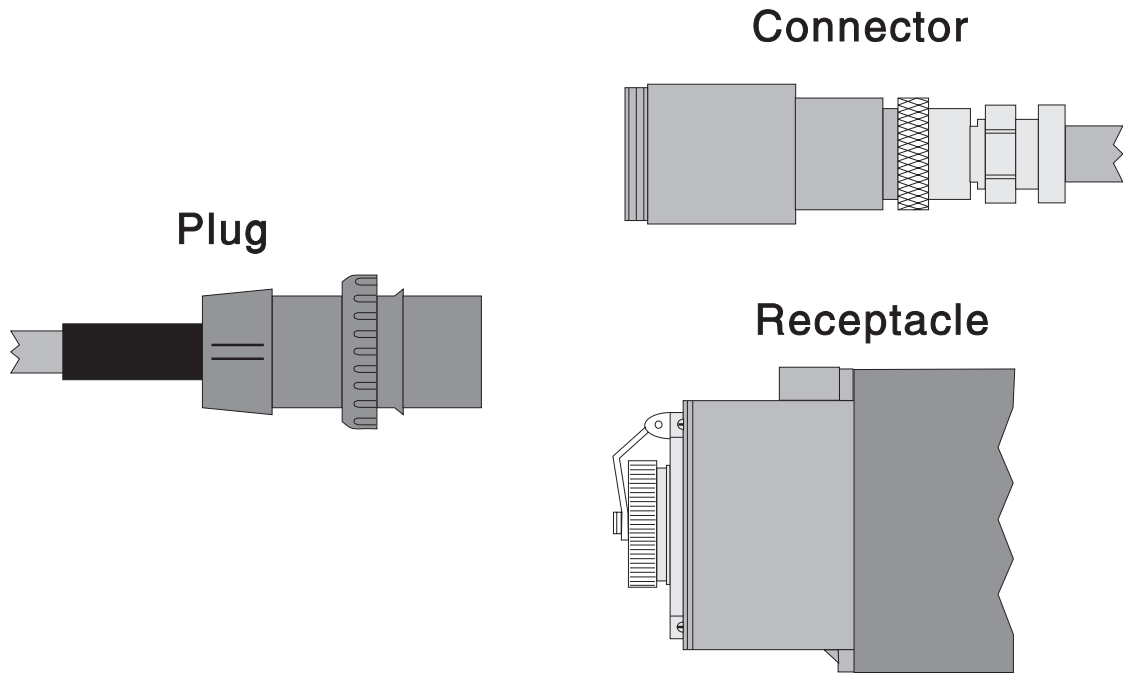
Receptacle

Figure   2-4. Single-Phase Power Connectors (U.S.)

2. Set the tester to the RX1 range and zero the tester. Check for continuity of 1 ohm or less between the building ground and the receptacle ground contact. If the reading is greater than 1 ohm, check the following:

- That a digital multimeter was not used because the result could be inaccurate
- That an IBM-approved tester that can measure ac voltage and ac impedance was used
- That a second building ground reference was tried

If a ground reading of 1 ohm or less cannot be achieved, inform the customer.

3. Set the tester to the highest volt ac range. Connect the tester leads between the building ground and the connector ground contact. Leave the tester leads connected.

DANGER

> **The remaining steps of the procedure contain measurements that are taken with power on. Remember that hazardous voltages are present.**

Note: Ask the customer to switch on and switch off the power source circuit breaker in the steps that follow.

4. Switch on the power source circuit breaker and check for 0 volts between the building ground and the receptacle ground contact.

5. With the power source circuit breaker still on, ensure that line voltage for phase-to-ground (100v-400v) is present. Repeat for the other two voltage contacts.

Note: In some conditions (for example, an impedance-grounded neutral system), the voltage contact selected may be grounded. If this occurs, repeat this step with another voltage contact.

6. Perform "Lockout Procedures" in *RS/6000 SP: Maintenance Information, Volume 2* Chapter 1, to remove power to the frame.

Installation Tasks

Before the RS/6000 SP frame is installed, perform the following tasks in the order listed:

1. "Installing Frame Side Covers" on page 2-8
2. "Placing the Frames into Position" on page 2-10
3. "Installing Stability Foot and Wheel Chocks" on page 2-14
4. "Seismic Hardware Considerations" on page 2-15

Notes

- If frame position is not critical, frame installation may be done at a later time in the overall installation procedure.

- Seismic hardware is required only in some areas. Check with customer.

Keep a record of the following items during installation.

1. The time taken to do the physical portion of the installation

2. Any problems that occur during the physical portion of the installation and the time taken to solve each problem

3. The time taken to run the machine diagnostics

4. Any problems that occur during the initial power-on sequence and machine diagnostics and the time taken to solve each problem.

Note: Once the physical portion of the installation is complete for an individual frame, the verification of that frame can be done concurrently with the installation of any additional frames.

Installing Frame Side Covers

The 1.93 m frame is shipped with side covers installed. Use the following procedure to install RS/6000 SP frame side covers on a 2.01 m frame:

Notes

- The manufacturing process has incorporated the cover bottom rail into the side cover. On later production covers, skip Step 1 and Step 4.

- If you are installing the 49-inch (1.25m) frame, go to "Placing the Frames into Position" on page 2-10.

---

1. If this frame has separate side cover bottom rails, remove or loosen the screws retaining the side cover bottom rails on the two sides of the frame. These mounting rails are approximately 13 inches (33 cm) from the bottom of the frame.

2. Place the two side covers against the two sides of the frame so that the beveled edge of each cover is toward the front of the frame and the mounting flange is at the bottom. This determines orientation of the side covers for the following steps.

3. Install side cover by hooking top flange of cover on side cover mounting rail so that front inner edge of the cover aligns with front frame edge. Pull cover down so that the top is even with the frame top.

4. If this frame has separate side cover bottom rails, install two screws to hold each side cover bottom rail to the side cover rail.

5. Install and tighten screws (**P/N 54G2882**) to hold each side cover bottom rail to the frame.

6. If this is a multi-switch frame (F/C 2030/1), install side skirts (see "Installing Skirts, Frame Covers, and Main Power Switch" on page 2-23). (It's easier to do it now before the frame extension is installed.)
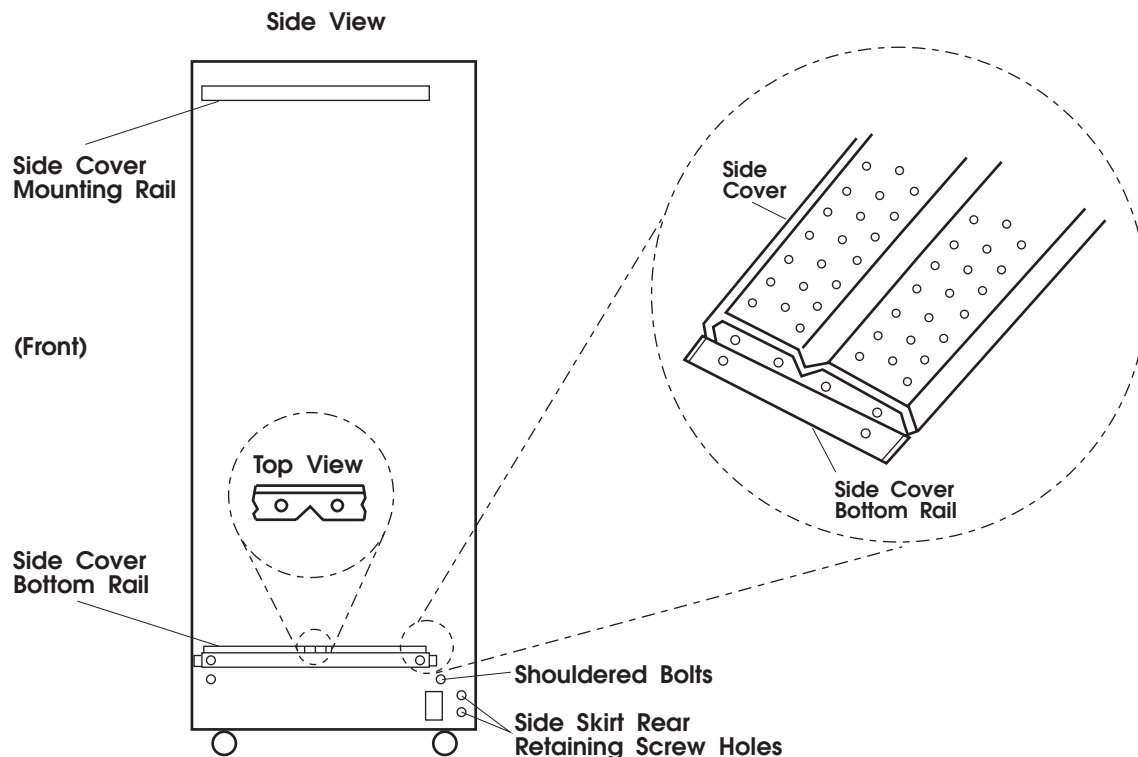
Figure 2-5. Installing Side Cover Rails

Installing Multi-Switch Frame Extension (F/C 2030/1)

The following procedure describes how to install the frame extension hardware for a multi-switch frame:

1. Make sure there is enough clear space behind the multi-switch frame to position the frame extension behind the multi-switch frame. The recommended clearance is 4 feet wide by 8 feet deep.

2. Remove both cable raceway assemblies from the frame extension by removing two nuts at bottom and two nuts at top of each raceway assembly.

3. Adjust the two feet on the frame extension to match the required height of the bottom of the frame from the floor.

4. Position the frame extension horizontally behind the multi-switch frame with the feet toward the frame and closest to the floor.

5. Align the frame extension so that each frame extension foot is about 12-18 inches behind the wheels of the frame.

6. Lift the frame extension at the end farthest from the frame and tilt the frame extension until it is even with the rest of the frame. Make any minor adjustments (adjust height using feet) to align bolt holes on the junction between the frame extension and the frame.

7. Install bolts through the holes from the frame extension side. Do not tighten until all bolts are installed.

8. Tighten bolts and recheck frame extension feet for any last adjustments.

9. Reinstall both cable raceway assemblies in the frame, reinstalling two nuts at top and two nuts at bottom of each raceway assembly.

Placing the Frames into Position

CAUTION:

- **When moving frames into position, team members should work together. Using one person on each corner of the frame can prevent strain.**

- **In raised floor installations, mechanically safe moldings should be installed around floor cutouts. Extreme caution should be used when moving frames during installation or removal because of the proximity of floor cutouts to casters.**

CAUTION:

A Johnson bar (J-bar) or similar device must not be used at any time to lift or move frames.

1. Using the customer's floor layout diagram generated from the *IBM RS/6000 SP: Planning, Volume 1, Hardware and Physical Environment*, place frames near their final locations.

2. Install frame jumper/ground cable:

    a. **SP-attached server**: Route the ground strap (part number 08J6118) to the ground bus bar on the bottom of the RS/6000 7017 Model S70 frame, see Figure 2-6.

    b. **All other SP frames**: Install the ground strap (part number 46G5695) between each adjacent frame through the closest exit hole and fasten to the nutclip on the EIA rail, as shown in Figure 2-7 on page 2-11.

Ground Bus Bar
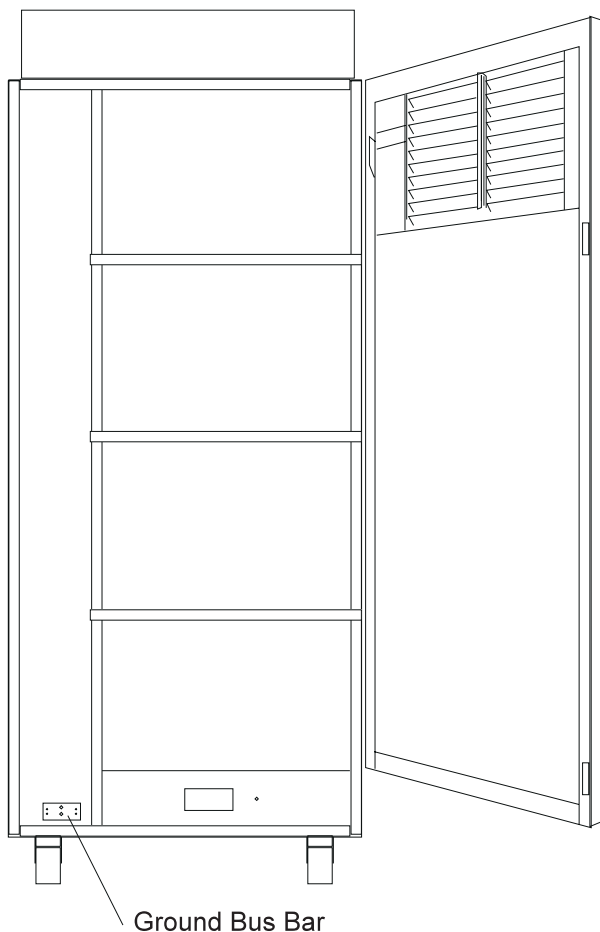
Figure 2-6. Installing Frame Jumper/Ground Cable Between an RS/6000 7017 Model S70 frame and an SP Frame
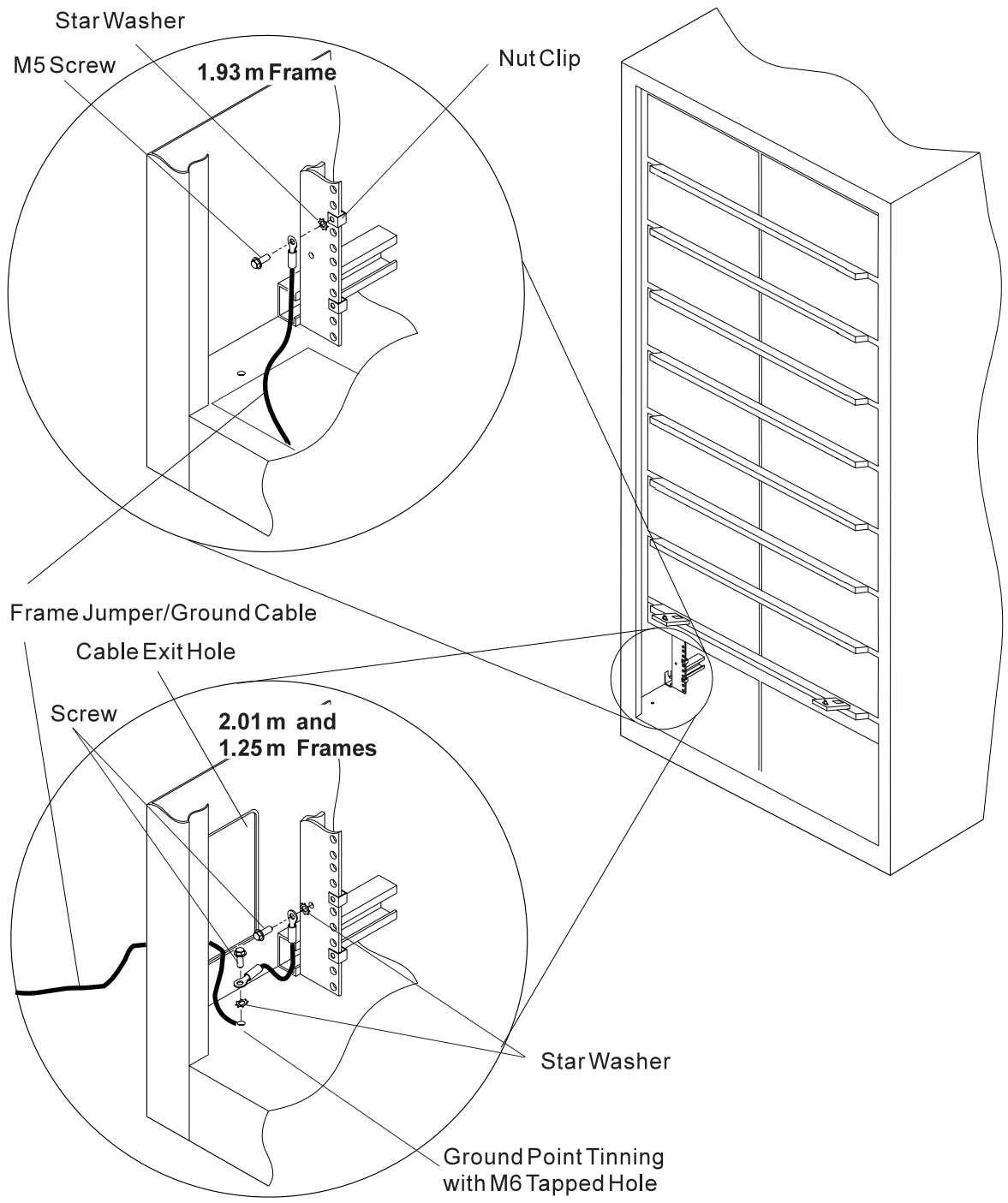
Figure 2-7. Installing Frame Jumper/Ground Cable Between SP Frames

3. Position the power cord near the customer's ac outlet or high-voltage transformer location.

Cut-Away View of the RS/6000 SP 1.93 m Base Frame
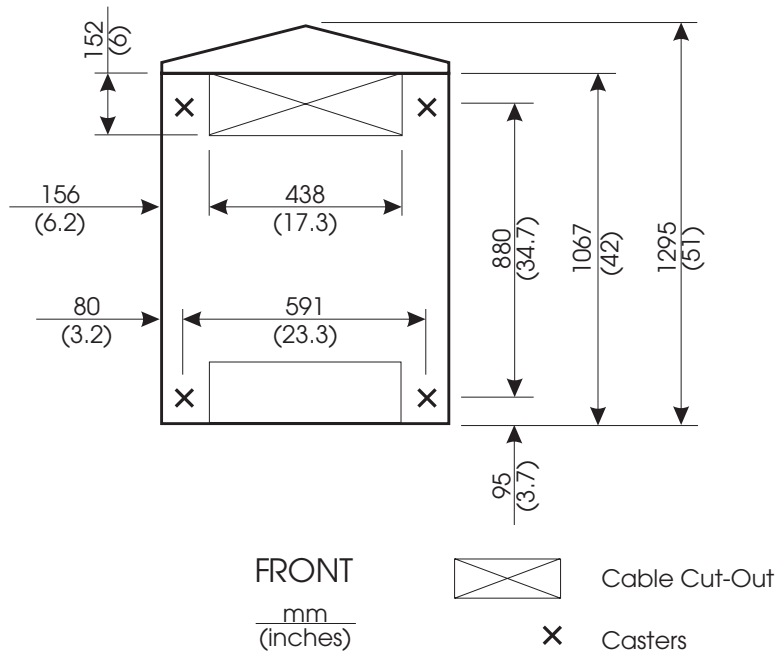
Figure 2-8. Cut-Away View of the RS/6000 SP 1.93 m Base Frame. This figure details the location and size of the casters, ac power cord, and input/output cable egress on the base of the RS/6000 SP 1.93 m frame. Dimensions are shown in millimeters (inches).

Notes:

1. Front cut-out is not used with SP systems.

2. Leveling pads have been replaced with wheel chocks on 1.93 m frames.

3. Frame outline is shown without covers.

Cut-Away View of the RS/6000 SP 79-Inch (2.01m) Base Frame
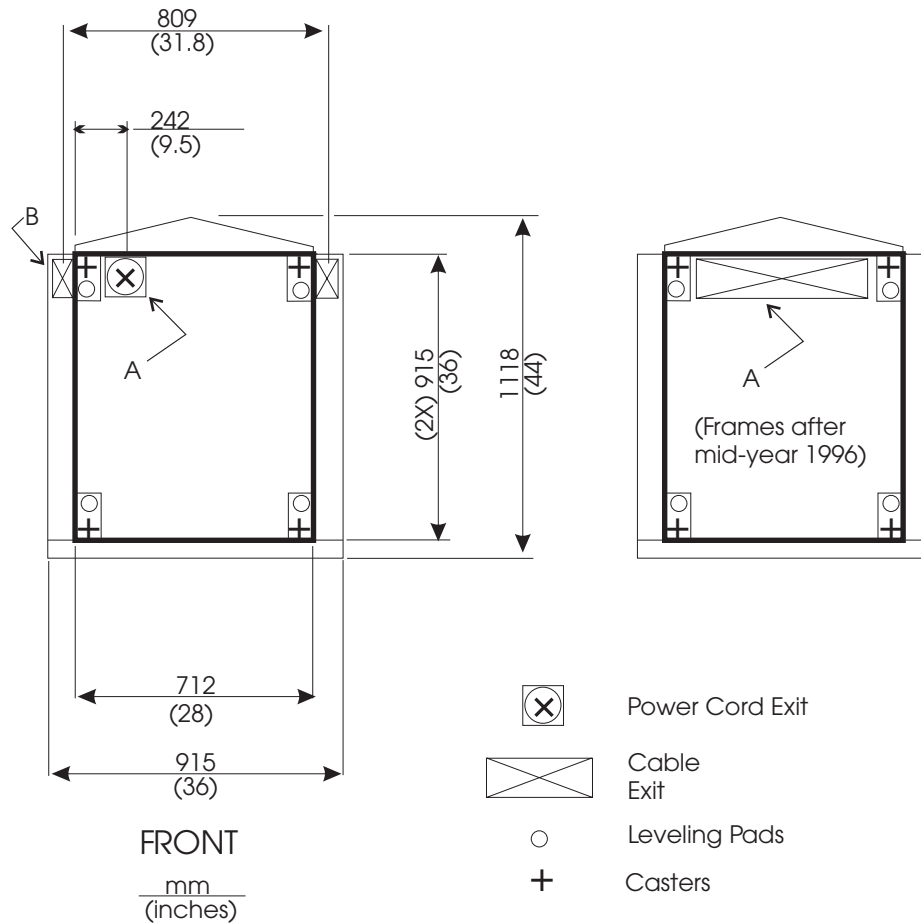
Figure 2-9. Cut-Away View of the RS/6000 SP 79-inch (2.01m) Base Frame. This figure details the location and size of the casters, ac power cord, and input/output cable egress on the base of the RS/6000 SP 79-inch (2.01m) frame. Dimensions are shown in millimeters (inches).

Note: Darker lines indicate outline of frame without covers or skirts.

Table 2-2. Floor Cutout Dimensions of the SP 79-Inch (2.01 M) Frame		
Cutout	**Size**	**Use**
A	102 millimeters (4 inches) x 102 millimeters (4 inches)	Power cord
	102 millimeters (4 inches) x 407 millimeters (18.5 inches)	Power cord and input/output cables on factory orders after mid-year 1996
B	83 millimeters (3.25 inches) x 152 (6 inches)	Input/output cables

Cut-Away View of the RS/6000 SP 49-Inch (1.25m) Frame
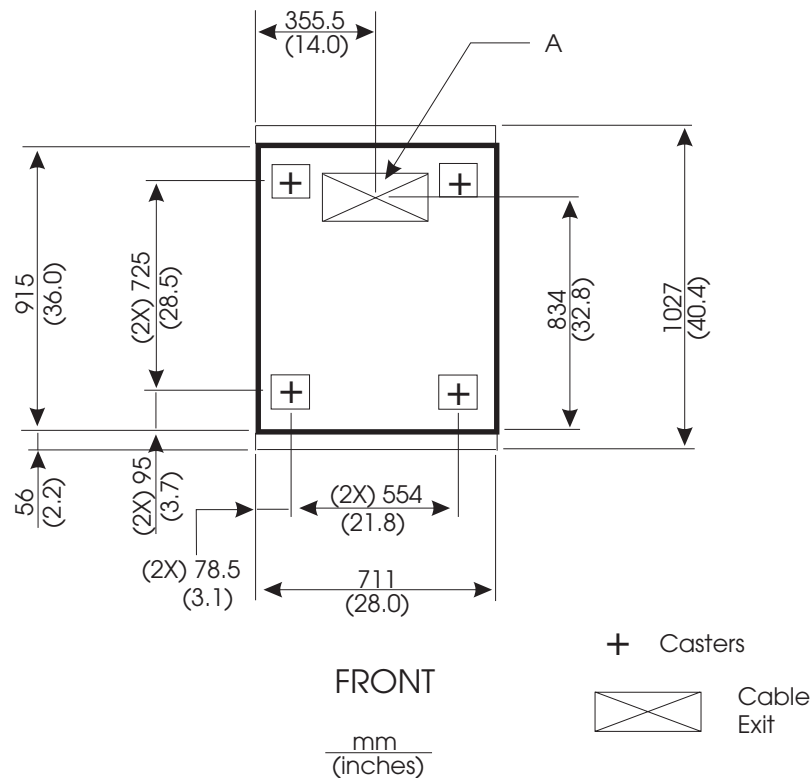
Figure 2-10. Cut-Away View of the RS/6000 SP 49-inch (1.25m) Base Frame. This figure details the location and size of the casters, ac power cord, and input/output cable egress on the base of the RS/6000 SP 49-inch (1.25m) frame. Dimensions are shown in millimeters (inches)

Cutout	Size	Use
A	102 millimeters (4 inches) x 388.4 millimeters (15.3 inches)	Input/output cables and power cord

Table 2-3. Floor Cutout Dimensions of the RS/6000 SP 49-Inch (1.25m) Frame

Installing Stability Foot and Wheel Chocks

Install the stability foot and wheel chocks:

1. Place the stability foot at the bottom front of the frame. Line up the two holes with the bolt holes in the frame. See Figure 2-11 on page 2-15.

2. Install two M10 bolts and washers through the stability foot into the bolt holes and tighten.

3. Slide a rubber wheel chock on each of the four wheels.
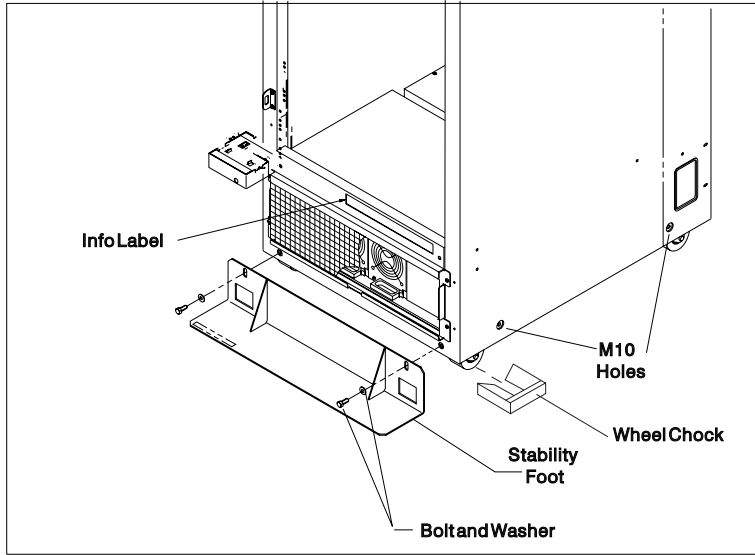
Figure 2-11. Installing the Stability Foot and Wheel Chocks

Seismic Hardware Considerations

If you are in a geographical area that is susceptible to severe earthquakes, special installation consider-ations may be required. Check with your IBM representative or local building codes.

Hold-down protection devices are available through IBM Global Services.

1.93 m Frame Seismic Tie-Downs: The 1.93 m RS/6000 SP frame has four M10 threaded holes on the bottom of the frame for attachment to customer-supplied hold-down devices. See Figure 2-12 on page 2-16 for hole locations.

(4X) M10

699.2
(27.53)

185.4
(7.30)

11.4
(0.45)

727.2
(28.63)

FRONT

mm
(inches)
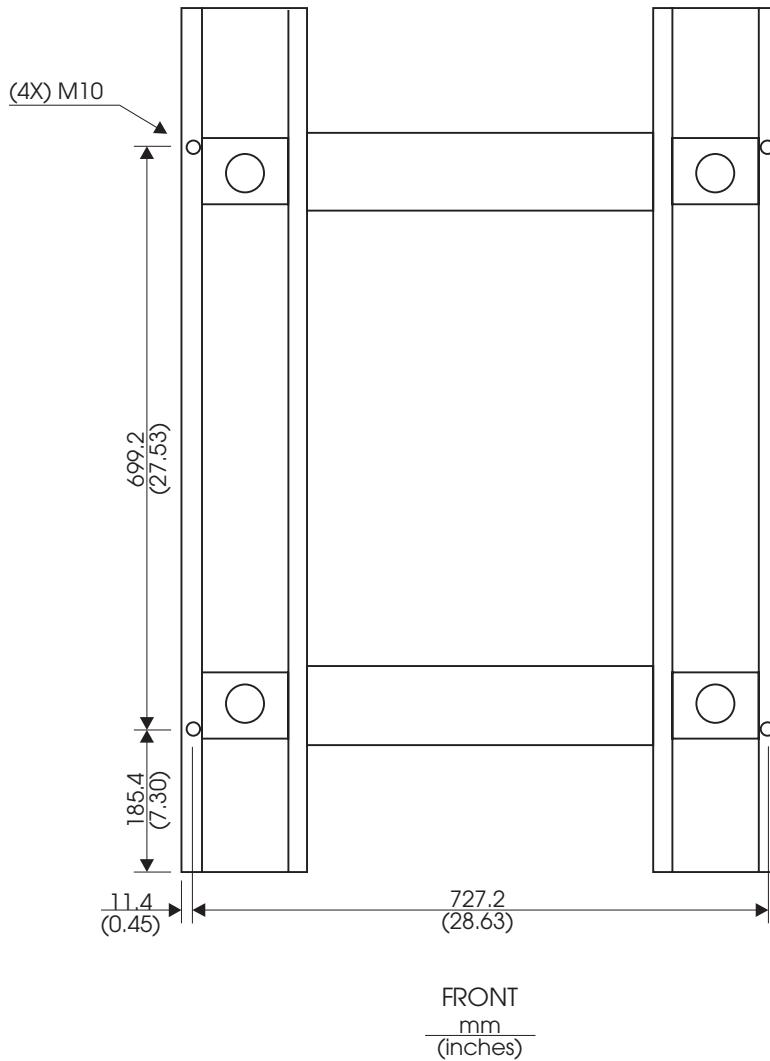
Figure 2-12. Specifications for Seismic Hardware on the 1.93 m Frame. Bottom view showing location of tapped holes for seismic tie-downs.

2.01 m Frame Seismic Tie-Downs: The 2.01 m RS/6000 SP frame has two M10 threaded holes on each side of the frame for attachment to customer-supplied hold-down applications. See Figure 2-13 on page 2-17 and Table 2-4 on page 2-17.

Hold-down protection devices are available through IBM Availability Services.
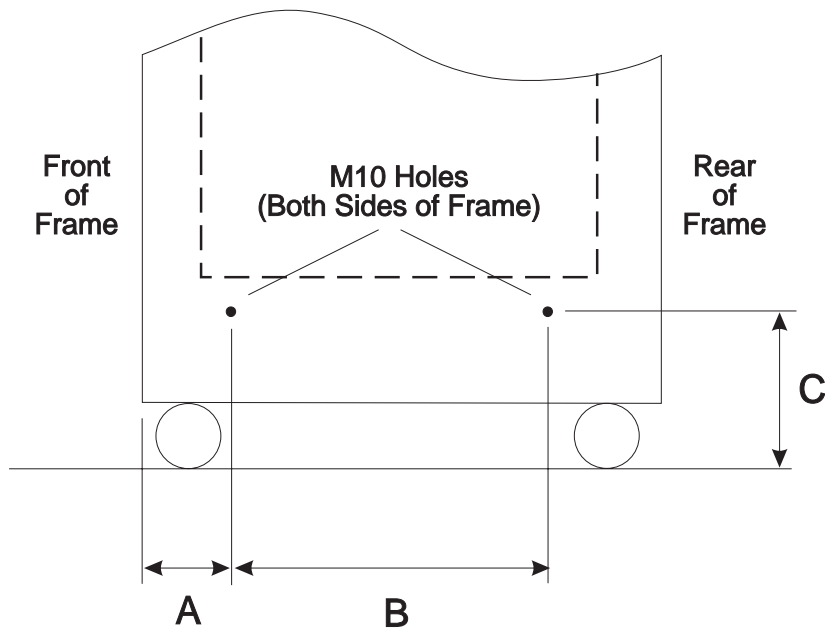
Figure 2-13. Specifications for Seismic Hardware

Table 2-4. Specifications for Seismic Hardware			
Frame	**A (Front of Frame to M10 Hole)**	**B (M10 Hole to M10 Hole)**	**C (M10 Hole to Floor)**
2.01 m (79 in.)	150mm (5.9 in.)	615mm (24.2 in.)	123mm (4.8 in.)
2.01 m (79 in.) (After midyear 1996)	175mm (6.9 in.)	565mm (22.2 in.)	123mm (4.8 in.)
1.25 m (49 in.)	150mm (5.9 in.)	615mm (24.2 in.)	90mm (3.5 in.)

Installing the High-Voltage Transformer Feature

> **Notes**
>
> - This feature is no longer in production. It is provided here for relocation purposes only.
>
> - This section on cabling the high-voltage transformer is only for high-voltage (380 - 415 V ac) customers. The high-voltage transformer feature is required only on frames using a power distribution unit (PDU). Frames with a scalable electrical power base unit (SEPBU) do not require this feature.
>
> - Frames with a PDU have a main circuit breaker at the rear of the power compartment (bottom section of frame).

Cabling the High-Voltage Transformer

Follow these steps to cable the high-voltage transformer:
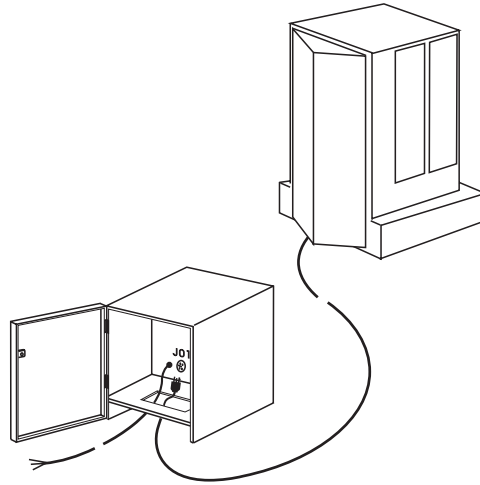
Figure 2-14. Installing the High-Voltage Transformer

1. Open the transformer using the hex key.
2. Locate the cable coiled inside the service area of the transformer.
3. Uncoil the cable and pull it through the hole in the base of the transformer.
4. Ensure that transformer circuit breakers CB01 and CB02 are in the '0' or down position.
5. Position the high-voltage transformer power cord near the customer's power receptacle.
6. Take RS/6000 SP power cord connector and run it under the transformer service area and through the hole in the bottom.
7. Plug cord into the output electrical receptacle, J01.

Installing ac Power Cords and Cables

This section includes the following tasks:

- "Connecting RS/6000 SP ac Power" on page 2-19
- "Installing SP-Attached Server Cables" on page 2-19
- "Installing Interframe Cables for HiPS and SPS Features" on page 2-20
- "Routing RS-232 and Ethernet LAN Cables" on page 2-23
- "Connecting PCI and Micro Channel Adapter Cables" on page 2-23

Note: These tasks should be done in the order they are listed. Some tasks may not be necessary if the feature is not installed.

Connecting RS/6000 SP ac Power

DANGER

Before connecting ac power cords to electrical outlets, ensure that:

- **The customer's branch distribution circuit breakers (customer power source circuit breakers) are off and tagged with DO NOT OPERATE tags, S229-0237 (or national language equivalent).**
- **The activities in "Performing the Customer 50/60-Hz Power Receptacle Safety Check" on page 2-4 have been performed on all customer power source outlets and cable connectors.**

1. Ensure that main power switch is in the Off ('0') position.

2. Ensure that the circuit breaker on the front of each processor node and switch assembly (if present) is in the Off ('0') position.

3. Plug the ac line cord in the rear of the frame.

4. Using the appropriate section below, connect the ac line from each frame or transformer to the customer receptacle that comes from the branch circuit distribution breakers.

If Hardwiring is Used: Ensure that the branch circuit breaker is locked in the off position. (Refer to the "Lockout/Tagout" section in *RS/6000 SP: Maintenance Information, Volume 2* for these procedures.) Ask the customer electrician to make connection to a branch circuit junction box or panel, per local requirements.

If Local Termination Connector is Used: Connect the ac line cord to the customer receptacle.

Installing SP-Attached Server Cables

If you are installing a SP-attached server continue with the following procedure. If not, go to "Installing Interframe Cables for HiPS and SPS Features" on page 2-20.

1. Ensure the SP-attached server frames are placed in their final positions.

2. Complete the SP-attached server frame installation and checkout using *RS/6000 Enterprise Server S70 Installation and Service Guide* prior to connecting the RS/6000 SP frame(s).

3. At the front of the RS/6000 7017 Model S70 frame, attach one end of cable part number 31L7196 to the 9 pin Service and Manufacturing Interface (SAMI) serial port on the left side of the SP-attached server operators panel. Attach the other end of the cable to the customer designated serial port at the SP control workstation.

   Note: 16 port ASYC cards are NOT supported for SP-attached server attachment, 8 or 128 port ASYC cards are the only supported port configurations for SP-attached server attach feature.

4. At the rear of the 7017 Model S70 frame, attach one end of cable part number 31L7197 to the serial port 1 of the primary I/O drawer of the SP-attached server. Attach the other end of the cable to the customer designated serial port at the SP control workstation.

5. Connect the SP-attached server to the SP systems Ethernet LAN network. Refer to "Connecting RS-232 and Ethernet LAN Cables to Customer's Hardware" on page 2-33.

Note: If you are connecting the SP-attached server to the SP Parallel Processing network continue with 6 on page 2-20. If not, go to "Installing Interframe Cables for HiPS and SPS Features" on page 2-20.

6. At the rear of the 7017 Model S70 frame, attach one end of cable part number 54G3301 to the RS/6000 SP system adapter in slot 10 of the I/O drawer in the SP-attached server. Attach the other end of the cable to the SPS switch in the node jack position designated by the Customer. See Table A-8 on page A-6.

7. Continue with "Installing Interframe Cables for HiPS and SPS Features."

Installing Interframe Cables for HiPS and SPS Features

Perform the following procedures to install the High Performance Switch (HiPS) and Scalable POWERparallel Switch (SPS) interframe cables:

1. Designate each frame with the number sequence one to N. Place frames in their final positions according to the customer's floor layout diagram. Frames should be within 3m (10 feet) of each other.

2. Refer to the "Locations" and "Service Procedures" sections of *RS/6000 SP: Maintenance Information, Volume 3* to read about the naming conventions for all components in the RS/6000 SP system.

3. Refer to Figure 2-15 on page 2-21 and Figure 2-16 on page 2-22 to familiarize yourself with the HiPS and SPS bulkheads.

Notes

- Switch clock connectors (J35 and J36) are present on an HiPS 2.0 switch assembly *only*.

- Switch clocks may be distributed via the switch data cables, so there may not be switch clock cables. HiPS 2.0 switch assemblies require data cable interposers (P/N 93G1097) for external clock-to-data cables. These interposers are used for coexistence in systems that have both HiPS 2.0 and HiPS 3.0 assemblies. See Figure A-5 on page A-11.

- The 8-port switches have jacks for nodes N01 - N08 only.

HiPS 2.0

N14 N13 N10 N09 N06 N05 N02 N01 N03 N04 N07 N08 N11 N12 N15 N16

J1 J2
J3 J4 J5 J6 J7 J8 J9 J10 J11 J12 J13 J14 J15 J16 J17 J18 J19 J20 J21 J22 J23 J24 J25 J26 J27 J28 J29 J30 J31 J32 J33 J34

J361 J362 J363 J364 J365 J366 J367
J35 J36

Supervisor
Connector

Switch
Data Cables

Switch
Clock
Cables

Power
Connector

HiPS 3.0

N14 N13 N10 N09 N06 N05 N02 N01 N03 N04 N07 N08 N11 N12 N15 N16

J1 J2
J3 J4 J5 J6 J7 J8 J9 J10 J11 J12 J13 J14 J15 J16 J17 J18 J19 J20 J21 J22 J23 J24 J25 J26 J27 J28 J29 J30 J31 J32 J33 J34

Supervisor
Connector

Switch
Data Cables

Power
Connector

HiPS-8 (LC8)

N06 N05 N02 N01 N03 N04 N07 N08

J1 J2
J3 J4 J5 J6 J7 J8 J9 J10 J11 J12 J13 J14 J15 J16 J17 J18 J19 J20 J21 J22 J23 J24 J25 J26 J27 J28 J29 J30 J31 J32 J33 J34

Supervisor
Connector

Switch
Data Cables

Power
Connector

Figure   2-15. High Performance Switch (HiPS) Bulkheads

SP Switch (SPS)

SP Switch-8 (SPS-8)
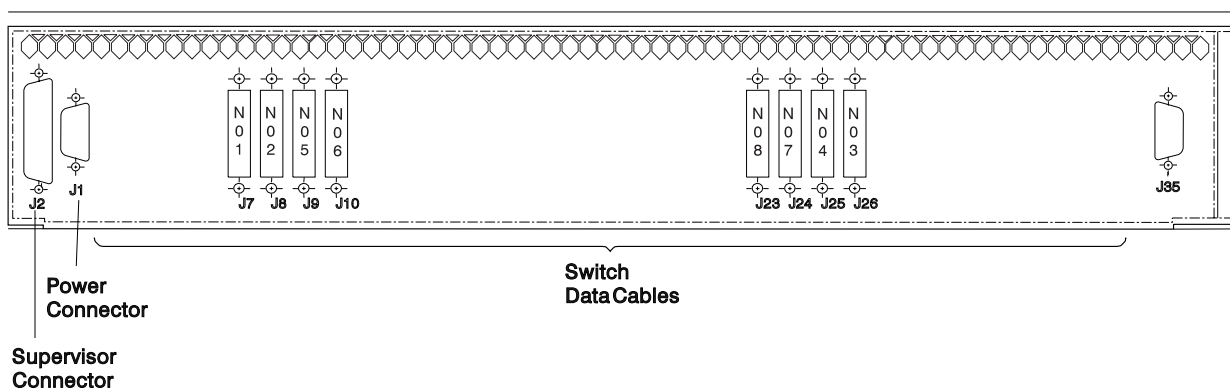
Figure   2-16. Scalable POWERparallel Switch (SPS) Bulkheads

4. If you are installing an expansion frame (F/C 1500, 1550, 1010/15/16/17/19), connect switch data cables from the base frame to the expansion frame using Table A-3 on page A-3 or Table A-7 on page A-5. (Refer to the "Cable Routing" section in *RS/6000 SP: Maintenance Information, Volume 3* to see the routing paths.)

5. On HiPS 2.0 switch assemblies only, make sure that data cable interposers are installed. Refer to Table A-12 on page A-11.

6. Locate the label sheets (Part Number 54G3277) and all data cables shipped with the RS/6000 SP for the switch feature. Refer to Figure A-6 on page A-12 for the sets of labels.

7. Refer to "Installing the HiPS System" on page A-14 or "Installing the SPS System" on page A-34 for the appropriate frame configuration chart that corresponds to this system.

   Attention: Switch data plug/jack connector pins are easily bent. Check for bent pins on male plugs or bent pin guides on female jacks if a cable is difficult to plug. Problems with bent pins or pin guides can propagate to new plugs/jacks if not corrected first.

   Within the ship group, there is a thumbscrew tool (P/N 17H5078) to assist in installing HiPS cables.

   On an SPS, to insure proper cable retention, listen for the audible "click" as the cable is seated.

8. Install the data cables according to the appropriate charts in Appendix A, "Switch Cable Charts" on page A-1. Record the serial numbers from the cables in the tables.

9. Neatly bundle all switch cables after all are installed.

10. Make sure all unused switch ports (HPS-BH-J3 through HPS-BH-34 or SPS-BH-J3 through SPS-BH-J34) have switch data wrap plugs (P/N 46G5619) installed. This is important for all systems.

Routing RS-232 and Ethernet LAN Cables

1. Route the RS-232 cables from the RS/6000 SP frame to the customer's control workstation(s).

2. If this frame has processor nodes, route the standard Ethernet LAN cable from the RS/6000 SP frame to the customer's control workstation(s).

Connecting PCI and Micro Channel Adapter Cables

1. Refer to "Cabling PCI and Micro Channel Adapters" on page C-16 for information on cable routing and cabling requirements for specific adapters.

2. Route cables for the PCI or Micro Channel adapters, using cable exits at the bottom of the frame. (Refer to Figure 2-9 on page 2-13 or Figure 2-8 on page 2-12 and Figure 2-10 on page 2-14.

3. Connect cables at PCI or Micro Channel adapters and external devices.

Installing Skirts, Frame Covers, and Main Power Switch

Installing the Acoustic Skirts

Perform one of the following procedures to install the acoustic skirts (depending on the frame type):

1.93 m Frame

1. Hang the side skirt on the shoulder bolts using the keyhole in the skirt.
2. Temporarily install the front skirt near the bottom of the frame using the bottom locating pins on the side skirts.

   Note: Engage one end of the front skirt at a time by lifting from the bottom surface of the skirt at the end you are engaging.

3. Push the top of the skirt onto the upper locating pins.
4. Ensure the air filter is securely installed in the air filter bracket.
5. Tighten the 2 quarter-turn screws on the top of the front skirt, into the filter bracket.

2.01 m Frame:

1. Position the side skirt onto the two shoulder screws on the side of the frame.
2. Reinstall the two mounting screws at the lower rear inside the frame. Do not tighten.
3. Replace the front skirt assembly. Position the side skirt lower aligning pins into the front skirt alignment pin holes. Once the front skirt is aligned with the side skirt, fasten the two captive screws by turning them a half turn.

   Note: Engage one end of the front skirt at a time by lifting from the bottom surface of the skirt at the end you are engaging.

4. Tighten mounting screws at lower rear, inside the frame.

Installing Frame Covers

1.93 m Frame: Frame covers are factory installed on 1.93 m frames.

2.01 m Frame

1. Install front cover on hinge brackets. Adjust brackets (if required) so the cover is centered left to right and the top is even with the side covers. Tighten bracket screws.

2. At inside bottom of front cover, remove small bolt for ground strap connection. Put bolt through washer and lug on ground strap. Install bolt into hole of front cover and tighten.

3. Install rear cover on hinge brackets. Adjust brackets (if required) so cover is centered left to right and top is even with side covers. Tighten bracket screws.

Installing Main Power Switch

Note: If you are installing the 1.93 m frame or the 49-inch (1.25m) frame, go to "Performing RS/6000 SP System Power-On and Verification" on page 2-25.

Refer to Figure 2-17 as you perform the following procedure. (See "Main Power Switch Assembly" in *IBM RS/6000 SP: Maintenance Information, Volume 4, Parts Catalog* if you need to know the part numbers.)

1. Unpack main power switch assembly.

2. Remove two mounting screws from the frame assembly near the hole for the main power switch assembly.

3. Lift main power switch assembly near hole in the frame assembly. Push excess cable into hole in the frame assembly.
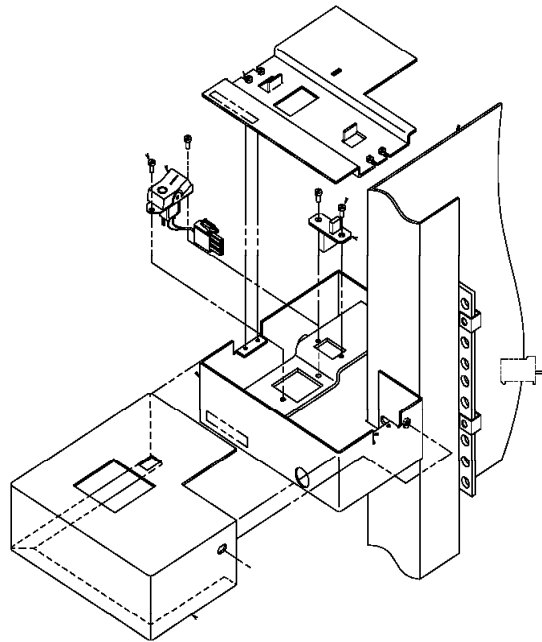
Figure 2-17. Installing the Main Power Switch

4. Install the two mounting screws that hold the main power switch assembly to the frame. Make sure you are using the lower two holes of the frame and that the cable is not pinched.

5. Install plastic slide rails on both sides of the depression on top side of the main power switch assembly, with thin edges toward top and outside of depression.

6. Install clear plastic slide cover on rails, with its indentation on top and on left side.

7. Install metal cover over the main power switch assembly and install the screw in the right side of the metal cover.

Performing RS/6000 SP System Power-On and Verification

Note: For systems with a switch feature, it is necessary to complete physical installation of entire system before performing full verification of the switch feature.

Note: A 9077 (any model) is not specifically tested with the following procedures. Refer to the *SP Switch Router Adapter Guide* for more information.

Verification of the system can be performed from the customer's control workstation, using the CE installation aid software (new system) or customer's configuration (MES - such as, frame add, node add or switch add). Perform one of the following procedures:

- "Verifying RS/6000 SP Frames Using CE Installation Aid" on page 2-27.
- "Verifying the RS/6000 SP System Using Customer Configuration" on page 2-34.

If results from any of the verification steps are not as stated, go directly to the "Start of Call" procedures in *RS/6000 SP: Maintenance Information, Volume 2* to perform RS/6000 SP service operations. You may also find it helpful to use the 'Problem Determination' section of the *IBM RS/6000 SP: Administration Guide* . Return to the install when the problem has been fixed.

Configuring Control Workstation as CE Installation Aid

Use these instructions to configure a control workstation (CWS) to verify the RS/6000 SP system installation. The CWS will function like the previous installation aid laptop.

Attention: This procedure overwrites all existing software and data on the CWS; therefore it must be used only when the control workstation is **new** or will be **completely reinstalled**. This procedure must **not** be used on an existing configured workstation or one that contains important customer data.

Notes

1. This procedure takes approximately 60–90 minutes to complete. Only the first part (starting load from mksysb tape image) requires interaction. Once tape load is started, other work can be performed during the remaining 45–75 minutes.

2. Before you begin, you must have the following:

   - Tape from system ship group with a label similar to:

   ```
   9076              DEFAULT IMAGE TAPE          01 of 01
   AIX 4.3.2         Tool IMAGE
   ```

   There are several variations of this tape to support different media sizes (4mm/8mm) and workstation types (MCA/PCI/SMP). **Make sure you use the appropriate tape for this control workstation; the tape in the system ship group should be correct.**

   - Only one frame can be connected at a time, using code level 2.50, and must be connected as follows:

      a. Frame supervisor serial cable to CWS serial S1 port.

      b. Frame's Ethernet cable to CWS installation interface (ent0)

      Note: These restrictions may be removed in later levels of software.

Perform the following steps on the control workstation:

1. Locate the items listed in the previous note.

2. If necessary, unpack and set up the control workstation hardware. Optionally, you can perform hard-ware checkout on the stand-alone CWS.

3. Insert the `INSTALL AID TAPE` in the tape drive.

4. Configure the CWS to IPL from tape, using one of the following methods:

   - From AIX prompt, enter `bootlist —m normal rmt0`, then enter `shutdown -Fr`, to reboot the CWS.

   - From diagnostic menu, select "Task Selection", select "Display or Change Bootlist", select "Normal mode bootlist", "Alter Current bootlist". Remove (or increase the number of) other devices from bootlist. Type `1` next to "rmt0" and press the appropriate function key to commit.

     Exit the diagnostic menus to shutdown the machine. After the shutdown is complete, press the reset button to reboot the CWS.

   - From the SMS menus, modify the bootlist to put the tape drive "rmt0" as the first boot device. Exit from menus to reboot the CWS.

5. After a few minutes loading from tape, you are prompted for information:

   a. Press function key `F1`, then `Enter` to define the system console.

   b. Type `1` and press `Enter` for English or select another language for install instructions.

   c. When "Welcome to Base Operating System Installation and Maintenance" menu is displayed:

      1) Type `2` and press `Enter` for "Change/Show Install Settings and Install".

      2) Follow the instructions displayed to make appropriate disk (or disks) selection. When disk selection is complete, type **0** and press **Enter**.

      3) If you are sure that you can overwrite existing CWS data, type `0` and press `Enter` to start the tape load.

   d. A screen is displayed indicating status (% tasks complete and Elapsed time), the remainder of the tape load takes approximately 2 hours.

6. When tape load is complete, the CWS reboots from the hard disk.

7. Remove the tape from the tape drive.

8. Login as userID "root".

9. An Xwindows screen with the installation verification menu is displayed.

10. Proceed with Verifying RS/6000 SP Frames Using CE Installation Aid.

Verifying RS/6000 SP Frames Using CE Installation Aid

Notes

1. The CE Installation Aid is only capable of verifying one frame at a time.

2. Complete "Configuring Control Workstation as CE Installation Aid" on page 2-25 before continuing.

3. Verifying the switch feature in an efficient manner requires:

   - Any multi-switch frames should be verified before other frames in the system.

   - Any expansion frames (F/C 1500, 1550, 1010/15/16/17/19) should be verified before their corresponding base frame (frame with switch).

   - For systems with an **SPS** switch, logical frame 1 should be the **first** frame verified (but verified after any multi-switch frames). For systems with a **HiPS** switch, logical frame 1 should be the **last** frame verified.

   - The user note window comes up automatically, or can be retrieved from the root menu pop-up window (using the left mouse button).

Prepare the CE Installation Aid:

Note: If you have problems performing these steps, call next level of support.

1. Ensure "Configuring Control Workstation as CE Installation Aid" on page 2-25 is complete (including IPL and login as "root").

2. Attach the Ethernet cable to the control workstation:

   - For Ethernet thin, connect a T or Y connector with one terminator and one long coax cable to the first ethernet adapter (en0).

   - For Ethernet twisted-pair (TTP), connect a cable from the first Ethernet adapter (en0) to the Ethernet LAN concentrator (HUB) for this frame.

Processor
Node 2

Processor
Node 1

RF shunt
Assembly

Frame Supervisor

Switch Assembly

Ethernet Thin Cable
(3m)

CE Installation Aid

Ethernet
(15-pin)

Parallel port
(25-pin)
not used

Serial port
(9-pin)

SCSI Port
(for tape drive)

Ethernet
Converter
box

Ethernet
thin cable
(3m)

Ethernet Thick
Cable (1m)

RS/232 serial
cable (3m)

Ethernet
Terminator

Ethernet
T-adapter
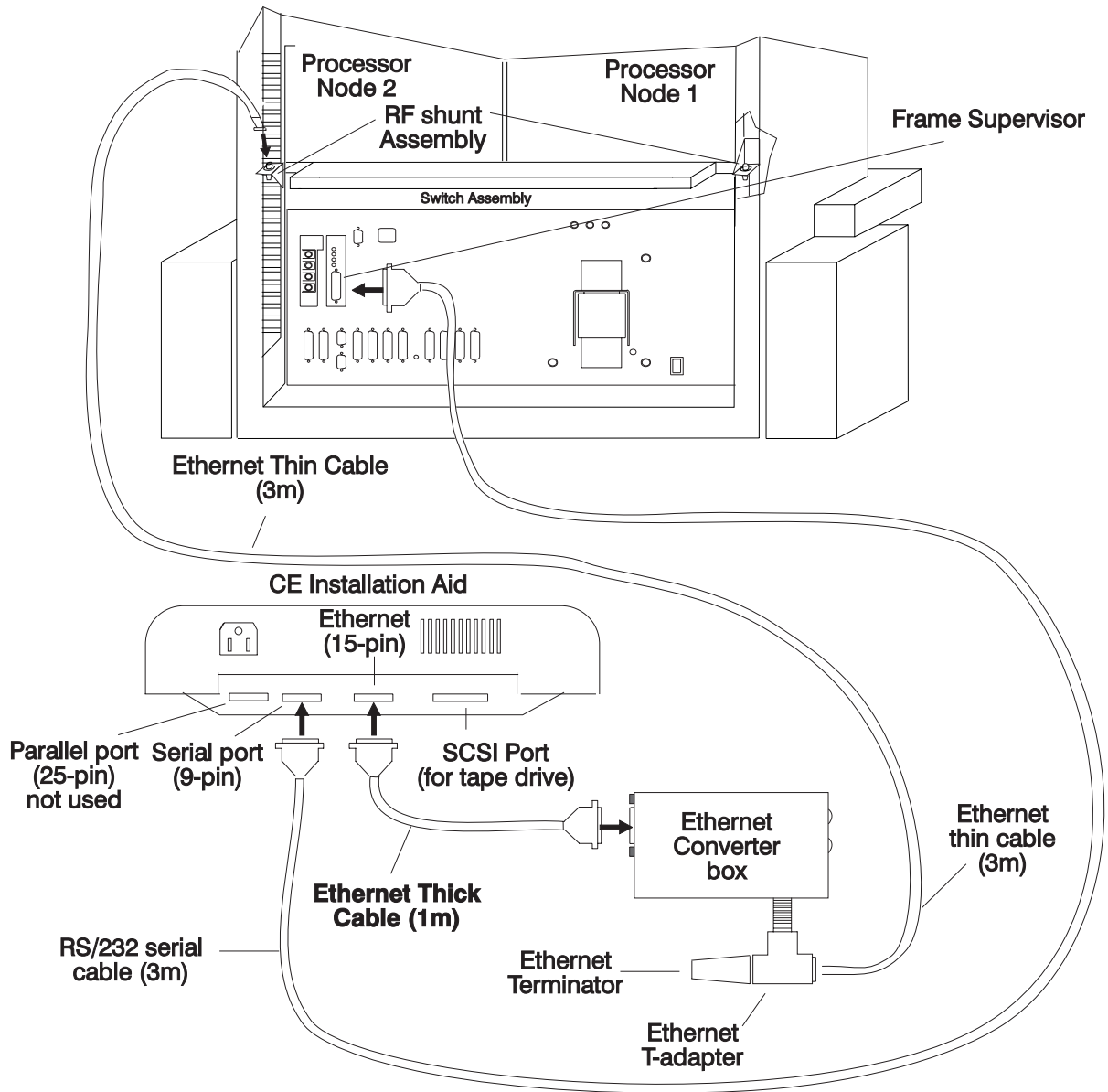
Figure   2-18. Connecting the CE Installation Aid (ACER)
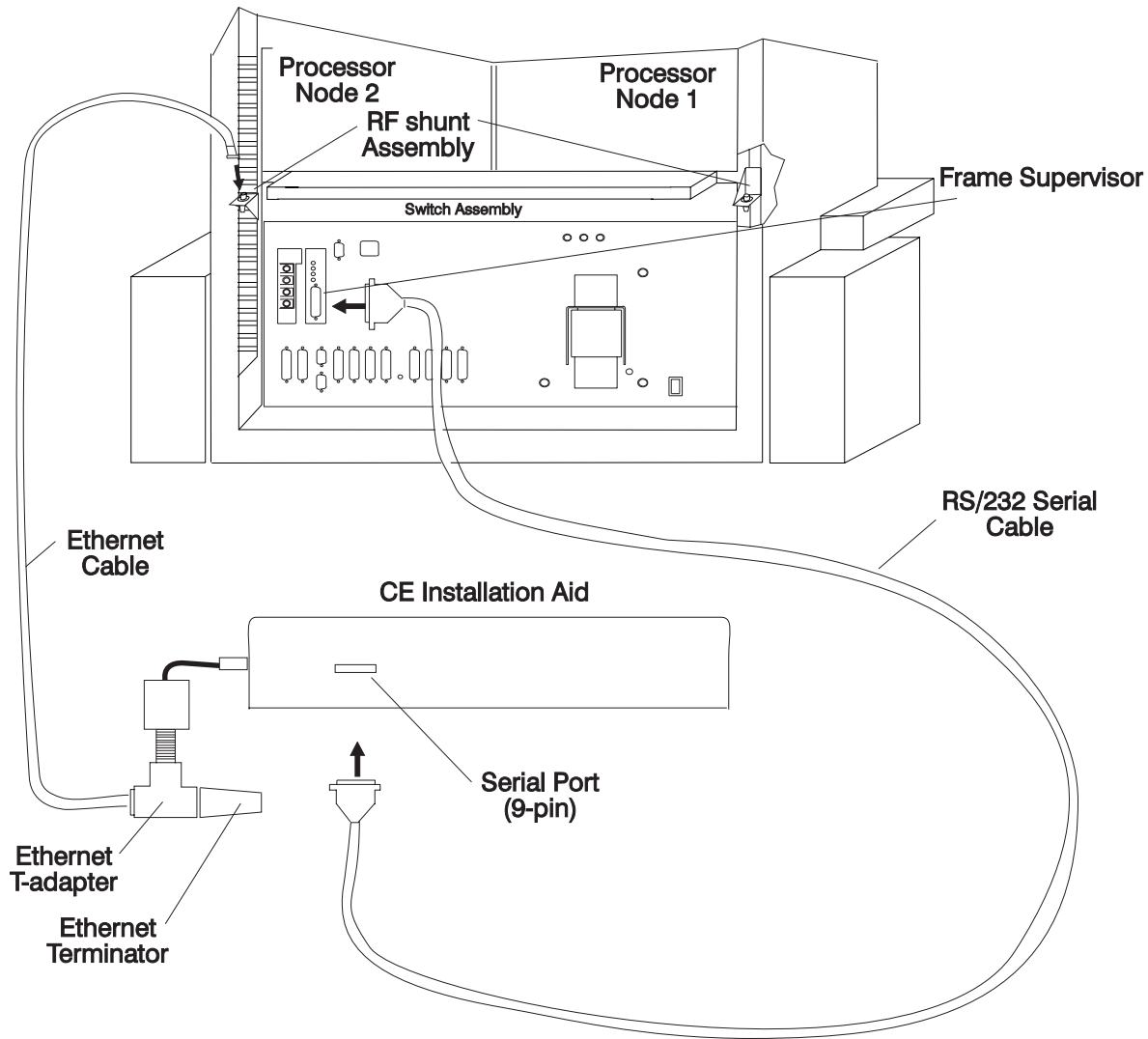
Figure   2-19. Connecting the CE Installation Aid (ThinkPad)

Verify a single RS/6000 SP frame: (Repeated for each frame):

Note: If a switch feature is installed in a multiframe environment, make sure that Frame 1 is the **first** (SPS) or **last** (HiPS) frame of the system to be verified. Also, any expansion frames (F/C 1500, 1550, 1010/15/16/17/19) should be verified before their corresponding base frame (frame with switch). Verifying frames in descending order for HiPS (5-4-3-2-1) or ascending order for SPS (1-2-3-4-5) will normally satisfy this requirement.

1. Check circuit breakers and power sequence frame:

   a. Ensure that main power switch is in the Off ('0') position.

   b. Ensure that the circuit breaker on the front of each processor node and switch assembly (if present) is in the Off ('0') position.

   c. Remove the lockout condition to restore ac power connection for this frame.

   d. Power on customer ac power for this frame.

   e. Put the frame power switch in the On ('1') position.

   f. Put the circuit breaker on the front of each processor node and switch assembly (if present) in the On ('1') position.

g. Put the circuit breaker on the front of the switch assemblies (if present) in the On ('1') position.

2. Cable the CE Installation Aid to the frame:

Note

If you need to physically move the CE Installation Aid to another ac outlet, perform the following steps:

1. From an available AIX window, perform the "shutdown -F" command, then wait for the "Halt completed" message or power-down completion.

2. Power off and uncable the CE Installation Aid.

3. Perform "Prepare the CE Installation Aid" on page 2-27 again.

---

a. Connect the RS-232 cable from the CE Installation Kit serial port to the frame supervisor (PDU-BH-J9).

b. If the nodes are using Ethernet Thin coax LAN connection, connect the Ethernet thin cable either at the RF shunt assembly behind slot 2 or at the Y-adapter on processor node 1.

c. If the nodes are using Ethernet TTP LAN connection, connect the Ethernet TTP cable to the LAN concentrator (HUB).

3. From the "SP System Installation Menu", select "New Frame Configuration" to configure the CE Installation Aid for this frame. From the "New Frame Configuration Menu":

a. If prompted, enter the Kerberos password of "root". (Make sure that the mouse cursor is in the current window!)

   Note: If there is no switch feature, go directly to step 3d.

b. Select "Logical Frames" to modify the number of logical frames in the entire RS/6000 SP system.

   Notes:

   1) For frames with HiPS-LC8 or SPS-8, set the number of logical frames to "1".

   2) If you enter 1–4 logical frames , the system should have no switch or single-stage switch. If you enter 6–8, the system should have dual-stage switch. . If you enter 5 logical frames, you will be prompted to select one of these two switch types..

c. Select "Logical Frame Number" to modify the logical frame number to match this frame. (If this is a multi-switch frame, this number does not matter.)

d. Select "Frame Type" to modify the frame type to match the frame.

   Notes:

   1) Frame types include:

   > **SP1**: SP1 hardware installed using SP1 cabling, etc.
   >
   > **Base**: SP frame (with switch) connected to one or more expansion frames
   >
   > **Expansion**: SP frame with nodes directly attached to the switch assembly in a base frame
   >
   > **Standard**: SP frame with processor nodes (not a base or expansion frame)
   >
   > **Multi-switch**: SP frame with 4 or 8 switch assemblies (no nodes)

   2) If you select "Expansion", you will be asked which frame (1, 2, or 3) and whether the switch in the base frame is an 8- or 32-port switch.

e. Select "Boot Network Type" to modify the type of network used for performing a network boot of the node. Boot network types include:

> **bnc** Ethernet thin COAX cable connection (standard SP1/SP2)
>
> **dix** Ethernet thick (15-pin) cable connection OR twisted-pair connections

   f. Select "Autoconfiguration" to configure the CE Installation Aid for this frame. Information on the software and hardware status will be returned.

> **Note:** If this step fails, look for any obvious connection or power problems. Then try repeating "Autoconfiguration". If problems persist, call next level of support.

   g. Type "**q**" to exit menu.

4. From the "SP System Installation Menu", select "Verify Frame Controls" to verify frame status and control functions.

> **Note:** This step can be repeated at this point if necessary.

5. If this is a multi-switch frame, go to step 11 on page 2-32.

6. From the "SP System Installation Menu", select "Gather Ethernet Hardware Addresses". This step will acquire the Ethernet hardware addresses specific to each processor node in this frame.

> **Note:** If this step fails on any processor node(s), retry this step again.

7. From the "SP System Installation Menu", select "Start System Monitor" to start the system monitor.

8. Verify processor nodes:

   a. Check the frame to determine the number of processor nodes. Make sure that the values at the top of the "SP System Installation Menu" accurately reflect the current frame configuration.

> **Note:** If information is incorrect, use MAPs to isolate problem.

   b. Ensure the circuit breakers of the processor nodes are in the On ('1') position.

   c. From the "SP System Installation Menu", select "Verify Processor Nodes".

     The software will:

- Verify communication to the frame, the processor nodes, and the switch assembly (if present).
- Power off processor nodes in this frame under program control.

> **Note:** You will be prompted to boot the nodes automatically. If you answer "yes", go to step 8f.

   d. From the "Global Commands" window:

     1) Click on buttons to select processor nodes (see note below).
     2) Click on the "Net Boot" button.
     3) Click on the "Do command" button. Click on "OK" button of popup window.

> **Note:** The CE Installation Aid supports network boot of up to 6 processor nodes at the same time, so select up to 6 processor nodes, wait until they complete IPL, then repeat step with next set of processor nodes.

   e. From the "3DigitDisplay" window, verify that for each processor node selected above, the "3DigitDisplay" is cycling through the IPL sequence.

   f. Wait for the "3DigitDisplay" to show one of the following conditions (for Thin or Wide nodes it should not take more than 10–15 minutes; for High nodes and 332 MHz nodes it may take up to 1.5 hours, depending on the node's configuration):

- **uuu**: PASS - indicates that diagnostics passed on a non-SMP node.
- **0aaa**: PASS - indicates that diagnostics passed on an SMP node.
- **000**:

FAIL - indicates that diagnostics found a problem.
Action: Wait until next step to get report on failure(s).

- **Stuck on 231**:

  IPL PROBLEM - indicates problem with Ethernet IPL
  Action:

  - All nodes: Perform the "Ethernet LAN Isolation Procedure" in *RS/6000 SP: Maintenance Information, Volume 3*
  - Single node(s): Check T-adapter coax connection at the rear of the processor node for a loose connection.

- **Stuck on same value** more than 4 minutes or **Flashing 888**: HANG or CRASH - indicates a problem during IPL or diagnostics. **Action:** Perform the following steps until condition clears:

  1) Perform "Net Boot" on this processor node to see if problem clears.
  2) Use the MAPs in *RS/6000 SP: Maintenance Information, Volume 2* to determine problem.

  g. From the "SP System Installation Menu", select "Check Node Diagnostics" to check results of processor node verification. This can be done at any time, however you will get an error if no nodes have completed diagnostics.

9. If switch feature is installed, verify switch feature in this frame:

   Attention: This step will interfere with any customer use of the switch feature. If this frame is attached to other frames that are in-use by customer, get concurrence from customer before continuing.

   Note: If you find any problems here, refer to the "Switch Function"MAP in *RS/6000 SP: Maintenance Information, Volume 2* to correct.

   a. From the "SP System Installation Menu", select "Verify Switch Feature" to verify the switch feature.

   b. From the "SP System Installation Menu", select "Check Switch Diagnostics" to check the results of the switch feature verification.

   c. **Note:** This step requires that all switch cabling is installed.

   From the "SP System Installation Menu", select "Verify Switch Clocks" to test the switch clock selection logic and any frame-to-frame switch clock cables. Follow directions given by the software.

10. Finishing the frame:

    Attention: If this frame contains any switch adapters or switch assemblies, you must leave the frame, processor nodes, and switch assembly powered-on until all frames have been verified. Successful verification of the switch network depends on correct settings left after frame verification by the CE Installation Aid.

    a. From the "SP System Installation Menu", select "Finish Frame" to perform required procedures following verification of each frame.

    b. Disconnect the RS-232 line from the RS/6000 SP frame.

    c. If attached, disconnect the Ethernet LAN cable from the frame or concentrator (HUB). This should be done at the Ethernet converter box if the customer's Ethernet Thin cable was used, or at the frame if the Installation Aid three meter (10 feet) Ethernet Thin cable was used.

11. Record verification time for frame:

12. Repeat "Verify a single RS/6000 SP frame: (Repeated for each frame)" on page 2-29 for each additional frame.

13. Record the installation complete for the System Serial Number.

14. Verification of the system is now complete.

15. Shutdown the CE Installation Aid:

    a. From an available AIX window, perform the "shutdown -F" command, then wait for the "Halt completed" message.

    b. If using a laptop, power-off, uncable, and repack the laptop for return.

    c. Remember to return the CE Installation Aid.

Connecting RS-232 and Ethernet LAN Cables to Customer's Hardware

1. Connect the RS-232 cable to the frame supervisor card inside the rear of the frame (PDU-BH-J9 or SEPBU-BH-J9).

2. Connect the coax Ethernet LAN cable:

    a. Connect one end of the coax LAN cable to the Ethernet RF shunt at the rear of the bottom node drawer.

    b. Connect the other end of the coax LAN cable to the rear of the Control Workstation.

    c. Ensure the Ethernet LAN is terminated both inside and outside the RS/6000 frame. Look for a terminator on a Y-adapter at both ends of the Ethernet LAN.

3. Connect the Thick Ethernet LAN cable:

    a. Connect one end of the LAN cable at the D-shell connector of the appropriate Ethernet card.

    b. Connect the other end of the LAN cable to the Customer's Ethernet concentrator.

    c. Ensure there is a connection is a connection from the Customer's Ethernet concentrator to the Control Workstation.

4. Connect the Twisted-Pair Ethernet LAN cable:

    Note: TTP LAN cables and concentrator are Customer supplied hardware and are not shipped with the RS/6000 SP.

    a. If necessary, install a transceiver to the D-shell connector of the appropriate Ethernet card.

    b. Connect one end of the TTP LAN cable at the transceiver or adapter of the appropriate Ethernet card.

    c. Connect the other end of the TTP LAN cable to the Customer's Ethernet concentrator.

    d. Ensure there is a connection from the Customer's Ethernet concentrator to the Control Work-station.

5. Perform the "Ethernet LAN Isolation Procedure" in *RS/6000 SP: Maintenance Information, Volume 3* to check for any Ethernet problems.

Verifying the RS/6000 SP System Using Customer Configuration

Notes

- This procedure requires that all base PSSP software has been properly installed on the control workstation, including all the required configuration steps. (Refer to *IBM Parallel System Support Programs for AIX, Installation and Migration Guide*, GA22-7347, to verify proper PSSP installation.) Without fully configured software, you will experience problems performing this verification procedure.

- You will need access to the "root" password. The customer may enter it as required.

- Problems found during software installation and configuration may be due to software, user configuration, or hardware problems. If unsure of the cause, contact next level of support for more information.
---

1. Make sure that the RS/6000 SP system is ready for verification by checking with the customer or system administrator:

   a. Make sure AIX and PSSP software is installed and configured on the system, including the processor nodes.

   b. Make sure all frames, switches, processor nodes, and SP-attached servers that will be tested are not in use by Customer or software installation group.

   c. Make sure all frames, processor nodes, and switches are powered on.

2. Refer to "Kerberos Authentication" in *RS/6000 SP: Maintenance Information, Volume 3* to check authentication time/date.

3. Verify processor nodes:

   a. Create the "/tmp/diag.test" script on the control workstation. You may use "vi /tmp/diag.test" to edit the file.

   Notes

   - The first line is required, but all other lines that start with '#' are optional.

   - The following characters are created using the specified keys on a standard keyboard:

     ```
     '     Key with "/' to left of Enter key
     ^     Shift-Key 6
     |     Shift-Key with ¦/\ above Enter key
     ```

```
┌─ /tmp/diag.test ──────────────────────────────────────────────────────┐
│ #!/bin/ksh                                                             │
│ # Script to run unattended diags on all devices (except ent0)         │
│ #-----------------------------------------------------------------    │
│ # First set the path for diags. For invocation from 'rsh'.            │
│ PATH=$PATH:/etc                                                        │
│ # Get the device list (remove entx and css0)                          │
│ /usr/sbin/lscfg | /bin/grep '^+ ' | /bin/grep -v ent | /bin/grep -v css0 | │
│    /bin/cut -d' ' -f2 |                                                │
│ # Run diag on each device                                             │
│ while read dev                                                         │
│   do                                                                   │
│   /usr/sbin/diag -c -d $dev                                           │
│   done                                                                 │
└───────────────────────────────────────────────────────────────────────┘
```

b. Check the control workstation host name (*CW_hostname*) by entering:

```
hostname
```

c. Copy the script to all processor nodes using "dsh":

```
dsh -a
/usr/lpp/ssp/rcmd/bin/rcp  CW_hostname:/tmp/diag.test  /tmp/diag.test
     (where CW_hostname is hostname of the control workstation)
chmod a+x /tmp/diag.test
exit
```

Note: All "dsh" commands take time (up to 5 minutes).

d. Execute the script on each node and collect results using "dsh":

```
dsh -a /tmp/diag.test ] dshbak > /tmp/diag.results
```

e. To remove the script from the nodes (optional):

```
dsh -a /usr/bin/rm /tmp/diag.test
```

f. Check results of diagnostics:

```
pg /tmp/diag.results
```

g. For any problems shown in the file, use MAPs or run diagnostics on the processor node(s).

4. If installed, verify switch feature:

a. Refer to the "Selecting Appropriate Switch Clocks" procedure in the "Selecting Appropriate Switch Clocks" section of the *RS/6000 SP: Maintenance Information, Volume 3*, Chapter 2 to make sure clocks on all switch assemblies are set properly.

b. Have customer verify that the correct switch topology file has been selected.

c. From Perspectives window on the control workstation, enter

```
Eunfence
```

for the processor node(s) and/or SP-attached server(s) added to the switch.

If this is unsuccessful, or the switch was not previously available, enter:

```
Estart
```

to restart the switch.

d. Determine the primary node number. From an AIX window on the control workstation, enter:

```
Eprimary
```

e. Determine the hostname for this node by checking *reliable_hostname* for node# from command:

```
splstdata -n | pg
```

f. Log onto the primary node with userID of "root":

```
telnet hostname
```

g. Check the results in file "/var/adm/SPlogs/css/out.top":

```
pg  /var/adm/SPlogs/css/out.top
```

h. If there are any obvious problems (such as primary processor node is unavailable or switch assembly is powered off), address those problems first, then repeat "Eunfence"/"Estart" step.

i. If any hardware problems are found (such as processor node problems or problems in "/var/adm/SPlogs/css/out.top"), use the MAPs in *RS/6000 SP: Maintenance Information, Volume 2* to perform service on the system.

j. If this is a single-frame system, verification is now complete. A green "switch_responds" indicator will be lit for the processor node(s) or SP-attached server(s).

5. If switch feature is present and this is a multi-frame system, verify switch feature clocks (optional):

a. Refer to the "Determining Switch Clock Source" procedure in the "Selecting Appropriate Switch Clocks" section in *RS/6000 SP: Maintenance Information, Volume 3*, Chapter 2 for instructions on determining and selecting switch master clocks.

b. After determining the current master clock selection, use the procedure to select a new master clock for the system.

c. From an AIX window on the control workstation, reinitialize the switch adapter on all nodes by entering:

```
dsh -a /usr/lpp/ssp/css/css_restart_node
```

d. From an AIX window on the control workstation, enter:

```
Estart
```

e. Log onto the primary node as "root".

f. Check the results in file "/var/adm/SPlogs/css/out.top":

```
pg  /var/adm/SPlogs/css/out.top
```

g. If you see one or more switch assemblies where all ports show errors, there is most likely a clocking problem between the clock source of the switch(es) and that switch(es). Use the "Switch Function" MAP in *RS/6000 SP: Maintenance Information, Volume 2* to perform service.

h. Repeat this procedure with another master clock.

i. At the customer's discretion, leave the clock configuration at it's current setting or set it back to the original configuration.

6. Verification is now complete.

Installing the High Availability Control Workstation (HACWS)

1. Route both RS-232 cables from the SP frame to both customer control workstations.

2. Connect both RS-232 cables to the Y serial cable and install in frame supervisor card (PDU-BH-J9).

3. To connect the Ethernet LAN from the frame(s) to both control workstations, refer to "Connecting RS-232 and Ethernet LAN Cables to Customer's Hardware" on page 2-33.

> **Note:** HACWS requires additional shared disk hardware external to the control workstations. Check with the customer concerning installation requirements.

4. Perform the "Ethernet LAN Isolation Procedure" in *RS/6000 SP: Maintenance Information, Volume 3* to check for any Ethernet problems.
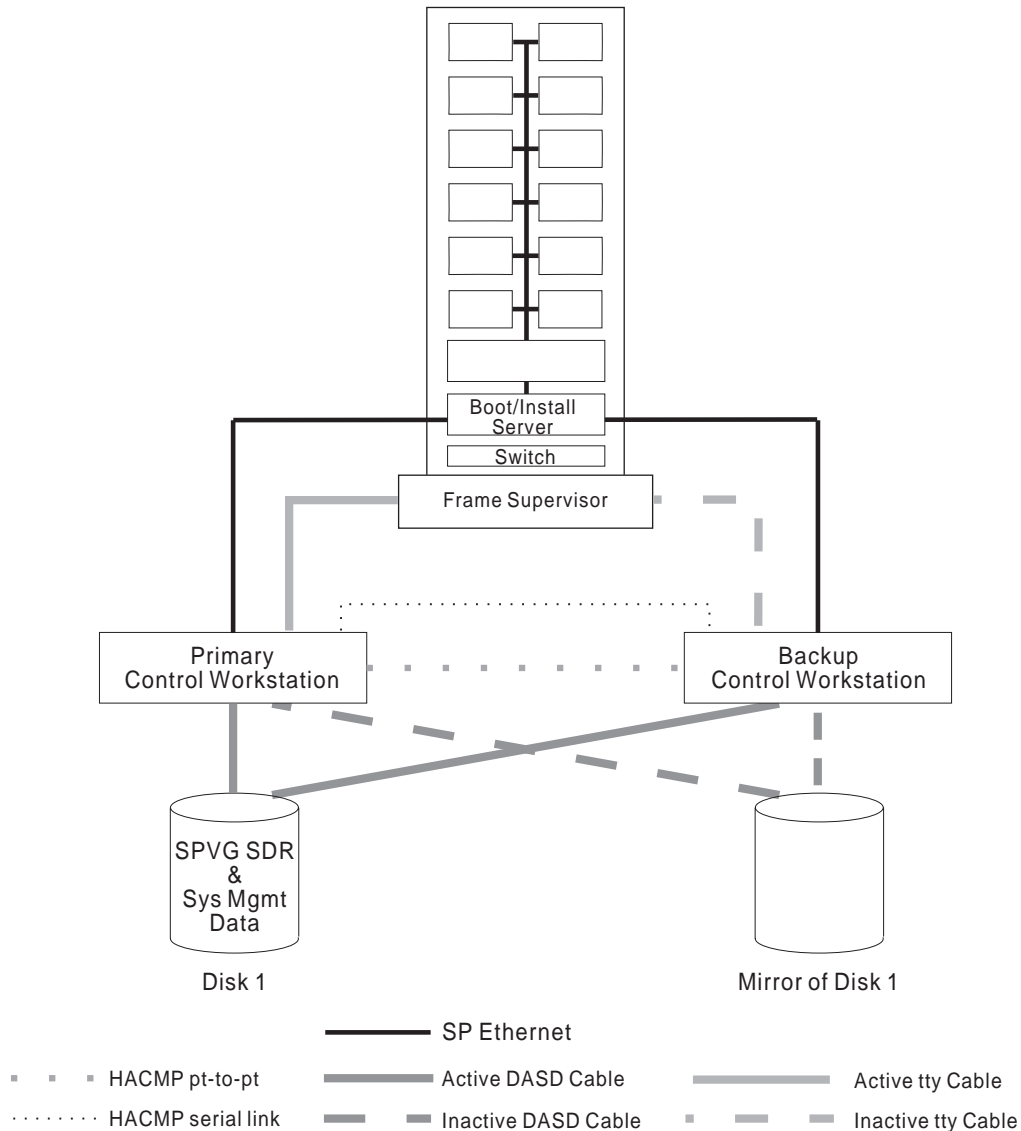
Figure   2-20. Cabling the High Availability Workstation (HACWS)

Reconfiguring Ethernet LANs

If a customer needs to reconfigure 10Base-2 (BNC coax) LANs in their RS/6000 SP system, you must use the RF Shunt assemblies described as follows:

- Ensure that the incoming internal Ethernet cables to the Ethernet LAN go through the RF Shunt assembly. (The assembly is labelled in the "Rear View of Frame Locations" figure located in *RS/6000 SP: Maintenance Information, Volume 3*.) There are a total of 4 RF Shunt assemblies provided for each frame.

RS/6000 SP Power Control Interface Function

If the customer is going to use the power control interface function, read the following section. Otherwise, refer to the **"No Power Control Interface"** section in "Typical Configurations" on page 2-38.

The RS/6000 SP SEPBU power unit contains a power control interface card. This card has a "AUX/LOC" switch, two "MAIN" output jacks, and two "AUX" input jacks.

The Auxilary/Local (AUX/LOC) switch controls whether power for this frame is controlled by:

    AUX: Power-on/off signals from the "AUX" jacks.
    LOC: Frame main power switch

Normally, this switch is left in the "LOC" position for local control. In the "LOC" position, power control interface signals will not affect power for this frame. Local power control on this frame can result in signals sent to the "MAIN" jacks; in this way power on/off signals can be sent to other equipment (including other RS/6000 SP frames).

When the switch is in the "AUX" position, local power controls, such as the main power switch, will have no effect. Power-on/off signals arriving at the "AUX" jack from another machine will control this SEPBU power state.

Typical Configurations

The following are some power control interface configurations used to illustrate typical uses of the power control interface function. Customer and system configurations may utilize one or more of the following configuration types concerning the power control interface function. Note that using the power control interface function can affect impact of certain outages and service operations; this should be taken into consideration when determining an effective power control interface configuration.

No Power Control Interface

> The power control interface switches of all RS/6000 SP frames are in "LOC" position. No cabling is necessary. Power control of each frame and attached unit is independent of all other units.

RS/6000 SP Chained Control

> First RS/6000 SP frame has power control interface switch in "LOC" position. All other RS/6000 SP frames have power control interface switches in the "AUX" position. A power control interface cable is run from the "MAIN" jack in the first frame to a "AUX" jack in second frame. Another power control interface cable is run from the "MAIN" jack in the second frame to a "AUX" jack in third frame, and so on.

> Powering on/off the first RS/6000 SP frame controls power of all other attached frames. Remember that this may affect how certain outages or service operations will impact the customer.

RS/6000 SP Cross-Control

> All RS/6000 SP frames have power control interface switch in "AUX" position. A power control interface cable is run from the "MAIN" jack in each frame to a "AUX" jack in another frame.

> Powering on/off any RS/6000 SP frame controls power of all other attached frames. Remember that this may affect how certain outages or service operations will impact the customer.

RS/6000 SP Control of Peripherals

A power control interface cable is run from RS/6000 SP frame "MAIN" jack to a "AUX" jack on the peripheral power control interface panel. Powering on/off this frame will have the corresponding effect on the attached peripheral(s). If the peripheral is connected to processors in more than one RS/6000 SP frame, certain outages or service operations may have an undesirable impact on the customer. In other cases, this may allow proper power synchronization of the processing units with their respective peripherals.

Installing the MODEM and Enabling the Service Director

Instructions for installing the modem and service director application are provided in *Service Director for RS/6000 CE Information Guide*, ZA38-0383 (part number 11J5158). Install the modem and register Service Director using the instructions provided in that document.

Installation of Service Director will automatically report hardware problems to IBM Support and will aid in problem determination through error analysis.

Post-Installation Tasks

Review Safety Check

1. Verify that all components are in their home position and that all covers are in place.

2. Clean up the area surrounding the RS/6000 SP system. Make sure all materials and components which are no longer required are returned or discarded.

Putting Away Shipping Group

Perform the following step:

1. Inventory and put away special parts and tools used during installation. Use the shipping group packing lists that were filed in the front of this manual to inventory the parts. These packing lists are used to inventory the manuals and tools during relocation or removal.

   Note: Keep part identification tags with the items so that these items can be identified later when used for maintenance.

Returning CE Installation Aid

If you ordered the CE Installation Aid, perform the following steps upon completion of the install:

1. Ensure all contents received in the kit are included for the return.

2. Return the CE Installation Aid as soon as possible for reuse on future installs. Refer to "Ordering RS/6000 SP CE Installation Aid" on page 2-4 for more information.

Acquiring VPD data from a RS/6000 SP

The following information explains, in brief, how to acquire VPD data form the RS/6000 SP. IBM Service Representatives can find more information about "How to get reliable VPD on RS/6000 SP — 9076" from the AIXTOOLS disk. Use the following command to get the current version of the SP2VPD PACKAGE:

```
TOOLCAT AIXTOOLS GET SP2VPD PACKAGE
```

Note: If nodes have been moved, there may still be "shadows" of the old configuration in the SDR. The **/usr/lpp/ssp/bin/spdelnode** may be used to delete node information from the SDR. Also, the SMIT panels can be used via the **fast_path: smit delete_data**. These commands should only be used by someone familiar with the SDR and the machine's configuration.

Every time a node is booted, the **/usr/lpp/ssp/install/bin/save_config** program is executed on the node. This program copies the VPD information from the node to the directory **/var/adm/SPlogs/SPconfig** on the control workstation. However, in some instances this information may not be valid. In particular, if an adapter was installed in the node but the device driver for the adapter was not present at the time the node was booted, then the VPD data will not show this adapter. Also, the **/var/adm/SPlogs/SPconfig** directory may have **umlc** files for old configurations.

To guarantee accurate VPD:

1. Correct the node information in the SDR.
2. Make sure that all adapters configure properly.
3. On the control workstation, erase all the **umlc** files in **/var/adm/SPlogs/SPconfig** with a command sequence such as:

```
rm /var/adm/SPlogs/SPconfig/*umlc
rm /var/adm/SPlogs/SPconfig/*lscfg
```

4. When all the nodes are booted, rerun the **save_config** command on the nodes to get "fresh" VPD with a command such as:

```
dsh -avG "/usr/lpp/ssp/install/bin/save_config"
```

(Eliminate the G flag for PSSP systems prior to 2.1)
5. Verify that there are **umlc** files in **/var/adm/SPlogs/SPconfig** on the control workstation for each node, that the files are not empty (not size 0 bytes) and that they can be viewed as plain text.
6. Follow the rest of the procedure below to collect the VPD data.

Complete the following steps to collect the VPD data:

1. Obtain the 3.5 inch high-density diskette and mailing folder shipped with the system.
2. Locate the control workstation for the system. This system will be used in the following steps.
3. Insert the 3.5 inch diskette into the diskette drive slot (fd0).
4. From an available AIX window, enter:

   /usr/lpp/ssp/install/bin/get_vpd *Serial# Model#*

   The following flags are available for the get_vpd command with PSSP 2.3:

Flag	**Meaning**
-h	Help
-d	Write the VPD on diskette
-s	Specify the Serial Number
-m	Specify the Model

   Data will be collected from individual files on the control workstation and copied onto the diskette in the diskette drive (fd0).

   Notes

   - The VPD file is stored in:

Location   PSSP Level

/var/adm/SPlogs/SPconfig PSSP 2.3

/etc/lpp/diagnostics/data PSSP 1.2, 2.1, 2.2

- The user executing the **get_vpd** command must have root authority.

- Executing the command without any parameters will produce a usage statement explaining command syntax. The user will be required to enter the system serial and model number.

- The *Serial#* parameter is a 9-digit number, where the first 4 digits are either: 0200 (World Trade) or 5100 (Domestic). The last 5 digits are the SP serial number. (Example: 510076341)

- The *Model#* parameter is the 3-digit model number for your SP machine. (Examples: 3A2, 405)

- This procedure obtains the VPD data from the control workstation, as it currently exists there. This data will have been transferred to the control workstation the last time the node booted.

5. When the command is finished, remove the diskette from the diskette drive and insert it into the prepared mailing folder.
6. Mail this folder.

Hardware Service Data

After installing an RS/6000 SP component, the following worksheet can be used to collect frame, node, and control workstation information. Copy this worksheet and locate it where the customer can keep it current with the pertinent information, such as near the control workstation. This information can then be used when requesting hardware service.

Copy this page, then cut along dotted line

IBM RS/6000 SP

For Hardware Service in North America
call   1-800-IBM SERV

For W/T Hardware Service
call _____

Customer # _____

Control Workstation:
M/T _____   Serial # _____   Model # _____

Frames:
M/T 9076   Model # _____

Serial #	Frame #	/	Node #	to	Frame #	/	Node #
_____	_____	/	_____		_____	/	_____
_____	_____	/	_____		_____	/	_____
_____	_____	/	_____		_____	/	_____
_____	_____	/	_____		_____	/	_____
_____	_____	/	_____		_____	/	_____

Copy this page, then cut along dotted line

Chapter 3. Relocation Procedures

The following procedures help prepare the RS/6000 SP system for relocation to another account (field transfer). For a move within an account, change the procedures as appropriate.

Attention: When relocating machines, special requirements must be met. Failure to comply with special packing and other requirements may result in damage to the equipment and may create a stability hazard. Do not proceed without the correct special packing, equipment, and instructions provided by the machine packaging bill of material.

Two service representatives can prepare a RS/6000 SP system for relocation in approximately three hours per frame.

Special Tools and Equipment

- Leveling pad wrench (P/N 8309875) (if leveling pads are installed)
- CE Installation Aid Kit, if required for testing (refer to "Ordering RS/6000 SP CE Installation Aid" on page 2-4)
- 5.5 mm socket, required to service some RS/6000 SP nodes

Testing Before Field Transfer

IBM recommends that diagnostics be run before disassembly for those machines that are to be transferred to another field location.

You may use one of the diagnostic procedures under "Performing RS/6000 SP System Power-On and Verification" on page 2-25.

Packing Materials

Any machine being moved or discontinued should be correctly packaged before shipment. Packaging bills of material are available and must be ordered from branch office DP orders and movements 45 days before the anticipated removal date.

For machine relocation, the service representative should order the appropriate packaging *Bills of Material* from the local Branch Office by the part numbers listed in Table 3-1 on page 3-2. For part numbers for machines outside of the US, consult local packaging specifications.

Table 3-1. Relocation Packaging Material	
To Relocate This:	**Order This:**
Domestic machine	7334604 (see note)
High voltage transformer	7334605
49-inch (1.25m) frame	7334832
Switch Assembly (blue case)	7334496
Switch Assembly (corrugated)	7334897
Wide node (blue case)	7334770
Wide node (corrugated)	7334770
Thin node (blue case)	7334773
Thin node (corrugated)	7334603
High node	7334978
Height reduced (RPQ)	7334866
Note: Part number 7334604 consists of two (2) ARBO shipping containers: one for covers, one for the frame.	

Preparing Frame for Shipment

Perform the following procedure to prepare the RS/6000 SP frame for shipment to another location:

1. Verify RS/6000 SP hardware. Use customer equipment or installation aid. Refer to "Performing RS/6000 SP System Power-On and Verification" on page 2-25, to perform procedures.

2. Power down the processor nodes from the control workstation.

3. Power off the RS/6000 SP frame by switching the main power switch to Off ('0'), then:

   - For PDU, put the circuit breaker at rear of PDU in the Off position.
   - For SEPBU, disconnect the AC line cord at rear of SEPBU.

   DANGER

   > **The frame main circuit breaker and the controller must not be switched on again now.**
   >
   > **Before disconnecting the power cables from the power receptacles, ensure that the customer's branch distribution circuit breakers (customer power source circuit breakers) are Off and tagged with DO NOT OPERATE tags, S229-0237. Refer to the "Lockout/Tagout" procedures in** *RS/6000 SP: Maintenance Information, Volume 2*, **before proceeding.**

4. Disconnect the main power cord from the RS/6000 SP frame to the AC electrical receptacle.

5. Prepare AC line cord for relocation:

   - For PDU, pull AC line cord upward and tie inside rear of frame.
   - For SEPBU, remove ac line cord from frame. Refer to "Removing the SEPBU ac Line Cord" in *RS/6000 SP: Maintenance Information, Volume 3* for more information. Pack the cable with the ship group.

6. Disconnect Ethernet LAN cables and the RS-232 cable to the customer's control workstation for each RS/6000 SP frame. Refer to "Installing Skirts, Frame Covers, and Main Power Switch" on page 2-23.

7. Disconnect any optional MCA cables exiting the frame.

8. If there are wide processor nodes with HiPS adapters in the frame, open **one** wide processor node and check for a small shock absorber pad between the HiPS adapter and plastic I/O planar connector near front end of HiPS adapter.

9. To avoid shipping damage, you must remove all ESCON and HIPPI Micro Channel adapters from processor nodes and pack them in antistatic packaging. If there was no shock absorber for the HiPS adapter, you must also remove all HiPS adapters.

10. Disconnect frame-to-frame high-performance switch cables.

11. Refer to "Installing Frame Side Covers" on page 2-8, and reverse the installation procedures to remove the RS/6000 SP covers before packing.

12. Refer to "Installing Stability Foot and Wheel Chocks" on page 2-14 (and "Seismic Hardware Considerations" on page 2-15, if necessary) and reverse the installation procedures.

13. Check that the hold-down screws on the node front decorative covers are securely fastening all processor nodes.

14. Repack ship group, using the packing list that is stored in the front of this manual.

15. Pack frame in wooden frame container (if applicable).

16. Pack covers in separate wooden cover container (if applicable).

   Note: The covers on the 49-inch (1.25m) frame remain on the frame.

Updating Records to Complete Relocation

Finish the relocation by:

1. Notifying the branch office when the machine is prepared for shipment.

2. Ensuring that all cables, manuals, and units are shipped.

Chapter 4. Maintenance Agreement Inspection Procedure

Introduction

This chapter contains information required by the IBM service representative when inspecting a RS/6000 SP for:

- A maintenance agreement qualification
- An equipment alteration or attachment review.

This chapter includes a list of preparatory items, a General Checklist Guide, and illustrations of the RS/6000 SP safety labels.

Preparation

- Before you proceed through the checklist, switch off power to the RS/6000 SP, and unplug the AC power cord from the electrical outlet.

- Have the following available for reference:

    – Copies of CEMs (ECAs and SAs) for this machine type

Note: Although completeness and accuracy are the goals of this publication, not all machine configurations (for example, special features, RPQs) are covered. If you encounter a machine with RPQs or features not described in this publication, use the installation instructions for that RPQ or feature.

General Checklist Guides

The intent of this inspection procedure is to help you identify potentially unsafe conditions on machines being inspected. At the time of manufacture, each machine has required safety items installed to protect the owners, operators, and service personnel from injury.

Before you switch on machine power, perform the following checklist procedure. If any apparent unsafe conditions are present, you must determine how serious the hazard could be and whether to continue without first correcting the problem.

Consider these conditions and the safety hazards they present:

- Electrical, especially primary power (for example, a "hot" frame can cause serious or fatal electric shock)

- Explosive (for example, bulging capacitors can result in serious injury)

- Use of chemicals, cleaning solutions, or solvents other than those specified by IBM.

Checklist

Check power:

☐ Perform "Lockout Procedures" in *RS/6000 SP: Maintenance Information, Volume 2*, Chapter 1, to remove power to the frame.

☐ Check that the power cord is not frayed or damaged.

☐ Check that the power cord is correctly connected to the power supply.

Check inside the machine:

☐ Check for any non-IBM alterations. If there are any, has the *R009, Non-IBM Alteration/Attachment Survey* been completed?

☐ Check for broken or loose parts or assemblies.

☐ Check all fasteners and screws that fasten the power supply assembly, fans, and covers.

Check for machine labels:

☐ Make sure all safety labels are correctly attached. Refer to "Safety Labels."

Check for system functionality:

☐ Review procedures in "Pre-installation Tasks", in Appendix C, "Installing RS/6000 SP Optional Features" on page C-1.

☐ Review and inventory ship group packing list that is stored in front of this manual.

☐ Refer to "Performing the Customer 50/60 Hz Power Receptacle Safety Check", in Chapter 2, "RS/6000 SP Installation Instructions" on page 2-1, and perform procedures.

☐ Refer to "Performing RS/6000 SP System Power-On and Verification" in Chapter 2, "RS/6000 SP Installation Instructions" on page 2-1, and perform procedures.

Safety Labels

The safety label shown in Figure 4-1 is located 40 inches from the floor, on the left and right front inside edges of the frame. It is also located inside the back door, on the top center of the frame.

Figure 4-1. Safety Label—Trained Service Personnel Only

The information label shown in Figure 4-2 (2.01 m and 1.93 m frames) is located on the front filter bracket (and rear left vertical member) of the RS/6000 SP frame.

The information label for the 1.25 m frame, single-phase power is located on the rear cover and on the rear left vertical member.
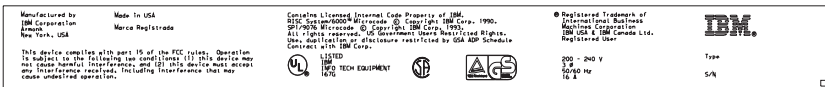
Figure 4-2. Information Label—RS/6000 SP Frame

Figure 4-3. Weight Label—RS/6000 SP Frame

PDU Safety Labels (Only on Frames with PDU, not SEPBU)

The safety label shown in Figure 4-4 is located inside the AC section of the Power Distribution Unit, on the bottom of the chassis, behind the power-on LED indicator.
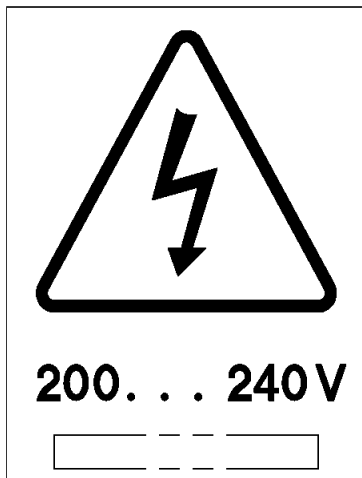
Figure 4-4. Safety Label—Power Distribution Unit AC Section

The safety label shown in Figure 4-5 on page 4-4 is located inside the DC section of the Power Distribution Unit, on the shield over the buss bars.

> 240 VA

Figure 4-5. Safety Label—Power Distribution Unit DC Section

The safety label shown in Figure 4-6 is located on top of the AC line filter cover.

WARNING

High grounding conductor current.
Grounding circuit continuity is vital for
safe operation of machine. Never operate
machine with grounding conductor
disconnected.
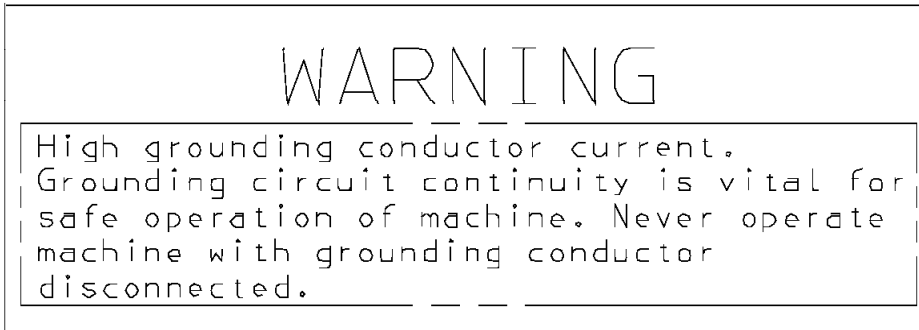
Figure 4-6. Safety Label—High Leakage Current

The safety label shown in Figure 4-7 is located on the bottom rear of the RS/6000 SP frame.

⚠ DANGER

Line voltage present with machine power off.
Refer to service documentation.
P/N 84X5045
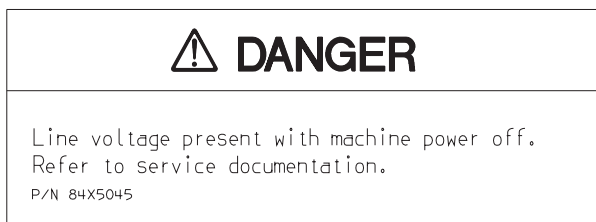
Figure 4-7. Safety Label—Line Voltage Present

High-Voltage Transformer Safety Labels (PDU Only)

The information label shown in Figure 4-8 is located on the front cover of the high-voltage transformer.

Manufactured by   Made in USA
IBM Corporation
Armonk   Marca Registrada
New York, USA

® Registered Trademark of
International Business
Machines Corporation
IBM USA & IBM Canada Ltd.
Registered User

IBM.

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.

LISTED
IBM
INFO TECH EQUIPMENT
167G

380 - 415 V
3 ∅
50/60 Hz
10 A

Type

S/N

Figure 4-8. Information Label—Transformer Front Cover

The safety label shown in Figure 4-9 on page 4-5 is located inside the service area of the high-voltage transformer.

```
  ⚠ DANGER

Line voltage present with machine power off.
Refer to service documentation.
P/N 84X5045
```
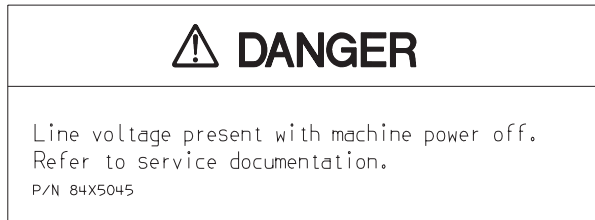
Figure   4-9. Safety Label—Trained Service Personnel Only

The safety label shown in Figure 4-7 on page 4-4 above is also located inside the service area high-voltage transformer.

SEPBU Safety Labels (Only on Frames with SEPBU, not PDU)

The safety label similar to the one shown in Figure 4-10 is located on the SEPBU chassis, inside each power module slot. It is also located on panels covering unused module slots and on the front right of the SEPBU power chassis. The label contains various translations.

```
  ⚠ DANGER

Line voltage present with machine power off.
Refer to service documentation.
P/N 84X5045
```
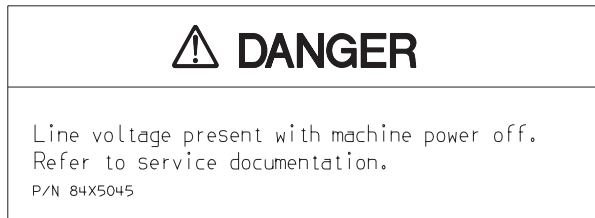
Figure   4-10. Safety Label—Line Voltage Present

The safety label shown in Figure 4-11 on page 4-6 is located on the inside rear floor of the frame.
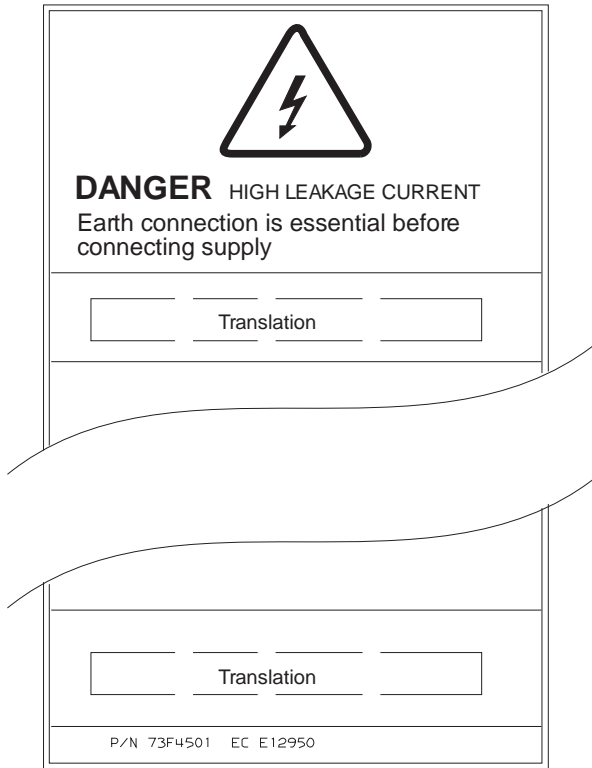
Figure 4-11. Safety Label—High Leakage Current

The safety label shown in Figure 4-12 is located on the top side of the AC cover on the rear panel bulkhead.
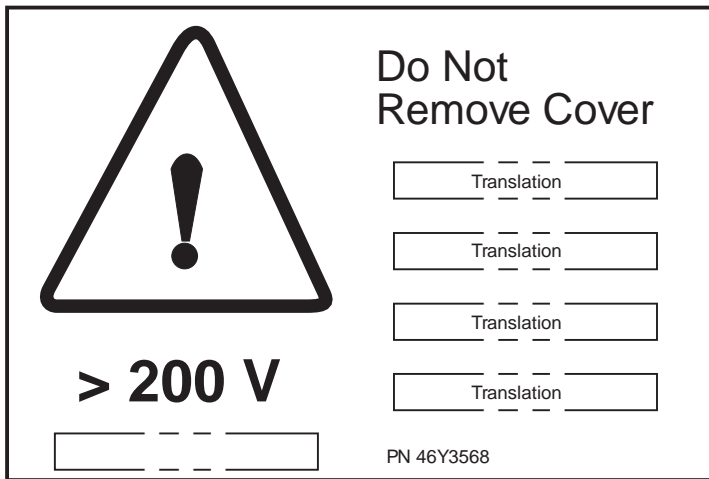
Figure 4-12. Safety Label—Do Not Remove Cover

Grounding (Earthing) Path Diagrams
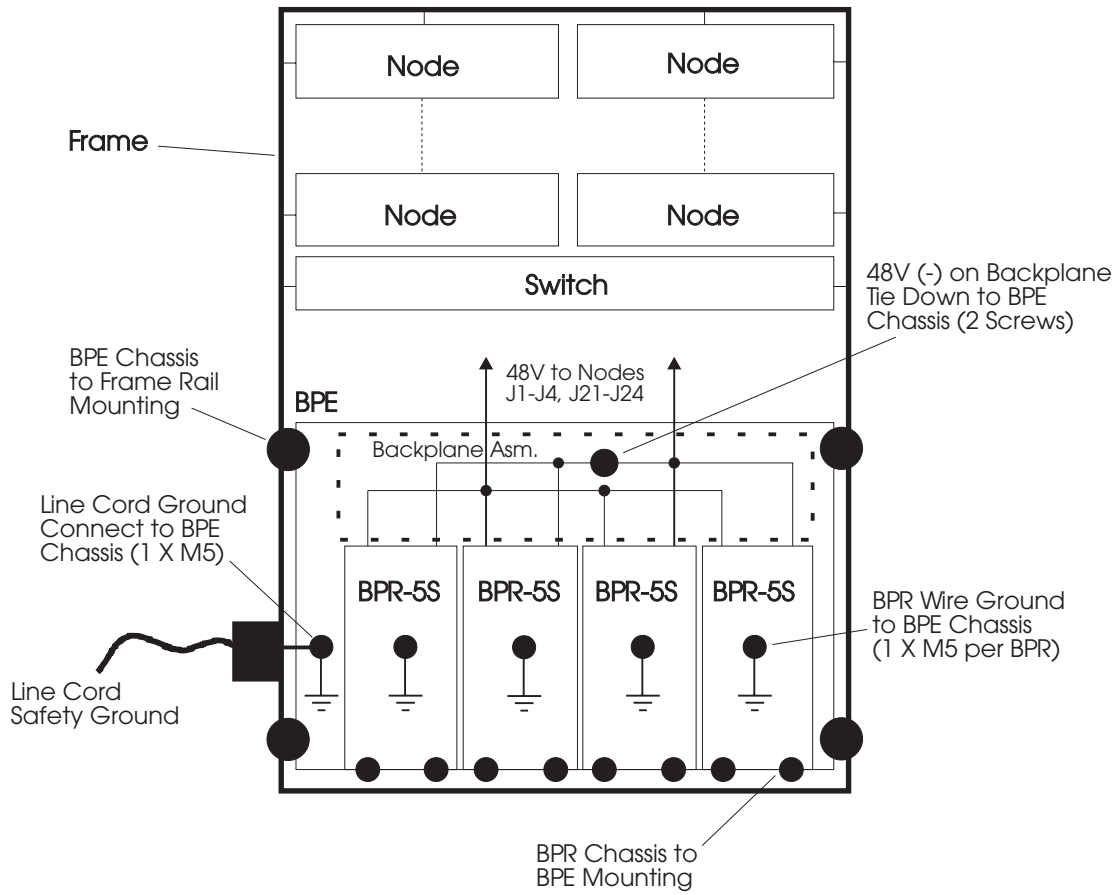
Figure   4-13. SEPBU Power System Grounding Path
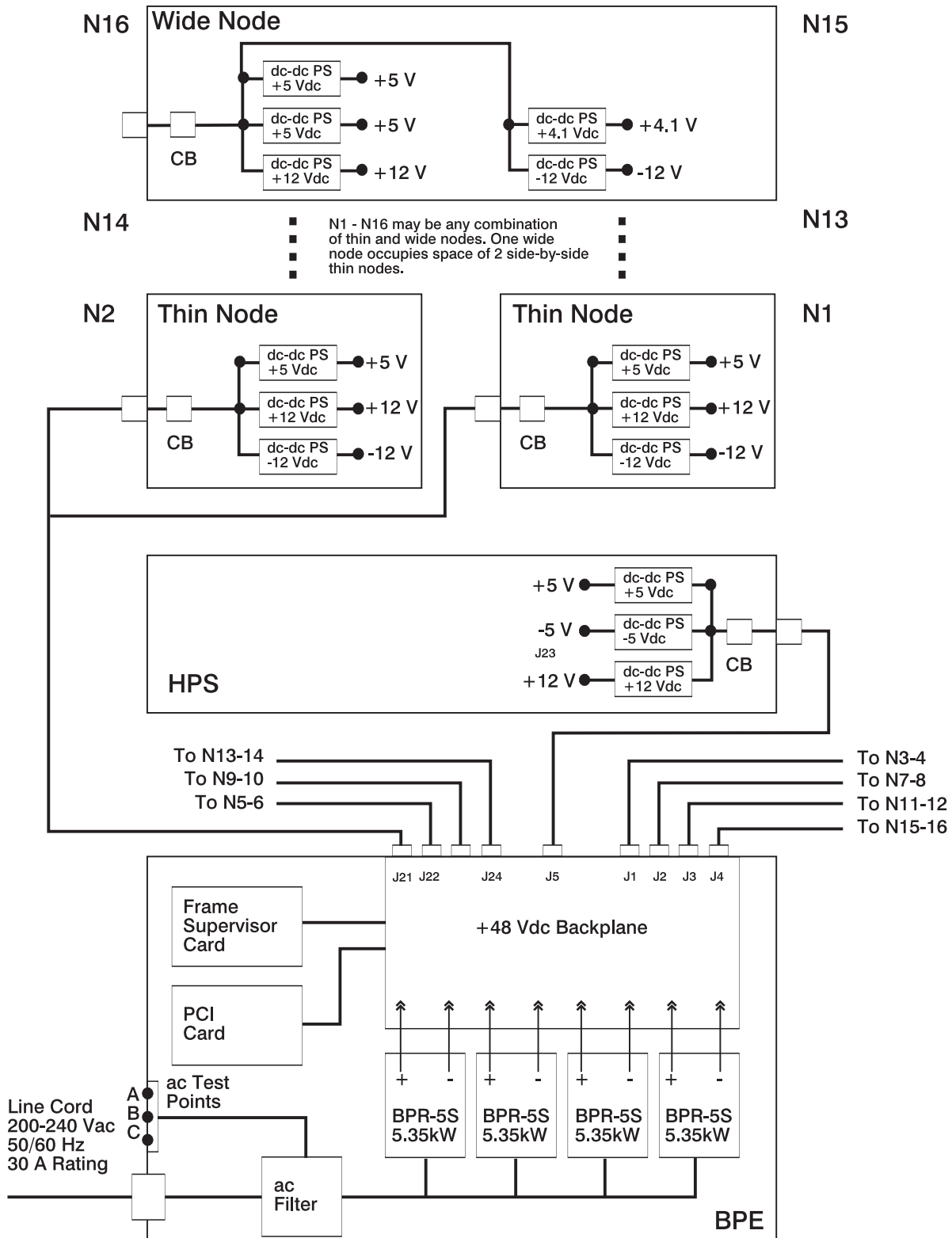
Figure 4-14. SEPBU Power System Single Line Grounding Path

Appendix A. Switch Cable Charts

This appendix contains cabling charts for HiPS and SPS internal and external (switch-to-switch) connections.

Internal Switch Connections

HiPS Internal Switch Connections

The following charts show the internal High Performance Switch data cabling:

Note: Refer to the "Cable Routing" section in chapter 1 of the *RS/6000 SP: Maintenance Information, Volume 3* to see the routing paths.

Table A-1. Internal HiPS 2.0 / 3.0 Data Cable Chart (Except to F/C 1010/15/16/17/19)					
Cable Part Number	**Plug From Location (See Note)**	**From Hori-zontal Path**	**Vertical Path Raceway**	**To Hori-zontal Path**	**Plug to Location**
93G1078	E00-S00-BH-J4	H2	V1	H9	E00-N14-BH-PA
93G1079	E00-S00-BH-J6	H2	V1	H9	E00-N13-BH-PA
93G1080	E00-S00-BH-J8	H2	V2	H7	E00-N10-BH-PA
93G1081	E00-S00-BH-J10	H2	V2	H7	E00-N09-BH-PA
93G1082	E00-S00-BH-J12	H2	V3	H5	E00-N06-BH-PA
93G1083	E00-S00-BH-J14	H2	V3	H5	E00-N05-BH-PA
93G1084	E00-S00-BH-J16	H2	V4	H3	E00-N02-BH-PA
93G1085	E00-S00-BH-J18	H2	V4	H3	E00-N01-BH-PA
93G1086	E00-S00-BH-J20	H2	V5	H4	E00-N03-BH-PA
93G1087	E00-S00-BH-J22	H2	V5	H4	E00-N04-BH-PA
93G1088	E00-S00-BH-J24	H2	V6	H6	E00-N07-BH-PA
93G1089	E00-S00-BH-J26	H2	V6	H6	E00-N08-BH-PA
93G1090	E00-S00-BH-J28	H2	V7	H8	E00-N11-BH-PA
93G1091	E00-S00-BH-J30	H2	V7	H8	E00-N12-BH-PA
93G1092	E00-S00-BH-J32	H2	V8	H10	E00-N15-BH-PA
93G1093	E00-S00-BH-J34	H2	V8	H10	E00-N16-BH-PA
Note: "PA" refers to connector on HiPS adapter.					

Table A-2 (Page 1 of 2). HiPS Data Cable Chart (F/C 1016/19). (2, 3, and 4-frame configurations)		
Cable Part Number	**Plug from Location**	**Plug to Location (See Notes 1 and 2)**
93G1076	E00-S00-BH-J16	E02-N01-BH-PA
93G1076	E00-S00-BH-J22	E03-N01-BH-PA
93G1076	E00-S00-BH-J20	E04-N01-BH-PA
93G1076	E00-S00-BH-J12	E02-N05-BH-PA
93G1076	E00-S00-BH-J26	E03-N05-BH-PA
93G1076	E00-S00-BH-J24	E04-N05-BH-PA
93G1076	E00-S00-BH-J8	E02-N09-BH-PA
93G1076	E00-S00-BH-J30	E03-N09-BH-PA
93G1076	E00-S00-BH-J28	E04-N09-BH-PA
93G1076	E00-S00-BH-J4	E02-N13-BH-PA

Table A-2 (Page 2 of 2). HiPS Data Cable Chart (F/C 1016/19). (2, 3, and 4-frame configurations)		
Cable Part Number	**Plug from Location**	**Plug to Location (See Notes 1 and 2)**
93G1076	E00-S00-BH-J34	E03-N13-BH-PA
93G1076	E00-S00-BH-J32	E04-N13-BH-PA
Notes:		
1. "Plug to" locations are on expansion frames (**F/C 1016/19**)		
2. "PA" refers to connector on TB2 adapter.		

Table A-3. Internal HiPS 3.0 Data Cable Chart (F/C 1010/15/16/17/19 Only)					
Cable Part Number	**From Horizontal Path (See Note 1)**	**Vertical Path Raceway**	**To Horizontal Path**	**Plug from Location**	**Plug to Location (See Notes 2 and 3)**
93G1075	H2-E1/E2	V1	H9	E00-S00-BH-J4	Exp-N13-BH-PA
93G1075	H2-E1/E2	V2	H7	E00-S00-BH-J8	Exp-N09-BH-PA
93G1075	H2-E1/E2	V3	H5	E00-S00-BH-J12	Exp-N05-BH-PA
93G1075	H2-E1/E2	V4	H3	E00-S00-BH-J16	Exp-N01-BH-PA
93G1075	H2-E1/E2	V5	H4	E00-S00-BH-J22	Exp-N03-BH-PA
93G1075	H2-E1/E2	V6	H6	E00-S00-BH-J26	Exp-N07-BH-PA
93G1075	H2-E1/E2	V7	H8	E00-S00-BH-J30	Exp-N11-BH-PA
93G1075	H2-E1/E2	V8	H10	E00-S00-BH-J34	Exp-N15-BH-PA
Notes:					
1. Cables are routed out and into the closest cable exit E1 or E2.					
2. "Exp" indicates expansion frame (**F/C 1010/15**)					
3. "PA" refers to connector on HiPS adapter.					

Table A-4 (Page 1 of 2). Internal HiPS-LC8 Data Cable Chart					
Cable Part Number	**Plug From Location**	**From Horizontal Path**	**Vertical Path Raceway (See Note 3)**	**To Horizontal Path (See Note 3)**	**Plug to Location (See Notes 1 and 2)**
93G1082	E00-S00-BH-J12	H2			E00-N(6)-BH-PA
93G1083	E00-S00-BH-J14	H2			E00-N(5)-BH-PA
93G1084	E00-S00-BH-J16	H2			E00-N(2)-BH-PA
93G1085	E00-S00-BH-J18	H2	V4	H3	E00-N(1)-BH-PA
93G1086	E00-S00-BH-J20	H2			E00-N(3)-BH-PA
93G1087	E00-S00-BH-J22	H2			E00-N(4)-BH-PA
93G1088	E00-S00-BH-J24	H2			E00-N(7)-BH-PA
93G1089	E00-S00-BH-J26	H2			E00-N(8)-BH-PA

Cable Part Number	Plug From Location	From Horizontal Path	Vertical Path Raceway (See Note 3)	To Horizontal Path (See Note 3)	Plug to Location (See Notes 1 and 2)

Table A-4 (Page 2 of 2). Internal HiPS-LC8 Data Cable Chart

Notes:

1. PA refers to connector on HiPS adapter.

2. N(#) refers to order of processor nodes starting from slot address 1.

3. Based on the slot number (1-16) of processor node N(#), use the vertical and horizontal routing from Table C-4 on page C-17 to route the switch data cable from that processor node.

SPS Internal Switch Connections

The following charts show the internal Scalable POWERparallel Switch (SPS) data cabling:

Note: Refer to the "Cable Routing" section in chapter 1 of the *RS/6000 SP: Maintenance Information, Volume 3* to see the routing paths.

Table A-5. Internal SPS Data Cable Chart (Except to F/C 1010/15/16/17)

Cable Part Number	Plug From Location	Plug to Location
46H9710	E00-S00-BH-J7	E00-N01-BH-PA
46H9711	E00-S00-BH-J8	E00-N02-BH-PA
46H9712	E00-S00-BH-J26	E00-N03-BH-PA
46H9713	E00-S00-BH-J25	E00-N04-BH-PA
46H9714	E00-S00-BH-J9	E00-N05-BH-PA
46H9715	E00-S00-BH-J10	E00-N06-BH-PA
46H9716	E00-S00-BH-J24	E00-N07-BH-PA
46H9717	E00-S00-BH-J23	E00-N08-BH-PA
46H9718	E00-S00-BH-J31	E00-N09-BH-PA
46H9719	E00-S00-BH-J32	E00-N10-BH-PA
46H9720	E00-S00-BH-J18	E00-N11-BH-PA
46H9721	E00-S00-BH-J17	E00-N12-BH-PA
46H9722	E00-S00-BH-J33	E00-N13-BH-PA
46H9723	E00-S00-BH-J34	E00-N14-BH-PA
46H9724	E00-S00-BH-J16	E00-N15-BH-PA
46H9725	E00-S00-BH-J15	E00-N16-BH-PA

Notes:

1. "PA" refers to connector on SPS adapter.

2. Any dependent node(s) attached to this SP switch are made in place of the corresponding node connection shown in the table.

Table A-6. Internal SPS Data Cable Chart (F/C 1016/19). (2, 3, and 4-frame configurations)		
Cable Part Number	**Plug from Location**	**Plug to Location (See Notes 1 and 2)**
46H9699	E00-S00-BH-J8	E02-N01-BH-PA
46H9699	E00-S00-BH-J25	E03-N01-BH-PA
46H9699	E00-S00-BH-J26	E04-N01-BH-PA
46H9699	E00-S00-BH-J10	E02-N05-BH-PA
46H9699	E00-S00-BH-J23	E03-N05-BH-PA
46H9699	E00-S00-BH-J24	E04-N05-BH-PA
46H9699	E00-S00-BH-J32	E02-N09-BH-PA
46H9699	E00-S00-BH-J17	E03-N09-BH-PA
46H9699	E00-S00-BH-J18	E04-N09-BH-PA
46H9699	E00-S00-BH-J34	E02-N13-BH-PA
46H9699	E00-S00-BH-J15	E03-N13-BH-PA
46H9699	E00-S00-BH-J16	E04-N13-BH-PA

Notes:

1. "Plug to" locations are on expansion frames (**F/C 1016/19**)

2. "PA" refers to connector on SPS adapter.

3. Any dependent node(s) attached to this SP switch are made in place of the corresponding node connection shown in the table.

Table A-7. Internal SPS Data Cable Chart (F/C 1010/15/16/17 Only)		
Cable Part Number	**Plug from Location**	**Plug to Location**
46H9698	E00-S00-BH-J34	Exp-N13-BH-PA
46H9698	E00-S00-BH-J32	Exp-N09-BH-PA
46H9698	E00-S00-BH-J10	Exp-N05-BH-PA
46H9698	E00-S00-BH-J8	Exp-N01-BH-PA
46H9698	E00-S00-BH-J25	Exp-N03-BH-PA
46H9698	E00-S00-BH-J23	Exp-N07-BH-PA
46H9698	E00-S00-BH-J17	Exp-N11-BH-PA
46H9698	E00-S00-BH-J15	Exp-N15-BH-PA

Notes:

1. "Exp" indicates expansion frame (**F/C 1010/15**)

2. "PA" refers to connector on SPS adapter.

3. Any dependent node(s) attached to this SP switch are made in place of the corresponding node connection shown in the table.

Table A-8. SP-Attached Server Internal SPS Data Cable Chart

Cable Part Number	Plug from Location	Plug to Location
46H9698	E00-S00-BH-J7	EXP-N01-I/O Drawer 0 Slot 10
46H9698	E00-S00-BH-J8	EXP-N02-I/O Drawer 0 Slot 10
46H9698	E00-S00-BH-J26	EXP-N03-I/O Drawer 0 Slot 10
46H9698	E00-S00-BH-J25	EXP-N04-I/O Drawer 0 Slot 10
46H9698	E00-S00-BH-J9	EXP-N05-I/O Drawer 0 Slot 10
46H9698	E00-S00-BH-J10	EXP-N06-I/O Drawer 0 Slot 10
46H9698	E00-S00-BH-J24	EXP-N07-I/O Drawer 0 Slot 10
46H9698	E00-S00-BH-J23	EXP-N08-I/O Drawer 0 Slot 10
46H9698	E00-S00-BH-J31	EXP-N09-I/O Drawer 0 Slot 10
46H9698	E00-S00-BH-J32	EXP-N10-I/O Drawer 0 Slot 10
46H9698	E00-S00-BH-J18	EXP-N11-I/O Drawer 0 Slot 10
46H9698	E00-S00-BH-J17	EXP-N12-I/O Drawer 0 Slot 10
46H9698	E00-S00-BH-J33	EXP-N13-I/O Drawer 0 Slot 10
46H9698	E00-S00-BH-J34	EXP-N14-I/O Drawer 0 Slot 10
46H9698	E00-S00-BH-J16	EXP-N15-I/O Drawer 0 Slot 10
46H9698	E00-S00-BH-J15	EXP-N16-I/O Drawer 0 Slot 10

Notes:

1. "Slot 10" refers to connector on SPS adapter. (Frame 1 node 1 must be an internal SP node.)

2. Any dependent node(s) attached to this SP switch are made in place of the corresponding node connection shown in the table.

Table A-9. Internal SPS-8 Data Cable Chart

Cable Part Number	Plug From Location	Plug to Location (See Notes 1 and 2)
11J3975	E00-S00-BH-J7	E00-N(1)-BH-PA
11J3976	E00-S00-BH-J8	E00-N(2)-BH-PA
11J3977	E00-S00-BH-J26	E00-N(3)-BH-PA
11J3978	E00-S00-BH-J25	E00-N(4)-BH-PA
11J3979	E00-S00-BH-J9	E00-N(5)-BH-PA
11J3980	E00-S00-BH-J10	E00-N(6)-BH-PA
11J3981	E00-S00-BH-J24	E00-N(7)-BH-PA
11J3982	E00-S00-BH-J23	E00-N(8)-BH-PA

Notes:

1. PA refers to connector on SPS adapter.

2. N(#) refers to order of processor nodes starting from slot address 1.

3. Any dependent node(s) attached to this SP switch are made in place of the corresponding node connection shown in the table.

Note: Switch Nodes define a node number for each physical node, such that from the bottom-most node to the top-most node there will be no gap in switch node numbers. 8-port switch node numbers are assigned starting with the first node slot and increasing by one for each node until the highest numbered node slot which is populated with a node. This is opposed to the physical node numbering concept embodied in node slots for the full-size switch, where each node has a physical node number that corresponds to the node slot in which it resides.

Table A-10. Internal SPS-8 Data Cable Chart (F/C 1027/1028/1029)		
Cable Part Number	**Plug From Location**	**Plug to Location (See Notes1, 2, and 3)**
48G9699	E00-S00-BH-J26	EXP-N(3)-BH-PA
48G9699	E00-S00-BH-J25	EXP-N(4)-BH-PA
48G9699	E00-S00-BH-J9	EXP-N(5)-BH-PA
48G9699	E00-S00-BH-J10	EXP-N(6)-BH-PA
48G9699	E00-S00-BH-J24	EXP-N(7)-BH-PA
48G9699	E00-S00-BH-J23	EXP-N(8)-BH-PA

Notes:

1. EXP refers to expansion frame (**F/C 1027/1028/1029**)

2. N(#) refers to logical order of processor nodes starting from the logical frame 1, nodes 1 and 2.

3. PA refers to connector on SPS adapter.

4. For systems with three or less nodes in the base frame, use the longest internal switch cable(s) to connect to the node(s) in the first expansion frame.

5. Any dependent node(s) attached to this SP switch are made in place of the corresponding node connection shown in the table.

0

14	15
12	13
10	11
8	9
6	7
4	5
2	3
0	1
Switch	
Frame n	

Model frame without a non-switched expansion frame can be populated as you please.

1

Frame n (Switch): 14, 12, 10, 8, 6, 4, 2, 0
Frame n+1 (No Switch): 15, 13, 11, 9, 7, 5, 3, 1

Model frame with one non-switched expansion frame has eight valid node placement slots in each frame.

2

Frame n (Switch): 14, 12, 10, 8, 6, 4, 2, 0
Frame n+1 (No Switch): 13, 9, 5, 1
Frame n+2 (No Switch): 15, 11, 7, 3

Model frame with two non-switched expansion frames has eight valid node placement slots in the first frame and only four in each of the other two.

3

Frame n (Switch): 12, 8, 4, 0
Frame n+1 (No Switch): 13, 9, 5, 1
Frame n+2 (No Switch): 15, 11, 7, 3
Frame n+3 (No Switch): 14, 10, 6, 2

Model frame with three non-switched expansion frames has four valid node placement slots in each frame.

Figure   A-1. Switch Node Numbering Per Number of Expansion Frames

4	5
2	3
1	
0	
SP Switch-8	
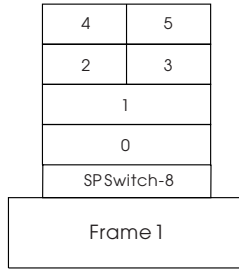
Frame 1

Figure   A-2. Switch Node Numbering for an SPS-8 and 49 in. Frame (Model 3AX)

To Switches   **To Nodes**

HIPS Board

J3 (V32) **E1**   3   4   **SW4**   7   0   **N14** J4 (V1)
J5 (V31) **E2**   2   **SW3**   5   (SWA1)   6   1   **N13** J6 (V2)
J7 (V30) **E3**   1 (SWA8) 6   5   2   **N10** J8 (V3)
J9 (V29) **E4**   0   7   4   3   **N9**   J10 (V4)

J11 (V28) **E5**   3   4   **SW5**   7   0   **N6**   J12 (V5)
J13 (V27) **E6**   2   **SW2**   5   (SWA2)   6   1   **N5**   J14 (V6)
J15 (V26) **E7**   1 (SWA7) 6   5   2   **N2**   J16 (V7)
J17 (V25) **E8**   0   7   4   3   **N1**   J18 (V8)

J19 (V24) **E9**   3   4   **SW6**   7   0   **N3**   J20 (V9)
J21 (V23) **E10**   2   **SW1**   5   (SWA3)   6   1   **N4**   J22 (V10)
J23 (V22) **E11**   1 (SWAU6) 6   5   2   **N7**   J24 (V11)
J25 (V21) **E12**   0   7   4   3   **N8**   J26 (V12)

J27 (V20) **E13**   3   4   **SW7**   7   0   **N11** J28 (V13)
J29 (V19) **E14**   2   **SW0**   5   (SWA4)   6   1   **N12** J30 (V14)
J31 (V18) **E15**   1 (SWA5) 6   5   2   **N15** J32 (V15)
J33 (V17) **E16**   0   7   4   3   **N16** J34 (V16)

Bulkhead   **Bulkhead**
Jacks   **Jacks**

Ex	External Connection x
Nx	Node Connection x
Jx	Jack x on the switch bulkhead
Vx	Vdc connector x on the switch board

Figure   A-3. HiPS Connections

To Switches

SPS Board

To Nodes

J3 (V32) E1 — 3 SW3 4 — 7 SW4 0 — N14 J34 (V1)
J4 (V31) E2 — 2 (U7) 5 — 6 (U0) 1 — N13 J33 (V2)
J5 (V30) E3 — 1 6 — 5 2 — N10 J32 (V3)
J6 (V29) E4 — 0 7 — 4 3 — N9 J31 (V4)

PLL3 | PLL4 | O4

J27 (V28) E5 — 3 SW2 4 — 7 SW5 0 — N6 J10 (V5)
J28 (V27) E6 — 2 (U6) 5 — 6 (U1) 1 — N5 J9 (V6)
J29 (V26) E7 — 1 6 — 5 2 — N2 J8 (V7)
J30 (V25) E8 — 0 7 — 4 3 — N1 J7 (V8)

PLL2 | O2 | PLL5

J11 (V24) E9 — 3 SW1 4 — 7 SW6 0 — N3 J26 (V9)
J12 (V23) E10 — 2 (U5) 5 — 6 (U2) 1 — N4 J25 (V10)
J13 (V22) E11 — 1 6 — 5 2 — N7 J24 (V11)
J14 (V21) E12 — 0 7 — 4 3 — N8 J23 (V12)

J19 (V20) E13 — 3 SW0 4 — 7 SW7 0 — N11 J18 (V13)
J20 (V19) E14 — 2 (U4) 5 — 6 (U3) 1 — N12 J17 (V14)
J21 (V18) E15 — 1 6 — 5 2 — N15 J16 (V15)
J22 (V17) E16 — 0 7 — 4 3 — N16 J15 (V16)

e0 | e1

Bulkhead Jacks | **Bulkhead Jacks**

Ex   External Connection x
Nx   Node Connection x
Jx   Jack x on the switch bulkhead
Vx   Vdc connector x on the switch board
PLLx   Phase-Lock Loop attached to chip x
Ox   Oscillator accompanying PLLx
e0 and e1   External clock connections

Figure   A-4. SPS Connections

External Switch Connections

Using the External Switch Cable Charts:

1. Select the appropriate section based on the number of **logical** frames. The number of logical frames is the number of frames with a switch, which may be less than the number of physical frames.

2. Use the following table to record the physical frame numbers of base frames and any expansion frames (F/C 1010 and F/C 1015). Processor nodes in an expansion frame will be cabled to a switch assembly in a base frame; then both frames will be considered as one logical frame.

Table   A-11. Physical Frame Designations

Logical Frame	L01	L02	L03	L04	L05	L06	L07	L08
Base Frame								
Expansion Frame **F/C 1010/15** (Optional)								

3. Make sure data cable interposers, P/N 93G1097, are installed on all HiPS 2.0 switch assemblies before continuing. See Figure A-5 on page A-11 and refer to the following table:

Table A-12. Data Cable Interposer Installation (HiPS 2.0 Only)		
System	**Logical Frames**	**Installation**
1-4 Switches	All Switch Frames	S00-BH-J3 to S00-BH-J361 S00-BH-J5 to S00-BH-J362 S00-BH-J7 to S00-BH-J363
5 Switches	L02, L03	S00-BH-J3 to S00-BH-J361 S00-BH-J7 to S00-BH-J363 S00-BH-J9 to S00-BH-J362
5 Switches	L01, L04, L05	S00-BH-J3 to S00-BH-J361 S00-BH-J5 to S00-BH-J362 S00-BH-J7 to S00-BH-J363
6-8 Switches	L02	S00-BH-J3 to S00-BH-J361 S00-BH-J7 to S00-BH-J363 S00-BH-J9 to S00-BH-J362
6-8 Switches	L03	S00-BH-J3 to S00-BH-J361 S00-BH-J5 to S00-BH-J362 S00-BH-J9 to S00-BH-J363
6-8 Switches	L01, L04-L08	S00-BH-J3 to S00-BH-J361 S00-BH-J5 to S00-BH-J362 S00-BH-J7 to S00-BH-J363
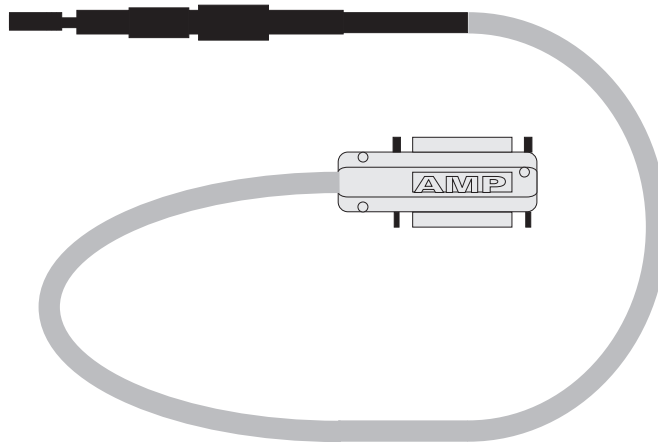
Figure A-5. HiPS 2.0 Interposer

4. Use the label sheets shown in Figure A-6 on page A-12 to label the cables. Use Figure A-7 on page A-12 and Figure A-8 on page A-13 to place labels on cables.
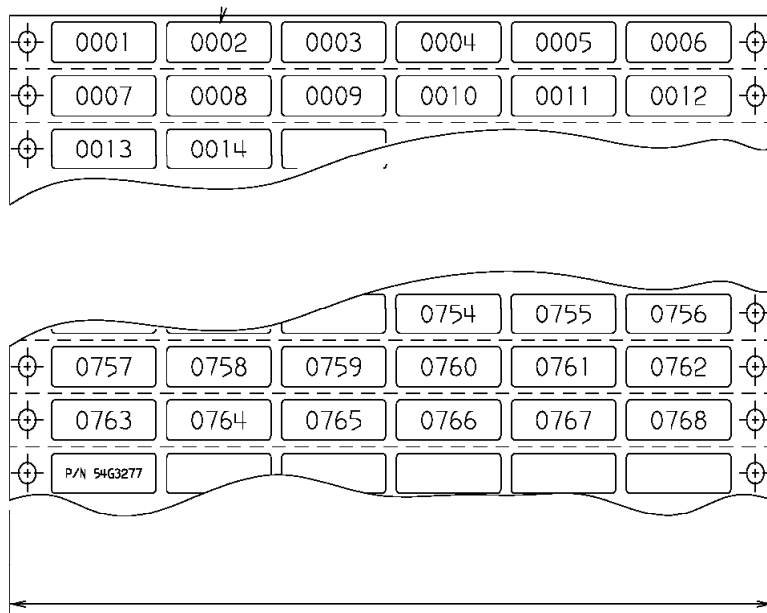
Figure A-6. Label Sheets 1 and 2
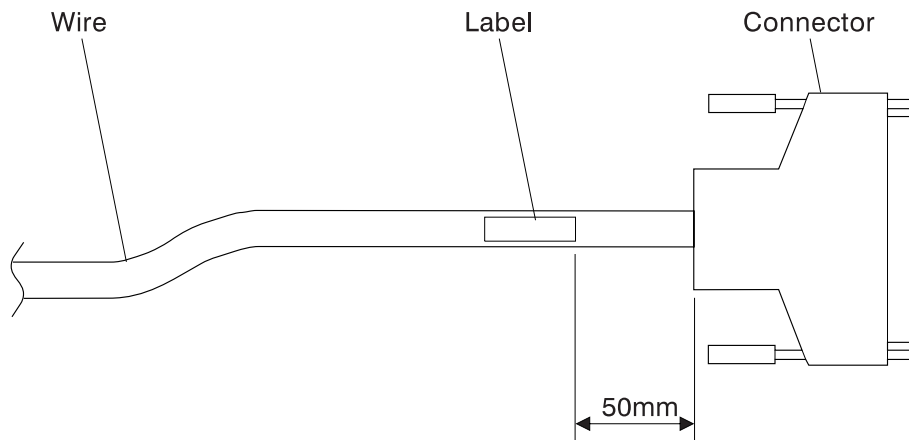
Figure A-7. Labeling Data Cables (HiPS)
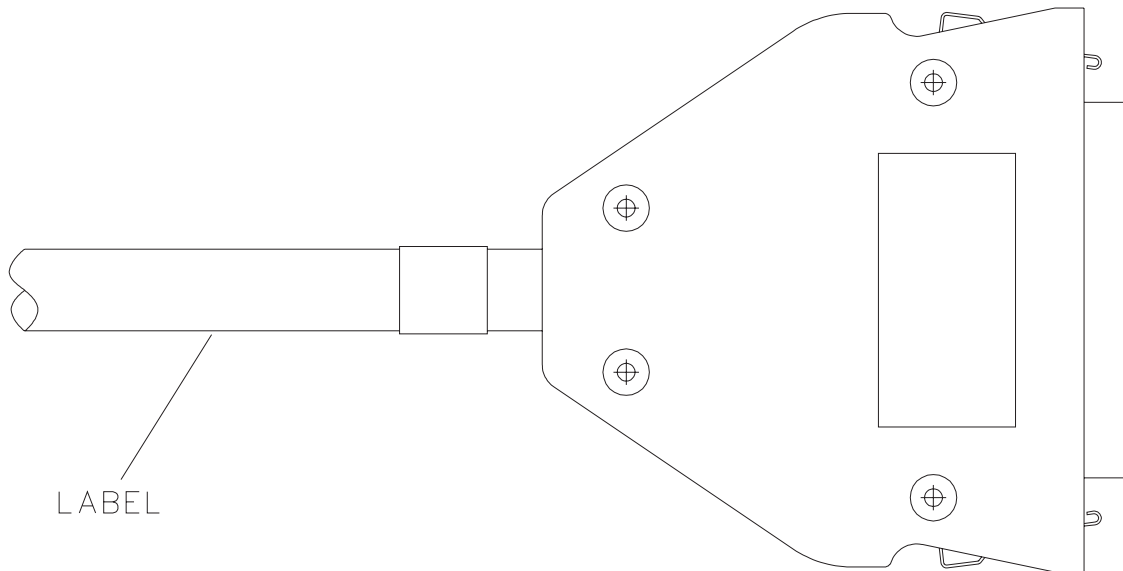
LABEL

Figure A-8. Labeling Data Cables (SPS)

5. There are four different lengths of external switch cable available for both HiPS and SPS switch-to-switch connections. See also, *IBM RS/6000 SP: Maintenance Information, Volume 4, Parts Catalog*.

External Switch Cables (HiPS)	
Length	**Cable Part Number**
5 meters	93G1075
10 meters	93G1076
15 meters	93G1077
20 meters	04H9531
External Switch Cables (SPS)	
Length	**Cable Part Number**
5 meters	46H9698
10 meters	46H9699
15 meters	46H9700
20 meters	46H9701

Note: The lengths in the cabling charts are based on standard assumptions; however, your system may use different cable lengths. Longer cables will have no effect on switch function.

6. As you install the cables, record cable serial numbers in the "Cable S/N" column of the cabling chart(s). The cable serial numbers will be used to track individual cables in the future.

Note: You may want to make a copy of the appropriate cabling charts and update this copy, in order to facilitate future changes.

7. **Routing Switch Cables - general suggestions**: You may want to wrap a light-color wash cloth or towel over the ends of bundles of cables when running under a raised floor. This will help avoid damage to connector pins, keep the cable ends together, keep connectors from catching on other cables, and make it easier to see the cable bundle under a raised floor.

8. **Routing Switch Cables - specific instructions**:

- *Frames with Processor Nodes* - All switch cables connected to switch bulkhead J3 through J17 should be routed through the exit (E1) closest to that side of frame, while all switch cables connected to switch bulkhead J19 through J33 should be routed through the other exit (E2). Refer to the "Locations" and "Service Procedures" chapters of *RS/6000 SP: Maintenance Information, Volume 3* for more information.

- *Multi-Switch Frames* - Cables should be bundled in groups of four and routed in the raceways as indicated in the cabling chart, Table A-33 on page A-21. By following this convention, future upgrades of the multi-switch frame should be easier to perform. Cables should exit the frame through the hole in the bottom of the frame extension, then be routed to the appropriate frame. Most of excess cable length should be left near the other frames rather than near the multi-switch frame.

External Cable Charts, Installation, and Upgrade Information

The rest of this appendix is divided into four sections

Section	Page	Reference
Installing the HiPS System	A-14	Used for initial HiPS installations and reference.
Upgrading the HiPS System	A-26	Used for upgrading HiPS systems.
Installing the SPS System	A-34	Used for initial SPS installations and reference.
Upgrading the SPS System	A-44	Used for upgrading SPS systems.

Installing the HiPS System

This section contains cabling information for:

- "Two-Frame HiPS Cable Connections"
- "Three-Frame HiPS Cable Connections" on page A-15
- "Four-Frame HiPS Cable Connections" on page A-16
- "Five-Frame HiPS Cable Connections" on page A-18
- "Multi-Switch (4 HiPS) Frame Cable Connections (Model 40x)" on page A-20.

Two-Frame HiPS Cable Connections

Table A-13 lists information about the data switch cables that interconnect a two-frame RS/6000 SP system.

Table A-13 (Page 1 of 2). Two-Frame HiPS Cable Connections			
		Switch Connection	
Length:	**Cable S/N:**	**Frame 1**	**Frame 2**
5 meters		L01-S00-BH-J3	L02-S00-BH-J3
5 meters		L01-S00-BH-J5	L02-S00-BH-J5
5 meters		L01-S00-BH-J7	L02-S00-BH-J7
5 meters		L01-S00-BH-J9	L02-S00-BH-J9
5 meters		L01-S00-BH-J11	L02-S00-BH-J11
5 meters		L01-S00-BH-J13	L02-S00-BH-J13

Table A-13 (Page 2 of 2). Two-Frame HiPS Cable Connections			
		Switch Connection	
Length:	**Cable S/N:**	**Frame 1**	**Frame 2**
5 meters		L01-S00-BH-J15	L02-S00-BH-J15
5 meters		L01-S00-BH-J17	L02-S00-BH-J17
5 meters		L01-S00-BH-J19	L02-S00-BH-J19
5 meters		L01-S00-BH-J21	L02-S00-BH-J21
5 meters		L01-S00-BH-J23	L02-S00-BH-J23
5 meters		L01-S00-BH-J25	L02-S00-BH-J25
5 meters		L01-S00-BH-J27	L02-S00-BH-J27
5 meters		L01-S00-BH-J29	L02-S00-BH-J29
5 meters		L01-S00-BH-J31	L02-S00-BH-J31
5 meters		L01-S00-BH-J33	L02-S00-BH-J33

Three-Frame HiPS Cable Connections

The following tables list information about the data switch cables that interconnect a three-frame RS/6000 SP system.

Table A-14. Three-Frame HiPS Cable Connections—Frame 1 to 2			
		Switch Connection	
Length	**Cable S/N**	**Frame 1**	**Frame 2**
5 meters		L01-S00-BH-J3	L02-S00-BH-J3
5 meters		L01-S00-BH-J7	L02-S00-BH-J7
5 meters		L01-S00-BH-J11	L02-S00-BH-J11
5 meters		L01-S00-BH-J15	L02-S00-BH-J15
5 meters		L01-S00-BH-J19	L02-S00-BH-J19
5 meters		L01-S00-BH-J23	L02-S00-BH-J23
5 meters		L01-S00-BH-J27	L02-S00-BH-J27
5 meters		L01-S00-BH-J31	L02-S00-BH-J31

Table A-15 (Page 1 of 2). Three-Frame HiPS Cable Connections—Frame 2 to 3			
		Switch Connection	
Length	**Cable S/N**	**Frame 2**	**Frame 3**
5 meters		L02-S00-BH-J5	L03-S00-BH-J5
5 meters		L02-S00-BH-J9	L03-S00-BH-J9
5 meters		L02-S00-BH-J13	L03-S00-BH-J13
5 meters		L02-S00-BH-J17	L03-S00-BH-J17
5 meters		L02-S00-BH-J21	L03-S00-BH-J21
5 meters		L02-S00-BH-J25	L03-S00-BH-J25
5 meters		L02-S00-BH-J29	L03-S00-BH-J29

Table A-15 (Page 2 of 2). Three-Frame HiPS Cable Connections—Frame 2 to 3			
		Switch Connection	
Length	**Cable S/N**	**Frame 2**	**Frame 3**
5 meters		L02-S00-BH-J33	L03-S00-BH-J33

Table A-16. Three-Frame HiPS Cable Connections—Frame 1 to 3			
		Switch Connection	
Length	**Cable S/N**	**Frame 1**	**Frame 3**
10 meters		L01-S00-BH-J5	L03-S00-BH-J3
10 meters		L01-S00-BH-J9	L03-S00-BH-J7
10 meters		L01-S00-BH-J13	L03-S00-BH-J11
10 meters		L01-S00-BH-J17	L03-S00-BH-J15
10 meters		L01-S00-BH-J21	L03-S00-BH-J19
10 meters		L01-S00-BH-J25	L03-S00-BH-J23
10 meters		L01-S00-BH-J29	L03-S00-BH-J27
10 meters		L01-S00-BH-J33	L03-S00-BH-J31

Four-Frame HiPS Cable Connections

The following tables list information about the data switch cables that interconnect a four-frame RS/6000 SP system.

Table A-17. Four-Frame HiPS Cable Connections—Frame 1 to 2			
		Switch Connection	
Length	**Cable S/N**	**Frame 1**	**Frame 2**
5 meters		L01-S00-BH-J3	L02-S00-BH-J3
5 meters		L01-S00-BH-J9	L02-S00-BH-J9
5 meters		L01-S00-BH-J15	L02-S00-BH-J15
5 meters		L01-S00-BH-J21	L02-S00-BH-J21
5 meters		L01-S00-BH-J27	L02-S00-BH-J27
5 meters		L01-S00-BH-J33	L02-S00-BH-J33

Table A-18. Four-Frame HiPS Cable Connections—Frame 2 to 3			
		Switch Connection	
Length	**Cable S/N**	**Frame 2**	**Frame 3**
5 meters		L02-S00-BH-J5	L03-S00-BH-J5
5 meters		L02-S00-BH-J11	L03-S00-BH-J11
5 meters		L02-S00-BH-J17	L03-S00-BH-J17
5 meters		L02-S00-BH-J23	L03-S00-BH-J23
5 meters		L02-S00-BH-J29	L03-S00-BH-J29

Table A-19. Four-Frame HiPS Cable Connections—Frame 3 to 4			
		Switch Connection	
Length	**Cable S/N**	**Frame 3**	**Frame 4**
5 meters		L03-S00-BH-J7	L04-S00-BH-J7
5 meters		L03-S00-BH-J13	L04-S00-BH-J13
5 meters		L03-S00-BH-J19	L04-S00-BH-J19
5 meters		L03-S00-BH-J25	L04-S00-BH-J25
5 meters		L03-S00-BH-J31	L04-S00-BH-J31
5 meters		L03-S00-BH-J33	L04-S00-BH-J33

Table A-20. Four-Frame HiPS Cable Connections—Frame 1 to 3			
		Switch Connection	
Length	**Cable S/N**	**Frame 1**	**Frame 3**
10 meters		L01-S00-BH-J5	L03-S00-BH-J3
10 meters		L01-S00-BH-J11	L03-S00-BH-J9
10 meters		L01-S00-BH-J17	L03-S00-BH-J15
10 meters		L01-S00-BH-J23	L03-S00-BH-J21
10 meters		L01-S00-BH-J29	L03-S00-BH-J27

Table A-21. Four-Frame HiPS Cable Connections—Frame 2 to 4			
		Switch Connection	
Length	**Cable S/N**	**Frame 2**	**Frame 4**
10 meters		L02-S00-BH-J7	L04-S00-BH-J5
10 meters		L02-S00-BH-J13	L04-S00-BH-J11
10 meters		L02-S00-BH-J19	L04-S00-BH-J17
10 meters		L02-S00-BH-J25	L04-S00-BH-J23
10 meters		L02-S00-BH-J31	L04-S00-BH-J29

Table A-22. Four-Frame HiPS Cable Connections—Frame 1 to 4			
		Switch Connection	
Length	**Cable S/N**	**Frame 1**	**Frame 4**
10 meters		L01-S00-BH-J7	L04-S00-BH-J3
10 meters		L01-S00-BH-J13	L04-S00-BH-J9
10 meters		L01-S00-BH-J19	L04-S00-BH-J15
10 meters		L01-S00-BH-J25	L04-S00-BH-J21
10 meters		L01-S00-BH-J31	L04-S00-BH-J27

Five-Frame HiPS Cable Connections

The following tables list information about the data switch cables that interconnect a five-frame RS/6000 SP system:

Table A-23. Five-Frame HiPS Cable Connections—Frame 1 to 2			
		Switch Connection	
Length	**Cable S/N**	**Frame 1**	**Frame 2**
5 meters		L01-S00-BH-J3	L02-S00-BH-J3
5 meters		L01-S00-BH-J11	L02-S00-BH-J11
5 meters		L01-S00-BH-J19	L02-S00-BH-J19
5 meters		L01-S00-BH-J27	L02-S00-BH-J27

Table A-24. Five-Frame HiPS Cable Connections—Frame 1 to 3			
		Switch Connection	
Length	**Cable S/N**	**Frame 1**	**Frame 3**
10 meters		L01-S00-BH-J5	L03-S00-BH-J3
10 meters		L01-S00-BH-J13	L03-S00-BH-J11
10 meters		L01-S00-BH-J21	L03-S00-BH-J19
10 meters		L01-S00-BH-J29	L03-S00-BH-J27

Table A-25. Five-Frame HiPS Cable Connections—Frame 1 to 4			
		Switch Connection	
Length	**Cable S/N**	**Frame 1**	**Frame 4**
10 meters		L01-S00-BH-J7	L04-S00-BH-J3
10 meters		L01-S00-BH-J15	L04-S00-BH-J11
10 meters		L01-S00-BH-J23	L04-S00-BH-J19
10 meters		L01-S00-BH-J31	L04-S00-BH-J27

Table A-26. Five-Frame HiPS Cable Connections—Frame 1 to 5			
		Switch Connection	
Length	**Cable S/N**	**Frame 1**	**Frame 5**
10 meters		L01-S00-BH-J9	L05-S00-BH-J3
10 meters		L01-S00-BH-J17	L05-S00-BH-J11
10 meters		L01-S00-BH-J25	L05-S00-BH-J19
10 meters		L01-S00-BH-J33	L05-S00-BH-J27

Table A-27. Five-Frame HiPS Cable Connections—Frame 2 to 3			
		Switch Connection	
Length	**Cable S/N**	**Frame 2**	**Frame 3**
5 meters		L02-S00-BH-J5	L03-S00-BH-J5
5 meters		L02-S00-BH-J13	L03-S00-BH-J13
5 meters		L02-S00-BH-J21	L03-S00-BH-J21
5 meters		L02-S00-BH-J29	L03-S00-BH-J29

Table A-28. Five-Frame HiPS Cable Connections—Frame 2 to 4			
		Switch Connection	
Length	**Cable S/N**	**Frame 2**	**Frame 4**
10 meters		L02-S00-BH-J7	L04-S00-BH-J5
10 meters		L02-S00-BH-J15	L04-S00-BH-J13
10 meters		L02-S00-BH-J23	L04-S00-BH-J21
10 meters		L02-S00-BH-J31	L04-S00-BH-J29

Table A-29. Five-Frame HiPS Cable Connections—Frame 2 to 5			
		Switch Connection	
Length	**Cable S/N**	**Frame 2**	**Frame 5**
10 meters		L02-S00-BH-J9	L05-S00-BH-J5
10 meters		L02-S00-BH-J17	L05-S00-BH-J13
10 meters		L02-S00-BH-J25	L05-S00-BH-J21
10 meters		L02-S00-BH-J33	L05-S00-BH-J29

Table A-30. Five-Frame HiPS Cable Connections—Frame 3 to 4			
		Switch Connection	
Length	**Cable S/N**	**Frame 3**	**Frame 4**
5 meters		L03-S00-BH-J7	L04-S00-BH-J7
5 meters		L03-S00-BH-J15	L04-S00-BH-J15
5 meters		L03-S00-BH-J23	L04-S00-BH-J23
5 meters		L03-S00-BH-J31	L04-S00-BH-J31

Table A-31 (Page 1 of 2). Five-Frame HiPS Cable Connections—Frame 3 to 5			
		Switch Connection	
Length	**Cable S/N**	**Frame 3**	**Frame 5**
10 meters		L03-S00-BH-J9	L05-S00-BH-J7
10 meters		L03-S00-BH-J17	L05-S00-BH-J15

Table A-31 (Page 2 of 2). Five-Frame HiPS Cable Connections—Frame 3 to 5			
		Switch Connection	
Length	**Cable S/N**	**Frame 3**	**Frame 5**
10 meters		L03-S00-BH-J25	L05-S00-BH-J23
10 meters		L03-S00-BH-J33	L05-S00-BH-J31

Table A-32. Five-Frame HiPS Cable Connections—Frame 4 to 5			
		Switch Connection	
Length	**Cable S/N**	**Frame 4**	**Frame 5**
10 meters		L04-S00-BH-J9	L05-S00-BH-J9
10 meters		L04-S00-BH-J17	L05-S00-BH-J17
10 meters		L04-S00-BH-J25	L05-S00-BH-J25
10 meters		L04-S00-BH-J33	L05-S00-BH-J33

Multi-Switch (4 HiPS) Frame Cable Connections (Model 40x)

The tables in this section list information about the data switch cables that interconnect a four-HiPS frame with 5-8 logical frames in a model 40x RS/6000 SP System. All interframe cabling will go from logical frame switches to the switches within the multi-switch frame (**F/C 2030**).

Notes:

1. Entries followed by an asterisk (*) indicate that the cable connection is replaced by a wrap plug if the corresponding frame (logical frame L06, L07, or L08) is not present.

2. Cables should be bundled (using ty-wraps) in groups of four as indicated by the dark lines in the cabling charts. They should be routed through the raceway indicated in the cabling chart. Adhering to these procedures will make upgrading the multi-switch frame much easier.

Figure A-10 on page A-21 shows a back view of the RS/6000 SP multi-switch frame with frame exten-sion, showing the horizontal and vertical paths of cable routing from connector-to-connector. The depths has been amplified on the drawing.

Note:

> W1 consists of vertical raceways V1-V4.
> W5 consists of vertical raceways V5-V8.
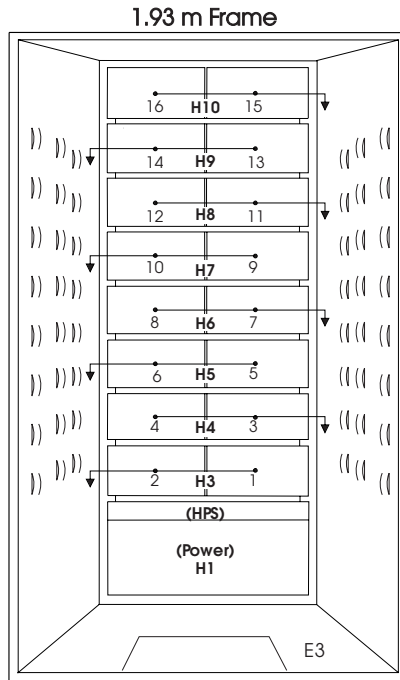
Figure   A-9. Frame Cable Routing Paths in Rear of RS/6000 SP Multi-Switch Frame (F/C 2030/1)—1.93 m Frame
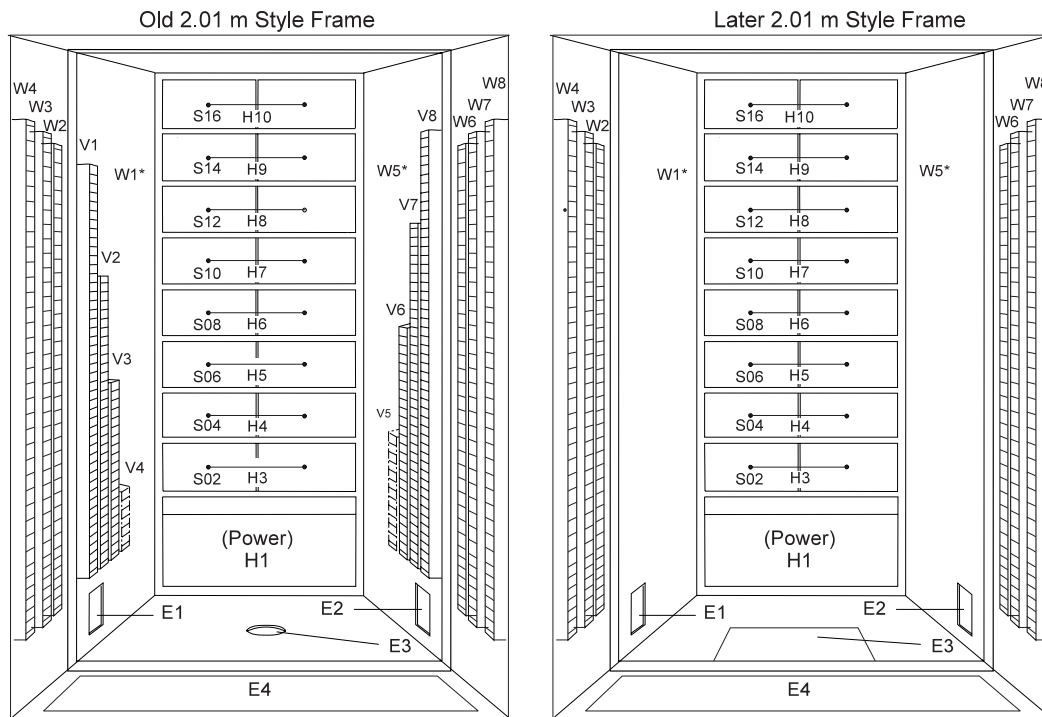
Figure   A-10. Frame Cable Routing Paths in Rear of RS/6000 SP Multi-Switch Frame (F/C 2030/1)—2.01 m Frame

Table A-33 (Page 1 of 2). Four-HiPS Frame Data Cable Connections—Raceway W1			
		Switch Connection	
Length:	**Cable S/N:**	**Switch Frame**	**Frame**
		S01-S14-BH-J3	L01-S00-BH-J9

Length:	Cable S/N:	Switch Connection	
		Switch Frame	**Frame**
		S01-S10-BH-J3	L01-S00-BH-J7
		S01-S06-BH-J3	L01-S00-BH-J5
		S01-S02-BH-J3	L01-S00-BH-J3
		S01-S14-BH-J5	L02-S00-BH-J9
		S01-S10-BH-J5	L02-S00-BH-J7
		S01-S06-BH-J5	L02-S00-BH-J5
		S01-S02-BH-J5	L02-S00-BH-J3
		S01-S14-BH-J7	L03-S00-BH-J9
		S01-S10-BH-J7	L03-S00-BH-J7
		S01-S06-BH-J7	L03-S00-BH-J5
		S01-S02-BH-J7	L03-S00-BH-J3
		S01-S14-BH-J9	L04-S00-BH-J9
		S01-S10-BH-J9	L04-S00-BH-J7
		S01-S06-BH-J9	L04-S00-BH-J5
		S01-S02-BH-J9	L04-S00-BH-J3
		S01-S14-BH-J4	L05-S00-BH-J9
		S01-S10-BH-J4	L05-S00-BH-J7
		S01-S06-BH-J4	L05-S00-BH-J5
		S01-S02-BH-J4	L05-S00-BH-J3
		S01-S14-BH-J6 *	L06-S00-BH-J9
		S01-S10-BH-J6 *	L06-S00-BH-J7
		S01-S06-BH-J6 *	L06-S00-BH-J5
		S01-S02-BH-J6 *	L06-S00-BH-J3
		S01-S14-BH-J8 *	L07-S00-BH-J9
		S01-S10-BH-J8 *	L07-S00-BH-J7
		S01-S06-BH-J8 *	L07-S00-BH-J5
		S01-S02-BH-J8 *	L07-S00-BH-J3
		S01-S14-BH-J10 *	L08-S00-BH-J9
		S01-S10-BH-J10 *	L08-S00-BH-J7
		S01-S06-BH-J10 *	L08-S00-BH-J5
		S01-S02-BH-J10 *	L08-S00-BH-J3

Table A-33 (Page 2 of 2). Four-HiPS Frame Data Cable Connections—Raceway W1

Note: Entries followed by an asterisk (*) indicate that the cable connection is replaced by a wrap plug if the corresponding frame (logical frame L06, L07, or L08) is not present.

Table A-34. Four-HiPS Frame Data Cable Connections—Raceway W2			
		Switch Connection	
Length:	**Cable S/N:**	**Switch Frame**	**Frame**
		S01-S14-BH-J11	L01-S00-BH-J17
		S01-S10-BH-J11	L01-S00-BH-J15
		S01-S06-BH-J11	L01-S00-BH-J13
		S01-S02-BH-J11	L01-S00-BH-J11
		S01-S14-BH-J13	L02-S00-BH-J17
		S01-S10-BH-J13	L02-S00-BH-J15
		S01-S06-BH-J13	L02-S00-BH-J13
		S01-S02-BH-J13	L02-S00-BH-J11
		S01-S14-BH-J15	L03-S00-BH-J17
		S01-S10-BH-J15	L03-S00-BH-J15
		S01-S06-BH-J15	L03-S00-BH-J13
		S01-S02-BH-J15	L03-S00-BH-J11
		S01-S14-BH-J17	L04-S00-BH-J17
		S01-S10-BH-J17	L04-S00-BH-J15
		S01-S06-BH-J17	L04-S00-BH-J13
		S01-S02-BH-J17	L04-S00-BH-J11
		S01-S14-BH-J12	L05-S00-BH-J17
		S01-S10-BH-J12	L05-S00-BH-J15
		S01-S06-BH-J12	L05-S00-BH-J13
		S01-S02-BH-J12	L05-S00-BH-J11
		S01-S14-BH-J14 *	L06-S00-BH-J17
		S01-S10-BH-J14 *	L06-S00-BH-J15
		S01-S06-BH-J14 *	L06-S00-BH-J13
		S01-S02-BH-J14 *	L06-S00-BH-J11
		S01-S14-BH-J16 *	L07-S00-BH-J17
		S01-S10-BH-J16 *	L07-S00-BH-J15
		S01-S06-BH-J16 *	L07-S00-BH-J13
		S01-S02-BH-J16 *	L07-S00-BH-J11
		S01-S14-BH-J18 *	L08-S00-BH-J17
		S01-S10-BH-J18 *	L08-S00-BH-J15
		S01-S06-BH-J18 *	L08-S00-BH-J13
		S01-S02-BH-J18 *	L08-S00-BH-J11
Note: Entries followed by an asterisk (*) indicate that the cable connection is replaced by a wrap plug if the corresponding frame (logical frame L06, L07, or L08) is not present.			

Length:	Cable S/N:	Switch Connection	
		Switch Frame	**Frame**
		S01-S14-BH-J19	L01-S00-BH-J25
		S01-S10-BH-J19	L01-S00-BH-J23
		S01-S06-BH-J19	L01-S00-BH-J21
		S01-S02-BH-J19	L01-S00-BH-J19
		S01-S14-BH-J21	L02-S00-BH-J25
		S01-S10-BH-J21	L02-S00-BH-J23
		S01-S06-BH-J21	L02-S00-BH-J21
		S01-S02-BH-J21	L02-S00-BH-J19
		S01-S14-BH-J23	L03-S00-BH-J25
		S01-S10-BH-J23	L03-S00-BH-J23
		S01-S06-BH-J23	L03-S00-BH-J21
		S01-S02-BH-J23	L03-S00-BH-J19
		S01-S14-BH-J25	L04-S00-BH-J25
		S01-S10-BH-J25	L04-S00-BH-J23
		S01-S06-BH-J25	L04-S00-BH-J21
		S01-S02-BH-J25	L04-S00-BH-J19
		S01-S14-BH-J20	L05-S00-BH-J25
		S01-S10-BH-J20	L05-S00-BH-J23
		S01-S06-BH-J20	L05-S00-BH-J21
		S01-S02-BH-J20	L05-S00-BH-J19
		S01-S14-BH-J22 *	L06-S00-BH-J25
		S01-S10-BH-J22 *	L06-S00-BH-J23
		S01-S06-BH-J22 *	L06-S00-BH-J21
		S01-S02-BH-J22 *	L06-S00-BH-J19
		S01-S14-BH-J24 *	L07-S00-BH-J25
		S01-S10-BH-J24 *	L07-S00-BH-J23
		S01-S06-BH-J24 *	L07-S00-BH-J21
		S01-S02-BH-J24 *	L07-S00-BH-J19
		S01-S14-BH-J26 *	L08-S00-BH-J25
		S01-S10-BH-J26 *	L08-S00-BH-J23
		S01-S06-BH-J26 *	L08-S00-BH-J21
		S01-S02-BH-J26 *	L08-S00-BH-J19

Table A-35. Four-HiPS Frame Data Cable Connections—Raceway W3

Note: Entries followed by an asterisk (*) indicate that the cable connection is replaced by a wrap plug if the corresponding frame (logical frame L06, L07, or L08) is not present.

Table A-36. Four-HiPS Frame Cable Connections—Raceway W4			
		Switch Connection	
Length:	**Cable S/N:**	**Switch Frame**	**Frame**
		S01-S14-BH-J27	L01-S00-BH-J33
		S01-S10-BH-J27	L01-S00-BH-J31
		S01-S06-BH-J27	L01-S00-BH-J29
		S01-S02-BH-J27	L01-S00-BH-J27
		S01-S14-BH-J29	L02-S00-BH-J33
		S01-S10-BH-J29	L02-S00-BH-J31
		S01-S06-BH-J29	L02-S00-BH-J29
		S01-S02-BH-J29	L02-S00-BH-J27
		S01-S14-BH-J31	L03-S00-BH-J33
		S01-S10-BH-J31	L03-S00-BH-J31
		S01-S06-BH-J31	L03-S00-BH-J29
		S01-S02-BH-J31	L03-S00-BH-J27
		S01-S14-BH-J33	L04-S00-BH-J33
		S01-S10-BH-J33	L04-S00-BH-J31
		S01-S06-BH-J33	L04-S00-BH-J29
		S01-S02-BH-J33	L04-S00-BH-J27
		S01-S14-BH-J28	L05-S00-BH-J33
		S01-S10-BH-J28	L05-S00-BH-J31
		S01-S06-BH-J28	L05-S00-BH-J29
		S01-S02-BH-J28	L05-S00-BH-J27
		S01-S14-BH-J30 *	L06-S00-BH-J33
		S01-S10-BH-J30 *	L06-S00-BH-J31
		S01-S06-BH-J30 *	L06-S00-BH-J29
		S01-S02-BH-J30 *	L06-S00-BH-J27
		S01-S14-BH-J32 *	L07-S00-BH-J33
		S01-S10-BH-J32 *	L07-S00-BH-J31
		S01-S06-BH-J32 *	L07-S00-BH-J29
		S01-S02-BH-J32 *	L07-S00-BH-J27
		S01-S14-BH-J34 *	L08-S00-BH-J33
		S01-S10-BH-J34 *	L08-S00-BH-J31
		S01-S06-BH-J34 *	L08-S00-BH-J29
		S01-S02-BH-J34 *	L08-S00-BH-J27
Note: Entries followed by an asterisk (*) indicate that the cable connection is replaced by a wrap plug if the corresponding frame (logical frame L06, L07, or L08) is not present.			

Upgrading the HiPS System

The following section is intended for use only when additional frames are added to an existing system AND the existing system contains the HiPS feature.

Note: Make sure to use the correct procedure based on the number of **logical** frames in the original system and the final system. The number of logical frames is the number of frames with an HiPS, which may be less than the number of physical frames.

This section contains cabling instructions for the following:

- "Upgrading From One Frame to Two Frames (HiPS)"
- "Upgrading From One Frame to Three Frames (HiPS)"
- "Upgrading From One Frame to Four Frames (HiPS)"
- "Upgrading From One Frame to Five Frames (HiPS)"
- "Upgrading From Two Frames to Three Frames (HiPS)" on page A-27
- "Upgrading From Two Frames to Four Frames (HiPS)" on page A-27
- "Upgrading From Two Frames to Five Frames (HiPS)" on page A-28
- "Upgrading From Three Frames to Four Frames (HiPS)" on page A-30
- "Upgrading From Three Frames to Five Frames (HiPS)" on page A-31
- "Upgrading From Four Frames to Five Frames (HiPS)" on page A-32
- "Upgrading to Model 40x with Multi-Switch (4 HiPS) Frame" on page A-34
- "Adding Frames to a Model 40x Multi-Switch (4 HiPS) Frame System" on page A-34.

Upgrading From One Frame to Two Frames (HiPS)

Perform the following procedure to install external HiPS cables:

1. Remove wrap plugs from odd-numbered jacks (J3-J35) on all switch assemblies.
2. Install switch cables as listed in "Two-Frame HiPS Cable Connections" on page A-14.

Upgrading From One Frame to Three Frames (HiPS)

Perform the following procedure to install external HiPS cables:

1. Remove wrap plugs from odd-numbered jacks (J3-J35) on all switch assemblies.
2. Install switch cables as listed in "Three-Frame HiPS Cable Connections" on page A-15.

Upgrading From One Frame to Four Frames (HiPS)

Perform the following procedure to install external HiPS cables:

1. Remove wrap plugs from odd-numbered jacks (J3-J35) on all switch assemblies.
2. Install switch cables as listed in "Four-Frame HiPS Cable Connections" on page A-16.

Upgrading From One Frame to Five Frames (HiPS)

Perform the following procedure to install external HiPS cables:

1. Remove wrap plugs from odd-numbered jacks (J3-J35) on all switch assemblies.
2. Install switch cables as listed in "Five-Frame HiPS Cable Connections" on page A-18.

Upgrading From Two Frames to Three Frames (HiPS)

Perform the following procedure to install external HiPS cables:

1. Change switch cable connections as indicated in the following table. The removed cables are to be labeled and plugged into the new locations.

Table   A-37. External HiPS Cable Changes For Two-To-Three Frame Upgrades

Length	Cable S/N	Removed Location		New Location	
		From	**To**	**From**	**To**
5 meters		L01-S00-BH-J5	L02-S00-BH-J5	L02-S00-BH-J5	L03-S00-BH-J5
5 meters		L01-S00-BH-J9	L02-S00-BH-J9	L02-S00-BH-J9	L03-S00-BH-J9
5 meters		L01-S00-BH-J13	L02-S00-BH-J13	L02-S00-BH-J13	L03-S00-BH-J13
5 meters		L01-S00-BH-J17	L02-S00-BH-J17	L02-S00-BH-J17	L03-S00-BH-J17
5 meters		L01-S00-BH-J21	L02-S00-BH-J21	L02-S00-BH-J21	L03-S00-BH-J21
5 meters		L01-S00-BH-J25	L02-S00-BH-J25	L02-S00-BH-J25	L03-S00-BH-J25
5 meters		L01-S00-BH-J29	L02-S00-BH-J29	L02-S00-BH-J29	L03-S00-BH-J29
5 meters		L01-S00-BH-J33	L02-S00-BH-J33	L02-S00-BH-J33	L03-S00-BH-J33

2. Install new external high-performance switch cables as indicated in the following table.

Table   A-38. External HiPS Cable Additions For Two-To-Three Frame Upgrades

Length	Cable S/N	From	To
10 meters		L01-S00-BH-J5	L03-S00-BH-J3
10 meters		L01-S00-BH-J9	L03-S00-BH-J7
10 meters		L01-S00-BH-J13	L03-S00-BH-J11
10 meters		L01-S00-BH-J17	L03-S00-BH-J15
10 meters		L01-S00-BH-J21	L03-S00-BH-J19
10 meters		L01-S00-BH-J25	L03-S00-BH-J23
10 meters		L01-S00-BH-J29	L03-S00-BH-J27
10 meters		L01-S00-BH-J33	L03-S00-BH-J31

Upgrading From Two Frames to Four Frames (HiPS)

Perform the following procedure to install external HiPS cables:

1. Change switch cable connections as indicated in the following table. The removed cables are to be labeled and plugged into the new locations.

Table   A-39 (Page 1 of 2). External HiPS Cable Changes For Two-To-Four Frame Upgrades

Length	Cable S/N	Removed Location		New Location	
		From	**To**	**From**	**To**
5 meters		L01-S00-BH-J7	L02-S00-BH-J7	L03-S00-BH-J7	L04-S00-BH-J7
5 meters		L01-S00-BH-J13	L02-S00-BH-J13	L03-S00-BH-J13	L04-S00-BH-J13
5 meters		L01-S00-BH-J19	L02-S00-BH-J19	L03-S00-BH-J19	L04-S00-BH-J19

Table A-39 (Page 2 of 2). External HiPS Cable Changes For Two-To-Four Frame Upgrades

Length	Cable S/N	Removed Location		New Location	
		From	**To**	**From**	**To**
5 meters		L01-S00-BH-J25	L02-S00-BH-J25	L03-S00-BH-J25	L04-S00-BH-J25
5 meters		L01-S00-BH-J31	L02-S00-BH-J31	L03-S00-BH-J31	L04-S00-BH-J31
5 meters		L01-S00-BH-J5	L02-S00-BH-J5	L02-S00-BH-J5	L03-S00-BH-J5
5 meters		L01-S00-BH-J11	L02-S00-BH-J11	L02-S00-BH-J11	L03-S00-BH-J11
5 meters		L01-S00-BH-J17	L02-S00-BH-J17	L02-S00-BH-J17	L03-S00-BH-J17
5 meters		L01-S00-BH-J23	L02-S00-BH-J23	L02-S00-BH-J23	L03-S00-BH-J23
5 meters		L01-S00-BH-J29	L02-S00-BH-J29	L02-S00-BH-J29	L03-S00-BH-J29

2. Install new external high-performance switch cables as indicated in the following table.

Table A-40. External HiPS Cable Additions For Two-To-Four Frame Upgrades

Length	Cable S/N	From	To
5 meters		L03-S00-BH-J33	L04-S00-BH-J33
10 meters		L01-S00-BH-J5	L03-S00-BH-J3
10 meters		L01-S00-BH-J11	L03-S00-BH-J9
10 meters		L01-S00-BH-J17	L03-S00-BH-J15
10 meters		L01-S00-BH-J23	L03-S00-BH-J21
10 meters		L01-S00-BH-J29	L03-S00-BH-J27
10 meters		L01-S00-BH-J7	L04-S00-BH-J3
10 meters		L01-S00-BH-J13	L04-S00-BH-J9
10 meters		L01-S00-BH-J19	L04-S00-BH-J15
10 meters		L01-S00-BH-J25	L04-S00-BH-J21
10 meters		L01-S00-BH-J31	L04-S00-BH-J27
10 meters		L02-S00-BH-J7	L04-S00-BH-J5
10 meters		L02-S00-BH-J13	L04-S00-BH-J11
10 meters		L02-S00-BH-J19	L04-S00-BH-J17
10 meters		L02-S00-BH-J25	L04-S00-BH-J23
10 meters		L02-S00-BH-J31	L04-S00-BH-J29

Upgrading From Two Frames to Five Frames (HiPS)

Perform the following procedure to install external HiPS cables:

1. Remove switch cable connections as indicated in the following table. These cables will not be reused in this system.

Table A-41 (Page 1 of 2). External HiPS Cable Removals For Two-To-Five Frame Upgrades

Length	Cable S/N	From	To
5 meters		L01-S00-BH-J9	L02-S00-BH-J9
5 meters		L01-S00-BH-J17	L02-S00-BH-J17

Table A-41 (Page 2 of 2). External HiPS Cable Removals For Two-To-Five Frame Upgrades			
Length	**Cable S/N**	**From**	**To**
5 meters		L01-S00-BH-J25	L02-S00-BH-J25
5 meters		L01-S00-BH-J33	L02-S00-BH-J33

2. Change switch cable connections as indicated in the following table. The removed cables are to be labeled and plugged into the new locations.

Table A-42. External HiPS Cable Changes For Two-To-Five Frame Upgrades					
Length	**Cable S/N**	**Removed Location**		**New Location**	
		From	**To**	**From**	**To**
5 meters		L01-S00-BH-J7	L02-S00-BH-J7	L03-S00-BH-J7	L04-S00-BH-J7
5 meters		L01-S00-BH-J15	L02-S00-BH-J15	L03-S00-BH-J15	L04-S00-BH-J15
5 meters		L01-S00-BH-J23	L02-S00-BH-J23	L03-S00-BH-J23	L04-S00-BH-J23
5 meters		L01-S00-BH-J31	L02-S00-BH-J31	L03-S00-BH-J31	L04-S00-BH-J31
5 meters		L01-S00-BH-J5	L02-S00-BH-J5	L02-S00-BH-J5	L03-S00-BH-J5
5 meters		L01-S00-BH-J13	L02-S00-BH-J13	L02-S00-BH-J13	L03-S00-BH-J13
5 meters		L01-S00-BH-J21	L02-S00-BH-J21	L02-S00-BH-J21	L03-S00-BH-J21
5 meters		L01-S00-BH-J29	L02-S00-BH-J29	L02-S00-BH-J29	L03-S00-BH-J29

3. Install new external high-performance switch cables as indicated in the following table.

Table A-43 (Page 1 of 2). External HiPS Cable Additions For Two-To-Five Frame Upgrades			
Length	**Cable S/N**	**From**	**To**
10 meters		L01-S00-BH-J5	L03-S00-BH-J3
10 meters		L01-S00-BH-J13	L03-S00-BH-J11
10 meters		L01-S00-BH-J21	L03-S00-BH-J19
10 meters		L01-S00-BH-J29	L03-S00-BH-J27
10 meters		L01-S00-BH-J7	L04-S00-BH-J3
10 meters		L01-S00-BH-J15	L04-S00-BH-J11
10 meters		L01-S00-BH-J23	L04-S00-BH-J19
10 meters		L01-S00-BH-J31	L04-S00-BH-J27
10 meters		L01-S00-BH-J9	L05-S00-BH-J3
10 meters		L01-S00-BH-J17	L05-S00-BH-J11
10 meters		L01-S00-BH-J25	L05-S00-BH-J19
10 meters		L01-S00-BH-J33	L05-S00-BH-J27
10 meters		L02-S00-BH-J7	L04-S00-BH-J5
10 meters		L02-S00-BH-J15	L04-S00-BH-J13
10 meters		L02-S00-BH-J23	L04-S00-BH-J21
10 meters		L02-S00-BH-J31	L04-S00-BH-J29
10 meters		L02-S00-BH-J9	L05-S00-BH-J5
10 meters		L02-S00-BH-J17	L05-S00-BH-J13

Table A-43 (Page 2 of 2). External HiPS Cable Additions For Two-To-Five Frame Upgrades			
Length	**Cable S/N**	**From**	**To**
10 meters		L02-S00-BH-J25	L05-S00-BH-J21
10 meters		L02-S00-BH-J33	L05-S00-BH-J29
10 meters		L03-S00-BH-J9	L05-S00-BH-J7
10 meters		L03-S00-BH-J17	L05-S00-BH-J15
10 meters		L03-S00-BH-J25	L05-S00-BH-J23
10 meters		L03-S00-BH-J33	L05-S00-BH-J31
10 meters		L04-S00-BH-J9	L05-S00-BH-J9
10 meters		L04-S00-BH-J17	L05-S00-BH-J17
10 meters		L04-S00-BH-J25	L05-S00-BH-J25
10 meters		L04-S00-BH-J33	L05-S00-BH-J33

Upgrading From Three Frames to Four Frames (HiPS)

Perform the following procedure to install external HiPS cables:

1. Change switch cable connections as indicated in the following table. The removed cables are to be labeled and plugged into the new locations.

Table A-44. External HiPS Cable Changes For Three-To-Four Frame Upgrades					
Length	**Cable S/N**	**Removed Location**		**New Location**	
		From	**To**	**From**	**To**
5 meters		L01-S00-BH-J7	L02-S00-BH-J7	L03-S00-BH-J7	L04-S00-BH-J7
5 meters		L01-S00-BH-J19	L02-S00-BH-J19	L03-S00-BH-J19	L04-S00-BH-J19
5 meters		L01-S00-BH-J31	L02-S00-BH-J31	L03-S00-BH-J31	L04-S00-BH-J31
5 meters		L02-S00-BH-J13	L03-S00-BH-J13	L03-S00-BH-J13	L04-S00-BH-J13
5 meters		L02-S00-BH-J25	L03-S00-BH-J25	L03-S00-BH-J25	L04-S00-BH-J25
5 meters		L02-S00-BH-J33	L03-S00-BH-J33	L02-S00-BH-J33	L01-S00-BH-J33
10 meters		L01-S00-BH-J9	L03-S00-BH-J7	L01-S00-BH-J7	L04-S00-BH-J3
10 meters		L01-S00-BH-J13	L03-S00-BH-J11	L01-S00-BH-J13	L04-S00-BH-J9
10 meters		L01-S00-BH-J21	L03-S00-BH-J19	L01-S00-BH-J23	L03-S00-BH-J21
10 meters		L01-S00-BH-J25	L03-S00-BH-J23	L01-S00-BH-J25	L04-S00-BH-J21
10 meters		L01-S00-BH-J33	L03-S00-BH-J31	L01-S00-BH-J31	L04-S00-BH-J27
5 meters		L01-S00-BH-J11	L02-S00-BH-J11	L02-S00-BH-J11	L03-S00-BH-J11
5 meters		L01-S00-BH-J23	L02-S00-BH-J23	L02-S00-BH-J23	L03-S00-BH-J23
5 meters		L02-S00-BH-J21	L03-S00-BH-J21	L02-S00-BH-J21	L01-S00-BH-J21
5 meters		L02-S00-BH-J9	L03-S00-BH-J9	L02-S00-BH-J9	L01-S00-BH-J9

2. Install new external high-performance switch cables as indicated in the following table.

Table A-45. External HiPS Cable Additions For Three-To-Four Frame Upgrades			
Length	**Cable S/N**	**From**	**To**
5 meters		L03-S00-BH-J33	L04-S00-BH-J33
10 meters		L01-S00-BH-J11	L03-S00-BH-J9
10 meters		L02-S00-BH-J19	L04-S00-BH-J17
10 meters		L02-S00-BH-J13	L04-S00-BH-J11
10 meters		L02-S00-BH-J7	L04-S00-BH-J5
10 meters		L01-S00-BH-J19	L04-S00-BH-J15
10 meters		L02-S00-BH-J25	L04-S00-BH-J23
10 meters		L02-S00-BH-J31	L04-S00-BH-J29

Upgrading From Three Frames to Five Frames (HiPS)

Perform the following procedure to install external HiPS cables:

1. Remove switch cable connections as indicated in the following table. These cables will not be reused in this system.

Table A-46. External HiPS Cable Removals For Two-To-Five Frame Upgrades			
Length	**Cable S/N**	**From**	**To**
5 meters		L02-S00-BH-J9	L03-S00-BH-J9
5 meters		L02-S00-BH-J17	L03-S00-BH-J17
5 meters		L02-S00-BH-J25	L03-S00-BH-J25
5 meters		L02-S00-BH-J33	L03-S00-BH-J33

2. Change switch cable connections as indicated in the following table. The removed cables are to be labeled and plugged into the new locations.

Table A-47. External HiPS Cable Changes For Three-To-Five Frame Upgrades		Removed Location		New Location	
Length	**Cable S/N**	**From**	**To**	**From**	**To**
5 meters		L01-S00-BH-J7	L02-S00-BH-J7	L03-S00-BH-J7	L04-S00-BH-J7
5 meters		L01-S00-BH-J15	L02-S00-BH-J15	L03-S00-BH-J15	L04-S00-BH-J15
5 meters		L01-S00-BH-J23	L02-S00-BH-J23	L03-S00-BH-J23	L04-S00-BH-J23
5 meters		L01-S00-BH-J31	L02-S00-BH-J31	L03-S00-BH-J31	L04-S00-BH-J31
10 meters		L01-S00-BH-J9	L03-S00-BH-J7	L01-S00-BH-J9	L05-S00-BH-J3
10 meters		L01-S00-BH-J17	L03-S00-BH-J15	L01-S00-BH-J17	L05-S00-BH-J11
10 meters		L01-S00-BH-J25	L03-S00-BH-J23	L01-S00-BH-J25	L05-S00-BH-J19
10 meters		L01-S00-BH-J33	L03-S00-BH-J31	L01-S00-BH-J33	L05-S00-BH-J27

3. Install new external high-performance switch cables as indicated in the following table.

Table A-48. External HiPS Cable Additions For Three-To-Five Frame Upgrades			
Length	**Cable S/N**	**From**	**To**
10 meters		L01-S00-BH-J7	L04-S00-BH-J3
10 meters		L01-S00-BH-J15	L04-S00-BH-J11
10 meters		L01-S00-BH-J23	L04-S00-BH-J19
10 meters		L01-S00-BH-J31	L04-S00-BH-J27
10 meters		L02-S00-BH-J7	L04-S00-BH-J5
10 meters		L02-S00-BH-J15	L04-S00-BH-J13
10 meters		L02-S00-BH-J23	L04-S00-BH-J21
10 meters		L02-S00-BH-J31	L04-S00-BH-J29
10 meters		L02-S00-BH-J9	L05-S00-BH-J5
10 meters		L02-S00-BH-J17	L05-S00-BH-J13
10 meters		L02-S00-BH-J25	L05-S00-BH-J21
10 meters		L02-S00-BH-J33	L05-S00-BH-J29
10 meters		L03-S00-BH-J9	L05-S00-BH-J7
10 meters		L03-S00-BH-J17	L05-S00-BH-J15
10 meters		L03-S00-BH-J25	L05-S00-BH-J23
10 meters		L03-S00-BH-J33	L05-S00-BH-J31
10 meters		L04-S00-BH-J9	L05-S00-BH-J9
10 meters		L04-S00-BH-J17	L05-S00-BH-J17
10 meters		L04-S00-BH-J25	L05-S00-BH-J25
10 meters		L04-S00-BH-J33	L05-S00-BH-J33

Upgrading From Four Frames to Five Frames (HiPS)

Perform the following procedure to install external HiPS cables:

1. Remove switch cable connections as indicated in the following table. These cables will not be reused in this system.

Table A-49. External HiPS Cable Removals For Two-To-Five Frame Upgrades			
Length	**Cable S/N**	**From**	**To**
5 meters		L01-S00-BH-J15	L02-S00-BH-J15
5 meters		L01-S00-BH-J21	L02-S00-BH-J21
5 meters		L02-S00-BH-J17	L03-S00-BH-J17
5 meters		L03-S00-BH-J19	L04-S00-BH-J19
5 meters		L03-S00-BH-J33	L04-S00-BH-J33

2. Change switch cable connections as indicated in the following table. The removed cables are to be labeled and plugged into the new locations.

Table A-50. External HiPS Cable Changes For Four-To-Five Frame Upgrades					
Length	**Cable S/N**	**Removed Location**		**New Location**	
		From	**To**	**From**	**To**
10 meters		L01-S00-BH-J17	L03-S00-BH-J15	L01-S00-BH-J17	L05-S00-BH-J11
5 meters		L02-S00-BH-J11	L03-S00-BH-J11	L02-S00-BH-J13	L03-S00-BH-J13
5 meters		L02-S00-BH-J23	L03-S00-BH-J23	L02-S00-BH-J21	L03-S00-BH-J21
5 meters		L01-S00-BH-J9	L02-S00-BH-J9	L01-S00-BH-J11	L02-S00-BH-J11
5 meters		L03-S00-BH-J13	L04-S00-BH-J13	L03-S00-BH-J15	L04-S00-BH-J15
5 meters		L03-S00-BH-J25	L04-S00-BH-J25	L03-S00-BH-J23	L04-S00-BH-J23
10 meters		L01-S00-BH-J11	L03-S00-BH-J9	L01-S00-BH-J21	L03-S00-BH-J19
10 meters		L01-S00-BH-J23	L03-S00-BH-J21	L01-S00-BH-J13	L03-S00-BH-J11
10 meters		L02-S00-BH-J13	L04-S00-BH-J11	L02-S00-BH-J23	L04-S00-BH-J21
10 meters		L02-S00-BH-J19	L04-S00-BH-J17	L02-S00-BH-J15	L04-S00-BH-J13
10 meters		L01-S00-BH-J13	L04-S00-BH-J9	L01-S00-BH-J15	L04-S00-BH-J11
10 meters		L01-S00-BH-J19	L04-S00-BH-J15	L01-S00-BH-J23	L04-S00-BH-J19
10 meters		L01-S00-BH-J25	L04-S00-BH-J21	L01-S00-BH-J25	L05-S00-BH-J19
10 meters		L02-S00-BH-J25	L04-S00-BH-J23	L02-S00-BH-J25	L05-S00-BH-J21
5 meters		L01-S00-BH-J33	L02-S00-BH-J33	L01-S00-BH-J19	L02-S00-BH-J19

3. Install new external high-performance switch cables as indicated in the following table.

Table A-51. External HiPS Cable Additions For Four-To-Five Frame Upgrades			
Length	**Cable S/N**	**From**	**To**
10 meters		L01-S00-BH-J9	L05-S00-BH-J3
10 meters		L01-S00-BH-J33	L05-S00-BH-J27
10 meters		L02-S00-BH-J9	L05-S00-BH-J5
10 meters		L02-S00-BH-J17	L05-S00-BH-J13
10 meters		L02-S00-BH-J33	L05-S00-BH-J29
10 meters		L03-S00-BH-J9	L05-S00-BH-J7
10 meters		L03-S00-BH-J17	L05-S00-BH-J15
10 meters		L03-S00-BH-J25	L05-S00-BH-J23
10 meters		L03-S00-BH-J33	L05-S00-BH-J31
10 meters		L04-S00-BH-J9	L05-S00-BH-J9
10 meters		L04-S00-BH-J17	L05-S00-BH-J17
10 meters		L04-S00-BH-J25	L05-S00-BH-J25
10 meters		L04-S00-BH-J33	L05-S00-BH-J33

Upgrading to Model 40x with Multi-Switch (4 HiPS) Frame

Perform the following procedure to install external HiPS cables:

1. Remove all existing switch-to-switch data cables, or wrap plug on odd-numbered jacks (J3-J35) on all switch assemblies.
2. Install switch cables as listed in "Multi-Switch (4 HiPS) Frame Cable Connections (Model 40x)" on page A-20.

Adding Frames to a Model 40x Multi-Switch (4 HiPS) Frame System

Perform the following procedure to install external HiPS cables:

1. Referring to tables in "Multi-Switch (4 HiPS) Frame Cable Connections (Model 40x)" on page A-20, remove wrap plugs on entries marked by an asterisk (*) which correspond to the new frame(s) being added.
2. Install additional switch cables on the appropriate jacks per tables "Multi-Switch (4 HiPS) Frame Cable Connections (Model 40x)" on page A-20.

Installing the SPS System

This section contains cabling information for:

- "Two-Frame SPS Cable Connections"
- "Three-Frame SPS Cable Connections" on page A-35
- "Four-Frame SPS Cable Connections" on page A-36
- "Five-Frame SPS Cable Connections" on page A-38
- "Multi-Switch (4 SPS) Frame Cable Connections (Model 40x)" on page A-40.

Two-Frame SPS Cable Connections

Table A-52 lists information about the data switch cables that interconnect a two-frame RS/6000 SP system.

Table A-52 (Page 1 of 2). Two-Frame SPS Cable Connections			
		Switch Connection	
Length:	**Cable S/N:**	**Frame 1**	**Frame 2**
5 meters		L01-S00-BH-J3	L02-S00-BH-J3
5 meters		L01-S00-BH-J4	L02-S00-BH-J4
5 meters		L01-S00-BH-J5	L02-S00-BH-J5
5 meters		L01-S00-BH-J6	L02-S00-BH-J6
5 meters		L01-S00-BH-J27	L02-S00-BH-J27
5 meters		L01-S00-BH-J28	L02-S00-BH-J28
5 meters		L01-S00-BH-J29	L02-S00-BH-J29
5 meters		L01-S00-BH-J30	L02-S00-BH-J30
5 meters		L01-S00-BH-J11	L02-S00-BH-J11
5 meters		L01-S00-BH-J12	L02-S00-BH-J12
5 meters		L01-S00-BH-J13	L02-S00-BH-J13

Table A-52 (Page 2 of 2). Two-Frame SPS Cable Connections			
		Switch Connection	
Length:	**Cable S/N:**	**Frame 1**	**Frame 2**
5 meters		L01-S00-BH-J14	L02-S00-BH-J14
5 meters		L01-S00-BH-J19	L02-S00-BH-J19
5 meters		L01-S00-BH-J20	L02-S00-BH-J20
5 meters		L01-S00-BH-J21	L02-S00-BH-J21
5 meters		L01-S00-BH-J22	L02-S00-BH-J22

Three-Frame SPS Cable Connections

The following tables list information about the data switch cables that interconnect a three-frame RS/6000 SP system.

Table A-53. Three-Frame SPS Cable Connections—Frame 1 to 2			
		Switch Connection	
Length	**Cable S/N**	**Frame 1**	**Frame 2**
5 meters		L01-S00-BH-J3	L02-S00-BH-J3
5 meters		L01-S00-BH-J5	L02-S00-BH-J5
5 meters		L01-S00-BH-J27	L02-S00-BH-J27
5 meters		L01-S00-BH-J29	L02-S00-BH-J29
5 meters		L01-S00-BH-J11	L02-S00-BH-J11
5 meters		L01-S00-BH-J13	L02-S00-BH-J13
5 meters		L01-S00-BH-J19	L02-S00-BH-J19
5 meters		L01-S00-BH-J21	L02-S00-BH-J21

Table A-54. Three-Frame SPS Cable Connections—Frame 2 to 3			
		Switch Connection	
Length	**Cable S/N**	**Frame 2**	**Frame 3**
5 meters		L02-S00-BH-J4	L03-S00-BH-J4
5 meters		L02-S00-BH-J6	L03-S00-BH-J6
5 meters		L02-S00-BH-J28	L03-S00-BH-J28
5 meters		L02-S00-BH-J30	L03-S00-BH-J30
5 meters		L02-S00-BH-J12	L03-S00-BH-J12
5 meters		L02-S00-BH-J14	L03-S00-BH-J14
5 meters		L02-S00-BH-J20	L03-S00-BH-J20
5 meters		L02-S00-BH-J22	L03-S00-BH-J22

Table A-55. Three-Frame SPS Cable Connections—Frame 1 to 3			
		Switch Connection	
Length	**Cable S/N**	**Frame 1**	**Frame 3**
10 meters		L01-S00-BH-J4	L03-S00-BH-J3
10 meters		L01-S00-BH-J6	L03-S00-BH-J5
10 meters		L01-S00-BH-J28	L03-S00-BH-J27
10 meters		L01-S00-BH-J30	L03-S00-BH-J29
10 meters		L01-S00-BH-J12	L03-S00-BH-J11
10 meters		L01-S00-BH-J14	L03-S00-BH-J13
10 meters		L01-S00-BH-J20	L03-S00-BH-J19
10 meters		L01-S00-BH-J22	L03-S00-BH-J21

Four-Frame SPS Cable Connections

The following tables list information about the data switch cables that interconnect a four-frame RS/6000 SP system.

Table A-56. Four-Frame SPS Cable Connections—Frame 1 to 2			
		Switch Connection	
Length	**Cable S/N**	**Frame 1**	**Frame 2**
5 meters		L01-S00-BH-J3	L02-S00-BH-J3
5 meters		L01-S00-BH-J6	L02-S00-BH-J6
5 meters		L01-S00-BH-J29	L02-S00-BH-J29
5 meters		L01-S00-BH-J12	L02-S00-BH-J12
5 meters		L01-S00-BH-J19	L02-S00-BH-J19
5 meters		L01-S00-BH-J22	L02-S00-BH-J22

Table A-57. Four-Frame SPS Cable Connections—Frame 2 to 3			
		Switch Connection	
Length	**Cable S/N**	**Frame 2**	**Frame 3**
5 meters		L02-S00-BH-J4	L03-S00-BH-J4
5 meters		L02-S00-BH-J27	L03-S00-BH-J27
5 meters		L02-S00-BH-J30	L03-S00-BH-J30
5 meters		L02-S00-BH-J13	L03-S00-BH-J13
5 meters		L02-S00-BH-J20	L03-S00-BH-J20

Table A-58 (Page 1 of 2). Four-Frame SPS Cable Connections—Frame 3 to 4			
		Switch Connection	
Length	**Cable S/N**	**Frame 3**	**Frame 4**
5 meters		L03-S00-BH-J5	L04-S00-BH-J5

Table A-58 (Page 2 of 2). Four-Frame SPS Cable Connections—Frame 3 to 4			
		Switch Connection	
Length	**Cable S/N**	**Frame 3**	**Frame 4**
5 meters		L03-S00-BH-J28	L04-S00-BH-J28
5 meters		L03-S00-BH-J11	L04-S00-BH-J11
5 meters		L03-S00-BH-J14	L04-S00-BH-J14
5 meters		L03-S00-BH-J21	L04-S00-BH-J21
5 meters		L03-S00-BH-J22	L04-S00-BH-J22

Table A-59. Four-Frame SPS Cable Connections—Frame 1 to 3			
		Switch Connection	
Length	**Cable S/N**	**Frame 1**	**Frame 3**
10 meters		L01-S00-BH-J4	L03-S00-BH-J3
10 meters		L01-S00-BH-J27	L03-S00-BH-J6
10 meters		L01-S00-BH-J30	L03-S00-BH-J29
10 meters		L01-S00-BH-J13	L03-S00-BH-J12
10 meters		L01-S00-BH-J20	L03-S00-BH-J19

Table A-60. Four-Frame SPS Cable Connections—Frame 2 to 4			
		Switch Connection	
Length	**Cable S/N**	**Frame 2**	**Frame 4**
10 meters		L02-S00-BH-J5	L04-S00-BH-J4
10 meters		L02-S00-BH-J28	L04-S00-BH-J27
10 meters		L02-S00-BH-J11	L04-S00-BH-J30
10 meters		L02-S00-BH-J14	L04-S00-BH-J13
10 meters		L02-S00-BH-J21	L04-S00-BH-J20

Table A-61. Four-Frame SPS Cable Connections—Frame 1 to 4			
		Switch Connection	
Length	**Cable S/N**	**Frame 1**	**Frame 4**
10 meters		L01-S00-BH-J5	L04-S00-BH-J3
10 meters		L01-S00-BH-J28	L04-S00-BH-J6
10 meters		L01-S00-BH-J11	L04-S00-BH-J29
10 meters		L01-S00-BH-J14	L04-S00-BH-J12
10 meters		L01-S00-BH-J21	L04-S00-BH-J19

Five-Frame SPS Cable Connections

The following tables list information about the data switch cables that interconnect a five-frame RS/6000 SP system.

Table A-62. Five-Frame SPS Cable Connections—Frame 1 to 2			
		Switch Connection	
Length	**Cable S/N**	**Frame 1**	**Frame 2**
5 meters		L01-S00-BH-J3	L02-S00-BH-J3
5 meters		L01-S00-BH-J27	L02-S00-BH-J27
5 meters		L01-S00-BH-J11	L02-S00-BH-J11
5 meters		L01-S00-BH-J19	L02-S00-BH-J19

Table A-63. Five-Frame SPS Cable Connections—Frame 1 to 3			
		Switch Connection	
Length	**Cable S/N**	**Frame 1**	**Frame 3**
10 meters		L01-S00-BH-J4	L03-S00-BH-J3
10 meters		L01-S00-BH-J28	L03-S00-BH-J27
10 meters		L01-S00-BH-J12	L03-S00-BH-J11
10 meters		L01-S00-BH-J20	L03-S00-BH-J19

Table A-64. Five-Frame SPS Cable Connections—Frame 1 to 4			
		Switch Connection	
Length	**Cable S/N**	**Frame 1**	**Frame 4**
10 meters		L01-S00-BH-J5	L04-S00-BH-J3
10 meters		L01-S00-BH-J29	L04-S00-BH-J27
10 meters		L01-S00-BH-J13	L04-S00-BH-J11
10 meters		L01-S00-BH-J21	L04-S00-BH-J19

Table A-65. Five-Frame SPS Cable Connections—Frame 1 to 5			
		Switch Connection	
Length	**Cable S/N**	**Frame 1**	**Frame 5**
10 meters		L01-S00-BH-J6	L05-S00-BH-J3
10 meters		L01-S00-BH-J30	L05-S00-BH-J27
10 meters		L01-S00-BH-J14	L05-S00-BH-J11
10 meters		L01-S00-BH-J22	L05-S00-BH-J19

Table A-66. Five-Frame SPS Cable Connections—Frame 2 to 3			
		Switch Connection	
Length	**Cable S/N**	**Frame 2**	**Frame 3**
5 meters		L02-S00-BH-J4	L03-S00-BH-J4
5 meters		L02-S00-BH-J28	L03-S00-BH-J28
5 meters		L02-S00-BH-J12	L03-S00-BH-J12
5 meters		L02-S00-BH-J20	L03-S00-BH-J20

Table A-67. Five-Frame SPS Cable Connections—Frame 2 to 4			
		Switch Connection	
Length	**Cable S/N**	**Frame 2**	**Frame 4**
10 meters		L02-S00-BH-J5	L04-S00-BH-J4
10 meters		L02-S00-BH-J29	L04-S00-BH-J28
10 meters		L02-S00-BH-J13	L04-S00-BH-J12
10 meters		L02-S00-BH-J21	L04-S00-BH-J20

Table A-68. Five-Frame SPS Cable Connections—Frame 2 to 5			
		Switch Connection	
Length	**Cable S/N**	**Frame 2**	**Frame 5**
10 meters		L02-S00-BH-J6	L05-S00-BH-J4
10 meters		L02-S00-BH-J30	L05-S00-BH-J28
10 meters		L02-S00-BH-J14	L05-S00-BH-J12
10 meters		L02-S00-BH-J22	L05-S00-BH-J20

Table A-69. Five-Frame SPS Cable Connections—Frame 3 to 4			
		Switch Connection	
Length	**Cable S/N**	**Frame 3**	**Frame 4**
5 meters		L03-S00-BH-J5	L04-S00-BH-J5
5 meters		L03-S00-BH-J29	L04-S00-BH-J29
5 meters		L03-S00-BH-J13	L04-S00-BH-J13
5 meters		L03-S00-BH-J21	L04-S00-BH-J21

Table A-70 (Page 1 of 2). Five-Frame SPS Cable Connections—Frame 3 to 5			
		Switch Connection	
Length	**Cable S/N**	**Frame 3**	**Frame 5**
10 meters		L03-S00-BH-J6	L05-S00-BH-J5
10 meters		L03-S00-BH-J30	L05-S00-BH-J29

Table A-70 (Page 2 of 2). Five-Frame SPS Cable Connections—Frame 3 to 5			
		Switch Connection	
Length	**Cable S/N**	**Frame 3**	**Frame 5**
10 meters		L03-S00-BH-J14	L05-S00-BH-J13
10 meters		L03-S00-BH-J22	L05-S00-BH-J21

Table A-71. Five-Frame SPS Cable Connections—Frame 4 to 5			
		Switch Connection	
Length	**Cable S/N**	**Frame 4**	**Frame 5**
10 meters		L04-S00-BH-J6	L05-S00-BH-J6
10 meters		L04-S00-BH-J30	L05-S00-BH-J30
10 meters		L04-S00-BH-J14	L05-S00-BH-J14
10 meters		L04-S00-BH-J22	L05-S00-BH-J22

Multi-Switch (4 SPS) Frame Cable Connections (Model 40x)

The tables in this section list information about the data switch cables that interconnect a four-SPS frame with 5-8 logical frames in a model 40x RS/6000 SP System. All interframe cabling will go from logical frame switches to the switches within the multi-switch frame (**F/C 2031**).

Note: Entries followed by an asterisk (*) indicate that the cable connection is replaced by a wrap plug if the corresponding frame (logical frame L06, L07, or L08) is not present.

Table A-72 (Page 1 of 2). Four-SPS Frame Data Cable Connections			
		Switch Connection	
Length	**Cable S/N**	**Switch Frame**	**Frame**
		S01-S14-BH-J3	L01-S00-BH-J6
		S01-S10-BH-J3	L01-S00-BH-J5
		S01-S06-BH-J3	L01-S00-BH-J4
		S01-S02-BH-J3	L01-S00-BH-J3
		S01-S14-BH-J4	L02-S00-BH-J6
		S01-S10-BH-J4	L02-S00-BH-J5
		S01-S06-BH-J4	L02-S00-BH-J4
		S01-S02-BH-J4	L02-S00-BH-J3
		S01-S14-BH-J5	L03-S00-BH-J6
		S01-S10-BH-J5	L03-S00-BH-J5
		S01-S06-BH-J5	L03-S00-BH-J4
		S01-S02-BH-J5	L03-S00-BH-J3
		S01-S14-BH-J6	L04-S00-BH-J6
		S01-S10-BH-J6	L04-S00-BH-J5
		S01-S06-BH-J6	L04-S00-BH-J4
		S01-S02-BH-J6	L04-S00-BH-J3

Table A-72 (Page 2 of 2). Four-SPS Frame Data Cable Connections		Switch Connection	
Length	**Cable S/N**	**Switch Frame**	**Frame**
		S01-S14-BH-J34	L05-S00-BH-J6
		S01-S10-BH-J34	L05-S00-BH-J5
		S01-S06-BH-J34	L05-S00-BH-J4
		S01-S02-BH-J34	L05-S00-BH-J3
		S01-S14-BH-J33*	L06-S00-BH-J6
		S01-S10-BH-J33*	L06-S00-BH-J5
		S01-S06-BH-J33*	L06-S00-BH-J4
		S01-S02-BH-J33*	L06-S00-BH-J3
		S01-S14-BH-J32 *	L07-S00-BH-J6
		S01-S10-BH-J32 *	L07-S00-BH-J5
		S01-S06-BH-J32 *	L07-S00-BH-J4
		S01-S02-BH-J32 *	L07-S00-BH-J3
		S01-S14-BH-J31*	L08-S00-BH-J6
		S01-S10-BH-J31*	L08-S00-BH-J5
		S01-S06-BH-J31*	L08-S00-BH-J4
		S01-S02-BH-J31*	L08-S00-BH-J3
Note: Entries followed by an asterisk (*) indicate that the cable connection is replaced by a wrap plug if the corresponding frame (logical frame L06, L07, or L08) is not present.			

Table A-73 (Page 1 of 2). Four-SPS Frame Cable Connections—Raceway W2		Switch Connection	
Length	**Cable S/N**	**Switch Frame**	**Frame**
		S01-S14-BH-J27	L01-S00-BH-J30
		S01-S10-BH-J27	L01-S00-BH-J29
		S01-S06-BH-J27	L01-S00-BH-J28
		S01-S02-BH-J27	L01-S00-BH-J27
		S01-S14-BH-J28	L02-S00-BH-J30
		S01-S10-BH-J28	L02-S00-BH-J29
		S01-S06-BH-J28	L02-S00-BH-J28
		S01-S02-BH-J28	L02-S00-BH-J27
		S01-S14-BH-J29	L03-S00-BH-J30
		S01-S10-BH-J29	L03-S00-BH-J29
		S01-S06-BH-J29	L03-S00-BH-J28
		S01-S02-BH-J29	L03-S00-BH-J27
		S01-S14-BH-J30	L04-S00-BH-J30
		S01-S10-BH-J30	L04-S00-BH-J29
		S01-S06-BH-J30	L04-S00-BH-J28

Table A-73 (Page 2 of 2). Four-SPS Frame Cable Connections—Raceway W2			
		Switch Connection	
Length	**Cable S/N**	**Switch Frame**	**Frame**
		S01-S02-BH-J30	L04-S00-BH-J27
		S01-S14-BH-J10	L05-S00-BH-J30
		S01-S10-BH-J10	L05-S00-BH-J29
		S01-S06-BH-J10	L05-S00-BH-J28
		S01-S02-BH-J10	L05-S00-BH-J27
		S01-S14-BH-J9 *	L06-S00-BH-J30
		S01-S10-BH-J9 *	L06-S00-BH-J29
		S01-S06-BH-J9 *	L06-S00-BH-J28
		S01-S02-BH-J9 *	L06-S00-BH-J27
		S01-S14-BH-J8 *	L07-S00-BH-J30
		S01-S10-BH-J8 *	L07-S00-BH-J29
		S01-S06-BH-J8 *	L07-S00-BH-J28
		S01-S02-BH-J8 *	L07-S00-BH-J27
		S01-S14-BH-J7 *	L08-S00-BH-J30
		S01-S10-BH-J7 *	L08-S00-BH-J29
		S01-S06-BH-J7 *	L08-S00-BH-J28
		S01-S02-BH-J7 *	L08-S00-BH-J27
Note: Entries followed by an asterisk (*) indicate that the cable connection is replaced by a wrap plug if the corresponding frame (logical frame L06, L07, or L08) is not present.			

Table A-74 (Page 1 of 2). Four-SPS Frame Cable Connections—Raceway W3			
		Switch Connection	
Length	**Cable S/N**	**Switch Frame**	**Frame**
		S01-S14-BH-J11	L01-S00-BH-J14
		S01-S10-BH-J11	L01-S00-BH-J13
		S01-S06-BH-J11	L01-S00-BH-J12
		S01-S02-BH-J11	L01-S00-BH-J11
		S01-S14-BH-J12	L02-S00-BH-J14
		S01-S10-BH-J12	L02-S00-BH-J13
		S01-S06-BH-J12	L02-S00-BH-J12
		S01-S02-BH-J12	L02-S00-BH-J11
		S01-S14-BH-J13	L03-S00-BH-J14
		S01-S10-BH-J13	L03-S00-BH-J13
		S01-S06-BH-J13	L03-S00-BH-J12
		S01-S02-BH-J13	L03-S00-BH-J11
		S01-S14-BH-J14	L04-S00-BH-J14
		S01-S10-BH-J14	L04-S00-BH-J13

Length	Cable S/N	Switch Connection	
		Switch Frame	Frame
		S01-S06-BH-J14	L04-S00-BH-J12
		S01-S02-BH-J14	L04-S00-BH-J11
		S01-S14-BH-J26	L05-S00-BH-J14
		S01-S10-BH-J26	L05-S00-BH-J13
		S01-S06-BH-J26	L05-S00-BH-J12
		S01-S02-BH-J26	L05-S00-BH-J11
		S01-S14-BH-J25 *	L06-S00-BH-J14
		S01-S10-BH-J25 *	L06-S00-BH-J13
		S01-S06-BH-J25 *	L06-S00-BH-J12
		S01-S02-BH-J25 *	L06-S00-BH-J11
		S01-S14-BH-J24 *	L07-S00-BH-J14
		S01-S10-BH-J24 *	L07-S00-BH-J13
		S01-S06-BH-J24 *	L07-S00-BH-J12
		S01-S02-BH-J24 *	L07-S00-BH-J11
		S01-S14-BH-J23 *	L08-S00-BH-J14
		S01-S10-BH-J23 *	L08-S00-BH-J13
		S01-S06-BH-J23 *	L08-S00-BH-J12
		S01-S02-BH-J23 *	L08-S00-BH-J11

Table A-74 (Page 2 of 2). Four-SPS Frame Cable Connections—Raceway W3

Note: Entries followed by an asterisk (*) indicate that the cable connection is replaced by a wrap plug if the corresponding frame (logical frame L06, L07, or L08) is not present.

Length	Cable S/N	Switch Connection	
		Switch Frame	Frame
		S01-S14-BH-J19	L01-S00-BH-J22
		S01-S10-BH-J19	L01-S00-BH-J21
		S01-S06-BH-J19	L01-S00-BH-J20
		S01-S02-BH-J19	L01-S00-BH-J19
		S01-S14-BH-J20	L02-S00-BH-J22
		S01-S10-BH-J20	L02-S00-BH-J21
		S01-S06-BH-J20	L02-S00-BH-J20
		S01-S02-BH-J20	L02-S00-BH-J19
		S01-S14-BH-J21	L03-S00-BH-J22
		S01-S10-BH-J21	L03-S00-BH-J21
		S01-S06-BH-J21	L03-S00-BH-J20
		S01-S02-BH-J21	L03-S00-BH-J19
		S01-S14-BH-J22	L04-S00-BH-J22

Table A-75 (Page 1 of 2). Four-SPS Frame Cable Connections—Raceway W4

Table A-75 (Page 2 of 2). Four-SPS Frame Cable Connections—Raceway W4			
		Switch Connection	
Length	**Cable S/N**	**Switch Frame**	**Frame**
		S01-S10-BH-J22	L04-S00-BH-J21
		S01-S06-BH-J22	L04-S00-BH-J20
		S01-S02-BH-J22	L04-S00-BH-J19
		S01-S14-BH-J18	L05-S00-BH-J22
		S01-S10-BH-J18	L05-S00-BH-J21
		S01-S06-BH-J18	L05-S00-BH-J20
		S01-S02-BH-J18	L05-S00-BH-J19
		S01-S14-BH-J17 *	L06-S00-BH-J22
		S01-S10-BH-J17 *	L06-S00-BH-J21
		S01-S06-BH-J17 *	L06-S00-BH-J20
		S01-S02-BH-J17 *	L06-S00-BH-J19
		S01-S14-BH-J16 *	L07-S00-BH-J22
		S01-S10-BH-J16 *	L07-S00-BH-J21
		S01-S06-BH-J16 *	L07-S00-BH-J20
		S01-S02-BH-J16 *	L07-S00-BH-J19
		S01-S14-BH-J15 *	L08-S00-BH-J22
		S01-S10-BH-J15 *	L08-S00-BH-J21
		S01-S06-BH-J15 *	L08-S00-BH-J20
		S01-S02-BH-J15 *	L08-S00-BH-J19
Note: Entries followed by an asterisk (*) indicate that the cable connection is replaced by a wrap plug if the corresponding frame (logical frame L06, L07, or L08) is not present.			

Upgrading the SPS System

The following section is intended for use only when additional frames are added to an existing system AND the existing system contains the SPS feature.

Note: Make sure to use the correct procedure based on the number of **logical** frames in the original system and the final system. The number of logical frames is the number of frames with an SPS, which may be less than the number of physical frames.

This section contains cabling instructions for the following:

- "Upgrading From One Frame to Two Frames (SPS)" on page A-45
- "Upgrading From One Frame to Three Frames (SPS)" on page A-45
- "Upgrading From One Frame to Four Frames (SPS)" on page A-45
- "Upgrading From One Frame to Five Frames (SPS)" on page A-45
- "Upgrading From Two Frames to Three Frames (SPS)" on page A-45
- "Upgrading From Two Frames to Four Frames (SPS)" on page A-46
- "Upgrading From Two Frames to Five Frames (SPS)" on page A-47
- "Upgrading From Three Frames to Four Frames (SPS)" on page A-48
- "Upgrading From Three Frames to Five Frames (SPS)" on page A-49
- "Upgrading From Four Frames to Five Frames (SPS)" on page A-51
- "Upgrading to Model 40x with Multi-Switch (4 SPS) Frame" on page A-52

- "Adding Frames (SPS) to a Model 40x Multi-Switch (4 SPS) Frame System" on page A-52.

Upgrading From One Frame to Two Frames (SPS)

Perform the following procedure to install external SPS cables:

1. Remove wrap plugs from odd-numbered jacks (J3-J35) on all switch assemblies.
2. Install switch cables as listed in "Two-Frame SPS Cable Connections" on page A-34.

Upgrading From One Frame to Three Frames (SPS)

Perform the following procedure to install external SPS cables:

1. Remove wrap plugs from odd-numbered jacks (J3-J35) on all switch assemblies.
2. Install switch cables as listed in "Three-Frame SPS Cable Connections" on page A-35.

Upgrading From One Frame to Four Frames (SPS)

Perform the following procedure to install external SPS cables:

1. Remove wrap plugs from odd-numbered jacks (J3-J35) on all switch assemblies.
2. Install switch cables as listed in "Four-Frame SPS Cable Connections" on page A-36.

Upgrading From One Frame to Five Frames (SPS)

Perform the following procedure to install external SPS cables:

1. Remove wrap plugs from odd-numbered jacks (J3-J35) on all switch assemblies.
2. Install switch cables as listed in "Five-Frame SPS Cable Connections" on page A-38.

Upgrading From Two Frames to Three Frames (SPS)

Perform the following procedure to install external SPS cables:

1. Change switch cable connections as indicated in the following table. The removed cables are to be labeled and plugged into the new locations.

Table A-76. External SPS Cable Changes For Two-To-Three Frame Upgrades

Length	Cable S/N	Removed Location		New Location	
		From	**To**	**From**	**To**
5 meters		L01-S00-BH-J4	L02-S00-BH-J4	L02-S00-BH-J4	L03-S00-BH-J4
5 meters		L01-S00-BH-J6	L02-S00-BH-J6	L02-S00-BH-J6	L03-S00-BH-J6
5 meters		L01-S00-BH-J28	L02-S00-BH-J28	L02-S00-BH-J28	L03-S00-BH-J28
5 meters		L01-S00-BH-J30	L02-S00-BH-J30	L02-S00-BH-J30	L03-S00-BH-J30
5 meters		L01-S00-BH-J12	L02-S00-BH-J12	L02-S00-BH-J12	L03-S00-BH-J12
5 meters		L01-S00-BH-J14	L02-S00-BH-J14	L02-S00-BH-J14	L03-S00-BH-J14
5 meters		L01-S00-BH-J20	L02-S00-BH-J20	L02-S00-BH-J20	L03-S00-BH-J20
5 meters		L01-S00-BH-J22	L02-S00-BH-J22	L02-S00-BH-J22	L03-S00-BH-J22

2. Install new external high-performance switch cables as indicated in the following table.

Table A-77. External SPS Cable Additions For Two-To-Three Frame Upgrades			
Length	Cable S/N	From	To
10 meters		L01-S00-BH-J4	L03-S00-BH-J3
10 meters		L01-S00-BH-J6	L03-S00-BH-J5
10 meters		L01-S00-BH-J28	L03-S00-BH-J27
10 meters		L01-S00-BH-J30	L03-S00-BH-J29
10 meters		L01-S00-BH-J12	L03-S00-BH-J11
10 meters		L01-S00-BH-J14	L03-S00-BH-J13
10 meters		L01-S00-BH-J20	L03-S00-BH-J19
10 meters		L01-S00-BH-J22	L03-S00-BH-J21

Upgrading From Two Frames to Four Frames (SPS)

Perform the following procedure to install external SPS cables:

1. Change switch cable connections as indicated in the following table. The removed cables are to be labeled and plugged into the new locations.

Table A-78. External SPS Cable Changes For Two-To-Four Frame Upgrades					
		Removed Location		New Location	
Length	Cable S/N	From	To	From	To
5 meters		L01-S00-BH-J5	L02-S00-BH-J5	L03-S00-BH-J5	L04-S00-BH-J5
5 meters		L01-S00-BH-J28	L02-S00-BH-J28	L03-S00-BH-J28	L04-S00-BH-J28
5 meters		L01-S00-BH-J11	L02-S00-BH-J11	L03-S00-BH-J11	L04-S00-BH-J11
5 meters		L01-S00-BH-J14	L02-S00-BH-J14	L03-S00-BH-J14	L04-S00-BH-J14
5 meters		L01-S00-BH-J21	L02-S00-BH-J21	L03-S00-BH-J21	L04-S00-BH-J21
5 meters		L01-S00-BH-J4	L02-S00-BH-J4	L02-S00-BH-J4	L03-S00-BH-J4
5 meters		L01-S00-BH-J27	L02-S00-BH-J27	L02-S00-BH-J27	L03-S00-BH-J27
5 meters		L01-S00-BH-J30	L02-S00-BH-J30	L02-S00-BH-J30	L03-S00-BH-J30
5 meters		L01-S00-BH-J13	L02-S00-BH-J13	L02-S00-BH-J13	L03-S00-BH-J13
5 meters		L01-S00-BH-J20	L02-S00-BH-J20	L02-S00-BH-J20	L03-S00-BH-J20

2. Install new external high-performance switch cables as indicated in the following table.

Table A-79 (Page 1 of 2). External SPS Cable Additions For Two-To-Four Frame Upgrades			
Length	Cable S/N	From	To
5 meters		L03-S00-BH-J22	L04-S00-BH-J22
10 meters		L01-S00-BH-J4	L03-S00-BH-J3
10 meters		L01-S00-BH-J27	L03-S00-BH-J6
10 meters		L01-S00-BH-J30	L03-S00-BH-J29
10 meters		L01-S00-BH-J13	L03-S00-BH-J12
10 meters		L01-S00-BH-J20	L03-S00-BH-J19
10 meters		L01-S00-BH-J5	L04-S00-BH-J3

Table A-79 (Page 2 of 2). External SPS Cable Additions For Two-To-Four Frame Upgrades			
Length	Cable S/N	From	To
10 meters		L01-S00-BH-J28	L04-S00-BH-J6
10 meters		L01-S00-BH-J11	L04-S00-BH-J29
10 meters		L01-S00-BH-J14	L04-S00-BH-J12
10 meters		L01-S00-BH-J21	L04-S00-BH-J19
10 meters		L02-S00-BH-J5	L04-S00-BH-J4
10 meters		L02-S00-BH-J28	L04-S00-BH-J27
10 meters		L02-S00-BH-J11	L04-S00-BH-J30
10 meters		L02-S00-BH-J14	L04-S00-BH-J13
10 meters		L02-S00-BH-J21	L04-S00-BH-J20

Upgrading From Two Frames to Five Frames (SPS)

Perform the following procedure to install external SPS cables:

1. Remove switch cable connections as indicated in the following table. These cables will not be reused in this system.

Table A-80. External SPS Cable Removals For Two-To-Five Frame Upgrades			
Length	Cable S/N	From	To
5 meters		L01-S00-BH-J6	L02-S00-BH-J6
5 meters		L01-S00-BH-J30	L02-S00-BH-J30
5 meters		L01-S00-BH-J14	L02-S00-BH-J14
5 meters		L01-S00-BH-J22	L02-S00-BH-J22

2. Change switch cable connections as indicated in the following table. The removed cables are to be labeled and plugged into the new locations.

Table A-81. External SPS Cable Changes For Two-To-Five Frame Upgrades					
		Removed Location		New Location	
Length	Cable S/N	From	To	From	To
5 meters		L01-S00-BH-J5	L02-S00-BH-J5	L03-S00-BH-J5	L04-S00-BH-J5
5 meters		L01-S00-BH-J29	L02-S00-BH-J29	L03-S00-BH-J29	L04-S00-BH-J29
5 meters		L01-S00-BH-J13	L02-S00-BH-J13	L03-S00-BH-J13	L04-S00-BH-J13
5 meters		L01-S00-BH-J21	L02-S00-BH-J21	L03-S00-BH-J21	L04-S00-BH-J21
5 meters		L01-S00-BH-J4	L02-S00-BH-J4	L02-S00-BH-J4	L03-S00-BH-J4
5 meters		L01-S00-BH-J28	L02-S00-BH-J28	L02-S00-BH-J28	L03-S00-BH-J28
5 meters		L01-S00-BH-J12	L02-S00-BH-J12	L02-S00-BH-J12	L03-S00-BH-J12
5 meters		L01-S00-BH-J20	L02-S00-BH-J20	L02-S00-BH-J20	L03-S00-BH-J20

3. Install new external high-performance switch cables as indicated in the following table.

Table A-82. External SPS Cable Additions For Two-To-Five Frame Upgrades			
Length	**Cable S/N**	**From**	**To**
10 meters		L01-S00-BH-J4	L03-S00-BH-J3
10 meters		L01-S00-BH-J28	L03-S00-BH-J27
10 meters		L01-S00-BH-J12	L03-S00-BH-J11
10 meters		L01-S00-BH-J20	L03-S00-BH-J19
10 meters		L01-S00-BH-J5	L04-S00-BH-J3
10 meters		L01-S00-BH-J29	L04-S00-BH-J27
10 meters		L01-S00-BH-J13	L04-S00-BH-J11
10 meters		L01-S00-BH-J21	L04-S00-BH-J19
10 meters		L01-S00-BH-J6	L05-S00-BH-J3
10 meters		L01-S00-BH-J30	L05-S00-BH-J27
10 meters		L01-S00-BH-J14	L05-S00-BH-J11
10 meters		L01-S00-BH-J22	L05-S00-BH-J19
10 meters		L02-S00-BH-J5	L04-S00-BH-J4
10 meters		L02-S00-BH-J29	L04-S00-BH-J28
10 meters		L02-S00-BH-J13	L04-S00-BH-J12
10 meters		L02-S00-BH-J21	L04-S00-BH-J20
10 meters		L02-S00-BH-J6	L05-S00-BH-J4
10 meters		L02-S00-BH-J30	L05-S00-BH-J28
10 meters		L02-S00-BH-J14	L05-S00-BH-J12
10 meters		L02-S00-BH-J22	L05-S00-BH-J20
10 meters		L03-S00-BH-J6	L05-S00-BH-J5
10 meters		L03-S00-BH-J30	L05-S00-BH-J29
10 meters		L03-S00-BH-J14	L05-S00-BH-J13
10 meters		L03-S00-BH-J22	L05-S00-BH-J21
10 meters		L04-S00-BH-J6	L05-S00-BH-J6
10 meters		L04-S00-BH-J30	L05-S00-BH-J30
10 meters		L04-S00-BH-J14	L05-S00-BH-J14
10 meters		L04-S00-BH-J22	L05-S00-BH-J22

Upgrading From Three Frames to Four Frames (SPS)

Perform the following procedure to install external SPS cables:

1. Change switch cable connections as indicated in the following table. The removed cables are to be labeled and plugged into the new locations.

Table A-83 (Page 1 of 2). External SPS Cable Changes For Three-To-Four Frame Upgrades					
		Removed Location		**New Location**	
Length	**Cable S/N**	**From**	**To**	**From**	**To**
5 meters		L01-S00-BH-J5	L02-S00-BH-J5	L03-S00-BH-J5	L04-S00-BH-J5

Table A-83 (Page 2 of 2). External SPS Cable Changes For Three-To-Four Frame Upgrades		Removed Location		New Location	
Length	**Cable S/N**	**From**	**To**	**From**	**To**
5 meters		L01-S00-BH-J11	L02-S00-BH-J11	L03-S00-BH-J11	L04-S00-BH-J11
5 meters		L01-S00-BH-J21	L02-S00-BH-J21	L03-S00-BH-J21	L04-S00-BH-J21
5 meters		L02-S00-BH-J28	L03-S00-BH-J28	L03-S00-BH-J28	L04-S00-BH-J28
5 meters		L02-S00-BH-J14	L03-S00-BH-J14	L03-S00-BH-J14	L04-S00-BH-J14
5 meters		L02-S00-BH-J22	L03-S00-BH-J22	L02-S00-BH-J22	L01-S00-BH-J22
10 meters		L01-S00-BH-J6	L03-S00-BH-J5	L01-S00-BH-J5	L04-S00-BH-J3
10 meters		L01-S00-BH-J28	L03-S00-BH-J27	L01-S00-BH-J28	L04-S00-BH-J6
10 meters		L01-S00-BH-J12	L03-S00-BH-J11	L01-S00-BH-J13	L03-S00-BH-J12
10 meters		L01-S00-BH-J14	L03-S00-BH-J13	L01-S00-BH-J14	L04-S00-BH-J12
10 meters		L01-S00-BH-J22	L03-S00-BH-J21	L01-S00-BH-J21	L04-S00-BH-J19
5 meters		L01-S00-BH-J27	L02-S00-BH-J27	L02-S00-BH-J27	L03-S00-BH-J27
5 meters		L01-S00-BH-J13	L02-S00-BH-J13	L02-S00-BH-J13	L03-S00-BH-J13
5 meters		L02-S00-BH-J12	L03-S00-BH-J12	L02-S00-BH-J12	L01-S00-BH-J12
5 meters		L02-S00-BH-J6	L03-S00-BH-J6	L02-S00-BH-J6	L01-S00-BH-J6

2. Install new external high-performance switch cables as indicated in the following table.

Table A-84. External SPS Cable Additions For Three-To-Four Frame Upgrades			
Length	**Cable S/N**	**From**	**To**
5 meters		L03-S00-BH-J22	L04-S00-BH-J22
10 meters		L01-S00-BH-J27	L03-S00-BH-J6
10 meters		L02-S00-BH-J11	L04-S00-BH-J30
10 meters		L02-S00-BH-J28	L04-S00-BH-J27
10 meters		L02-S00-BH-J5	L04-S00-BH-J4
10 meters		L01-S00-BH-J11	L04-S00-BH-J29
10 meters		L02-S00-BH-J14	L04-S00-BH-J13
10 meters		L02-S00-BH-J21	L04-S00-BH-J20

Upgrading From Three Frames to Five Frames (SPS)

Perform the following procedure to install external SPS cables:

1. Remove switch cable connections as indicated in the following table. These cables will not be reused in this system.

Table A-85 (Page 1 of 2). External SPS Cable Removals For Two-To-Five Frame Upgrades			
Length	**Cable S/N**	**From**	**To**
5 meters		L02-S00-BH-J6	L03-S00-BH-J6
5 meters		L02-S00-BH-J30	L03-S00-BH-J30
5 meters		L02-S00-BH-J14	L03-S00-BH-J14

Table A-85 (Page 2 of 2). External SPS Cable Removals For Two-To-Five Frame Upgrades			
Length	**Cable S/N**	**From**	**To**
5 meters		L02-S00-BH-J22	L03-S00-BH-J22

2. Change switch cable connections as indicated in the following table. The removed cables are to be labeled and plugged into the new locations.

Table A-86. External SPS Cable Changes For Three-To-Five Frame Upgrades					
		Removed Location		**New Location**	
Length	**Cable S/N**	**From**	**To**	**From**	**To**
5 meters		L01-S00-BH-J5	L02-S00-BH-J5	L03-S00-BH-J5	L04-S00-BH-J5
5 meters		L01-S00-BH-J29	L02-S00-BH-J29	L03-S00-BH-J29	L04-S00-BH-J29
5 meters		L01-S00-BH-J13	L02-S00-BH-J13	L03-S00-BH-J13	L04-S00-BH-J13
5 meters		L01-S00-BH-J21	L02-S00-BH-J21	L03-S00-BH-J21	L04-S00-BH-J21
10 meters		L01-S00-BH-J6	L03-S00-BH-J5	L01-S00-BH-J6	L05-S00-BH-J3
10 meters		L01-S00-BH-J30	L03-S00-BH-J29	L01-S00-BH-J30	L05-S00-BH-J27
10 meters		L01-S00-BH-J14	L03-S00-BH-J13	L01-S00-BH-J14	L05-S00-BH-J11
10 meters		L01-S00-BH-J22	L03-S00-BH-J21	L01-S00-BH-J22	L05-S00-BH-J19

3. Install new external high-performance switch cables as indicated in the following table.

Table A-87 (Page 1 of 2). External SPS Cable Additions For Three-To-Five Frame Upgrades			
Length	**Cable S/N**	**From**	**To**
10 meters		L01-S00-BH-J5	L04-S00-BH-J3
10 meters		L01-S00-BH-J29	L04-S00-BH-J27
10 meters		L01-S00-BH-J13	L04-S00-BH-J11
10 meters		L01-S00-BH-J21	L04-S00-BH-J19
10 meters		L02-S00-BH-J5	L04-S00-BH-J4
10 meters		L02-S00-BH-J29	L04-S00-BH-J28
10 meters		L02-S00-BH-J13	L04-S00-BH-J12
10 meters		L02-S00-BH-J21	L04-S00-BH-J20
10 meters		L02-S00-BH-J6	L05-S00-BH-J4
10 meters		L02-S00-BH-J30	L05-S00-BH-J28
10 meters		L02-S00-BH-J14	L05-S00-BH-J12
10 meters		L02-S00-BH-J22	L05-S00-BH-J20
10 meters		L03-S00-BH-J6	L05-S00-BH-J5
10 meters		L03-S00-BH-J30	L05-S00-BH-J29
10 meters		L03-S00-BH-J14	L05-S00-BH-J13
10 meters		L03-S00-BH-J22	L05-S00-BH-J21
10 meters		L04-S00-BH-J6	L05-S00-BH-J6
10 meters		L04-S00-BH-J30	L05-S00-BH-J30
10 meters		L04-S00-BH-J14	L05-S00-BH-J14

Table A-87 (Page 2 of 2). External SPS Cable Additions For Three-To-Five Frame Upgrades			
Length	**Cable S/N**	**From**	**To**
10 meters		L04-S00-BH-J22	L05-S00-BH-J22

Upgrading From Four Frames to Five Frames (SPS)

Perform the following procedure to install external SPS cables:

1. Remove switch cable connections as indicated in the following table. These cables will not be reused in this system.

Table A-88. External SPS Cable Removals For Two-To-Five Frame Upgrades			
Length	**Cable S/N**	**From**	**To**
5 meters		L01-S00-BH-J29	L02-S00-BH-J29
5 meters		L01-S00-BH-J12	L02-S00-BH-J12
5 meters		L02-S00-BH-J30	L03-S00-BH-J30
5 meters		L03-S00-BH-J11	L04-S00-BH-J11
5 meters		L03-S00-BH-J22	L04-S00-BH-J22

2. Change switch cable connections as indicated in the following table. The removed cables are to be labeled and plugged into the new locations.

Table A-89. External SPS Cable Changes For Four-To-Five Frame Upgrades					
		Removed Location		**New Location**	
Length	**Cable S/N**	**From**	**To**	**From**	**To**
10 meters		L01-S00-BH-J30	L03-S00-BH-J29	L01-S00-BH-J30	L05-S00-BH-J27
5 meters		L02-S00-BH-J27	L03-S00-BH-J27	L02-S00-BH-J28	L03-S00-BH-J28
5 meters		L02-S00-BH-J13	L03-S00-BH-J13	L02-S00-BH-J12	L03-S00-BH-J12
5 meters		L01-S00-BH-J6	L02-S00-BH-J6	L01-S00-BH-J27	L02-S00-BH-J27
5 meters		L03-S00-BH-J28	L04-S00-BH-J28	L03-S00-BH-J29	L04-S00-BH-J29
5 meters		L03-S00-BH-J14	L04-S00-BH-J14	L03-S00-BH-J13	L04-S00-BH-J13
10 meters		L01-S00-BH-J27	L03-S00-BH-J6	L01-S00-BH-J12	L03-S00-BH-J11
10 meters		L01-S00-BH-J13	L03-S00-BH-J12	L01-S00-BH-J28	L03-S00-BH-J27
10 meters		L02-S00-BH-J28	L04-S00-BH-J27	L02-S00-BH-J13	L04-S00-BH-J12
10 meters		L02-S00-BH-J11	L04-S00-BH-J30	L02-S00-BH-J29	L04-S00-BH-J28
10 meters		L01-S00-BH-J28	L04-S00-BH-J6	L01-S00-BH-J29	L04-S00-BH-J27
10 meters		L01-S00-BH-J11	L04-S00-BH-J29	L01-S00-BH-J13	L04-S00-BH-J11
10 meters		L01-S00-BH-J14	L04-S00-BH-J12	L01-S00-BH-J14	L05-S00-BH-J11
10 meters		L02-S00-BH-J14	L04-S00-BH-J13	L02-S00-BH-J14	L05-S00-BH-J12
5 meters		L01-S00-BH-J22	L02-S00-BH-J22	L01-S00-BH-J11	L02-S00-BH-J11

3. Install new external high-performance switch cables as indicated in the following table.

Length	Cable S/N	From	To
		Table A-90. External SPS Cable Additions For Four-To-Five Frame Upgrades	
10 meters		L01-S00-BH-J6	L05-S00-BH-J3
10 meters		L01-S00-BH-J22	L05-S00-BH-J19
10 meters		L02-S00-BH-J6	L05-S00-BH-J4
10 meters		L02-S00-BH-J30	L05-S00-BH-J28
10 meters		L02-S00-BH-J22	L05-S00-BH-J20
10 meters		L03-S00-BH-J6	L05-S00-BH-J5
10 meters		L03-S00-BH-J30	L05-S00-BH-J29
10 meters		L03-S00-BH-J14	L05-S00-BH-J13
10 meters		L03-S00-BH-J22	L05-S00-BH-J21
10 meters		L04-S00-BH-J6	L05-S00-BH-J6
10 meters		L04-S00-BH-J30	L05-S00-BH-J30
10 meters		L04-S00-BH-J14	L05-S00-BH-J14
10 meters		L04-S00-BH-J22	L05-S00-BH-J22

Upgrading to Model 40x with Multi-Switch (4 SPS) Frame

Perform the following procedure to install external SPS cables:

1. Remove all existing switch-to-switch data cables, or wrap plug on odd-numbered jacks (J3-J35) on all switch assemblies.
2. Install switch cables as listed in "Multi-Switch (4 SPS) Frame Cable Connections (Model 40x)" on page A-40.

Adding Frames (SPS) to a Model 40x Multi-Switch (4 SPS) Frame System

Perform the following procedure to install external SPS cables:

1. Referring to tables in "Multi-Switch (4 SPS) Frame Cable Connections (Model 40x)" on page A-40, remove wrap plugs on entries marked by an asterisk (*) which correspond to the new frame(s) being added.
2. Install additional switch cables on the appropriate jacks per tables "Multi-Switch (4 SPS) Frame Cable Connections (Model 40x)" on page A-40.

Appendix B. SP Optional Features on Thin, Wide, and High Nodes

This appendix contains tables which describe the optional features available on thin, wide, and high nodes.

Thin, Wide, and High Node Processor Drawer Features

Table B-1 (Page 1 of 2). Thin, Wide, and High Node Processor Drawer Features	
Feature Code	**Description**
2002	Thin node drawer consisting of two 66 MHz POWER2 processor nodes which can be asymmetrically configured for memory, DASD and adapters. Each node has an Ethernet for the system control network, two memory card slots, four Micro Channel slots, and two DASD bays.
2003	Wide node drawer consisting of one 66 MHz POWER2 processor node. This node has eight memory card slots, eight Micro Channel and four DASD bays. The Ethernet High Performance LAN adapter (**F/C 2980**) is a prerequisite on all wide nodes.
2004	Thin node drawer consisting of a high performance Thin Node 2 CPU card packaged in an SP thin processor node. The CPU requires the equivalent of two memory cards to maintain high bandwidth to memory. Due to packaging constraints, this is accomplished using a single memory card plus SIMMs on the CPU card. In addition, a new +4 V dc power supply is added to provide an additional required voltage. Other than these changes, the Thin Node 2 processor node components are the same as thin processor node type **F/C 2002**.
2005	Wide node drawer consisting of one 77 MHz POWER2 processor node. This node has eight memory card slots, eight Micro Channel and four DASD bays. The Ethernet High Performance LAN adapter (**F/C 2980**) is a prerequisite on all wide nodes.
2006	604 high node consisting of a 2-, 4-, 6-, or 8-way symmetric multiprocessing system that uses PowerPC 604 processors that operate at 112 MHz. The 604 high node occupies two drawers (four slots) in a frame, has four memory card slots, 16 Micro Channel, three DASD bays and four CPU cards (two CPUs per card).
2007	Wide node drawer consisting of one 135 MHz wide node. This node has eight memory card slots, eight Micro Channel, and four DASD bays. The Ethernet High Performance LAN adapter (**F/C 2980**) is a prerequisite on all wide nodes.
2008	Thin node drawer consisting of two 120 MHz thin nodes. Each node has four memory card slots, four Micro Channel, and two DASD bays.
2009	604e high node consisting of a 2-, 4-, 6-, or 8-way symmetric multiprocessing system that uses PowerPC 604e processors that operate at 200 MHz. The 604e high node occupies two drawers (four slots) in a frame, has four memory card slots, 16 Micro Channel, four DASD bays and four CPU cards (two CPUs per card).
2022	Thin node drawer consisting of two 160 MHz thin nodes. Each node has four memory card slots, four Micro Channel, and two DASD bays.
2050	One 332 MHz SMP thin node, two of which can occupy a drawer. Each node may be equipped with either two or four processors and has two memory slots, two PCI slots, two DASD bays, and a dedicated MX slot for an optional SP Switch MX adapter.
2051	One 332 MHz SMP wide node occupying one drawer. Each node may be equipped with either two or four processors and has two memory slots, ten PCI slots, four DASD bays, and a dedicated MX slot for an optional SP Switch MX adapter.

Table B-1 (Page 2 of 2). Thin, Wide, and High Node Processor Drawer Features	
Feature Code	**Description**
2052	One POWER3 SMP thin node, two of which can occupy a drawer. Each node may be equipped with either one or two processors and has two memory slots, two PCI slots, two DASD bays, and a dedicated MX slot for an required SP Switch MX2 adapter.
2053	One POWER3 SMP wide node occupying one drawer. Each node may be equipped with either one or two processors and has two memory slots, ten PCI slots, four DASD bays, and a dedicated MX slot for an required SP Switch MX2 adapter.

Processor Options for Multiprocessor Nodes

Processor Options for POWER3 SMP Thin and Wide Nodes

Table B-2. Processor Options for POWER3 SMP Thin and Wide Nodes			
Feature Code	**Multiplier**	**Description**	**Comments**
4342	X 1	One processor card with one CPU	minimum required
4342	X 2	Two processor cards with one CPU each (two CPUs total)	maximum allowed
Note: Feature code and node limits apply to both the POWER3 SMP thin and POWER3 SMP wide nodes			

Processor Options for 332 MHz SMP Wide Nodes and 332 MHz SMP Thin Nodes

Table B-3. Processor Options for 332 MHz SMP Nodes			
Feature Code	**Multiplier**	**Description**	**Comments**
4320	X 1	One processor card with two CPUs	minimum required
4320	X 2	Two processor cards with two CPUs each (four CPUs total)	maximum allowed
Note: Feature code and node limits apply to both the 332 MHz SMP thin and 332 MHz SMP wide nodes			

Processor Options for 200 MHz High Nodes

Table B-4. Processor Options for 200 MHz High Nodes			
Feature Code	**Multiplier**	**Description**	**Comments**
4324	X 1	Two processors	minimum required
4324	X 2	Four processors	
4324	X 3	Six processors	
4324	X 4	Eight processors	maximum allowed

Processor Options for 112 MHz High Nodes

Table B-5. Processor Options for 112 MHz High Nodes				
Feature Code	**Multiplier**	**Description**	**Comments**
4301	X 1	Two processors	minimum required
4301	X 2	Four processors	
4301	X 3	Six processors	
4301	X 4	Eight processors	maximum allowed

Thin Node Memory Options

Optional Memory Features for POWER3 SMP Thin Nodes (F/C 2052)

POWER3 SMP thin nodes have two memory cards and require a minimum of 256 MB of memory. These nodes will support a maximum of 4 GB of memory. Memory is supplied by 128 MB DIMMs that must be mounted in pairs (256 MB increments). The memory cards **are not** required to be configured symmetrically. Each card has the capacity to mount 2 GB of DIMMs. Memory cards and DIMMs **are not** interchangeable between SMP and non-SMP thin nodes. Memory cards **are not** interchangeable between 332 MHz SMP and POWER3 SMP thin nodes.

Table B-6. Memory features for POWER3 SMP thin nodes (F/C 2052)				
Feature Code	**Description**	**Minimum Node Requirement**	**Maximum Allowed Per Node**
4098	Base Memory Card	1	2
4110	One Pair of 128 MB DIMMs (256 MB total)	1	16 DIMMs (8 pairs)

Optional Memory Features for 332 MHz SMP Thin Nodes (F/C 2050)

332 MHz SMP thin nodes have two memory cards and require a minimum of 256 MB of memory. These nodes will support a maximum of 3 GB of memory. Memory is supplied by 128 MB DIMMs that must be mounted in pairs (256 MB increments). The memory cards **are not** required to be configured symmetrically. Each card has the capacity to mount 2 GB of DIMMs, however, only 3 GB are addressable per node. Memory cards and DIMMs **are not** interchangeable between SMP and non-SMP thin nodes. Memory cards **are not** interchangeable between 332 MHz SMP and POWER3 SMP Thin and Wide thin nodes.

Table B-7. Memory features for 332 MHz SMP thin nodes (F/C 2050)				
Feature Code	**Description**	**Minimum Node Requirement**	**Maximum Allowed Per Node**
4093	Base Memory Card	2	2
4110	One Pair of 128 MB DIMMs (256 MB total)	1	12 DIMMs (6 pairs)

Optional Memory Features for 160 MHz Thin Node (F/C 2022)

All 160 MHz thin nodes can be equipped with the feature codes listed in Table B-8 on page B-4. These memory options are configured with type S6.0 memory. If you are upgrading older thin nodes to 160 MHz, the memory modules **must** be replaced with type S6.0 memory.

The 160 MHz thin node has a minimum requirement of two memory cards per node. All cards must be symmetrical in size and must be installed in two or four card increments. The 160 MHz thin node requires a minimum memory size of 64 MB and has a maximum limit of 1 GB (four 256 MB cards).

Note: For optimal performance, use four, 32 MB cards as a minimum memory option.

Table B-8. Optional Memory Features for Thin Processor Nodes (F/C 2008)		
Feature Code	**Description**	**Order Type**
4086	32 MB card	Factory or Field
4087	64 MB card	Factory or Field
4088	128 MB card	Factory or Field
4089	256 MB card	Factory or Field

Optional Memory Features for 120 MHz Thin Node (F/C 2008)

The 120 MHz thin node has a minimum requirement of two memory cards per node. All cards must be symmetrical in size and must be installed in two or four card increments. The 120 MHz thin node requires a minimum memory size of 64 MB and has a maximum limit of 1 GB (four 256 MB cards).

Note: For optimal performance, use four, 32 MB cards as a minimum memory option.

Table B-9. Optional Memory Features for Thin Processor Nodes (F/C 2008)		
Feature Code	**Description**	**Order Type**
4076	32 MB card	Factory or Field
4077	64 MB card	Factory or Field
4078	128 MB card	Factory or Field
4079	256 MB card	Factory or Field

Thin Node Memory Upgrade Notice: All new 120 MHz thin nodes can be equipped with the feature codes listed in Table B-9. These memory options are configured with type S5.0 memory. Existing 66 MHz thin nodes were configured with either Type S4.5 or Type S4.6 memory. The **S4.6** memory in the 66 MHz nodes can be reused when upgrading the 66 MHz processors to 120 MHz. However, type S4.6 memory **cannot** be mixed with the type S5.0 memory in thin nodes.

Type S4.5 memory is **not supported** in a 120 MHz thin node and those memory features must be replaced during the node upgrade. To find out if your system has type S4.5 memory, issue the following command:

    lscfg -v sysplanar0] more

This command provides the part numbers and EC levels of the system planar, including memory cards. Within the memory section of the list that is displayed, look for the following EC levels:

Table B-10. Type S4.5 Memory Information			
EC Level	**Card Size**	**Feature Code**	**Part Number**
33	32 MB	4067	65G1800
33	64 MB	4069	65G1801
33	128 MB	4090	65G1802
34	256 MB	4095	52G4685

If these EC levels are displayed, that node has S4.5 memory and the memory **must** be replaced before the node can be upgraded.

If the nodes you want to upgrade have type S4.5 memory, contact the Order Support Group for assistance.

Optional Memory Features for 62 MHz and 66 MHz Thin Nodes (F/C 2001/2002)

Note: Each feature code listed in Table B-11 represents one memory card. When more than one card must be ordered, the table notes the quantity required in parenthesis beneath the feature code.

Table B-11. Optional Memory Features for Thin Processor Nodes (F/C 2001/2002)			
Memory Size (per node)	**Description**	**Feature Code**	**Order Type**
64 Megabytes	Standard *prereq* card in Slot C	4069	Prereq
128 Megabytes	Retains the standard 64-megabyte card in Slot C and adds a 64-megabyte card to Slot B	4069	Field
128 Megabytes	Substitutes the standard 64-megabyte card in Slot C with one 128-megabyte card	4090	Field
192 Megabytes	Substitutes the standard 64-megabyte card in Slot C with one 128-megabyte card, and adds a 64-megabyte card in Slot B.	4090 and 4069	Field
256 Megabytes	Substitutes the standard 64-megabyte card with two 128-megabyte cards	4090 (2x)	Field
256 Megabytes	Substitutes the standard 64-megabyte card in Slot C with one 256-megabyte card	4095	Field
384 Megabytes	Substitutes the standard 64-megabyte card in Slot C with one 256-megabyte card, and adds a 128-megabyte card in Slot B.	4095 and 4090	Field
512 Megabytes	Substitutes the standard 64-megabyte card in Slot C with two 256-megabyte cards	4095 (2x)	Field

Optional Memory Features for 66 MHz Thin Node 2 Nodes (F/C 2004)

Table B-12. Optional Memory Features for Thin Processor Node 2 (F/C 2004)				
Memory Size (per node)	**Memory Size on CPU Card**	**Feature Code**	**Memory Card Size (Slot C)**	**Feature Code**
64 Megabytes (Prerequisite)	32 Megabytes	4053	32 Megabytes	4067
128 Megabytes (Prerequisite)	64 Megabytes	4054	64 Megabytes	4069
256 Megabytes	128 Megabytes	4055	128 Megabytes	4090
512 Megabytes	256 Megabytes	4056	256 Megabytes	4095
64 Megabytes (SIMM upgrade)	32-64 Megabytes	5064	32-64 Megabytes	5064
128 Megabytes (SIMM upgrade)	32/64-128 Megabytes	5129	32/64-128 Megabytes	5129
Note: The Thin Node 2 requires one memory card plus 8 memory SIMMs plugged on the CPU card.				

Wide Node Memory Options

Optional Memory Features for POWER3 SMP Wide Nodes (F/C 2053)

POWER3 SMP wide nodes have two memory cards and require a minimum of 256 MB of memory. These nodes will support a maximum of 4 GB of memory. Memory is supplied by 128 MB DIMMs that must be mounted in pairs (256 MB increments). The memory cards **are not** required to be configured symmetrically. Each card has the capacity to mount 2 GB of DIMMs. Memory cards and DIMMs **are not** interchangeable between SMP and non-SMP wide nodes. Memory cards **are not** interchangeable between 332 MHz SMP and POWER3 SMP wide nodes.

Table B-13. Memory features for POWER3 SMP wide nodes (F/C 2053)			
Feature Code	**Description**	**Minimum Node Requirement**	**Maximum Allowed Per Node**
4098	Base Memory Card	1	2
4110	One Pair of 128 MB DIMMs (256 MB total)	1	16 DIMMs (8 pairs)

Optional Memory Features for 332 MHz SMP Wide Nodes (F/C 2051)

332 MHz SMP wide nodes have two memory cards and require a minimum of 256 MB of memory. These nodes will support a maximum of 3 GB of memory. Memory is supplied by 128 MB DIMMs that must be mounted in pairs (256 MB increments). The memory cards **are not** required to be configured symmetrically. Each card has the capacity to mount 2 GB of DIMMs, however, only 3 GB are addressable per node. Memory cards and DIMMs **are not** interchangeable between SMP and non-SMP wide nodes. Memory cards **are not** interchangeable between 332 MHz SMP andPOWER3 SMP Thin and Wide wide nodes.

Table B-14. Memory features for 332 MHz SMP wide nodes (F/C 2051)			
Feature Code	**Description**	**Minimum Node Requirement**	**Maximum Allowed Per Node**
4093	Base Memory Card	2	2
4110	One Pair of 128 MB DIMMs (256 MB total)	1	12 DIMMs (6 pairs)

Optional Memory Features for 135 MHz and 77 MHz Wide Processor Nodes

Table B-15 (Page 1 of 2). Optional Memory Features for 135 MHz and 77 MHz Wide Processor Nodes				
Memory Size (per node)	**Description**	**Memory Slot**	**Feature Code**	**Order Type**
64 Megabytes	Two 32-megabyte cards of standard memory (prereq)	D, H	4076 (2x)	Prereq
128 Megabytes	Retains the standard 32-megabyte cards in Slots D and H, and adds a 32-megabyte card to Slots B and F	B, D, F, H	4076	Factory or Field
128 Megabytes	Substitutes the standard 32-megabyte cards in Slots D and H with 64-megabyte cards	D, H	4077 (2x)	Factory or Field
256 Megabytes	Removes the standard 32-megabyte cards in Slots D and H, and adds a 64-megabyte card to Slots B, D, F, H	B, D, F, H	4077 (4x)	Factory or Field
256 Megabytes	Retains the standard 32-megabyte cards in Slots D and H, and adds a 32-megabyte card to Slots A, B, C, E, F, G	A, B, C, D, E, F, G, H	4076 (6x)	Factory or Field
256 Megabytes	Substitutes the standard 32-megabyte cards in Slots D and H with two 128-megabyte cards	D, H	4078 (2x)	Factory or Field
512 Megabytes	Removes the standard 32-megabyte cards in Slots D and H, and adds a 64-megabyte card in all slots	A, B, C, D, E, F, G, H	4077 (8x)	Factory or Field
512 Megabytes	Removes the standard 32-megabyte cards in Slots D and H, and adds 128-megabyte cards in slots B, D, F, and H	B, D, F, H	4078 (4x)	Factory or Field
512 Megabytes	Substitutes the standard 32-megabyte cards in Slots D and H with 256-megabyte cards	D, H	4079 (2x)	Factory or Field
1 Gigabyte	Removes the standard 32-megabyte cards in Slots D and H, and adds 128-megabyte cards to all slots	A, B, C, D, E, F, G, H	4078 (8x)	Factory or Field
1 Gigabyte	Removes the standard 32-megabyte cards in Slots D and H, and adds 256-megabyte cards to Slots B, D, F, and H	B, D, F, H,	4079 (4x)	Factory or Field
2 Gigabyte	Removes the standard 32-megabyte cards in Slots D and H, and adds 256-megabyte cards to all slots	A, B, C, D, E, F, G, H	4079 (8x)	Factory or Field

Table B-15 (Page 2 of 2). Optional Memory Features for 135 MHz and 77 MHz Wide Processor Nodes				
Memory Size (per node)	Description	Memory Slot	Feature Code	Order Type

Notes:

1. Order Single In-Line Memory Module (SIMM) kit (**F/C 5064**) for installation on previously installed 32-megabyte memory cards (**F/C 4076**) for field upgrade to 64 megabytes. (Quantity: 1 kit per card).

2. Order SIMM kit (**F/C 5129**) for installation on previously installed 32-megabyte (**F/C 4076**) and 64-megabyte (**F/C 4077**) (quantity: 1 kit per card) memory cards for field upgrade to 128 megabytes.

3. **Guidelines for Wide Node Memory Expansion:**

   For wide nodes, all memory cards must be installed in pairs and only two, four, or eight-card configurations are supported, as follows:

   - Two-card configurations: cards must be plugged into the **D** and **H** positions.
   - Four-card configurations: cards must be plugged into the **B, D, F** and **H** positions.
   - Eight-card configurations: cards must be plugged into the **A** through **H** positions.
     - Positions **A, C, E, G** must have the same card size.
     - Positions **B, D, F, H** must have the same card size.

Wide Node Memory Upgrade Notice:
All new 135 MHz wide nodes and existing 77 MHz wide nodes use S5.0 memory. However, 66 MHz wide nodes were configured with either Type S4.6 or Type S4.5 memory cards. Type S4.6 memory cards can be used to upgrade wide nodes in the field and, on wide nodes, these two memory types **can** be mixed.

Type **S4.5** memory **is not** supported in a 135 MHz wide node and those memory features must be replaced during the node upgrade. To find out if your system has type S4.5 memory, issue the following command:

    lscfg -v sysplanar0] more

This command provides the part numbers and EC levels of the system planar, including memory cards. Within the memory section of the list that is displayed, look for the following EC levels:

Table B-16. Type S4.5 Memory Information			
EC Level	Card Size	Feature Code	Part Number
33	32 MB	4067	65G1800
33	64 MB	4069	65G1801
33	128 MB	4090	65G1802
34	256 MB	4095	52G4685

If these EC levels are displayed, that node has S4.5 memory and the memory **must** be replaced before the node can be upgraded.

If the nodes you want to upgrade have type S4.5 memory, contact the Order Support Group for assistance.

Optional Memory Features for 66 MHz Wide Processor Nodes

Note: Each feature code listed in Table B-17 on page B-9 represents one memory card. When more than one card must be ordered, the table notes the quantity required in parenthesis beneath the feature code.

Table   B-17. Optional Memory Features for 66 MHz Wide Processor Nodes

Memory Size (per node)	Description	Memory Slot	Feature Code	Order Type
64 Megabytes	Two 32-megabyte cards of standard memory (prereq)	D, H	4067 (2x)	Prereq
128 Megabytes	Retains the standard 32-megabyte cards in Slots D and H, and adds a 32-megabyte card to Slots B and F	B, D, F, H	4067	Field
128 Megabytes	Substitutes the standard 32-megabyte cards in Slots D and H with 64-megabyte cards	D, H	4069 (2x)	Field
256 Megabytes	Removes the standard 32-megabyte cards in Slots D and H, and adds a 64-megabyte card to Slots B, D, F, H	B, D, F, H	4069 (4x)	Field
256 Megabytes	Retains the standard 32-megabyte cards in Slots D and H, and adds a 32-megabyte card to Slots A, B, C, E, F, G	A, B, C, D, E, F, G, H	4067 (6x)	Field
256 Megabytes	Substitutes the standard 32-megabyte cards in Slots D and H with two 128-megabyte cards	D, H	4090 (2x)	Field
512 Megabytes	Removes the standard 32-megabyte cards in Slots D and H, and adds a 64-megabyte card in all slots	A, B, C, D, E, F, G, H	4069 (8x)	Field
512 Megabytes	Removes the standard 32-megabyte cards in Slots D and H, and adds 128-megabyte cards in slots B, D, F, and H	B, D, F, H	4090 (4x)	Field
512 Megabytes	Substitutes the standard 32-megabyte cards in Slots D and H with 256-megabyte cards	D, H	4095 (2x)	Field
1 Gigabyte	Removes the standard 32-megabyte cards in Slots D and H, and adds 128-megabyte cards to all slots	A, B, C, D, E, F, G, H	4090 (8x)	Field
1 Gigabyte	Removes the standard 32-megabyte cards in Slots D and H, and adds 256-megabyte cards to Slots B, D, F, and H	B, D, F, H,	4095 (4x)	Field
2 Gigabyte	Removes the standard 32-megabyte cards in Slots D and H, and adds 256-megabyte cards to all slots	A, B, C, D, E, F, G, H	4095 (8x)	Field

Note:

1. Order Single In-Line Memory Module (SIMM) kit (**F/C 5064**) for installation on previously installed 32-megabyte memory cards (**F/C 4067**) for field upgrade to 64 megabytes. (Quantity: 1 kit per card)
2. Order SIMM kit (**F/C 5129**) for installation on previously installed 32-megabyte (**F/C 4067**) and 64-megabyte (**F/C 4069**) (Quantity: 1 kit per card) memory cards for field upgrade to 128 megabytes.
3. **Guidelines for Wide Node Memory Expansion:**

   For wide nodes, all memory cards must be installed in pairs and only two, four, or eight-card configurations are supported, as follows:
   - Two-card configurations: cards must be plugged into the **D** and **H** positions.
   - Four-card configurations: cards must be plugged into the **B, D, F** and **H** positions.
   - Eight-card configurations: cards must be plugged into the **A** through **H** positions.
     – Positions **A, C, E, G** must have the same card size.
     – Positions **B, D, F, H** must have the same card size.

High Node Memory Options

Note: Both the 200 MHz and the 112 MHz high nodes have specific memory configurations that should be avoided see *IBM RS/6000 SP: Planning Volume 1, Hardware and Physical Environment* for specific details.

Optional Memory Features for 200 MHz (604e) High Nodes

There are four memory slots in the 604e high node (A, B, C, and D). The minimum configuration is one 256-megabyte (MB) card in slot A. Beyond that, you can use any combination of the following feature codes, up to a maximum of four total memory cards. (The maximum would therefore be four 1-gigabyte cards for a total of 4 GB.)

Note: When upgrading a 604 high node to a 604e, the 64 MB card (F/C 4155) from the 604 configuration is not supported in the 604e configuration. You must upgrade these cards to a supported memory size.

Table   B-18. Optional Memory Features for 604e High Nodes

Memory Size	Feature Code
256 Megabytes	4029
512 Megabytes	4154
1 Gigabyte	4030

Optional Memory Features for 112 MHz (604) High Nodes

There are four memory slots in the 604 high node (A, B, C, and D). The minimum configuration is one 64 MB card in slot A. Beyond that, you can use any combination of the following feature codes, up to a maximum of four total memory cards. (The maximum would therefore be four 512 MB cards for a total of 2 GB.)

Table   B-19. Optional Memory Features for 604 High Nodes

Memory Size	Feature Code
64 Megabytes	4155
128 Megabytes	4156
256 Megabytes	4157
512 Megabytes	4158

Optional Direct Access Storage Devices (DASD)

Table B-20 (Page 1 of 2). DASD Features			
Feature Code	**DASD Size**	**DASD Type**	**Node Type**
2900	4.5 GB	Ultra SCSI	POWER3 SMP Thin
			POWER3 SMP Wide
			332 MHz SMP Thin
			332 MHz SMP Wide
			200 MHz High
			160 MHz Thin
			120 MHz Thin
			135 MHz Wide
2908	9.1 GB	Ultra SCSI	POWER3 SMP Thin
			POWER3 SMP Wide
			332 MHz SMP Thin
			332 MHz SMP Wide
			200 MHz High
			160 MHz Thin
			120 MHz Thin
			135 MHz Wide
3000	4.5 GB	Fast / Wide	332 MHz SMP Thin
			332 MHz SMP Wide
			200 MHz High
			160 MHz Thin
			120 MHz Thin
			135 MHz Wide
3010	9.1 GB	Fast / Wide	332 MHz SMP Thin
			332 MHz SMP Wide
			160 MHz Thin
			120 MHz Thin
			135 MHz Wide
3031	2.2 GB	Fast	112 MHz High
Note:			
- Each node type has a minimum prerequisite and a maximum allowable DASD allocation. See *IBM RS/6000 SP: Planning Volume 1, Hardware and Physical Environment* for DASD limits. - Some older nodes may require Micro Channel adapters and cables to utilize some DASD options.			
Reference for withdrawn DASD			
2555	1 Gigabyte	Fast	wide/thin
2580	2 Gigabytes	Fast	wide/thin
3032	1.1 Gigabytes	Fast / Wide	wide/thin

Table B-20 (Page 2 of 2). DASD Features			
Feature Code	**DASD Size**	**DASD Type**	**Node Type**
3033	2.2 Gigabytes	Fast / Wide	wide/thin
3034	4.5 Gigabytes	Fast / Wide	wide/thin

Switch Adapter Features

Table B-21. Switch Adapter Features	
Adapter Feature Code	**Description**
4020 (Note 1, 2)	SP Switch Adapter(s) For installation as follows: - Optional - Order one adapter per **MCA** node.
4021	SP Switch Router Adapter For installation as follows: - Required for the RS/6000 Switch Router - Multiple adapters allowed in each SP Switch Router.
RS/6000 FC 8396	RS/6000 SP system attachment adapter (SP Switch adapter used in SP-attached servers) For installation as follows: - Required in servers attached to a switch configured SP system - Only one adapter is allowed per server.
4022 (Note 1, 2)	SP Switch MX adapter (SP switch adapter for 332 MHz SMP nodes) For installation as follows: - Optional - Order one adapter per **PCI** node - Withdrawn 10/98.
4023 (Note 1, 2)	SP Switch MX2 Adapter (SP switch adapter for POWER3 SMP Thin and Wide nodes and 332 MHz SMP Thin and Wide nodes) For installation as follows: - Optional - Order one adapter per **PCI** node.
4018 (Note 1, 2)	HiPS Adapter-2(s) for installation as follows: - Withdrawn, only available for existing systems. - Order one adapter per node.
4017 (Note 1, 2, 3)	HiPS Adapter-1(s) for installation as follows: Withdrawn
Notes:	
1. Neither the HiPS Adapter-1 nor the HiPS Adapter-2 can exist in the same system with any type of SP Switch adapter.	
2. When thin nodes are mounted in a frame, unused switch ports in that frame are not available for expansion purposes.	
3. F/C 4017 is only available for coexistence with an SP1.	

PCI Bus Communications Adapter Options for 332 MHz SMP and POWER3 SMP Thin and Wide Nodes

PCI Adapter Options

Some adapters have quantity limits or placement restrictions that vary depending on the type of node you install the adapter in. For For information on specific node types see:

- Table B-22 for information on POWER3 SMP thin and wide nodes
- Table B-23 on page B-14 for information on 332 MHz SMP thin and wide nodes

PCI Adapters for POWER3 SMP nodes

Table B-22 (Page 1 of 2). PCI adapter requirements for POWER3 SMP thin and wide nodes				
Feature Code	PCI Adapter Name	Number of PCI Slots Required	Max. Number Allowed Per Node Wide / Thin	Notes
2741	FDDI SK-NET LP SAS	1	6 / 2	1
2742	FDDI SK-NET LP DAS	1	6 / 2	1
2743	FDDI SK-NET UP SAS	1	4 / 2	1
2751	S/390 ESCON	1	2 / 1	2
2920	Token Ring Auto Lanstream	1	8 / 2	
2943	RS-422 8-port Async.	1	8 / 2	
2944	WAN RS232 128-port	1	7 / 2	
2947	ARTIC960Hx 4-port selectable	1	8 / 2	
2962	2-port Multiprotocol Adapter	1	8 / 2	
2963	ATM Turboways 155 UTP	1	6 / 2	1
2968	Ethernet 10/100 MB	1	6 / 2	1
2969	Gigabit Ethernet-SX	1	2 / 1	3, 4
2985	Ethernet 10 MB BNC	1	8 / 2	
2987	Ethernet 10 MB AUI	1	8 / 2	
2988	ATM 155 MMF	1	6 / 2	1
6206	Ultra SCSI SE	1	6 / 2	
6207	Ultra SCSI DE	1	6 / 2	
6208	SCSI-2 Single-Ended	1	8 / 2	
6209	SCSI-2 Differential	1	8 / 2	
6215	SSA RAID EL	1	6 / 2	
6222	SSA Fast-Write Cache Option	0	Mounts on F/C 6215	
6310	ARTIC960RxD Quad Digital Trunk	1	4 / 2	

Table B-22 (Page 2 of 2). PCI adapter requirements for POWER3 SMP thin and wide nodes				
Feature Code	PCI Adapter Name	Number of PCI Slots Required	Max. Number Allowed Per Node Wide / Thin	Notes
Notes:				

Notes:

1. Note 1 adapter rules:
   - Max. combination of (6) Note 1 adapters with (0) F/C 2969 in wide node.
   - Max. combination of (4) Note 1 adapters with (1) F/C 2969 in wide node.
   - Max. combination of (2) Note 1 adapters with (2) F/C 2969 in wide node.
   - (0) Note 1 adapters supported with F/C 2969 in thin node.
2. **Cannot be installed** in slots I5, I6, I7, or I8 in POWER3 SMP nodes.
3. **Cannot be installed** in slots I2 or I3 (CPU side) in POWER3 wide nodes.
4. **Reduced performance** in slots I2 or I3 (CPU side) in POWER3 thin nodes.

PCI Adapters for 332 MHz SMP nodes

Table B-23 (Page 1 of 2). PCI adapter requirements for 332 MHz SMP thin and wide nodes				
Feature Code	PCI Adapter Name	Number of PCI Slots Required	Max. Number Allowed Per Node Wide / Thin	Notes
2741	FDDI SK-NET LP SAS	1	4 / 2	1, 7
2742	FDDI SK-NET LP DAS	1	4 / 2	1, 7
2743	FDDI SK-NET UP SAS	1	4 / 2	1, 7
2751	S/390 ESCON	1	2 / 1	2, 3
2920	Token Ring Auto Lanstream	1	9 / 2	
2943	RS-422 8-port Async.	1	6 / 2	
2944	WAN RS232 128-port	1	7 / 2	
2947	ARTIC960Hx 4-port selectable	1	6 / 2	2
2962	2-port Multiprotocol Adapter	1	6 / 2	2, 4
2963	ATM Turboways 155 UTP	1	4 / 2	1, 2
2968	Ethernet 10/100 MB	1	4 / 2	1, 2, 7
2969	Gigabit Ethernet-SX	1	2 / 1	2
2985	Ethernet 10 MB BNC	1	8 / 2	
2987	Ethernet 10 MB AUI	1	8 / 2	
2988	ATM 155 MMF	1	4 / 2	1, 2
6206	Ultra SCSI SE	1	4 / 2	2, 5, 6
6207	Ultra SCSI DE	1	4 / 2	2, 5, 6
6208	SCSI-2 Single-Ended	1	8 / 2	
6209	SCSI-2 Differential	1	8 / 2	
6215	SSA RAID EL	1	6 / 2	2, 6

Table B-23 (Page 2 of 2). PCI adapter requirements for 332 MHz SMP thin and wide nodes				
Feature Code	PCI Adapter Name	Number of PCI Slots Required	Max. Number Allowed Per Node Wide / Thin	Notes
6222	SSA Fast-Write Cache Option	0	Mounts on F/C 6215	
6310	ARTIC960RxD Quad Digital Trunk	1	4 / 2	2

Notes:

1. Note 1 adapter rules:

   - Max. combination of (4) Note 1 adapters with (0) F/C 2969 in wide node.

   - Max. combination of (2) Note 1 adapters with (1) F/C 2969 in wide node.

   - (0) Note 1 adapters with (2) F/C 2969 in wide node.

   - (0) Note 1 adapters supported with F/C 2969 in thin node.

2. **Cannot be installed** in slots I5, I6, I7, or I8 in 332 MHz SMP wide nodes.

3. Only one adapter may be placed in each of the two available PCI slot groups.

4. Maximum of six (6) adapters in 332 MHz SMP wide nodes.

5. Maximum of four (4) adapters in 332 MHz SMP wide nodes.

6. Distribute evenly across available slots.

7. **Reduced performance** if placed in slots I5, I6, I7, or I8 in 332 MHz SMP wide nodes.

MCA Bus Communications Adapter Options for Wide, Thin and High Nodes

Table B-24 (Page 1 of 3). Micro Channel Adapter Features for Wide, Thin, and High Nodes				
Feature Code	MCA Adapter Name	Number of MCA Slots Required	Max. Number Allowed per Node Wide/Thin/High	Notes
1902	Optics Daughter Card	0	2 / 1 / NA	
1904	**Fibre Channel** 1 GB	1	2 / 2 / NA	1
1906	**Fibre Channel** 266	1	2 / 2 / NA	1
2402	**IBM Network Terminal Accelerator** 256	1	7 / 4 / 4	
2403	**IBM Network Terminal Accelerator** 2048	1	7 / 4 / 4	
2410	**SCSI-2** External I/O Controller	1	7 / 4 / NA	
2412	**Enhanced SCSI-2** Differential Fast/Wide Adapter/A	1	7 / 4 / 14	
2415	**SCSI-2** Fast/Wide Adapter/A	1	7 / 4 / 14	
2416	**SCSI-2** Differential Fast/Wide Adapter/A	1	7 / 4 / 14	
2420	**SCSI-2** Differential External I/O Controller	1	7 / 2 / NA	

Feature Code	MCA Adapter Name	Number of MCA Slots Required	Max. Number Allowed per Node Wide/Thin/High	Notes
2700	**4-Port Multiprotocol Communications Controller**	1	7 / 3 / 8	
2723	**FDDI** Dual Ring	1	3 / 2 / 4	3
2724	**FDDI** SAS *single-ring*	1	6 / 2 / 8	
2735	**HIPPI**	5	1 / NA / 2	4
2754	**S/390 ESCON** Channel Emulator Adapter	2	2 / 1 / 4	
2755	**BMCA**	1	2 / 2 / 2	5, 6
2756	**ESCON** Control Unit Adapter	2	2 / 1 / 4	
2930	**RS-232** *8-port Adapter*	1	7 / 4 / 14	
2940	*8-port Async Adapter*	1	7 / 4 / 14	
2960	*X.25 Interface Co-Processor/2*	1	7 / 4 / 8	
2970	**Token-Ring**	1	7 / 4 / 12	
2972	**Auto Token-Ring LANstreamer MC 32**	1	7 / 3 / 12	
2980	**Ethernet**	1	7 / 3 / 12	2
2984	**ATM** TURBOWAYS 100	1	2 / 2 / 2	
2989	**ATM** TURBOWAYS 155	1	4 / 2 / 4	
2992	**Ethernet/FDX** *10 Mbps TP/AUI MC Adapter*	1	7 / 3 / 12	2
2993	**Ethernet/FDX** *10 Mbps BNC MC Adapter*	1	7 / 3 / 12	2
2994	**10/100 Ethernet** *Twisted Pair MC Adapter*	1	2 / 2 / 4	
4224	Ethernet 10BaseT Transceiver	0	8 / 4 / 15	
6212	**9333 HPSA** *(High Performance Subsystem Adapter)*	1	6 / 2 / 8	7
6214	**SSA** 4-Port Adapter	1	4 / 2 / 8	
6216	**SSA** 4-Port Adapter	1	4 / 2 / 8	
6217	**SSA** 4-Port RAID Adapter	1	4 / 2 / 8	
6219	**Micro Channel SSA** Multi-Initiator/RAID EL Adapter	1	4 / 2 / 8	8
6222	**SSA** Fast-Write Cache Option	0	Mounts on F/C 6219	
6305	Digital Trunk Dual	1	6 / 3 / 2	
7006	Realtime Interface Co-Processor Portmaster	1	7 / 4 / 8	
8128	128-Port Async Controller	1	7 / 4 / 7	

Table B-24 (Page 2 of 3). Micro Channel Adapter Features for Wide, Thin, and High Nodes

Feature Code	MCA Adapter Name	Number of MCA Slots Required	Max. Number Allowed per Node Wide/Thin/High	Notes

Note:

1. Not supported in 120 MHz thin nodes or 135 MHz wide nodes.

2. High nodes and wide nodes have a minimum of one if used.

3. FDDI dual ring adapters (**F/C 2723**) have a mandatory prerequisite of the FDDI-SAS (**F/C 2724**).

4. The HIPPI feature (**F/C 2735**) uses three physical MCA slots and requires a total of five slots to satisfy power and thermal requirements.

5. The BMCA node-to-node (**F/C 2752**) cables are required on any node having the BMCA adapter and not having an external host connection.

6. BMCA adapters may not be installed in two adjacent MCA slots due do physical cabling constraints. There is a limit of 32 adapters per frame, and a limit of 16 cables exiting the frame.

7. A maximum of 128 9333 High Performance Subsystem Adapter cables is allowed per frame.

8. Will not operated in SSA loops containing F/C 6214 or F/C 6216.

Table B-24 (Page 3 of 3). Micro Channel Adapter Features for Wide, Thin, and High Nodes

Appendix C. Installing RS/6000 SP Optional Features

Use the following sections for physical installation of RS/6000 SP optional features.

Begin MES Installation

Step	Section	Page
Table C-1. Optional Features Installation Task Overview		
___ 1.	**Preinstallation Tasks for Optional Features**	**C-2**
	These tasks help you check on the optional part assemblies and the other pre-installation tasks that support the optional features.	
___ 2.	Proceed to Steps A-J, depending on the upgrades to be installed. (Refer to the notes on the next page.)	
___ (a	**Installing Additional Frames**	**2-1**
	To install additional frames, use **Chapter 2, "RS/6000 SP Installation Instructions" on page 2-1** .	
___ (b	**Installing Additional Processor Nodes**	**C-3**
	This section contains procedures for adding thin or wide processor nodes. For 604 or 604e high processor nodes or 332 MHZ SMP nodes, perform the procedure provided in the MES kit..	
___ (c	**Direct Access Storage Device (DASD) Upgrades**	**C-7**
	Perform the procedure provided in the MES kit.	
___ (d	**Memory Upgrades**	**C-7**
	These tasks help you upgrade the memory capacity of the processor nodes.	
___ (e	**Installing Micro Channel Adapters**	**C-13**
	Perform this procedure to install Micro Channel adapters in the processor nodes.	
___ (f	**Upgrading CPUs**	**C-12**
	Perform this procedure to upgrade the CPU in a 604 or 604e high node.	
___ (g	**Cabling PCI and Micro Channel Adapters**	**C-16**
	This section helps you cable the PCI and Micro Channel adapters from the processor nodes.	
___ (h	**Installing the High Availability Control Workstation (HACWS)**	**C-29**
	This section helps you install the optional High Availability Control Workstation (HACWS).	
___ (i	**Attaching the 9077 SP Switch Router (Dependent Node)**	**C-28**
	Perform the procedure in "Installing GRF Hardware for use as an SP Dependent Node" in the *SP Switch Router Adapter Guide.*	
___ (j	**Installing or Upgrading Switch Features**	**C-19**
	These tasks help you install the high-performance switch (HiPS) for various RS/6000 SP frame configurations.	
___ (k	**Special 2AX and 3AX Upgrades**	**C-30**
	For 2AX/3AX Models only, this sections helps you upgrade SEPBU power to N+1 operation, and upgrade the frame capacity from 2AX to either 20X or 30X, and from 3AX to 30X.	
___ 3.	**Verifying Optional Feature Installations**	**C-31**
	These tasks help you run the diagnostics after the optional features are installed.	
___ 4.	**Post-Installation Tasks for Optional Features**	**C-34**
	These tasks are performed after the optional features have been installed.	

Notes:

1. Verification of MES upgrades is done on an individual frame basis. Therefore, verification should normally be performed after all upgrades are made to an individual frame before proceeding to the next frame.

2. All upgrades should be done one processor node at a time to avoid having to reaccess the same processor node more than once.

Preinstallation Tasks for Optional Features

After you have consulted *IBM RS/6000 SP: Planning Volume 1* to reassess the power/cooling requirements for new RS/6000 SP options, perform this procedure to prepare for the physical installation of the RS/6000 SP optional features you are installing:

1. For feature frames, first do the tasks described in "Pre-installation Tasks for RS/6000 SP Components" on page 2-2.

2. Check all the items and inventory parts for the RS/6000 SP feature you are installing in the Bill of Materials. This check on parts received must be completed prior to obtaining the customer's machine time commitment.

3. Read the installation instructions for the RS/6000 SP feature you are installing prior to obtaining the customer's machine time commitment.

4. Check the disposition of any parts to be removed.

5. Refer to "Handling the Static-Sensitive Devices" in *RS/6000 SP: Maintenance Information, Volume 2* before removing or installing ESD sensitive devices.

6. To insure that the features can be properly installed in the system, check the system configuration. As appropriate, determine which slots are available for the optional feature you are installing. Refer to "Checking the System Configuration."

7. Have the customer remove the processor node from the active configuration and power off the processor node.

Checking the System Configuration

You should use one or both of the following procedures to check the current configuration.

Note: Refer to Chapter 1, "The RS/6000 SP System" on page 1-1 for more information on allowable configurations.

Physical Check

1. For additional frames or processor nodes, check that there is a physical location designated for frame, or slot for processor node.

2. For Micro Channel adapters, check for unpopulated Micro Channel slots at rear of processor node. Be careful since some adapters may use more than one slot, may have a blank (no connector) faceplate, or have requirements concerning empty slots.

3. For additional DASD in wide processor nodes, you may check for open DASD slots through front of wide processor node.

Software Check

1. From an available AIX window on the control workstation, type

        cd /var/adm/SPlogs/SPconfig

    followed by ENTER.

2. There is a file for every processor node in the system called "*Node* #.lscfg". You may check the current processor node configurations using one or more of the following methods:

    a. Check total detail configuration:

        pg *Node*#.lscfg

b. Check disks (last two digits of location indicate SCSI address, in first digit):

```
cat  Node#.lscfg | grep disk
```

c. Check memory (last two digits of location indicate card slot):

```
cat  Node#.lscfg | grep mem
```

d. Check Micro Channel adapters (last two digits of location indicate card slot):

```
cat  Node#.lscfg | grep 00-0[12345678]
```

Note: Locations may look like the following:

```
hdisk1 00-00-00-10      (disk at SCSI address 1)
  mem0 00-0H            (Memory card at slot H)
  ent0 00-01            (Ethernet card at slot 1)
```

Installing Additional Processor Nodes

Installing Additional Thin Processor Nodes

CAUTION:
Due to the weight of each thin node (18 Kg [40 lbs]), use care when removing and replacing thin nodes above shoulder height.

Perform this procedure to add thin processor nodes:

1. Remove the blank cover from the location the thin node is to be installed and discard.

2. Remove the nut clips from the front EIA rails and save. The nut clips will be reinstalled later.

3. Using the last processor node installed, locate studs on the shelf.

4. Since there are no locations for the installation of the shelf to be installed, count twelve holes up from the stud on the shelf below. Mark the tenth hole on each side to identify the placement of the shelf.

5. Repeat Steps 1-4 for each node location to be added for this frame.
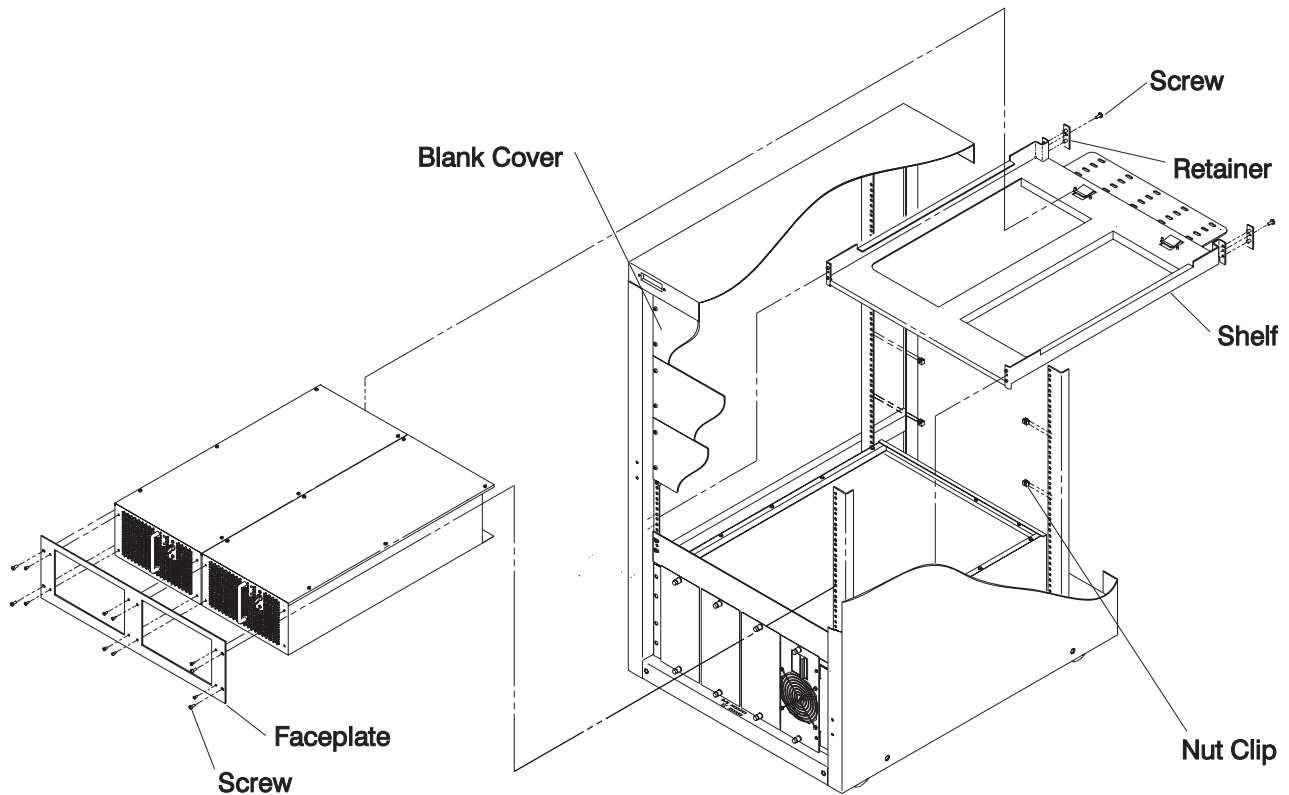
Figure C-1. Installing a Thin Processor Node

6. Lift shelf into rear of frame. Tilt shelf at a 30° angle to get between EIA rails, then level shelf into a straight position.

7. Locate holes marked in Step 4 and position the studs from each side of the shelf to the marked holes.

8. Install nut clips previously removed, into the rear EIA rail, positioning with the screw holes of the shelf bracket.

9. Push shelf into marked holes, ensuring that the studs are inserted.

10. Install retainers on both sides of rear shelf and secure with screws.

11. Repeat steps 6 through 10, for each added shelf.

12. Install two processor nodes onto shelf.

13. Install the node front faceplate using 6 screws, previously removed.

14. Connect the existing 48-volt power cable and supervisor bus cable. Both cables are provided with the SP system.

15. Repeat steps 12 through 14 for any additional thin processor nodes.

16. Connect Micro Channel adapter cables to the processor node. Refer to "Cabling PCI and Micro Channel Adapters" on page C-16 as required. A minimum configuration will include an Ethernet adapter.

17. Ensure that all newly installed processor node power switches are in the On ('1') position.

18. Return to Step 2 in Table C-1 on page C-1.
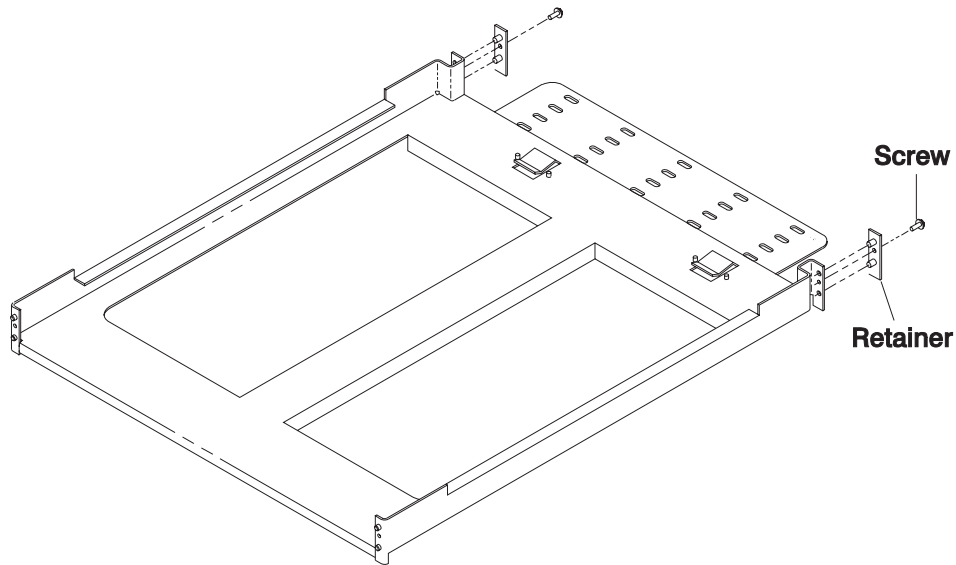
Figure   C-2. Thin Node Shelf

Installing Additional Wide Processor Nodes

CAUTION:
The wide node weight may exceed 32 Kg (70.5 lbs).

CAUTION:
When using step ladder or step stool, be sure that the work surface is level and the step ladder or step stool is in good working order.

Perform this procedure to add wide processor nodes (two people are required):

1. Ensure ESD antistatic wrist strap is used.

2. Remove the blank cover from the frame location where the wide node is to be installed and discard.

3. Using the last node installed, locate studs on each side of shelf.

4. Since there are no locations for installation of shelf to be installed, count from the last stud of the shelf below, ten holes up.

5. Install right node support bracket from the rear of machine into the right side of frame ensuring studs are completely inserted into vertical EIA rail.

6. From rear of machine hold node bracket in place, install nut clips into rear machine rail to support screws of wide node brackets.

7. Install screw into the rear of bracket, but do not tighten screw at this time.

   Note: Screw should be loose enough to adjust the node bracket to the EIA bracket and support the weight of the processor node.

8. Install left node support bracket into the left side of frame ensuring studs are completely inserted into vertical EIA rail.

9. From rear of machine hold node bracket in place, install nut clips into rear machine rail to support screws of wide node brackets.

10. Install screw into the rear of bracket, but do not tighten screw at this time.

    Note: Screw should be loose enough to adjust the node bracket to the EIA bracket and support the weight of the processor node.

11. Position cable shelf into the rear of bracket. Tighten each screw.
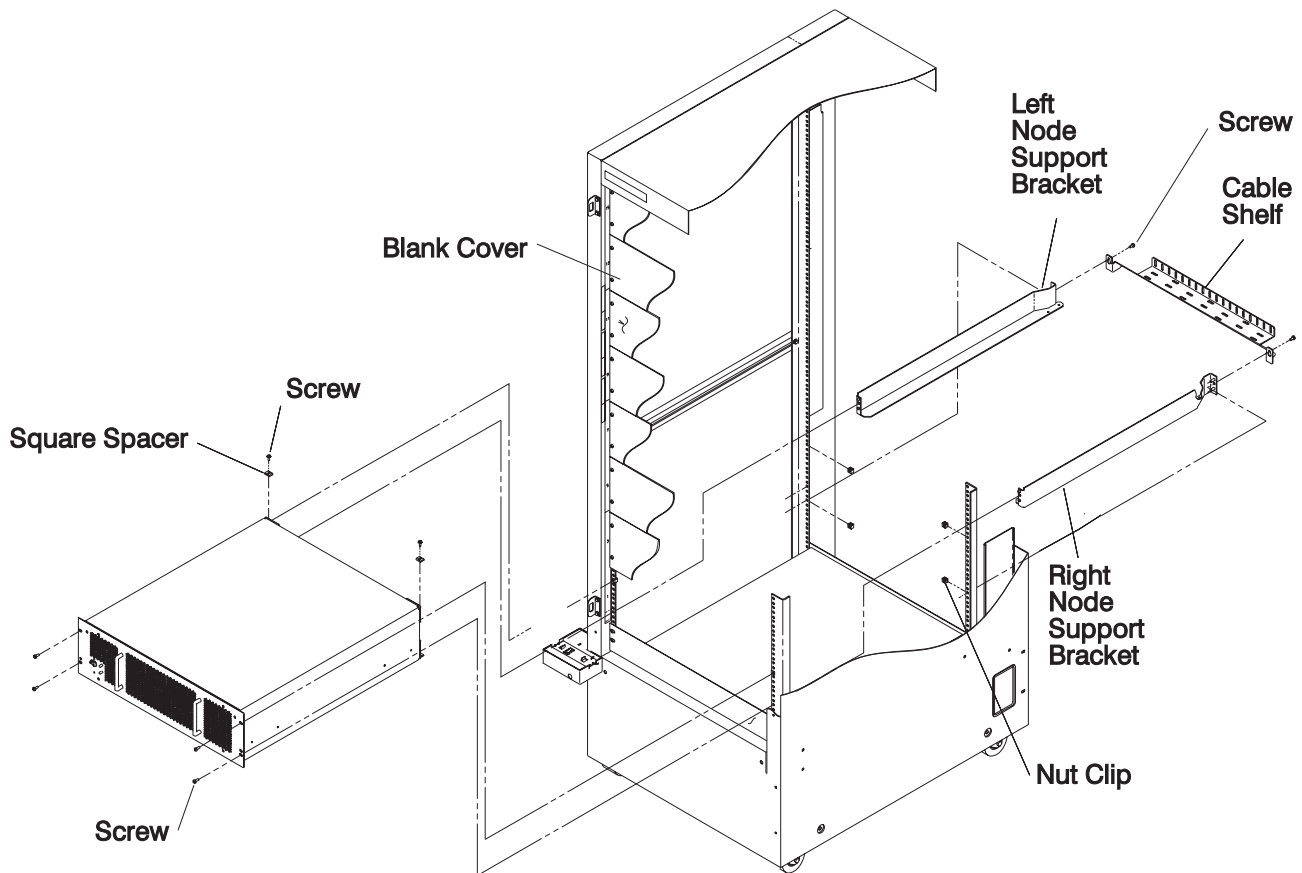
Figure C-3. Installing a Wide Processor Node

12. Install new wide processor node from the front of machine, placing node on support brackets.

13. At the front of machine, install four screws to fasten the front of node drawer to vertical rail.

    Note: Ensure that the holes on the machine vertical rails are visible through the lower holes of the processor node assembly. The node's support brackets may have to be rocked.

14. Tighten the screws that were previously left untightened.

15. At the rear of node, install the square spacer and screw on each side of node to fasten to the node brackets.

    Note: Test the movement of the drawer, by moving it back and forward.

16. Connect the existing 48 V cable and supervisor bus cable. Both cables are provided with the RS/6000 SP machine.

17. Connect Micro Channel adapter cables to the processor node. Refer to "Cabling PCI and Micro Channel Adapters" on page C-16 as required. A minimum configuration will include an Ethernet adapter.

18. Repeat this entire procedure for any additional wide nodes.

19. Ensure that all newly installed processor node power switches are in the On ('1') position.

20. Return to Step 2 in Table C-1 on page C-1.

Installing Additional 604 or 604e High Nodes

To add additional 604 or 604e high processor nodes, use the instructions provided with the MES kit.

Installing Additional 332 MHz SMP Nodes

To add additional 332 MHz SMP nodes, use the instructions provided with the MES kit.

Installing Additional POWER3 SMP Thin and Wide Nodes

To add additional POWER3 SMP Thin and Wide nodes, use the instructions provided with the MES kit.

Direct Access Storage Device (DASD) Upgrades

To perform DASD upgrades, use the instructions provided with the MES kit.

Memory Upgrades

Perform this procedure for memory upgrades:

1. Refer to "Handling a Static-Sensitive Device" in *RS/6000 SP: Maintenance Information, Volume 2* before removing or installing a device in any processor node.

2. Make sure you have performed "Checking the System Configuration" on page C-2 to check current configuration of the affected processor node(s). This information can be used to check or plan locations for new adapters.

3. Perform "Installing Memory Feature Upgrades (Thin and Wide Nodes)." Refer to "RS/6000 SP Memory Part Numbers" in *RS/6000 SP: Maintenance Information, Volume 2*.

4. Return to Step 2 in Table C-1 on page C-1.

Optional Memory Features for Thin and Wide Nodes

See Appendix B, "SP Optional Features on Thin, Wide, and High Nodes" on page B-1 for a detailed information of optional memory features for thin and wide processor nodes.

Installing Memory Feature Upgrades (Thin and Wide Nodes)

Follow this procedure when upgrading memory cards in thin or wide processor nodes:

Note: Refer to "Handling the Static-Sensitive Devices" in *RS/6000 SP: Maintenance Information, Volume 2* before removing or installing ESD sensitive devices.

1. Set power switches on the processor node(s) to Off.
2. If upgrading memory in a thin processor node, remove the front cover. Refer to "Removing Thin Processor Nodes" in *RS/6000 SP: Maintenance Information, Volume 2*. Remove the top cover off the processor node.
3. If upgrading memory in a wide processor node, refer to "Opening a Wide Processor Node" in *RS/6000 SP: Maintenance Information, Volume 2*. Remove the top card holder, if installed.
4. If adding a card (not replacing), go to Step 7.
5. Remove the memory card by pulling on the top edge of the card.
6. Refer to "Exchanging Memory SIMMs for Memory Upgrade" on page C-8, if you are exchanging memory SIMMs.

Attention: The latches on the SIMMs connectors break easily, so use care when handling.

Note: Memory cards removed as a result of the feature option upgrade installation belong to the customer. Memory SIMMs must be returned to the factory.

7. Align the card with front and rear guides and connector. Press the card down into connectors.
8. If this is a type 2004 node (Thin Node 2), repeat Steps 5-7 for the CPU card. Exchange memory SIMMs in J1-J8 only. Refer to Figure C-4.

Note: For type 2004 node, make sure CPU power cable (N00-PR-P3) is attached at CPU card.

9. If upgrading memory in a thin processor node, install the node top cover. Refer to "Replacing Thin Processor Nodes" in *RS/6000 SP: Maintenance Information, Volume 2*.
10. If upgrading memory in a wide processor node, refer to "Closing a Wide Processor Node" in *RS/6000 SP: Maintenance Information, Volume 2*.
11. Continue to next section, or return to Step 2 in Table C-1 on page C-1.
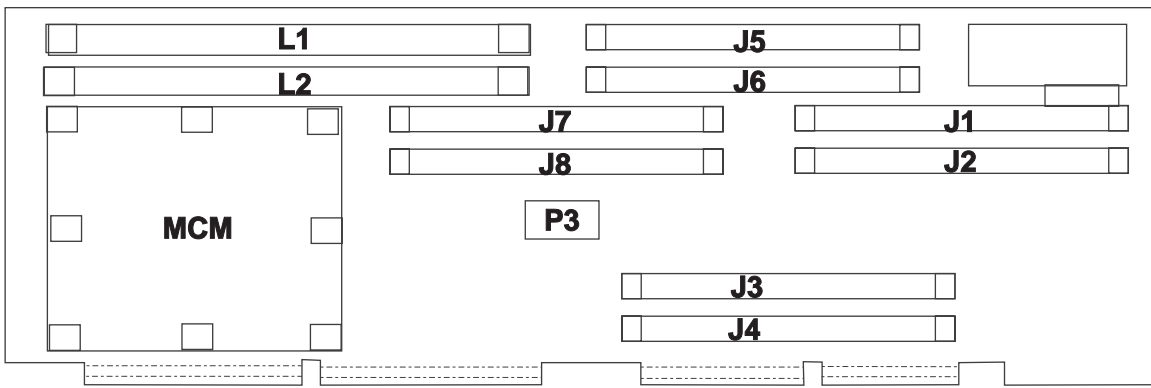
J1-J8 Memory SIMMs
L1-L2 Cache Memory SIMMs

Figure C-4. Thin Node 2 CPU Card Locations

Installing Memory SIMM Upgrades

The following table indicates the B/M part number for the SIMM upgrade:

Table C-2. Memory SIMM Upgrade		
Feature B/M	**Feature Code**	**Feature Description**
54G3059	5129	64-128 MB Memory SIMM Kit
64G6063	5064	32-64 MB Memory SIMM Kit

Refer to "Memory Upgrades" on page C-7, for installation procedures.

Exchanging Memory SIMMs for Memory Upgrade

Note: Refer to "Handling the Static-Sensitive Devices" in *RS/6000 SP: Maintenance Information, Volume 2* before removing or installing ESD sensitive devices.

1. Remove the memory SIMMs from the memory cards being upgraded by releasing the retainer tabs and pulling them away from the ends of the SIMMs. Refer to Figure C-5 on page C-9.
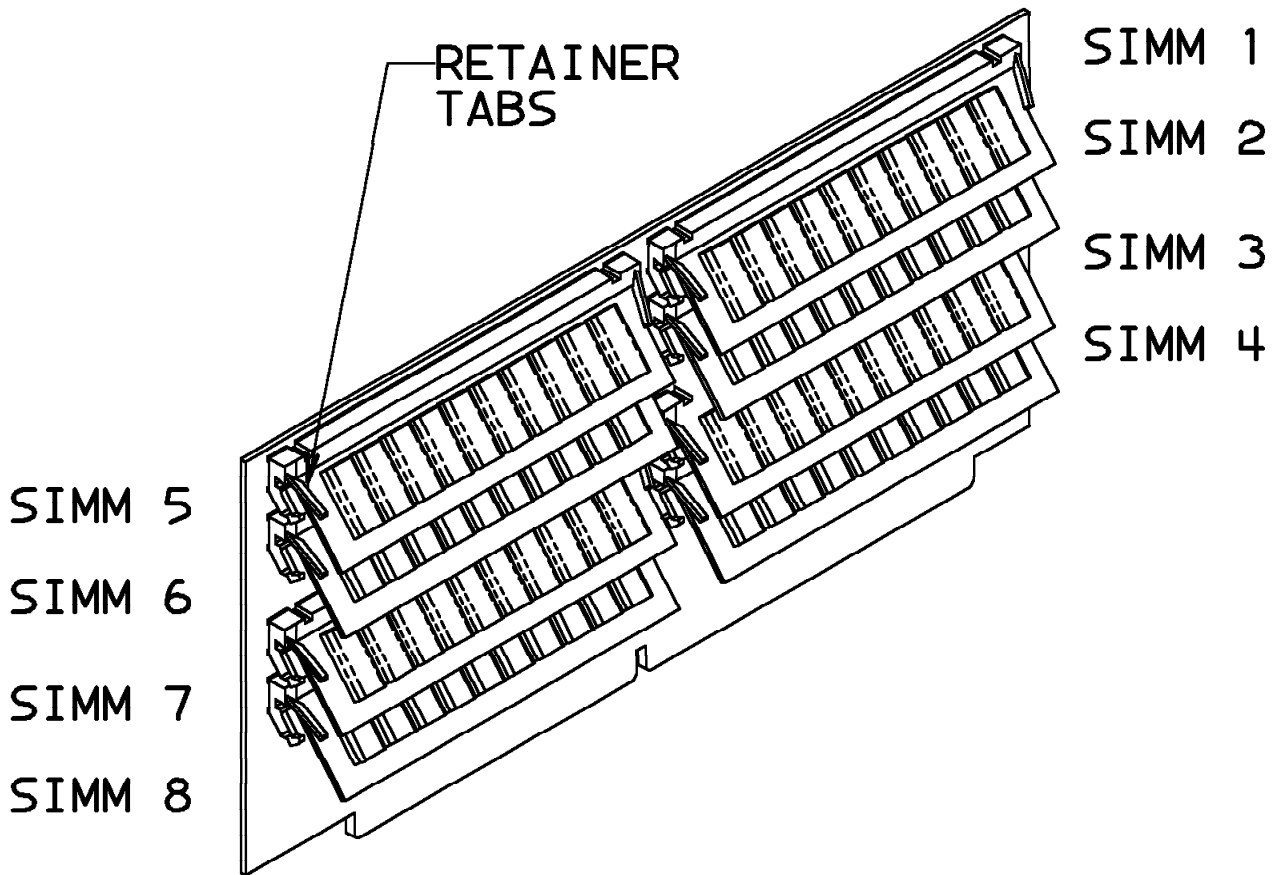
Figure   C-5. Memory Card with SIMMs

2. Rotate the SIMMs away from the center (or bottom) of the card and pull it away from its socket. Be sure to remove all eight SIMMs from the card.

3. Place each new SIMM in the keyed socket of the card, then press the SIMM into the socket and then toward the center (or bottom) of the memory card until the retainers snap into place.

4. Make a note of the FRU number on the SIMMs you removed.

5. Place all removed SIMMs in the ESD bag supplied and seal it with the new ESD label provided.

6. Place the ESD bag containing the old SIMMs into the empty FRU protective box provided. Close and seal the box. Write in the FRU number that you got from the removed SIMMs.

Table C-3. Memory SIMM Return Kit	
SIMM Kit Memory Size	**Return Kit B/M #**
32, 64, 128 MB	54G2915

7. Attach the FRU return address label to the FRU box. On that label, write in the MES number. Be sure all FRU Return labels are attached firmly to the box or boxes to be returned, and that all labels have the proper MES number written in. Return all boxes to the proper MES supplier.

8. Install 8 new memory SIMMs on card starting at the bottom of card (nearest card contacts) and working upward. Installing in a different order may be physically difficult.

9. Return to procedure you came from.

Installing the L2 Processor Cache

Follow this procedure when installing the L2 cache in processor node types 2002 and 2004:

Note: Refer to "Handling the Static-Sensitive Devices" in *RS/6000 SP: Maintenance Information, Volume 2* before removing or installing ESD sensitive devices.

1. Set power switches on the processor node(s) to Off.
2. Remove the front cover. Refer to "Removing Thin Processor Nodes" in *RS/6000 SP: Maintenance Information, Volume 2*. Remove the top cover off the processor node.
3. If this is a type 2002 node, remove the CPU card.
4. Install caches SIMM(s) in SIMM socket(s).

   Attention: The latches on the SIMMs connectors break easily, so use care when handling.

5. If this is a type 2002 node, align the card with front and rear guides and connector. Press the card down into connectors.
6. Install the node top cover. Refer to "Replacing Thin Processor Nodes" in *RS/6000 SP: Maintenance Information, Volume 2*.
7. Continue to next section, or return to Step 2 in Table C-1 on page C-1.
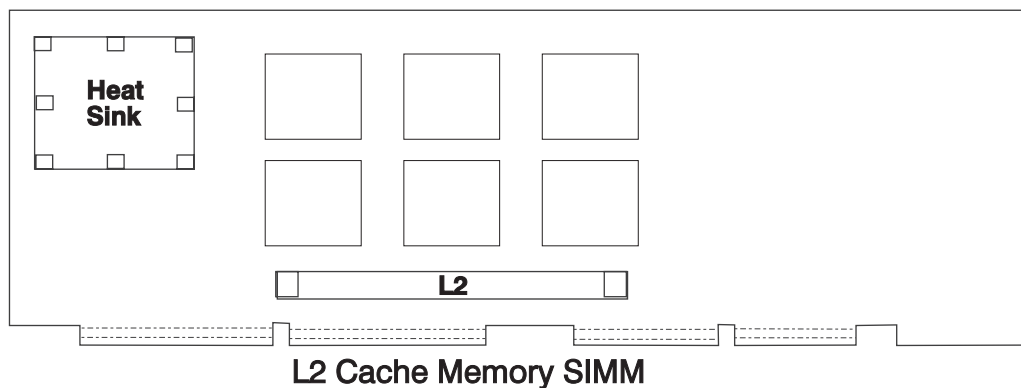
Figure C-6. 66 MHz Thin Processor Node (With L2 Cache) CPU Card Locations

Optional Memory Features for 604 and 604e High Nodes

See Appendix B, "SP Optional Features on Thin, Wide, and High Nodes" on page B-1 for a detailed information of optional memory features for 604 and 604e high processor nodes.

Upgrading 604 High Node Memory

Note: Follow proper procedures when installing memory cards and/or memory DIMMs. Cards require 75 pounds of force to seat correctly.

1. Ensure ESD antistatic wrist device is attached.

2. At the front of the frame, locate the circuit breaker assembly below the 604 high node.

3. Place both switches in the Off ('0') position.

4. Loosen the four screws and remove cover.

5. Remove the CPU module from the node's chassis by disconnecting the two cables from the lateral planar card and moving them away from the front of the unit.

6. Loosen the two retaining screws from the bottom of the CPU module and slide CPU module from the chassis towards you. Grab the bottom of the unit (using both hands) and remove from chassis. Set on ESD protective pad.

7. Loosen the docking screws until the CPU module is disengaged from the MCA module connectors.

8. Remove the seven screws from the top cover and then remove the top cover.

9. Rotate the right side of the top cover upward until you can access the interlock cable connector.

10. Disconnect the interlock cable connector from the lateral planar card.

11. Install the memory cards in a right to left sequence beginning with slot 0, and then continuing with slot 1, 2 and 3. Memory cards must be installed with no empty slots.

   Note: When replacing the CPU module, ensure the two cables are placed away from the CPU module while installing.

12. Grab the bottom of the CPU module with both hands and slowly slide into chassis until the docking screw touches the nut in the MCA module.

13. Install the docking screw until the CPU module is far enough into the chassis to install the two retaining screws.

14. Reinstall the two retaining screws at the bottom of the CPU module, but do not tighten.

15. Tighten each of the retaining screws.

16. Tighten the docking screw.

17. Reinstall the two cables into the lateral planar card, cables are keyed.

18. Place both switches on the circuit breaker assembly into the On ('1') position.

Upgrading 604e High Node Memory

Note: Ensure memory DIMM types are not mixed on individual memory cards or on the node.

Note: Follow proper procedures when installing memory cards and/or memory DIMMs. Cards require 75 pounds of force to seat correctly.

1. Ensure ESD antistatic wrist device is attached.

2. At the front of the frame, locate the circuit breaker assembly below the 604e high node.

3. Place both switches in the Off ('0') position.

4. Loosen the four screws and remove cover.

5. Remove the CPU module from the node's chassis by disconnecting the two cables from the lateral planar card and moving them away from the front of the unit.

6. Remove the two retaining screws from the bottom of the CPU module.

7. Loosen the docking screws until the CPU module is disengaged from the MCA module connectors.

8. Grasp the front of the CPU module and pull the CPU module toward you until you can grasp the bottom of the CPU module on each side.

   Note: Make sure that the operator panel cable and the media power cable are placed out of the path of the CPU module.

9. While grasping the bottom of the CPU module on each side, pull the CPU module toward you until it is out of the CPU enclosure, then place the CPU module on a stable surface.

10. Remove the seven screws from the CPU module top cover and then remove the top cover.

11. To remove a memory card:

a. Position single-piece extraction tools on either end of the card you are removing by placing the pin of the extraction tool through the hole in the top corner of the card.

b. With both extraction tools positioned on the card, firmly rotate both handles of the extraction tools downward until the card disengages from the slot, then remove the card.

12. To remove a DIMM from the memory card, push the release tabs away from the memory module until the DIMM disengages from the slot, then remove the DIMM.

13. To install a DIMM on a memory card:

   a. Place the DIMM in the slot on the memory card.

   Note: Make sure the gold tabs are aligned with the pins and DIMM notches.

   b. Press equally on both ends of the DIMM until the DIMM is fully inserted.

   c. Inspect that:

   - The top of the gold tab is flush with the connector at the center of the connector.

   - Each end of the DIMM tabs are exposed equally

   d. , then press the DIMM into the slot until the DIMM is firmly seated.

   Note: Install, then inspect, one DIMM at a time.

14. Install the memory cards in a right-to-left sequence beginning with slot A, and then continuing with slot B, C, and D. Memory cards must be installed with no empty slots between installed memory cards.

15. Replace the top cover using seven screws.

Note: When replacing the CPU module, ensure the two cables are placed away from the CPU module while installing.

16. Grasp the bottom of the CPU module with both hands and slowly slide into CPU enclosure until the threaded tip of the docking screw touches the nut in the MCA module.

   Note: The system planar edge should be approximately 2 mm inside the bottom front edge of the CPU enclosure.

17. Install the docking screw until the CPU module is far enough into the CPU enclosure to install the two retaining screws.

18. Reinstall the two retaining screws at the bottom of the CPU module, but do not tighten.

19. Tighten the docking screw.

20. Tighten each of the retaining screws.

21. Reinstall the two cables into the lateral planar card, cables are keyed.

22. Place both switches on the circuit breaker assembly into the On ('1') position.

Upgrading CPUs

Upgrading the 604 or 604e High Node CPU

1. Ensure ESD antistatic wrist device is attached.

2. At the front of the frame, locate the circuit breaker assembly below the 604 high node.

3. Place both circuit breakers in the Off ('0') position.

4. Loosen the four screws and remove front node cover.

5. Remove the CPU module from the node's chassis by disconnecting the two cables from the lateral planar card and moving then away from the front of the module.

6. Remove the two retainer screws from the CPU module. Save for reinstallation.

7. Loosen the docking screw until the CPU module is disengaged from the I/O planar interface connectors.

8. Grasp the front of the CPU module top cover, then pull the CPU module toward you until you can grasp the bottom of the CPU module on each side.

9. While grasping the bottom of the CPU module on each side, pull the CPU module toward you until it is out of the node enclosure. Place CPU module on stable surface.

10. Remove the seven screws from the top cover and then remove the top cover.

11. Rotate the right side of the top cover upward until you can access the interlock cable connector.

12. Disconnect the interlock cable connector from the lateral planar card.

13. Install the CPU cards in a right to left sequence beginning with slot 0, and then continuing with slot 1, 2 and 3. Memory cards must be installed with no empty slots.

> **Note:** When replacing the CPU module, ensure the two cables are placed away from the CPU module while installing.

14. Slide CPU module into node enclosure.

15. Tighten the docking screw.

16. Install and tighten the two retaining screws.

17. Reconnect the two cables into the lateral planar card (cables are keyed).

18. Install the front cover with four screws.

19. Place both circuit breakers in the On ('1') position.

Installing Micro Channel Adapters

Installing Micro Channel Adapters in Thin and Wide Nodes

Perform this procedure to upgrade thin, or wide processor nodes for the installation of the adapters.

Note: See "Installing Micro Channel Adapters in a 604 or 604e High Node" on page C-14 for installation in 604 or 604e high nodes.

1. Refer to "Handling a Static-Sensitive Device" in *RS/6000 SP: Maintenance Information, Volume 2* before removing or installing a device in any processor node.

2. Facing the back of the thin or wide processor nodes, there are four vertical slots available in thin nodes and eight slots available in wide nodes. Slot four in thin nodes and slot eight in wide nodes are reserved for the HiPS Adapter-1, HiPS Adapter-2, or SPS Adapter.

3. Make sure you have checked the current configuration of the affected processor node(s), see *RS/6000 SPL Maintenance Information, Volume 1.* This information can be used to check or plan locations for new adapters.

   See Appendix B in *RS/6000 SPL Maintenance Information, Volume 1* for a description of the maximum slots allowed for communication and parallel adapter cards in processor node upgrades.

4. Complete node shutdown procedure.

5. At the rear of the processor node, loosen the knurled knob in the adapter slot to install the adapter card.

6. **For thin processor nodes**, refer to "Removing a Thin Processor Node" in *RS/6000 SP: Maintenance Information, Volume 2*. Remove the processor node cover (after removing the node) by removing the screws on top of the processor node.

7. **For wide processor nodes**, refer to "Opening a Wide Processor Node" in *RS/6000 SP: Maintenance Information, Volume 2*. Open node, and then remove the top card holder, if installed, by removing the screw and releasing the tab.

8. Remove the MCA slot cover.

9. If the adapter has a card extender that holds the front end of the adapter, release the extender by pressing the locking tab to the side. (Extender must be installed if not on card.)

10. Grasp the adapter by the pull tabs and push into the slot.

11. If required, adjust card hold-down bracket or remove cylinders.

    Attention: If a type-5 MCA card is being installed in a thin node or a wide node, ensure that the hold-down cylinder has been removed from the corresponding location in the top cover to prevent damage to the card when the cover is reinstalled. A rubber hold-down pad must be installed on the top cover after the cylinder is removed.

12. **For thin processor nodes**, install top cover using the screws and refer to "Replacing a Thin Processor Node" in *RS/6000 SP: Maintenance Information, Volume 2*.

13. **For SCSI Fast/Wide MCA Connection to Internal DASD**, install internal SCSI interface cable from top connector on MCA card to Fast/Wide DASD.

    Notes

    - This is for 66 and 77 MHz wide node only.

    - If you are connecting to standard SCSI-2 DASDs you need SCSI-2 F/W connector converter P/N 92F3024 to connect the DASD.
    ---

14. **For wide processor nodes**, install the card holder, if present, and refer to "Closing a Wide Processor Node" in *RS/6000 SP: Maintenance Information, Volume 2*.

    At the rear of this processor node, tighten the knurled knob for this adapter card.

15. If there is any adapter microcode to be installed, contact the customer site to see if they have the right level of code and if they need any assistance.

16. Proceed to the next upgrade installation task.

    Note: Cables will be connected later.

Installing Micro Channel Adapters in a 604 or 604e High Node

Perform this procedure to upgrade 604 or 604e high processor nodes for the installation of the adapters.

1. Refer to "Handling a Static-Sensitive Device" in *RS/6000 SP: Maintenance Information, Volume 2* before removing or installing a device in any processor node.

2. Facing the back of the 604 or 604e high processor node, there are fifteen vertical slots available. Slot 1/8 is reserved for HiPS Adapter-2, slot 0/1 is reserved for SP LAN Ethernet, slot 0/7 is reserved for the SPS Adapter, and slot 0/8 contains the mandatory high node SCSI card.

3. Make sure you have checked the current configuration of the affected processor node(s), see *RS/6000 SPL Maintenance Information, Volume 1*. This information can be used to check or plan locations for new adapters.

   See Appendix B in *RS/6000 SPL Maintenance Information, Volume 1* for a description of the maximum slots allowed for communication and parallel adapter cards in processor node upgrades.

4. At the front of the frame, locate the circuit breaker assembly below the 604 or 604e High Node.

5. Place both switches in the Off ('0') position.

6. At the rear of the 604 or 604e High Node, loosen the two self-contained screws and remove cover.

7. Determine the appropriate location to install the MCA card.

8. Disconnect the power supply cable (if required) above the location in which the MCA card will be installed.

   Note: Cooling modules do not have power cables installed.

9. Loosen the self-contained screw until the power/cooling module disengages.

10. Slowly pull the power supply out and place both hands under module for support to remove from chassis.

11. Remove adapter slot bracket from the selected MCA location.

12. Lay card flat, turning connector side down, inside the MCA module.

13. Align card connector with MCA module connector.

14. Press card into appropriate slot, ensuring that the plate of the adapter bracket is under the knurled knob and in contact with the card guide at the top of the adapter bracket.

15. Tighten the knurled knob.

16. Using both hands under the module for support, slowing slide the power supply/cooling module into chassis.

    Attention: Ensure SCSI cable is out of the way before installing power supply on right side.

17. If this is a power supply, reconnect the power cables to the module.

18. Tighten the self-contained screw.

19. Reinstall cover and tighten each of the retaining screws.

20. Place both switches of the circuit breaker assembly in the On ('1') position.

21. If there is any adapter microcode to be installed, contact the customer site to see if they have the right level of code and if they need any assistance.

22. Proceed to the next upgrade installation task.

Installing PCI Adapters

To install PCI adapters, use the instructions provided with the MES kit.

Cabling PCI and Micro Channel Adapters

Note: For adapters not listed in this section or for additional information, refer to *Adapters, Devices and Cable Information for Micro Channel Bus Systems*, SA38-0533 for Micro Channel adapters or *Adapters, Devices and Cable Information for Multiple Bus Systems*, SA38-0516 for PCI Adapters.

Cable Routing

Figure C-7 and Figure C-8 on page C-17 show back views of the RS/6000 SP frame, showing the horizontal and vertical paths of cable routing from connector-to-connector, with the depth amplified on the drawing.
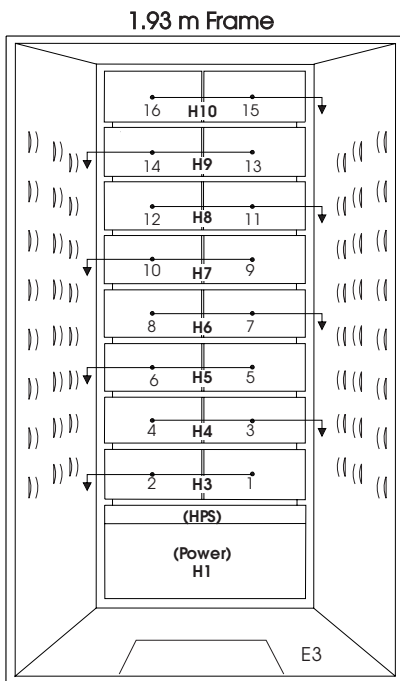
Figure C-7. Frame Cabling Routing Path in Rear of RS/6000 SP Frame—1.93 m Frame
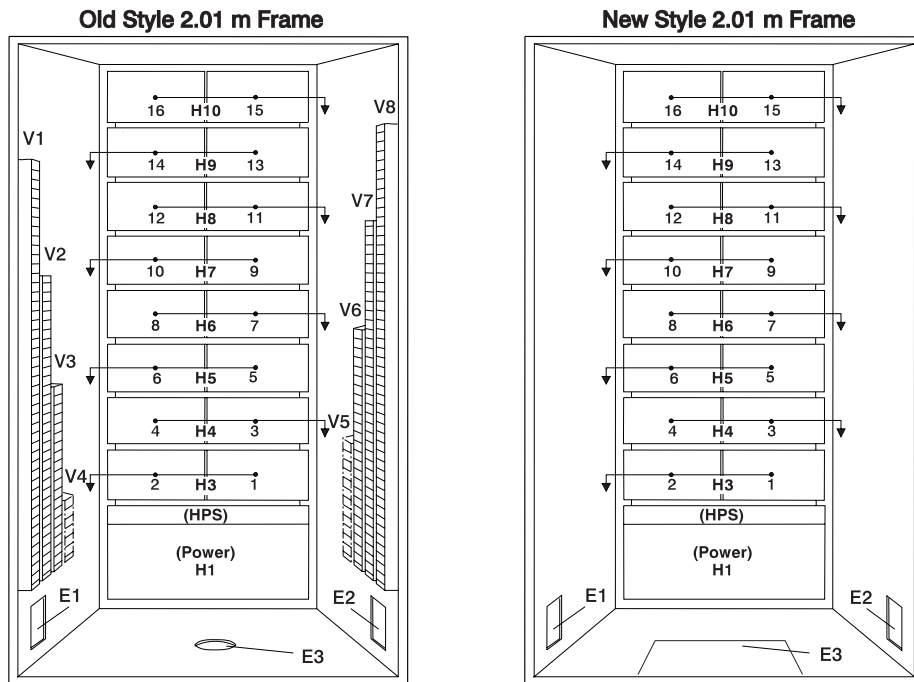
Figure   C-8. Frame Cabling Routing Path in Rear of RS/6000 SP Frame—2.01 m Frame

Table C-4. External Cable Routing				
To Slot:	**Cable Budget millimeters (inches)**	**Frame Entrance:**	**Vertical Routing:**	**Horizontal Routing:**
1	1800 (71)	E3	V4	H3
2	1500 (59)	E3	V4	H3
3	1680 (66)	E3	V5	H4
4	1980 (78)	E3	V5	H4
5	2160 (85)	E3	V3	H5
6	1850 (73)	E3	V3	H5
7	2030 (80)	E3	V6	H6
8	2340 (92)	E3	V6	H6
9	2510 (99)	E3	V2	H7
10	2210 (87)	E3	V2	H7
11	2390 (94)	E3	V7	H8
12	2690 (106)	E3	V7	H8
13	2870 (113)	E3	V1	H9
14	2570 (101)	E3	V1	H9
15	2740 (108)	E3	V8	H10
16	3050 (120)	E3	V8	H10

Cabling the HiPS Adapter

Perform "Cabling Switch Data Cables to Processor Nodes" on page C-23.

Cabling the Block Multiplexer Channel Adapter (BMCA) Card

Refer to the *Block Multiplexer Channel Adapter Feature Summary* (SA23-2483), for the BMCA requirements, configurations, and restrictions before installing this feature.

Due to cable restraints, processor nodes on a single channel string should be positioned next to one another, side by side, or one above the other. (See note 3 below.)

Notes:

1. If you experience difficulty in installing all of the cables exiting the frame through the frame cable exit hole, contact the next level of support.

2. There is a limit of 16 BMCA cables exiting each frame.

3. If your configuration requires that you space the adapters a greater distance apart, but are daisy chaining them on the same channel, **F/C 2753** can be used. This feature contains a Y-cable with one longer end that normally exits the SP2 frame.

   Using this feature will leave you with an extra bus-and-tag terminator and bus-and-tag cable.

Perform one of the following cabling procedures:

Cabling the BMCA Feature to a Single Processor Node: Follow this procedure to cable the BMCA feature to a single processor node in a RS/6000 SP frame:

1. Connect cable part number 54G3361 to the BMCA adapter card that you installed in the processor node as shown in Figure C-9.

2. Connect terminator part number 6473048 to the short end of this cable.

3. Connect cable 68F7211 to the long end of this same cable.

4. Connect the other end of cable part number 68F7211 to the standard I/O bus and tag that connects to the Customer's System/370 or System/390.

5. Return to Step 2 in Table C-1 on page C-1.
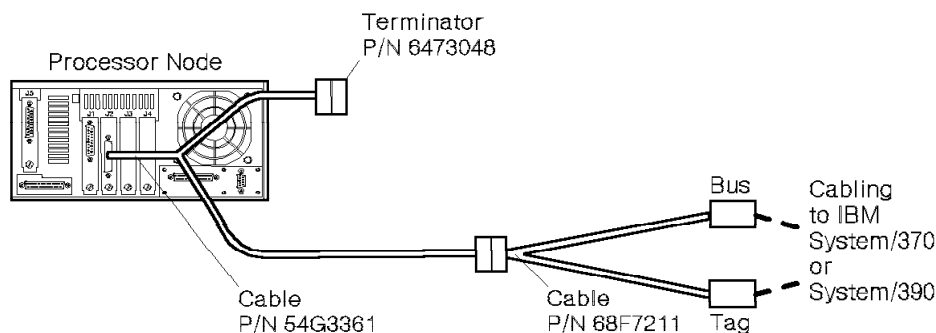
Figure   C-9. BMCA Cabling to a Single Processor Node

Cabling the BMCA Feature to Multiple Processor Nodes: Follow this procedure to cable the BMCA feature to multiple processor nodes in a RS/6000 SP frame:

 1. Determine which processor node will be the first in the string and then connect cable part number 54G3361 to the BMCA adapter card in that node as shown in Figure C-10 on page C-19.

 2. The second processor node and each succeeding node receives cable 54G3360.

 3. The cables attached to the second processor node, and all succeeding nodes are then connected together to form a daisy chain.

 4. The loose end in the last cable on the daisy chain string receives terminator 6473048.

 5. The free end of cable part number 54G3360 on the second node is connected to the short end of the first node cable part number 54G3361.

 6. Connect cable part number 68F7211 to the long end of cable part number 54G3361 that you already connected to the first processor node in the string.

 7. Connect the other end of cable part number 68F7211 to the standard I/O bus and tag that connects to the Customer's System/370 or System/390.

 8. Ensure all S/B switches are set to the 'select' position.

 9. Verify that the IOCDS for new channel devices have been completed, if required.

10. Cables should be run through the cable raceways where possible. If there is insufficient space in the raceways, cables should be run along outside of raceways, then ty-wrapped to provide strain relief from weight of cables.

11. Continue to next section, or return to Step 2 in Table C-1 on page C-1.
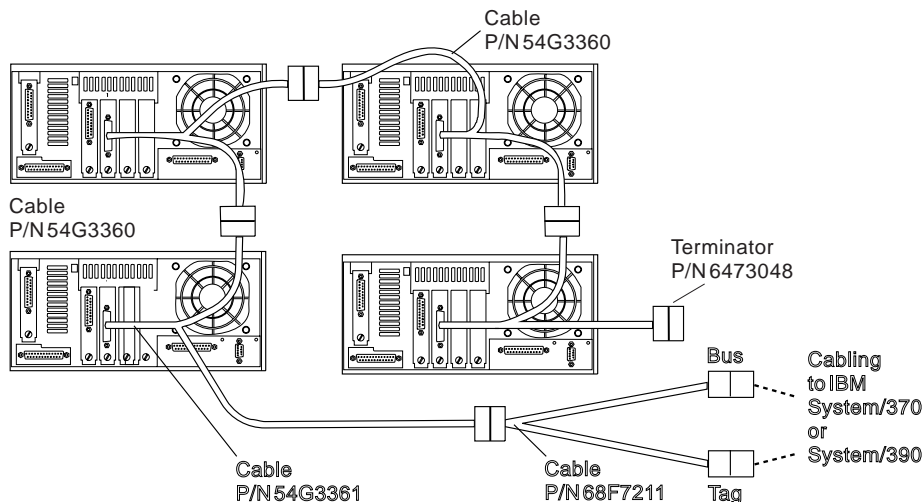
Figure C-10. BMCA Cabling to a Multiple Processor Nodes

Installing or Upgrading Switch Features

The RS/6000 SP system may have a High Performance Switch (HiPS) or Scalable POWERparallel Switch (SPS) ordered as a feature. All processor nodes in the system must be connected to the switch if either switch option is installed.

Use the following procedure to install a switch feature:

 1. Refer to "Handling a Static-Sensitive Device" in *RS/6000 SP: Maintenance Information, Volume 2* before removing or installing a device in any processor node.

2. Make sure you have performed "Checking the System Configuration" on page C-2 to check current configuration of the affected processor node(s). This information can be used to check or plan locations for new adapters.

3. If appropriate, perform "Installing the Switch Adapter Cards."

4. Perform "Cabling Switch Data Cables to Processor Nodes" on page C-23.

5. If appropriate, perform "Installing Interframe Cables for Switch Features" on page C-24.

Note: Some nodes may need to have EPROMs changed.

Installing the Switch Adapter Cards

To install switch adapter cards, use the instructions provided with the MES kit.

Upgrading an 8-Port Assembly

Perform the following procedure when upgrading an HiPS-LC8 switch assembly to an HiPS 3.0 switch assembly, or a SPS-8 assembly to a SPS assembly:

Note: Removed cables will be returned on the REMR.

1. Turn the power switch on the front of the switch assembly to the Off ('0') position.
2. Disconnect all cables from rear of the switch assembly.
3. Disconnect switch data cables at rear of all processor nodes.
4. Remove all switch data cables from the cable raceways. These cables will be returned on the REMR.
5. Remove four screws from front of the switch assembly and slide the switch assembly out of the front of the frame.
6. Continue with Step 5 of "Installing the HiPS Assembly" to install the new switch assembly.

Installing the HiPS Assembly

Perform the following procedure to upgrade the RS/6000 SP model with the installation of the HiPS:

1. Remove screws holding the faceplate located below processor nodes.
2. Remove nut clips from front machine horizontal rails and install into rear of machine where support brackets will be installed.
3. From the rear of the machine, install a switch support bracket into the right machine rail, ensuring that the studs of the bracket are completely inserted. Secure with screw.
4. Repeat the preceding step, this time installing a switch support bracket into the left machine rail.
5. Install the switch box assembly by sliding it into the front of the frame.
6. Install screws on the front of the switch to hold the box assembly to frame.
7. Connect the supervisor cable to switch E00-S00-BH-J2 (provided with basic frame).
8. Install the 48-volt power cable in location E00-PDU-BH-J5 to E00-S00-BH-J1.

Refer to *RS/6000 SP: Maintenance Information, Volume 2* to aid your understanding of the nomenclature for the connector and cable locations in the RS/6000 SP system.

Installing the SPS Assembly

The Scalable POWERparallel Switch (SPS) is a complete assembly in one container. Due to the weight, the switch can be installed disassembled (recommended if one team is installing the switch). The installation as a complete assembly (by two teams) is also shown here.

CAUTION:
Outer edges of chassis may be sharp. Care must be taken when removing and installing chassis.

1. At the front of machine remove screws holding the faceplate located below processor nodes.

2. Remove the lower nut clips from each side of the horizontal rails where the switch will be installed.

   Note: Do not remove the nut clips in the higher location of the EIA rail.

3. Install the nut clips into rear of machine, where support brackets will be installed.

4. If uncertain where to install nut clips, starting from the bottom of the horizontal rail, count the holes up to the 21st location and install nut clips.

   Note: Rails will be supplied in the SPS container.

5. From the rear of machine install an SPS support bracket into the right machine rail, ensuring that the studs of the bracket are completely inserted.

6. Secure with screw.

7. Repeat the preceding step, this time installing an SPS support bracket into the left machine rail.

8. Remove SPS assembly from container.

9. If this is a one team installation, go to step 17. If two teams, continue.

10. Remove nut clips from each side of the outer chassis. See Figure C-11 on page C-22, **point C**.

11. Remove the four screws from the front of the SPS assembly and remove fan assembly. See Figure C-11 on page C-22, **point A**.

12. Lift switch from container, using one person on each side of the assembly.

13. Slide switch into front of frame, ensuring connectors on assembly are facing the back of frame.

14. Install two screws in the rear to secure the assembly to the assembly rails.

15. Reinstall the four screws previously removed into the front of the assembly. Do not tighten.

16. Tighten each screw one at time by alternating between each screw. Installation of SPS is completed for two teams. Go to step 33 on page C-22.

17. Carefully remove the SPS assembly from container.

18. Remove the four screws from the front of the assembly and remove fan assembly. See Figure C-11 on page C-22, **point A**.

19. Remove nut clips from each side of the outer chassis. See Figure C-11 on page C-22, **point C**.

20. Set fan assembly and screws safely away to be reinstalled.

21. Remove the two nuts from the rear of the outer chassis. See Figure C-11 on page C-22, **point D**. Save for reinstallation.

22. Remove the two screws from inside of inner chassis. See Figure C-11 on page C-22, **point B**, and Figure C-12 on page C-23. Save for reinstallation.

23. To remove the inner chassis, push the inner chassis from the rear of the outer chassis and set inner chassis aside. See Figure C-11 on page C-22.

24. Lift outer chassis, slide into front of frame.

25. Install two screws in the rear to secure the assembly to the assembly rails.

26. Install inner chassis into outer chassis, ensuring that cable connectors are going toward the rear of the frame. Secure using the two side screws removed earlier.

27. Locate fan assembly and screws removed earlier from chassis.

28. Locate connector inside of fan and inner chassis. See Figure C-12 on page C-23.

29. Angle fan assembly tilting upward and align connectors.

30. Install the fan assembly into the inner chassis using the four screws previously removed. Do not tighten.

31. Tighten each screw one at time by alternating between each screw.

32. Install the two rear nuts previously removed into the rear of the chassis.

33. Install the 48 V power cable into location L00-PDU-BH-J5 to L00-S00-BH-J1.

    Note: 48 V cable will be supplied in the SPS container.

34. Connect the supervisor cable to the assembly, E00-PDU-BH-J7 to E00-S00-BH-J2.
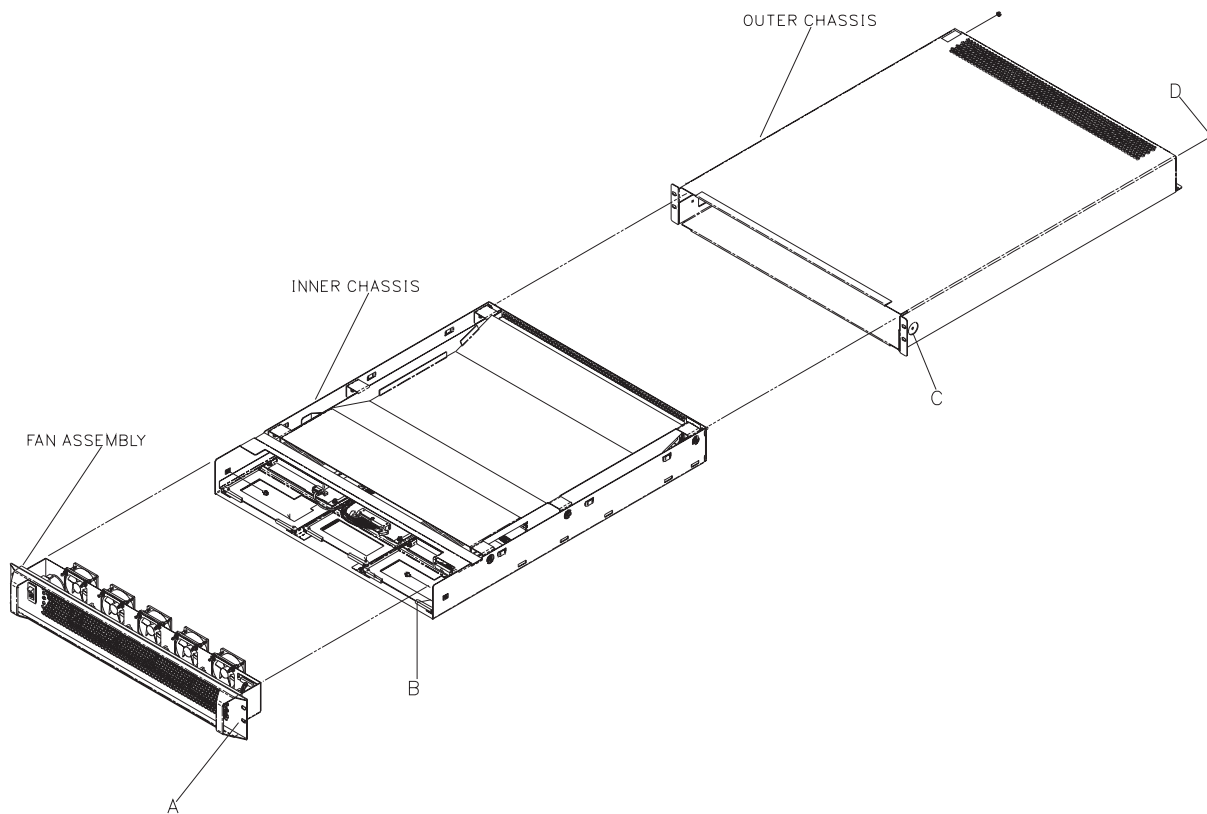
Figure   C-11. Disassembling the SPS
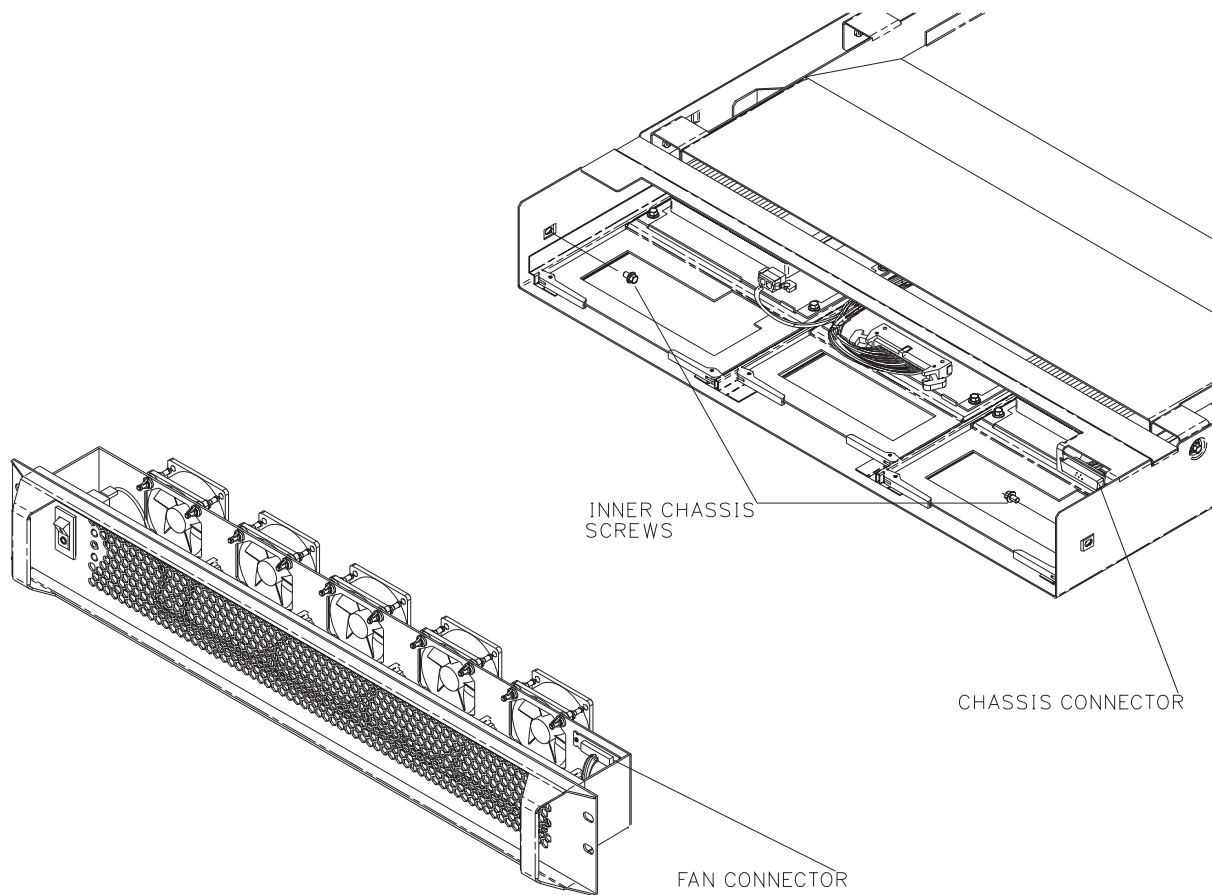
Figure C-12. Reinstalling the SPS Fan Assembly

Cabling Switch Data Cables to Processor Nodes

Perform the following procedure to install the switch node data cables:

Use the appropriate table (see "Internal Switch Connections" on page A-1) for the feature being installed.

1. Plug all cables at the switch.
2. Run all cables through the raceways to the corresponding processor node switch adapter locations, and connect to switch adapter.

   Note: Two or more frames with wide processor nodes or high processor nodes sharing a single switch assembly are considered a single logical frame.

3. If there are separate clock cables for the processor nodes, install clock cables at switch adapter cards (and at switch assembly as required).
4. If there are no other RS/6000 SP frames with the switch to cable in the configuration, terminate the unused odd J-plug locations (J3 through J33) using Terminator P/N 46G5619.
5. Make sure that all unused even J-plug locations (J4 through J34) are terminated.
6. Continue to next section, or return to Step 2 in Table C-1 on page C-1.

Installing Interframe Cables for Switch Features

Perform the following procedure to install the switch interframe cables for two-to-five logical frame RS/6000 SP systems:

1. If side skirts are installed on the RS/6000 SP frames, they must be removed for frame-to-frame cable installation (see Figure 2-9 on page 2-13). Refer to "Removing the Acoustic Skirts" in *RS/6000 SP: Maintenance Information, Volume 2* for the procedure.

2. Designate each adjacent frame with the number sequence one to five, depending on the number of logical frames you intend to connect. Position the frames to be connected with the multi-frame high-performance switch feature within three meters (≈ 10 feet), with at least .050 meter (≈ 2 inch) distance.

3. Install ground strap cable P/N 46G5695 between each adjacent frame through the closest exit hole and fasten the M6 ground point below the exit as shown in Figure C-13.
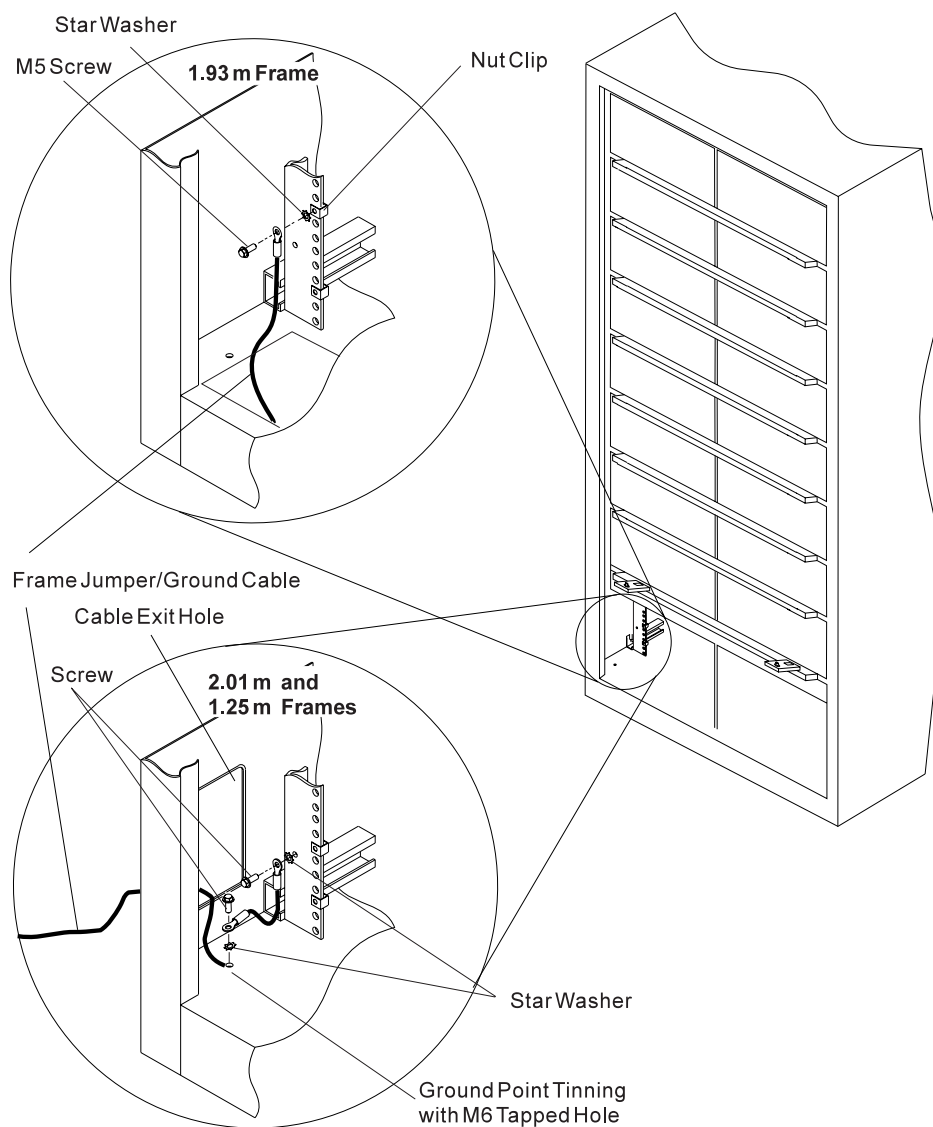
Figure C-13. Installing Ground Strap Between Frames

4. Refer to the "Naming Standard for RS/6000 SP Components" in *RS/6000 SP: Maintenance Information, Volume 2* to read about the naming conventions.

5. Refer to the Figure C-14 on page C-25 and Figure C-15 on page C-26 to familiarize yourself with the bulkhead and its locations.

HiPS 2.0
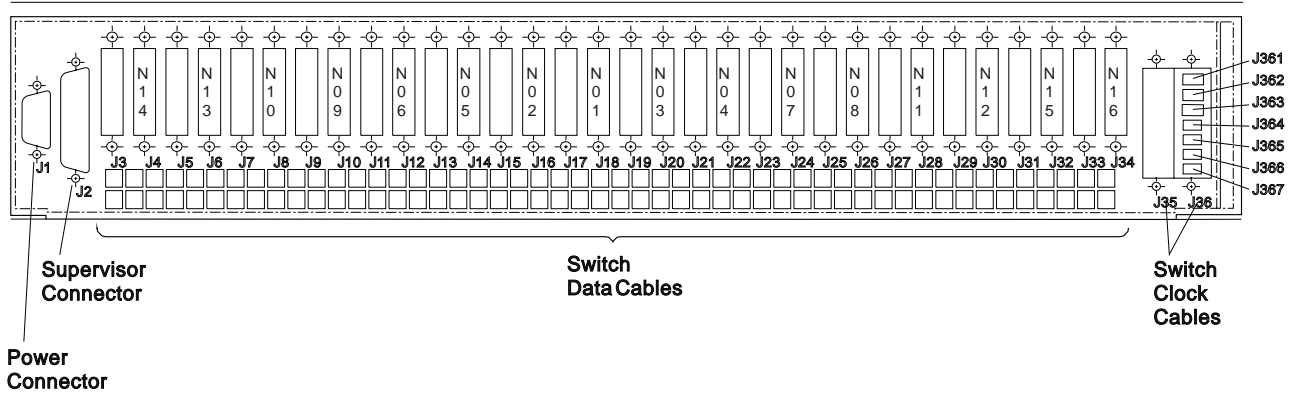
HiPS 3.0
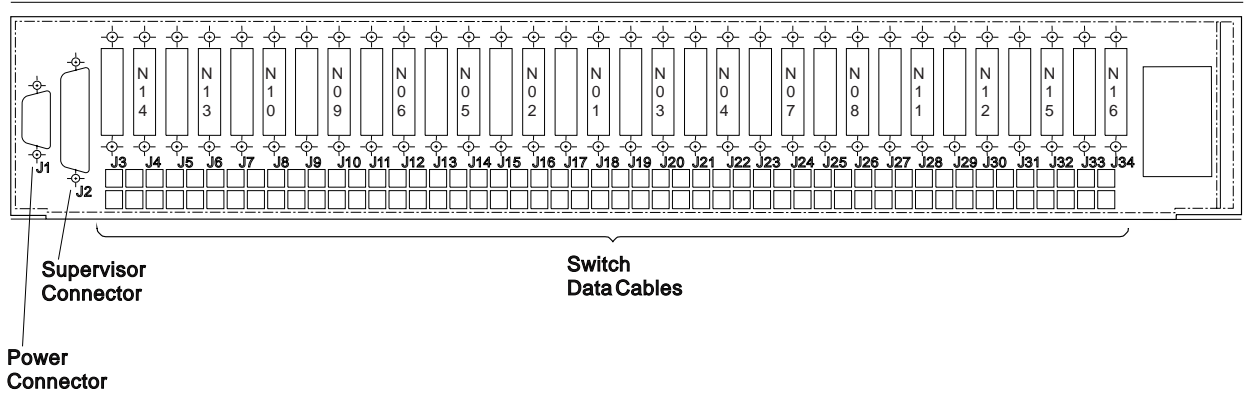
HiPS-8 (LC8)
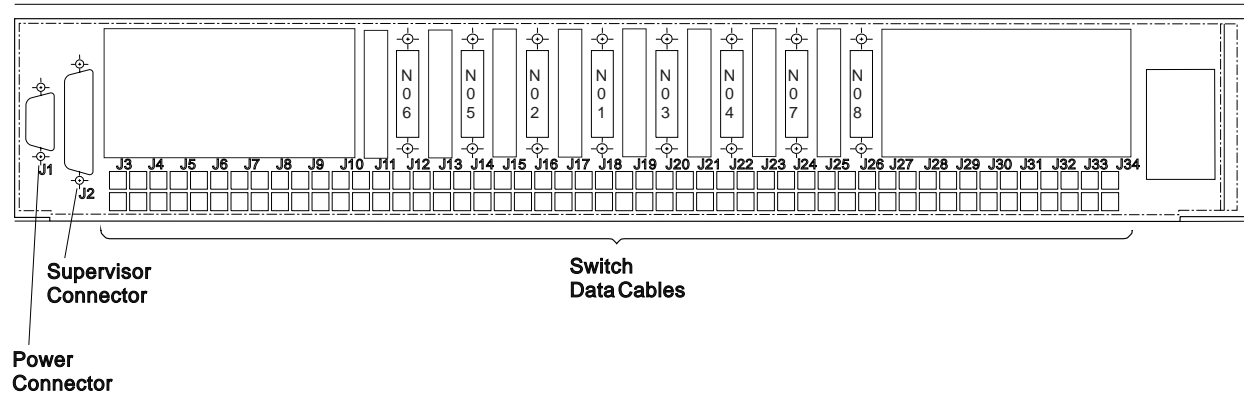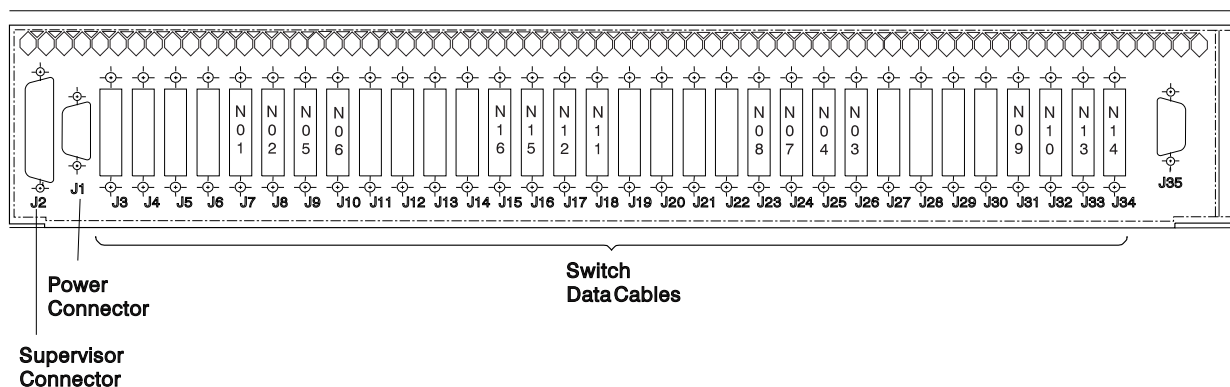
Figure C-14. High Performance Switch (HiPS) Bulkheads

SP Switch (SPS)

SP Switch-8 (SPS-8)

Figure C-15. Scalable POWERparallel Switch (SPS) Bulkheads

Notes

- Switch clock connectors (J35 and J36) are not present on an HiPS 3.0 switch assembly.

- Switch clocks may be distributed via the switch data cables, so there may not be switch clock cables.

- HiPS 2.0 switch assemblies require data cable interposers (P/N 93G1097) for external clock-to-data cables. These interposers are used for coexistence in systems that have both HiPS 2.0 and HiPS 3.0 assemblies. See Figure A-5 on page A-11.

- An 8-port switch has jacks for nodes N01 - N08 only.
---

6. On **HiPS 2.0** switch assemblies only, make sure that data cable interposers are installed. Refer to Table A-12 on page A-11.

7. Locate the two label sheets (P/N 54G3277) and all data cables shipped with the RS/6000 SP for the switch feature. Refer to Figure A-6 on page A-12 for the sets of labels.

8. Refer to "Installing the HiPS System" on page A-14 or "Installing the SPS System" on page A-34 for the appropriate frame configuration/upgrade chart that corresponds to this system.

Attention: Switch data plug/jack connector pins are easily bent. Check for bent pins on male plugs or bent pin guides on female jacks if a cable is difficult to plug. Problems with bent pins or pin guides can propagate to new plugs/jacks if not corrected first.

9. Install the data cables according to the appropriate charts in Appendix A, "Switch Cable Charts" on page A-1. Record serial number from cables in the tables.

10. Neatly bundle all switch cables after all are installed.

11. Make sure all unused switch ports (HPS-BH-J3 through HPS-BH-34 or SPS-BH-J3 through SPS-BH-34) have switch data wrap plugs installed. This is important for single frame systems and for frames with less than 16 nodes.

12. If applicable, refer to "Replacing the Acoustic Skirts" in *RS/6000 SP: Maintenance Information, Volume 2* to install the frame skirts.

13. Return to Step 2 in Table C-1 on page C-1.
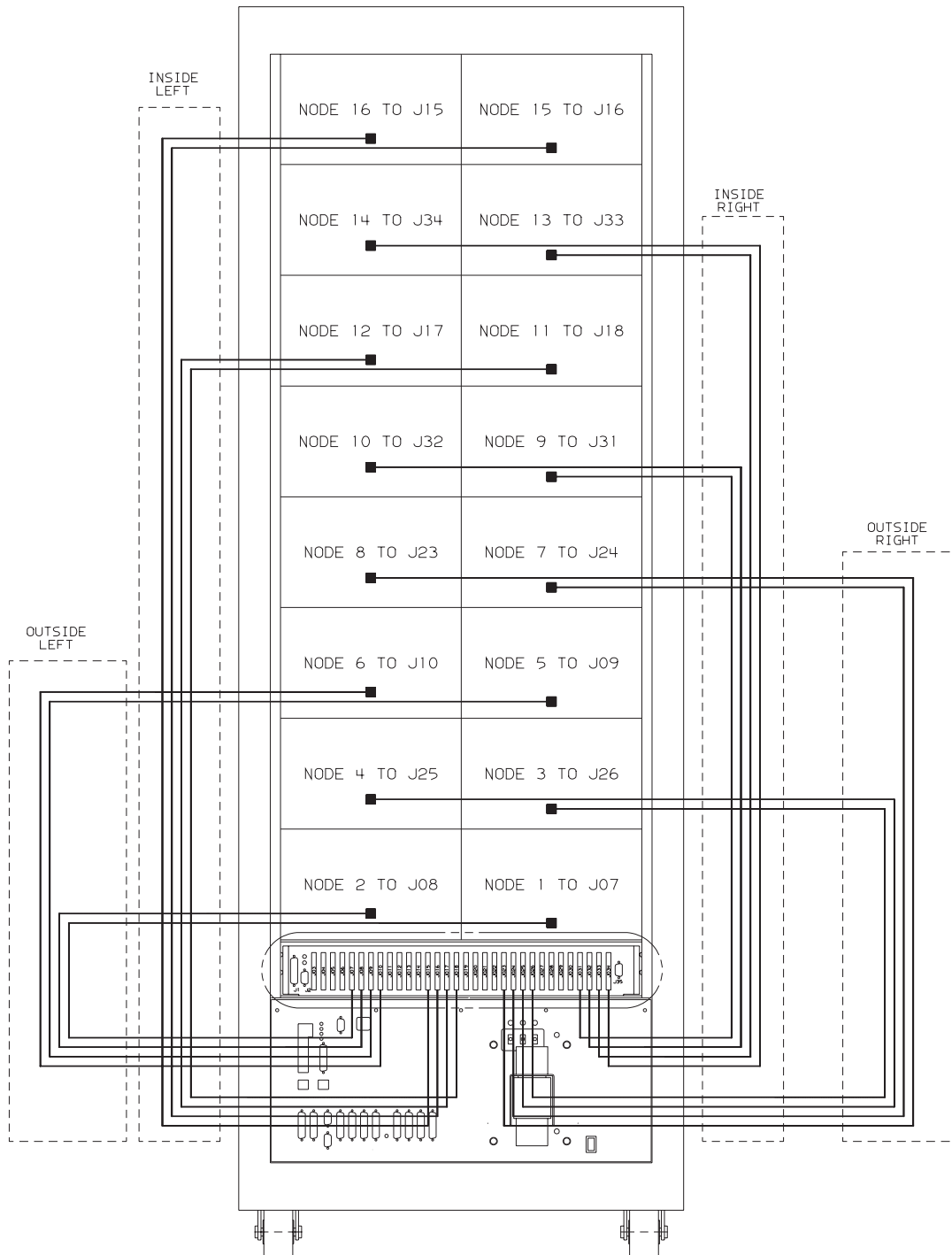
Figure C-16. SPS Cable Routing Diagram

Attaching the 9077 SP Switch Router (Dependent Node)

To attach and configure a 9077 SP Switch Router, see *SP Switch Router Adapter Guide*.

Installing the High Availability Control Workstation (HACWS)

Note: The Frame Supervisor card can be removed and replaced concurrently.

1. Route the new RS-232 cable from the SP frame to the new customer control workstation.

2. Route the Ethernet LAN cable from the SP frame to the new customer control workstation.

3. Check the supervisor card and, if necessary, remove and replace it. The HACWS card will have 8 LEDs instead of 4. (See either the PDU remove and replace procedures or the SEPBU remove and replace procedures in Chapter 3 of *RS/6000 SP: Maintenance Information, Volume 2*.)

   Note: Do not reinstall the J9 cable after replacing the frame supervisor card at this time.

4. Connect both new and existing RS-232 cables to the Y serial cable and install in frame supervisor card (PDU-BH-J9).

5. Install the BNC Y-adapter to the Ethernet adapter of the control work station.

6. Connect Ethernet cable to the Ethernet adapter of the control work station, then attach cable to LAN network.

7. Make sure the Ethernet LAN is terminated at both ends. Look for a terminator on a T-adapter.

8. Perform the "Ethernet LAN Isolation Procedure" in *RS/6000 SP: Maintenance Information, Volume 2* to check for any Ethernet problems.

Note: HACWS requires additional shared disk hardware external to the control workstations. Check with the customer concerning installation requirements.
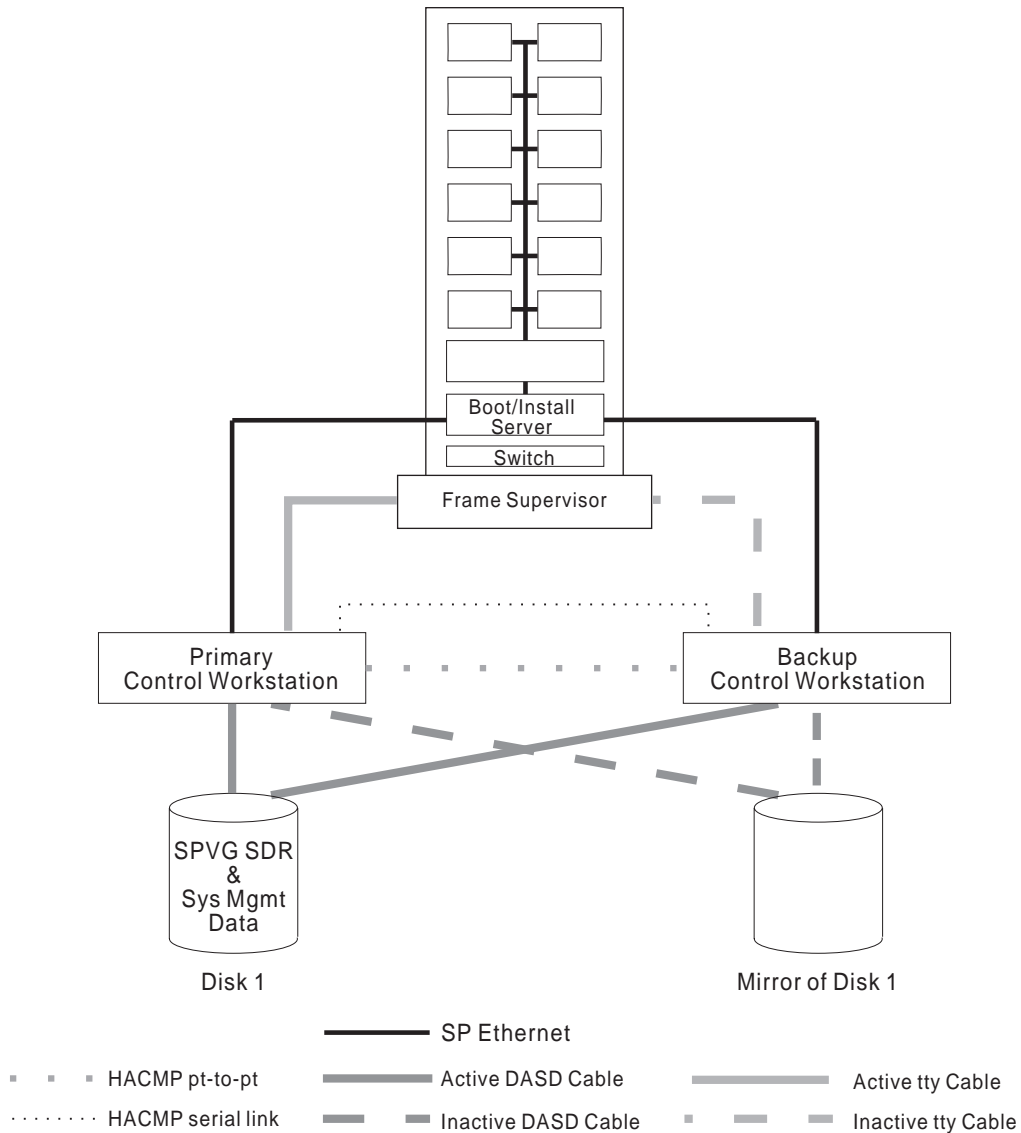
Figure   C-17. Cabling the High Availability Workstation (HACWS)

Special 2AX and 3AX Upgrades

Upgrading SEPBU to N+1 Operation

This upgrade is related to the 49-inch Model 2AX/3AX frame only.

Note: The SEPBU in a 2AX/3AX frame uses single-phase voltage inputs.

This upgrade involves installing an additional SEPBU power module into position "C" of the SEPBU power chassis.

Note: Refer to "Replacing the SEPBU Power Module" in Chapter 3 of the *RS/6000 SP: Maintenance Information, Volume 2* for the procedure.

1. Remove blank cover from position "C" of the SEPBU.

2. Install the new power module into position "C" of the SEPBU.

Upgrading Frame Capacity - Model 2AX to 20X or 30X

This upgrade is related to the 49-inch Model 2AX frame.

The following upgrade consists in replacing the 49-inch frame with a full-height frame, increasing the processor node capacity to eight processor node drawers. The single-phase SEPBU power unit is converted to a three-phase SEPBU in order to supply greater power capacity.

When upgrading from the Model 2AX to the Model 30X only, an HiPS or SPS is needed to allow connection of up to 16 processor nodes, and to allow for connection to other switch assemblies. (The Model 20X does not have an HiPS or SPS.)

Note: Upgrade procedures are included with the MES upgrade kit.

Upgrading Frame Capacity - Model 3AX to 30X

This upgrade is related to the 49-inch Model 3AX frame.

The following upgrade consists in replacing the 49-inch frame with a full-height frame, increasing the processor node capacity to eight processor node drawers. The single-phase SEPBU power unit is converted to a three-phase SEPBU in order to supply greater power capacity.

The 8-port switch versions are replaced by a full-size switch to allow connection of up to 16 processor nodes, and to allow for connection to other switch assemblies.

Note: Upgrade procedures are included with the MES upgrade kit.

Verifying Optional Feature Installations

Note: A 9077 (any model) is not specifically tested with these procedures. Refer to the *SP Switch Router Adapter Guide* for more information.

There are several methods for verifying installation of the optional features. Use the following table to determine the recommended method of verifying the feature installation(s). Use the first method that applies. Return to Table C-5 on page C-32 as often as necessary until all new features are verified.

Table C-5. Recommended Verification Methods	
Upgrade (MES)	**Verification Strategy**
Additional Frame	Perform "Verifying RS/6000 SP Frames Using CE Installation Aid" on page 2-27 or "Verifying the RS/6000 SP System Using Customer Configuration" on page 2-34 to perform complete verification of frame hardware.
Additional Processor Node(s)	Perform "Verifying New Processor Node(s)" on page C-32 to perform verification of processor node hardware only.
Processor Node Upgrades • DASD Upgrades • Memory Upgrades • Micro Channel Adapters	Perform "Verifying Processor Node Basic Functions" on page C-32 to perform verification of processor node hardware only.
New HiPS feature(s) • Additional Frame with HiPS • Additional Processor Node(s) with HiPS Adapter • Installation of HiPS	Perform "Verifying the Switch Assembly Feature" on page C-33 to perform verification of HiPS feature only.
All appropriate verification steps are completed.	Go to "Post-Installation Tasks for Optional Features" on page C-34.

Verifying New Processor Node(s)

1. The customer or CE must complete the steps in the "Adding Nodes" section of the "Reconfiguring the RS/6000 SP System" chapter in the *IBM RS/6000 SP: Installation Guide* before continuing.

2. Perform "Verifying Processor Node Basic Functions" for the new processor nodes.

Verifying Processor Node Basic Functions

The following procedure describes how to perform a verification test of basic functions on one or more processor nodes. The verification test does not include interactive portions of device diagnostics.

This procedure should be performed from a window on the control workstation.

1. Determine Internet (IP) address for processor node(s).

2. From an available AIX window, type "ping *Node_IP_Address*" followed by **ENTER**.

3. If the **ping** command is successful, you should see lines returned indicating response time. If you get no response times, there is no Ethernet connection with the processor node; check processor node, Ethernet hardware (including adapter connection, LAN, and terminators), and the TCPIP setup of the "en0" interface on the processor node(s). Refer to "Verifying New Processor Node(s)" if necessary.

4. Hold down the "Ctrl" key and press the "C" key to stop the "ping" command.

5. From the AIX window, type "telnet *Node_IP_Address*" followed by ENTER. If you do not get a login screen, make sure processor node has completed IPL in NORMAL mode (3-Digit display is blank).

6. Enter userID of "root" and press ENTER.

7. Use the "diag " command to run advanced diagnostics against the "Base System" and any other Micro Channel feature adapters in the system. Refer to "Running Diagnostics in a Processor Node" in *RS/6000 SP: Maintenance Information, Volume 2* if you need more information on running diagnostics.

8. Verify that all installed devices are shown in the tested devices list.

9. If installed devices are not in the device list or fail diagnostics, check for obvious problems such as: poor seating of the device, loose memory SIMMs, duplicate or unseated SCSI address jumper(s), unplugged cable(s) at rear of processor node, etc. Use *Diagnostic Information for Micro Channel Bus Systems* (SA38-0532) and *Adapters, Devices and Cable Information Manual* (SA38-0533), as appropriate.

10. Verification of the processor node is now complete.

Verifying the Switch Assembly Feature

The following procedure describes how to perform a verification test of the HiPS or SPS feature.

Note: The customer must install AIX and configure the switch feature for the new system before this verification test can be completed. Some testing can be done on switch-to-switch cabling before the customer has completed configuration; however, you will get errors on connections to any newly added processor nodes in the system.

1. Before continuing, make sure the Customer's topology file reflects the number of switches in the new system configuration. If not, the customer must select the correct topology file using the "Etopology" command.

2. If possible, make sure that the customer has installed AIX and RS/6000 SP specific software (including CSS) on all processor nodes in the system. Processor nodes that are not configured will return errors in "/var/adm/SPlogs/css/out.top" at a later step.

3. Power-on all switch assemblies and set the switch clocks appropriately. Refer to the "Selecting Appropriate Switch Clocks" section in Chapter 2 of *RS/6000 SP: Maintenance Information, Volume 2* for more information. For any frames where you change the clock selection, you should power-off the processor nodes to put them in a known state.

4. Power-on all processor nodes in the system. Wait until IPL has completed for all processor nodes.

   Note: If IPL fails for any processor nodes, use the MAPs in *RS/6000 SP: Maintenance Information, Volume 2* to isolate and repair the problem.

5. From the control workstation, check/set the primary node using the "Eprimary" command.

   Example:

   ```
   Eprimary 1
   ```

6. From the control workstation, issue the "Eclock -r" command to set clocks on all switch assemblies.

7. From the control workstation, issue the "Estart" command.

8. Log into the primary node using the "telnet" command.

   telnet *primarynode_hostname*

9. On the primary node, check the results in the **/var/adm/SPlogs/css/out.top** file.

10. If the **out.top** file reports any problems, use the "Switch Function" MAP in *RS/6000 SP: Maintenance Information, Volume 2* to isolate and repair the problem.

    Note: Processor nodes that are not configured by the customer will return errors in **/var/adm/SPlogs/css/out.top**.

11. Verification of the HiPS feature is now complete.

Post-Installation Tasks for Optional Features

Acquiring VPD data from a RS/6000 SP

Refer to "Acquiring VPD data from a RS/6000 SP" on page 2-39.

Appendix D. Translated Safety Notices

Dansk

> **Fare!**
>
> Strømforsyningsenhedens dæksler må ikke åbnes. Strømforsyningsenheden må ikke repareres, men skal udskiftes som en enhed

> **Fare!**
>
> En forkert forbundet stikkontakt kan give livsfarlig elektrisk spænding på metaldele i systemet eller på udstyr, der er tilsluttet systemet. Det er kundens ansvar at sikre, at stikkontakten er korrekt forbundet til jord.
>
> Før signalkabler tilsluttes eller fjernes: Sørg for at afmontere alle strømførende kabler, både til systemenheden og til det tilsluttede udstyr.
>
> Hvis systemet skal have tilsluttet eller fjernet enheder: Sørg for, at strømforsyningskablerne til disse enheder er taget ud af stikkontakterne, før signalkablerne tilsluttes. Hvis det er muligt, skal alle strømførende kabler på det eksisterende system afmonteres, før nyt udstyr tilsluttes.
>
> Brug kun én hånd, når du skal forbinde eller afmontere signalkabler. Derved undgår du at få elektrisk stød, som kan opstå, hvis to flader med forskellig spænding berøres samtidig.
>
> Kabler til skærmterminaler, printere, telefoner eller overspændingsafledere til kommunikationsudstyr må ikke monteres i tordenvejr.

> **Fare!**
>
> Før du sætter netledningen fra dette produkt i stikkontakten, skal du kontrollere, at stikkontakten har korrekt forbindelse til jord og den rette spænding.

> **Fare!**
>
> Du må ikke tilslutte eller fjerne kabler, der har ledende overflader eller ledende stik, i tordenvejr.

> **Fare!**
>
> Før du afmonterer eller installerer evt. dele, der er sluttet til nettet, skal du slukke for strømmen og tage maskinens netledning ud af stikkontakten.

> **Fare!**
>
> Undgå elektrisk stød under installation, flytning eller omkonfigurering af maskinen: Slut først netledningen til nettet, efter du har tilsluttet alle signalkabler.

D-1

> **Fare!**
>
> Høj spænding. Udfør procedurerne "Lockout/Tagout Procedure for PDU" eller "Lockout/Bagout Procedure for PDU" for at fjerne netspænding fra rammen.

> **Fare!**
>
> Høj spænding. Udfør procedurerne "Lockout/Tagout Procedure for PDU" eller "Lockout/Bagout Procedure for PDU" for at fjerne netspænding fra rammen og fra højspændingstransformeren, hvis den er installeret.

> **Fare!**
>
> Høj spænding ved testpunkter. Benyt testpinde (probes) beregnet til høj spænding.

> **Fare!**
>
> Høj effekt. Kortslut ikke 48-volts rammen til rammen eller til 48-volts returen. Kortslutning medfører systemafbrydelse og muligvis fysisk skade.

> **Fare!**
>
> Hvis en ikke-dubleret strømforsyningsenhed svigter, er der ingen lamper, der lyser. Lampen for højspænding lyser heller ikke, selv om der stadig er høj spænding.

> **Fare!**
>
> I resten af proceduren er der målinger, som skal udføres, mens strømmen er tilsluttet. Husk, at der er farlig spænding.

> **Fare!**
>
> Rammens hovedafbryder og kontrolenhed må ikke tændes igen nu.
>
> Før du fjerner netledningerne fra stikkontakterne, skal du sørge for, at hovedafbryderne er slået fra og mærket MÅ IKKE BENYTTES (DO NOT OPERATE, S229-0237). Læs om "Lockout/Tagout"-procedurerne i *RS/6000 SP: Maintenance Information Volume 2*, før du fortsætter.

> **Fare!**
>
> Før du slutter netledninger til stikkontakter, skal du sikre dig, at:
>
> - Hovedafbryderne er slået fra og mærket MÅ IKKE BENYTTES (DO NOT OPERATE, S229-0237).
> - Aktiviteterne i "Performing the customer 50/60 Hz Power Receptacle Safety Check" er udført på alle kundens stikkontakter og kabelstik.

> **Fare!**
>
> Sørg for, at hovedafbryderne er slået fra og mærket MÅ IKKE BENYTTES (DO NOT OPERATE, S229-0237).

> **Fare!**
>
> Både SEPBU-rammen og PDU 48-volts rammen er udskiftelige enheder (FRU), der IKKE indeholder nogen dele, som skal efterses. Det står også på dem. Forsøg ikke at isolere eller reparere disse komponenter, da det kan være meget farligt, i værste tilfælde livsfarligt.

Pas på!

PDU-enheden, 48-volts jævnstrømsrammen og SEPBU-rammen vejer over 18 kg. Pas på, når du afmonterer eller installerer dem. Afmontér alle 48-volts jævnstrømsforsyningsenheder fra rammen, før du afmonterer eller installerer denne.

Pas på!

Enheden vejer mere end 18 kg. Der skal to til at løfte den.

Pas på!

Dækslerne skal altid være på, undtagen når enheden efterses af teknisk uddannet personale.

Pas på!

Når der er service på enheden, må dækslerne ikke være fjernet eller åbnet, mens maskinen kører uden at være overvåget.

Pas på!

Da de tynde noder vejer ca. 18 kg, skal du passe på, når du afmonterer eller udskifter disse over skulderhøjde.

Pas på!

Den brede node kan veje over 32 kg.

Pas på!

Åbn ikke mere end én skuffe med en bred node eller switch-enhed ad gangen.

Pas på!

Sørg for, at støttefoden og bremseklodserne til hjulene er monteret på rammen. De skal sikre, at rammen bliver stående, hvor den skal, under et eftersyn.

Pas på!

Yderkanterne af rammerne kan være skarpe. Pas på, når rammen flyttes eller installeres.

Pas på!

Der kan være skarpe kanter på jordforbindelsen.

Pas på!

Fjern ikke brede noder eller switch-enheder fra monteringsskinnerne. Pas på, når du arbejder med monteringsskinner, så du ikke får fingrene i klemme eller kommer til at slippe enheden.

Pas på!

Fjern ikke monteringskruerne til skuffen forneden i begge sider.

Pas på!

Når låsen er slået fra, kan du skubbe skuffen i. Lad være med at trække i skuffen, da den kan glide ud af skinnen og dermed udgøre en sikkerhedsrisiko.

Pas på!

Pga. de brede noders vægt skal du passe på, når du skubber eller lukker skuffer med brede processornoder over skulderhøjde.

Pas på!

- Når rammer flyttes på plads, er det vigtigt at samarbejde. Undgå overbelastning: Tag fat i hver sit hjørne.
- Hvis enheden står på en forhøjning, bør der være en mekanisk sikkerhedsliste rundt om forhøjningen. Vær meget forsigtig ved flytning af rammer, der skal installeres eller afmonteres, fordi styrehjulene ofte er placeret tæt på forhøjningens kant.

Pas på!

Brug aldrig en jernstang til at løfte eller flytte rammer.

Pas på!

Når du bruger en trappestige eller en taburet, skal du sørge for, at du står på en plan flade, og at stigen eller taburetten ikke er i stykker.

Pas på!

Flytbare stiger udgør en stor sikkerhedsrisiko, hvis de ikke anvendes korrekt. Følg disse generelle retningslinier:

- Sørg for, at stigen står fast og sikkert, og at ingen af trinnene eller stiverne er i stykker.
- Stil altid stigen på en plan flade.
- Brug ikke en metalstige i nærheden af elektriske ledninger.
- Stræk dig ikke for at nå. Flyt hellere stigen.

Vær lige så forsigtig på en kort stige som på en lang skydestige. Falsk tryghed kan føre til uforsigtighed og fald, som kan medføre personskader.

Deutsch

VORSICHT

Abdeckungen des Netzteils nicht abnehmen. Netzteile nicht reparieren; sie werden als Ganzes ausgetauscht.

VORSICHT

Gerät nur an eine Schutzkontaktsteckdose mit ordnungsgemäß geerdetem Schutzkontakt anschließen. Bei nicht ordnungsgemäß angeschlossener Netzsteckdose können an offenliegenden Metallteilen des Systems oder an Metallteilen an das System angeschlossener Einheiten gefährliche Berührungsspannungen auftreten. Für den ordnungsgemäßen Zustand der Steckdose ist der Betreiber verantwortlich.

Vor dem Anschließen oder Lösen von Signalkabeln sicherstellen, daß die Netzkabel aller Einheiten gezogen sind.

Werden Zusatzeinheiten an das System angeschlossen, sicherstellen, daß die Netzstecker dieser Einheiten vor dem Anschließen der Signalkabel gezogen wurden. Falls möglich, vor dem Anschließen der Einheit alle Netzstecker des bestehenden Systems ziehen.evice.

Einheit alle Netzstecker des bestehenden Systems ziehen. Die Signalkabel nach Möglichkeit einhändig anschließen oder lösen, um einen Stromschlag durch Berühren von Oberflächen mit unterschiedlichem elektrischem Potential zu vermeiden.

Während eines Gewitters keine Kabel von Bildschirmeinheiten, Druckern, Telefonapparaten oder Blitzschutzeinheiten anschließen.

VORSICHT

In den USA, Kanada und Japan wird dieses Produkt mit einem 4poligen Netzstecker ausgeliefert. Zur Vermeidung eines Stromschlags dieses Netzkabel mit einer ordnungsgemäß geerdeten Netzsteckdose verwenden.

VORSICHT

Maschine nur an eine ordnungsgemäß geerdete Steckdose mit der auf der Maschine angegebenen Netzspannung anschließen.

VORSICHT

Bei Gewitter keine Kabel anschließen oder lösen.

VORSICHT

Vor dem Ein- oder Ausbau von Teilen, die an die Primärstromversorgung angeschlossen sind, Netzschalter ausschalten und Gerätenetzkabel aus der Netzsteckdose ziehen.

> **VORSICHT**
>
> Um einen elektrischen Schlag während Installation, Standortwechsel oder Rekonfiguration der Maschine zu vermeiden, das Netzanschlußkabel erst nach Anschluß aller Signalkabel anschließen.

> **VORSICHT**
>
> Hochspannung! Um zu verhindern, daß Primärstrom am Gehäuse anliegt, die Prozedur "Lockout/Tagout Procedure for PDU" bzw. "Lockout/Bagout Procedure for PDU" ausführen.

> **VORSICHT**
>
> Hochspannung! Um zu verhindern, daß Primärstrom am Gehäuse anliegt, die Prozedur "Lockout/Tagout Procedure for PDU" bzw. "Lockout/Bagout Procedure for PDU" ausführen (Hochspannungstransformator).

> **VORSICHT**
>
> An den Prüfpunkten liegt Hochspannung an. Nur Hochspannungsprüfspitzen verwenden.

> **VORSICHT**
>
> Hochspannung! 48V nicht mit Gehäuse oder 48VRtn kurzschließen. Das Kurzschließen kann zu einer Beschädigung des Systems und zu Verletzungen führen.

> **VORSICHT**
>
> Bei Ausfall eines Stromversorgungsmoduls erlöschen alle LEDs. Die Hochspannungs-LED leuchten auch dann nicht, wenn noch Hochspannung anliegt.

> **VORSICHT**
>
> Die übrigen Schritte enthalten Maßnahmen, bei deren Durchführung der Strom eingeschaltet ist. Gefährliche Spannung!

> **VORSICHT**
>
> Die Hauptsicherung des Gehäuses und die Steuereinheit dürfen jetzt nicht mehr eingeschaltet werden.
>
> Vor dem Abziehen der Netzkabel von den Netzsteckdosen sicherstellen, daß im Sicherungskasten die Stromzufuhr zu den Wechselstromsteckdosen unterbrochen ist (Netzsicherungen des Kunden) und die Sicherungen mit dem Hinweis NICHT EINSCHALTEN versehen sind. Vor dem Fortfahren die Prozeduren unter "Lockout/Tagout" in *RS/6000 SP: Maintenance Information Manual Volume 2* ausführen.

VORSICHT

Vor dem Anschließen der Netzkabel an die Netzsteckdosen sicherstellen, daß:

- im Sicherungskasten die Stromzufuhr zu den Wechselstromsteckdosen unterbrochen ist (Netzsicherungen des Kunden) und die Sicherungen mit dem Hinweis NICHT EINSCHALTEN versehen sind.

- "Performing the customer 50/60 Hz Power Receptacle Safety Check" für alle Steckdosen und Kabelanschlüsse des Kunden durchgeführt wurde.

VORSICHT

Sicherstellen, daß im Sicherungskasten die Stromzufuhr zu den Wechselstromsteckdosen unterbrochen ist (Netzsicherungen des Kunden) und die Sicherungen mit dem Hinweis NICHT EINSCHALTEN versehen sind.

VORSICHT

Sowohl beim SEPBU-Netzgehäuse als auch beim 48V-Netzgehäuse (PDU) handelt es sich um FRUs (Field Replaceable Units), die keine zu wartenden Teile enthalten. Es liegt eine entsprechende Kennzeichnung vor. Nicht versuchen, diese Komponenten zu isolieren oder zu reparieren. Dies könnte zu Verletzungen führen.

ACHTUNG:

Das Gewicht von Stromversorgungseinheit, 48V-Netzgehäuse und SEPBU-Netzgehäuse beträgt mehr als 18 kg. Vorsicht beim Entfernen und Installieren. Vor dem Aus- oder Einbau des Netzgehäuses alle 48V-Netzteile entfernen.

ACHTUNG:

Die Einheit wiegt mehr als 18 kg. Zum Anheben der Einheit sind zwei Kundendiensttechniker erforderlich.

ACHTUNG:

Die Abdeckungen müssen immer geschlossen sein. Sie dürfen nur von ausgebildetem Kundendienstpersonal geöffnet werden.

ACHTUNG:

Nach Wartung der Einheit die Abdeckungen wieder anbringen und schließen.

ACHTUNG:

Jeder Thin Node wiegt ca. 18 kg. Daher beim Ausbauen und Austauschen von Thin Nodes über Schulterhöhe vorsichtig vorgehen.

ACHTUNG:

Der Wide Node kann über 32 kg wiegen.

ACHTUNG:

Nur jeweils einen Einschub für Wide Node oder Schalterbaugruppen öffnen.

ACHTUNG:

Sicherstellen, daß der Stützfuß und die Ausgleichsunterlagen am Rahmen angebracht sind. Rahmen angebracht sind. Diese gewährleisten Gleichgewicht und Position während der Wartungsoperationen.

ACHTUNG:

Die äußeren Kanten des Gehäuses sind scharf. Beim Entfernen und Installieren des Gehäuses vorsichtig vorgehen.

ACHTUNG:

Das Masseband kann scharfe Kanten aufweisen.

ACHTUNG:

Keine Wide Nodes von den Halterungsschienen entfernen. Beim Arbeiten an den breiten Halterungsschienen für die Nodes muß vorsichtig vorgegangen werden, um ein Quetschen der Finger oder versehentliches Lösen des Nodes zu verhindern.

ACHTUNG:

Nicht die Befestigungsschrauben des Einschubgehäuses an der Unterseite entfernen.

ACHTUNG:

Nach dem Öffnen der Verriegelung den Einschub zudrücken. Nicht ziehen, da der Einschub von den Schienen rutschen könnte.

ACHTUNG:

Aufgrund des Gewichts jedes Nodes beim Verschieben und Schließen von Wide Nodes über Schulterhöhe vorsichtig vorgehen.

ACHTUNG:

- Beim Aufstellen von Gehäusen sollten die Mitarbeiter des Installationsteams gemeinsam arbeiten. Zur Vermeidung von Verspannungen sollte an jeder Ecke jeweils ein Mitarbeiter das Gehäuse anheben.
- Bei Doppelbodeninstallationen müssen die Ränder der Bodenvertiefungen mit sicher befestigten Abdeckleisten versehen sein. Beim Ausrichten von Gehäusen während der Installation oder des Ausbaus ist äußerste Vorsicht geboten, damit die Rollen nicht über den Rand der Aussparung gleiten.

ACHTUNG:

Zum Anheben oder Verschieben von Gehäusen in keinem Fall J-Hebel verwenden!

ACHTUNG:

Bei Verwendung von Trittleitern sicherstellen, daß diese auf einer ebenen Fläche stehen und sich in ordnungsgemäßem Zustand befinden.

ACHTUNG:

Tragbare Leitern stellen bei unsachgemäßer Verwendung eine ernsthafte Gefahr dar. Folgende allgemeine Richtlinien befolgen:

- Sicherstellen, daß die Leiter fest steht und keine defekten Stufen oder Streben aufweist.
- Nur auf ebenen Oberflächen arbeiten.
- Niemals eine Metalleiter in der Nähe von Stromversorgungsleitungen verwenden.
- Niemals zu weit vorbeugen. Statt dessen die Leiter verschieben.

Español

PELIGRO

No intente abrir las cubiertas de la fuente de alimentación. Las fuentes de alimentación no reciben servicio técnico y deben sustituirse como una unidad.

PELIGRO

Una toma de alimentación eléctrica incorrectamente cableada puede originar voltajes peligrosos en las partes metálicas del sistema o de los dispositivos conectados al mismo. Es responsabilidad del cliente asegurarse de que la toma de alimentación está correctamente cableada y conectada a tierra para evitar descargas eléctricas.

Antes de instalar o desmontar cables de señal, asegúrese de que los cables de alimentación de la unidad del sistema y de todos los dispositivos conectados están desenchufados.

Al añadir o quitar cualquier dispositivo adicional al o del sistema, asegúrese de que los cables de alimentación para dichos dispositivos están desenchufados antes de conectar los cables de señal. Si es posible, desconecte todos los cables de alimentación existentes antes de añadir un dispositivo.

Cuando sea posible, utilice sólo una mano para conectar o desconectar los cables de señal para evitar posibles descargas eléctricas al tocar dos superficies con diferentes potenciales eléctricos.

Durante una tormenta eléctrica, no conecte cables a monitores, impresoras o protectores de estación para líneas de comunicaciones.

PELIGRO

En los EE.UU., Canadá y Japón, este producto tiene un cable de alimentación de 4 hilos con un enchufe de 4 conexiones. Utilice este cable con un receptáculo de alimentación con la correcta conexión a tierra para evitar posibles descargas eléctricas.

PELIGRO

Antes de conectar el cable de alimentación de este producto a la alimentación CA, verifique si el receptáculo de alimentación está correctamente conectado a tierra y tiene el voltaje correcto.

> **PELIGRO**
>
> Durante una tormenta eléctrica, no conecte ni desconecte ningún cable que tenga una superficie externa conductiva o un conector conductivo.

> **PELIGRO**
>
> Apague la alimentación y desenchufe el cable de alimentación de la máquina, antes de extraer o instalar cualquier parte que esté conectada a la alimentación primaria.

> **PELIGRO**
>
> Para evitar posibles descargas eléctricas durante la instalación de la máquina, cambio de ubicación o reconfiguración, conecte el cable de alimentación primaria sólo después de conectar todos los cables eléctricos de señal.

> **PELIGRO**
>
> Hay alto voltaje. Realice "Lockout/Tagout Procedure for PDU" o "Lockout/Bagout Procedure for PDU" para suprimir la alimentación primaria al bastidor.

> **PELIGRO**
>
> Hay alto voltaje. Realice "Lockout/Tagout Procedure for PDU" o "Lockout/Bagout Procedure for PDU" para suprimir la alimentación primaria al bastidor (y al transformador de alto voltaje si hay).

> **PELIGRO**
>
> Hay alto voltaje en los puntos de prueba. Utilice sondas de prueba de alto voltaje.

> **PELIGRO**
>
> Hay alto potencial. No ponga en contacto 48V en el bastidor o 48VRtn. Cortocicuitar puede ocasionar la parada del sistema y posibles daños físicos.

> **PELIGRO**
>
> Si falla un módulo de alimentación exclusivo, se apagarán todos los LED. El LED de alto voltaje se apagará aunque todavía exista alto voltaje.

> **PELIGRO**
>
> Los pasos restantes del procedimiento contiene medidas que se han tomado con la alimentación encendida. Recuerde que hay voltajes peligrosos.

PELIGRO

El disyuntor del circuito principal del bastidor y el controlador no deben conectarse otra vez ahora.

Antes de desconectar los cables de alimentación de los receptáculos de alimentación, asegúrese de que los disyuntores del circuito de distribución de la derivación del cliente (disyuntores del circuito de la fuente de alimentación del cliente) están Off (desactivados) e identificados con distintivos de DO NOT OPERATE (NO TOCAR), S229-0237. Consulte los procedimientos "Lockout/Tagout" en la publicación *RS/6000 SP: Maintenance Information Volume 2*, antes de seguir.

PELIGRO

Antes de conectar los cables de alimentación CA a las tomas eléctricas asegúrese de que:

- Los disyuntores del circuito de distribución de la derivación del cliente (disyuntores del circuito de la fuente de alimentación del cliente) están desconectados e identificados con los distintivos de DO NOT OPERATE, S229-0237 (o equivalente en el idioma nacional).

- Se han realizado las actividades indicadas en "Performing the customer 50/60 Hz Power Receptacle Safety Check" en todos los conectores de cable y tomas de alimentación eléctrica del cliente.

PELIGRO

Asegúrese de que los disyuntores del circuito de distribución de la derivación del cliente (disyuntores del circuito de la fuente de alimentación del cliente) de las tomas de alimentación eléctrica CA están desconectados e identificados con distintivos de DO NOT OPERATE, S229-0237 (o el equivalente del idioma nacional).

PELIGRO

Tanto el chasis de alimentación SEPBU como el chasis de alimentación PDU 48V son unidades sustituibles localmente (las FRU) que contienen partes a las que NO se da servicio; están etiquetadas como tales. No intente reparar ni actuar sobre estos componentes, ya que al hacerlo puede ocasionar graves daños e incluso la muerte.

PRECAUCIÓN:

El peso del conjunto PDU, el chasis de alimentación 48 V cc y el chasis de alimentación SEPBU es mayor de 18 Kg (40 libras). Tenga cuidado al extraer o instalar estos componentes. Extraiga todas las fuentes de alimentación de 48 V cc del chasis de alimentación antes de extraer o instalar el chasis de alimentación.

PRECAUCIÓN:

El peso de la unidad excede de 18 Kg (40 libras) y se necesitan dos personas para levantarlas.

PRECAUCIÓN:

Las cubiertas han de permanecer cerradas durante todo el tiempo excepto cuando ha de intervenir el personal técnico apropiado.

PRECAUCIÓN:

Cuando la unidad está recibiendo servicio, las cubiertas no deben ponerse a un lado ni abrirse mientras la máquina está ejecutando de forma desatendida.

PRECAUCIÓN:

Debido al peso de cada nodo delgado (por debajo de 18 Kg [40 libras]), tenga cuidado cuando extraiga o sustituya nodos delgados por encima de la altura del hombro.

PRECAUCIÓN:

El peso del nodo ancho puede exceder de 32 Kg (70,5 libras).

PRECAUCIÓN:

No abra más de un nodo ancho o el cajón de conmutación a la vez.

PRECAUCIÓN:

Asegúrese de que están instalados el pie de estabilidad y los calzos de las ruedas en el bastidor. Esto es necesario para mantener la posición y el equilibrio del bastidor durante las operaciones de servicio.

PRECAUCIÓN:

Los bordes exteriores del chasis pueden ser cortantes. Tenga cuidado cuando extraiga e instale el chasis.

PRECAUCIÓN:

La banda de toma de tierra puede tener bordes cortantes.

PRECAUCIÓN:

No extraiga nodos anchos ni conjuntos de conmutación de las correderas de montaje. Debe tener precaución cuando trabaje con las correderas de montaje para evitar pellizcos en los dedos o la caída accidental de la unidad.

PRECAUCIÓN:

No quite los tornillos de montaje de la carcasa del cajón situados en la parte inferior de ambos lados.

PRECAUCIÓN:

Una vez liberado el pestillo, empuje el cajón cerrado. No tire de él, ya que el cajón puede salirse de los rieles, provocando un peligro de seguridad.

PRECAUCIÓN:

Debido al peso de cada nodo ancho, tenga cuidado cuando deslice o cierre los nodos de procesador anchos por encima de la altura del hombro.

PRECAUCIÓN:

- Cuando se trasladan de posición los bastidores, los miembros del equipo deben trabajar conjuntamente. Puede ser conveniente utilizar una persona en cada esquina del bastidor para evitar la fatiga.

- En instalaciones de suelo elevado, deben instalarse mecánicamente cajetines de seguridad alrededor de los aislantes del suelo. Extreme la precaución cuando mueva bastidores durante la instalación o sustitución debido a la proximidad de los aislantes del suelo a las roldanas.

PRECAUCIÓN:

No debe utilizarse en ningún momento una barra Johnson (J-bar) o un dispositivo similar para elevar o mover bastidores.

PRECAUCIÓN:

Cuando utilice una escalera o banqueta, asegúrese de que la superficie esté nivelada y que la escalera está en buenas condiciones para su uso.

PRECAUCIÓN:

Las escaleras portátiles presentan serios peligros si no se usan adecuadamente. Siga estas directrices generales:

- Asegúrese de que la escalera es firme y estable, y no tiene peldaños ni costados defectuosos.

- Trabaje sólo sobre una superficie nivelada.

- Nunca utilice ua escalera metálica cerca de líneas eléctricas.

- No intente alcanzar partes alejadas. En su lugar, mueva la escalera.

Tenga el mismo cuidado con una escalera pequeña que con una gran escalera de 30 peldaños. La falsa seguridad puede llevar a descuidar la precaución y caerse lo cual puede producir graves daños.

Français

DANGER

N'essayez pas d'ouvrir le bloc d'alimentation. Ce dernier ne peut être réparé et doit être remplacé au complet.

DANGER

Un mauvais câblage du socle de prise de courant peut provoquer une mise sous tension dangereuse des parties métalliques du système ou des unités qui lui sont raccordées. Il appartient au client de s'assurer que le socle de prise de courant est correctement câblé et mis à la terre afin d'éviter tout risque de choc électrique.

Avant de connecter ou de déconnecter les cordons d'interface, vérifiez que les cordons d'alimentation de l'unité centrale et de toutes les unités qui lui sont raccordées sont débranchés.

Lorsque vous ajoutez ou que vous enlevez des unités au système, assurez-vous que les cordons d'alimentation de ces unités sont débranchés avant de connecter ou de déconnecter les cordons d'interface. Débranchez si possible tous les cordons d'alimentation de l'ensemble du système avant d'ajouter une unité.

Afin d'éviter tout risque de choc électrique provenant d'une différence de potentiel de terre, n'utilisez qu'une seule main, lorsque cela est possible, pour connecter ou déconnecter les cordons d'interface.

Pendant un orage, ne manipulez pas de dispositifs de protection électrique, de connecteurs, ni de cordons téléphoniques, de transmission, d'interface ou d'alimentation.

DANGER

Aux États-Unis, au Canada et au Japon, ce produit est équipé d'un cordon d'alimentation à trois fils et d'une fiche de prise de courant à trois broches. Pour éviter tout risque de choc électrique, branchez ce cordon sur un socle de prise de courant correctement mis à la terre.

DANGER

Avant de brancher le cordon d'alimentation sur le socle de prise de courant, vérifiez que celui-ci est correctement mis à la terre et que la tension est adéquate.

DANGER

Pendant un orage, ne connectez ni ne déconnectez aucun câble présentant des risques de contact avec des éléments non protégés (enveloppe extérieure ou connecteur métallique).

DANGER

Avant de retirer ou d'installer un élément relié à une source d'alimentation, mettez l'appareil hors tension et débranchez son cordon d'alimentation du socle de prise de courant.

DANGER

Afin d'éviter tout risque de choc électrique lorsque vous installez, déplacez ou reconfigurez l'appareil, connectez tous les cordons d'interface avant de brancher le cordon d'alimentation.

DANGER

Présence de tension élevée. Exécutez les procédures décrites dans "Lockout/Tagout Procedure for PDU" ou "Lockout/Bagout Procedure for PDU" pour couper l'alimentation du châssis.

DANGER

Présence de tension élevée. Exécutez les procédures décrites dans "Lockout/Tagout Procedure for PDU" ou "Lockout/Bagout Procedure for PDU" pour couper l'alimentation du châssis (et du transformateur du haute tension, le cas échéant).

DANGER

Présence de tension élevée aux points de test. Utilisez des sondes de test haute tension.

DANGER

Présence d'une forte énergie. Ne mettez pas le 48 V en court-circuit avec le châssis, ni avec le retour du 48 V (48VRtn) ; cela entraînerait un dysfonctionnement du système et un risque de blessure.

DANGER

En cas de défaillance d'un seul bloc d'alimentation, tous les voyants s'éteignent, y compris le voyant de haute tension, bien que la haute tension soit encore présente.

DANGER

Les mesures indiquées dans les étapes suivantes de la procédure sont prises avec l'appareil sous tension. Gardez à l'esprit qu'une tension dangereuse est présente dans l'unité.

DANGER

Ne remettez pas en fonction le disjoncteur principal ni le contrôleur pour le moment.

Avant de déconnecter les cordons d'alimentation des socles de prise de courant, assurez-vous que les disjoncteurs principaux (clients) sont hors fonction et que l'étiquette portant la mention DO NOT OPERATE, S229-0237 (ou son équivalent traduit) y est apposée. Avant de continuer, reportez-vous aux procédures intitulées "Lockout/Tagout", dans le document *RS/6000 SP: Maintenance Information Volume 2.*

DANGER

Avant de brancher les cordons d'alimentation sur les socles de prise de courant, vérifiez les points suivants :

- Les disjoncteurs principaux (clients) sont hors fonction et que l'étiquette portant la mention DO NOT OPERATE, S229-0237 (ou son équivalent traduit) y est apposée.

- Les opérations décrites dans "Performing the customer 50/60 Hz Power Receptacle Safety Check" ont été effectuées pour tous les connecteurs de câble et socles de prise de courant client.

DANGER

Vérifiez que les disjoncteurs (client) correspondant aux socles de prise de courant c.a. sont hors fonction et que l'étiquette portant la mention DO NOT OPERATE, S229-0237 (ou son équivalent traduit) y est apposée.

DANGER

Les unités d'alimentation SEBPU et 48 V sont des unités remplaçables sur site ; comme le rappelle leur étiquette, elles ne contiennent aucune pièce réparable. Toute tentative de retrait ou de réparation de ces pièces peut entraîner des blessures graves, voire mortelles.

ATTENTION:

L'unité d'alimentation, l'unité d'alimentation 48 V c.c. et l'unité d'alimentation SEPBU pèsent plus de 18 kg. Soyez prudent lorsque vous retirez ou installez l'une de ces unités. Avant de procéder à l'intervention, retirez les blocs d'alimentation 48 V c.c. de l'unité.

ATTENTION:

L'unité pèse plus de 18 kg ; deux personnes qualifiées sont nécessaires pour la soulever.

ATTENTION:

Les carters de l'unité doivent être maintenus fermés, excepté lors des opérations de maintenance par du personnel qualifié.

ATTENTION:

Au cours d'une opération de maintenance, l'unité ne doit pas rester sans surveillance, carters ouverts.

ATTENTION:

En raison du poids des noeuds fins (moins de 18 kg), soyez prudent lorsque vous les manipulez (pour les retirer ou les remplacer) à hauteur d'épaule.

ATTENTION:

Un noeud large peut peser plus de 32 kg.

ATTENTION:

N'ouvrez jamais plusieurs tiroirs pour noeuds larges ou ensembles de commutateurs à la fois.

ATTENTION:

Assurez-vous que le stabilisateur et les cales utilisés pour assurer l'équilibre du châssis et maintenir sa position lors des opérations de maintenance, sont correctement fixés.

ATTENTION:

Soyez prudent lorsque vous retirez ou installez le châssis ; ses bords externes peuvent être tranchants.

ATTENTION:

Les bords des tresses de masse peuvent être tranchants.

ATTENTION:

Ne retirez pas les noeuds larges ou les ensembles de commutateurs des glissières de montage. Lorsque vous manipulez ces dernières, prenez garde à vos doigts et veillez à ce que l'unité reste en place.

ATTENTION:

Ne retirez pas les vis situées de part et d'autre du boîtier du tiroir, dans la partie inférieure.

ATTENTION:

Une fois le taquet retiré, fermez le tiroir. Ne le tirez pas car cela risquerait de le faire sortir des glissières. En outre, les conditions de sécurité ne seraient pas réunies.

ATTENTION:

En raison du poids des noeuds larges, soyez prudent lorsque vous les manipulez (pour les faire glisser ou les fermer) à hauteur d'épaule.

ATTENTION:

- Le déplacement du châssis doit être le résultat d'un travail collectif. Pour réduire l'effort nécessaire à cette opération, il est préférable qu'elle soit effectuée par plusieurs personnes (une à chaque angle du châssis).
- S'il y a lieu, installez des moulures de sécurité sur le pourtour des découpes pratiquées dans le faux plancher. Lors du déplacement du châssis pour installation ou retrait, veillez à ce que ses roulettes ne se coincent pas dans les découpes du plancher.

ATTENTION:

Une barre Johnson ou un outil similaire ne doivent pas être utilisés pour soulever ou déplacer les châssis.

ATTENTION:

Si vous utilisez un escabeau ou un tabouret, assurez-vous qu'il est posé sur une surface plane et qu'il est suffisamment solide.

ATTENTION:

Si vous utilisez une échelle, respectez les consignes de sécurité suivantes :

- assurez-vous que l'échelle est stable et que ses barreaux et ses montants sont solidement fixés ;

- posez l'échelle sur une surface plane ;
- n'utilisez jamais une échelle métallique à proximité de lignes électriques ;
- si nécessaire, déplacez l'échelle.

Respectez ces précautions quel que soit le type d'échelle utilisé (coulissante ou non) ; toute imprudence risque d'entraîner une chute dangereuse.

Português

> **PERIGO**
>
> Não tente abrir as tampas das fontes de alimentação. As fontes de alimentação não são recuperáveis e devem ser substituídas como uma unidade

> **PERIGO**
>
> Uma tomada elétrica que não é corretamente ligada pode colocar voltagem perigosa em peças metálicas do sistema ou nos dispositivos acoplados ao mesmo. É responsabilidade do cliente garantir que a tomada esteja corretamente ligada e aterrada para impedir um choque elétrico.
>
> Antes de instalar ou retirar os cabos de sinal, certifique-se de que os cabos de força para a unidade do sistema e todos os dispositivos acoplados estão desconectados.
>
> Quando estiver acrescentando qualquer dispositivo adicional ao sistema ou retirando-o do mesmo, certifique-se de que os cabos de força para aqueles dispositivos estão desconectados antes de que os cabos de sinal estejam ligados. Se possível, desconecte todos os cabos de força do sistema já existente antes de acrescentar um dispositivo.
>
> Quando possível, use uma das mãos para conectar ou desconectar cabos de sinal para impedir um possível choque resultante do toque em duas superfícies com potenciais elétricos diferentes.
>
> Durante uma tempestade elétrica, não conecte cabos para estações de vídeo, impressoras, telefones ou estações protetoras para linhas de comunicação.

> **PERIGO**
>
> Nos E.U.A, Canadá e Japão este produto está equipado com um cabo de alimentação de 4 condutores com uma ficha de 4 pinos. Ligue este cabo de alimentação a uma tomada eléctrica com a devida ligação à terra, para evitar a possibilidade de choques eléctricos.

> **PERIGO**
>
> Antes de ligar o cabo de alimentação deste produto, assegure-se de que a tomada eléctrica está devidamente ligada à terra e de que tem a tensão correcta.

> **PERIGO**
>
> Durante uma tempestade eléctrica, não ligue nem desligue qualquer cabo que apresente uma superfície externa condutora ou um conector condutor.

PERIGO

Desligue o interruptor de alimentação e desligue da tomada o cabo de alimentação da máquina, antes de remover ou instalar qualquer componente ligado à alimentação primária.

PERIGO

Para evitar a possibilidade de choques eléctricos durante a instalação, recolocação ou reconfiguração da máquina, ligue o cabo de alimentação primária somente depois de ter ligado todos os cabos eléctricos de sinal.

PERIGO

Sob alta tensão. Execute um dos procedimentos "Lockout/Tagout Procedure for PDU" ou "Lockout/Bagout Procedure for PDU", para cortar a alimentação primária à estrutura.

PERIGO

Sob alta tensão. Execute um dos procedimentos "Lockout/Tagout Procedure for PDU" ou "Lockout/Bagout Procedure for PDU", para cortar a alimentação primária à estrutura (e ao transformador de alta tensão, se existente).

PERIGO

Sob alta tensão nos pontos de teste. Utilize pontas de teste apropriadas para alta tensão.

PERIGO

Possibilidade de potência elevada. Não provoque curto-circuitos da corrente de 48V. Um curto-circuito terá como resultado uma paragem de funcionamento do sistema e possíveis lesões pessoais.

PERIGO

Se um dos módulos de alimentação falhar, todos os LEDs se apagarão. O LED de alta tensão estará apagado, embora o equipamento continue sob alta tensão.

PERIGO

Os passos restantes do procedimento incluem medições efectuadas com a alimentação eléctrica ligada. Lembre-se de que estão presentes tensões perigosas.

┌─ PERIGO ───

O disjuntor principal da estrutura e o controlador não devem voltar a ser ligados agora.

Antes de desligar os cabos de alimentação das respectivas tomadas, assegure-se de que os disjuntores do ramal de distribuição do cliente (disjuntores da fonte de alimentação do cliente) estão desligados (posição Off) e sinalizados com etiquetas DO NOT OPERATE, S229-0237. Antes de continuar, consulte os procedimentos relativos a "Lockout/Tagout", apresentados no manual *RS/6000 SP: Maintenance Information Volume 2*.

└───

┌─ PERIGO ───

Antes de ligar cabos de alimentação de corrente alterna às respectivas tomadas, assegure-se de que:

- Os disjuntores do ramal de distribuição do cliente (disjuntores da fonte de alimentação do cliente) estão desligados (posição Off) e sinalizados com etiquetas DO NOT OPERATE, S229-0237 (ou o equivalente em Português).

- As actividades indicadas no parágrafo "Performing the customer 50/60 Hz Power Receptacle Safety Check" foram executadas em todas as tomadas e conectores de cabos da fonte de alimentação do cliente.

└───

┌─ PERIGO ───

Assegure-se de que os disjuntores do ramal de distribuição do cliente (disjuntores da fonte de alimentação do cliente), relativos às tomadas de alimentação de corrente alterna, estão desligados (posição Off) e sinalizados com etiquetas DO NOT OPERATE, S229-0237 (ou o equivalente em Português).

└───

┌─ PERIGO ───

Tanto o chassis de alimentação SEPBU como o chassis de alimentação PDU 48 V são FRUs (Field Replaceable Units - Unidades Substituíveis no Local) que NÃO incluem QUALQUER componente passível de assistência; ambos apresentam etiquetas que os identificam como tal. Não tente isolar nem reparar estes componentes, uma vez que dessa acção podem resultar lesões pessoais graves ou mesmo a morte.

└───

CUIDADO:

O peso total do conjunto PDU, chassis de alimentação de 48 V de corrente contínua e chassis de alimentação SEPBU é superior a 18 Kg. Tenha cuidado ao remover ou instalar. Retire todas as fontes de alimentação de 48 V de corrente contínua do chassis de alimentação, antes de o remover ou instalar.

CUIDADO:

A unidade pesa mais de 18 Kg e são necessárias duas pessoas para levantá-la.

CUIDADO:

As tampas devem estar sempre fechadas excepto para a execução de trabalhos de assistência por pessoal técnico devidamente qualificado.

CUIDADO:

Durante a execução de trabalhos de assistência à unidade, as tampas não devem ser retiradas ou deixadas abertas enquanto a máquina está a funcionar sem assistência.

CUIDADO:

Devido ao peso de cada "thin node" (quase 18 Kg), tenha cuidado ao removê-los e substituí-los a uma altura superior à do ombro.

CUIDADO:

O peso de um "wide node" pode exceder 32 Kg.

CUIDADO:

Não abra mais do que uma gaveta de "wide node" ou conjunto de comutadores de cada vez.

CUIDADO:

Assegure-se de que a base estabilizadora e os calços das rodas estão instalados na estrutura. Eles são necessários para manter o equilíbrio e imobilizar a estrutura durante a execução de trabalhos de assistência.

CUIDADO:

As arestas exteriores do chassis podem ser cortantes. É necessário cuidado ao remover e instalar o chassis.

CUIDADO:

A fita de terra pode ter arestas cortantes.

CUIDADO:

Não retire "wide nodes" ou conjuntos de comutadores das calhas de montagem. É necessário cuidado ao trabalhar com calhas de montagem, para evitar dedos entalados ou a queda acidental da unidade.

CUIDADO:

Não retire os parafusos de montagem da armação da gaveta, na parte inferior de ambos os lados.

CUIDADO:

Uma vez solta a patilha, empurre a gaveta para fechá-la. Não a puxe, porque pode fazê-la sair das calhas, criando uma situação potencialmente perigosa.

CUIDADO:

Devido ao peso de cada "wide node", tenha cuidado ao extraí-los ou introduzi-los a uma altura superior à do ombro.

CUIDADO:

- O posicionamento de estruturas deve ser executado por quatro pessoas (uma em cada canto da estrutura), trabalhando em conjunto, por forma a evitar esforços excessivos.

- Em instalações com pavimento sobre-elevado, devem ser colocadas protecções mecanicamente seguras em volta das aberturas do pavimento. É necessário extremo cuidado ao deslocar as estruturas, durante a instalação ou remoção, devido às pequenas distâncias entre aquelas aberturas e as rodas das estruturas.

CUIDADO:

Nunca deve ser utilizada uma alavanca ou qualquer dispositivo semelhante para levantar ou deslocar estruturas.

CUIDADO:

Se utilizar um escadote ou um banco, assegure-se de que os mesmos são instalados sobre uma superfície nivelada e se encontram em boas condições.

CUIDADO:

Os escadotes podem ser perigosos se não utilizados correctamente. Tenha em atenção as seguintes sugestões:

- Assegure-se de que o escadote está firme e bem apoiado e não apresenta degraus ou qualquer outra peça defeituosos.
- Trabalhe sempre sobre uma superfície nivelada.
- Nunca utilize um escadote metálico nas proximidades de linhas eléctricas.
- Nunca se estique em cima do escadote. Em vez disso, desloque o escadote.

Seja cuidadoso ao utilizar qualquer escadote, independentemente da respectiva altura. Uma falsa sensação de segurança, provocada pela pequena altura de um escadote, pode levar a faltas de cuidado e a quedas com lesões pessoais dolorosas.

Bibliography

This bibliography helps you find product documentation related to the RS/6000 SP hardware and software products.

You can find most of the IBM product information for RS/6000 SP products on the World Wide Web. Formats for both viewing and downloading are available.

SP related documentation is shipped with the PSSP product in a variety of formats and can be installed on your system. The man pages for public code that PSSP includes are also available online.

You can order hard copies of the product documentation from IBM. This bibliography lists the titles that are available and their order numbers.

Finally, this bibliography contains a list of non-IBM publications that discuss parallel computing and other topics related to the RS/6000 SP.

Finding Documentation on the World Wide Web

Most of the RS/6000 SP hardware and software books are available from the IBM RS/6000 web site at **http://www.rs6000.ibm.com**. You can view a book or download a Portable Document Format (PDF) version of it. At the time this manual was published, the full path to the "RS/6000 SP Product Documentation Library" page was **http://www.rs6000.ibm.com/resource/aix_resource/sp_books**. However, the structure of the RS/6000 web site can change over time.

MKTTOOLS

An online version of this document is made available on MKTTOOLS for IBM marketing and service representatives. To subscribe to future updates or to get the current version, type the following on VM:

TOOLCAT MKTTOOLS SUBSCRIBE *Package Name* **PACKAGE**

TOOLCAT MKTTOOLS GET *Package Name* **PACKAGE**

The following SP hardware publication packages are available:

Publication	Package Name
IBM RS/6000 SP: Maintenance Information, Volume 1, Installation and Relocation	GA227375
IBM RS/6000 SP: Maintenance Information, Volume 2, Maintenance Analysis Procedures	GA227376
IBM RS/6000 SP: Maintenance Information, Volume 3, Locations and Service Procedures	GA227377
IBM RS/6000 SP: Maintenance Information, Volume 4, Parts Catalog	GA227378
IBM RS/6000 SP: Planning, Volume 1, Hardware and Physical Environment	GA227280
IBM RS/6000 SP: Planning, Volume 2, Control Workstation and Software Environment	GA227281

Accessing Documentation Online

On the same medium as the PSSP product code, IBM ships man pages, HTML files, and PDF files. In order to use these publications, you must first install the **ssp.docs** file set.

To view the HTML publications, you need access to an HTML document browser such as Netscape. The HTML files and an index that links to them are installed in the **/usr/lpp/ssp/html** directory. Once installed, you can also view the HTML files from the RS/6000 SP Resource Center.

If you have installed the SP Resource Center on your SP system, you can access it by entering the **/usr/lpp/ssp/bin/resource_center** command. If you have the SP Resource Center on CD-ROM, see the **readme.txt** file for information about how to run it.

To view the PDF publications, you need access to the Adobe Acrobat Reader 3.0.1. The Acrobat Reader is shipped with the AIX Version 4.3 Bonus Pack and is also freely available for downloading from the Adobe web site at URL **http://www.adobe.com**.

Manual Pages for Public Code

The following manual pages for public code are available in this product:

SUP	/usr/lpp/ssp/man/man1/sup.1
NTP	/usr/lpp/ssp/man/man8/xntpd.8
	/usr/lpp/ssp/man/man8/xntpdc.8
Perl (Version 4.036)	/usr/lpp/ssp/perl/man/perl.man
	/usr/lpp/ssp/perl/man/h2ph.man
	/usr/lpp/ssp/perl/man/s2p.man
	/usr/lpp/ssp/perl/man/a2p.man
Perl (Version 5.003)	Man pages are in the /usr/lpp/ssp/perl5/man/man1 directory

Manual pages and other documentation for **Tcl**, **TclX**, **Tk**, and **expect** can be found in the compressed **tar** files located in the **/usr/lpp/ssp/public** directory.

RS/6000 SP Planning Publications

This section lists the IBM product documentation for planning for the IBM RS/6000 SP hardware and software.

- *IBM RS/6000 SP: Planning, Volume 1, Hardware and Physical Environment*, GA22-7280

- *IBM RS/6000 SP: Planning, Volume 2, Control Workstation and Software Environment*, GA22-7281

RS/6000 SP Hardware Maintenance Publications

This section lists the IBM product documentation for the IBM RS/6000 SP hardware.

- *IBM RS/6000 SP: Maintenance Information, Volume 1, Installation and Relocation*, GA22-7375

- *IBM RS/6000 SP: Maintenance Information, Volume 2, Maintenance Analysis Procedures*, GA22-7376

- *IBM RS/6000 SP: Maintenance Information, Volume 3, Locations and Service Procedures*, GA22-7377

- *IBM RS/6000 SP: Maintenance Information, Volume 4, Parts Catalog*, GA22-7378

RS/6000 SP Standard Ship Group Publications

The following publications are shipped with each system:

- *Diagnostic Information for Micro Channel Bus Systems*, SA38-0532

- *Adapters, Devices and Cable Information for Micro Channel Bus Systems*, SA38-0533

- *Diagnostic Information for Multiple Bus Systems*, SA38-0509

- *Adapters, Devices and Cable Information for Multiple Bus Systems*, SA38-0516

- *7012 300 Series Installation and Service Guide*, SA23-2624

- *7013 500 Series Installation and Service Guide*, SA23-2622

- *7015 Models R30, R40, and R50 CPU Enclosure Operator Guide*, SA23-2742

- *7015 Models R30, R40, and R50 CPU Enclosure Installation and Service Guide*, SA23-2743

- *IBM RS/6000 SP: Maintenance Information, Volume 1, Installation and Relocation*, GA22-7375

- *IBM RS/6000 SP: Maintenance Information, Volume 2, Maintenance Analysis Procedures*, GA22-7376

- *IBM RS/6000 SP: Maintenance Information, Volume 3, Locations and Service Procedures*, GA22-7377

- *IBM RS/6000 SP: Maintenance Information, Volume 4, Parts Catalog*, GA22-7378

- *IBM RS/6000 SP: Planning, Volume 1, Hardware and Physical Environment*, GA22-7280

- *Service Director for 9076 RISC System/6000 SP CE Information Guide*, ZA38-0383

RS/6000 SP Switch Router Publications

The RS/6000 SP Switch Router is based on the Ascend GRF switched IP router product from Ascend Communications, Inc.. You can order the SP Switch Router as the IBM 9077.

The following publications are shipped with the SP Switch Router. You can also order these publications from IBM using the order numbers shown.

- *Ascend GRF Getting Started*, GA22-7368

- *Ascend GRF Configuration Guide*, GA22-7366

- *Ascend GRF Reference Guide*, GA22-7367

- *IBM SP Switch Router Adapter Guide*, GA22-7310.

Adapters

- *SP Switch Router Adapter Guide*, GA22-7310

- *FDDI Introduction and Planning Guide*, GA27-3892

- *FDDI User's Guide and Programming Reference*, SC28-2823

- *Planning for Fiber Optic Channel Links*, GA23-0367

- *IBM Token-Ring Network Introduction and Planning Guide*, GA27-3677

- *RS/6000 Token Ring Adapter Card*, G511-1681

- *HIPPI User's Guide and Programmer's Reference*, SA23-0369 and SA23-2488

- *AIX Parallel and ESCON Channel Tape Attachment/6000 Installation and User's Guide*, GA32-0311

- *9334 SCSI Expansion Units Operator Guide*, GA33-3232

- *9334 Models 010 and 011 SCSI Expansion Units: Installation and Service Guide*, SY33-0165

- *9334 Models 500 and 501 SCSI Expansion Units: Installation and Service Guide*, SY33-0167

- *SCSI-2 Fast/Wide Adapter*, SC23-2646

- *IBM SCSI-2 Fast/Wide Adapter/A Technical Reference*, S83G-7545

- *Turboways 100 User's Guide ATM*, GA27-4057

- *9333 Model 010 and 011 High-Performance Disk-Drive Subsystem Operator Guide*, GA33-3208

- *9333 Model 010 and 011 High-Performance Disk-Drive Subsystem Installation and Service Guide*, SY33-0161

- *9333 Model 010 and 011 High-Performance Disk-Drive Subsystem Hardware Technical Information*, SA33-3209

- *9333 Model 500 and 501 High-Performance Disk-Drive Subsystem Operator Guide*, GA33-3234

- *9333 Model 500 and 501 High-Performance Disk-Drive Subsystem Installation and Service Guide*, SY33-0168

- *9333 Model 500 and 501 High-Performance Disk-Drive Subsystem Hardware Technical Information*, SA33-3235

- *IBM SCSI Tape Drive, Medium Changer, and Library Device Drivers Installation and User's Guide*, GC35-0154

Network Connectivity

- *IBM LAN Cabling System Planning and Installation Guide*, GA27-3361
- *IBM Cabling System Optical Fiber Planning and Installation Guide*, GA27-3943
- *IBM 8250/8260/8285 Planning and Site Preparation Guide*, GA33-0285
- *IBM 6611 Network Processor: Introduction and Planning Guide*, GK2T-0334

Other Service Publications

- *IBM AIX Version 3.2 Problem Solving Guide and Reference*, SC23-2204
- *IBM AIX Version 4 Problem Solving Guide and Reference*, SC23-2606
- *IBM AIX Version 4.3 Problem Solving Guide and Reference*, SC23-4123
- *7012 300 Series Operator Guide*, SA23-2623
- *7012 300 Series Installation and Service Guide*, SA23-2624
- *7013 500 Series Operator Guide*, SA38-0530
- *7013 500 Series Installation and Service Guide*, SA38-0531
- *Electrical Safety for IBM Customer Engineers*, S229-8124
- *7015 Model R30 CPU Enclosure Operator Guide*, SA23-2742
- *7015 Model R30 CPU Enclosure Installation and Service Guide*, SA23-2743
- *RS/6000 7017 S Series Installation and Service Guide*, SA38-0548
- *Supplement for RS/6000 7017 S Series Installation and Service*, SN32-9059
- *RS/6000 7017 S Series User's Guide*, SA38-0549

RS/6000 SP Software Publications

This section lists the IBM product documentation for software products related to the IBM RS/6000 SP. These products include:

- IBM Parallel System Support Programs for AIX (PSSP)
- IBM LoadLeveler for AIX (LoadLeveler)
- IBM Parallel Environment for AIX (Parallel Environment)
- IBM General Parallel File System for AIX (GPFS)
- IBM Engineering and Scientific Subroutine Library (ESSL) for AIX
- IBM Parallel ESSL for AIX
- IBM High Availability Cluster Multi-Processing for AIX (HACMP)
- IBM Client Input Output/Sockets (CLIO/S)
- IBM Network Tape Access and Control System for AIX (NetTAPE)

PSSP Publications

IBM RS/6000 SP:

- *Planning, Volume 2, Control Workstation and Software Environment*, GA22-7281

PSSP:

- *Installation and Migration Guide*, GA22-7347

- *Administration Guide*, SA22-7348

- *Managing Shared Disks*, SA22-7349

- *Performance Monitoring Guide and Reference*, SA22-7353

- *Diagnosis Guide*, GA22-7350

- *Command and Technical Reference*, SA22-7351

- *Messages Reference*, GA22-7352

RS/6000 Cluster Technology (RSCT):
- *Event Management Programming Guide and Reference*, SA22-7354

- *Group Services Programming Guide and Reference*, SA22-7355

As an alternative to ordering the individual books, you can use SBOF-8587 to order the PSSP software library.

LoadLeveler Publications

LoadLeveler:
- *Using and Administering*, SA22-7311

- *Diagnosis and Messages Guide*, GA22-7277

GPFS Publications

GPFS:
- *Installation and Administration Guide*, SA22-7278

Parallel Environment Publications

Parallel Environment:
- *Installation Guide*, GC28-1981

- *Hitchhiker's Guide*, GC23-3895

- *Operation and Use, Volume 1*, SC28-1979

- *Operation and Use, Volume 2*, SC28-1980

- *MPI Programming and Subroutine Reference*, GC23-3894

- *MPL Programming and Subroutine Reference*, GC23-3893

- *Messages*, GC28-1982

As an alternative to ordering the individual books, you can use SBOF-8588 to order the PE library.

Parallel ESSL and ESSL Publications
- *ESSL Products: General Information*, GC23-0529

- *Parallel ESSL: Guide and Reference*, SA22-7273

- *ESSL: Guide and Reference*, SA22-7272

HACMP Publications

HACMP:
- *Concepts and Facilities*, SC23-1938

- *Planning Guide*, SC23-1939

- *Installation Guide*, SC23-1940

- *Administration Guide*, SC23-1941

- *Troubleshooting Guide*, SC23-1942

- *Programming Locking Applications*, SC23-1943

- *Programming Client Applications*, SC23-1944

- *Master Index and Glossary*, SC23-1945

- *HANFS for AIX Installation and Administration Guide*, SC23-1946

- *Enhanced Scalability Installation and Administration Guide*, SC23-1972

CLIO/S Publications

CLIO/S:
- *General Information*, GC23-3879

- *User's Guide and Reference*, GC28-1676

NetTAPE Publications

NetTAPE:
- *General Information*, GC23-3990

- *User's Guide and Reference*, available from your IBM representative

AIX and Related Product Publications

For the latest information on AIX and related products, including RS/6000 hardware products, see *AIX and Related Products Documentation Overview*, SC23-2456. You can order a hard copy of the book from IBM. You can also view it online from the "AIX Online Publications and Books" page of the RS/6000 web site, at URL **http://www.rs6000.ibm.com/resource/aix_resource/Pubs**.

Red Books

IBM's International Technical Support Organization (ITSO) has published a number of redbooks related to the RS/6000 SP. For a current list, see the ITSO website, at URL **http://www.redbooks.ibm.com**.

Non-IBM Publications

Here are some non-IBM publications that you may find helpful.

- Almasi, G., Gottlieb, A., *Highly Parallel Computing*, Benjamin-Cummings Publishing Company, Inc., 1989.

- Foster, I., *Designing and Building Parallel Programs*, Addison-Wesley, 1995.

- Gropp, W., Lusk, E., Skjellum, A., *Using MPI*, The MIT Press, 1994.

- Message Passing Interface Forum, *MPI: A Message-Passing Interface Standard, Version 1.1*, University of Tennessee, Knoxville, Tennessee, June 6, 1995.

- Message Passing Interface Forum, *MPI-2: Extensions to the Message-Passing Interface, Version 2.0*, University of Tennessee, Knoxville, Tennessee, July 18, 1997.

- Ousterhout, John K., *Tcl and the Tk Toolkit*, Addison-Wesley, Reading, MA, 1994, ISBN 0-201-63337-X.

- Pfister, Gregory, F., *In Search of Clusters*, Prentice Hall, 1998.

Glossary of Terms and Abbreviations

This glossary includes terms and definitions from:

- The *IBM Dictionary of Computing*, New York: McGraw-Hill, 1994.

- The *American National Standard Dictionary for Information Systems*, ANSI X3.172-1990, copyright 1990 by the American National Standards Institute (ANSI). Copies can be purchased from the American National Standards Institute, 1430 Broadway, New York, New York 10018. Definitions are identified by the symbol (A) after the definition.

- The *ANSI/EIA Standard - 440A: Fiber Optic Terminology* copyright 1989 by the Electronics Industries Association (EIA). Copies can be purchased from the Electronic Industries Association, 2001 Pennsylvania Avenue N.W., Washington, D.C. 20006. Definitions are identified by the symbol (E) after the definition.

- The *Information Technology Vocabulary* developed by Subcommittee 1, Joint Technical Committee 1, of the International Organization for Standardization and the International Electrotechnical Commission (ISO/IEC JTC1/SC1). Definitions of published parts of this vocabulary are identified by the symbol (I) after the definition; definitions taken from draft international standards, committee drafts, and working papers being developed by ISO/IEC JTC1/SC1 are identified by the symbol (T) after the definition, indicating that final agreement has not yet been reached among the participating National Bodies of SC1.

The following cross-references are used in this glossary:

> **Contrast with.** This refers to a term that has an opposed or substantively different meaning.
> **See.** This refers the reader to multiple-word terms in which this term appears.
> **See also.** This refers the reader to terms that have a related, but not synonymous, meaning.
> **Synonym for.** This indicates that the term has the same meaning as a preferred term, which is defined in the glossary.

This section contains some of the terms that are commonly used in the SP publications.

IBM is grateful to the American National Standards Institute (ANSI) for permission to reprint its definitions from the American National Standard *Vocabulary for Information Processing* (Copyright 1970 by American National Standards Institute, Incorporated), which was prepared by Subcommittee X3K5 on Terminology and Glossary of the American National Standards Com-

mittee X3. ANSI definitions are preceded by an asterisk (*).

Other definitions in this glossary are taken from *IBM Vocabulary for Data Processing, Telecommunications, and Office Systems* (SC20-1699) and *IBM DATABASE 2 Application Programming Guide for TSO Users* (SC26-4081).

A

adapter. An adapter is a mechanism for attaching parts. For example, an adapter could be a part that electrically or physically connects a device to a computer or to another device. In the SP system, network connectivity is supplied by various adapters, some optional, that can provide connection to I/O devices, networks of workstations, and mainframe networks. Ethernet, FDDI, token-ring, HIPPI, SCSI, FCS, and ATM are examples of adapters that can be used as part of an SP system.

address. A character or group of characters that identifies a register, a device, a particular part of storage, or some other data source or destination.

AFS. A distributed file system that provides authentication services as part of its file system creation.

AIX. Abbreviation for Advanced Interactive Executive, IBM's licensed version of the UNIX operating system. AIX is particularly suited to support technical computing applications, including high function graphics and floating point computations.

Amd. Berkeley Software Distribution automount daemon.

API. Application Programming Interface. A set of programming functions and routines that provide access between the Application layer of the OSI seven-layer model and applications that want to use the network. It is a software interface.

application. The use to which a data processing system is put; for example, a payroll application, an airline reservation application.

application data. The data that is produced using an application program.

ARP. Address Resolution Protocol.

ATM. Asynchronous Transfer Mode. (See *TURBOWAYS 100 ATM Adapter*.)

Authentication. The process of validating the identity of a user or server.

Authorization. The process of obtaining permission to perform specific actions.

B

batch processing. * (1) The processing of data or the accomplishment of jobs accumulated in advance in such a manner that each accumulation thus formed is processed or accomplished in the same run. * (2) The processing of data accumulating over a period of time. * (3) Loosely, the execution of computer programs serially. (4) Computer programs executed in the background.

BMCA. Block Multiplexer Channel Adapter. The block multiplexer channel connection allows the RS/6000 to communicate directly with a host System/370 or System/390; the host operating system views the system unit as a control unit.

BOS. The AIX Base Operating System.

C

call home function. The ability of a system to call the IBM support center and open a PMR to have a repair scheduled.

CDE. Common Desktop Environment. A graphical user interface for UNIX.

charge feature. An optional feature for either software or hardware for which there is a charge.

CLI. Command Line Interface.

client. * (1) A function that requests services from a server and makes them available to the user. * (2) A term used in an environment to identify a machine that uses the resources of the network.

Client Input/Output Sockets (CLIO/S). A software package that enables high-speed data and tape access between SP systems, AIX systems, and ES/9000 mainframes.

CLIO/S. Client Input/Output Sockets.

CMI. Centralized Management Interface provides a series of SMIT menus and dialogues used for defining and querying the SP system configuration.

communications adapter. A hardware feature that enables a computer or device to become a part of a data network.

concurrent maintenance. Maintenance that can be performed concurrently with customer operations. (Contrast with definition of N+1.)

connectionless. A communication process that takes place without first establishing a connection.

connectionless network. A network in which the sending logical node must have the address of the receiving logical node before information interchange can begin. The packet is routed through nodes in the network based on the destination address in the packet. The originating source does not receive an acknowledgment that the packet was received at the destination.

control workstation. A single point of control allowing the administrator or operator to monitor and manage the SP system using the IBM AIX Parallel System Support Programs.

css. Communication subsystem.

D

daemon. A process, not associated with a particular user, that performs system-wide functions such as administration and control of networks, execution of time-dependent activities, line printer spooling and so forth.

DASD. Direct Access Storage Device. Storage for input/output data.

DCE. Distributed Computing Environment.

DFS. distributed file system. A subset of the IBM Distributed Computing Environment.

Direct Access Storage Device (DASD). A device in which access to data is independent of where data resides on the device.

default. An alternative value, attribute, or option that is assumed when none has been specified.

DIMM. Dual Inline Memory Module

diskless workstation. A computer workstation with its own processor, keyboard, graphics system and monitor but no local disk system. The system relies on disk resources which are found in the network either on a dedicated server or shared over the entire network resources.

DNS. Domain Name Service. A hierarchical name service which maps high level machine names to IP addresses.

E

Error Notification Object. An object in the SDR that is matched with an error log entry. When an error log entry occurs that matches the Notification Object, a user-specified action is taken.

ESCON. Enterprise Systems Connection. The ESCON channel connection allows the RS/6000 to communicate directly with a host System/390; the host operating system views the system unit as a control unit.

Ethernet. (1) Ethernet is the standard hardware for TCP/IP local area networks in the UNIX marketplace. It is a 10-megabit per second baseband type LAN that allows multiple stations to access the transmission medium at will without prior coordination, avoids contention by using carrier sense and deference, and resolves contention by collision detection (CSMA/CD). (2) A passive coaxial cable whose interconnections contain devices or components, or both, that are all active. It uses CSMA/CD technology to provide a best-effort delivery system.

Ethernet network. A baseband LAN with a bus topology in which messages are broadcast on a coaxial cabling using the carrier sense multiple access/collision detection (CSMA/CD) transmission method.

event. In Event Management, the notification that an expression evaluated to true. This evaluation occurs each time an instance of a resource variable is observed.

expect. Programmed dialogue with interactive programs.

expression. In Event Management, the relational expression between a resource variable and other elements (such as constants or the previous value of an instance of the variable) that, when true, generates an event. An example of an expression is $X < 10$ where X represents the resource variable `IBM.PSSP.aixos.PagSp.%totalfree` (the percentage of total free paging space). When the expression is true, that is, when the total free paging space is observed to be less than 10%, the Event Management subsystem generates an event to notify the appropriate application.

F

failover. Also called fallover, the sequence of events when a primary or server machine fails and a secondary or backup machine assumes the primary workload. This is a disruptive failure with a short recovery time.

fall back. Also called fallback, the sequence of events when a primary or server machine takes back control of its workload from a secondary or backup machine.

FDDI. Fiber Distributed Data Interface.

Fiber Distributed Data Interface (FDDI). An American National Standards Institute (ANSI) standard for 100-megabit-per-second LAN using optical fiber cables. An FDDI local area network (LAN) can be up to 100 km (62 miles) and can include up to 500 system units. There can be up to 2 km (1.24 miles) between system units and/or concentrators.

file. * A set of related records treated as a unit, for example, in stock control, a file could consist of a set of invoices.

file name. A CMS file identifier in the form of 'filename filetype filemode' (like: TEXT DATA A).

file server. A centrally located computer that acts as a storehouse of data and applications for numerous users of a local area network.

File Transfer Protocol (FTP). The Internet protocol (and program) used to transfer files between hosts. It is an application layer protocol in TCP/IP that uses TELNET and TCP protocols to transfer bulk-data files between machines or hosts.

foreign host. Any host on the network other than the local host.

FTP. File transfer protocol.

G

gateway. An intelligent electronic device interconnecting dissimilar networks and providing protocol conversion for network compatibility. A gateway provides transparent access to dissimilar networks for nodes on either network. It operates at the session presentation and application layers.

H

HACMP. High Availability Cluster Multi-Processing for AIX.

HACWS. High Availability Control Workstation function, based on HACMP, provides for a backup control workstation for the SP system.

Hashed Shared Disk (HSD). The data striping device for the IBM Virtual Shared Disk. The device driver lets application programs stripe data across physical disks in multiple IBM Virtual Shared Disks, thus reducing I/O bottlenecks.

help key. In the SP graphical interface, the key that gives you access to the SP graphical interface help facility.

High Availability Cluster Multi-Processing. An IBM facility to cluster nodes or components to provide high availability by eliminating single points of failure.

High Availability Control Workstation (HACWS). The high availability control workstation (HACWS) is a feature that backs up the control workstation. It uses a second control workstation along with either a SCSI-2 or a 9333.

High Performance Switch (HiPS). An IBM multi-stage packet switch for high-performance communication between processor nodes, the fore-runner to the SPS. See *Scalable POWERparallel Switch (SPS)*.

HIPPI. High Performance Parallel Interface. RS/6000 units can attach to a HIPPI network as defined by the ANSI specifications. The HIPPI channel supports burst rates of 100 Mbps over dual simplex cables; connections can be up to 25 km in length as defined by the standard and can be extended using third-party HIPPI switches and fiber optic extenders.

HiPS. See *High Performance Switch*.

home directory. The directory associated with an individual user.

host. A computer connected to a network, and providing an access method to that network. A host provides end-user services.

I

instance vector. Obsolete term for resource identifier.

Intermediate Switch Board. Switches mounted in the Sp Switch expansion frame.

Internet. A specific inter-network consisting of large national backbone networks such as APARANET, MILNET, and NSFnet, and a myriad of regional and campus networks all over the world. The network uses the TCP/IP protocol suite.

Internet Protocol (IP). (1) A protocol that routes data through a network or interconnected networks. IP acts as an interface between the higher logical layers and the physical network. This protocol, however, does not provide error recovery, flow control, or guarantee the reliability of the physical network. IP is a connectionless protocol. (2) A protocol used to route data from its source to it destination in an Internet environment.

IP address. A 32-bit address assigned to devices or hosts in an IP internet that maps to a physical address.

The IP address is composed of a network and host portion.

ISB. Intermediate Switch Board.

K

Kerberos. A service for authenticating users in a network environment.

kernel. The core portion of the UNIX operating system which controls the resources of the CPU and allocates them to the users. The kernel is memory-resident, is said to run in "kernel mode" and is protected from user tampering by the hardware.

L

LAN. (1) Acronym for Local Area Network, a data network located on the user's premises in which serial transmission is used for direct data communication among data stations. (2) Physical network technology that transfers data a high speed over short distances. (3) A network in which a set of devices is connected to another for communication and that can be connected to a larger network.

local host. The computer to which a user's terminal is directly connected.

log database. A persistent storage location for the logged information.

log event. The recording of an event.

log event type. A particular kind of log event that has a hierarchy associated with it.

logging. The writing of information to persistent storage for subsequent analysis by humans or programs.

M

manhattan distance. The distance between two points extending across one or more 90 degree junction(s).

mask. To use a pattern of characters to control retention or elimination of portions of another pattern of characters.

menu. A display of a list of available functions for selection by the user.

Motif. The graphical user interface for OSF, incorporating the X Window System. Also called OSF/Motif.

MTBF.   Mean time between failure. This is a measure of reliability.

MTTR.   Mean time to repair. This is a measure of serviceability.

N

N+1.   Redundant power or cooling component. (Does not mean concurrent maintenance.)

naive application.   An application with no knowledge of a server that fails over to another server. Client to server retry methods are used to reconnect.

network.   An interconnected group of nodes, lines, and terminals. A network provides the ability to transmit data to and receive data from other systems and users.

NFS.   Network File System. NFS allows different systems (UNIX or non-UNIX), different architectures, or vendors connected to the same network, to access remote files in a LAN environment as though they were local files.

NIM.   Network Installation Management is provided with AIX to install AIX on the nodes.

NIM client.   An AIX system installed and managed by a NIM master. NIM supports three types of clients:

- Standalone
- Diskless
- Dataless

NIM master.   An AIX system that can install one or more NIM clients. An AIX system must be defined as a NIM master before defining any NIM clients on that system. A NIM master managers the configuration database containing the information for the NIM clients.

NIM object.   A representation of information about the NIM environment. NIM stores this information as objects in the NIM database. The types of objects are:

- Network
- Machine
- Resource

NIS.   Network Information System.

node.   In a network, the point where one or more functional units interconnect transmission lines. A computer location defined in a network. The SP system can house several different types of nodes for both serial and parallel processing. These node types can include thin nodes, wide nodes, 604 high nodes, as well as other types of nodes both internal and external to the SP frame.

Node Switch Board.   Switches mounted on frames that contain nodes.

NSB.   Node Switch Board.

NTP.   Network Time Protocol.

O

ODM.   Object Data Manager. In AIX, a hierarchical object-oriented database for configuration data.

P

parallel environment.   A system environment where message passing or SP resource manager services are used by the application.

Parallel Environment.   A licensed IBM program used for message passing applications on the SP or RS/6000 platforms.

parallel processing.   A multiprocessor architecture which allows processes to be allocated to tightly coupled multiple processors in a cooperative processing environment, allowing concurrent execution of tasks.

parameter.   * (1) A variable that is given a constant value for a specified application and that may denote the application. * (2) An item in a menu for which the operator specifies a value or for which the system provides a value when the menu is interpreted. * (3) A name in a procedure that is used to refer to an argument that is passed to the procedure. * (4) A particular piece of information that a system or application program needs to process a request.

partition.   See system partition.

PCI.   See *Power Control Interface (PCI)*

PDU.   See *Power Distribution Unit*

Perl.   Practical Extraction and Report Language.

perspective.   The primary window for each SP Perspectives application, so called because it provides a unique view of an SP system.

pipe.   A UNIX utility allowing the output of one command to be the input of another. Represented by the] symbol. It is also referred to as filtering output.

PMR.   Problem Management Report.

POE.   Formerly Parallel Operating Environment, now Parallel Environment for AIX.

port.   (1) An end point for communication between devices, generally referring to physical connection. (2) A

16-bit number identifying a particular TCP or UDP resource within a given TCP/IP node.

Power Control Interface (PCI).   A function that allows the user to configure a computer system and associated hardware (such as disk units, tape drives) to control power on/off for the various components. For example, he may have external disk unit power controlled by RS/6000 SP frame power, causing the disk unit power to be synchronized to the RS/6000 SP frame power.

Power Distribution Unit (PDU).   The SP power system, replaced by SEPBU. (See *Scalable Electric Power Base Unit (SEPBU)*)

predicate.   Obsolete term for expression.

Primary node or machine.   (1) A device that runs a workload and has a standby device ready to assume the primary workload if that primary node fails or is taken out of service. (2) A node on the SP Switch that initializes, provides diagnosis and recovery services, and performs other operations to the switch network. (3) In IBM Virtual Shared Disk function, when physical disks are connected to two nodes (twin-tailed), one node is designated as the primary node for each disk and the other is designated the secondary, or backup, node. The primary node is the server node for IBM Virtual Shared Disks defined on the physical disks under normal conditions. The secondary node can become the server node for the disks if the primary node is unavailable (off-line or down).

Problem Management Report.   The number in the IBM support mechanism that represents a service incident with a customer.

procedure.   A sequenced set of statements that may be used at one or more points in one or more computer programs, and that usually has one or more input parameters and yields one or more output parameters.

process.   * (1) A unique, finite course of events defined by its purpose or by its effect, achieved under defined conditions. * (2) Any operation or combination of operations on data. * (3) A function being performed or waiting to be performed. * (4) A program in operation. For example, a daemon is a system process that is always running on the system.

protocol.   A set of semantic and syntactic rules that defines the behavior of functional units in achieving communication.

R

RAID.   Redundant array of independent disks.

rearm expression.   In Event Management, an expression used to generate an event that alternates with an original event expression in the following way: the event expression is used until it is true, then the rearm expression is used until it is true, then the event expression is used, and so on. The rearm expression is commonly the inverse of the event expression (for example, a resource variable is on or off). It can also be used with the event expression to define an upper and lower boundary for a condition of interest.

rearm predicate.   Obsolete term for rearm expression

remote host.   *See foreign host.*

resource.   In Event Management, an entity in the system that provides a set of services. Examples of resources include hardware entities such as processors, disk drives, memory, and adapters, and software entities such as database applications, processes, and file systems. Each resource in the system has one or more attributes that define the state of the resource.

resource identifier.   In Event Management, a set of elements, where each element is a name/value pair of the form `name=value`, whose values uniquely identify the copy of the resource (and by extension, the copy of the resource variable) in the system.

resource monitor.   A program that supplies information about resources in the system. It can be a command, a daemon, or part of an application or subsystem that manages any type of system resource.

resource variable.   In Event Management, the representation of an attribute of a resource. An example of a resource variable is `IBM.AIX.PagSp.%totalfree`, which represents the percentage of total free paging space. `IBM.AIX.PagSp` specifies the resource name and `%totalfree` specifies the resource attribute.

RISC.   Reduced Instruction Set Computing (RISC), the technology for today's high performance personal computers and workstations, was invented in 1975. Uses a small simplified set of frequently used instructions for rapid execution.

rlogin (remote LOGIN).   A service offered by Berkeley UNIX systems that allows authorized users of one machine to connect to other UNIX systems across a network and interact as if their terminals were connected directly. The rlogin software passes information about the user's environment (for example, terminal type) to the remote machine.

RPC. Acronym for Remote Procedure Call, a facility that a client uses to have a server execute a procedure call. This facility is composed of a library of procedures plus an XDR.

RSH. A variant of RLOGIN command that invokes a command interpreter on a remote UNIX machine and passes the command line arguments to the command interpreter, skipping the LOGIN step completely. See also *rlogin*.

S

Scalable Electric Power Base Unit (SEPBU). The main power system for the SP machine. It provides +12 V (base), +48 V (bulk), and +24V (on/off switch circuit and PCI) power. The SEPBU accepts both low voltage (200-240 V ac) and high voltage (380-415 V ac) input options without use of an external transformer. The SEPBU uses three-phase voltage input, except for 2AX and 3AX Model applications which use single-phase voltage input only.

Scalable POWERparallel Switch (SPS). An enhanced IBM multi-stage packet switch for high-performance communication between processor nodes. The SPS is the follow-on to the HiPS.

SCSI. See *Small Computer System Interface*.

Secondary node. In IBM Virtual Shared Disk function, when physical disks are connected to two nodes (twin-tailed), one node is designated as the primary node for each disk and the other is designated as the secondary, or backup, node. The secondary node acts as the server node for the IBM Virtual Shared disks defined on the physical disks if the primary node is unavailable (off-line or down).

SEPBU. See *Scalable Electric Power Base Unit (SEPBU)*

server. (1) A function that provides services for users. A machine may run client and server processes at the same time. (2) A machine that provides resources to the network. It provides a network service, such as disk storage and file transfer, or a program that uses such a service. (3) A device, program, or code module on a network dedicated to providing a specific service to a network. (4) On a LAN, a data station that provides facilities to other data stations. Examples are file server, print server, and mail server.

shell. The shell is the primary user interface for the UNIX operating system. It serves as command language interpreter, programming language, and allows foreground and background processing. There are three different implementations of the shell concept: Bourne, C and Korn.

SIMM. Single Inline Memory Module

Small Computer System Interface (SCSI). An input and output bus that provides a standard interface for the attachment of various direct access storage devices (DASD) and tape drives to the RS/6000.

Small Computer Systems Interface Adapter (SCSI Adapter). An adapter that supports the attachment of various direct-access storage devices (DASD) and tape drives to the RS/6000.

SMIT. The System Management Interface Toolkit is a set of menu driven utilities for AIX that provides functions such as transaction login, shell script creation, automatic updates of object database, and so forth.

SNMP. Simple Network Management Protocol. (1) An IP network management protocol that is used to monitor attached networks and routers. (2) A TCP/IP-based protocol for exchanging network management information and outlining the structure for communications among network devices.

socket. (1) An abstraction used by Berkeley UNIX that allows an application to access TCP/IP protocol functions. (2) An IP address and port number pairing. (3) In TCP/IP, the Internet address of the host computer on which the application runs, and the port number it uses. A TCP/IP application is identified by its socket.

SPS. See *Scalable POWERparallel Switch*.

standby node or machine. A device that waits for a failure of a primary node in order to assume the identity of the primary node. The standby machine then runs the primary's workload until the primary is back in service.

subnet. Shortened form of subnetwork.

subnet address. The portion of the host address that identifies a subnetwork.

subnet mask. A bit template that identifies to the TCP/IP protocol code the bits of the host address that are to be used for routing for specific subnetworks.

subnetwork. Any group of nodes that have a set of common characteristics, such as the same network ID.

subsystem. A software component that is not usually associated with a user command. It is usually a daemon process. A subsystem will perform work or provide services on behalf of a user request or operating system request.

SUP. Software Update Protocol.

Sysctl. Secure System Command Execution Tool. An authenticated client/server system for running commands remotely and in parallel.

syslog. A BSD logging system used to collect and manage other subsystem's logging data.

System Administrator. The user who is responsible for setting up, modifying, and maintaining the SP system.

system partition. A group of non-overlapping nodes on a switch chip boundary that act as a logical SP system.

T

tar. Tape ARchive, is a standard UNIX data archive utility for storing data on tape media.

Tcl. Tool Command Language.

TclX. Tool Command Language Extended.

TCP. Acronym for Transmission Control Protocol, a stream communication protocol that includes error recovery and flow control.

TCP/IP. Acronym for Transmission Control Protocol/Internet Protocol, a suite of protocols designed to allow communication between networks regardless of the technologies implemented in each network. TCP provides a reliable host-to-host protocol between hosts in packet-switched communications networks and in interconnected systems of such networks. It assumes that the underlying protocol is the Internet Protocol.

Telnet. Terminal Emulation Protocol, a TCP/IP application protocol that allows interactive access to foreign hosts.

Tk. Tcl-based Tool Kit for X Windows.

TMPCP. Tape Management Program Control Point.

token-ring. (1) Network technology that controls media access by passing a token (special packet or frame) between media-attached machines. (2) A network with a ring topology that passes tokens from one attaching device (node) to another. (3) The IBM Token-Ring LAN connection allows the RS/6000 system unit to participate in a LAN adhering to the IEEE 802.5 Token-Passing Ring standard or the ECMA standard 89 for Token-Ring, baseband LANs.

transaction. An exchange between the user and the system. Each activity the system performs for the user is considered a transaction.

transceiver (transmitter-receiver). A physical device that connects a host interface to a local area network, such as Ethernet. Ethernet transceivers contain electronics that apply signals to the cable and sense collisions.

transfer. To send data from one place and to receive the data at another place. Synonymous with move.

transmission. * The sending of data from one place for reception elsewhere.

TURBOWAYS 100 ATM Adapter. An IBM high-performance, high-function intelligent adapter that provides dedicated 100 Mbps ATM (asynchronous transfer mode) connection for high-performance servers and workstations.

U

UDP. User Datagram Protocol.

UNIX operating system. An operating system developed by Bell Laboratories that features multiprogramming in a multiuser environment. The UNIX operating system was originally developed for use on minicomputers, but has been adapted for mainframes and microcomputers. **Note:** The AIX operating system is IBM's implementation of the UNIX operating system.

user. Anyone who requires the services of a computing system.

User Datagram Protocol (UDP). (1) In TCP/IP, a packet-level protocol built directly on the Internet Protocol layer. UDP is used for application-to-application programs between TCP/IP host systems. (2) A transport protocol in the Internet suite of protocols that provides unreliable, connectionless datagram service. (3) The Internet Protocol that enables an application programmer on one machine or process to send a datagram to an application program on another machine or process.

user ID. A non-negative integer, contained in an object of type *uid_t*, that is used to uniquely identify a system user.

V

Virtual Shared Disk, IBM. The function that allows application programs executing at different nodes of a system partition to access a raw logical volume as if it were local at each of the nodes. In actuality, the logical volume is local at only one of the nodes (the server node).

W

workstation.   * (1) A configuration of input/output equipment at which an operator works. * (2) A terminal or microcomputer, usually one that is connected to a mainframe or to a network, at which a user can perform applications.

X

X Window System.   A graphical user interface product.

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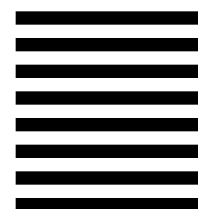
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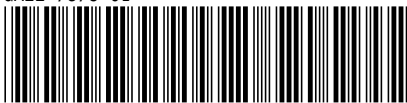
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