IBM

@server

xSeries 445 Type 8870

Hardware Maintenance Manual and Troubleshooting Guide

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Note: Before using this information and the product it supports, read Appendix B, "Notices," on page 301.

The most recent version of this document is available at http://www.ibm.com/pc/support.

About this manual

This manual contains diagnostic information, a Symptom-to-FRU index, service information, error codes, error messages, and configuration information for the IBM® @server™ xSeries® 445 Type 8870 server.

Important: This manual is intended for trained servicers who are familiar with IBM xSeries products. Before servicing an IBM product, be sure to review "Safety information" on page 257.

Important safety information

Be sure to read all caution and danger statements in this book before performing any of the instructions.

Leia todas as instruções de cuidado e perigo antes de executar qualquer operação.

在安装本产品之前，请仔细阅读 Safety Information
(安全信息)。

安裝本產品之前，請先閱讀「安全資訊」。

Prenez connaissance de toutes les consignes de type Attention et

Danger avant de procéder aux opérations décrites par les instructions.

Lesen Sie alle Sicherheitshinweise, bevor Sie eine Anweisung ausführen.

Accertarsi di leggere tutti gli avvisi di attenzione e di pericolo prima di effettuare qualsiasi operazione.

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

Lea atentamente todas las declaraciones de precaución y peligro ante de llevar a cabo cualquier operación.

WARNING: Handling the cord on this product or cords associated with accessories sold with this product, will expose you to lead, a chemical known to the State of California to cause cancer, and birth defects or other reproductive harm. *Wash hands after handling.*

ADVERTENCIA: El contacto con el cable de este producto o con cables de accesorios que se venden junto con este producto, pueden exponerle al plomo, un elemento químico que en el estado de California de los Estados Unidos está considerado como un causante de cancer y de defectos congénitos, además de otros riesgos reproductivos. *Lávese las manos después de usar el producto.*

Online support

You can download the most current diagnostic, BIOS flash, and device driver files from http://www.ibm.com/pc/support on the World Wide Web.

Contents

Chapter 1. General information

The IBM @server xSeries 445 is a four U-high[1] rack model server for high-volume network transaction processing. This high-performance server, based on IBM Enterprise X-Architecture technologies, is ideally suited for networking environments that require superior microprocessor performance, efficient memory management, flexibility, and reliable data storage.

The xSeries 445 comes with a limited warranty. If you have access to the World Wide Web, you can obtain up-to-date information about your xSeries 445 and other IBM server products at http://www.ibm.com.

Your xSeries 445 server contains several IBM Enterprise X-Architecture technologies that help increase server performance and reliability. The Enterprise X-Architecture technologies provided in the server model include the most recent advancements in X-Architecture features. More information about Enterprise X-Architecture features is available on the World Wide Web at http://www.ibm.com/pc/us/eserver/xseries/xarchitecture/enterprise/index.html.

For service, assistance, or additional information on the World Wide Web, see Appendix A, "Getting help and technical assistance," on page 299.

The machine type and serial number are located on the ID label located on the left side of the bezel just above the hard disk drives.
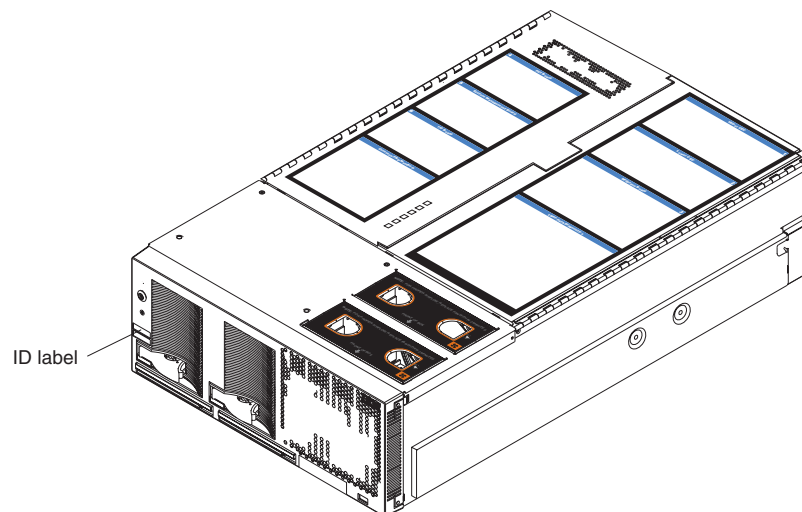
Figure 1. xSeries 445 server

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1. Racks are marked in vertical increments of 1.75 inches each. Each increment is referred to as a unit, or ″U.″ A one-U-high device is 1.75 inches tall.

1

Related publications

This *Hardware Maintenance Manual and Troubleshooting Guide* is provided in Portable Document Format (PDF). It contains information to help you solve a problem yourself or to provide helpful information to a service technician.

In addition to this *Hardware Maintenance Manual and Troubleshooting Guide*, the following xSeries 445 documentation is provided with the server:

* *Installation Guide*

  This printed publication contains instructions for setting up the server and basic instructions for installing some options.
* *User's Guide*

  This publication provides general information about the server, including information about features, how to configure the server, and how to get help.
* *Option Installation Guide*

  This publication is in PDF on the IBM *xSeries Documentation* CD. It contains detailed instructions for installing, removing, and connecting optional devices that the server supports.
* *Rack Installation Instructions*

  This printed publication contains instructions for installing the server in a rack cabinet.
* *Safety Information*

  This publication is in PDF on the IBM *xSeries Documentation* CD. It contains translated caution and danger statements. Each caution and danger statement that appears in the documentation has a number that you can use to locate the corresponding statement in your language in the *Safety Information* book.

Depending on the server model, additional publications might be included on the *IBM xSeries Documentation* CD.

Notices and statements used in this book

The caution and danger statements used in this book also appear in the multilingual Safety Information book provided on the *IBM xSeries Documentation* CD. Each caution and danger statement is numbered for easy reference to the corresponding statement in the safety book.

The notice and statement definitions are as follows:

* **Note:** These notices provide important tips, guidance, or advice.
* **Important:** These notices provide information or advice that might help you avoid inconvenient or problem situations.
* **Attention:** These notices indicate possible damage to programs, devices, or data. An attention notice is placed just before the instruction or situation in which damage could occur.
* **Caution:** These statements indicate situations that can be potentially hazardous to you. A caution statement is placed just before the description of a potentially hazardous procedure step or situation.
* **Danger:** These statements indicate situations that can be potentially lethal or extremely hazardous to you. A danger statement is placed just before the description of a potentially lethal or extremely hazardous procedure step or situation.

Features and specifications

The following information is a summary of the features and specifications for the server.

Microprocessor:
- Supports the following microprocessors:
  - Up to 8 Intel® Xeon MP microprocessors (16 in a 16-way configuration)

    OR
  - Up to 4 Intel Xeon DP microprocessors

    Note: Use the Information in BIOS to determine the type and speed of the microprocessors installed in the server.
- IBM XA-32™ chip set with integrated memory, I/O, system cache, and remote I/O controllers

Memory:
- Minimum: 2 GB
- Maximum: 64 GB
- Type: 2-way interleaved PC1600, DDR SDRAM, registered DIMMs only
- Supports 512 MB, 1GB and 2 GB dual inline memory modules (DIMMs)
- XceL4™ Server Accelerator Cache (64 MB per SMP Expansion Module)

Drives:
- Diskette: 1.44 MB
- DVD-ROM
- Supports up to two internal Ultra320 SCSI hard disk drives

Active™ PCI-X expansion slots:

Six 64-bit Active PCI-X expansion slots:
- Two 66 MHz PCI-X slots
- Two 100 MHZ PCI-X slots
- Two 133 MHZ PCI-X slots
- Additional PCI-X slots available in an optional remote I/O expansion enclosure

Cooling:

Four hot-swap fans:
- Two 150 mm x 51 mm redundant fans
- Two 150 mm x 38 mm fans

Acoustical noise emissions:
- Sound power, idling: 6.5 bel maximum
- Sound power, operating: 6.5 bel maximum

Power supply:

Two hot-swap power supplies (depending on model):
- 550 watts at 110 V ac or 1050 watts at 220 V ac
- 600 watts at 110 V ac or 1200 watts at 220 V ac

Video:
- Models with the Remote Supervisor Adapter II-EXA: ATI Radeon RV-100 video controller on the RSA II-EXA adapter
- Models with the Remote Supervisor Adapter: ATI Rage XL video controller on the system board
- PCI bus interface
- Compatible with SVGA

Size (4 U):
- Height: 17.8 cm (7 inches, 4 U)
- Depth: 69.85 cm (27.5 inches)
- Width: 48.3 cm (19 inches)
- Maximum weight: 50 kg (110 lb) depending on your configuration

Integrated functions:
- Broadcom 5704 Dual Gigabit 10/100/1000 Ethernet controller
- Light path diagnostics feature
- LSI Logic 1030 Dual Ultra320 SCSI controller
- Remote Supervisor Adapter II-EXA
  - ATI Radeon RV-100 video controller
  - Ethernet port
  - RSA II-EXA breakout port
- Remote Supervisor Adapter
  - ASM interconnect port
  - Ethernet port
  - Management port
- IDE controller
- RXE Management Port
- Three USB ports
- Keyboard port
- SCSI port
- Mouse port
- Symmetrical multiprocessing (SMP) Expansion Ports (three or six ports depending on your configuration)
- Two remote I/O expansion enclosure (RXE) Expansion Ports

Environment:
- Air temperature:
  - Server on: 10° to 35°C (50.0° to 95.0°F). Altitude: 0 to 914 m (2998.7 ft).
  - Server on: 10° to 32° C (50.0° to 89.6° F). Altitude: 914 m (2998.7 ft) to 2133 m (6998.0 ft).
  - Server off: -40° to 60° C (-104° to 140° F). Maximum altitude: 2133 m (6998.0 ft).
- Humidity:
  - Server on: 8% to 80%
  - Server off: 5% to 100%

Heat output:

Approximate heat output in British thermal units (Btu) per hour:
- Minimum configuration: 855 Btu (250 watts)
- Maximum configuration: 2726 Btu (800 watts)

Electrical input:
- Sine-wave input (50 or 60 Hz) required
- Input voltage low range:
  - Minimum: 100 V ac
  - Maximum: 127 V ac
- Input voltage high range:
  - Minimum: 200 V ac
  - Maximum: 240 V ac
- Input kilovolt-amperes (kVA) approximately:
  - Minimum: 0.250 kVA
  - Maximum: 0.800 kVA

Notes:
1. Power consumption and heat output vary depending on the number and type of optional features installed and the power-management optional features in use.
2. These levels were measured in controlled acoustical environments according to the procedures specified by the American National Standards Institute (ANSI) S12.10 and ISO 7779 and are reported in accordance with ISO 9296. Actual sound-pressure levels in a given location might exceed the average values stated because of room reflections and other nearby noise sources. The declared sound-power levels indicate an upper limit, below which a large number of computers will operate.

Server controls and indicators

The following section identifies the controls and indicators on the front and rear of the server.

Front view
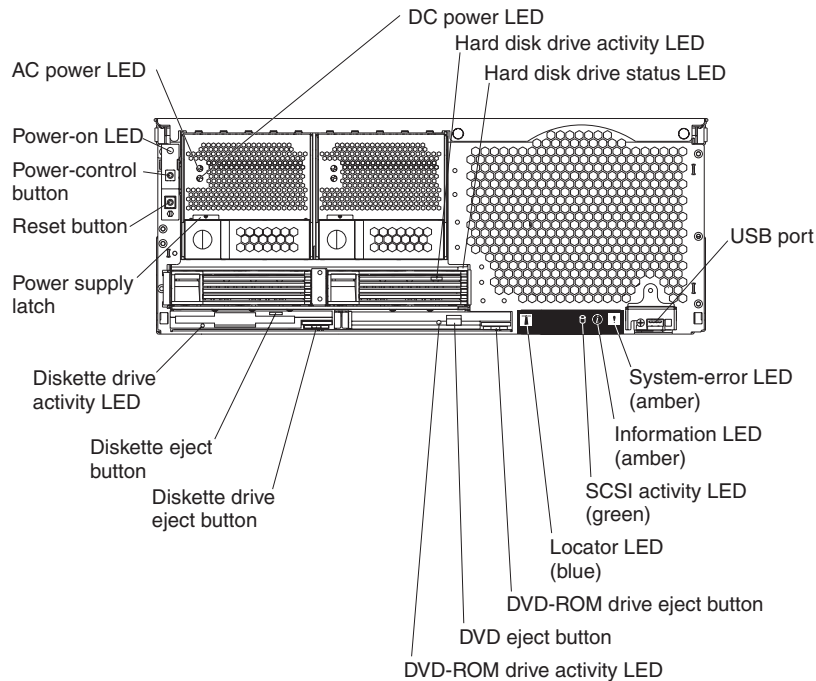
Figure 2. Front view of xSeries 445

AC and DC power LED: Each hot-swap power supply has an ac power LED and a dc power LED. During typical operation, both the ac and dc power LEDs are lit. For any other combination of LEDs, see "Power LED errors" on page 240.

Hard disk drive activity LED: When this green LED is on, it indicates that the hard disk drive is in use.

Note: On some server models, each hot-swap hard disk drive has an activity LED. When this LED is flashing, it indicates that the drive is in use.

Hard disk drive status LED: When the drive is connected to the integrated SCSI controller with RAID capabilities, a flashing status LED indicates that the drive is a secondary drive in a mirrored pair and the drive is being synchronized. When the drive is connected to an optional ServeRAID controller, a slowly flashing (one flash per second) status LED indicates that the drive is being rebuilt. When the LED is flashing rapidly (three flashes per second), it indicates that the controller is identifying the drive.

Note: On some server models, each hot-swap hard disk drive has a status LED. The interpretation of a flashing status LED depends on the SCSI controller connected to the hot-swap drive, as follows:

- When the drive is connected to the integrated SCSI controller with RAID capabilities, a flashing status LED indicates that the drive is a secondary drive in a mirrored pair and the drive is being synchronized.
- When the drive is connected to an optional ServeRAID controller, a slowly flashing (one flash per second) status LED indicates that the drive is being rebuilt. When the LED is flashing rapidly (three flashes per second), it indicates that the controller is identifying the drive.

USB port: This is an automatically configured port that you can use to connect one or more USB devices to the front of the server, using Plug and Play technology.

System-error LED: When this amber LED is on, it indicates a system error has occurred.

Information LED: When this amber LED is on, it indicates information about a system error has been placed in the System Error log.

SCSI activity LED: When this green LED is on, it indicates that there is activity on the SCSI bus.

Locator LED: The locator LED is on the left front of the Light Path Diagnostic drawer. This blue LED indicates the primary and secondary servers. This LED blinks on the primary server. If the LED remains solid, it indicates that server is the secondary server.

DVD-ROM drive eject button: Press this button to release a DVD-ROM drive from the server.

DVD eject button: Press this button to release a DVD from the DVD-ROM drive.

DVD-ROM drive activity LED: When this LED is on, it indicates that the DVD-ROM drive is in use.

Diskette drive eject button: Press this button to release a diskette drive from the server.

Diskette eject button: Press this button to release a diskette from the diskette drive.

Diskette drive activity LED: When this LED is on, it indicates that the diskette drive is in use.

Power-supply latch: This latch is used to secure the power supply in place.

Reset button: Press this button to reset the server and run the power-on self-test (POST). You might have to use a pen or the end of a straightened paper clip to press the button.

Power-control button: Press this button to turn the server on and off manually. A power-control-button shield comes with the server. You can install this disk-shaped shield to prevent the server from being turned off accidentally.

Rear view

The rear view of the server will differ according to whether it contains a Remote Supervisor Adapter or a Remote Supervisor Adapter II-EXA. The rear view of each type is illustrated below.

Remote Supervisor Adapter II-EXA models

The rear view of a server containing a Remote Supervisor Adapter II-EXA is shown below.
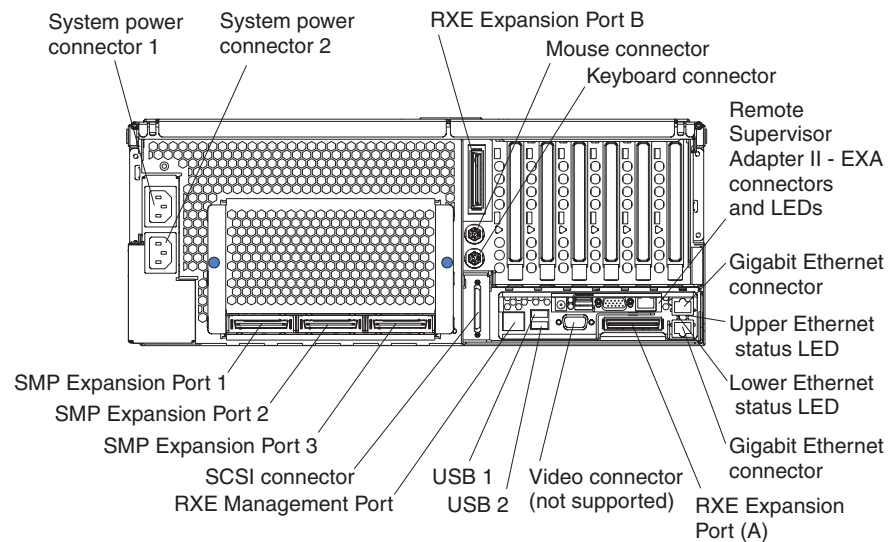
Figure 3. Rear view of the Remote Supervisor Adapter II-EXA model of the xSeries 445

Remote Supervisor Adapter models

The rear view of a server containing a Remote Supervisor Adapter is shown below.
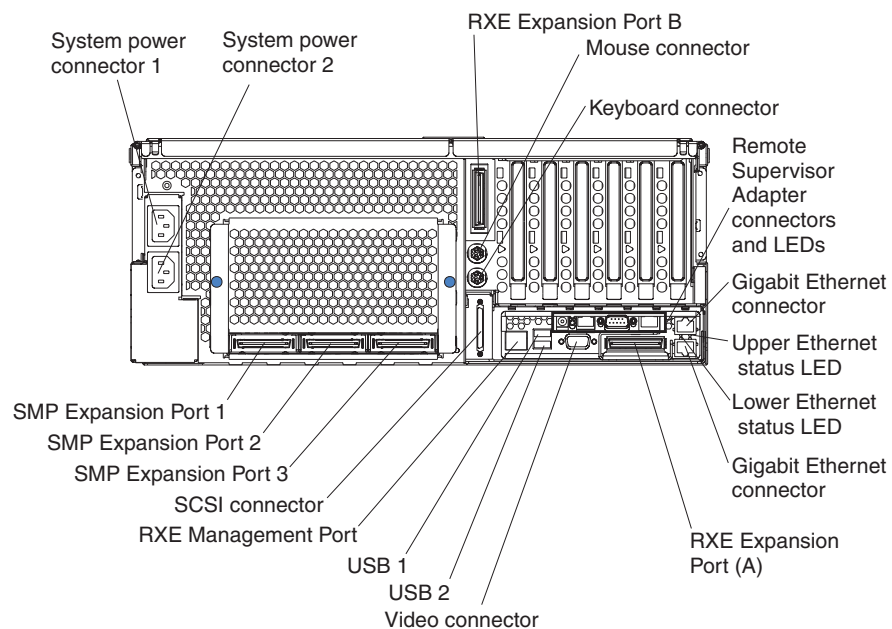
Figure 4. Rear view of the Remote Supervisor Adapter model of the xSeries 445

System power connectors (1 and 2): The system power cords are connected to these two connectors to provide power to the system.

RXE Expansion Port B: Use this port to connect the server to a remote I/O enclosure when two SMP Expansion Modules are installed.

Mouse connector: Connect a mouse or other PS/2® device to this connector.

Keyboard port: Connect a keyboard to this port.

Remote Supervisor Adapter II-EXA connectors and LEDs: This group of connectors and LEDs located on the back of the server is used for system-management information and control.
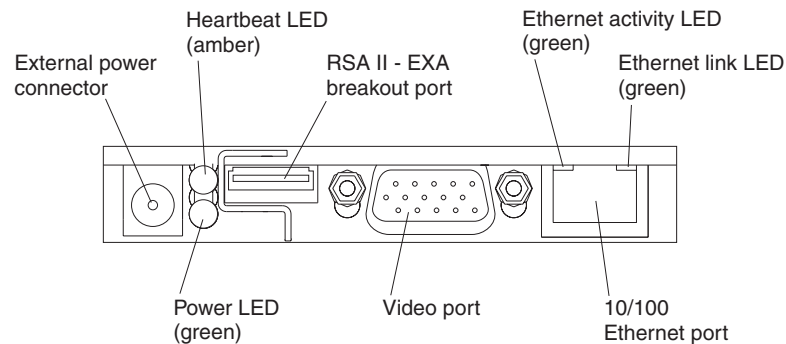
Figure 5. Remote Supervisor Adapter II-EXA connectors and LEDs

- **External power connector:** This connector is used to connect the Remote Supervisor Adapter II-EXA to an external power source.
- **Heartbeat LED:** This amber LED flashes continuously to indicate that there is activity on the Remote Supervisor Adapter II-EXA.
- **RSA II-EXA breakout port:** The RSA II-EXA breakout cable is connected to this port to provide two serial (communication) ports, one USB port, and one RS-485 port with two connectors.
- **Ethernet activity LED:** When the LED is green, there is activity on the Ethernet LAN.
- **Ethernet link LED:** When the LED is green, the link is active.
- **10/100 Ethernet port:** Ethernet signal cables are connected to the Ethernet port.
- **Video port:** Connect the signal cable for a monitor to this port.

  Important: When the Remote Supervisor Adapter II-EXA is installed in place of the Remote Supervisor Adapter, you must connect the monitor or console switch to this video port. The integrated video controller on the server is disabled for models with a Remote Supervisor Adapter II-EXA installed.

- **Power LED:** This green LED comes on and stays on when you plug in the server.

Remote Supervisor Adapter connectors and LEDs: This group of connectors and LEDs located on the back of the server is used for system-management information and control.

Figure 6. Remote Supervisor Adapter connectors and LEDs

- **External power connector:** You can connect an optional ac power adapter to this connector.
- **Error LED:** This amber LED is lit when a system-management error has occurred.
- **ASM interconnect port:** Connect signal cables for managing expansion-module resources to this port.
- **Ethernet activity LED:** This green LED is lit when there is activity on the Ethernet LAN.
- **Ethernet link LED:** This green LED is lit when the Ethernet link is active.
- **10/100 Ethernet port:** Connect Ethernet signal cables to this port.
- **Management port:** Connect a serial cable to this port to enable system management through a modem, or connect a null modem cable to this port to enable system management through a workstation or laptop computer.
- **Power LED:** This green LED comes on and stays lit when you plug in the server.

Upper Ethernet status LED: This LED displays the link and activity status for the upper Gigabit Ethernet port. When the LED is green, the link is active. When the LED blinks green and amber, there is activity on the Ethernet LAN.

Lower Ethernet status LED: This LED displays the link and activity status for the lower Gigabit Ethernet port. When the LED is green, the link is active. When the LED blinks green and amber, there is activity on the Ethernet LAN.

Gigabit Ethernet connectors: Gigabit Ethernet Signal cables are connected to the Gigabit Ethernet connectors. These ports support 10/100/1000 speed connections.

RXE Expansion Port A: Use this port to connect the server to a remote I/O enclosure, when only one SMP Expansion Module is installed.

Video port: The signal cable for a monitor connects to the video port.

Important: This port is only supported on models with a Remote Supervisor Adapter. If a Remote Supervisor Adapter II-EXA is installed in place of the Remote Supervisor Adapter. the integrated video controller on the server is disabled and the monitor is connected to the video port on the Remote Supervisor Adapter II-EXA.

USB 2: This is an automatically configured port that you can use to connect one or more USB devices to the server, using Plug and Play technology.

USB 1: This is an automatically configured port that you can use to connect one or more USB devices to the server, using Plug and Play technology.

RXE Management Port: Use this port to connect a management cable from the server to a remote I/O enclosure.

SCSI port: This port is used to connect external SCSI devices to the server.

SMP Expansion port 3: This port is used to interconnect two SMP Expansion Modules together in 16-way configurations.

SMP Expansion port 2: This port is used to interconnect two SMP Expansion Modules together.

SMP Expansion port 1: This port is used to interconnect two SMP Expansion Modules together.

Server power features

When the server is connected to an ac power source but is not turned on, the operating system does not run, and all core logic except for the service processor is shut down; however, the server can respond to requests from the service processor, such as a remote request to turn on the server. The power-on LED flashes to indicate that the server is connected to ac power but not turned on.

Turning on the server

Approximately 20 seconds after the server is connected to ac power, the power-control button becomes active, and you can turn on the server and start the operating system by pressing the power-control button.

You can also turn on the server in any of the following ways:

- If the server is connected to an Advanced System Management interconnect network that contains at least one server with an optional Remote Supervisor Adapter installed, the server can be turned on from the Remote Supervisor Adapter user interface.
- If a power failure occurs while the server is turned on, the server will restart automatically when power is restored.
- If your operating system supports the system-management software for an optional Remote Supervisor Adapter, the system-management software can turn on the server.
- If your operating system supports the Wake on LAN® feature, the Wake on LAN feature can turn on the server.

Note: When you press the power-control button on either the primary or secondary server in a 16-way configuration, both servers will be turned on. If both servers do not turn on when either power-control button is pressed, see "Error symptoms" on page 230 and "Scalable partitions" on page 140.

Turning off the server

When you turn off the server and leave it connected to ac power, the server can respond to requests from the service processor, such as a remote request to turn on the server. To remove all power from the server, you must disconnect it from the power source.

Some operating systems require an orderly shutdown before you turn off the server. See your operating-system documentation for information about shutting down the operating system.

Statement 5

CAUTION:
The power control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

2

1
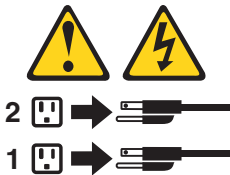
You can turn off the server in any of the following ways:

- You can turn off the server from the operating system, if your operating system supports this feature. After an orderly shutdown of the operating system, the server will be turned off automatically.
- You can press the power-control button to start an orderly shutdown of the operating system and turn off the server, if your operating system supports this feature.
- If the operating system stops functioning, you can press and hold the power-control button to turn off the server.
- If the server is connected to an Advanced System Management interconnect network that contains at least one server with an optional Remote Supervisor Adapter installed, the server can be turned off from the Remote Supervisor Adapter user interface.
- The server can be turned off from the Remote Supervisor Adapter user interface.
- If the Wake on LAN feature turned on the server, the Wake on LAN feature can turn off the server.
- The Remote Supervisor Adapter can turn off the server as an automatic response to a critical system failure.

Note: When you press the power-control button on either the primary or secondary server in a 16-way configuration, both servers will be turned on. If both servers do not turn on when either power-control button is pressed, see "Error symptoms" on page 230 and "Scalable partitions" on page 140.

IBM Director

With IBM Director, a network administrator can:
- View the hardware configuration of remote systems, in detail
- Monitor the usage and performance of critical components, such as microprocessors, disks, and memory
- Centrally manage individual or large groups of IBM and non-IBM Intel™-based servers, desktop computers, workstations, and mobile computers on a variety of platforms

IBM Director provides a comprehensive entry-level workgroup hardware manager. Key features include:
- Advanced self-management capabilities for maximum system availability
- Multiple operating-system platform support, including Windows® Server 2003, Windows 2000, Windows XP Professional, Novell NetWare, Linux, and Caldera OpenUNIX
- Support for IBM and non-IBM servers, desktop computers, workstations, and mobile computers
- Support for systems-management industry standards
- Integration into leading workgroup and enterprise systems-management environments
- Ease of use, training, and setup

IBM Director also provides an extensible platform that supports advanced server tools that are designed to reduce the total cost of managing and supporting networked systems. By deploying IBM Director, you can achieve reductions in ownership costs through:
- Reduced downtime
- Increased productivity of IT personnel and users
- Reduced service and support costs

For more information about IBM Director, see the *IBM Director* CD that comes with the server, the IBM Director publications on the CD, and the following Web pages:

Systems Management - Director Package
> http://www.ibm.com/pc/qtechinfo/MIGR-40738.html

> This Web page includes links to software downloads and publications for the latest release of IBM Director.

IBM xSeries Systems Management page
> www.ibm.com/pc/ww/eserver/xseries/systems_management/index.html

> This Web page presents an overview of IBM Systems Management and IBM Director.

IBM Universal Manageability page
> http://www.ibm.com/pc/us/pc/um/index.html

> This Web page links to an IBM portfolio of advanced management tools that help reduce costs and increase availability throughout the life cycle of a product.

If you plan to use IBM Director to manage the server, you must install the applicable IBM Director updates, which could include a Service Pack for your release of IBM Director, individual emergency fixes (interim fixes), and a Director System Support Package (DSSP) for this server.

Note: For Automatic Server Restart (ASR) support and environmental-sensor support, you must install version 3.1.1 of IBM Director.

To install the IBM Director updates, complete the following steps, in order:

1. If you plan to enable the Automatic Server Restart (ASR) feature, install the ASR device driver, which is available from the IBM Web site:

   a. Go to http://www.ibm.com.

   b. Click **Support & downloads**.

   c. Click **All downloads & drivers**.

   d. In the **Enter search terms** field, type `Advanced System Management 8870` and click Submit.

   e. Select the applicable IBM Advanced System Management device driver for the server and operating system.

   f. Click the file link for the executable file to download the file, and follow the instructions in the readme file to install the device driver.

2. Install the IBM Director application.

3. If the IBM Director CD that comes with the server includes the IBM Director Service Pack, install the Service Pack. If the DVD does not contain the Service Pack, check the IBM Web site to see if a Service Pack is available. If it is, download and install the Service Pack according to the instructions in its readme file.

4. Install any applicable interim fixes, DSSPs, and additional updates for the server from the IBM Web site:

   a. Go to http://www.ibm.com.

   b. Click **Support & downloads**.

   c. Click **All downloads & drivers**.

   d. In the **Enter search terms** field, type `director 8870` and click Submit.

   e. Select the interim fix, DSSP, or update that you want to download.

   f. Click the file link for the executable file to download the file, and follow the instructions in the readme file to install the update.

The Update*Xpress* program

The Update*Xpress* program is available for most xSeries servers and server options. It detects supported and installed device drivers and firmware in the server and installs available updates. You can download the Update*Xpress* program from the Web at no additional cost, or you can purchase it on a CD. To download the program or purchase the CD, go to http://www.ibm.com/pc/ww/eserver/xseries/serverguide/xpress.html.

Chapter 2. Configuration

The following configuration programs are provided with the server:

- **Configuration/Setup Utility**

  The Configuration/Setup Utility program is part of the basic input/output system (BIOS) code in the server. Use it to configure management port assignments, change interrupt request (IRQ) settings, change the startup-device sequence, set the date and time, and set passwords. See "Using the Configuration/Setup Utility program" on page 14 for more information.

  Notes:

  1. In a 16-way configuration some options or settings are defined through the primary server, while others must be defined on the individual server. Ensure that options or settings on the secondary server are correct before creating a scalable partition.

  2. For information on creating, deleting, and configuring scalable partitions, see "Scalable partitions" on page 140.

- **IBM *ServerGuide Setup and Installation* CD**

  The ServerGuide™ program provides software-setup tools and installation tools that are designed for the server. Use this CD during the installation of the server to configure basic hardware features, such as an integrated SCSI controller with RAID capabilities, and to simply the installation of your operating system. For information about using this CD, see "Using the ServerGuide Setup and Installation CD" on page 20.

  Notes:

  1. If you are installing a Linux-based operating system, do not install the default ATI video driver. Instead, install the Video Electronics Standards Association (VESA) video driver and set the resolution to 1024 x 768.

  2. If the server model comes with an operating system, such as Microsoft® Windows 2000 Datacenter Server or VMware ESX server, see the software documentation provided with your software for configuration information

- **Ethernet controller configuration**

  To configure the integrated Ethernet controller, see "Configuring the Gigabit Ethernet controller" on page 24.

- **Integrated system management firmware update utility program**

  For information about updating the integrated system management firmware, see "Updating the integrated system management firmware" on page 24.

- **LSI Logic Configuration Utility**

  Use the LSI Logic Configuration Utility to configure the integrated SCSI controller with RAID capabilities and the devices that are attached to it. For information about using this utility program, see "Using the LSI Logic Configuration Utility program" on page 25.

- **ServeRAID Manager**

  ServeRAID™ Manager is available as a stand-alone program and as an IBM Director extension. If a ServeRAID adapter is installed in the server or if you are using the RAID capabilities of the integrated SCSI controller, use ServeRAID Manager to define and configure your disk-array subsystem *before* you install the operating system. For information about using this program, see "Using ServeRAID Manager" on page 25 for more information.

- **Remote Supervisor Adapter configuration process**

  Configuration activities are also required for the Remote Supervisor Adapter or Remote Supervisor Adapter II-EXA. See "Remote Supervisor Adapters" on page 32 for information about setting up and cabling the Remote Supervisor Adapter.
- **Preboot Execution Environment (PXE) boot agent utility program**

  The PXE boot agent utility program is part of the BIOS code in the server. Use it to change network startup (boot) protocols and startup order and to select operating-system wake-up support. For information about using this utility program, see "Using the PXE boot agent utility program" on page 60.

Using the Configuration/Setup Utility program

The Configuration/Setup Utility program is part of the BIOS code. You can use it to:

- Configure system devices and ports
- Configure scalable partitions
- Configure memory settings
- Change the drive startup sequence
- Enable USB keyboard and mouse support
- Resolve configuration conflicts
- Set the date and time
- Set passwords and security settings

Starting the Configuration/Setup Utility program

Complete the following steps to start the Configuration/Setup Utility program:

1. Turn on the server.

   Note: In a 16-way configuration some options or settings are defined through the primary server, while others must be defined on the individual server. Ensure that options or settings on the secondary server are correct before creating a scalable partition.

2. When the prompt `Press F1 for Configuration/Setup` appears, press F1. If you have set both a power-on password and an administrator password, you must type the administrator password to access the full Configuration/Setup Utility menu. If you do not type the administrator password, a limited Configuration/Setup Utility menu is available.

   Note: Depending on your configuration you might experience a delay before the Configuration/Setup menu appears.

3. Select settings to view or change.

Configuration/Setup Utility menu choices

The following choices are on the Configuration/Setup Utility main menu. Depending on the version of the BIOS code in the server, some menu choices might differ slightly from these descriptions.

- **System Summary**

  Select this choice to view configuration information, including the type, speed, and cache sizes of the microprocessors and the amount of installed memory. When you make configuration changes through other options in the Configuration/Setup Utility program, the changes are reflected in the system summary; you cannot change settings directly in the system summary.

  This choice is on the full and limited Configuration/Setup Utility menu.

- **System Information**

  Select this choice to view information about the server. When you make changes through other options in the Configuration/Setup Utility program, some of those changes are reflected in the system information; you cannot change settings directly in the system information.

  This choice is on the full Configuration/Setup Utility menu only.

  – **Product Data**

    Select this choice to view the machine type and model of the server, the serial number, and the revision level or issue date of the BIOS and diagnostics code stored in electrically erasable programmable ROM (EEPROM).

  – **System Card Data**

    Select this choice to view vital product data (VPD) for some server components.

- **Devices and I/O Ports**

  Select this choice to view or change assignments for devices and input/output (I/O) ports and to configure the remote console redirection.

  Select this choice to enable or disable integrated SCSI and Ethernet controllers and all standard ports (such as the serial port). **Enable** is the default setting for all controllers. If you disable a device, it cannot be configured, and the operating system will not be able to detect it (this is equivalent to disconnecting the device). If you disable the integrated SCSI controller and no SCSI adapter is installed, the server will have no SCSI capability. If you disable the integrated Ethernet controller and no Ethernet adapter is installed, the server will have no Ethernet capability.

  Select this choice to configure and enable the remote console redirection feature on the server. This feature allows the user to view POSTexecution, change system configuration settings and to use DOS based configuration utilities remotely. See "Remote console redirection" on page 18 for more information.

  This choice is on the full Configuration/Setup Utility menu only.

- **Date and Time**

  Select this choice to set the date and time in the server, in 24-hour format (*hour*.*minute*:*second*).

  This choice is on the full Configuration/Setup Utility menu only.

- **System Security**

  Select this choice to set passwords and the Remote Control Security settings. See "Passwords" on page 19 for more information about passwords. You can also enable the chassis-intrusion detector to alert you each time the server cover is open.

  Note: In a 16-way configuration security settings are defined through the primary server. If you bypass the 16-way configuration during start up or start the servers in a stand alone configuration; then, you must define the security setting on each individual server.

  This choice is on the full Configuration/Setup Utility menu only.

  – **Power-on Password**

    Select this choice to set or change a power-on password. See "Power-on password" on page 19 for more information.

– **Administrator Password**

Attention: If you set an administrator password and then forget it, there is no way to change, override, or remove it. You must replace the system board.

This choice is on the Configuration/Setup Utility menu only if an optional IBM Remote Supervisor Adapter is installed.

Select this choice to set or change an administrator password. An administrator password is intended to be used by a system administrator; it limits access to the full Configuration/Setup Utility menu. If an administrator password is set, the full Configuration/Setup Utility menu is available only if you type the administrator password at the password prompt. See "Administrator password" on page 20 for more information.

- **Start Options**

Select this choice to view or change the start options. Changes in the start options take effect when you restart the server.

You can set keyboard operating characteristics, such as the keyboard speed, and you can specify whether the server starts with the keyboard number lock on or off. You can enable the server to run without a diskette drive, monitor, or keyboard.

The startup sequence specifies the order in which the server checks devices to find a boot record. The server starts from the first boot record that it finds. If the server has Wake on LAN hardware and software and the operating system supports Wake on LAN functions, you can specify a startup sequence for the Wake on LAN functions. You can also specify whether the integrated SCSI controller or a PCI SCSI adapter has boot precedence.

If you enable the boot fail count, the BIOS default settings will be restored after three consecutive failures to find a boot record.

You can enable a virus-detection test that checks for changes in the boot record when the server starts.

This choice is on the full Configuration/Setup Utility menu only.

- **Advanced Setup**

Select this choice to change settings for advanced hardware features.

Important: The server might malfunction if these options are incorrectly configured. Follow the instructions on the screen carefully.

This choice is on the full Configuration/Setup Utility menu only.

– **CPU Socket State**

You can enable a CPU socket and view the CPU socket state.

– **System Partition Visibility**

Select this choice to specify whether the System Partition is to be visible or hidden. See "Using the ServerGuide Setup and Installation CD" on page 20 for information about the System Partition.

– **Memory Settings**

Select this choice to manually enable a pair of memory connectors. If a memory error is detected during POST or memory configuration, the server automatically disables the failing pair of memory connectors and continues operating with reduced memory. After the problem is corrected, you must manually enable the memory connectors. Use the arrow keys to highlight the pair of memory connectors that you want to enable, and use the arrow keys to select **Enable**.

The following gives information about memory mirroring:

- The hot-add memory feature allows you to add DIMMs without turning off the server. This feature is supported only in those servers using Windows Server 2003 Enterprise or Datacenter editions.
- To use the hot-add memory feature memory mirroring must be Disabled.
- To use the hot-replace memory feature memory mirroring must be Enabled.

– **CPU Options**

Select this choice to specify whether the serial number in the microprocessor is to be readable. You can also disable the microprocessor cache or set it to use the write-back or write-through method. Write-back caching generally provides better system performance.

– **PCI Bus Control**

Select this choice to view and set interrupts for PCI devices and to configure the master-latency-timer value for the server.

– **Integrated System Management Processor Settings**

Select this choice to enable or disable the **Reboot on System NMI** option on the menu. If you enable this option, the server will automatically restart 60 seconds after the service processor issues a nonmaskable interrupt (NMI) to the server. If you disable this option, the server will not restart. **Enable** is the default setting.

– **Scalability Port Configuration**

Select this choice to view a summary of the current scalability port configurations.

Note: Scalability ports are called SMP Expansion Ports in this publication.

– **Scalable Partition Settings**

Select this choice to view a summary of current scalable partition settings and to configure or delete partition settings.

Notes:

1. Partition settings are called partition descriptors in some IBM documentation.
2. See "Scalable partitions" on page 140 for more information on creating, deleting, and configuring scalable partitions.

- **Error Logs**

Select this choice to view or clear error logs.

Note: When troubleshooting problems with PCI-X slots, you will notice that the error logs report the PCI-X busses numerically. The numerical assignment will change depending on your configuration.

– **POST Error Log**

Select this choice to view the three most recent error codes and messages that were generated during POST. Select **Clear error logs** to clear the POST error log.

– **System Event/Error Log**

Select this choice to view the System Event/Error log, which contains all system error and warning messages that have been generated. Use the arrow keys to move between pages in the log. Select **Clear error logs** to clear the System Event/Error log.

- **Save Settings**

Select this choice to save the changes you have made in the settings.

- **Restore Settings**

  Select this choice to cancel the changes you have made in the settings and restore the previous settings.

- **Load Default Settings**

  Select this choice to cancel the changes you have made in the settings and restore the factory settings.

- **Exit Setup**

  Select this choice to exit from the Configuration/Setup Utility program. If you have not saved the changes you have made in the settings, you are asked whether you want to save the changes or exit without saving them.

Additional Configuration/Setup Utility menu choices

With IBM Remote Supervisor Adapter in the server, you can view the following additional menu choices:

- **System Card Data**

  Select this choice to display information about the server.

- **PCI Slot/Device Information**

  Select this choice to view the properties of adapters installed in PCI slots.

- **Administrator Password**

  Select this choice to set or change the administrator password.

- **Remote Control Security Settings**

  Select this choice to set a remote-control password. When you set a remote-control password, you can also set the number of times the wrong remote-control password can be entered before the user is locked out of the server, and the duration before another attempt is allowed.

- **Remote Supervisor Adapter Settings**

  Select this choice to view the MAC address, IP address, subnet mask address, and gateway information and to set the DHCP control.

For a list of supported options for the server, go to http://www.ibm.com/pc/us/compat/.

Remote console redirection

From the **Device I/O Ports** choice, you can enable and configure the remote console redirection through the **Remote Console Redirection** submenu. The **Devices and I/O Ports** choice is on the full Configuration/Setup menu only.

Complete the following steps to enable and configure the remote console redirection feature:

1. Ensure that you have installed and enabled the serial port that comes with the server. See "Installing the serial port" on page 91.
2. From the **Devices and I/O Ports** choice, use the Up Arrow and Down Arrow keys (↑ and ↓) to select **Remote Console Redirection**; then, press Enter. The Remote Console Redirection window opens.
3. In the Remote Console Redirection window **Enable** the remote console redirection and enter the necessary settings for the server to work with a remote console.

   Note: The remote console settings must match those in the Remote Console Redirection window to ensure proper operation.
4. Once you have made the necessary changes, press Esc.

5. Select **Save Settings**; then, press Enter.

6. Confirm your selection; then, exit the Configuration/Setup Utility program.

7. Connect the server to a remote console using a null modem cable.

Passwords

From the **System Security** choice, you can set, change, and delete a power-on password and an administrator password. The **System Security** choice is on the full Configuration/Setup menu only.

Note: In a 16-way configuration, passwords reside with the primary server. Upon separation, the secondary server will revert to its original password.

If you set only a power-on password, you must type the power-on password to complete the system startup, and you have access to the full Configuration/Setup Utility menu.

An administrator password is intended to be used by a system administrator; it limits access to the full Configuration/Setup Utility menu. If you set only an administrator password, you do not have to type a password to complete the system startup, but you must type the administrator password to access the Configuration/Setup Utility menu.

If you set a power-on password for a user and an administrator password for a system administrator, you can type either password to complete the system startup. A system administrator who types the administrator password has access to the full Configuration/Setup Utility menu; the system administrator can give the user authority to set, change, and delete the power-on password. A user who types the power-on password has access to only the limited Configuration/Setup Utility menu; the user can set, change, and delete the power-on password, if the system administrator has given the user that authority.

Power-on password

If a power-on password is set, when you turn on the server, the system startup will not be completed until you type the power-on password. You can use any combination of up to seven characters (A–Z, a–z, and 0–9) for the password.

When a power-on password is set, you can enable the Unattended Start mode, in which the keyboard and mouse remain locked but the operating system can start. You can unlock the keyboard and mouse by typing the power-on password.

If you forget the power-on password, you can regain access to the server in any of the following ways:

- If an administrator password is set, type the administrator password at the password prompt. Start the Configuration/Setup Utility program and reset the power-on password.
- Remove the battery and then reinstall the battery (see "Replacing the battery" on page 154).
- Change the position of the power-on password override jumper (J20) to bypass the power-on password check (see "I/O board internal connectors" on page 166). You can then start the Configuration/Setup Utility program and change the power-on password. For the location of the password override jumper, see "I/O board internal connectors" on page 166.

Notes:

1. Before changing any switch settings or moving any jumpers, turn off the server; then, disconnect all power cords and external cables. (Review the information in "Safety information" on page 257 and "Turning off the server" on page 10).

2. Any system-board switch or jumper blocks that are not shown in the illustrations in this book are reserved.

Administrator password

If an administrator password is set, you must type the administrator password for access to the full Configuration/Setup Utility menu. You can use any combination of up to seven characters (A–Z, a–z, and 0–9) for the password. The **Administrator password** choice is on the Configuration/Setup Utility menu only if an IBM Remote Supervisor Adapter is installed.

Attention: If you set an administrator password and then forget it, there is no way to change, override, or remove it. You must replace the system board.

Using the ServerGuide Setup and Installation CD

The *ServerGuide Setup and Installation* CD includes an easy-to-use setup and installation program that is designed for your IBM server. The ServerGuide program detects the server model and hardware options that are installed and uses that information during setup to configure the hardware. The ServerGuide program simplifies operating-system installations by providing updated device drivers and, in some cases, installing them automatically.

Note: If the server model came with an operating system, such as Microsoft Windows 2000 Datacenter Server or VMware ESX server, see the software documentation provided with your software for configuration information.

If a later version of the ServerGuide program is available, you can download a free image of the *ServerGuide Setup and Installation* CD, or you can purchase the CD. To download the image, go to the IBM ServerGuide Web page at http://www.ibm.com/pc/qtechinfo/MIGR-4ZKPPT.html. To purchase the latest *ServerGuide Setup and Installation* CD, go to the ServerGuide fulfillment Web site at http://www.ibm.com/pc/coupon/.

The ServerGuide program has the following features to make setup easier:
- An easy-to-use interface with online help
- Diskette-free setup, and configuration programs that are based on detected hardware
- ServeRAID Manager program, which configures your ServeRAID adapter or integrated SCSI controller with RAID capabilities
- A system BIOS code update program, which updates the BIOS code directly from the CD
- Device drivers that are provided for the server model and detected hardware
- Operating-system partition size and file-system type that are selectable during setup

ServerGuide features

Features and functions can vary slightly with different versions of the ServerGuide program. To learn more about the version that you have, start the *ServerGuide Setup and Installation* CD and view the online overview. Not all features are supported on all server models.

The ServerGuide program requires a supported IBM server with an enabled startable (bootable) CD-ROM or DVD-ROM drive. In addition to the *ServerGuide Setup and Installation* CD, you must have your operating-system CD to install your operating system.

The ServerGuide program has the following features:
- Sets system date and time.
- Detects the SCSI RAID adapter, controller, or integrated SCSI controller with RAID capabilities and runs the SCSI RAID configuration program.
- Updates the licensed internal code (firmware) level without diskettes.
- Checks the system BIOS code and microcode (firmware) levels of supported options to determine whether a later level is available from the CD. You can perform updates without using diskettes.
- Creates a System Partition on the default drive. You can run server-specific utility programs after setup.
- Detects installed hardware options and provides updated device drivers for most adapters and devices.
- Creates a setup-replication diskette for replicating setup selections for other servers of the same model.
- Provides diskette-free installation for supported operating systems.
- Provides a replicated installation path for multiple installations of supported operating systems.
- Includes an online readme file with links to tips for your hardware and operating-system installation.

Setup and configuration overview

When you use the *ServerGuide Setup and Installation* CD, you do not need setup diskettes. You can use the CD to configure any supported IBM server model. The ServerGuide program checks your system BIOS, service processors, and other system hardware to determine if system updates are available. The setup program provides a list of tasks that are required to set up the server model. On a server with a ServeRAID adapter or integrated SCSI controller with RAID capabilities, you can run the SCSI RAID configuration program to create logical drives.

Notes:
1. Specific features and functions can vary with different versions of the ServerGuide software.
2. Plug and Play adapters are configured automatically. Non-Plug and Play adapters or non-IBM adapters might require switch settings, additional device drivers, and installation after the operating system is installed. See the documentation that comes with the adapter.
3. Diagnostics for the server come in BIOS code or on a separate diagnostics CD.

System Partition

The ServerGuide program creates a 50 MB System Partition on the default drive. The System Partition contains server-specific utility programs such as service-processor disk operating system (DOS) utilities, system diagnostics, flash BIOS updates, and other programs. Programs in the System Partition vary by server model, and not all server models run utility programs from the System Partition. To determine which ones do, start the *ServerGuide Setup and Installation* CD and view the online overview.

After setup is complete, you can access programs in the System Partition by restarting the server and pressing Alt+F1 when the prompt is displayed. The **System Partition** menu displays the programs that are available on the server model.

Typical operating-system installation

You can use the ServerGuide program to shorten your installation time. The ServerGuide program provides the device drivers that are required for your hardware and for the operating system that you are installing. This section describes a typical ServerGuide operating-system installation.

Note: Features and functions can vary slightly with different versions of the ServerGuide program.

1. After you have completed the setup process, the operating-system installation program starts. (You will need your operating-system CD to complete the installation.)
2. The ServerGuide program stores information about the server model, service processor, hard disk drive controllers, and network adapters. Then, the program checks the CD for newer device drivers. This information is stored and then passed to the operating-system installation program.
3. With some operating-system installations, you can create an operating-system replication diskette for setting up additional servers. This diskette contains the Internet protocol (IP) address, server name, and other selections.
4. The ServerGuide program presents operating-system partition options that are based on your operating-system selection and the installed hard disk drives.
5. If you are installing the operating system from diskettes, the ServerGuide program lists the diskettes that you must create and the optional device-driver diskettes (for installed adapters or controllers) that you might want to create.
6. The ServerGuide program prompts you to insert your operating-system CD and restart the server. At this point, the installation program for the operating system takes control to complete the installation.

The following table contains information about the operating systems supported by the server:

Table 1. Supported operating systems and the configurations they support

Operating system	ServerGuide support	Maximum memory and SMP support	Hot-plug PCI support	Memory hot-add support	Hyper-threading support	RSA II-EXA support
Microsoft Windows NT® Server 4.0 Enterprise Edition	No	4 GB, Single SMP Expansion module only (2-way with Intel Xeon DP microprocessors, 4-way with Intel Xeon MP microprocessors)	No	No	No	No
Microsoft Windows 2000 Server	Yes	4 GB, 4-way	Yes	No	No	Yes
Microsoft Windows 2000 Advanced Server	Yes	8 GB, 8-way	Yes	No	No	Yes
Microsoft Windows 2000 Datacenter Server	No	32 GB, 16-way	Yes	No	Yes	Yes
Microsoft Windows Server 2003 Standard Edition	Yes	4 GB, 4-way	Yes	No	Yes	Yes
Microsoft Windows Server 2003 Enterprise Edition	Yes	32 GB, 8-way	Yes	Yes	Yes	Yes
Microsoft Windows Server 2003 Datacenter Edition	No	64 GB, 16-way	Yes	Yes	Yes	Yes
Novell NetWare 6.5	No	64 GB, 8-way	Yes	No	Yes	No
Red Hat Linux Advanced Server 2.1	No	16 GB, 8-way	Yes	No	Yes	No
SCO UnixWare 7.1.3	No	64 GB, 8-way	No	No	Yes	No
SuSE Linux Enterprise Server 8.0	No	32 GB, 8-way	Yes	No	Yes	Yes
VMware ESX Server 2.0	No	64 GB, 16-way	No	No	No	Yes

Setting up or updating multiple servers

You can use the ServerGuide program to create diskettes that help you set up or update multiple servers. You can modify information on the diskettes as you use them to set up or update other servers.

Note: Availability and function can vary by server model and by the hardware that is installed.

You can create a setup-replication diskette, which contains your hardware configuration selections. Use this diskette to replicate selections to other servers that are of the same model.

You can create an operating-system replication diskette, which contains information that you need to complete multiple installations. Not all operating systems support operating-system replication diskettes.

Installing your operating system without ServerGuide

If you have already configured the server hardware and you decide not to use the ServerGuide program to install your operating system, complete the following steps to download the latest operating-system installation instructions from the IBM Support Web page:

1. Go to http://www.ibm.com/pc/support/.
2. In the **Download** section, click **Downloads & drivers**.
3. On the ″Downloads and drivers″ page, in the **Brand** field, select **Servers**.
4. In the **Family** field, select **xSeries 445**.
5. Click **Display documents**.
6. In the **View by document type** field, select **OS installation**.
7. Select the instructions for your operating system.

Configuring the Gigabit Ethernet controller

The Ethernet controller is integrated on the system board. It provides an interface for connecting to a 10-Mbps, 100-Mbps, or 1-Gbps network and provides full-duplex (FDX) capability, which enables simultaneous transmission and reception of data on the network. If the Ethernet ports in the server support auto-negotiation, the controller detects the data-transfer rate (10BASE-T, 100BASE-TX, or 1000BASE-T) and duplex mode (full-duplex or half-duplex) of the network and automatically operates at that rate and mode.

You do not need to set any jumpers or configure the controller. However, you must install a device driver to enable the operating system to address the controller. For device drivers and information about configuring the Ethernet controller, see the *Broadcom NetXtreme Gigabit Ethernet Software CD* that comes with the server. For updated information about configuring the controller, go to http://www.ibm.com/pc/support/

Updating the integrated system management firmware

To update the firmware for the integrated system management processor (ISMP), download the Integrated System Management Processor Update Utility program for the server from the IBM Support Web site at http://www.ibm.com/pc/support/. Run the utility program to create a diskette that you can use to update the firmware. The utility program updates the integrated system management processor firmware only and does not affect any device drivers.

Complete the following steps to update the firmware:

1. Turn off the server.
2. Insert the diskette into the diskette drive.
3. Turn on the server. If the server does not start from the diskette, use the Configuration/Setup Utility program to configure the diskette drive as a startup device (see "Using the Configuration/Setup Utility program" on page 14). Then, start again at step 1.
4. From the main menu, select **Update System Management Firmware** and press Enter.
5. Follow the instructions on the screen to complete the update.

If there is an error in updating the firmware, try updating the firmware again.

Using the LSI Logic Configuration Utility program

Use the LSI Logic Configuration Utility program to:

- Perform a low-level format of a SCSI hard disk drive
- Set a SCSI device scan order

Notes:

1. The integrated SCSI controller with RAID capabilities in the server supports only RAID level-1 and RAID level-1 Enhanced (RAID level-1E). Installing an optional ServeRAID controller provides additional RAID levels. See "Using ServeRAID Manager" for information about configuring the server for RAID operation.

2. If you install a different type of RAID adapter in the server, use the configuration method supplied with the RAID adapter to view or change SCSI settings for attached devices.

Complete the following steps to start the LSI Logic Configuration Utility program:

1. Turn on the server.
2. When the prompt `<<< Press <CTRL><C> to start LSI Logic Configuration Utility >>>` appears, press Ctrl+C. If you have set an administrator password, you are prompted to type the password.
3. Use the arrow keys to select a controller (channel) from the list of adapters; then, press Enter.
4. Follow the instructions on the screen to change the settings of the selected items; then, press Enter. If you select **Device Properties** or **Mirroring Properties**, additional screens are displayed.

Using ServeRAID Manager

Use ServeRAID Manager, which is on the *IBM ServeRAID Support* CD, to:

- Configure a redundant array of independent disks (RAID)
- Restore a SCSI hard disk drive to the factory-default settings, erasing all data from the disk
- View your RAID configuration and associated devices
- Monitor the operation of your RAID controllers

To perform some tasks, you can run ServeRAID Manager as an installed program. However, to configure the integrated SCSI controller with RAID capabilities and perform an initial RAID configuration on the server, you must run ServeRAID Manager in Startable CD mode, as described in the instructions in this section. If you install a different type of RAID adapter in the server, use the configuration method described in the instructions that come with that adapter to view or change SCSI settings for attached devices.

See the ServeRAID documentation on the *IBM ServeRAID Support* CD for additional information about RAID technology and instructions for using ServeRAID Manager to configure your integrated SCSI controller with RAID capabilities. Additional information about ServeRAID Manager is also available from the **Help** menu. For information about a specific object in the ServeRAID Manager tree, select the object and click **Actions > Hints and tips**.

Configuring the controller

By running ServeRAID Manager in Startable CD mode, you can configure the controller before you install your operating system. The information in this section assumes that you are running ServeRAID Manager in Startable CD mode.

To run ServeRAID Manager in Startable CD mode, turn on the server; then, insert the CD into the DVD-ROM drive. If ServeRAID Manager detects an unconfigured controller and ready drives, the Configuration wizard starts, and a window similar to that shown in the following illustration opens.
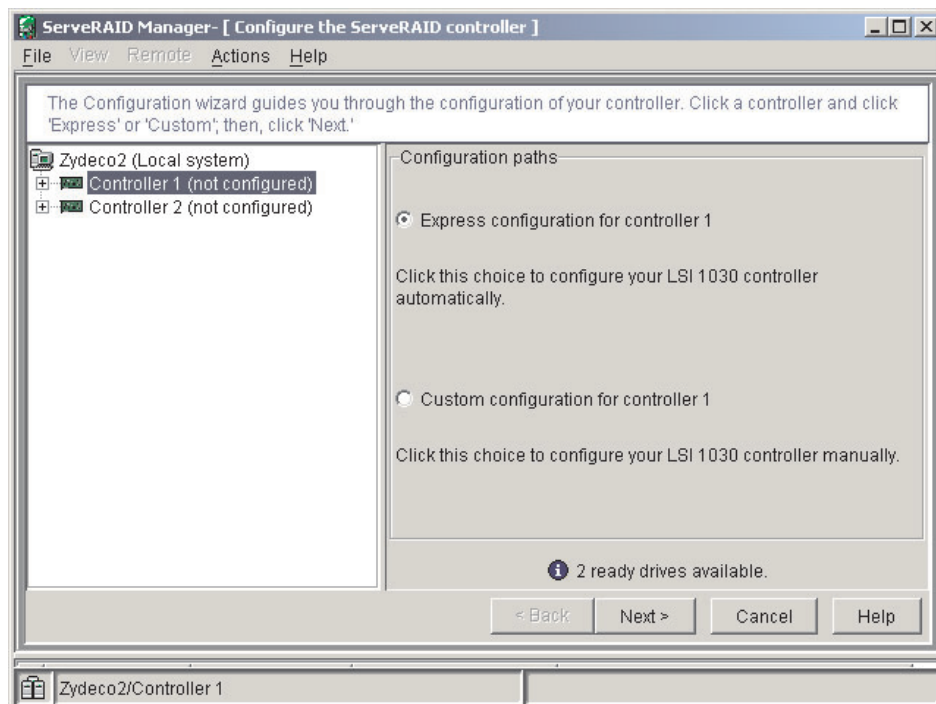
Figure 7. "Configuration wizard" window

In the Configuration wizard, you can select express configuration or custom configuration. Express configuration automatically configures the controller by grouping the first two physical drives in the ServeRAID Manager tree into an array and creating a RAID level-1 logical drive. If you select custom configuration, you can select the two physical drives that you want to group into an array and create a hot-spare drive.

Using express configuration

Complete the following steps to use express configuration:

1. In the ServeRAID Manager tree, click the controller.

2. Click **Express configuration**.

3. Click Next. The "Configuration summary" window opens.

4. Review the information in the "Configuration summary" window. To change the configuration, click **Modify arrays**.
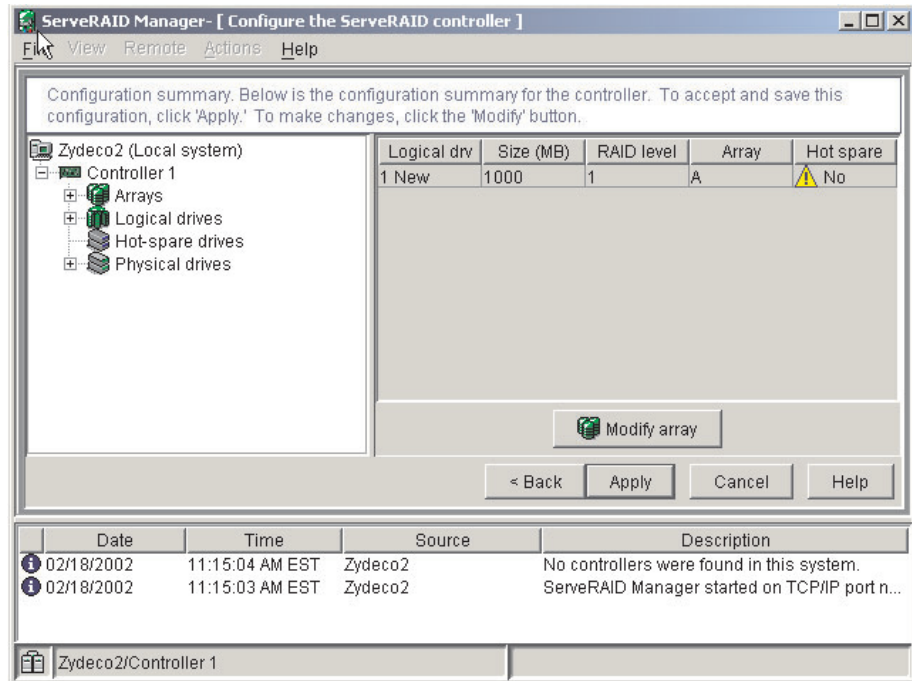
Figure 8. "Configuration summary" window

5. Click **Apply**; then, click **Yes** when asked if you want to apply the new configuration. The configuration is saved in the controller and in the physical drives.

6. Exit from ServeRAID Manager and remove the CD from the DVD-ROM drive.

7. Restart the server.

Using custom configuration

Complete the following steps to use custom configuration:

1. In the ServeRAID Manager tree, click the controller.

2. Click **Custom configuration**.

3. Click **Next**. The "Create arrays" window opens.
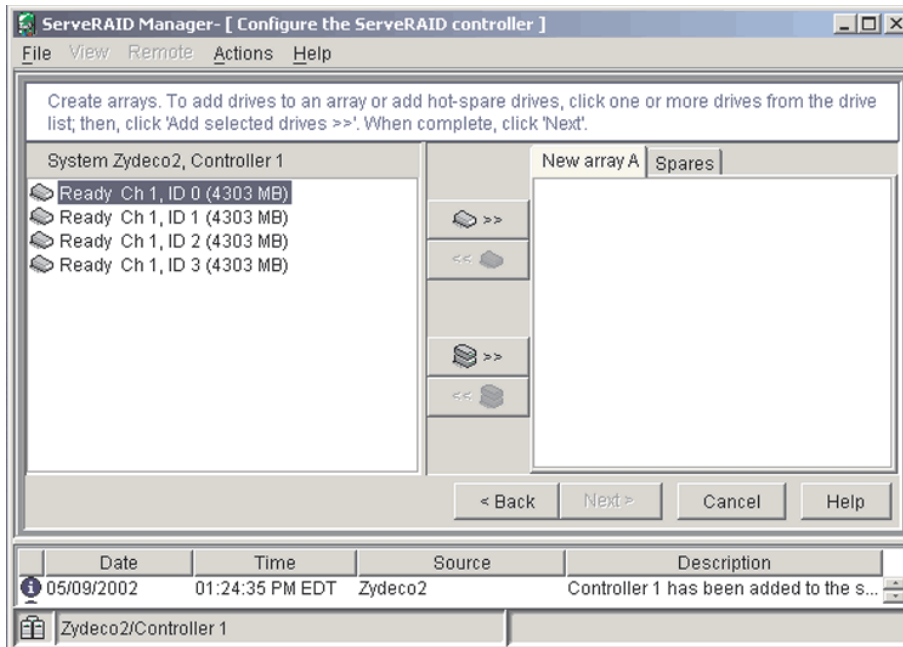
Figure 9. "Create arrays" window

4. From the list of ready drives, select the two drives that you want to group into the array.

5. Click (`Add selected drives`) to add the drives to the array.

6. If you want to configure a hot-spare drive, complete the following steps:

   a. Click the Spares tab.

   b. Select the physical drive that you want to designate as the hot-spare drive, and click (`Add selected drives`).
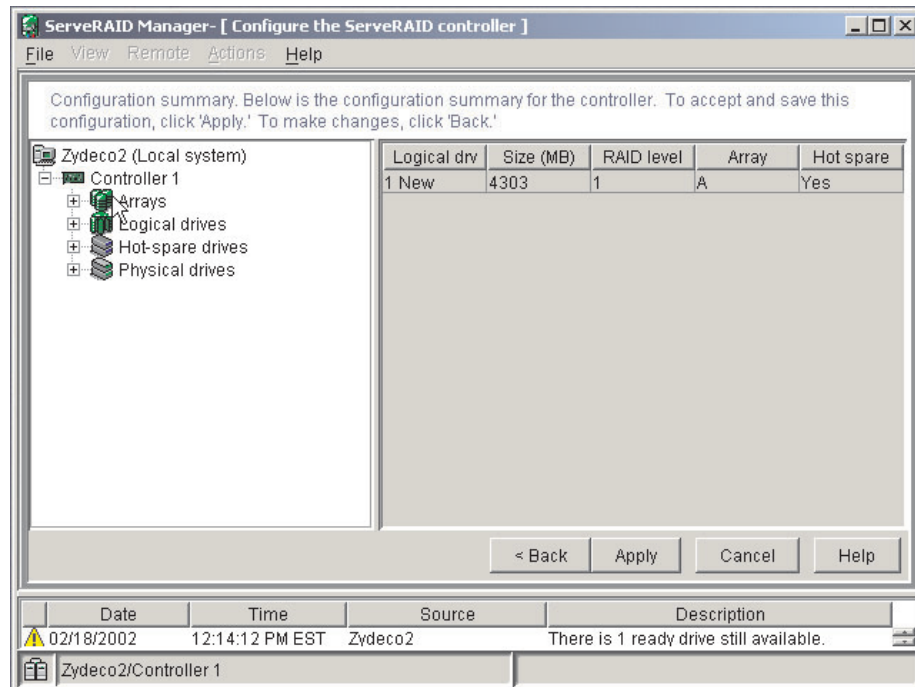
Figure 10. "Configuration summary" window

7. Click **Next**. The "Configuration summary" window opens.

8. Review the information in the "Configuration summary" window. To change the configuration, click **Back**.

9. Click **Apply**; then, click **Yes** when asked if you want to apply the new configuration. The configuration is saved in the controller and in the physical drives.

10. Exit from ServeRAID Manager and remove the CD from the DVD-ROM drive.

11. Restart the server.

Viewing the configuration

You can use ServeRAID Manager to view information about RAID controllers and the RAID subsystem (such as arrays, logical drives, hot-spare drives, and physical drives). When you click an object in the ServeRAID Manager tree, information about that object appears in the right pane. To display a list of available actions for an object, click the object and click **Actions**.
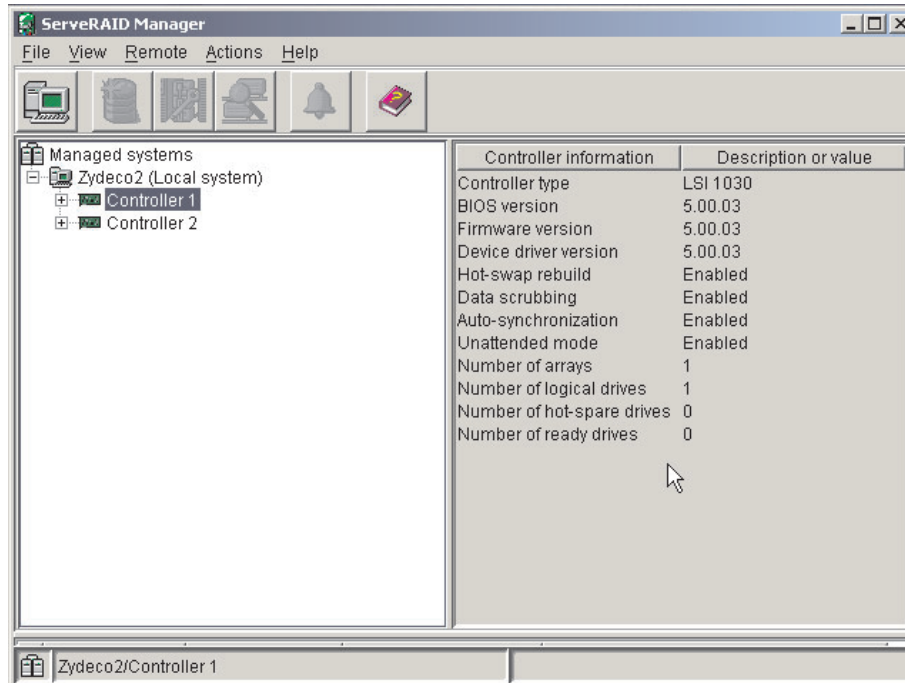
Figure 11. ServeRAID Manager window

Getting assistance

For more information about ServeRAID Manager, see the online help system. To start the help system, click Help on the toolbar or select an item from the **Help** menu.
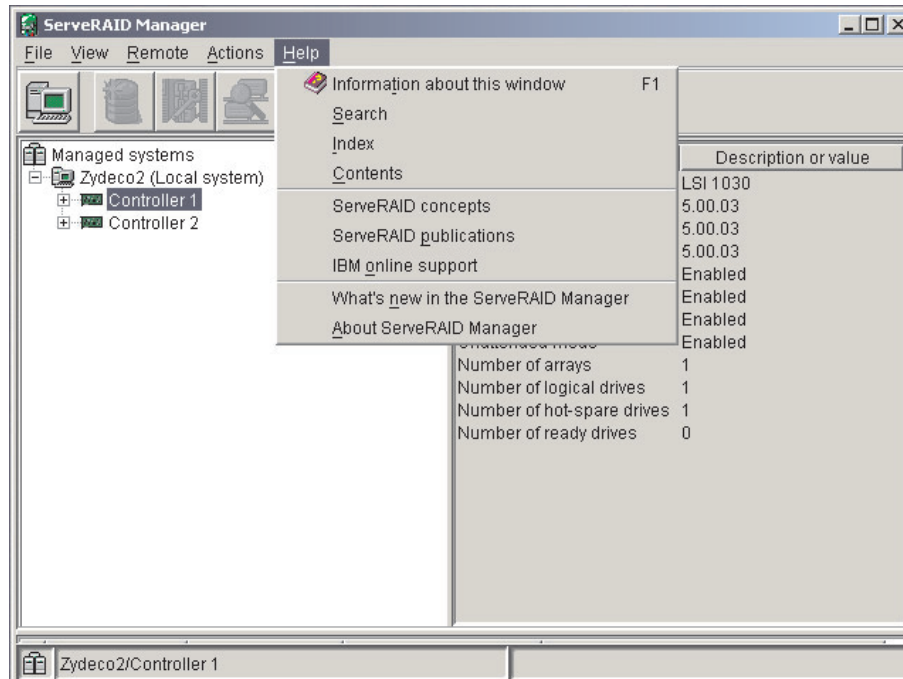
Figure 12. ServeRAID Manager help menu

The help system (ServeRAID Assist) will open within the ServeRAID Manager interface.

To learn more about the ServeRAID Manager tree objects and the actions that apply to them, select a tree object and click **Actions > Hints and tips**. ServeRAID Assist will start, and information about the tree object will appear in the right pane of ServeRAID Manager.
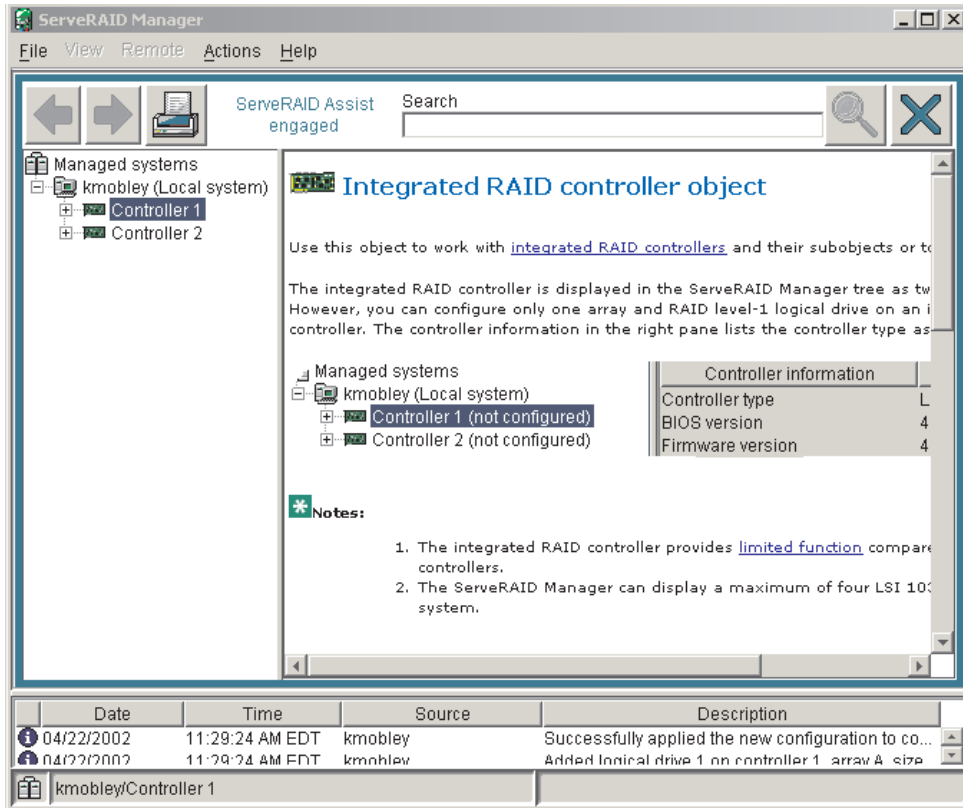
Figure 13. Hints and tips feature

Remote Supervisor Adapters

This section describes how to identify the Remote Supervisor Adapter, its features, and prerequisites for setup. It also explains how to use the documentation effectively and how to cable and configure a Remote Supervisor Adapter II-EXA or a Remote Supervisor Adapter for use on an Advanced System Management (ASM) network so that you can manage the server from a remote location. For more detailed information, see the *Remote Supervisor Adapter User's Guide* on the IBM *xSeries Documentation* CD.

Identifying the Remote Supervisor Adapter

The server comes with either a Remote Supervisor Adapter or a Remote Supervisor Adapter II-EXA installed. Before you can configure and use your Remote Supervisor Adapter, you must identify which Remote Supervisor Adapter is installed. The easiest way to identify the Remote Supervisor Adapter installed in the server is visually. Use Figure 14 on page 33 and Figure 15 on page 33 to identify the Remote Supervisor Adapter installed in the server:
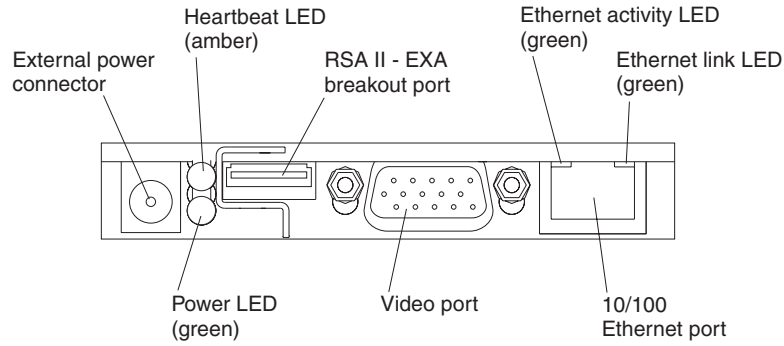
Figure 14. Remote Supervisor Adapter II-EXA connectors and LEDs
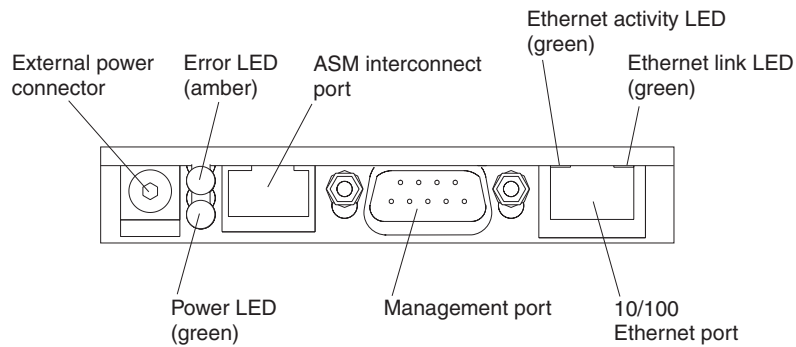
Figure 15. Remote Supervisor Adapter connectors and LEDs

After identifying the adapter, see "Setting up the Remote Supervisor Adapter II-EXA" or "Setting up the Remote Supervisor Adapter" on page 44.

Setting up the Remote Supervisor Adapter II-EXA

This section describes features, setup requirements, and how to cable and configure the Remote Supervisor Adapter II-EXA for use on an Advanced System Management (ASM) network so that you can manage the server from a remote location.

For more detailed information, see the *Remote Supervisor Adapter II User's Guide* on the IBM *xSeries Documentation* CD.

Remote Supervisor Adapter II-EXA features

The Remote Supervisor Adapter II-EXA provides the following:

- Seamless remote accelerated graphics
- Enhanced security features
- Continuous health monitoring and control
- Advanced Predictive Failure Analysis® (PFA) support
- Automated Server Restart (ASR)
- Automatic notification and alerts
- Event logs that are time stamped, saved on the Remote Supervisor Adapter II-EXA, and can be attached to e-mail alerts
- Server console redirection
- LAN and Advanced System Management (ASM) interconnect remote access

- Simple Network Management Protocol (SNMP) trap support
- Domain Name System (DNS) and Dynamic Host Configuration Protocol (DHCP) support
- Remote power control
- Capture operating-system-failure screen
- Remote firmware update and access to critical server settings
- Independent power, which enables around-the-clock access to the server even when the server power is off
- Virtually attach remote diskette drive, CD-ROM drive, or disk image to server

Setup requirements

The following items are required to set up the Remote Supervisor Adapter II-EXA:

- Make sure you have an Internet connection. You will need an Internet connection during the installation process to download software and firmware from the IBM Support Web site. For information about how to download the Remote Supervisor Adapter II-EXA files, see "Obtaining Remote Supervisor Adapter II-EXA software and firmware" on page 37.
- Install the operating system on the server before you install the device drivers for the Remote Supervisor Adapter II-EXA. For information about installing the operating system, see the documentation that comes with the server.
- Remote Supervisor Adapter II-EXA device drivers. See Table 1 on page 23 for a list of the supported operating systems.

  Note: Not all versions of Red Hat Linux or SuSE Linux are supported for all server models. To check if there is a supported Remote Supervisor Adapter II-EXA device driver for the server model running your version of Linux, go to http://www.ibm.com/pc/support/.

- The remote disk function requires the following software:
  – Server (for the server operating system to support the remote disk): Microsoft Windows 2000 with Service Pack 3 or above.
  – Client: Microsoft Windows 2000 or above and the Java™ 1.4 Plug-in or later.
- To configure the remote alert recipients for Director over LAN or Director over modem, the remote alert recipient must be an IBM Director-enabled server with UM Server Extensions.
- The Remote Supervisor Adapter II supports the following Web browsers for remote access. The Web browser that you use must be Java-enabled and must support JavaScript™.
  – Microsoft Internet Explorer 4.0 (with Service Pack 1), or later
  – Netscape Navigator 4.72, or later (version 6.0 is not currently supported)

    Notes:
    1. Java plug-in version 1.4 or later is required.
    2. The Remote Supervisor Adapter II Web interface does not support the double-byte character set (DBCS) languages.

  – Support of HTTP version 1.0, or later
  – Minimum display resolution of 800 x 600 pixels and 256 colors

  Note: The ASM Web interface and the ASM text-based interface do not support the double-byte character set (DBCS) languages.

Cabling and configuring the Remote Supervisor Adapter II-EXA

Complete the following tasks to cable and configure the Remote Supervisor Adapter II-EXA.

Note: After you initially configure the adapter, use the Web-based interface to create a backup copy of the configuration. If you need to replace the adapter in the future, you can restore the configuration and resume normal operation more quickly. See the IBM *Remote Supervisor Adapter II User's Guide,* on the IBM *xSeries Documentation* CD for details.

Task 1. Cable the Remote Supervisor Adapter II-EXA.

Task 2. Get the Remote Supervisor Adapter software and firmware.

Task 3. Complete the setup of the Remote Supervisor Adapter II-EXA.

For service, assistance, or additional information on the World Wide Web, see Appendix A, "Getting help and technical assistance," on page 299.

The RSA II-EXA breakout cable: The ASM breakout cable connects the Remote Supervisor Adapter II-EXA to the ASM interconnect network, the server USB port, and an external modem.
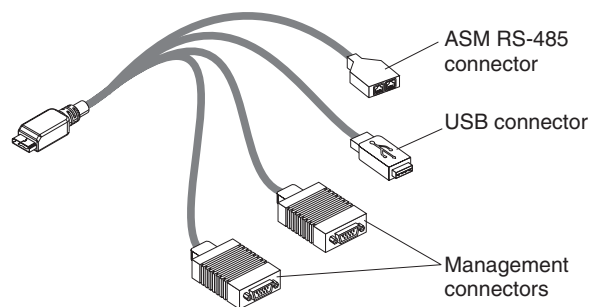
Figure 16. RSA II-EXA breakout cable

RSA II-EXA breakout cable connections: The RSA II-EXA breakout cable is used to provide the following connections:

- **ASM Interconnect port**
  To connect the Remote Supervisor Adapter II-EXA to an ASM interconnect network, connect a Category 3 or Category 5 cable to one of the ASM Interconnect ports on the RSA II-EXA breakout cable. For more information, see "Using the ASM interconnect network" on page 56.

- **USB connector**
  To connect the Remote Supervisor Adapter II-EXA to the USB port on the server for providing remote keyboard, video, and mouse control of the server, plug the USB connector on the RSA II-EXA breakout cable in to a USB port on the server.

- **Management port**
  To connect the Remote Supervisor Adapter II-EXA to a modem, connect the modem to the management port connector on the RSA II-EXA breakout cable.

  Note: Connecting a modem to the Remote Supervisor Adapter II-EXA provides dial-out support only.

Cable the Remote Supervisor Adapter II-EXA: This section provides the
information needed to cable the Remote Supervisor Adapter II.
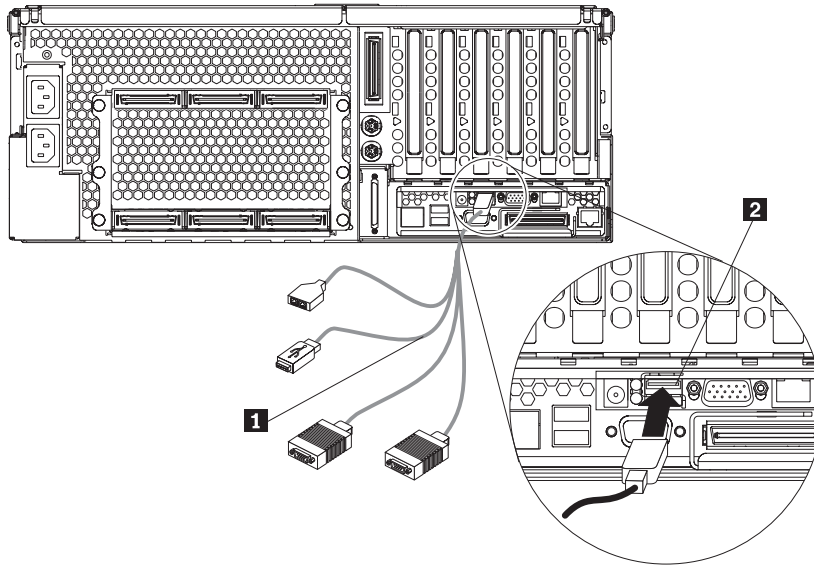
Figure 17. Connect the RSA II-EXA breakout cable to the server

1. Connect the RSA II-EXA breakout cable (**1**) to the RSA II-EXA breakout port
   (**2**) on the server.
2. Connect the video cable from your video device to the video port on the Remote
   Supervisor Adapter.
3. Plug the USB connector on the RSA II-EXA breakout cable in to one of the USB
   ports on the rear of the server.
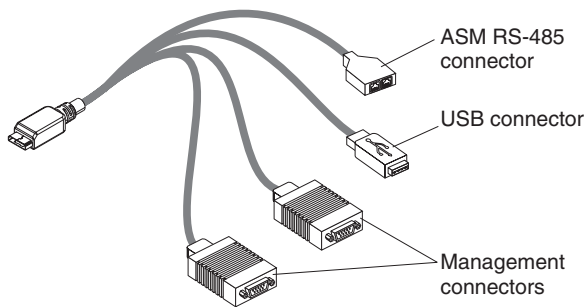
Figure 18. RSA II-EXA breakout cable

4. Complete the following steps to connect the Remote Supervisor Adapter II-EXA
   to the LAN:
   a. Connect one end of a Category 3 or Category 5 Ethernet cable to the
      Ethernet connector on the Remote Supervisor Adapter II-EXA. Connect the
      other end of the Ethernet cable to your network.
   b. Check the Remote Supervisor Adapter II-EXA Ethernet link and activity
      LEDs. The location of the LEDs are shown in the following illustration.
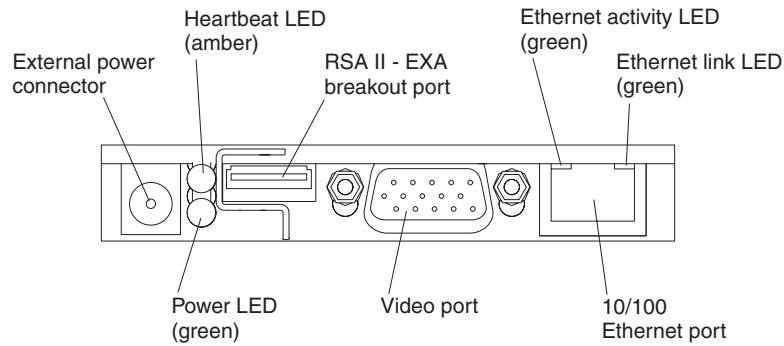
Figure 19. Remote Supervisor Adapter II-EXA connectors

- **External power connector:** This connector is used to connect the Remote Supervisor Adapter II-EXA to an external power source.
- **Heartbeat LED:** This amber LED flashes continuously to indicate that there is activity on the Remote Supervisor Adapter II-EXA.
- **RSA II-EXA breakout port:** The RSA II-EXA breakout cable is connected to this port to provide two serial (communication) ports, one USB port, and one RS-485 port with two connectors.
- **Ethernet activity LED:** When the LED is green, there is activity on the Ethernet LAN.
- **Ethernet link LED:** When the LED is green, the link is active.
- **10/100 Ethernet port:** Ethernet signal cables are connected to the Ethernet port.
- **Video port: Connect the signal cable for a monitor to this port.**

  Important: When the Remote Supervisor Adapter II-EXA is installed in place of the Remote Supervisor Adapter, you must connect the monitor or console switch to this video port. The integrated video controller on the server is disabled for models with a Remote Supervisor Adapter II-EXA installed.
- **Power LED:** This green LED comes on and stays on when you plug in the server.

c. Continue with "Obtaining Remote Supervisor Adapter II-EXA software and firmware" and "Completing the setup" on page 39.

Note: See the *IBM Remote Supervisor Adapter II User's Guide* on the IBM *xSeries Documentation* CD for detailed information on how to manage the server remotely using the Web-based user interface.

Obtaining Remote Supervisor Adapter II-EXA software and firmware: Before you can continue the configuration of the Remote Supervisor Adapter II-EXA, you must download software and firmware from the IBM Support Web site. This section describes how to download the files from the Web site. Which files you need to download depends on your operating system.

Note: Changes are made periodically to the IBM Support Web site to provide timely customer information and better navigation. The search methods in the following procedures are suggestions. You might need to modify the search process depending on the Web page design.

For Microsoft Windows 2000: If the server in which the Remote Supervisor Adapter II-EXA is installed is running the Microsoft Windows 2000 operating system, you will need to download one file, which contains the following software and firmware:

- Software and firmware installation instructions
- Video adapter basic input/output system (BIOS) update
- IBM @server xSeries BIOS update with support for the Remote Supervisor Adapter II-EXA
- Diagnostics code update
- Remote Supervisor Adapter II-EXA device drivers
- Remote Supervisor Adapter II-EXA firmware code update
- Integrated system management processor (ISMP) update
- Video device driver
- Advanced Settings Utility program

The software and firmware files that you need are contained in one system service package for Windows installation kit. Complete the following steps to locate and download the package file.

1. Go to http://www.ibm.com/pc/support/.
2. In the left navigation pane, click **Search PC support**.
3. In the "Search PC support" window, under **Additional search options**, in the **Restrict to this document type** field, select **Downloads and drivers**.
4. In the **Restrict to this brand** field, select **Servers**.
5. Wait for the page to automatically refresh; then, in the **Restrict to this family** field, select the server model.
6. Wait for the page to automatically refresh; then, in the **Enter search terms** field, type "`system service package`". (Do not use the **Search** field.)
7. Click **Search**.
8. Select the system service package that corresponds to the server model and the operating system that is running on the server in which the Remote Supervisor Adapter II is installed. The file you download will be in *.exe format.
9. Click the file link to download the system service package to *d*:/ibmssp, where *d* is the hard disk drive letter. (Create the directory if necessary.)
10. Browse the *d*:/ibmssp directory and double click the *.exe file to extract the packaged files. Extract the files into the *d*:/ibmssp directory.
11. See the readme.txt file that is extracted into the *d*:/ibmssp directory for a list of the file names and their descriptions.
12. To ensure correct software installation, follow the detailed installation instructions in *Remote Supervisor Adapter II Installation Instructions for Windows Users*, which is in Portable Document Format (PDF) in the *d*:/ibmssp directory. Then, continue with "Completing the setup" on page 39.

For SuSE Linux and Red Hat Linux: If the server in which the Remote Supervisor Adapter II-EXA is installed is running the Red Hat Linux or SuSE Linux operating system, you will need to download one file, which contains the following software and firmware:

- Software and firmware installation instructions
- Video adapter basic input/output system (BIOS) update
- IBM @server xSeries BIOS update with support for the Remote Supervisor Adapter II-EXA

- Diagnostics code update
- Remote Supervisor Adapter II-EXA device drivers
- Remote Supervisor Adapter II-EXA firmware code update
- Advanced Settings Utility program

The software and firmware files that you need are contained in one system service package for Linux installation kit. Complete the following steps to locate and download the package file:

1. Go to http://www.ibm.com/pc/support/.
2. In the left navigation pane, click **Search PC support**.
3. In the "Search PC support" window, under **Additional search options**, in the **Restrict to this document type** field, select **Downloads and drivers**.
4. In the **Restrict to this brand** field, select **Servers**.
5. Wait for the page to automatically refresh; then, in the **Restrict to this family** field, select the server model.
6. Wait for the page to automatically refresh; then, in the **Enter search terms** field, type "`system service package`". (Do not use the **Search** field.)
7. Click **Search**.
8. Select the system service package that corresponds to the server model and the operating system that is running on the server in which the Remote Supervisor Adapter II is installed. The file you download will be in *.tgz format.
9. Click the file link to download the system service package.
10. From a command-line prompt, type "`tar -xvfz `*filename*`.tgz`", where *filename* is the name of the file you downloaded. This command will create a directory named ibmssp and extract the files to it.
11. See the readme.txt file that is extracted into the ibmssp directory for a list of the file names and their descriptions.
12. To ensure correct software installation, follow the detailed installation instructions in *Remote Supervisor Adapter II Installation Instructions for Linux Users*, which is in Portable Document Format (PDF) in the ibmssp directory. Then, continue with "Completing the setup."

Completing the setup: Complete the following steps to complete the setup of the Remote Supervisor Adapter II-EXA:

1. If you plan to configure Simple Network Management Protocol (SNMP) traps on the Remote Supervisor Adapter II-EXA, install and compile the management information base (MIB) on your SNMP manager. The MIB supports SNMP traps. The MIB is available on the IBM Support Web site. For more information, see "Obtaining Remote Supervisor Adapter II-EXA software and firmware" on page 37.
2. If you did not restart the server after installing the Remote Supervisor Adapter II-EXA device drivers, restart the server now.
3. See the *IBM Remote Supervisor Adapter II User's Guide* on IBM *xSeries Documentation* CD for detailed instructions for completing the configuration of the Remote Supervisor Adapter II-EXA, including the following features:
   - Defining the login IDs and passwords
   - Selecting the events that will receive alert notification

- Monitoring remote server status using the Remote Supervisor Adapter II-EXA Web interface
- Controlling the server remotely
- Virtually attaching a remote diskette drive, CD-ROM drive, or disk image to the server

If you want to set up an ASM interconnect network and have not already done so, go to "Configuring and connecting to the ASM interconnect network." If you do not want to set up an ASM interconnect network, your configuration is now complete.

Configuring and connecting to the ASM interconnect network

This section includes information about how to configure and connect the server to function within an Advanced System Management (ASM) interconnect network.

Overview: You can connect system-management processors and adapters together to form an Advanced System Management (ASM) interconnect network. *System-management processors and adapters* are Remote Supervisor Adapter II-EXAs, Remote Supervisor Adapter IIs, Remote Supervisor Adapters, ASM processors, ASM PCI adapters, and integrated system management processors (ISMPs). These system-management processors and adapters are also known as *service processors*.

An ASM interconnect network provides two levels of functionality. First, the ASM interconnect network enables you to control and to configure settings for the servers in which other system-management processors and adapters reside. Second, the ASM interconnect network enables other system-management processors and adapters to use the resources (Ethernet or modem) of other Remote Supervisor Adapter II-EXAs, Remote Supervisor Adapters IIs, Remote Supervisor Adapters, ASM processors (modems only), and ASM PCI adapters in the ASM interconnect network for sending alerts. This interconnect network is used when system-management processors or adapters cannot send an alert and must forward the information to another system-management processor or adapter to send the alert.

Planning and cabling your ASM interconnect network: To support the most recent ASM features, a Remote Supervisor Adapter II-EXA must be the main gateway to your ASM interconnect network if the network also includes servers with Remote Supervisor Adapters, ASM PCI adapters, ASM processors, or ISMPs. The Remote Supervisor Adapter II-EXA forwards the ASM information generated by the servers attached to the ASM interconnect network to other servers on your Ethernet network or that are attached through a modem. The connected ASM processors, ASM PCI Adapters, and ISMPs are managed through the user interface and Web browser access of the Remote Supervisor Adapter II.

Before cabling the ASM interconnect network, review the following information:
- You must connect an RSA II-EXA breakout cable to the Remote Supervisor Adapter II-EXA.
- You must connect an ASM interconnect module to a Remote Supervisor Adapter.
- The cables in an ASM interconnect network are hot-swappable.
- Make sure that the firmware for the Remote Supervisor Adapter II-EXA, Remote Supervisor Adapter, ASM processor, ASM PCI adapter, and ISMP are at the latest level.
- The servers in an ASM interconnect network are referred to by their assigned names, not by their positions in the rack cabinet.

An ASM interconnect network can have up to 24 RS-485 connections, depending on the configuration. The connections can include Remote Supervisor Adapter II-EXAs, Remote Supervisor Adapter IIs, Remote Supervisor Adapters, ASM processors, ASM PCI adapters, and ISMPs. Use the following information to determine the number of servers and connections that you can have on your ASM interconnect network:

- Each Remote Supervisor Adapter II-EXA, Remote Supervisor Adapter II, Remote Supervisor Adapter, ASM processor, ASM PCI adapter, and ISMP in a server that is connected to the network uses one connection. For example, if a server that is connected to the network has a Remote Supervisor Adapter and an integrated ASM processor, the server uses two connections on the network.

- The network must include at least one server with a Remote Supervisor II-EXA, Remote Supervisor Adapter II, or Remote Supervisor Adapter (either installed as an option or preinstalled in the server).

- On an ASM interconnect network, one ASM processor or one ASM PCI adapter can communicate with 11 RS-485 connections. These connections must be to ASM processors, ASM PCI adapters, Remote Supervisor Adapters, Remote Supervisor Adapter II-EXAs, or Remote Supervisor Adapter IIs. The ASM processor and ASM PCI adapter cannot communicate with ISMPs.

- If your existing ASM interconnect network has 12 RS-485 connections that include only ASM processors, ASM PCI adapters, and at least one Remote Supervisor Adapter or Remote Supervisor Adapter II, you can also add up to 12 ISMP-based servers to this same network. The Remote Supervisor Adapter on this network will communicate with all 23 RS-485 connections; however, an ASM processor or ASM PCI adapter on this network will communicate with only the 11 non-ISMP RS-485 connections. The ASM processor and ASM PCI adapter will not recognize the ISMPs, but the ISMPs can reside on the same ASM interconnect network.

- Make sure that the ASM interconnect network is set up as a bus, not as a ring. You must connect the servers to the ASM interconnect network in a series, with terminated beginning and end points. Be sure to use the RS-485 terminator plugs. For more information, see "Using the RS-485 terminator plugs on interconnected servers."

- Make sure that the total combined length of all Ethernet cables connecting the servers in the ASM interconnect network does not exceed 91 m (300 ft).

Using the RS-485 terminator plugs on interconnected servers: The Remote Supervisor Adapter II-EXA comes with two RS-485 terminator plugs. To ensure successful RS-485 communication on your ASM interconnect network, you must install the terminator plugs in the open connectors at each end of the RS-485 bus. The illustrations in "ASM interconnect network configuration examples" on page 42 can help you determine where to put the RS-485 terminator plugs on your ASM interconnect network.

Forwarding alerts: Remote Supervisor Adapters, ASM PCI adapters, ASM processors, and ISMPs that are connected to an ASM interconnect network share resources and system-management information. This section provides information about how alerts are forwarded in the ASM interconnect network.

During normal operation, each Remote Supervisor Adapter, ASM processor, ASM PCI adapter, and ISMP on the ASM interconnect network communicates with the other processors and adapters on the network. Processors or adapters that have a modem or Ethernet connection notify the other processors and adapters that these communications resources are available for use by other servers on the ASM interconnect network. These resources are then used as ASM interconnect network

resources, enabling Remote Supervisor Adapters, ASM processors, ASM PCI adapters, and ISMPs on the ASM interconnect network to send alerts using a modem or the network, even if they do not have a modem or network connection physically attached.

Note: ISMPs can use the communications resources of a Remote Supervisor Adapter, Remote Supervisor Adapter II-EXA, or Remote Supervisor Adapter II only.

When alerts are generated, they are forwarded to the Remote Supervisor Adapter II-EXA, Remote Supervisor Adapter II, Remote Supervisor Adapter, ASM processor, or ASM PCI adapter on the ASM interconnect network that has the communication resources to forward the alert. If no system on the ASM interconnect network meets the requirements, the alert is set for transmission if the connection type is configured or becomes available later.

If multiple modems or network connections exist in the ASM interconnect network, you cannot specify which system will receive an alert or which will use its modem or network connection to forward the alert. If an alert is forwarded to a Remote Supervisor Adapter II-EXA, Remote Supervisor Adapter II, Remote Supervisor Adapter, ASM processor, or ASM PCI adapter that is unable to deliver the alert (for example, the modem it is configured to use has failed or the network cannot resolve the destination IP address), the processor or adapter attempts to forward the alert to another system on the ASM interconnect network that has the communication resources to forward the alert.

Alerts are typically sent only once (per connection type), but an alert is forwarded to another interconnect device if the resources exist on other interconnect devices in the network. For example, on a three ASM processor network where ASM processor 1 generates a modem alert, but does not have a modem and the two other ASM servers with ASM processors have modems connected to them, the following might occur:

If ASM processor 1 generates an alert and the modem is unplugged from ASM processor 2 45 seconds or less prior to ASM processor 1 generating the alert, ASM processor 1 forwards the alert to ASM processor 2 having previously determined that ASM processor 2 had an available modem (which is now no longer available). When ASM processor 2 receives the forwarded alert, knowing its modem is not available, it determines that a modem is attached to ASM processor 3, and forwards the alert to ASM processor 3. Therefore, depending upon the time frame (45 seconds) within which a resource (modem) fails, the alert might be forwarded multiple times until a device on the interconnect network can send the alert.

ASM interconnect network configuration examples: The illustrations in this section show sample ASM interconnect network configurations.

In the following example, an Ethernet cable connects the remote system management administrator's system to the Remote Supervisor Adapter II-EXA that is installed in an xSeries 445. In this case, the xSeries 445 uses the LAN connection to forward system-management data generated by the other servers in the ASM interconnect network to the remote system-management administrator.
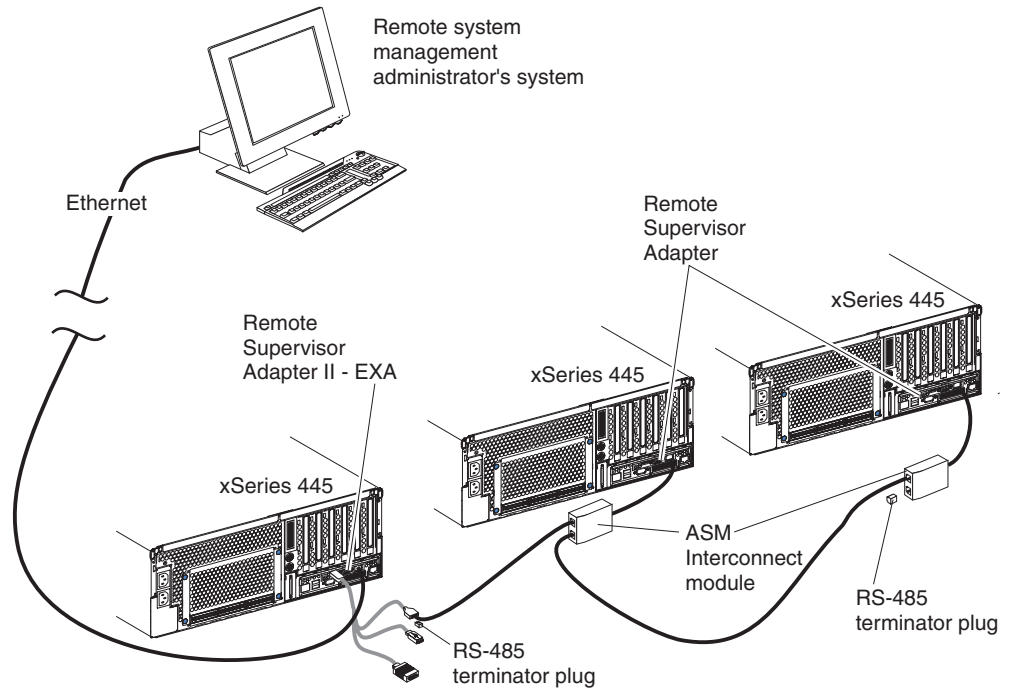
Figure 20. ASM interconnect network Ethernet configuration

In the following example, a Remote Supervisor Adapter II-EXA is installed in an xSeries 445, and creates an interconnect network with the other xSeries 445 servers which have a Remote Supervisor Adapter installed. A modem is connected to the serial connector of the Remote Supervisor Adapter II-EXA (on one end of the ASM breakout cable), a second modem is connected to the management port of the Remote supervisor Adapter in the server connected to the end of the ASM interconnect network, and a modem is connected to the remote system-management administrator's system.

Note: For information about connecting a modem to the management port on an xSeries 445, see the documentation that comes with the server.
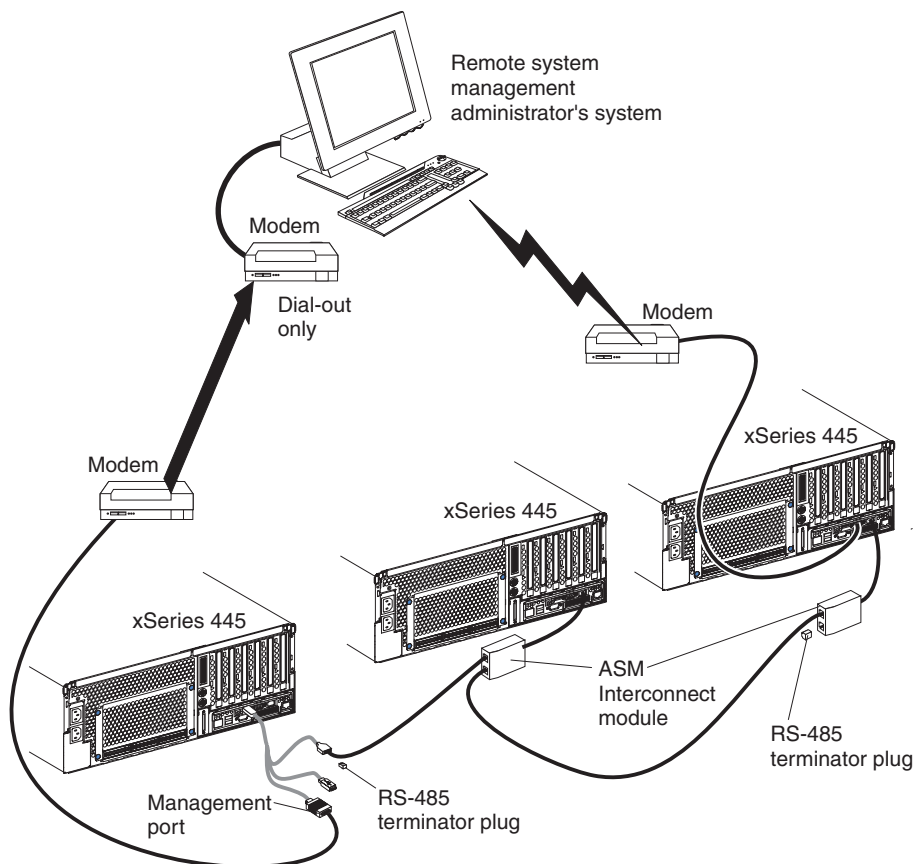
Note: The ASM Interconnect module is connected to the RS-485 port on the back panel of the Remote Supervisor Adapter in each server.

Figure 21. ASM interconnect network modem configuration

Setting up the Remote Supervisor Adapter

This section describes features, setup requirements, and how to cable and configure the Remote Supervisor Adapter for use on an Advanced System Management (ASM) network so that you can manage the server from a remote location.

Note: The information in this section is intended for use with the Remote Supervisor Adapter, not the Remote Supervisor Adapter II-EXA. For information on setting up and configuring a Remote Supervisor Adapter II-EXA go to "Setting up the Remote Supervisor Adapter II-EXA" on page 33.

For more detailed information, see the *Remote Supervisor Adapter User's Guide* on the IBM *xSeries Documentation* CD.

Remote Supervisor Adapter features

Standard features of the Remote Supervisor Adapter are as follows:

- Continuous health monitoring and control
- Advanced Predictive Failure Analysis (PFA)
- Configurable notification and alerts

- Event logs that are time-stamped, saved in nonvolatile memory, and can be attached to e-mail alerts
- Remote graphics console redirection
- LAN, serial, and Advanced System Management (ASM) interconnect remote access
- Point-to-point protocol (PPP) support
- Simple Network Management Protocol (SNMP)
- Domain Name System (DNS) and Dynamic Host Configuration Protocol (DHCP) support
- Remote power control
- Microsoft Windows NT and Windows 2000 blue-screen capture
- Remote firmware update and access to critical server settings
- Optional, independent power, which enables around-the-clock access to the server, even if the server is powered off

Setup requirements

Before you set up the Remote Supervisor Adapter, you must download to a diskette, the DOS Remote Supervisor Utility program from http://www.ibm.com/pc/support/.

Perform the following before you set up the Remote Supervisor Adapter:

- Install the operating system on the server, using ServerGuide and the documentation that comes with the operating system.
- Install the agent component of UM Server Extensions to use the following Advanced System Management (ASM) Web interface features:
    – Shutdown O/S and then Power Off Server
    – Shutdown O/S and then Restart Server

  UM Server Extensions is on the system-management software CD that comes with the server. For information about installing the agent component, see the documentation that comes with the system-management CD.
- To configure the remote alert recipients for Director over LAN or Director over modem, the remote alert recipient must be an IBM Director-enabled server with UM Server Extensions.
- If you want to use a Web browser to access the Remote Supervisor Adapter remotely, the following software is required:
    – Microsoft Internet Explorer 4.0 (with Service Pack 1), or later
    – Netscape Navigator 4.72, or later (version 6.0 is not currently supported)
    – Java enabled Web browser (See your browser documentation or online Help for instructions about enabling its Java support.)
    – Support for JavaScript 1.2, or later (See your browser documentation or online Help for instructions about enabling its JavaScript support.)
    – Support of HTTP version 1.0, or later
    – Minimum display resolution of 800 x 600 pixels and 256 colors

  Note: The ASM Web interface and the ASM text-based interface do not support the double-byte character set (DBCS) languages.

Cabling and configuring the Remote Supervisor Adapter

Complete the following tasks to cable and configure the Remote Supervisor Adapter.

Note: After you initially configure the adapter, use the Web-based interface to create a backup copy of the configuration. If you need to replace the adapter in the future, you can restore the configuration and resume normal operation more quickly. See the IBM *Remote Supervisor Adapter User's Guide,* on the IBM *xSeries Documentation* CD for details.

Task 1. Connect the Ethernet and management port cables. See "Cabling the Ethernet LAN port and management port."

Task 2. Perform the initial configuration to enable remote access to the Remote Supervisor Adapter. So that you can:

- Configure the Ethernet port
- Configure the management (COM) port
- Set up the point-to-point protocol

See "Enabling remote access to the adapter" on page 48.

Task 3. Configure the remote-control password to enable the ASM Web interface remote control features. See "Configuring the remote control password" on page 55.

Task 4. Install the ASM device drivers. See "Installing Advanced System Management device drivers" on page 53.

For service, assistance, or additional information on the World Wide Web, see Appendix A, "Getting help and technical assistance," on page 299.

Cabling the Ethernet LAN port and management port: This section describes how to cable the Remote Supervisor Adapter. You can manage the server remotely through the Remote Supervisor Adapter using one of the user interfaces and one of the connection methods that are described in Table 2. Select the interface method you want to use to perform remote management; then, perform the indicated cabling procedure.

If you plan to set up an ASM interconnect network, before you begin cabling the server, see "Using the ASM interconnect network" on page 56 for instructions about cabling the ASM interconnect port and setting up the network. You might want to review the information in "ASM interconnect network configuration examples" on page 42 before you connect the cables. Then, return to these instructions to start the cabling procedures.

Table 2. Cabling tasks to enable remote access to the Remote Supervisor Adapter

User interface to Remote Supervisor Adapter	Connection to Remote Supervisor Adapter	For the cabling procedure, see:
ASM Web interface using HTTP	LAN using the Ethernet port	"Cabling the Ethernet LAN port" on page 47
Text-based user interface using the Telnet protocol		

Table 2. Cabling tasks to enable remote access to the Remote Supervisor Adapter (continued)

User interface to Remote Supervisor Adapter	Connection to Remote Supervisor Adapter	For the cabling procedure, see:
Text-based user interface using a modem or a null modem	Management (COM) port	"Cabling the management (COM) port" on page 48
ASM Web interface using point-to-point protocol (PPP)		
Text-based user interface using the Telnet protocol over PPP		

Cabling the Ethernet LAN port: Complete the following steps to attach the Ethernet cables.

Attention: To avoid damage to the Ethernet connector on the Remote Supervisor Adapter, *do not* connect the ASM Interconnect module to the Ethernet port.

1. Connect one end of a Category 3 or Category 5 Ethernet cable to the Ethernet port on the Remote Supervisor Adapter. Connect the other end of the Ethernet cable to the network.
2. Check the Ethernet LEDs to ensure that the network connection is working. The following illustration shows the location of the LEDs.
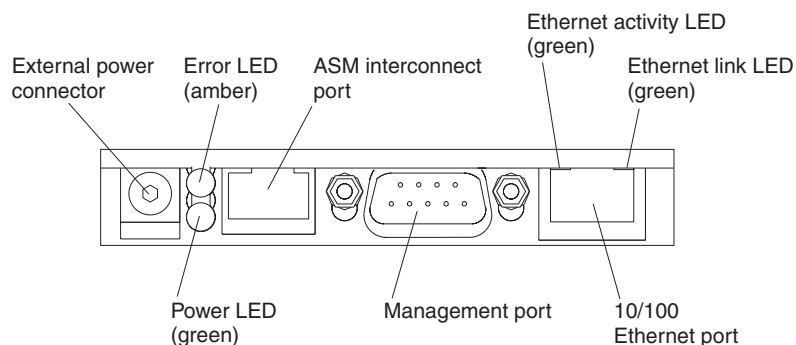

Figure 22. Remote Supervisor Adapter connectors

- **External power connector (not supported)** - This connector is not supported on this server.
- **Error LED** - This amber LED is lit when a system management error has occurred.
- **ASM interconnect port** - Signal cables for managing expansion module resources are connected to this port.
- **Ethernet activity LED:** When the LED is green there is activity on the Ethernet LAN.
- **Ethernet link LED:** When the LED is green the link is active.
- **10/100 Ethernet port** - Ethernet Signal cables are connected to the Ethernet port.
- **Management port** - Connect a serial cable to this port to enable system management through a modem, or connect a null modem cable to enable system management through a workstation or laptop computer.

- **Power LED** - This green LED goes on and stays on when you plug in the server.

  If you want to use the management port connection, continue with "Cabling the management (COM) port" on page 48; otherwise, go to "Configuring the adapter."

Cabling the management (COM) port: To cable the management (COM) port, connect a modem or null modem cable to the management port on the Remote Supervisor Adapter.

Continue with "Configuring the adapter."

Configuring the adapter: This section describes how to enable remote access to the Remote Supervisor Adapter and install ASM device drivers.

These procedures assume that you have an operational keyboard and pointing device attached to the server.

Enabling remote access to the adapter: The Remote Supervisor Adapter requires configuration to enable remote access through either the Ethernet port or the management port. From Table 3, select the interface method that you want to use to perform remote management; then, perform the indicated configuration procedure.

Note: For detailed information about using the ASM Web interface and the text-based user interface, see the *Remote Supervisor Adapter User's Guide* on the IBM *xSeries Documentation* CD.

Table 3. Configuration tasks to enable remote access to the Remote Supervisor Adapter

User interface to Remote Supervisor Adapter	Connection to Remote Supervisor Adapter	For the configuration procedure, see:
ASM Web interface using HTTP	LAN using the Ethernet port	"Configuring the Ethernet settings for Web-based remote access"
Text-based user interface using the Telnet protocol		
Text-based user interface using a modem or a null modem	Management (COM) port	"Configuring the management port for text-based remote access" on page 50 and "Setting up point-to-point protocol" on page 52
ASM Web interface using point-to-point protocol (PPP)		
Text-based user interface using the Telnet protocol over PPP		

Configuring the Ethernet settings for Web-based remote access: If you have an accessible, active, and configured dynamic host configuration protocol (DHCP) server on the network, the hostname, IP address, gateway address, subnet mask, and DNS server IP address are set automatically. You do not need to perform further configuration tasks to enable the Ethernet connection because the default value for the **DHCP Setting** field is **Enabled**. If you need to configure the management port, go to "Configuring the management port for text-based remote access" on page 50; otherwise, go to "Installing Advanced System Management device drivers" on page 53.

If you do not have a DHCP server on the network, complete the following steps to configure the Ethernet settings.

1. With the server turned off, insert the diskette with the downloaded utility program into the diskette drive; then, turn on the server. The utility starts automatically, displaying the Remote Supervisor Utility window.

2. Use the Up Arrow and Down Arrow keys (↑ and ↓) to select **Configuration Settings**; then, press Enter. The Configuration Settings window opens.

3. Use the arrow keys to select **Ethernet Settings**; then, press Enter.

   The Ethernet Settings window opens, as shown in the following illustration.

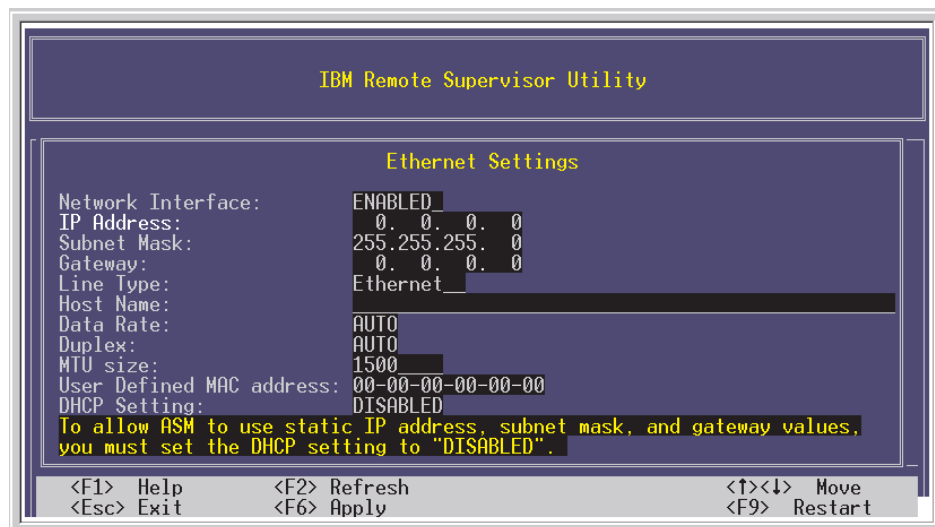   **Note:** The values in the window are only examples; your settings might be different.

```
                    IBM Remote Supervisor Utility


                          Ethernet Settings
Network Interface:         ENABLED_
IP Address:                  0.  0.  0.  0
Subnet Mask:               255.255.255.  0
Gateway:                     0.  0.  0.  0
Line Type:                 Ethernet__
Host Name:
Data Rate:                 AUTO
Duplex:                    AUTO
MTU size:                  1500__
User Defined MAC address:  00-00-00-00-00-00
DHCP Setting:              DISABLED
To allow ASM to use static IP address, subnet mask, and gateway values,
you must set the DHCP setting to "DISABLED".

 <F1>  Help      <F2> Refresh                    <↑><↓>  Move
 <Esc> Exit      <F6> Apply                      <F9>  Restart
```

Figure 23. Ethernet Settings window with Web-based remote values

4. Use the arrow keys to navigate to each field. Your system administrator can provide the information for the following fields:

   Network Interface
   The default value is **Enabled**; verify that it is still set to **Enabled**.

   IP Address
   Type the IP address of the Remote Supervisor Adapter.

   Subnet Mask
   Type the subnet mask used by the Remote Supervisor Adapter. The default value is 255.255.255.0.

   Gateway
   Type the IP address of the gateway.

   Host Name
   Type the host name of the Remote Supervisor Adapter. The default host name is ASMA*<burned-in MAC address>*.

   For detailed information about the Ethernet settings, see the *Remote Supervisor Adapter User's Guide* on the IBM *xSeries Documentation* CD.

5. Change the **DHCP Setting** field to **Disabled**. The default value is **Enabled**.

6. Press F6 to apply the change.

7. Press Esc. After the Warning window opens, press Enter to restart the Remote Supervisor Adapter.

8. Press Esc to return to the Configuration Settings window.
   If you need to configure the management port, go to "Configuring the management port for text-based remote access."

9. Press Esc to return to the Utility program main window.

10. Use the arrow keys to select **Exit Utility** from the menu or press Esc to close the Utility program.

11. Remove the diskette from the server. The server restarts automatically.

12. If you also want to configure the management port, continue with "Configuring the management port for text-based remote access." Otherwise, go to "Installing Advanced System Management device drivers" on page 53.

Configuring the management port for text-based remote access: Complete the following steps to configure the Remote Supervisor Adapter management port for access using a modem or null modem. If you completed the procedure for configuring the Ethernet port and the Configuration Settings window is open, go to step 3

1. With the server turned off, insert the diskette with the downloaded utility program into the diskette drive; then, turn on the server. The utility starts automatically, displaying the Remote Supervisor Utility window.

2. Use the Up Arrow and Down Arrow keys (↑ and ↓) to select **Configuration Settings**; then, press Enter.

   The Configuration Settings window opens.

3. Use the arrow keys to select **Modem Settings**; then, press Enter.

   The Modem Settings window opens, as shown in the following illustration.

   Note: The values in the window are only examples; your settings might be different.
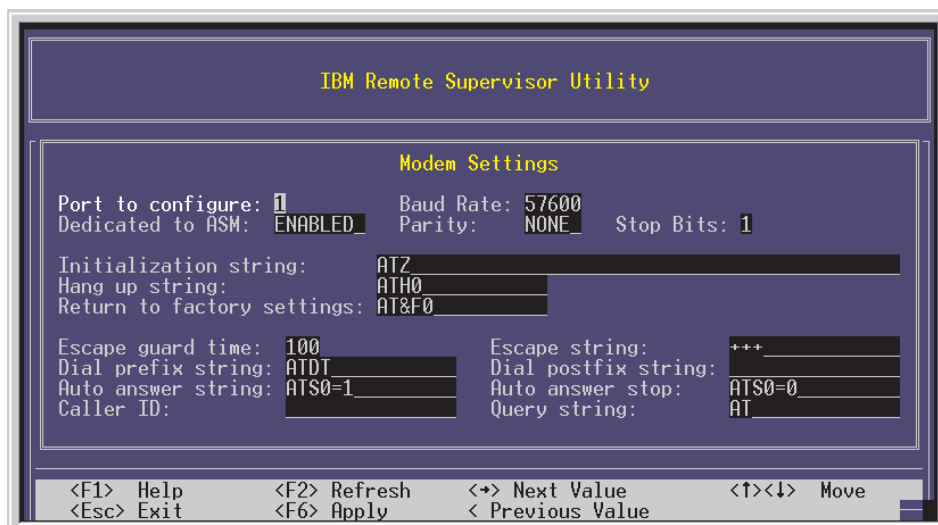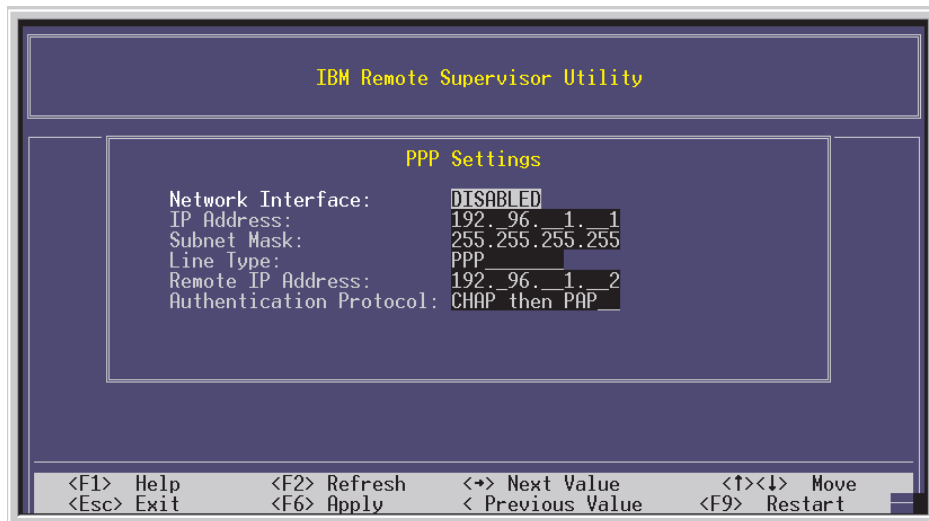

Figure 24. Ethernet Settings window with text-based remote access values

4. Verify the following management port values:

Baud Rate
The default is 57600. Make sure that the baud rate matches the baud rate of the device you are connecting to the management port on the Remote Supervisor Adapter.

Dedicated to ASM
The default is **Disabled**. If you are using point-to-point protocol (PPP), set this field to **Enabled**. If the value in this field is **Enabled** when the server is restarted, the management port remains dedicated to system management and is not returned to the operating system.

You can dedicate the integrated management port on the Remote Supervisor Adapter to system management or share it with the operating system. If the management port is dedicated to system management, it serves only the Remote Supervisor Adapter and is always available for dial-in or dial-out alerting purposes. You cannot view the port using the operating system or any application.

Note: To use this management port, you must first install the ASM device drivers as described in "Installing Advanced System Management device drivers" on page 53.

If the management port is shared with the operating system, it is dedicated to the Remote Supervisor Adapter only while the server is turned off or during POST. The port is returned to the operating system after POST completes. You can view the port using the operating system or any application. The Remote Supervisor Adapter takes over the port from the operating system only when information about a critical event is received. The Remote Supervisor Adapter dials out and transmits an alert and keeps the port dedicated until the server is restarted. The port is no longer available to the operating system or applications.

Parity The default is **None**.

Stop Bits
The default is **1**.

Note: The data bits value is preset to 8 and cannot be changed.

For detailed information about the management port and modem settings, see the *Remote Supervisor Adapter User's Guide* on the IBM *xSeries Documentation* CD.

5. If you made changes to the management port settings, press F6 to apply the change.
6. Press Esc to return to the Configuration Settings window.
   If you need to set up point-to-point protocol, go to "Setting up point-to-point protocol" on page 52.
7. Press Esc to return to the Utility program main window.
8. Use the arrow keys to select **Exit Utility** from the menu, or press Esc to close the Utility program.
9. Remove the diskette from the diskette drive. The Remote Supervisor Adapter restarts automatically.
10. Continue with "Setting up point-to-point protocol" on page 52.

Setting up point-to-point protocol: The Remote Supervisor Adapter management port supports point-to-point protocol (PPP). PPP enables TCP/IP communication over the management port, which enables Web-based management and Telnet sessions over a modem. To set up PPP, complete the following steps. If you completed the procedure for configuring the management port and the Configuration Settings window is open, go to step 3 on page 52.

1. With the server turned off, insert the downloaded utility program into the diskette drive; then, turn on the server. The utility starts automatically, displaying the Remote Supervisor Utility window.

2. Use the Up Arrow and Down Arrow keys (↑ and ↓) to select **Configuration Settings**; then, press Enter.

   The Configuration Settings window opens.

3. Use the arrow keys to select **PPP Settings**; then, press Enter.

   The PPP Settings window opens, as shown in the following illustration.

   Note: The values in the window are only examples; your settings might be different.

Figure 25. Ethernet Settings window setting up point-to-point protocol

4. Use the arrow keys to navigate to each field. Verify the values in the following fields:

   Network Interface
   > The default is **Disabled**. Change this field to **Enabled**.

   IP Address
   > The default value is 192.96.1.1. You can use the default value or another value, but the server must be able to establish a connection to that address. The default IP address (local and remote) is easily reconfigurable.

   Subnet Mask
   > The default value is 255.255.255.255.

   Line Type
   > The value is set to **PPP**.

   Remote IP Address
   > The default value is 192.96.1.2.

Authentication Protocol

> The default is **CHAP then PAP**. Make sure that the value in this field matches your client settings.

For detailed information about the PPP settings, see the information about configuring PPP access over a management port in the *Remote Supervisor Adapter User's Guide* on the IBM *xSeries Documentation* CD.

5. Press F6 to apply the changes.

6. Press Esc. After the Warning window opens, press Enter to restart the Remote Supervisor Adapter.

7. Press Esc to return to the Configuration Settings window. If you need to configure the management port, go to "Configuring the management port for text-based remote access" on page 50.

8. Press Esc to return to the Utility program main window.

9. Use the arrow keys to select **Exit Utility** from the menu or press Esc to close the Utility program.

10. Remove the diskette from the diskette drive. The server restarts automatically.

11. Continue with "Installing Advanced System Management device drivers."

Installing Advanced System Management device drivers: You must install the ASM device drivers for the server. The device drivers enable communication between the Remote Supervisor Adapter and the server in which it is installed. You can obtain the most current device drivers from http://www.ibm.com/pc/support.

The following sections describe the procedure for installing the ASM device drivers for the server, depending on your operating system.

Notes:

1. If you are installing device drivers manually, note the following requirements:

    *   Make sure that the operating system is installed on the server before you install the ASM device drivers. For information about installing the operating system, see the documentation that comes with the operating system.

    *   Before installing the ASM device drivers for the Remote Supervisor Adapter, stop any system-management application.

2. If you are using ServerGuide to install device drivers and your operating system is Windows 2000, ServerGuide installs the ASM device drivers automatically.

*   Windows 2000: Continue with "Installing Windows 2000 ASM device drivers"

*   Windows NT: Go to "Installing Windows NT ASM device drivers" on page 54.

After you install the ASM device drivers, go to "Configuring the remote control password" on page 55 to set the remote control password.

Installing Windows 2000 ASM device drivers: To install the ASM device drivers for Windows 2000, complete the following steps.

Notes:

1. Do not use the Hardware Wizard to install the drivers. If the Hardware Wizard starts itself for the installation of any System Management Driver hardware, exit the Hardware Wizard by selecting **Cancel**.

2. If IBM Netfinity® Director, IBM Director, or UM Services is running on the server, stop the system-management application before proceeding.

Complete the following steps to manually install the Windows 2000 ASM device drivers.

1. Open a command prompt.
2. If you are installing from a diskette, type: `a:\WIN2000\SETUP`, where *a* is the drive letter of the diskette drive.
3. If you are installing from a CD, type: `d:\DD\WIN2000\SETUP`, where *d* is the drive letter of the DVD-ROM drive.
4. Follow the directions that display on the screen.
5. Go to "Configuring the remote control password" on page 55.

Installing Windows NT ASM device drivers: Select one of the following methods to install the ASM device drivers for Windows NT:

• Non-interactive

   The non-interactive method for installing the ASM device drivers accepts the default values for any window prompts that appear. You are prompted to respond only if an error occurs during installation.

• Interactive

   The normal (interactive) method for installing the ASM device drivers prompts you with instructions and waits for you to respond before continuing with the installation.

Note: If IBM Netfinity Director, IBM Director, UM Services, or IBM Netfinity Manager is running on the server, stop the system-management application before proceeding.

Using the non-interactive method: Complete the following steps to use the non-interactive method.

1. Open a Windows NT command prompt; then, type one of the following commands:

   • If the installation is from a diskette, type:

      `a:\NT\SETUP -q`

      (where *a* is the drive letter assigned to the diskette drive).

      Press Enter.

   • If the installation is from a CD, type:

      `d:\DD\NT\SETUP -q`

      (where *d* is the drive letter assigned to the DVD-ROM drive).

      Press Enter.

2. Follow the instructions that appear in the window.
3. Go to "Configuring the remote control password" on page 55.

Using the interactive method: Complete the following steps to use the interactive method.
1. Open a Windows NT command prompt; then, type one of the following commands:
    - If the installation is from a diskette, type:

        `a:\NT\SETUP`

        (where *a* is the drive letter assigned to the diskette drive).

        Press Enter.
    - If the installation is from a CD, type:

        `d:\DD\NT\SETUP`

        (where *d* is the drive letter assigned to the DVD-ROM drive).

        Press Enter.
2. Follow the instructions that appear in the window.
3. Continue with "Configuring the remote control password."

Configuring the remote control password: If you want to use the remote control features of the Remote Supervisor Adapter ASM Web interface, you must configure the remote control password using the Configuration/Setup Utility program that comes with the server. This program is part of the basic input/output system (BIOS) code.

To set up a remote control password, complete the following steps:
1. Start the server, and watch the monitor screen.
2. When the message `Press F1 for Configuration/Setup` is displayed, press F1. The Configuration/Setup Utility main menu window opens.
3. Use the Up Arrow and Down Arrow keys (↑ and ↓) to select **System Security;** then, press Enter. The System Security window opens.
4. Select **Remote Control Security Settings**; then, press Enter. The Remote Control Security Settings window opens.
5. Enter the Remote Control Password that you will use each time you log in to the remote-control features of the Remote Supervisor Adapter ASM Web Interface.
6. Select **Save New Remote Control Password**; then, press Enter.
7. In the System Security window, press Esc.
8. Select **Save Settings**; then, press Enter.
9. Confirm your selection; then, exit the Configuration/Setup Utility program.
10. Continue with "Completing the configuration."

Completing the configuration: To complete the configuration of the Remote Supervisor Adapter, see the *Remote Supervisor Adapter User's Guide* on the IBM *xSeries Documentation* CD. Completing the configuration includes the following tasks:
- Defining the login IDs and passwords
- Selecting the events that will receive alert notification
- Monitoring remote server status using the ASM Web interface or a text-based user interface
- Controlling the server remotely

If you want to set up an ASM interconnect network and have not already done so, continue with "Using the ASM interconnect network." If you do not want to set up an ASM interconnect network, Remote Supervisor Adapter configuration is now complete. To start managing the server remotely, see the *Remote Supervisor Adapter User's Guide* on the IBM *xSeries Documentation* CD.

Using the ASM interconnect network

This section explains how to configure and connect the server to function within an ASM interconnect network.

The ASM interconnect network can include as many as 12 individual ASM connections in a single bus. These connections can include Remote Supervisor Adapters, ASM processors, and ASM PCI Adapters. When the clients and servers are connected, they use the ASM interconnect network to share ASM resources, information, and alerts among multiple servers, without having to add additional communications hardware or network interface adapters.

An ASM interconnect network provides two levels of functionality. First, the ASM interconnect network enables you to configure settings and to control the servers where other Remote Supervisor Adapters, ASM processors, and ASM PCI Adapters on the network reside. Second, the ASM interconnect network enables other interconnect network devices to use the resources (Ethernet or modem) of other Remote Supervisor Adapters, ASM processors, and ASM PCI Adapters in the ASM interconnect network for sending alerts. This interconnect network is used when Remote Supervisor Adapters, ASM processors, or ASM PCI Adapters cannot send an alert and must forward the information to another one of these devices to send the alert.

Planning and cabling the interconnect network: To support the most recent ASM features, a Remote Supervisor Adapter must be the main gateway interconnect to the ASM interconnect bus if the bus also includes servers with ASM PCI adapters or ASM processors. The Remote Supervisor Adapter forwards the ASM information generated by the servers attached to the ASM interconnect bus to other servers on the Ethernet network. The connected ASM processors and ASM PCI Adapters are managed through the new user interface and Web browser access of the Remote Supervisor Adapter.

Note: To ensure the stability of the system, you must have the most current level of firmware installed on the Remote Supervisor Adapter that is the main interconnect gateway for the ASM interconnect network. The most current level of firmware is available on the World Wide Web at http://www.ibm.com/pc/support/. For more information on updating firmware, see the IBM *Remote Supervisor Adapter User's Guide* on the IBM *xSeries Documentation* CD.

You must connect an ASM Interconnect module to the Remote Supervisor Adapter and to each xSeries 445 server that you connect to the ASM interconnect network bus.

Attention: To avoid damage to the Ethernet connector on the Remote Supervisor Adapter, do not connect the ASM Interconnect module to the Remote Supervisor Adapter Ethernet port.

To connect the servers, note the following setup and configuration considerations:

- Make sure that the ASM interconnect network is set up as a bus, not as a ring. You must connect the servers to the ASM interconnect network in a series, with terminated beginning and end points.
- Make sure that the total combined length of all Ethernet cables connecting the server in the ASM interconnect network does not exceed 91 M (300 ft).
- Each Remote Supervisor Adapter, ASM PCI adapter, or ASM processor that is connected to the ASM interconnect network bus counts as one connection. For example, if an ASM PCI adapter is installed in a server that has an ASM processor, the processor and the adapter connect to each other using one ASM interconnect connection, but the processor and the adapter count as two connections on the ASM interconnect network bus.

Forwarding alerts: Remote Supervisor Adapters, ASM PCI adapters, and ASM processors that are connected to an ASM interconnect network share resources and system-management information. This section provides information on how alerts are forwarded in the ASM interconnect network.

During normal operation, each Remote Supervisor Adapter, ASM processor, or ASM PCI adapter on the ASM interconnect network communicates with the other processors and adapters on the network. Processors or adapters that have a modem or Ethernet connection notify the other processors and adapters that these communications resources are available for use by other servers on the ASM interconnect network. These resources are then used as ASM interconnect network resources, enabling Remote Supervisor Adapters, ASM processors, or ASM PCI adapters on the ASM interconnect network to send alerts using a modem or the network, even if they do not have a modem or network connection physically attached.

When alerts are generated, they are forwarded to the Remote Supervisor Adapter, ASM processor, or ASM PCI adapter on the ASM interconnect network that has the communication resources to forward the alert. If no system on the ASM interconnect network meets the requirements, the alert is set for transmission if the connection type is configured or becomes available later.

If multiple modems or network connections exist in the ASM interconnect network, you cannot specify which system will receive an alert or which will use its modem or network connection to forward the alert. If an alert is forwarded to a Remote Supervisor Adapter, ASM processor, or ASM PCI adapter that is unable to deliver the alert (for example, the modem it is configured to use has failed or the network cannot resolve the destination IP address), the processor or adapter attempts to forward the alert to another system on the ASM interconnect network that has the communication resources to forward the alert.

Alerts are typically sent only once (per connection type), but an alert is forwarded to another interconnect device if the resources exist on other interconnect devices in the network. For example, on a three ASM processor network where ASM processor 1 generates a modem alert, but does not have a modem and the other ASM processors have modems, the following might occur:

If ASM processor 1 generates an alert and the modem is unplugged from ASM processor 2 45 seconds prior to ASM processor 1 generating the alert, ASM processor 1 forwards the alert to ASM processor 2, having previously determined that ASM processor 2 has an available modem. When ASM processor 2 receives the forwarded alert, it determines that a modem is attached to ASM processor 3,

and forwards the alert. Therefore, depending upon the time frame (45 seconds) within which a resource (modem) fails, the alert might be forwarded multiple times until an interconnect device can send the alert.

Cabling for the ASM interconnect network: Depending upon the servers you have, you might need additional ASM Interconnect modules or Category 5 or Category 3 Ethernet cables. The following table lists some IBM Netfinity and IBM xSeries products, and indicates whether you need to use an ASM Interconnect module to set up the ASM interconnect network.

Server name	ASM Interconnect module needed
Netfinity 4500R	yes
Netfinity 5000	yes
Netfinity 5500	yes
Netfinity 5500-M10	yes
Netfinity 5500-M20	yes
Netfinity 5600	yes
Netfinity 6000R	no
Netfinity 7100	no
Netfinity 7600	no
xSeries 220	yes
xSeries 232	yes
xSeries 240	yes
xSeries 330	The ASM interconnect module is required to link the Remote Supervisor Adapter to the microprocessor in the server. Use the RS-485 ports to create the ASM interconnect network.
xSeries 340	yes
xSeries 342	yes
xSeries 350	no
xSeries 360	yes
xSeries 440	yes
xSeries 445	yes (Not required for models that come with a Remote Supervisor II-EXA installed)

For the servers that do not need an ASM Interconnect module, a module is still needed to connect the Remote Supervisor Adapter in the gateway server to the integrated ASM processor. After you make that connection, you can connect the servers together using their ASM interconnect ports. For additional information, see "ASM interconnect network configuration examples" on page 42.

Connecting the ASM Interconnect module to the xSeries 445: The ASM Interconnect module connects the Remote Supervisor Adapter to the ASM interconnect network. This module must be purchased separately. To connect the ASM interconnect module to the Remote Supervisor Adapter, complete the following steps.

Attention: To avoid damage to the Ethernet connector, do not plug the ASM interconnect module into the Remote Supervisor Adapter Ethernet port.

1. Connect the ASM Interconnect module **1** to the Remote Supervisor Adapter ASM interconnect (peer-to-peer) port **2** as shown in the following illustration. This port is on the edge of the Remote Supervisor Adapter that is accessible from the rear of the server and is labeled RS485.
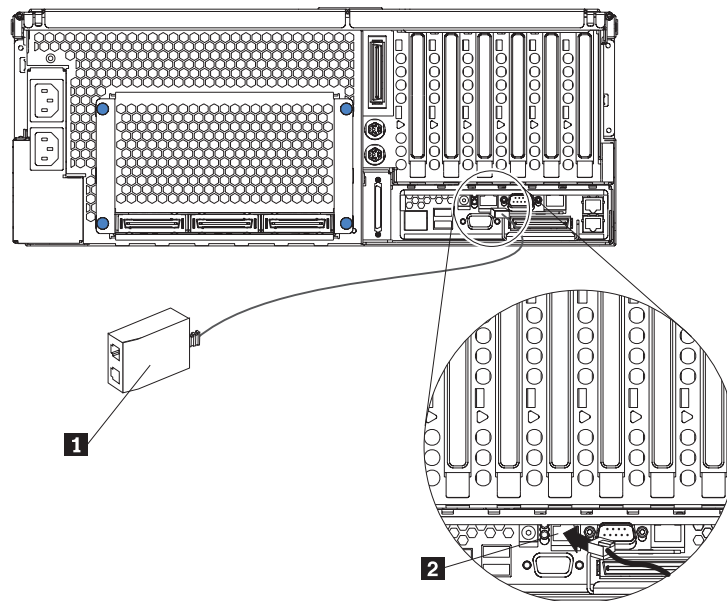
Figure 26. Connecting an ASM Interconnect module to an xSeries 445 server

2. Connect one or two Category 3 or Category 5 Ethernet cables to the other end of the ASM Interconnect module.
3. Continue with "ASM interconnect network configuration examples" on page 42.

Using the PXE boot agent utility program

Use the Preboot Execution Environment (PXE) boot agent utility program to enable or disable operating-system wake-up support.

Note: The server does not support changing the network boot protocol or specifying the startup order of devices through the PXE boot agent utility program.

Starting the PXE boot agent utility program

Complete the following steps to start the PXE boot agent utility program:

1. Turn on the server.
2. When the Initializing `Intel (R) Boot Agent Version X.X.XX PXE 2.0 Build XXX` (`WfM 2.0`) prompt appears, press Ctrl+S. You have 2 seconds (by default) to press Ctrl+S after the prompt appears.
3. Use the arrow keys and press Enter to select a choice from the menu.
4. Follow the instructions on the screen to change the settings of the selected items; then, press Enter.

PXE boot agent utility menu choices

The following choices are on the PXE boot agent utility menu:

- **Network Boot Protocol**

  PXE is the default setting. Do not change this setting; the server does not support any other network boot protocols.

- **Boot Order**

  The server does not support this choice. Use the **Start Options** choice in the Configuration/Setup Utility program to specify the startup order of devices.

- **Show setup prompt**

  Select this choice to enable or disable the PXE setup prompt. **Disable** is the default setting. When the prompt is enabled, the prompt `Press Ctrl+S to enter the setup menu` appears under the initializing prompt.

- **Setup time wait menu**

  Select this choice to specify the amount of time (in seconds) that the system will wait for you press Ctrl+S after the prompt appears. You can select 2 (default), 3, 5, or 8 seconds.

- **Legacy OS wake up support**

  Select this choice to enable or disable the legacy operating-system wake-up support. **Disabled** is the default setting.

  If you are using an Advanced Configuration and Power Interface (ACPI) aware operating system, such as Microsoft Windows 2000 or Windows NT, disable this choice to use Wake on LAN support. Otherwise, enable it.

  If you are using a non-ACPI-aware operating system, do not send wake-up packets to the server while it is turned on. If you send a wake-up packet to the server while it is turned on and you are then unable to turn off the server, see "Power problems" at "Error symptoms" on page 230.

Chapter 3. Diagnostics

This section provides basic troubleshooting information to help resolve some common problems that might occur with the server.

If you cannot locate and correct the problem using the information in this section, see Appendix A, "Getting help and technical assistance," on page 299 for more information.

General checkout

The server diagnostic programs (see "Starting the diagnostic programs" on page 70) are stored in the upgradeable electronically erasable programmable read-only memory (EEPROM) on the I/O board and on the *Resource* CD. These programs provide the primary methods of testing the major components of the server.

If you cannot determine whether a problem is caused by the hardware or by the software, run the diagnostic programs to confirm that the hardware is working properly.

Note: A single problem might cause several error messages. When this occurs, work to correct the cause of the first error message. After you correct the cause of the first error message, the other error messages usually will not occur the next time you run the test.

A failed server might be part of a shared hard disk drive cluster (two or more servers sharing one or more external storage devices). Before you run diagnostics, verify that the failing server is not part of a shared storage device cluster.

A server might be part of a cluster if:
- The server is identified as part of a cluster.
- One or more external storage units are attached to the server and at least one of the attached storage units is also attached to another server or unidentifiable source.
- One or more servers are located near the failing server.

If the failing server is suspected to be part of a shared hard disk drive cluster, run all diagnostic tests except those that test the storage unit (storage device residing in the storage unit) or the storage adapter attached to the storage unit.

Notes:
1. For servers that are part of a shared hard disk drive cluster, run one test at a time. Do not run any suite of tests, such as "quick" or "normal" tests, because this could enable the hard disk drive diagnostic tests.
2. If multiple error codes are displayed, diagnose the first error code that is displayed.
3. If the server stops with a POST error, see "POST" on page 63.
4. If the server stops and no error is displayed, see "Undetermined problems" on page 246.
5. For power problems, see "Power LED errors" on page 240 and "12v bus faults" on page 229.
6. For safety information, see "Safety information" on page 257.
7. For intermittent problems, check the system-error log (see "Error logs" on page 65).

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Follow the steps in this checkout procedure to identify server problems.

Note: For a 16-way configuration, the server must be started up as a standalone server (see "Starting the diagnostic programs" on page 70).

001 **IS THE SERVER PART OF A CLUSTER?**

YES. Schedule maintenance for the server. Shut down all servers related to the cluster. Run the storage test.

NO. Go to step **002** .

002 **IF THE SYSTEM IS NOT PART OF A CLUSTER:**

If the operating system is running, do the following:
1. Check the Light Path (see "Light path LED errors" on page 190).
2. Check the service processor system-error logs.
    a. If the system-error log indicates a damaged field replaceable unit (FRU), replace the FRU, and run diagnostics to confirm that the problem has been solved.
    b. If the system-error log does not indicate a damaged FRU, see "Error symptoms" on page 230 and "Undetermined problems" on page 246.

If the operating system is not running, do the following:
1. Check the Light Path (see "Light path LED errors" on page 190).
2. Check the service processor system-error logs.
    a. If the error log indicates a damaged field replaceable unit (FRU), replace the FRU, and run diagnostics to confirm that the problem has been solved.
    b. If the error log does not indicate a damaged FRU, check the operating system event logs; if these logs do not specify a particular error, go to step 3.
3. Turn off the server and all external devices.
4. Check all cables and power cords.
5. Set all display controls to the middle position.
6. Turn on all external devices.
7. Turn on the server.
8. Monitor the screen and the serial port for POST errors, and record any POST error messages that are displayed on the screen. If an error is displayed, look up the first error (see "POST error codes" on page 224).
9. Run diagnostics (see "Starting the diagnostic programs" on page 70).

003 **DID THE DIAGNOSTIC PROGRAM START?**

NO. Find the failure symptom in "Error symptoms" on page 230.

YES. Run the diagnostic programs. If necessary, see "Diagnostic programs and error messages" on page 68.

If you receive an error, see Chapter 7, "Symptom-to-FRU index," on page 187.

If the diagnostic programs were completed successfully and you still suspect a problem, see "Undetermined problems" on page 246.

If the server does not turn on, see "Error symptoms" on page 230.

Diagnostic tools overview

The following tools are available to help you identify and resolve hardware-related problems:

- **POST beep codes, error messages, and error logs**

  The power-on self-test (POST) generates beep codes and messages to indicate successful test completion or the detection of a problem. See "POST" for more information.

- **Light path diagnostics feature**

  Use the Light path diagnostics feature to identify system errors quickly.

- **Diagnostic programs and error messages**

  The server diagnostic programs are stored in upgradeable read-only memory (ROM) on the I/O board. These programs are the primary method of testing the major components of the server. See "Diagnostic programs and error messages" on page 68 for more information.

  Note: The diagnostic programs and error messages are specific to each server. When running diagnostics and reading error messages of two merged servers, be sure that you know which server gave the error before attempting any repairs or changing any settings.

POST

When you turn on the server, it performs a series of tests to check the operation of server components and some of the options installed in the server. This series of tests is called the power-on self-test, or POST.

If POST finishes without detecting any problems, a single beep sounds, and the first screen of your operating system or application program appears.

If POST detects a problem, more than one beep sounds, or an error message appears on your screen. See "Beep symptoms" on page 188 and "POST error codes" on page 224 for more information.

Notes:

1. If you have a power-on password set, you must type the password and press Enter, when prompted, before POST will continue.
2. A single problem might cause several error messages. When this occurs, work to correct the cause of the first error message. After you correct the cause of the first error message, the other error messages usually will not occur the next time you run the test.
3. When turning on the 16-way configuration you might hear a beep code of one long beep and two short beeps if no video device is connected to the secondary server. This is an acceptable action.

POST in a partitioned environment

During POST in a 16-way configuration, status messages about the partition merge are generated and will appear on the screen of the primary server.

Note: If the scalability connection cannot be detected, the message "Upper to lower SMP Expansion Module cable not detected" will appear. For cabling information, see "SMP Expansion Port cabling" on page 127.

The partition merge status messages consist of one column listing the SMP Expansion Modules (numbered sequentially, beginning with ″1″) and one column for that Module's merge status, as in the following example:

```
SMP Exp. Module        Partition Merge Status
       1               Primary lower
       2               Primary upper
       3               Searching
       4               Searching
```

The status column changes as SMP Expansion Modules are recognized:

```
SMP Exp. Module        Partition Merge Status
       1               Primary lower
       2               Primary upper
       3               Found
       4               Found
```

When the non-boot chassis is merged into one partition, the status column changes again:

```
SMP Exp. Module        Partition Merge Status
       1               Primary lower
       2               Primary upper
       3               Merged
       4               Merged
```

If the merge was not successful (see "Verifying scalability and RXE cabling" on page 72), the status message will provide information about the failure, as in the following three examples:

```
SMP Exp. Module        Partition Merge Status
       1               Primary lower
       2               Primary upper
       3               Failed: BIOS version is newer than primary server BIOS
       4               Failed: BIOS version is newer than primary server BIOS
```

```
SMP Exp. Module        Partition Merge Status
       1               Primary lower
       2               Primary upper
       3               Failed: BIOS version is older than primary server BIOS
       4               Failed: BIOS version is older than primary server BIOS
```

```
SMP Exp. Module        Partition Merge Status
       1               Primary lower
       2               Primary upper
       3               Failed: Timed out
       4               Failed: Timed out
```

An overall status message will then appear.

```
Partition merge successful
```

If the merge was not successful, the message will indicate the failure (see "Verifying scalability and RXE cabling" on page 72).

For example:

```
Partition merge failed: No secondary SMP Exp. Modules merged
```

The message above indicates that the secondary chassis was not seen.

```
Partition mismatch: Expected partition 8-8, Actual partition   8-4
```

The message above indicates that one of the SMP Expansion Modules was not enabled.

Error logs

The POST error log contains the three most recent error codes and messages that the system generated during POST. The System Error log contains all messages issued during POST and all system status messages from the service processor.

You can view the contents of the System Error log from the Configuration/Setup Utility program or from the diagnostic programs.

Note: When troubleshooting problems with PCI-X slots, you will notice that the error logs report the PCI-X buses numerically. The numerical assignment will change depending on your configuration.

Viewing error logs from the Configuration/Setup Utility program

Start the Configuration/Setup Utility program; then, select **Error Logs** from the main menu. See "Using the Configuration/Setup Utility program" on page 14 for more information.

Viewing error logs from the diagnostic programs

Start the diagnostic programs; select **Hardware Info** from the top of the diagnostic programs screen; select **System Error Log** from the list that appears; then, follow the instructions on the screen. See "Starting the diagnostic programs" on page 70 for more information for more information.

Light path diagnostics

The server's light path diagnostics feature provides a path that can be followed in four phases to help identify the source of an error. The lights are designed to be followed in an orderly progression, depending on the error. The lights are viewed in the following order:

1. Begin on the front panel (see "Server controls and indicators" on page 4).
2. Proceed to the light path diagnostics panel (see Figure 27 on page 66).
3. Check the lights on the top of the server (see Figure 28 on page 67).
4. Look inside the server, if required.

Many errors are first indicated by the illumination of the system-error light in the operator information panel on the front of the server (see "Server controls and indicators" on page 4). If the system-error light is on, one or more lights on top of and/or inside the server might also be on that can direct you to the source of the error. This section will describe how to follow this light path.

Note: In a merged system of more than one server, light path diagnostics will
indicate errors on the primary server only.

The following procedure describes how to follow the light path.

Note: Read "Safety information" on page 257, "Handling static-sensitive devices"
on page 80, and "Working inside the server with power on" on page 79.

1. Check the light path diagnostics panel and note which lights are illuminated.
   These lights will indicate the type of error. These lights are described more fully
   at "Light path LED errors" on page 190.
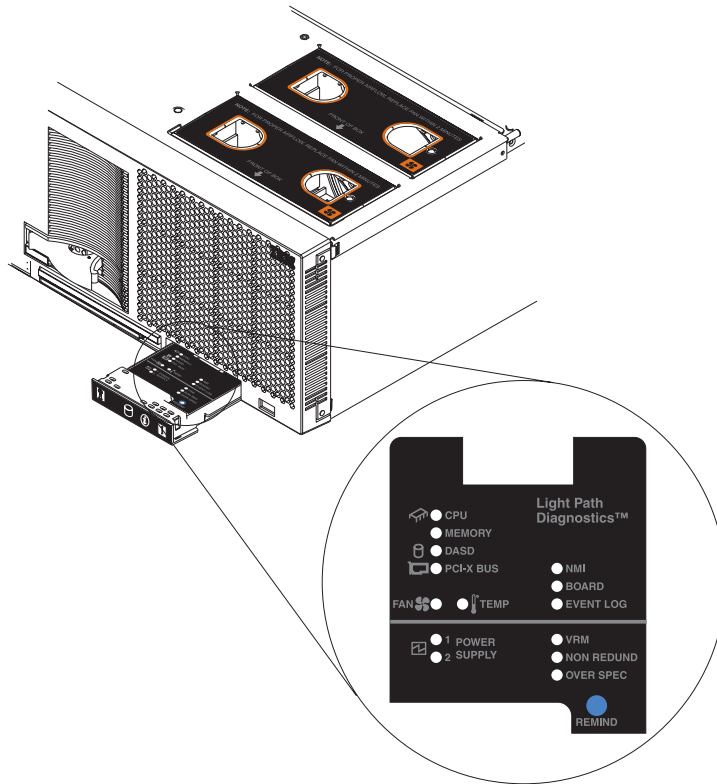
Figure 27. Light path diagnostics panel

   The light path diagnostics panel is located inside the light path diagnostics
   drawer on the front right of the server. Press on the front of the light path
   diagnostics drawer and the light path diagnostic panel will be exposed.

   More information about the individual lights on this panel is available at "Light
   path LED errors" on page 190. =

2. After you have viewed the light path diagnostics panel, check the lights on the
   top of the server, including the fans, and note which lights are illuminated.

   Six LEDs on the center plane are visible through the top cover. If one of these
   is illuminated, the number next to the illuminated light indicates the particular
   board implicated in the error.
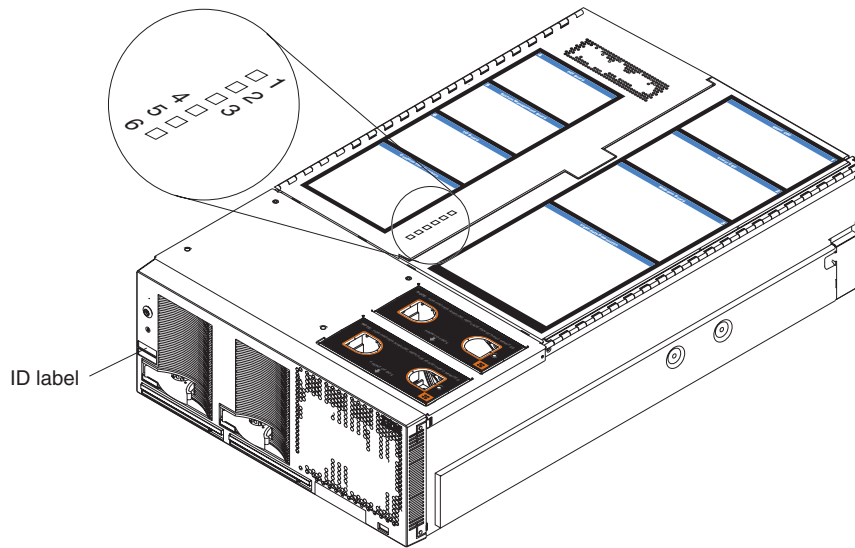
Figure 28. Top cover LEDs

Table 4. Top cover LEDs

LED	Fault
1	Upper SMP Expansion Module
2	Lower SMP Expansion Module
3	Center plane power
4	PCI-X power
5	Remote Supervisor Adapter
6	I/O board power

3. Once you know the general type of error and the general location of the component involved, the next step is to check the system service label on the outside top of the server.

   This label gives an overview of internal components that correspond to each of the six LEDs on the top of the server. This information, combined with the information contained in the table "Light path LED errors" on page 190, can often provide enough information to correct the indicated error.

4. If necessary, you can consult the illuminated LEDs on the indicated board. For example, a microprocessor error will light the LED next to the failing microprocessor on one of the SMP Expansion boards.

Diagnostic programs and error messages

The server diagnostic programs are stored in upgradeable read-only memory (ROM) on the I/O board. These programs are the primary method of testing the major components of the server.

Diagnostic error messages indicate that a problem exists; they are not intended to be used to identify a failing part. Troubleshooting and servicing of complex problems that are indicated by error messages should be performed by trained service personnel.

Sometimes the first error to occur causes additional errors. In this case, the server displays more than one error message. Always follow the suggested action instructions for the *first* error message that appears.

The following sections contain the error codes that might appear in the detailed test log and summary log when running the diagnostic programs.

The error code format is as follows:

```
fff-ttt-iii-date-cc-text message
```

where:

fff   is the three-digit function code that indicates the function being tested when the error occurred. For example, function code 089 is for the microprocessor.

ttt   is the three-digit failure code that indicates the exact test failure that was encountered.

iii   is the three-digit device ID.

date   is the date that the diagnostic test was run and the error recorded.

cc   is the check value that is used to verify the validity of the information.

text message
    is the diagnostic message that indicates the reason for the problem.

Text messages

The diagnostic text message format is as follows:

`Function Name: Result (test specific string)`

where:

Function Name

is the name of the function being tested when the error occurred. This corresponds to the function code (fff) given in the previous list.

Result

can be one of the following:

Passed

This result occurs when the diagnostic test completes without any errors.

Failed This result occurs when the diagnostic test discovers an error.

User Aborted

This result occurs when you stop the diagnostic test before it is complete.

Not Applicable

This result occurs when you specify a diagnostic test for a device that is not present.

Aborted

This result occurs when the test could not proceed because of the system configuration.

Warning

This result occurs when a possible problem is reported during the diagnostic test, such as when a device that is to be tested is not installed.

Test Specific String

This is additional information that you can use to analyze the problem.

Starting the diagnostic programs

This section describes the general procedure to run the diagnostic programs on either a standalone server or a 16-way configuration.

You can press F1 while running the diagnostic programs to obtain help information. You also can press F1 from within a help screen to obtain online documentation from which you can select different categories. To exit from help and return to where you left off, press Esc.

Note: In a 16-way configuration, diagnostics are run on the server to which the keyboard, mouse and video are attached. To run diagnostics on the second server, the second server must be connected to a keyboard, video and mouse or to a KVM switch.

Complete the following steps to start the diagnostic programs:

1. Turn on the server and watch the screen; then, continue with step 2 for 16-way configuration, or with step 3 for all other models.

   Note: For 16-way configuration, turn on both servers and watch the screen.

2. For 16-way configuration: When the message `Searching for secondary server, Press ESC to bypass partition merge and boot standalone` appears, press ESC; then continue with step 3.. The screen will display the message `Secondary server has been found`.

3. When the message `Press F1 for Configuration/Setup, Press F2 for Diagnostics` appears, press F2.

   If a power-on password is set, the server prompts you for it. Type the power-on password, and press Enter.

   To run diagnostics on the secondary server in a a16-way configuration, perform the previous steps for the primary server first, then for the secondary server.

   Note: For 16-way configuration, the secondary server must be connected to a KVM switch or to its own pointing device, keyboard, and monitor in order to run diagnostic programs on that server. The procedure for starting diagnostics is the same for both servers and the merge process can be stopped from either the primary or secondary servers.

4. When the Diagnostic Programs screen appears, select either **Extended** or **Basic** from the top of the screen.

5. Select the test you want to run from the list that appears; then, follow the instructions on the screen.

   Notes:

   a. If the server stops during testing and you cannot continue, restart the server and try running the diagnostic programs again. If the problem remains, replace the component that was being tested when the server stopped.

   b. The keyboard and mouse (pointing device) tests assume that a keyboard and mouse are attached to the server.

   c. If you run the diagnostic programs with no mouse attached to the server, you will not be able to navigate between test categories using the **Next Cat** and **Prev Cat** buttons. All other functions provided by mouse-selectable buttons are also available using the function keys.

d. You can test the USB keyboard by using the regular keyboard test. The regular mouse test can test a USB mouse. Also, you can run the USB interface test only if there are no USB devices attached.

e. You can view server configuration information (such as system configuration, memory contents, interrupt request (IRQ) use, direct memory access (DMA) use, device drivers, and so on) by selecting **Hardware Info** from the top of the screen.

If the diagnostic programs do not detect any hardware error but the problem persists during normal server operations, a software error might be the cause. If you suspect a software problem, see the information that comes with the software package.

Diagnostic error codes are listed at "Diagnostic error codes" on page 211.

Viewing the test log

When the tests are completed, you can view the test log by selecting **Utility** from the top of the screen and then selecting **View Test Log**.

Notes:

1. You can view the test log only while you are in the diagnostic programs. When you exit the diagnostic programs, the test log is cleared (saved test logs are not affected). To save the test log so that you can view it later, click **Save Log** on the diagnostic programs screen and specify a location and name for the saved log file.

2. To save the test log to a diskette, you must use a diskette that you have formatted yourself; this function does not work with preformatted diskettes. If the diskette has sufficient space for the test log, the diskette may contain other data.

Viewing the System Error log

You can also view the System Error log from the diagnostic programs. See the instructions in "Error logs" on page 65.

Verifying scalability and RXE cabling

This section describes the procedure to verify scalability and RXE cabling on a 16-way configuration. Begin the procedure by viewing the connections in each 8-way system:

From the diagnostic program main menu, select

1. Hardware Info
2. Summit Chips

A screen similar to the following is shown:

```
============================================================================
      This_____    Connectd_to   Ext  Is     Has    Port      Trans  Recei  Error
  no  Chip_._Port   Chip_._Port   Int  Ready  Cable  Speed     Error  Error  Count
  --  -----------   -----------   ---  -----  -----  -----     -----  -----  -----
      Scalability:
  01  Scalab_1.P1   ...........   Ext  yes    yes    1600 MHz  no     no     00
  02  Scalab_1.P2   ...........   Ext  yes    yes    1600 MHz  no     no     00
  03  Scalab_1.P3   Scalab_2.P3   Ext  yes    yes    1600 MHz  no     no     00
  04  Scalab_2.P1   ...........   Ext  yes    yes    1600 MHz  no     no     00
  05  Scalab_2.P2   ...........   Ext  yes    yes    1600 MHz  no     no     00
  06  Scalab_2.P3   Scalab_1.P3   Ext  yes    yes    1600 MHz  no     no     00
      Memory:
  07  Memory_1.P0   PCI-X__1.P0   Int  yes    yes    1000 MHz  no     no     00
  08  Memory_1.P1   PCI-X__2.P0   Int  yes    yes    1000 MHz  no     no     00
  09  Memory_2.P0   PCI-X__2.P1   Int  yes    yes    1000 MHz  no     no     00
  10  Memory_2.PB   ...........   Ext  yes    no      250 MHz  no     no     00
      PCI-X:
  11  PCI-X__1.P0   Memory_1.P0   Int  yes    yes    1000 MHz  no     no     00
  12  PCI-X__1.PA   ...........   Ext  yes    yes     250 MHz  no     no     00
  13  PCI-X__2.P0   Memory_1.P1   Int  yes    yes    1000 MHz  no     no     00
  14  PCI-X__2.P1   Memory_2.P0   Int  yes    yes    1000 MHz  no     no     00
============================================================================
```

The information in the columns indicates:

1. The name of each port
2. The item the port is connected to
3. Whether the port is external or internal
4. Whether the port is it ready to operate
5. Whether the port has a cable attached to it
6. The port speed
7. Whether there are "transmit errors" posted by the chip
8. Whether there are "receive errors" posted by the chip
9. The number of "receive errors" (since the count was last cleared)

Scalability cabling

The verification checklist for the scalability ports is described in the following list.

Note: The "Connected to" information is not known for ports that had been connected to the other server prior to booting as a standalone server for the diagnostic programs.

1. The "Connected to" column must be "unknown" for four ports, as shown.
2. The "Connected to" column must show that both "P3"s connect to each other.
3. The "Is Ready" just be "Yes" for all six ports.
4. The "Has Cable" must be "Yes" for all six ports.
5. The "Transmit" and "Receive" errors should both be "No" for all six ports.

After performing these checks for one server in the configuration, perform the checks for the other server. The results must be identical.

RXE cabling

The cabling to an RXE100 Expansion Enclosure should be as follows:

Primary Port A to **Secondary Port A**

Primary Port B to **RXE100 Side A**

Secondary Port B to **RXE100 Side B**

These connections can be verified with the following display (from the diagnostic program main menu, select ″Hardware Info″ and ″Summit Chips″). The primary display in the following example begins with ″Memory″:

```
================================================================================
      This_____   Connectd_to   Ext  Is     Has    Port      Trans  Recei  Error
  no  Chip_._Port  Chip_._Port   Int  Ready  Cable  Speed     Error  Error  Count
  --  -----------  -----------   ---  -----  -----  -----     -----  -----  -----
      Memory:
  07  Memory_1.P0  PCI-X__1.P0   Int  yes    yes    1000 MHz   no     no     00
  08  Memory_1.P1  PCI-X__2.P0   Int  yes    yes     500 MHz   no     no     00
  09  Memory_2.P0  PCI-X__2.P1   Int  yes    yes     500 MHz   no     no     00
  10  Memory_2.PB  RXE100_A.PA   Ext  yes    yes     500 MHz   no     no     00
      PCI-X:
  11  PCI-X__1.P0  Memory_1.P0   Int  yes    yes    1000 MHz   no     no     00
  12  PCI-X__1.PA  ...........   Ext  yes    yes     250 MHz   no     no     00
  13  PCI-X__2.P0  Memory_1.P1   Int  yes    yes     500 MHz   no     no     00
  14  PCI-X__2.P1  Memory_2.P0   Int  yes    yes     500 MHz   no     no     00
      RXE100:
  15  RXE100_A.PA  Memory_2.PB   Ext  yes    yes     500 MHz   no     no     00
  16  RXE100_A.P1  ...........   Int  yes    yes     250 MHz   no     no     00
================================================================================
```

In line number 12, Port A is shown as ″Ready″, but the ″Connected_to″ is unknown.

In line number 10, Port B is shown as ″Connected_to″ RXE100 Side A, Port A.

In line number 16, Port 1 is the internal port connecting to Side B, and it is ″Ready″.

The secondary display in the following example begins with ″Memory″:

```
================================================================================
     This_____    Connectd_to   Ext Is    Has   Port    Trans Recei Error
 no  Chip_._Port   Chip_._Port   Int Ready Cable Speed   Error Error Count
 --  -----------   -----------   --- ----- ----- -----   ----- ----- -----
     Memory:
 07  Memory_1.P0   PCI-X__1.P0   Int  yes   yes  1000 MHz  no    no    00
 08  Memory_1.P1   PCI-X__2.P0   Int  yes   yes   500 MHz  no    no    00
 09  Memory_2.P0   PCI-X__2.P1   Int  yes   yes   500 MHz  no    no    00
 10  Memory_2.PB   RXE100_B.PB   Ext  yes   yes   500 MHz  no    no    00
     PCI-X:
 11  PCI-X__1.P0   Memory_1.P0   Int  yes   yes  1000 MHz  no    no    00
 12  PCI-X__1.PA   ...........   Ext  yes   yes   250 MHz  no    no    00
 13  PCI-X__2.P0   Memory_1.P1   Int  yes   yes   500 MHz  no    no    00
 14  PCI-X__2.P1   Memory_2.P0   Int  yes   yes   500 MHz  no    no    00
     RXE100:
 15  RXE100_B.P1   ...........   Int  yes   yes   250 MHz  no    no    00
 16  RXE100_B.PB   Memory_2.PB   Ext  yes   yes   500 MHz  no    no    00
================================================================================
```

In line number 12, Port A is shown as ″Ready″, but the ″Connected_to″ is unknown.

In line number 10, Port B is shown as ″Connected_to″ RXE100 Side B, Port B.

In line number 15, Port 1 is the internal port connecting to Side A, and it is ″Ready″.

Testing the scalability and RXE cabling

There are 12 ports on each xSeries 445 chassis that can be tested:
1. The six scalability ports
2. The two RIOG ports (Port A and Port B)
3. The four ports on the Remote Expansion Enclosure:
   a. The two internal ports (Port A and Port B)
   b. The two internal ports (between Side A and Side B)

Depending on the BIOS determination of what is present on the system, some of the ports will not be selectable (greyed out), shown with a ″.........″:

Note: When starting the diagnostic programs, make sure that Esc is pressed on the primary server first (see step 2 on page 70 of "Starting the diagnostic programs" on page 70). The merge must be bypassed on the primary server first. If Esc is pressed on the secondary server first, some ports will be disabled, greying out the test for those ports.

- If SMP2 is not present, all 4 entries under SMP2 will be greyed out.
- If RXE100 is not present, all 4 RXE100 entries will be greyed out; or, if either side is not present, that side will be greyed out. (The SideB shown below is not present.)
- If the port being tested blocks access to the chip controlling that port, that entry will be greyed out. An example is shown below, ″RXE100, SideA Port″. Testing that port will drive traffic on the cable between SideA and the xSeries 445 so that the Summit chip on the RXE100 cannot be accessed to stop the test.

```
=====================================================================
  SMP1:  Scalability Port1       _____
         Scalability Port2       _____
         Scalability Port3       _____
         RXE Expansion Port A    _____
  SMP2:  Scalability Port1       _____
         Scalability Port2       _____
         Scalability Port3       _____
         RXE Expansion Port B    _____
  RXE100, SideA Port             ..........
  RXE100, from SideA to SideB    _____
  RXE100, from SideB to SideA    ..........
  RXE100, SideB Port             ..........
=====================================================================
```

Use the following procedure to test any of these 12 ports:

1. Turn on pinging for two seconds.
2. Count the pings issued, the pings received, and the errors received.

A port passes this test if both:

1. The port error status indicates:
   a. no transmit errors
   b. no receive errors
2. The percentage-good determined by (pings received) divided by (pings issued) is greater than 98%.

However, a test can fail for many reasons. These checks are made just before the pinging is set to start:

1. The port is not initialized.
2. The port has no cable.
3. The cabling detected by BIOS during POST is invalid.

Each failure shows a display of what the error is (for approximately three seconds).

Recovering BIOS code

If the BIOS code has become damaged, such as from a power failure during a flash update, the server might not restart correctly or might not display video (no video). You can recover the BIOS code using the BIOS code page jumper and a BIOS flash diskette.

Note: You can download a BIOS flash diskette from the World Wide Web.

- Use the ServerGuide program to make a BIOS flash diskette. Go to http://www.ibm.com/pc/support/, click **IBM Server Support**, and make the selections for the server.

To recover the BIOS code:

1. Turn off the server and peripheral devices and disconnect all external cables and power cords; then, remove the cover (see "Opening the cover" on page 82).
2. Remove fans 3 and 4 (see "Replacing fans 3 and 4" on page 123).
3. Locate the boot recovery (BIOS) jumper (J28) on the I/O board.

Jumper (J28)
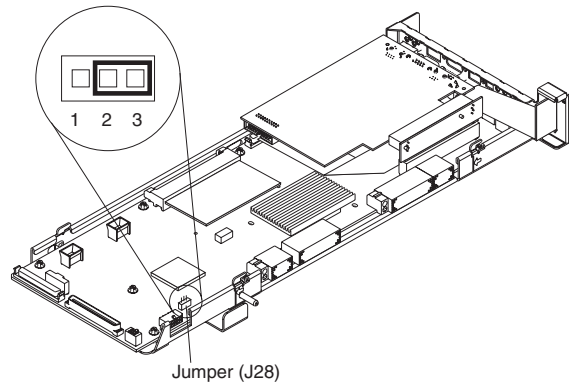
4. Move the jumper from pins 1 and 2 to pins 2 and 3 to enable the BIOS back page.

5. Reconnect all external cables and power cords and turn on the peripheral devices.

6. Insert the BIOS flash diskette into the diskette drive.

7. Restart the server. The system begins the power-on self-test (POST) and BIOS flash.

8. Select **1 - Update POST/BIOS** from the menu that contains various flash (update) options.

9. When prompted as to whether you want to save the current code to a diskette, press N.

10. When prompted to choose a language, select a language (from 0 to 7) and press Enter to accept your choice.

11. Do not restart the system at this time.

12. Remove the BIOS flash diskette from the diskette drive.

13. Turn off the server.

14. Move the jumper on J28 to pins 1 and 2 to return to normal startup mode.

15. Replace fans 3 and 4 (see "Replacing fans 3 and 4" on page 123).

16. Restart the server.

17. Replace the cover (see "Closing the cover" on page 125).

Ethernet controller troubleshooting

The method of testing the Ethernet controller depends on which operating system is being used (see the Ethernet controller device driver README file).

You can use the Ethernet wrap test to determine if a hardware problem is causing the Ethernet connection to fail. To perform the Ethernet wrap test, use the wrap plug (FRU 48P9494) with the diagnostic tests.

Note: The wrap plug connects to the Ethernet port. Do not connect the wrap plug to the serial port of the Remote Supervisor Adapter.

If the problem still exists after checking the operating system documentation, try the following:
- Make sure that the cable is installed correctly.

  The network cable must be securely attached at all connections. If the cable is attached but the problem remains, try a different cable.

  If you set the Ethernet controller to operate at 100 Mbps, you must use Category 5 cabling.

  If you directly connect two workstations (without a hub), or if you are not using a hub with X ports, use a crossover cable.

  Note: To determine whether a hub has an X port, check the port label. If the label contains an *X*, the hub has an X port.
- Determine if the hub supports auto-negotiation. If not, try configuring the integrated Ethernet controller manually to match the speed and duplex mode of the hub.
- Check the Ethernet controller lights on the server rear panel.

  These lights indicate whether a problem exists with the connector, cable, or hub.
  - The Ethernet Link Status light illuminates when the Ethernet controller receives a LINK pulse from the hub. If the light is off, there might be a defective connector or cable, or a problem with the hub.
  - The Ethernet Transmit/Receive Activity light illuminates when the Ethernet controller sends or receives data over the Ethernet Network. If the Ethernet Transmit/Receive Activity light is off, make sure that the hub and network are operating and that the correct device drivers are loaded.
- Check the LAN activity light (if available) on the rear of the server. The LAN activity light is illuminated when data is active on the Ethernet network. If the LAN activity light is off, make sure that the hub and network are operating and that the correct device drivers are loaded.
- Make sure that you are using the correct device drivers, which are supplied with the server.
- Check for operating-system-specific causes for the problem.
- Make sure that the device drivers on the client and server are using the same protocol.

If the Ethernet controller still cannot connect to the network, inform the network administrator.

Chapter 4. Installing options

This chapter provides instructions to help you install options in the server. Some option-removal instructions are provided in case you need to remove one option to install another. For a list of supported options for the server, see the ServerProven® list at http://www.ibm.com/pc/compat/.

Installation guidelines

Before you begin to install options in the server, read the following information:

- Become familiar with the information provided in "Handling static-sensitive devices" on page 80, and "Safety information" on page 257. These guidelines will help you work safely with the server and options.
- Make sure that you have an adequate number of properly grounded electrical outlets for the server, monitor, and other devices that you will connect to the server.
- Back up all important data before you make changes to disk drives.
- Have a small flat-blade screwdriver available.
- You do not need to turn off the server to install or replace hot-swap power supplies, hot-swap fans, or hot-plug Universal Serial Bus (USB) devices.
- Blue on a component indicates touch points, where a you can grip t he component to remove it from or install it in the server, open or close a latch, and so on.
- Orange on a component or an orange label on or near a component indicates that the component can be hot-swapped, which means that if the server and operating system support hot-swap capability, you can remove or install the component while the server is running. (Orange can also indicate touch points on hot-swap components.) See the instructions for removing or installing a specific hot-swap component for any additional procedures that you might have to perform before you remove or install the component.
- For a list of supported options for the server, go to http://www.ibm.com/pc/compat/.

Working inside the server with power on

The server supports hot-swap devices and is designed to operate safely while turned on with the cover removed. Follow these guidelines when you work inside a server that is turned on:

- Avoid loose-fitting clothing on your forearms. Button long-sleeved shirts before working inside the server; do not wear cuff links while you are working inside the server.
- Do not allow your necktie or scarf to hang inside the server.
- Remove jewelry, such as bracelets, rings, necklaces, and loose-fitting wrist watches.
- Remove items from your shirt pocket, such as pens or pencils, that could fall into the server as you lean over it.
- Avoid dropping any metallic objects, such as paper clips, hairpins, and screws, into the server.

Handling static-sensitive devices

Attention: Static electricity can damage electronic devices and the server. To avoid damage, keep static-sensitive devices in their static-protective packages until you are ready to install them.

To reduce the possibility of damage from electrostatic discharge, observe the following precautions:

- Limit your movement. Movement can cause static electricity to build up around you.
- Handle the device carefully, holding it by its edges or its frame.
- Do not touch solder joints, pins, or exposed printed circuitry.
- Do not leave the device where others can handle and damage it.
- While the device is still in its static-protective package, touch it to an unpainted metal part of the server for at least 2 seconds. This drains static electricity from the package and from your body.
- Remove the device from its package and install it directly into the server without setting it down. If it is necessary to set down the device, put it back into its static-protective package. Do not place the device on the server cover or on a metal surface.
- Take additional care when handling devices during cold weather. Heating reduces indoor humidity and increases static electricity.

System reliability considerations

To help ensure proper cooling and system reliability, make sure that:

- Each of the drive bays has a drive or a filler panel and electromagnetic compatibility (EMC) shield installed in it.
- If the server has only one symmetrical multiprocessing (SMP) Expansion Module installed ensure that the SMP baffle is installed during normal operation.
- There is adequate space around the server to allow the server cooling system to work properly. Leave approximately 50 mm (2.0 in.) of open space around the front and rear of the server. Do not place objects in front of the fans.
- Do not leave open spaces above or below an installed server in a rack cabinet. To prevent damage to server components, always install a blank filler panel to cover the open space and to ensure proper air circulation.
- You have followed the cabling instructions that come with optional adapters.
- You have replaced a failed fan within 48 hours.
- You have replaced a hot-swap drive within 2 minutes of removal.
- Microprocessor socket 4 always contains either a microprocessor baffle or a microprocessor and heat sink.

Major components of the xSeries 445

The following illustration shows the locations of major components in the server.

Note: The illustrations in this document might differ slightly from your hardware.
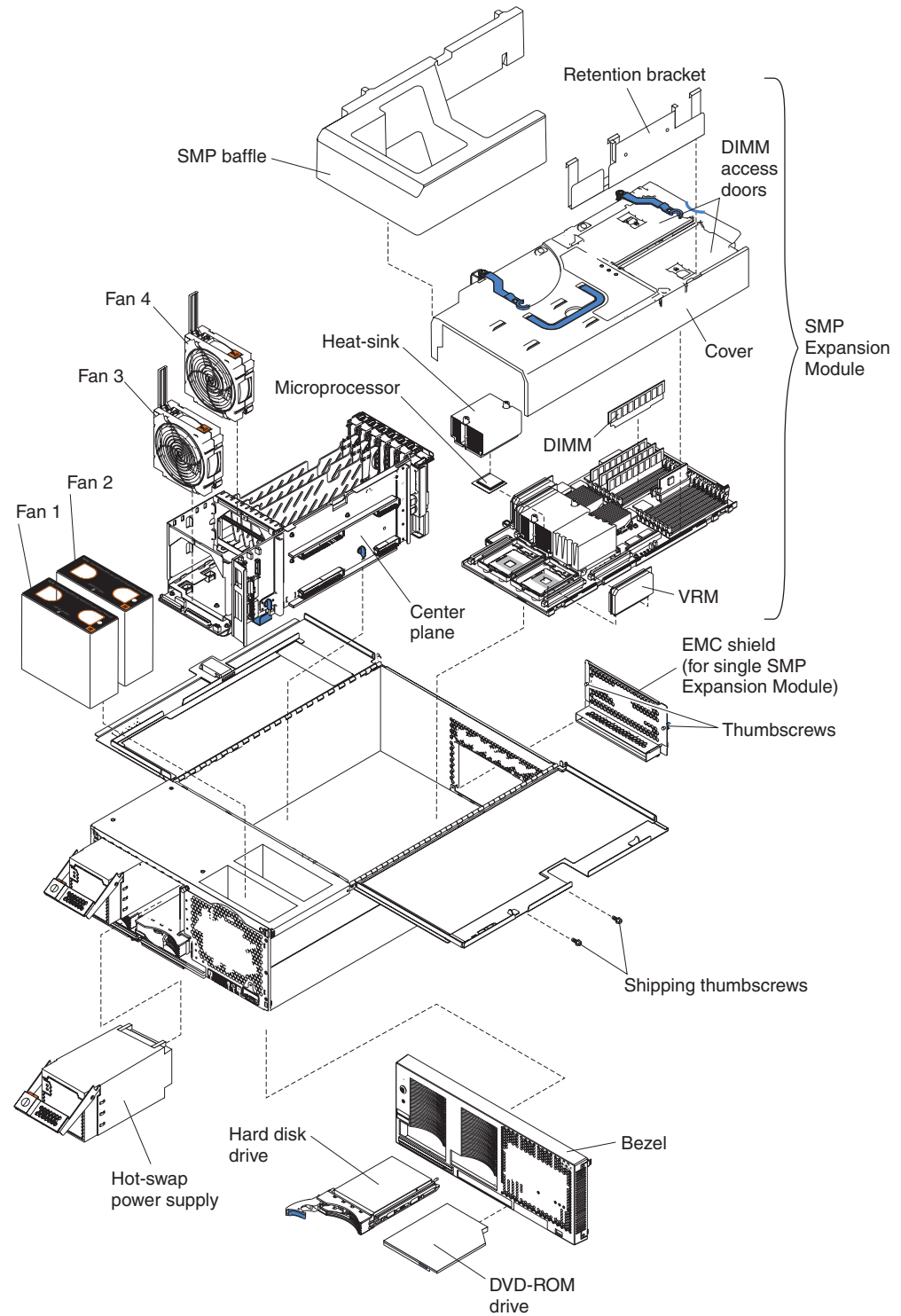
Figure 29. Major components of the xSeries 445

Opening the cover

Complete the following steps to open the server cover:

1. Review the information in Working inside the server with power on, "Safety information" on page 257, and "Installation guidelines" on page 79.

2. Pull out on the quick release latches on each side of the server; then, pull the server out of its rack enclosure until it stops.
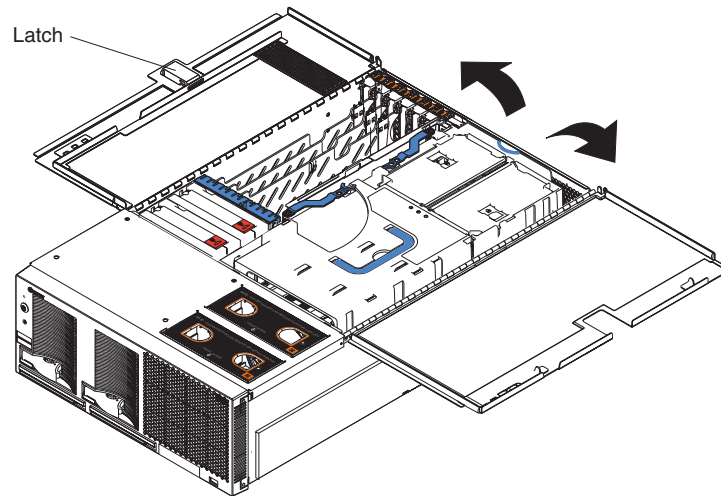
Latch

Figure 30. Opening the cover

3. Pull the release latch on the left half of the top cover to the right.

4. Using the finger hole in the release latch, open the left half of the cover; then, open the right half of the cover.

   Attention: For proper cooling and airflow, close the cover before turning on the server. Operating the server for extended periods of time (more than 30 minutes) with the cover open might damage server components.

Removing and replacing the bezel

Complete the following steps to remove and replace the server bezel:
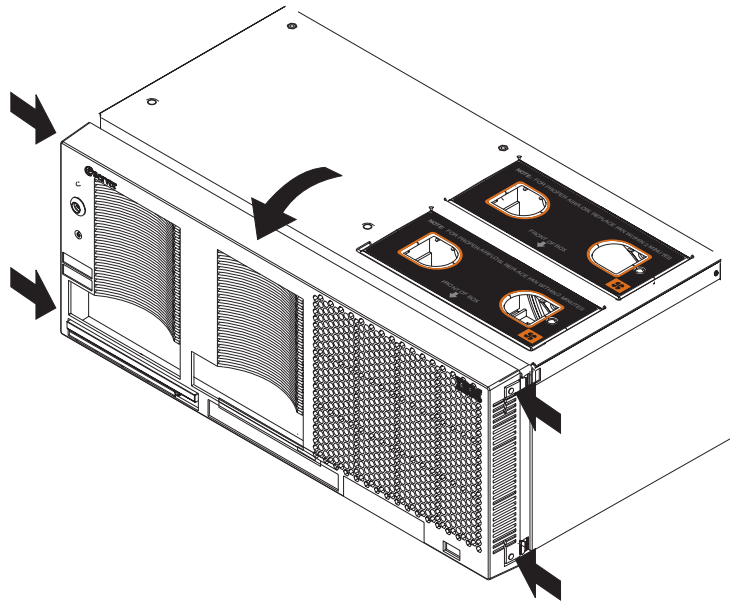
Figure 31. Removing the bezel

1. Remove the bezel.
   a. Press on the two tabs at the top edge of the bezel, and pull the top of the bezel slightly away from the server.
   b. Press on the two tabs at the bottom edge of the bezel, and pull the bezel off the server. Store the bezel in a safe place.
2. Replace the bezel.
   a. Align the four tabs with the slots in the server chassis.
   b. Press firmly against the front of the bezel until it snaps into place.

Removing and replacing a hot-swap power supply

The two hot-swap power supplies in the server can be removed and replaced without turning off the server. This section provides instructions for removing and installing the hot-swap power supplies.The following notes and safety information contains information you must consider when removing or installing a hot-swap power supply:

- During normal operation, both power supplies must be installed for proper operation and cooling.
- The xSeries 445 server requires a 220 V power connection for full power-supply redundancy. Whenever possible, use a 220 V connection for all configurations. However, you can use a 110 V connection, but without power-supply redundancy.
- If the server power supplies are not running redundantly, a power supply LED will be lit on the Light Path panel (see "Light path LED errors" on page 190).

Statement 8

CAUTION:
Never remove the cover on a power supply or any part that has the following label attached.

Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.

Power light — Power supply 1
Power supply 2
Power-on light
Power button
Reset button
Power supply latch
Handle
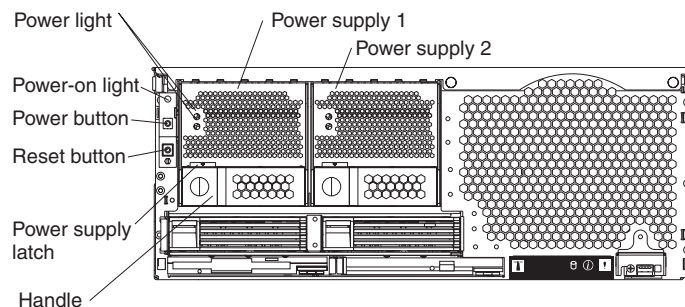
Figure 32. Hot-swap power supply

Complete the following steps to remove and replace a power supply:

1. Review the information in "Installation guidelines" on page 79 and "Safety information" on page 257.

2. Remove the front bezel (see "Removing and replacing the bezel" on page 83 for instructions on removing the front bezel).

Hot-swap
power supply

Release latch

AC LED

DC LED

Power supply handle
(in open position)
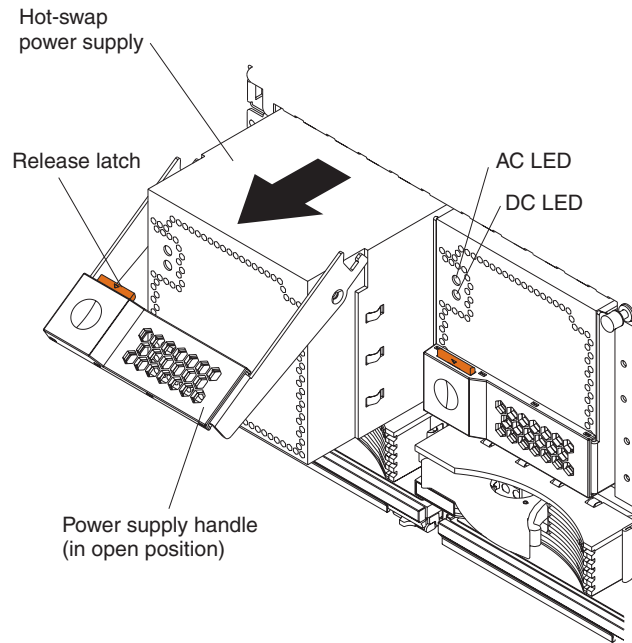
Figure 33. Removing a power supply

3. Press the release latch; then, lift the handle on the power supply to the open position and remove the power supply.

Hot-swap
power supply

Release latch

AC LED

DC LED

Power supply handle
(in open position)
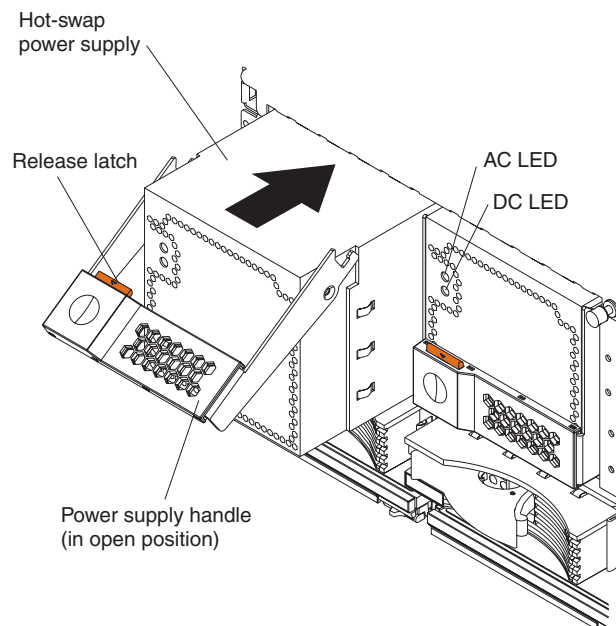
Figure 34. Installing a power supply

4. Install the new power supply:
   a. Place the handle on the power supply in the open position.
   b. Slide the power supply into the chassis and press the handle to the closed position.

5. Verify that the dc power LED and the ac power LED on the power supply are lit, indicating that the power supply is operating properly.
6. Replace the front bezel on the server (see "Removing and replacing the bezel" on page 83 for instructions).

PCI and PCI-X adapters

The following notes describe the types of adapters that the server supports and other information that you must consider when installing an adapter:

Note: The illustrations in this document might differ slightly from your hardware.
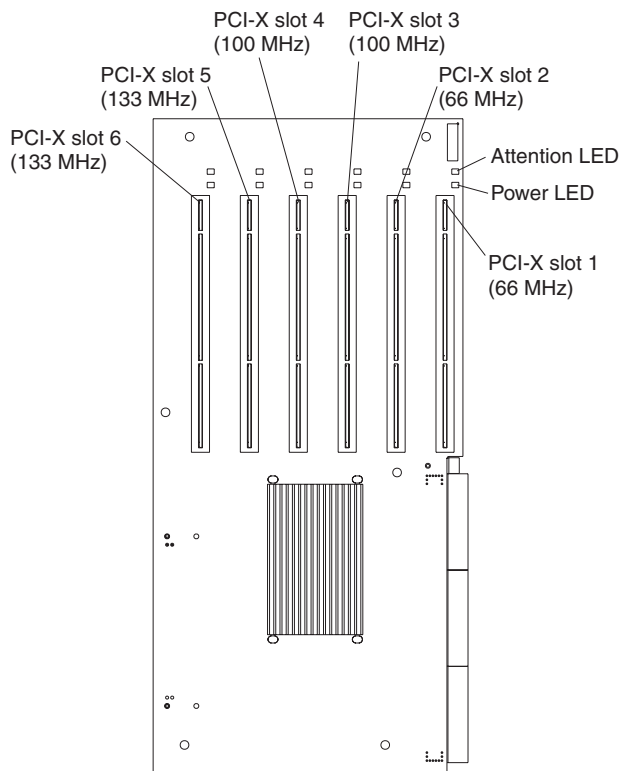
Figure 35. PCI-X slots

PCI and PCI-X adapter considerations

Before you install adapters, review the following:
- Locate the documentation that comes with the adapter and follow those instructions in addition to the instructions in this chapter.
- If you need to change the switch settings or jumper settings on your adapter, follow the instructions that come with the adapter.
- Video adapters are not supported.
- Some long adapters have extension handles or brackets installed. Before installing the adapter, you must remove the extension handle or bracket.
- The server uses a rotational interrupt technique to configure PCI-X adapters. You can use this technique to install PCI-X adapters that currently do not support sharing of PCI-X interrupts.

- The server scans devices and PCI-X slots to assign system resources in the following order: DVD-ROM drive; disk drives; integrated SCSI devices; PCI-X slots 1, 2, 3, 4, 5, 6; and the integrated Ethernet controller. If an RXE-100 enclosure is attached to the server, the scan continues in sequence with PCI slots 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, and 18.

  Note: The POST/BIOS settings control the scanning order of the adapters in the PCI-X slots. However, if multiple (like) adapters from a single vendor are installed, the first installed adapter will control the ROM space for all additional like adapters that may be added at a later time. This action overrides the scan sequence set in the POST/BIOS. Some ServeRAID adapters have this impact on the scan sequence.

- You can use the Configuration/Setup Utility program to change the sequence and have the server scan one of the first six PCI slots before it scans the integrated devices. You cannot change the scan sequence of the PCI slots in an RXE-100 enclosure.

- You can install both PCI and PCI-X adapters in the same bus. However, if you install a PCI adapter and a PCI-X adapter in the same bus, the PCI-X features of the PCI-X adapter will be disabled and the adapter will function as a PCI adapter.

- You can install PCI or PCI-X adapters of speeds faster than what is labeled for a particular PCI-X bus. For example, if you install two 133 MHz adapters into slots that are labeled as 100 MHz slots, the adapters will operate at 100 MHz.

- If you install a 33 MHz and a 66 MHz adapter in the same bus, the bus speed will match that of the slowest adapter.

- If a single 133 MHz adapter is installed in PCI-X Bus B (slot 3 and 4), and the other slot in PCI-X Bus B is empty, the adapter will operate at 133 MHz.

- The server supports six hot-plug 64-bit adapters in the expansion slots located on the PCI-X board.

  Note: You can add up to 12 PCI-X slots to the server by connecting the server to a remote I/O expansion enclosure. For more information about the expansion enclosure and how to connect the server to it, see the documentation that comes with your expansion enclosure.

Bus	Slot	Supported adapter speed (MHz)
A	1	66
A	2	66
B	3	100 (133 if slot 4 is empty)
B	4	100 (133 if slot 3 is empty)
C	5	133
D	6	133

- The server supports 3.3 V adapters; it does not support 5.0 V adapters.
- Do not install a PCI-X adapter in PCI-X slot 1 if you are going to install the serial port that comes with the server. See "Installing the serial port" on page 91 for instruction for installing the serial port.

Complete the following steps to install an adapter:

1. Review the information in "Safety information" on page 257, Working inside the server with power on, and "Handling static-sensitive devices" on page 80.

2. Use the operating system to disable the Active PCI-X slot; then, insert or remove a hot-plug PCI or PCI-X adapter. Some operating systems do not support the enabling and disabling of a PCI-X slot. If your operating system does not support this function, then turn off the server, and disconnect all external cables and power cords before proceeding.

3. Pull out on the quick release latches on each side of the server; then, pull the server out of its rack enclosure until it stops.

4. Open the top cover.

   Note: Inside the server there are six PCI-X slots: two 66 MHz, two 100 MHz, and two 133 MHz. Before attempting to install a new adapter, be sure there is an available slot for it. If you need additional PCI-X slots, you can purchase a Remote Expansion Enclosure either from your IBM marketing representative or authorized reseller.
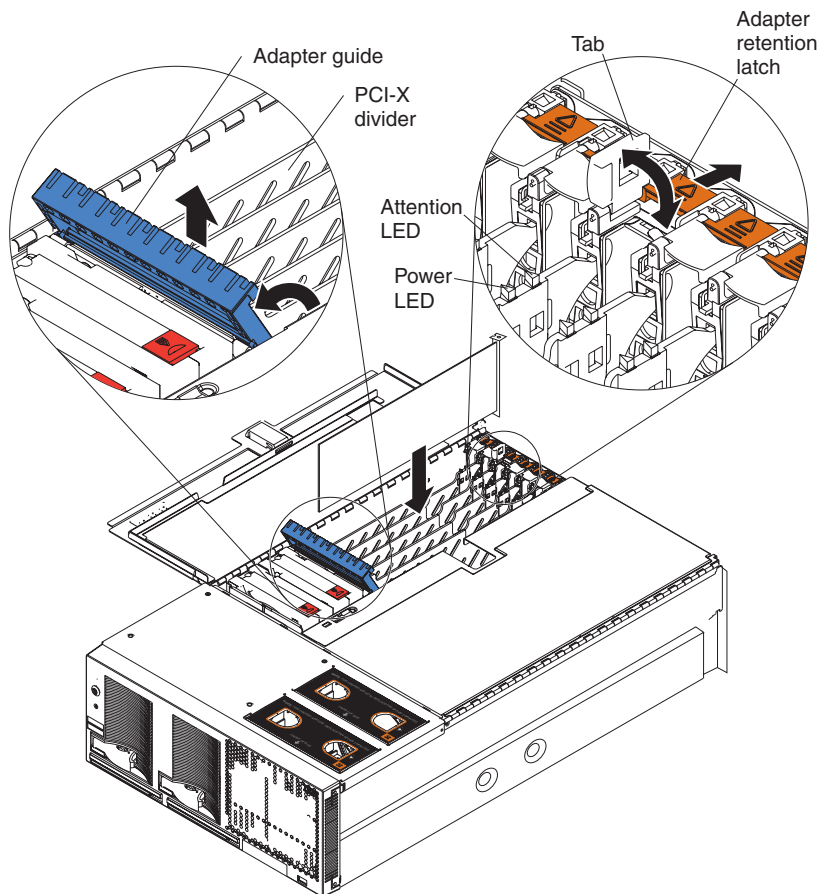
Figure 36. PCI-X slot components

5. See the documentation that comes with your adapter for any cabling instructions; then, set any jumpers or switches as described by the adapter manufacturer.

   Note: Route adapter cables before you install the adapter.

6. Install the adapter:

   a. Open the blue adapter guide by lifting the front edge, as shown in the illustration.

   b. Push the orange adapter retention latch toward the rear of the server and open the tab.

   c. Remove the expansion-slot cover. If you are hot-swapping a PCI or PCI-X adapter do not remove the PCI-X divider.

   d. Carefully grasp the adapter by its top edge or upper corners and align it with the connector on the I/O board.

   e. If necessary remove the extension handles or bracket before installing a long adapter.

      Attention: When you install an I/O adapter, be sure the adapter is correctly seated in the connector slot. Improperly seated adapters might cause damage to the board, the riser card, or the adapter.

   f. Press the adapter *firmly* into the adapter connector.

   g. If they were removed, reinstall the PCI-X dividers between the Active PCI-X adapter slots.

   h. Push down on the blue adapter guide to keep the adapter steady.

   i. Close the tab; then, push down on the orange adapter retention latch until it clicks into place, securing the adapter.

7. Connect the internal cables to the adapter. If you are installing a ServeRAID adapter, see "Cabling a ServeRAID adapter" for instructions.

8. If you have other options to install or remove, do so now.

9. Close the cover on the server; then, reinstall the server in the rack and connect all external cables.

10. Enable the slot or turn on the server, depending on your operating system.

Cabling a ServeRAID adapter

Some xSeries 445 models come with an optional IBM ServeRAID adapter installed to control the internal hot-swap hard disk drives and external hard disk drives. If the server did not come with an optional IBM ServeRAID adapter installed; then, see your ServeRAID adapter option documentation for complete instructions on installing a ServeRAID adapter in the server and for additional information on ServeRAID adapters.

Servers without an optional IBM ServeRAID adapter installed come with two SCSI cables:

• One end of the first SCSI cable is attached to the connector on the SCSI backplane, and the other end is attached to the connector for the integrated SCSI controller behind fans 3 and 4.

• The second SCSI cable is preinstalled along the inside of the server chassis and both ends are loose inside the server. When you install a ServeRAID adapter, you will connect this cable to the adapter and the SCSI backplane on the I/O board.

The following procedure describes the internal cabling needed to install a ServeRAID adapter.

Important: When installing multiple ServeRAID adapters in a server that has the PCI-X slot enabled for high scan (boot) priority, ensure that the ServeRAID adapter controlling the startup (boot) drive is installed in a PCI slot that is scanned before the PCI slots that contain the other ServeRAID adapters. See "PCI and PCI-X adapters" on page 86.

Complete the following steps to cable the ServeRAID adapter.

 1. Review the information in "Safety information" on page 257 and "Installation guidelines" on page 79.
 2. Turn off the server and disconnect all power cords and external cables; then, open the server cover (see "Opening the cover" on page 82).
 3. Remove fans 3 and 4, which are located just behind the PCI-X slots.
 4. Disconnect the short SCSI cable from the SCSI backplane and the integrated SCSI controller on the I/O board; then, store this short cable in a safe place for future use.
 5. Install the ServeRAID adapter in a PCI-X slot (see "PCI and PCI-X adapters" on page 86).
 6. Locate one end of the preinstalled SCSI cable and connect it to the ServeRAID adapter.
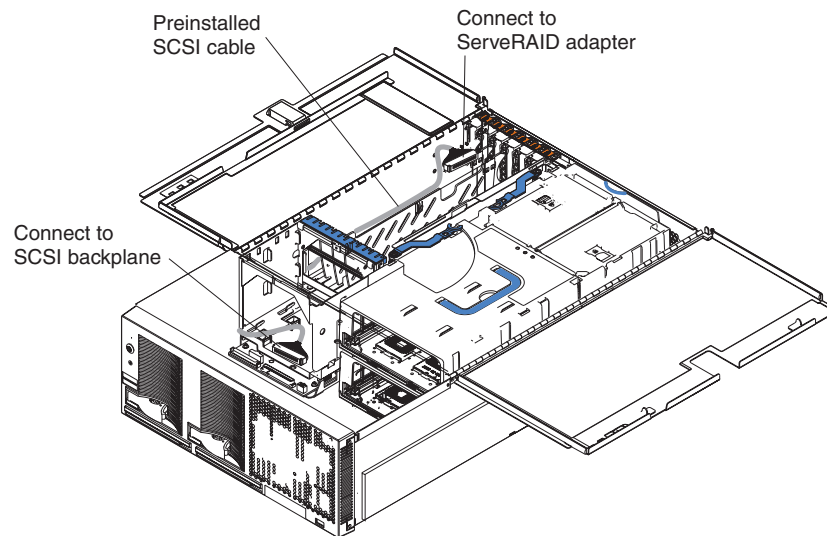
Figure 37. Location of preinstalled SCSI cable

 7. Locate the other end of the preinstalled SCSI cable and connect it to the SCSI backplane on the I/O board.

Front of server

SCSI backplane
connector
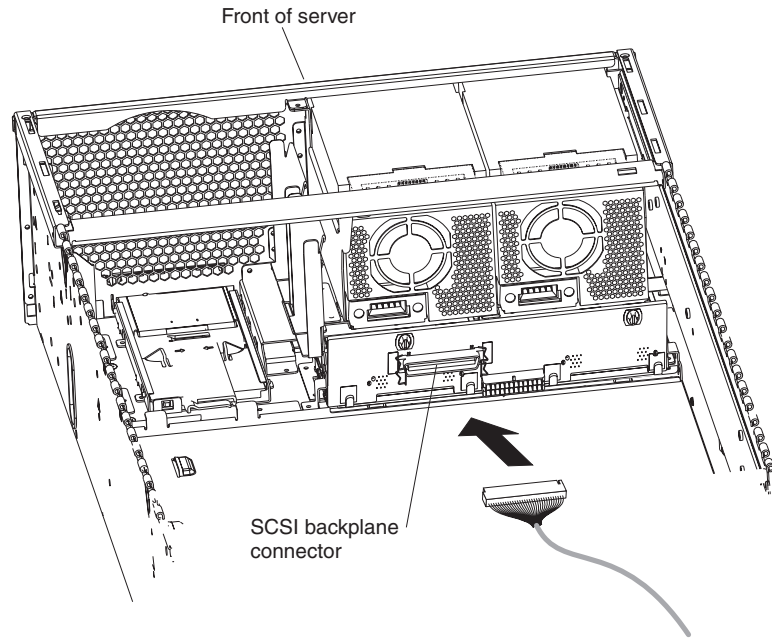
Figure 38. Connecting the SCSI cable to the SCSI backplane

8. Reinstall fans 3 and 4.
9. If you have other options to install or remove, do so now.
10. Close the cover on the server; then, reinstall the server in the rack and connect all external cables.
11. Turn on the server.

Installing the serial port

Included with the server is a serial port that you can install at any time. This section provides the instructions for installing the serial port.

Note: The serial port will occupy PCI-X slot one.

Complete the following steps to install the serial port.

1. Review the information in "Safety information" on page 257 and "Installation guidelines" on page 79.
2. Pull out on the quick release latches on each side of the server; then, pull the server out of its rack enclosure until it stops.
3. Open the top cover.
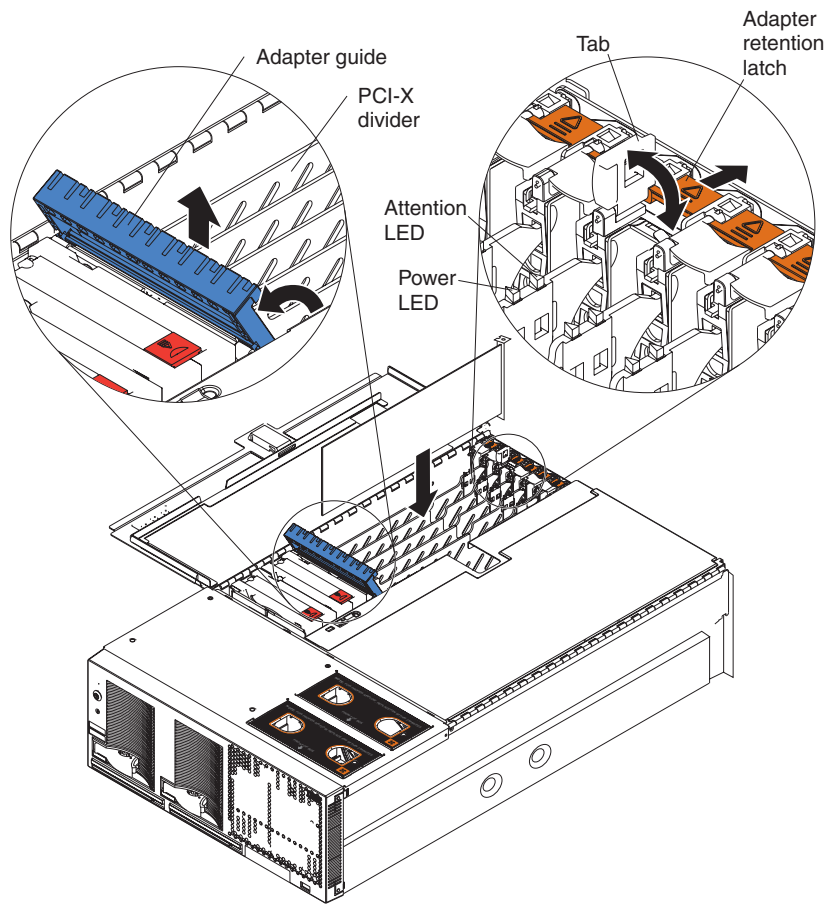
Figure 39. PCI-X slot components

4. Open the blue adapter guide by lifting the front edge, as shown in the illustration.

5. Remove the PCI-X slot cover and the PCI-X divider from slot one.
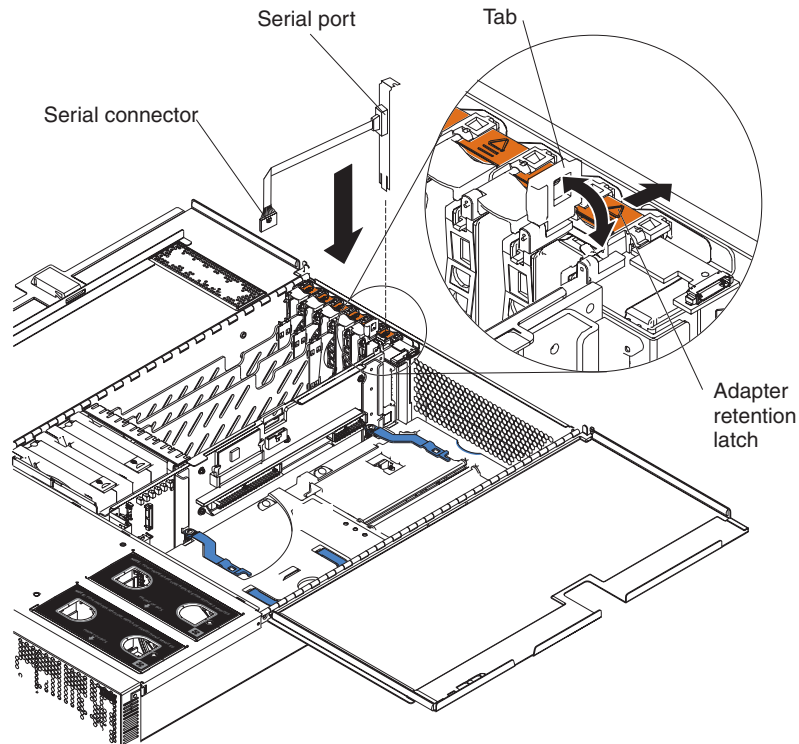
Figure 40. Insert the serial port into PCI-X slot 1

6. Insert the serial port into the opening.
7. Close the tab; then, push down on the orange adapter retention latch until it clicks into place.
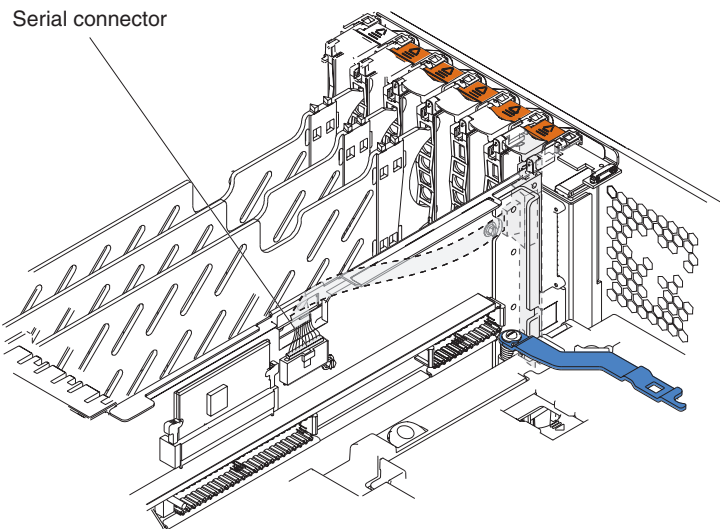
Figure 41. Route the serial port ribbon cable through the slot

8. Route the ribbon cable through the lower slot in the center of the server.
9. Connect the serial port's ribbon cable to the connector on the center plane.
10. If you have other options to install or remove, do so now.
11. Close the top cover.

12. Slide the server into the rack enclosure until it stops; then, secure the server in the rack enclosure using the quick release latches.

13. Connect all external cables and turn on the server.

Note: Use the Configuration/Setup Utility program to configure the serial port.

Installing or replacing a drive

This section provides the instructions for installing and replacing a hot-swap hard disk drive, diskette drive, and DVD-ROM drive.

Hot-swap hard disk drive

Attention: When you handle static-sensitive devices, take precautions to avoid damage from static electricity. For details on handling these devices, see "Handling static-sensitive devices" on page 80.

The following steps describe how to install or replace a hot-swap hard disk drive.

Note: Hard disk drives can only be hot-swapped if hard drive mirroring, such as that available with RAID, is in effect.

1. Inspect the drive for any signs of damage.

2. Review the information in "Installation guidelines" on page 79 and "Safety information" on page 257.

3. Check the instructions that come with the drive for more information about installing your drive.

4. Remove the filler panel or defective hard disk drive from the hard disk drive bay.

5. Install the new hard disk drive in the drive bay:

    a. Ensure that the handle on the hard disk drive tray is in the open position.

    b. Slide the drive into the bay until it stops.

    c. Push the handle on the front of the hard disk drive closed.

Filler panel
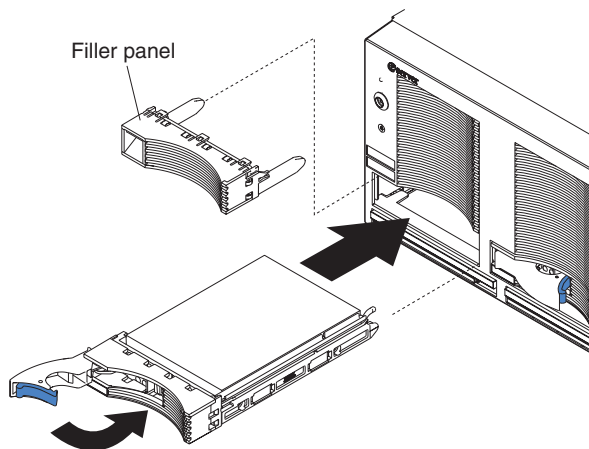
Figure 42. Installing a hard disk drive

Note: When the hard disk drive activity LED is on, it indicates that the hard disk drive is in use. When the drive is connected to the integrated SCSI controller with RAID capabilities, a flashing status LED indicates that the drive is a secondary drive in a mirrored pair and the drive is being synchronized. When the drive is connected to an optional ServeRAID controller, a slowly flashing (one flash per second) status LED indicates that the drive is being rebuilt. When the LED is flashing rapidly (three flashes per second), it indicates that the controller is identifying the drive.

6. If you have other options to install or remove, do so now.

Diskette drive

The following notes contain information that you must consider when installing diskette drive:

- Your xSeries 445 server supports the installation of up to two diskette drives.
- If only one diskette drive is installed, it must be installed in the drive bay on the right.

Complete the following steps to remove and install a diskette drive in the server:

1. Review the information in "Installation guidelines" on page 79 and "Safety information" on page 257.

    Attention: The IDE drives installed in the server are not hot-swappable.

2. Turn off the server and disconnect the power cord from the back of the server.

3. Push the diskette drive eject button to the right.

4. Using the tab, pull the diskette drive partially out of the server; then, grasp the drive and remove it from the server.

5. Install the new diskette drive:

    a. Inspect the drive for any signs of damage.

    b. Slide the drive into the left drive bay until it stops.

    Note: In the unlikely event that no other IDE drives are installed, the diskette drive must be installed in the external removable media bay on the right.

External removable
media bays

Diskette
drive

Diskette drive
eject button

Tab
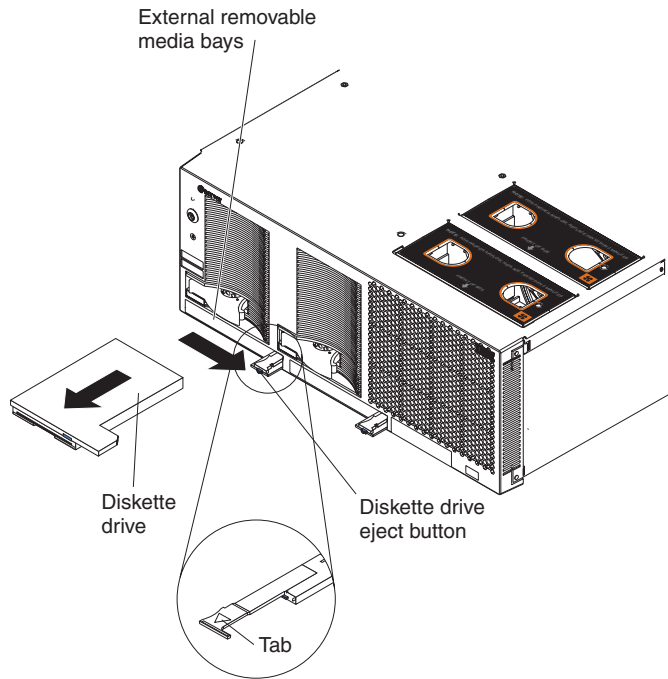
Figure 43. Installing a diskette drive

6. If you have other options to install or remove, do so now. Otherwise, connect the power cords and turn on the server.

DVD-ROM drive

The following notes contain information that you must consider when installing a DVD-ROM:

- Your xSeries 445 server supports the installation of up to two DVD-ROM drives.
- If no other IDE drives are installed, the diskette drive must be installed in the right external removable media bay. CD-ROM or DVD-ROM drives can be installed in either external removable media bay.

Complete the following steps to remove and install a DVD-ROM drive in the server:

1. Review the information in "Installation guidelines" on page 79 and "Safety information" on page 257.

   Attention: The IDE drives installed in the server are not hot-swappable.

2. Turn off the server and disconnect the power cords from the back of the server.

3. Push the DVD-ROM eject button to the right.

4. Using the tab, pull the DVD-ROM drive partially out of the server; then, grasp the drive and remove it from the server.

5. Install the new DVD-ROM drive:

   a. Inspect the drive for any signs of damage.

   b. Slide the DVD-ROM drive into the drive bay until it stops.

External removable
media bays

DVD-ROM drive

DVD-ROM drive
eject button

Tab
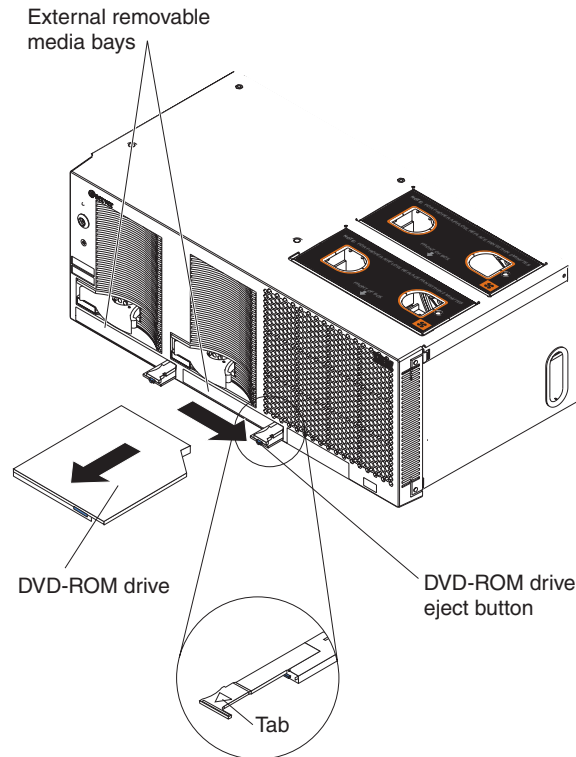
Figure 44. Installing a DVD-ROM drive

6. If you have other options to install or remove, do so now. Otherwise, connect the power cords and turn on the server.

SMP Expansion Module

The SMP Expansion Module contains the XceL4 system cache, DIMMs, microprocessors, and voltage regulator modules (VRMs). This section provides instructions for removing and installing the SMP Expansion Module, microprocessors, VRMs, and DIMMs.

The following notes describe components in the SMP Expansion Module and other information that you must consider when installing an SMP Expansion Module:

*   Use two hands to install or remove an SMP Expansion Module. Do not allow the expansion module to come in contact with the center planar while lifting it out or putting into the server.
*   For the server to operate properly, there must be a minimum of one SMP Expansion Module installed.
*   An SMP Expansion Module must contain at least one microprocessor and two DIMMs.
*   If there is only one SMP Expansion Module installed in the server, an SMP baffle must be installed in place of the upper SMP Expansion Modules to ensure proper cooling of the server.
*   When the minimum number of microprocessors is installed in the SMP Expansion Module, a microprocessor baffle must be installed in microprocessor socket 4 to ensure proper cooling within the server.

- Before removing or installing SMP Expansion Modules, you must remove the retention bracket or brackets and electromagnetic compatibility (EMC) shield from the rear of the server, and remove any scalability cables.
- You must run the Configuration/Setup Utility program whenever you remove or replace an SMP Expansion Module or one of its associated options.
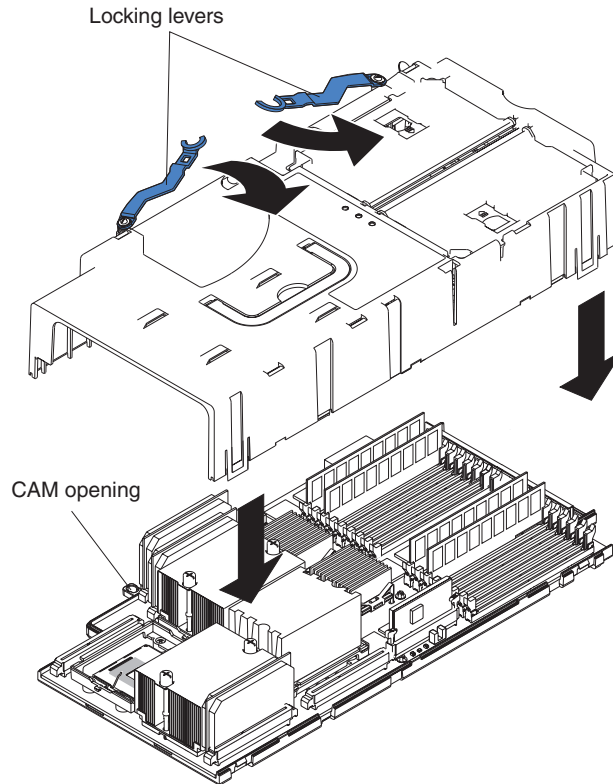
Figure 45. Complete SMP Expansion Module

Removing and Installing the SMP Expansion Module and cover

This section describes how to remove and install an SMP Expansion Module and its cover.

Removing the SMP Expansion Module and cover

Complete the following steps to remove an SMP Expansion Module from the server and to remove the SMP Expansion Module cover:

1. Review the information in "Installation guidelines" on page 79, and "Safety information" on page 257.
2. Turn off the server and peripheral devices, disconnect the power cords and all external cables from the SMP Expansion Module.
3. Pull out on the quick release latches on each side of the server; then, pull the server out of its rack enclosure until it stops.
4. Open the top cover.
5. If necessary, remove the SMP baffle.

6. Remove the retention bracket or brackets from the server:
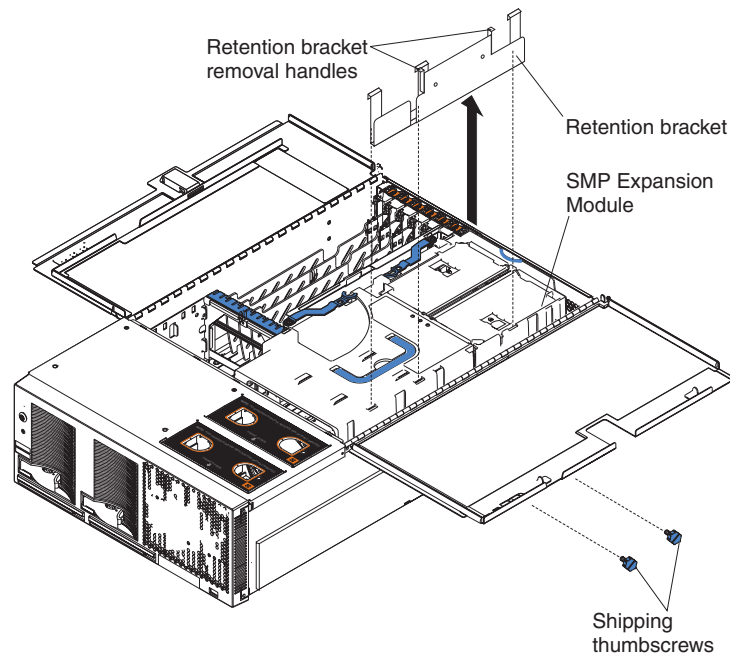
Figure 46. Removing the retention bracket and shipping thumbscrews

    a. Remove the shipping thumbscrews from the right side of the server.

       Note: There are two shipping thumbscrews per retention bracket.

    b. Grasp the retention bracket by the removal handles and lift it up and out of the server. Store the retention bracket or brackets in a safe place for use later.

       Note: If there is one SMP Expansion Module installed, you will need to remove the SMP baffle from the server; then, remove the retention bracket from the lower SMP Expansion Module as described in steps 3a and 3b.
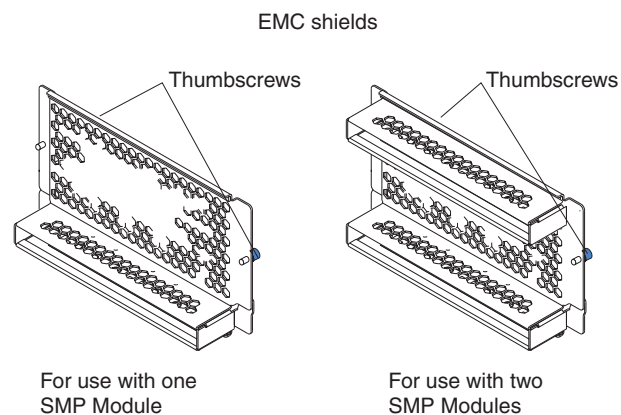
Figure 47. EMC shields

7. Remove the EMC shield from the server.
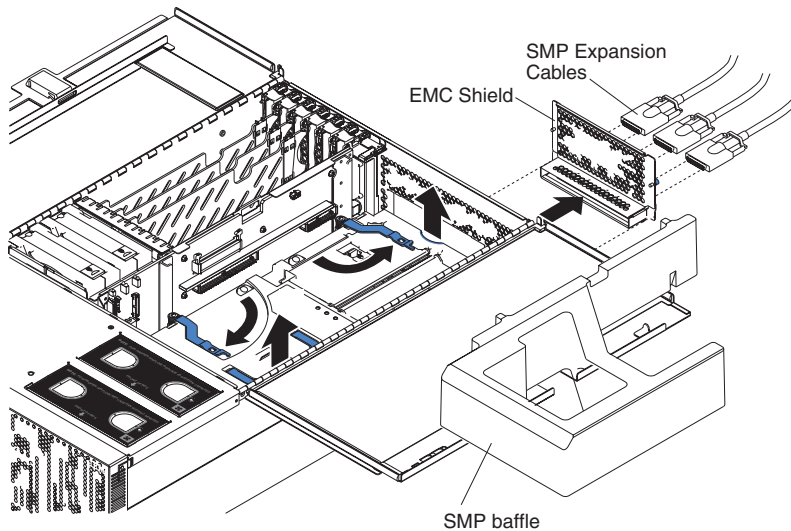
Figure 48. Removing the EMC shield

a. If necessary, disconnect the SMP Expansion cables that are connected to the SMP Expansion Modules.
b. Loosen the blue thumbscrews holding the EMC shield to the server.
c. Remove the EMC shield from the rear of the server.
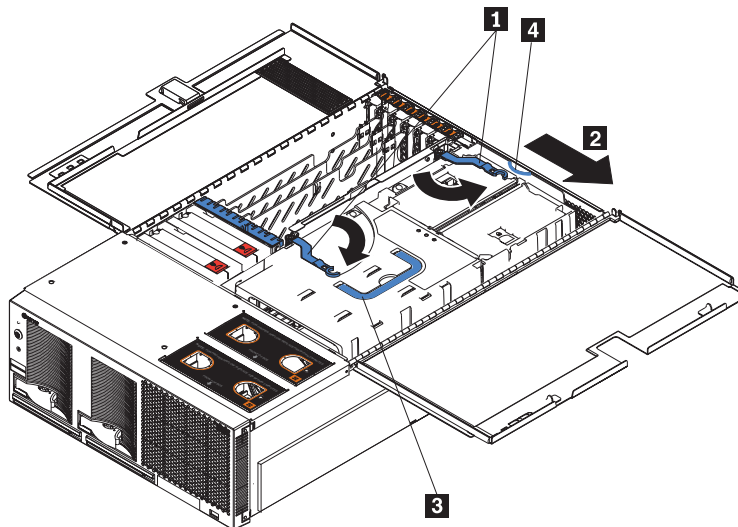
Figure 49. Rotate the locking levers to remove the SMP Expansion Module

8. Grasp each of the locking levers (**1**) on the top of the SMP Expansion Module, and lift them up slightly.
9. Working from the right side of the server, rotate the two locking levers (**1**) toward you until they are fully extended, as shown.
10. Slide (**2**) the SMP Expansion Module away from the center plane slightly, toward the right side of the server.

   Attention: When removing the SMP Expansion Module from the server, lift it out carefully, taking care not to damage the components on the center plane.

11. Use the handle (**3**) and the finger relief (**4**) on the SMP Expansion Module cover to carefully lift the SMP Expansion Module out of the server.
12. Remove the SMP Expansion Module cover:
     a. Place the SMP Expansion Module on a flat, level surface.
     b. Rotate the two locking levers until they are fully extended beyond the edge of the SMP Expansion Module cover. Do not force the locking levers past the position shown in the illustration.
     c. Using the locking levers, lift the front edge of the cover off the SMP Expansion Module.
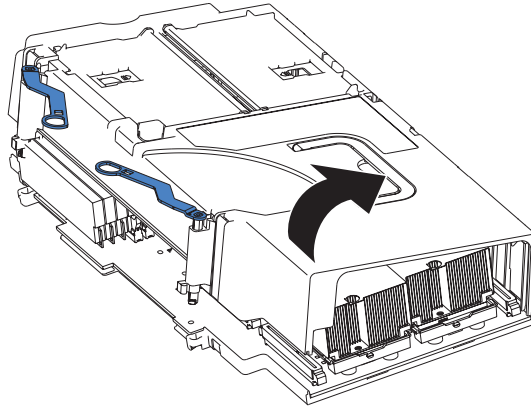
Figure 50. Removing the SMP Expansion Module cover

     d. Lift the cover off the SMP Expansion Module.
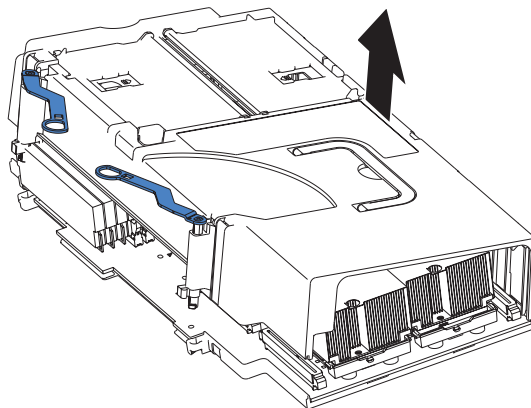
Figure 51. Lift the cover off

Installing the SMP Expansion Module and cover

The following notes contain information which must be considered when installing the SMP Expansion Module:

*   If there are two SMP Expansion Modules installed in the server, you must install the retention brackets for each of the SMP Expansion Module.
*   If the server is going to shipped or moved over a long distance, you must reinstall the retention brackets and shipping thumbscrews for each SMP Expansion Module.

Complete the following steps to install the SMP Expansion Module cover and the SMP Expansion Module:

1. Install the cover on the SMP Expansion Module:

    a. Set the cover on top of the expansion module.

    b. Extend the locking levers as shown in the illustration; then, let the cam on the front of the cover fall into the cam opening on the SMP Expansion Module circuit board.
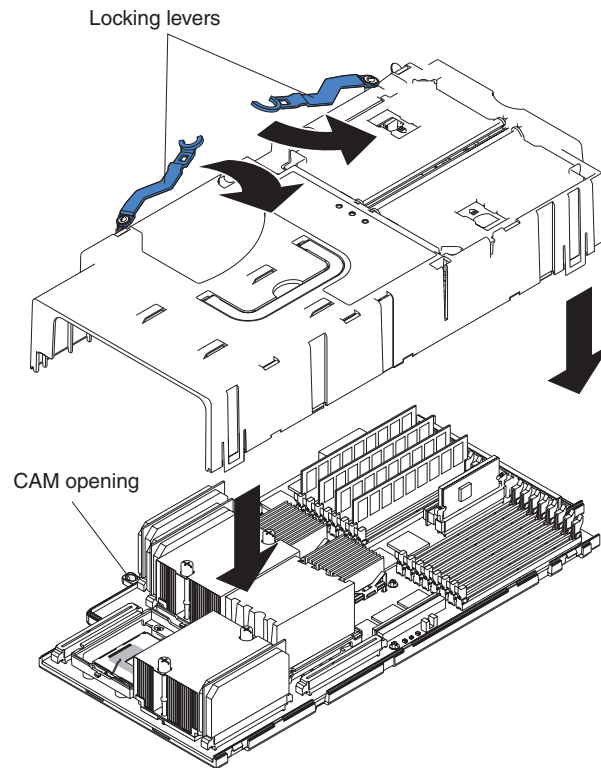
Figure 52. Installing the SMP Expansion Module cover

    c. Release the locking levers and align the rear of the cover with the rear edge of the circuit board.

    d. Press down on the cover until it snaps into place.

    e. Lift slightly on the locking levers and rotate them back until they stop.

Locking
levers
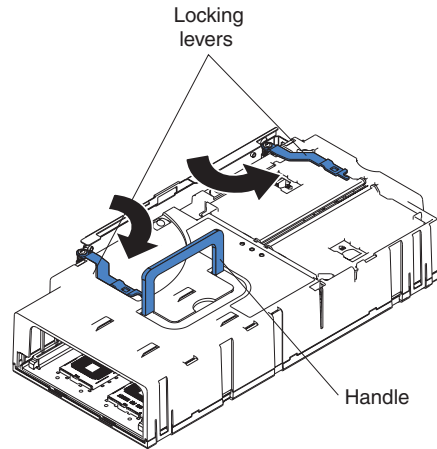
Handle

Figure 53. Locking lever position for installing the SMP Expansion Module

2. Install the SMP Expansion Module into the server:

Locking
levers

Center plane
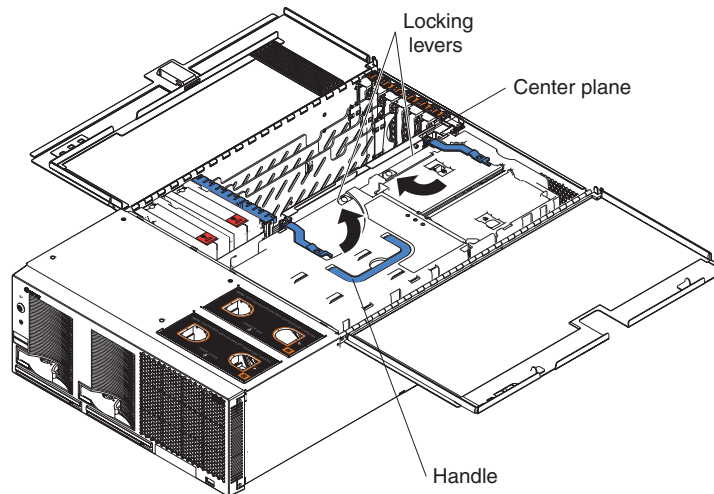
Handle

Figure 54. SMP Expansion Module locking lever position

a. Lift the SMP Expansion Module by its handle and use the finger relief to hold the SMP Expansion Module steady.

b. Being careful not to damage the components on the center planar, lower the SMP Expansion Module into the server.

c. Release the handle and slide the SMP Expansion Module toward the center plane until it stops, making sure that the handle lies flat.

d. Rotate the SMP Expansion Module locking levers forward until the SMP Expansion Module is securely fastened in place. See the following illustration.
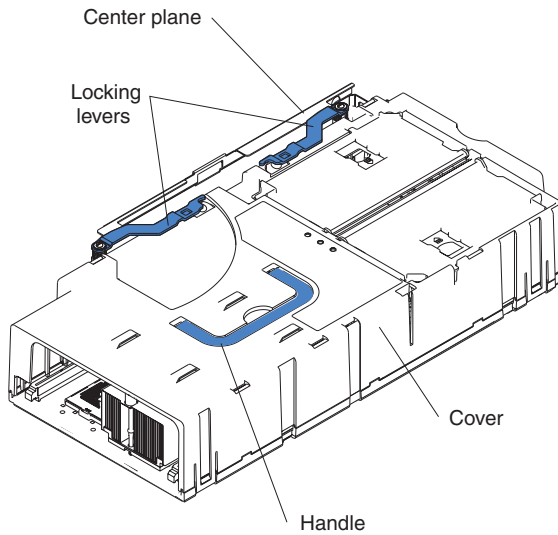
Figure 55. Locking lever position when the SMP Expansion Module is installed

3. Install the EMC shield on the rear of the server; then, hand tighten the blue thumbscrews to secure the EMC shield.
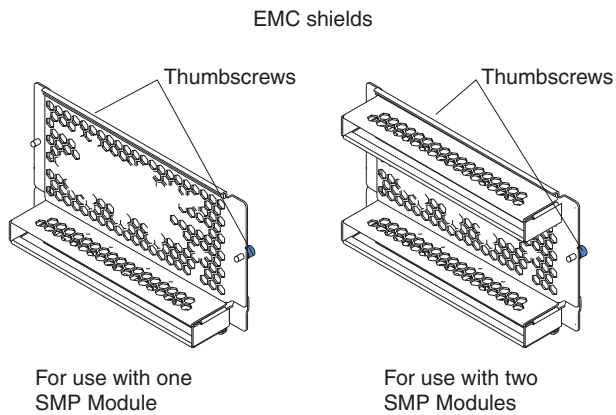
Figure 56. EMC shields

4. If you have other options to install or remove, do so now.
5. Close the top cover.
6. Slide the server into the rack enclosure until it stops; then, secure the server in the rack enclosure using the quick release latches.
7. Connect all external cables and turn on the server.
8. Turn on the server.

Memory modules

This section contains instructions on installing, adding, hot-adding, removing, and hot-replacing memory modules. It includes information about memory mirroring and Memory ProteXion features of the Active Memory technology.

The following notes describe the types of dual inline memory modules (DIMMs) that the server supports and other information that you must consider when installing DIMMs:

- The server comes with a minimum of two 512 MB DIMMs installed in slots 1 and 3 in the SMP Expansion Module and supports 512 MB, 1 GB, and 2 GB DIMMs, for a maximum of 64 GB (mirroring supported) of system memory, depending on your configuration.
- IBM periodically makes updates available to provide enhancements to the standard features of the server. Currently, your xSeries 445 supports the Memory Mirroring and Memory ProteXion features of the Active Memory technology. Be sure to check the IBM support Web site occasionally to ensure that you have the most current levels of system software installed.
- The hot-add memory feature allows you to add DIMMs without turning off the server. This feature is supported only in those servers using Windows Server 2003 Enterprise or Datacenter editions.

   Note: You can enable the hot-add and hot-replace memory features or you can enable the fastpath memory feature, but you cannot enable both at the same time. The fastpath memory feature increases memory performance.

- To use the hot-add memory feature you must first disable memory mirroring in the Configuration/Setup Utility and there cannot be any DIMMs present in the port in which you want to add DIMMs.
- The hot-replace memory feature allows you to replace DIMMs of the same type, size, and clock speed without turning off the server.

   Note: When memory modules are hot-replaced, the DIMM slots are automatically re-enabled. If the server is turned off when replacing DIMMs, you must re-enable the slots through the Configuration/Setup Utility program (see "Using the Configuration/Setup Utility program" on page 14).

- To use the hot-replace memory feature you must enable memory mirroring in the Configuration/Setup Utility.
- When using memory mirroring, all of the DIMMs in each memory port must be the same size and clock speed.

   Note: When memory mirroring is enabled, BIOS will only report half of the installed memory.

- Damaged or faulty DIMMs can be replaced without having to replace all the DIMMs in the bank. Ensure the new DIMM is the same size and clock speed as the other DIMMs in the bank.
- See the ServerProven list at http://www.ibm.com/pc/compat/ for a list of memory modules for use with the server. For optimum performance balance the amount memory between the two ports.

- When installing or removing DIMMs, it must be done in pairs and in the following order:

Table 5. Memory installation order

Port	Bank	Pair	Slot Number
1	1	1	1, 3
2	1	2	9, 11
1	2	3	5, 7
2	2	4	13, 15
1	3	5	2, 4
2	3	6	10, 12
1	4	7	6, 8
2	4	8	14, 16
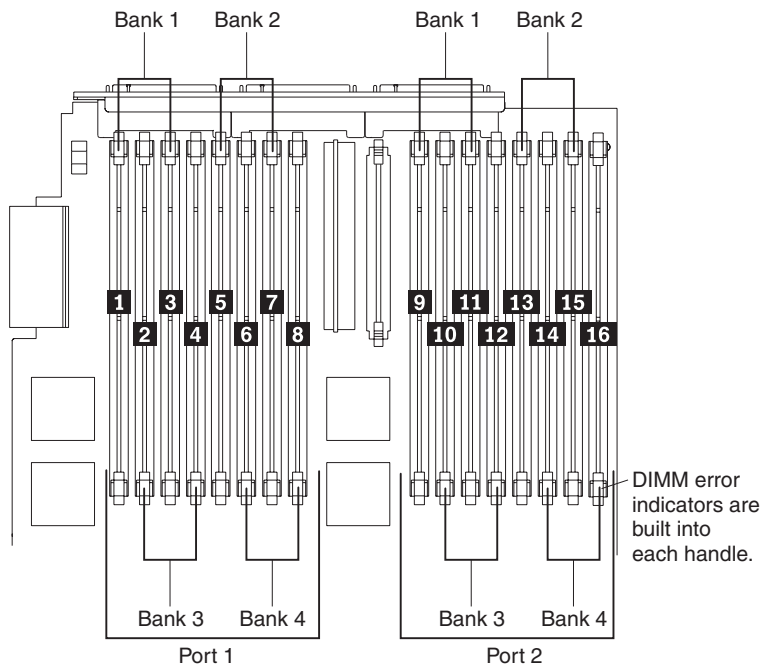
Figure 57. DIMM banks

- Each pair or bank of DIMMs must be of the same size and clock speed.
- When you install or remove a bank of DIMMs, the server configuration information changes. Therefore, you must change and save the new configuration information by using the Configuration/Setup Utility program. When you restart the server, the system displays a message indicating that the memory configuration has changed. Start the Configuration/Setup Utility program and select **Save Settings** (see "Starting the Configuration/Setup Utility program" on page 14).
- The illustrations in this document might differ slightly from your hardware.
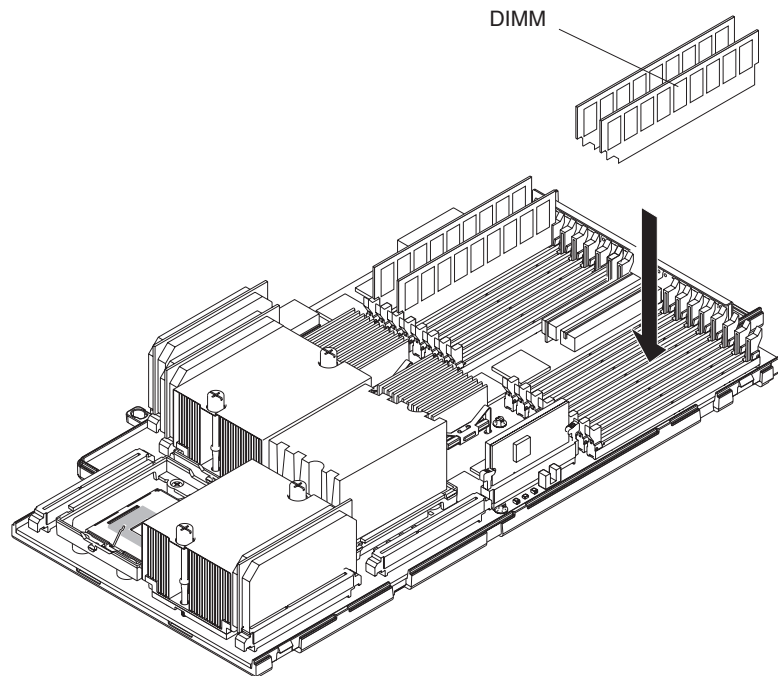
DIMM

Figure 58. DIMM installation

Active Memory

Active Memory is an IBM technology that improves the reliability of the DIMMs through memory mirroring, memory scrubbing, and Memory ProteXion™ features.

The following notes describe the Active Memory features:

- Memory mirroring allows you to improve the memory reliability of the server by creating a mirror of the data in memory port one and storing it in memory port two.

    Note: When using memory mirroring, the DIMMs in each partner bank must be the same size and clock speed. For example, if the DIMMs in port 1, bank 1 are 512 MB, then the DIMMs in port 2, bank 1 (the partner bank) must also be 512 MB (see Table 5 on page 106 for port and bank assignments).

Complete the following steps to enable memory mirroring:

1. Check your operating system documentation to be sure that it supports memory mirroring.

2. Install DIMMs of the same size and clock speed in the two memory ports.

3. Enable memory mirroring in the Configuration/Setup Utility:

    a. Turn on the server and watch the monitor screen.

    b. When the message `Press F1 for Configuration/Setup` appears, press F1.

    c. From the Configuration/Setup Utility main menu, select **Advanced Setup**.

    d. Select **Memory Settings**.

e. Select **Memory Mirroring Settings** and enable memory mirroring.

> **Note:** When memory mirroring is enabled, reported memory is reduced to half of installed memory.

f. Save and exit the Configuration/Setup Utility program.

How does memory mirroring work?

When memory mirroring is enabled, the data that is written to memory is stored in two locations. One copy is kept in the memory port one DIMMs, while a second copy is kept in the memory port two DIMMs. During the execution of the read command, the data is read from the DIMM with the least amount of reported memory errors through Memory scrubbing, which is enabled with memory mirroring.

If memory scrubbing determines a DIMM is damaged beyond use, read and write operations are redirected to the remaining good DIMMs. Memory scrubbing then reports the damaged DIMM and the Light Path Diagnostics feature displays the error. After the damaged DIMM is replaced, memory mirroring then copies the mirrored data back into the new DIMM.

- Memory scrubbing is an automatic daily test of all the system memory that detects and reports memory errors that might be developing before they cause a server outage.

> **Note:** Memory scrubbing and Memory ProteXion technology work in conjunction with each other and do not require memory mirroring to be enabled to work.

When an error is detected, memory scrubbing determines if the error is recoverable or not. If it is recoverable, Memory ProteXion is enabled and the data that was stored in the damaged locations is rewritten to a new location. The error is then reported so that preventative maintenance can be performed. As long as there are enough good locations to allow the proper operation of the server, no further action is taken other than recording the error in the error logs.

If the error is not recoverable, memory scrubbing sends an error message to the Light Path Diagnostics feature, which then turns on the proper LEDs to guide you to the damaged DIMM. If memory mirroring is enabled, then the mirrored copy of the data in the mirrored DIMM is used to refresh the new DIMM once it is installed.

- Memory ProteXion reassigns memory bits to new locations within memory when recoverable errors have been detected.

When a recoverable error is found by memory scrubbing, Memory ProteXion writes the data that was to be stored in the damaged memory locations to spare memory locations within the same DIMM.

Removing and replacing DIMMs

Complete the following steps to remove and replace a DIMM in the SMP Expansion Module with the server turned off:

Attention: When working with DIMMs or other options, you might need to remove one or both of the SMP Expansion Modules. See "Hot-replace DIMMs" on page 110 for information on how to hot-replace DIMMs with the server turned on.

1. Review the information in "Installation guidelines" on page 79, and "Safety information" on page 257.
2. Turn off the server and peripheral devices, disconnect the power cords, and all external cables from the SMP Expansion Module.

3. Pull out on the quick release latches on each side of the server; then, pull the server out of its rack enclosure until it stops.

4. Open the top cover.

5. If necessary, remove the top SMP Expansion Module or SMP baffle from the server. See "Removing the SMP Expansion Module and cover" on page 98 for instructions.

6. Open the DIMM access door that covers the DIMM you will be removing.
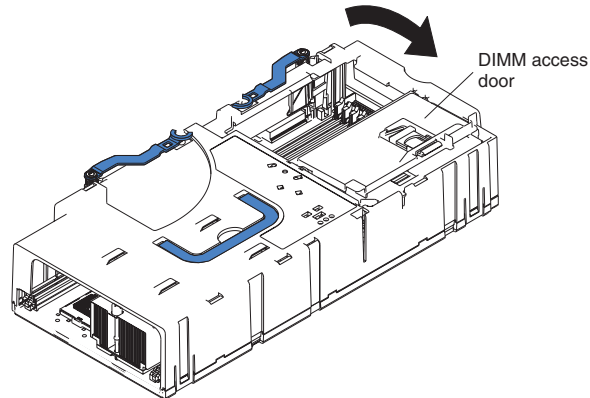
DIMM access door

Figure 59. Opening the DIMM access door

7. Open the retaining clip on each end of the DIMM connector.

8. Lift the DIMM straight up and out of the SMP Expansion Module.

9. Install a new DIMM:

   a. Touch the static-protective package containing the DIMM to any unpainted metal surface on the server. Then, remove the DIMM from the package.

   Attention: To avoid breaking the retaining clips or damaging the DIMM connectors, open and close the clips gently.
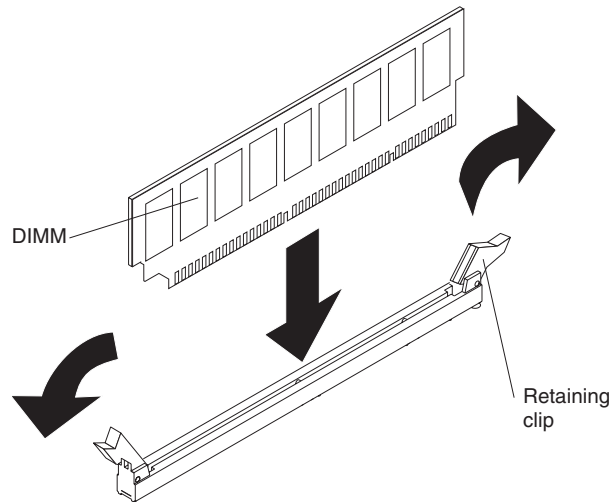
   b. Insert the DIMM into the connector by aligning the DIMM edges with the slots at each end of the DIMM connector. Firmly press the DIMM straight down into the connector by applying pressure on both ends of the DIMM simultaneously. Be sure that the retaining clips snap into the locked position when the DIMM is firmly seated in the connector.
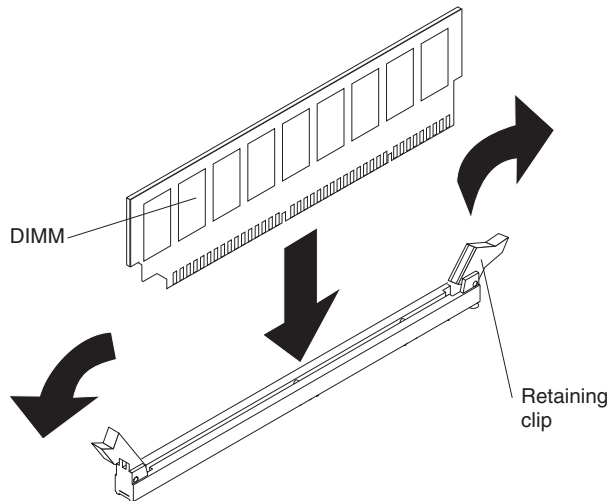
Figure 60. Inserting a DIMM into a DIMM slot

> **Attention:** If a gap exists between the DIMM and the retaining clips, the DIMM has not been properly installed. In this case, open the retaining clips and remove the DIMM; then, reinsert the DIMM.

   c. Repeat steps 9a and 9b for each DIMM.

10. Close the DIMM access door.
11. If necessary, reinstall either the top SMP Expansion Module or SMP baffle in the server. See "Installing the SMP Expansion Module and cover" on page 101 for instructions.
12. Close the top cover.
13. Slide the server into the rack enclosure until it stops; then, secure the server in the rack enclosure using the quick release latches.
14. Connect all external cables and turn on the server.

Note: When you install or remove banks of DIMMs, the server configuration information changes. Therefore, you must change and save the new configuration information by using the Configuration/Setup Utility program (see "Starting the Configuration/Setup Utility program" on page 14).

Hot-replace DIMMs

This section includes the instructions needed to hot-replace DIMMs in the servers SMP Expansion Module with the power on.

Notes:

1. Ensure that before you attempt to hot-replace a DIMM, the new DIMM is the same size and clock speed and that memory mirroring is enabled.
2. You can enable the hot-add and hot-replace memory features or you can enable the fastpath memory feature, but you cannot enable both at the same time. The fastpath memory feature increases memory performance.

Attention: If two SMP Expansion Modules are installed in a server, you can not hot-replace or hot-add the DIMMs in the lowest SMP Expansion Module. In order to gain access to the DIMMs of a lower SMP Expansion Module, you must first remove the upper SMP Expansion Module which requires you to turn off the server. See "Removing and replacing DIMMs" on page 108 for information on how to remove and replace DIMMs while the server is turned off.

Complete the following steps to hot-replace a DIMM from the server SMP Expansion Module:

1. Review the information in "Installation guidelines" on page 79, "Handling static-sensitive devices" on page 80, and "Safety information" on page 257

2. Pull out on the quick release latches on each side of the server; then, pull the server out of its rack enclosure until it stops.

3. Open the top cover.

4. If necessary, remove the SMP baffle.

5. Open the DIMM access door on the SMP Expansion Module.
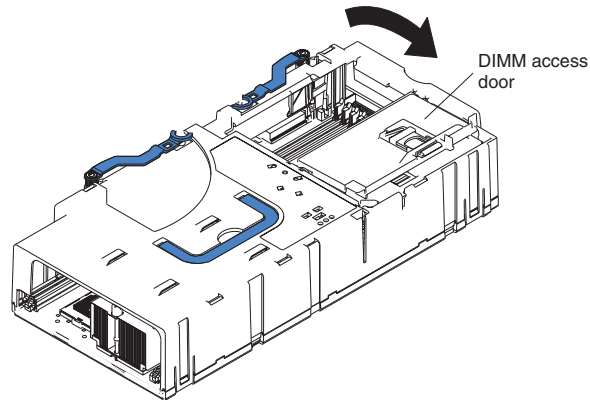
Figure 61. Opening the DIMM access door

6. Open the retaining clip on each end of the DIMM connector.

7. Lift the DIMM to be hot-replaced straight up and out of the SMP Expansion Module.

8. Installing the new DIMM:

   a. Touch the static-protective package containing the DIMM to any unpainted metal surface on the server. Then, remove the DIMM from the package.

   Attention: To avoid breaking the retaining clips or damaging the DIMM connectors, open and close the clips gently.

   b. Insert the DIMM into the connector by aligning the DIMM edges with the slots at each end of the DIMM connector. Firmly press the DIMM straight down into the connector by applying pressure on both ends of the DIMM simultaneously. Be sure that the retaining clips snap into the locked position when the DIMM is firmly seated in the connector.
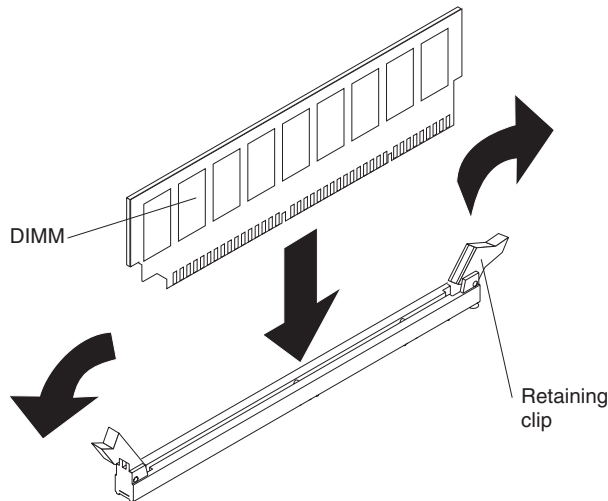
Figure 62. Inserting a DIMM into a DIMM slot

> **Attention:** If a gap exists between the DIMM and the retaining clips, the DIMM has not been properly installed. In this case, open the retaining clips and remove the DIMM; then, reinsert the DIMM.

  c. Repeat steps 8a and 8b for each DIMM.
 9. Close the DIMM access door.
10. If necessary, reinstall the SMP baffle.
11. Close the top cover.
12. Slide the server into the rack enclosure until it stops; then, secure the server in the rack enclosure using the quick release latches.

Hot-add memory

The hot-add memory feature enables you to add DIMMs without turning off the server. This feature is supported only in those servers using Windows Server 2003 Enterprise or Datacenter editions.

This section includes the instructions needed to enable the hot-add memory feature on the sever and to hot-add DIMMs to the server's SMP Expansion Module with the power on.

Notes:

1. Memory mirroring must be disabled before using the hot-add memory feature.
2. Either port 1 or port 2 (see "DIMM banks", Figure 57 on page 106) must be completely empty. The empty port is where you can add DIMMs.

   The xSeries 445 model servers have four 512 MB DIMMs standard, two DIMMs in each port. To enable hot-add, you must move two DIMMs so that all four are in one port. This is because the power to the port to which you plan to add DIMMs must be off before you add the DIMMs. Once any DIMMs are added and the door closed, power is applied.
3. If the server has two SMP Expansion Modules installed, you cannot move all memory to the top SMP Expansion Module to support hot-swap or hot-add. This is because the bottom SMP Expansion Module must have memory installed (at least two DIMMs) for the server to boot.
4. You must hot-add two DIMMs at a time.

   You can add two, four, six or eight DIMMs. Once you add DIMMs and close the memory door, you cannot add more memory without powering off the server.

5. The pair of DIMMs added to a bank (see "DIMM banks", Figure 57 on page 106) must be of the same size and clock speed.

6. If the server has two SMP Expansion Modules installed, you can only hot-add memory to the top SMP Expansion Module.

7. You can enable the hot-add and hot-replace memory features or you can enable the fastpath memory feature, but you cannot enable both at the same time. The fastpath memory feature increases memory performance.

Enabling the memory hot-add feature: Before you can hot-add DIMMs, the memory hot-add feature must be enabled, and memory mirroring must be disabled.

Notes:

1. For a multi-node system, you must complete the following instructions for the primary system when it is not in a merged state. Hot-add and memory mirroring should both be disabled on any additional systems within the multi-node partition.

2. When hot-adding to a multi-node setup, do not open more than one DIMM access door at a time. Complete the hot-add operation in one system prior to starting any hot-add operations for any other system in the multi-node partition.

3. Ensure that you hot-add DIMMs in pairs of two; that the new DIMMs are the same size and clock speed; and that the port to which you intend to add them is empty.

Attention: If two SMP Expansion Modules are installed in a server, you cannot hot-replace or hot-add the DIMMs in the lower SMP Expansion Module because accessing the lower SMP Expansion Module requires removing the upper SMP Expansion Module, a procedure that requires turning off the server. See "Removing and replacing DIMMs" on page 108 for information on how to remove and replace DIMMs while the server is turned off.

Complete the following steps to ensure that these features are correctly configured:

1. Start the Configuration/Setup Utility.
2. Select **Advanced Setup** from the menu.
3. Select **Memory Settings**.
4. In the next window select **Memory Mirroring Settings**.
5. Ensure that Memory Mirroring is set to **Disabled**.
6. Press **Esc**.
7. Ensure that **Memory Hot Add** is set to **Enabled**.

   Note: A minimum of 4 GB of memory must be installed in the server in order for hot-add memory to be available; otherwise, the option will not appear in the Configuration/Setup Utility program.

8. Save and exit the Configuration/Setup Utility.

Hot-adding DIMMs: Complete the following steps to hot-add DIMMs to the server's SMP Expansion Module:

1. Review the information in "Installation guidelines" on page 79, "Handling static-sensitive devices" on page 80, and "Safety information" on page 257.

2. Pull out on the quick release latches on each side of the server; then, pull the server out of its rack enclosure until it stops.

3. Open the top cover.

4. If necessary, remove the SMP baffle.
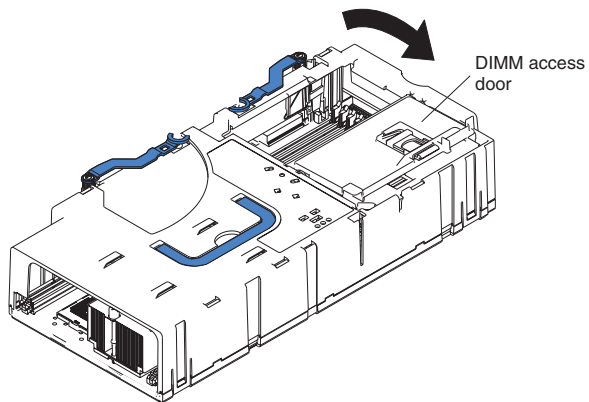
DIMM access door

Figure 63. Opening the DIMM access door

5. Open the DIMM access door on the SMP Expansion Module.

   Attention: Ensure that the memory port below the door you are opening does not contain any DIMMs.
6. Open the retaining clip on each end of the DIMM connector.

7. Add new DIMMs:

   a. Touch the static-protective package containing the DIMM to any unpainted metal surface on the server. Then, remove the DIMM from the package.

      Attention: To avoid breaking the retaining clips or damaging the DIMM connectors, open and close the clips gently.

DIMM

Retaining clip

Figure 64. Inserting a DIMM into a DIMM slot

   b. Insert the DIMM into the connector by aligning the DIMM edges with the slots at each end of the DIMM connector. Firmly press the DIMM straight down into the connector by applying pressure on both ends of the DIMM simultaneously. Be sure that the retaining clips snap into the locked position when the DIMM is firmly seated in the connector.

      Note: Memory should be added in pairs of two.

      Attention: If a gap exists between the DIMM and the retaining clips, the DIMM has not been properly installed. In this case, open the retaining clips and remove the DIMM; then, reinsert the DIMM.

   c. Repeat steps 7a and 7b for each DIMM.

8. Close the DIMM access door.

9. If necessary, reinstall the SMP baffle.

10. Close the top cover and slide the server into the rack enclosure until it stops; then, secure the server in the rack enclosure using the quick release latches.

Installing and replacing a microprocessor

This section describes how to install and remove microprocessors and VRMs.

The following notes describe the types of microprocessors that the server supports and other information that you must consider when installing a microprocessor:

- Read the documentation that comes with the microprocessor to determine whether you need to update the basic input/output system (BIOS) code in the server. To download the most current level of BIOS code for the server, go to http://www.ibm.com/pc/support/.

- If the server comes with Intel Xeon MP microprocessors then, obtain an SMP-capable operating system. For a list of supported operating systems, go to http://www.ibm.com/pc/compat/.

- To order additional microprocessor or SMP Expansion Module options, contact your IBM marketing representative or authorized reseller.

- To avoid damage and ensure proper server operation after you install a replacement or an additional microprocessor, use a microprocessor that has the same cache size and type, clock speed, and internal and external clock frequencies as the microprocessors already installed in the individual SMP Expansion Module. For a list of microprocessors supported by the server, see the ServerProven list at http://www.ibm.com/pc/compat/ on the World Wide Web.

- The microprocessor in socket 1 of the bottom SMP Expansion Module is the startup (boot) microprocessor.

- An air baffle or microprocessor must be installed in microprocessor socket 4, depending on your configuration.

- If you are adding Intel Xeon MP microprocessors, populate the empty microprocessor sockets in numeric order, starting with socket 1. If you install the microprocessors in the wrong order, the server will not start.

  Attention: You must ensure that the locking lever on the microprocessor socket is in the fully open position before you insert the microprocessor in the socket. Failure to do so might result in permanent damage to the microprocessor, microprocessor socket, and system board. See Figure 67 on page 118.

- Always install the heat sink and VRM that comes with the microprocessor.

- Server models that come with Intel Xeon DP microprocessors support a maximum of two microprocessors per SMP Expansion Module, installed in microprocessor sockets 1 and 4.

- Intel Xeon DP microprocessors are supported in microprocessor sockets 1 and 4 only. Intel Xeon MP microprocessors are supported in microprocessor sockets 1, 2, 3, and 4.The following illustration shows the location of the startup microprocessor and its VRM on the system board. It also shows the microprocessor baffles and the VRM slots for the other microprocessor sockets.

- The following illustration shows the locations of the startup microprocessor and its VRM on the system board. It also shows the microprocessor baffles and the VRM slots for the other microprocessor sockets.

Note: The illustrations in this document might differ slightly from your hardware.
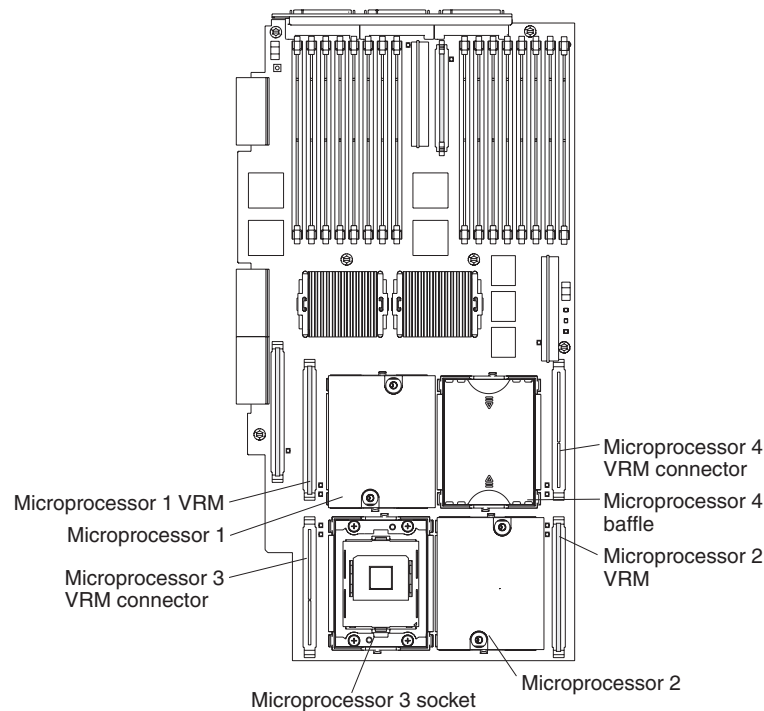
Figure 65. Microprocessor connector and component locations

Complete the following steps to install a microprocessor:

1. Read the "Handling static-sensitive devices" on page 80, "Installation guidelines" on page 79 and "Safety information" on page 257.
2. Turn off the server and peripheral devices, disconnect the power cords, and disconnect all external cables from the SMP Expansion Module; then, open the cover.
3. If necessary, remove the SMP baffle or top SMP Expansion Module.

   Note: If the server contains only one SMP Expansion Module, remove the SMP baffle above it to gain access to the module. If the server contains two SMP Expansion Modules, remove the top module to gain access to the bottom or lower SMP Expansion Module.
4. Remove the SMP Expansion Module in which you plan to install the microprocessor; then, remove the module cover and determine the socket where the microprocessor is to be installed. For details, see "Removing the SMP Expansion Module and cover" on page 98.
5. Determine which type of microprocessors are installed in the server. The easiest way to do this is by the locations of the installed microprocessors in the SMP Expansion Module. If the microprocessors are installed only in connectors 1 and 4, the server came with Intel Xeon DP microprocessors. If the microprocessors are installed in any other connectors, such as 1 and 2 or 1,2, and 3, then the server came with Intel Xeon MP microprocessors.

   Attention: When you handle static-sensitive devices, take precautions to avoid damage from static electricity. For details on handling these devices, see "Handling static-sensitive devices" on page 80.

6. If you are installing a new microprocessor, go to step 9; otherwise, continue:
   a. Verify that you have selected the correct microprocessor to be replaced. The LED next to the failing microprocessor will be lit. The LEDs can be turned on by pressing the Remind button on the SMP Module (for the location of this Remind button, see Figure 115 on page 178).

      Attention: The heat-conducting grease between the heat sink and the microprocessor might have formed a strong bond.
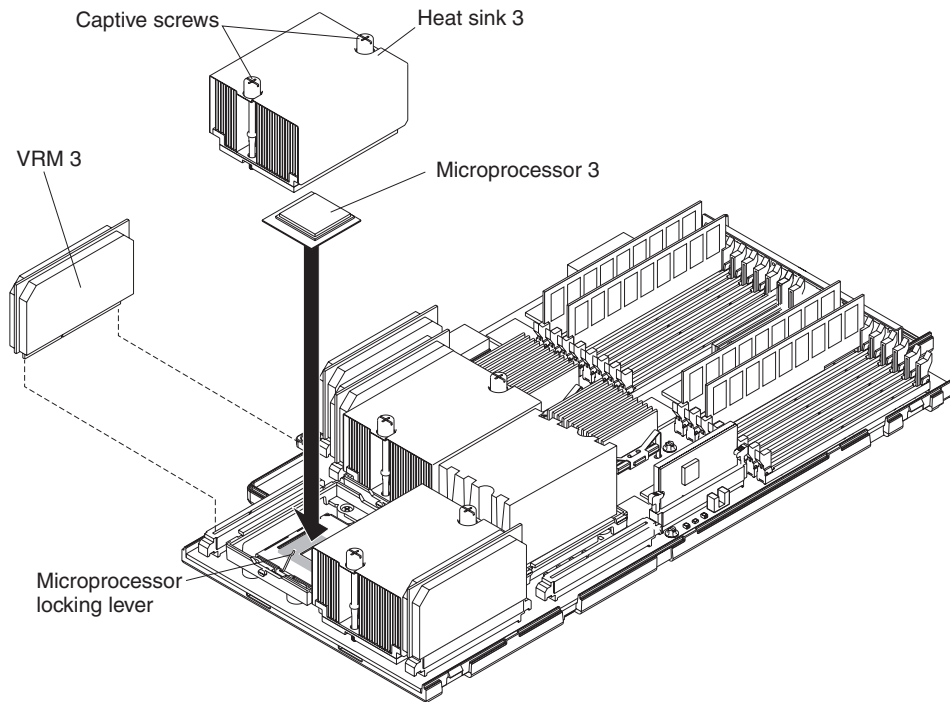
Figure 66. Microprocessor installation

   b. Using a screwdriver, fully loosen one of the two captive mounting screws on the heat sink, and then fully loosen the other one until the bond between the heat sink and the microprocessor is broken; then, remove the heat sink.
   c. Rotate the locking lever on the microprocessor socket from its closed and locked position until it stops or clicks in the fully open position (approximately 135° angle), as shown.
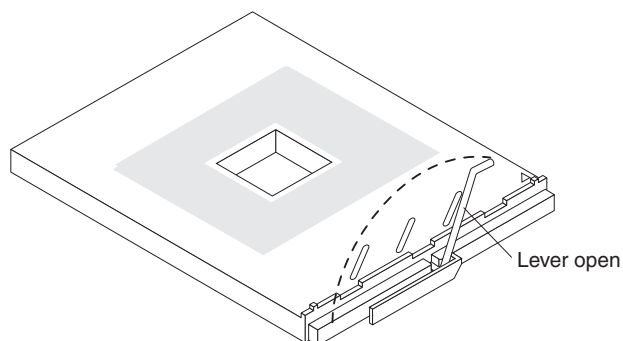
Figure 67. Microprocessor locking lever fully open

7. Install the VRM that comes with the microprocessor kit in the slot adjacent to the microprocessor you are replacing or installing. Some microprocessor options contain a VRM with a clip to secure the VRM in the slot. This clip is not needed for installation and can be discarded.

   a. If you are replacing a failed VRM:

      1) Verify that you have selected the correct VRM to be replaced. The LED next to the failing VRM will be lit.

      2) Grasp the VRM at both upper corners and lift it out of the slot.
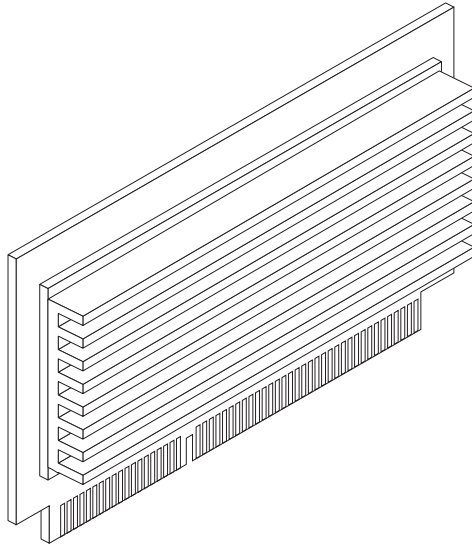
Figure 68. Microprocessor VRM

   b. Holding the new VRM by the upper corners, plug it *firmly* into the slot.

8. If necessary, remove microprocessor baffle from the microprocessor socket. Keep the microprocessor baffle for possible future use.

9. Touch the static-protective package containing the new microprocessor to any *unpainted* metal surface on the server; then, remove the microprocessor from the package.

10. Install the microprocessor:

    Important: When installing Intel Xeon DP microprocessors, you must install them in the following order: socket 1 then socket 4. When installing Intel Xeon MP microprocessors, you must install them in the following order: sockets 1, 2, 3, and then 4.

    a. Remove the protective label from the microprocessor socket.

    b. Rotate the locking lever on the microprocessor socket from its closed and locked position until it stops or clicks in the fully open position (approximately 135° angle), as shown.

       Attention: You must ensure that the locking lever on the microprocessor socket is in the fully open position before you insert the microprocessor in the socket. Failure to do so might result in permanent damage to the microprocessor, microprocessor socket, and system board.

Lever open
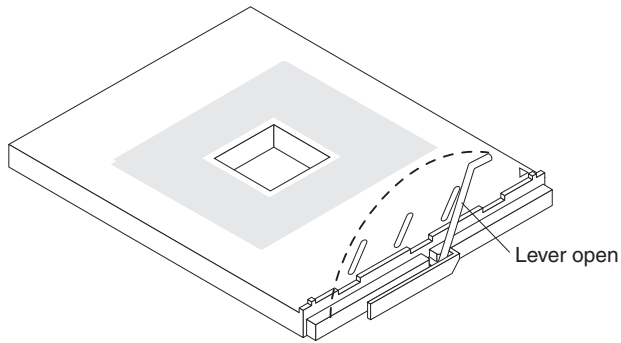
Figure 69. Microprocessor locking lever fully open

    c. Align the triangle icon on the microprocessor with the triangle icon on the socket and press the microprocessor gently into the socket.

    Attention: Make sure that the microprocessor is aligned correctly before you proceed. To avoid bending the pins on the microprocessor, do not use excessive force when pressing it into the socket.

    d. Close the locking lever to secure the microprocessor. Pressing gently on the top of the microprocessor while closing the latch helps ensure a good connection.

11. Install the heat sink:

    a. Remove the heat sink from its package and detach the protective cover from the bottom of the heat sink

    Attention: Do not disturb or contaminate the heat-conducting grease on the bottom of the new heat sink. Doing so damages its heat-conducting capability and exposes the new microprocessor to overheating.

Captive screws

Heat sink

Protective cover
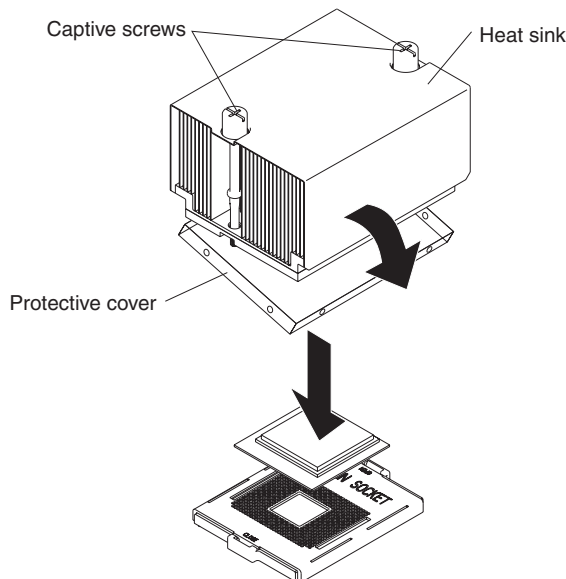
Figure 70. Aligning the heat sink over the microprocessor

    b. Align the heat sink over the microprocessor; then, carefully set it down on top of the microprocessor.

      c. Using a screwdriver, secure the heat sink to the microprocessor socket on the SMP board using the two captive mounting screws. Press firmly on the screws and tighten them, alternating between them. Do not overtighten the screws.

12. Install the SMP Expansion Module cover; then, install the SMP Expansion Module in the server. For details, see "Installing the SMP Expansion Module and cover" on page 101.

13. If you have other options to install or remove, do so now.

14. Close the top cover.

15. Slide the server into the rack enclosure until it stops; then, secure the server in the rack enclosure using the quick release latches.

16. Connect all external cables and turn on the server.

17. Turn on the server.
    Important: If the server will not start after replacing or installing a microprocessor, you might have installed a microprocessor in the wrong socket or installed a microprocessor of a different type, or the VRM is not seated properly. Ensure that you have installed the microprocessor in the correct location and that it is of the same type. Also ensure that the VRM is properly seated in the slot.

    Note: When you install or remove microprocessors, the server configuration information changes. Therefore, you must change and save the new configuration information by using the Configuration/Setup Utility program (see "Starting the Configuration/Setup Utility program" on page 14).

Replacing and troubleshooting fans

Your xSeries 445 server has four hot-swap fan assemblies, two 150 mm x 38 mm, and two 150 mm x 51 mm fans. The two 150 mm x 38 mm fans (fan 3 and fan 4) are located in front of the PCI-X planar and are used to cool the power supplies, PCI-X slots, and the I/O board. The two 150 mm x 51 mm fans (fan 1 and fan 2) are located toward the front of the server and are used to cool the SMP Expansion Modules. See the following illustration.

Note: The illustrations in this document might differ slightly from your hardware.
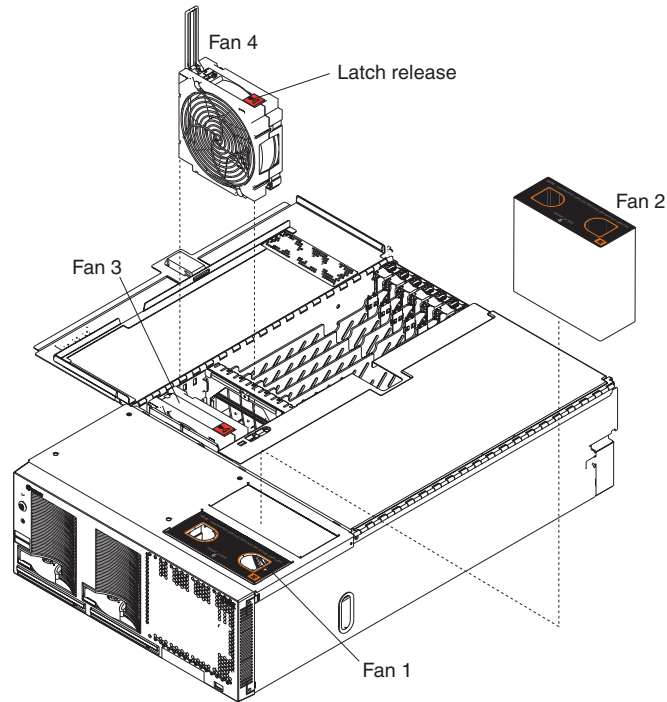
Figure 71. Fans

Each fan has an LED located on the top left side. When the fan is operating correctly, this LED is off. If a fan stops working, the Light Path Diagnostics feature will light a system-error light on the front of the server, indicating that there is a problem and guide you to the defective fan. When this occurs, first identify the defective fan; then, using the appropriate procedure, remove and replace the fan.

Replacing fans 1 and 2

As shown in the following illustration, fans 1 and 2 are located on the right side of the server, and cool the SMP Expansion Modules. These fans are redundant, meaning that if one fails, the remaining fan will temporarily speed up to properly cool the SMP Expansion Modules. In the event of a failure, replace the malfunctioning fan within 48 hours.

Complete the following steps to replace fans 1 and 2:

1. Read the safety information in "Installation guidelines" on page 79 and "Safety information" on page 257.

   Attention: All fans must be replaced within 48 hours of failing.

2. Pull out on the quick release latches on each side of the server; then, pull the server out of its rack enclosure until it stops.

3. Remove the fan from the server:
   a. Place your fingers into the two finger holes on the top of the fan and squeeze them together.

   Note: The illustrations in this document might differ slightly from your hardware.
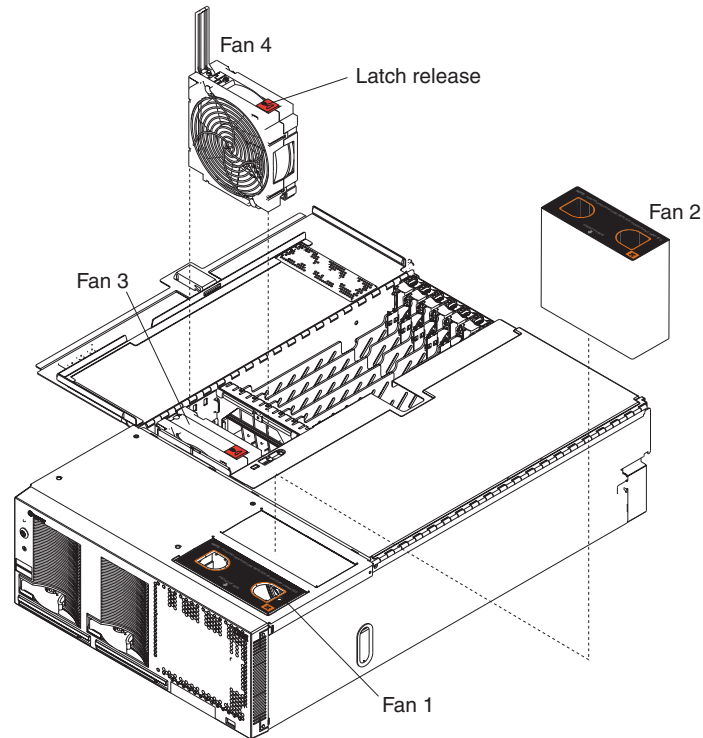
Figure 72. Fans

   b. Lift the fan out of the server.
4. Orient the new fan so that the LED on the top of the fan is to the right side of the server.
5. Push the replacement fan assembly into the server until it clicks into place.
6. If you have other options to install or remove, do so now.
7. Close the server cover. See "Closing the cover" on page 125.
8. Slide the server into the rack enclosure until it stops; then, secure the server in the rack enclosure using the quick release latches.

Replacing fans 3 and 4

As shown in the illustration, these two fans (fan 3 and fan 4) are located in front of the I/O board and the PCI-X slots. These fans are redundant, meaning that if one fails, the remaining fan will temporarily speed up to properly cool the I/O components in the server. In the event of a failure, you must replace the malfunctioning fan within 48 hours.

Complete the following steps to replace fans 3 and 4:

1. Read the safety information in "Installation guidelines" on page 79 and "Safety information" on page 257.
   Attention: All fans must be replaced within 48 hours of failing.

2. Pull out on the quick release latches on each side of the server; then, pull the server out of its rack enclosure until it stops.
3. Remove the fan from the server:
   a. Press the latch release to the right and let the handle come up.

   Note: The illustrations in this document might differ slightly from your hardware.
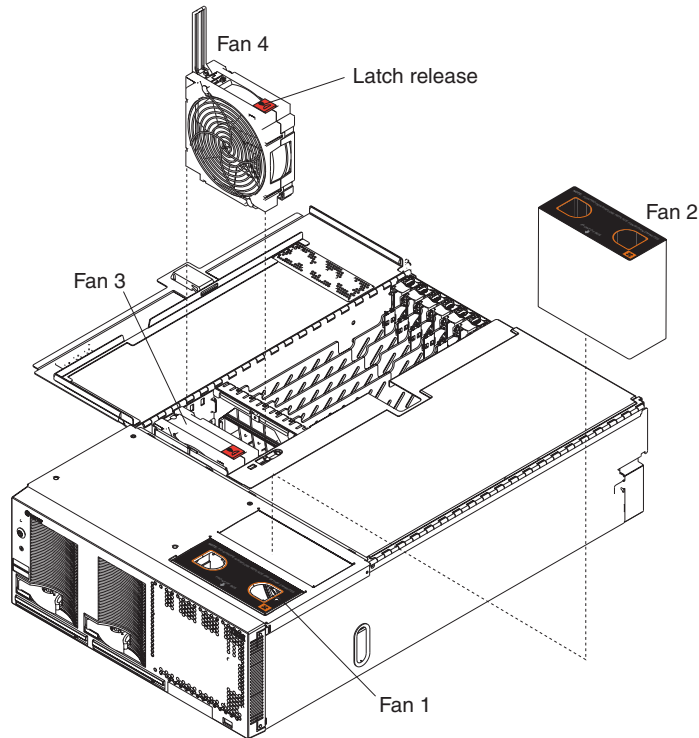
Figure 73. Fans

   b. Grasp the handle and lift the fan out of the server.
4. Orient the new fan so that the latch release on the top of the fan is to the right side of the server.
5. With the handle raised, push the replacement fan assembly into the server until it clicks into place.
6. Push the handle down until it clicks into place under the latch release.
7. If you have other options to install or remove, do so now.
8. Slide the server into the rack enclosure until it stops; then, secure the server in the rack enclosure using the quick release latches.

Closing the cover

Complete the following steps to install the server cover:

1. Close the cover by first closing the right side; then, close the left side and press down to latch the two halves of the cover in place.
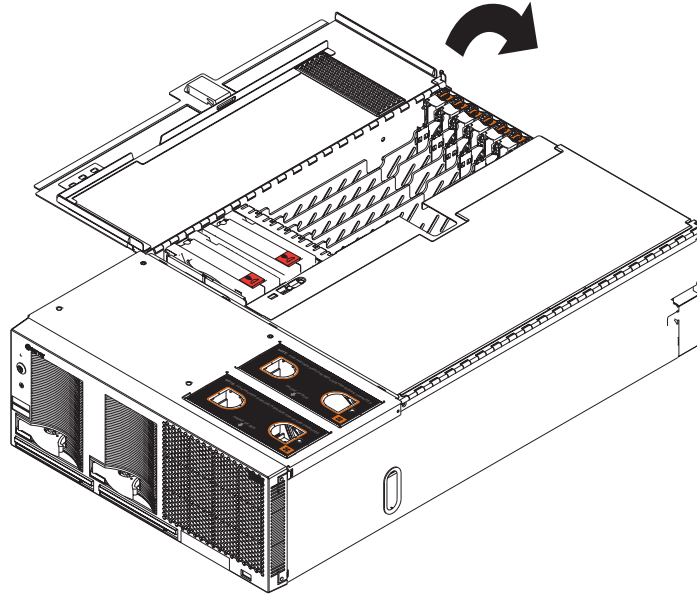
Figure 74. Closing the cover

2. Reconnect all external cables and power cords to the server; then, plug the power cords into properly grounded electrical outlets. See Chapter 5, "I/O connectors and indicators," on page 145 for connector locations.
3. Slide the server into the rack enclosure until it stops; then, secure the server in the rack enclosure using the quick release latches.
4. Turn on the server.

Connecting the cables

This section describes how to connect cables to the SMP Expansion Port, system power connectors, RXE Expansion Port, SCSI connector, USB connector, video connector, mouse connector, keyboard connector, Ethernet connector, and RXE Management port for up to 16-way operation.

For information about creating and managing scalable partitions, see "Scalable partitions" on page 140.

For details about the locations and functions of all of the ports, LEDs, and connectors see Chapter 5, "I/O connectors and indicators," on page 145.

Notes:

1. The information in this publication is for single and dual server configurations using up to 16 microprocessors and four SMP Expansion Modules.
2. There are two different SMP Expansion cables used to connect the SMP Expansion Modules.
   a. 2.5 m (8.2 ft) copper clad (comes in the IBM @server xSeries 445 Two-chassis 16-way Scalability Kit)
   b. 25.4 cm (10 in) black clad
3. Before connecting RXE or SMP Expansion cables to the server, ensure that the protective cover is removed from the connectors on each end.
4. See the following illustration to locate the connectors on the back of the server, depending on your model. The illustrations in this document might differ slightly from your hardware.
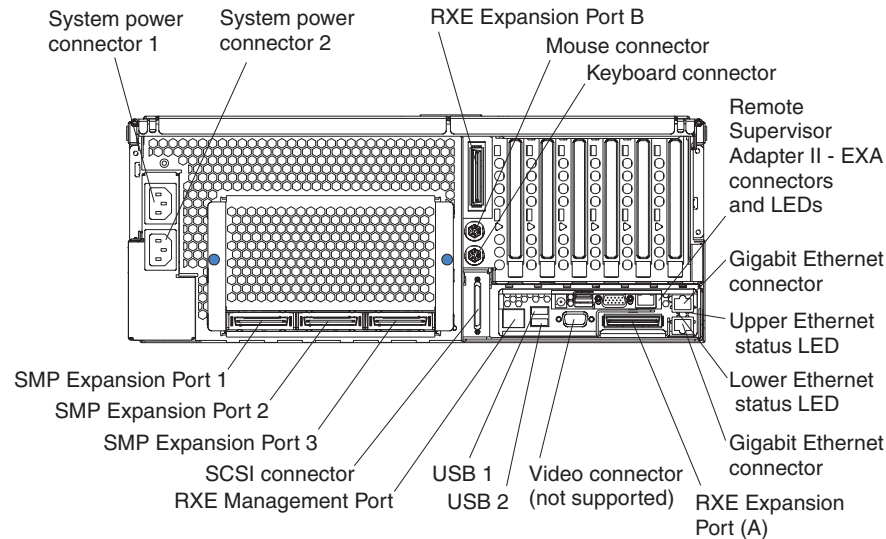
Figure 75. Rear view of Remote Supervisor Adapter II-EXA model

Important: If the server has a Remote Supervisor Adapter II-EXA installed, the integrated video controller on the server is disabled. You must connect a monitor or console switch to the video port on the adapter.

System power connector 1
System power connector 2
RXE Expansion Port B
Mouse connector
Keyboard connector
Remote Supervisor Adapter connectors and LEDs
Gigabit Ethernet connector
Upper Ethernet status LED
Lower Ethernet status LED
Gigabit Ethernet connector
RXE Expansion Port (A)
SMP Expansion Port 1
SMP Expansion Port 2
SMP Expansion Port 3
SCSI connector
RXE Management Port
USB 1
USB 2
Video connector
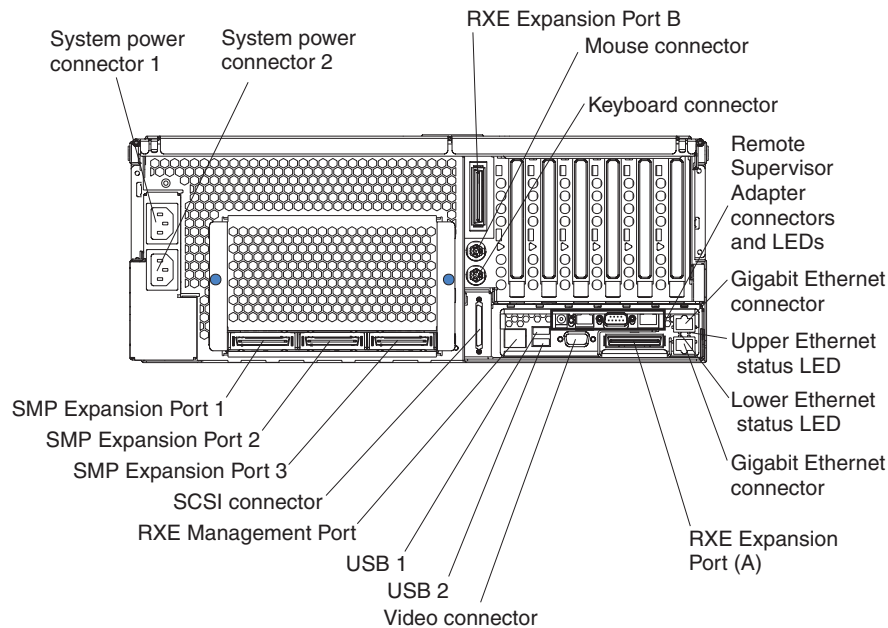
Figure 76. Rear view of Remote Supervisor Adapter model

5. If the server model comes with an operating system installed, such as Microsoft Windows 2000 Datacenter Server or VMware ESX server, see the software documentation provided with your software for additional cabling instructions.

To effectively manage the cables on this server, keep groups of cables secured together, and do not run cables across the back of the server. Use cable ties to bundle similar cables together. Use hook-and-loop fasteners to secure the cable bundles to the vertical rails of the rack cabinet.

Attention: Do not secure cables too tightly. Overtightening can cause internal damage to the cables.

SMP Expansion Port cabling

Depending upon your configuration, there are either three or six SMP Expansion Ports located on the back of the server. The cabling information in this section is for configurations using up to four SMP Expansion Modules in two servers.

Configurations that use only one SMP Expansion Module have three SMP Expansion Ports and do not require any SMP Expansion Port cabling.

-   If you are installing a server that has only one SMP Expansion Module and you are connecting an RXE-100 enclosure, go to "One server with one SMP Expansion Module" on page 133.
-   If you are installing a server that has only one SMP Expansion Module and you are not connecting an RXE-100 enclosure, connect all remaining external cables to the server; then, go to "Creating a scalable partition" on page 141 and follow the instructions for creating a scalable partition.
-   If you are installing a server that has two SMP Expansion Modules, go to "One server with two SMP Expansion Modules" on page 128.
-   If you are installing two servers that each have two SMP Expansion Modules, go to "Two servers with four SMP Expansion Modules (16-way)" on page 129.

One server with two SMP Expansion Modules

Complete the following steps to cable two SMP Expansion Modules in a single server together, using the two 25.4 cm (10 in.) SMP expansion Cables, for up to 8-way operation. In the illustration, the SMP Expansion Modules are numbered 0 and 1, from bottom to top. The SMP Expansion Ports are numbered 1 through 3, left to right. If the server comes with two SMP Expansion Modules, the SMP Expansion cables are included with the server. If you purchased a second SMP Expansion Module, the cables are included with the option.
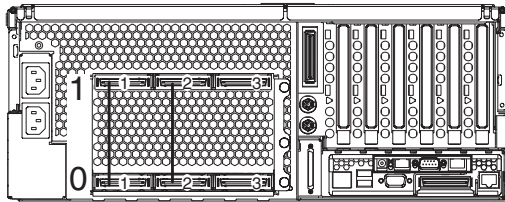
Figure 77. SMP Expansion Module numbering

1. Remove the protective covers from the connectors on the ends of the cables.
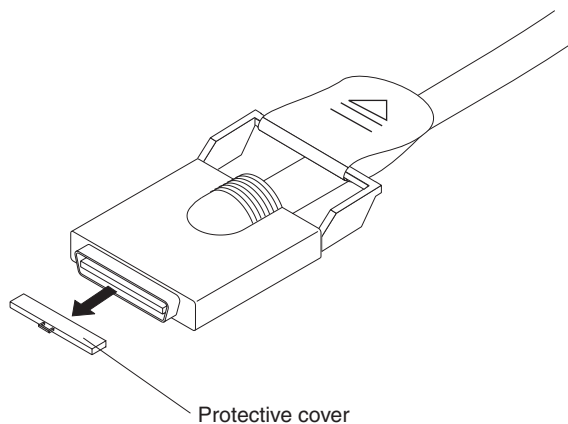
Protective cover

Figure 78. SMP Expansion cable with protective cover

2. Connect one end of a 25.4 cm (10 in.) SMP Expansion cable to port 1 of SMP Expansion Module 0; then, connect the opposite end of the cable to port 1 of SMP Expansion Module 1.

3. Connect one end of the second 25.4 cm (10 in.) SMP Expansion cable to port 2 of SMP Expansion Module 0; then, connect the opposite end of the cable to port 2 of SMP Expansion Module 1.

4. If you are connecting an RXE-100 enclosure, go to "One server with two SMP Expansion Modules" on page 135. If you are not connecting an RXE-100 enclosure, connect all remaining external cables to the server; then, go to"Creating a scalable partition" on page 141 and follow the instructions for creating a scalable partition.

   Notes:

   a. When multiple cables are connected between the SMP Expansion Module ports, SMP data is interleaved between the cables for better performance.

   b. The server will start and operate with one cable attached between the two SMP Expansion Modules.

Two servers with four SMP Expansion Modules (16-way)

Complete the following steps to cable four SMP Expansion Modules and two servers together, using the four 2.5 m (8.2 ft) and two 25.4 cm (10 in.) SMP expansion cables, that came with the servers, for up to 16-way operation. In the illustration, the SMP Expansion Modules are numbered 0 through 3, from primary to secondary server. The SMP Expansion Ports are numbered 1 through 3, left to right.

1. Remove the protective covers from the connectors on the ends of the cables.
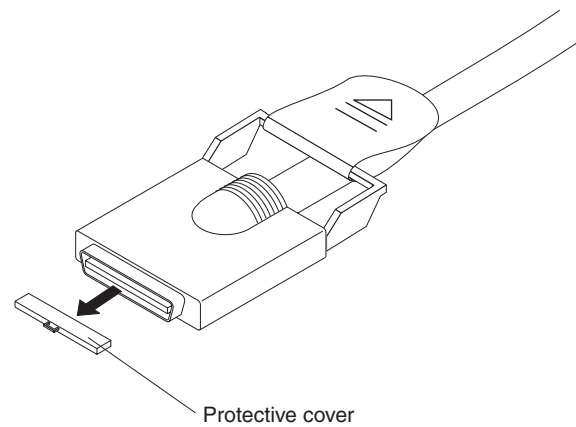
Protective cover

Figure 79. SMP Expansion cable with protective cover

2. Label each end of the 2.5 m (8.2 ft) SMP Expansion cables according to where they will connect to each server. See the following illustration. The SMP Expansion module numbering shown in the following illustration is for reference purposes only. These numbers do not appear on the servers.
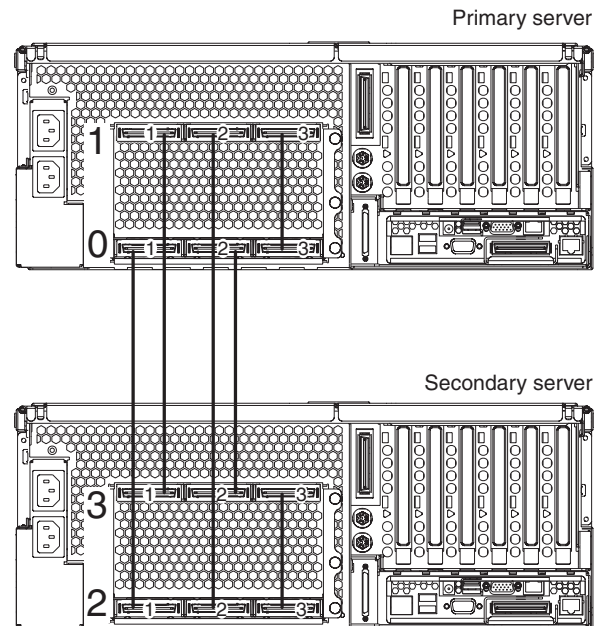
Figure 80. 16-way SMP Expansion port cabling

3. Connect the SMP Expansion cables to the primary server:

   a. Connect one end of a 2.5 m (8.2 ft) SMP Expansion cable to port 1 of SMP Expansion Module 0 on the primary server; then, route the cable through the cable-management arm.
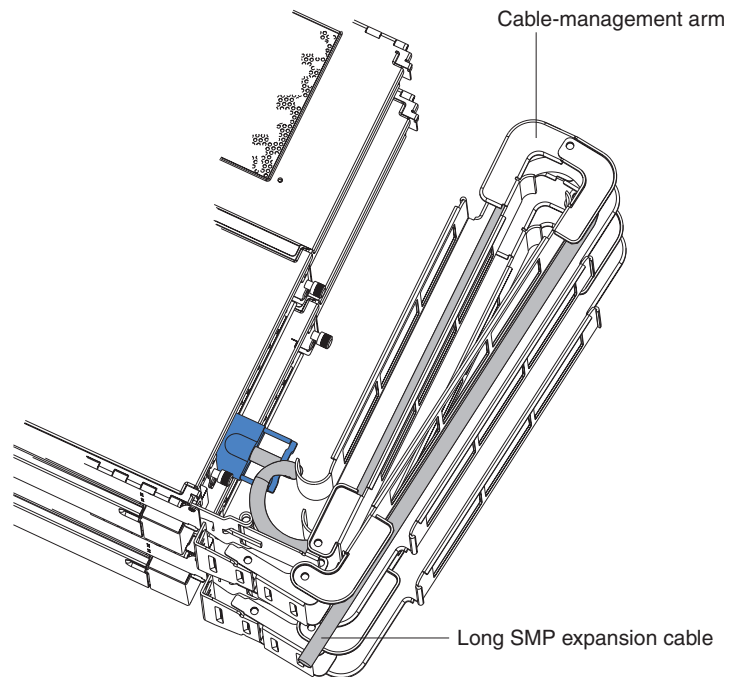
Figure 81. Routing cables through the cable management arm

   b. Connect one end of a 2.5 m (8.2 ft) SMP Expansion cable to port 2 of SMP Expansion Module 0 on the primary server; then, route the cable beside the first cable in the cable-management arm.
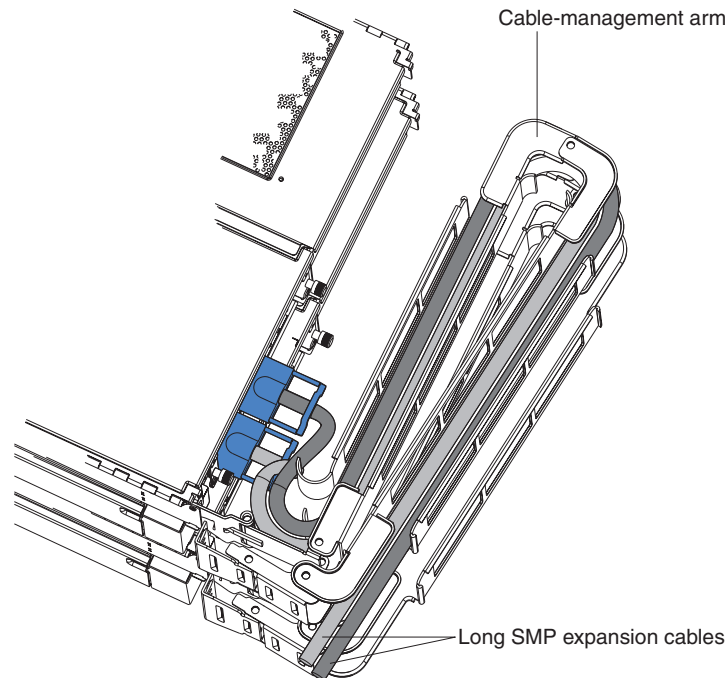
Figure 82. Routing cables through the cable management arm

    c. Connect one end of a 2.5 m (8.2 ft) SMP Expansion cable to port 1 of SMP Expansion Module 1 on the primary server; then, route the cable through the cable-management arm as in step 3a on page 130.

    d. Connect one end of a 2.5 m (8.2 ft) SMP Expansion cable to port 2 of SMP Expansion Module 1 on the primary server; then, route the cable through the cable-management arm as in step 3b on page 130.

    e. Verify that a 25.4 cm (10 in.) SMP Expansion cable is connected between port 3 of SMP Expansion Module 0 and port 3 of SMP Expansion Module 1.

4. Connect the SMP Expansion cables to the secondary server:

    a. Locate the SMP Expansion cable that is connected to port 1 of SMP Expansion Module 0 on the primary server; then, connect the opposite end of the cable to port 1 of SMP Expansion Module 2. Next, route the cable through the secondary cable-management arm.

    b. Locate the SMP Expansion cable that is connected to port 2 of SMP Expansion Module 1 on the primary server; then, connect the opposite end of the cable to port 2 of SMP Expansion Module 2. Next, route the cable through the secondary cable-management arm.

    c. Locate the SMP Expansion cable that is connected to port 1 of SMP Expansion Module 1 on the primary server; then, connect the opposite end of the cable to port 1 of SMP Expansion Module 3. Next, route the cable through the secondary cable-management arm.

    d. Locate the SMP Expansion cable that is connected to port 2 of SMP Expansion Module 0 on the primary server; then, connect the opposite end of the cable to port 2 of SMP Expansion Module 3. Next, route the cable through the secondary cable-management arm.

    e. Verify that a 25.4 cm (10 inches) SMP Expansion cable is connected between port 3 of SMP Expansion Module 2 and port 3 of SMP Expansion Module 3.

5. Connect the Remote Supervisor Adapter or Remote Supervisor Adapter II-EXA Ethernet port on each server to a LAN or to each other with an Ethernet crossover cable. This connection is needed so that the adapters can communicate and perform the necessary functions for the two servers to create or delete scalable partitions.
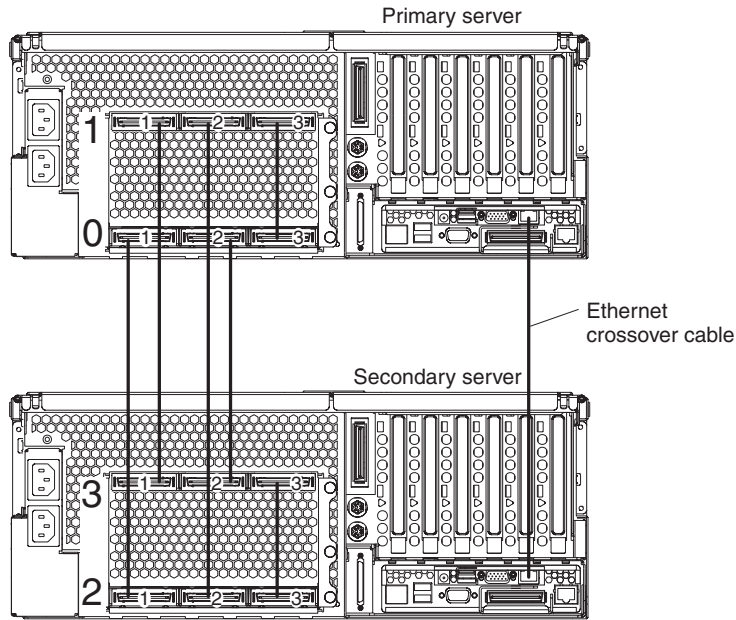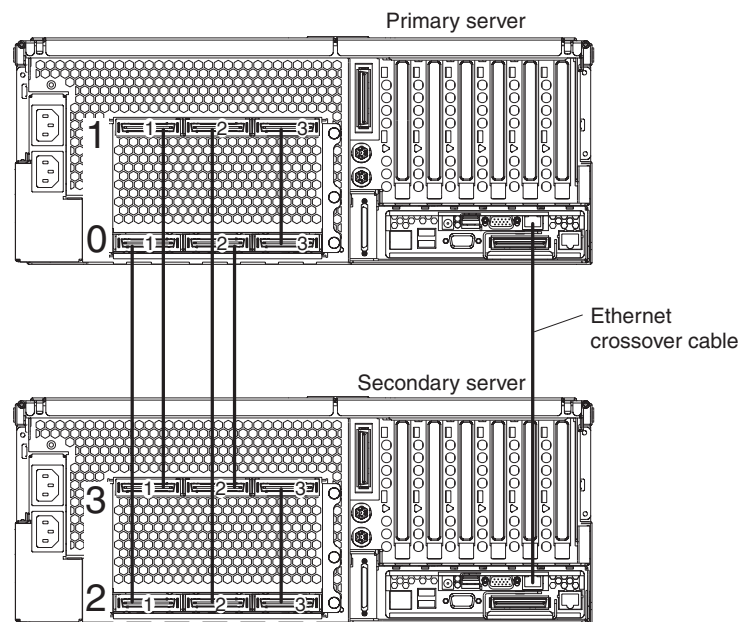

Figure 83. Using an Ethernet crossover cable to connect the Remote Supervisor Adapters.
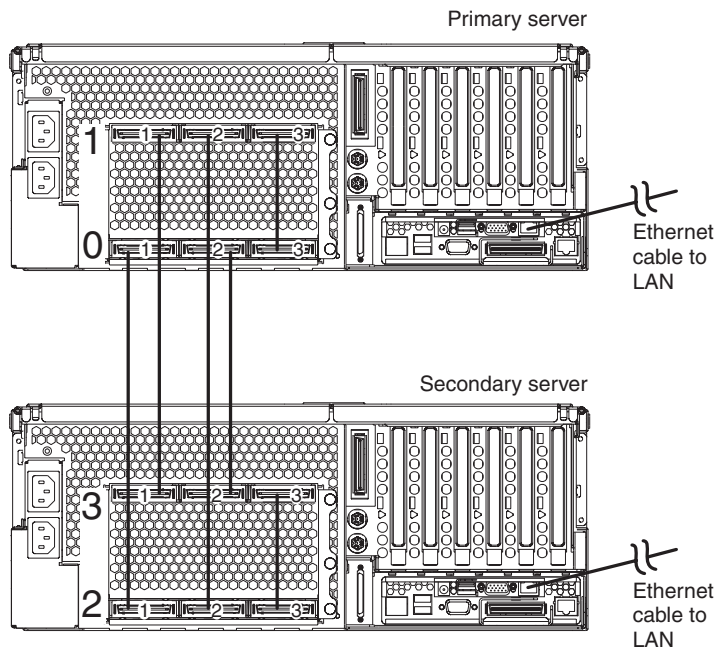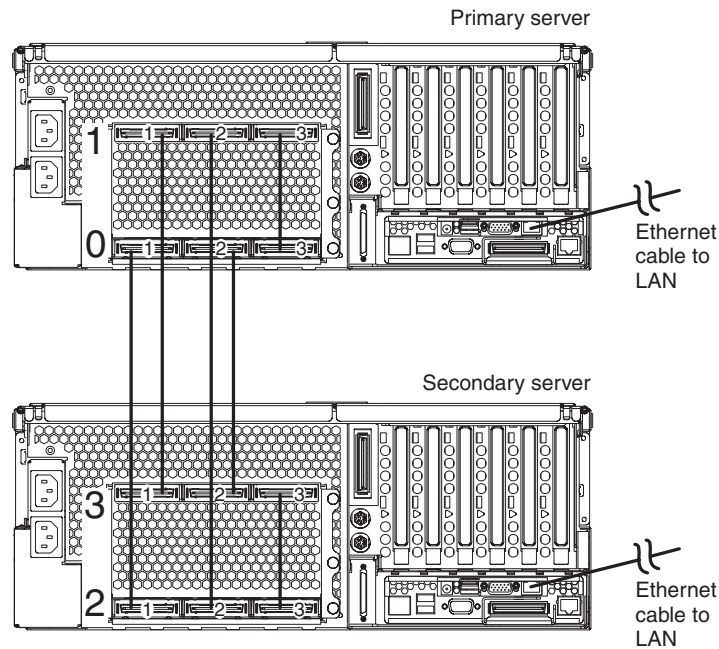

Figure 84. Connecting the Remote Supervisor Adapters to a LAN.

6. Route any remaining cables through the cable-management arms.

7. Secure the cables in the cable-management arms with the hook-and-loop straps that come with the server.

8. If you are connecting an RXE-100 enclosure, go to "16-way configuration" on page 138. If you are not connecting an RXE-100 enclosure, connect all remaining external cables to the server; then, go to "Creating a scalable partition" on page 141 and follow the instructions for creating a scalable partition.

RXE Expansion and Management Port cabling

The server has two RXE Expansion Ports located on the rear of the server. Use these ports to connect the server to a remote I/O enclosure and to expand the number of PCI-X slots that are available for use by the server.

The server has one RXE Management Port located on the back of the server. Use this port to connect the server to the management port of an optional remote I/O enclosure. This port is used to manage the PCI-X slots in a remote I/O enclosure, including slot assignments and managing access.

For detailed information about how the server and remote I/O enclosure work together, see the documentation that comes with the remote I/O enclosure.

One server with one SMP Expansion Module

If the server has one SMP Expansion Module installed, complete the following steps to connect an RXE-100 enclosure:

1. Remove the protective covers from the connectors on the ends of the cables.
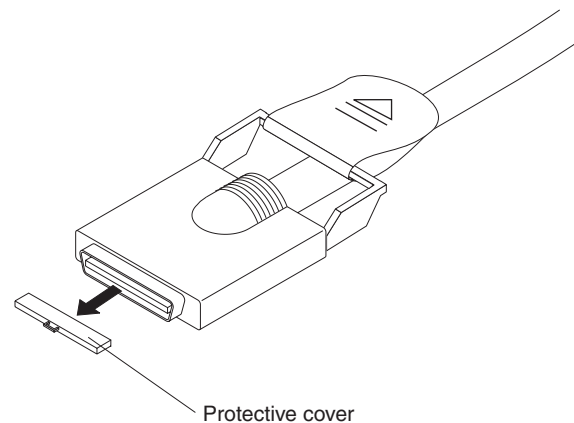
Protective cover

Figure 85. RXE Expansion cable with protective cover

2. Using an RXE Expansion cable, connect one end of the cable to RXE Expansion Port A on the server.
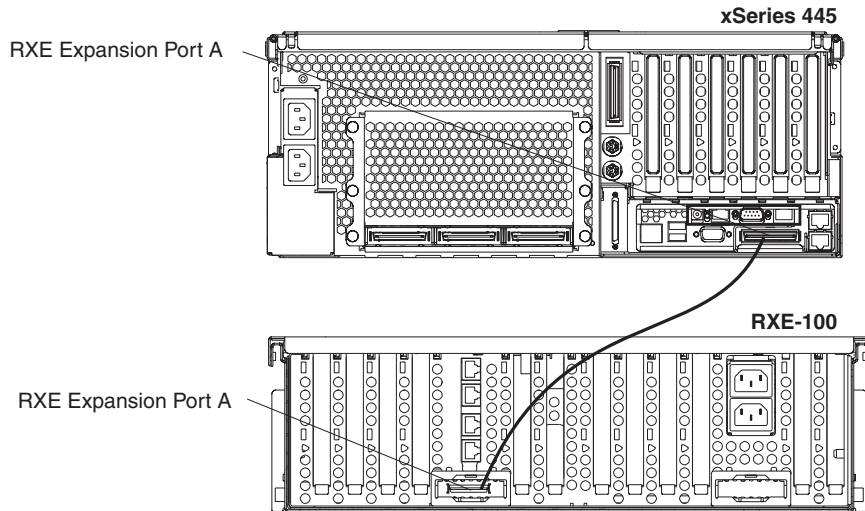
Figure 86. RXE Expansion Port cabling a server with one SMP Expansion Module

3. Connect the opposite end of the cable to an RXE Expansion Port on the remote I/O enclosure.

4. Using an RXE Management cable, connect one end of the cable to the RXE Management Port on the server.
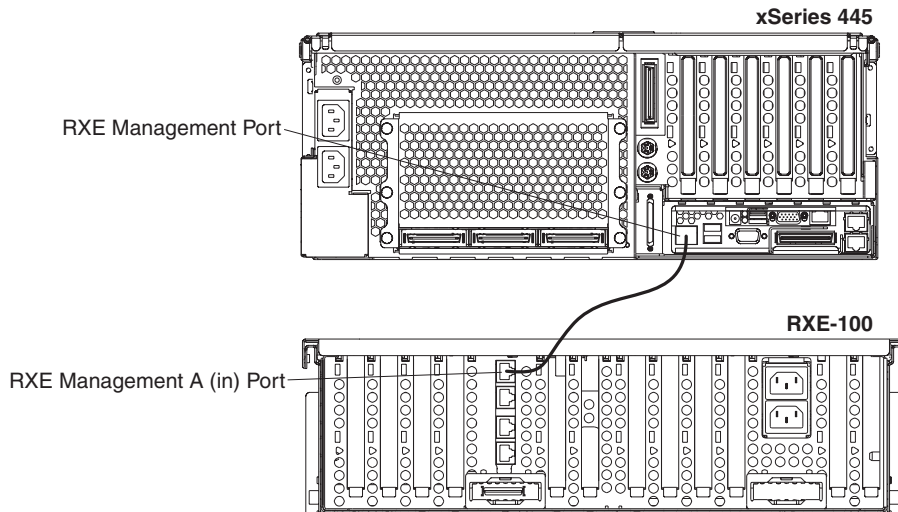
Figure 87. Cabling RXE Management Port - one server

5. Connect the opposite end of the cable to the RXE Management A (in) Port on the remote I/O enclosure.

6. Connect all remaining external cables to the server; then, go to "Creating a scalable partition" on page 141 and follow the instructions for creating a scalable partition.

One server with two SMP Expansion Modules

If the server has two SMP Expansion Modules installed, complete the following steps to connect an RXE-100 enclosure:

1. Remove the protective covers from the connectors on the ends of the cables.
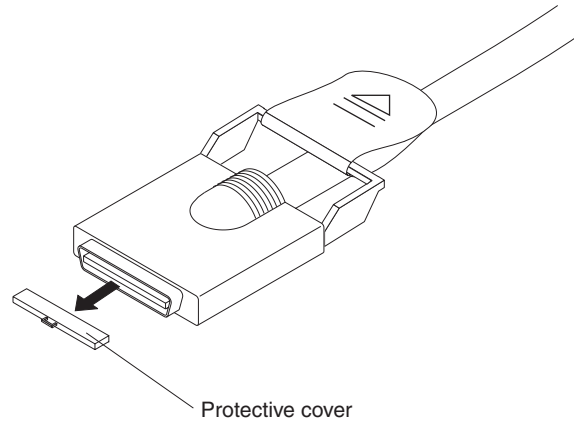
Protective cover

Figure 88. RXE Expansion cable with protective cover

2. Using an RXE Expansion cable, connect one end of the cable to RXE Expansion Port B on the server.
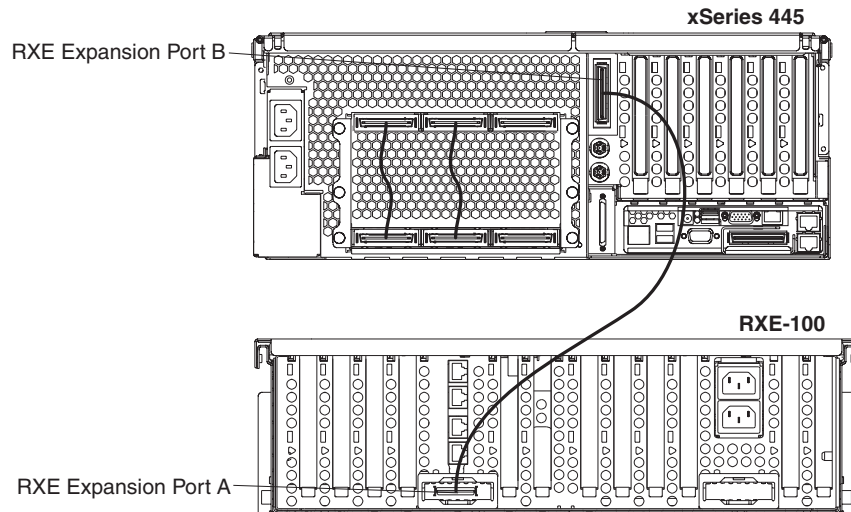
Figure 89. RXE Expansion port cabling a server with two SMP Expansion Modules

3. Connect the opposite end of the cable to an RXE Expansion Port on the remote I/O enclosure.

   Notes:

   a. When two SMP Expansion Modules are installed, both of the RXE Expansion ports are active.

   b. To increase reliability connect a second RXE Expansion cable from the server RXE Expansion Port A to the remote I/O enclosure RXE Expansion Port B. This will create a redundant data path if either of the two cables fail.

4. Using an RXE Management cable, connect one end of the cable to the RXE Management Port on the server.
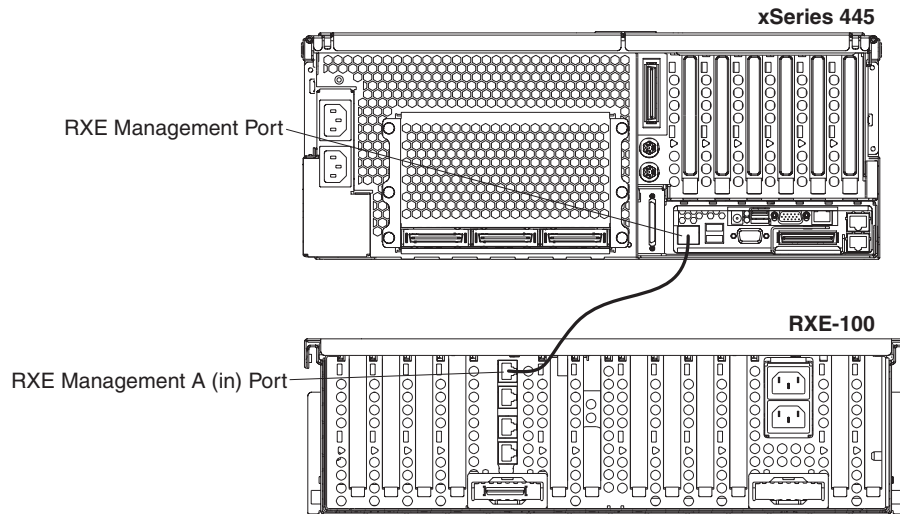
Figure 90. Cabling RXE Management Port - one server

5. Connect the opposite end of the cable to the RXE Management A (in) Port on the remote I/O enclosure.
6. Connect all remaining external cables to the server; then, go to "Creating a scalable partition" on page 141 and follow the instructions for creating a scalable partition.

Two stand-alone servers

To cable two stand-alone servers to a single remote I/O enclosure complete the following steps.

1. Determine which server will be connected to port A of the remote I/O enclosure and which will be connected to port B.
2. Remove the protective covers from the connectors on the ends of the cables.
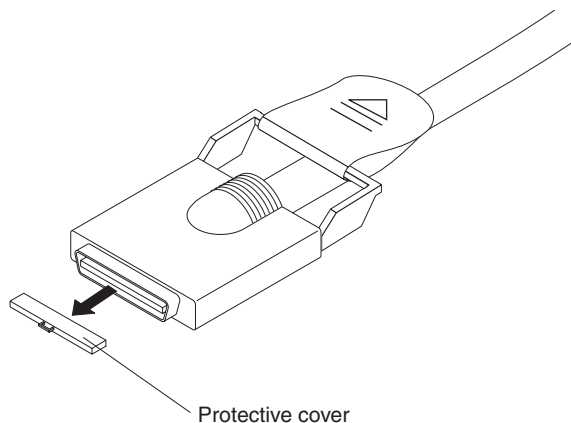
Figure 91. RXE Expansion cable with protective cover

3. Using an RXE Expansion cable, connect one end of the cable to RXE Expansion Port A on the remote I/O enclosure.
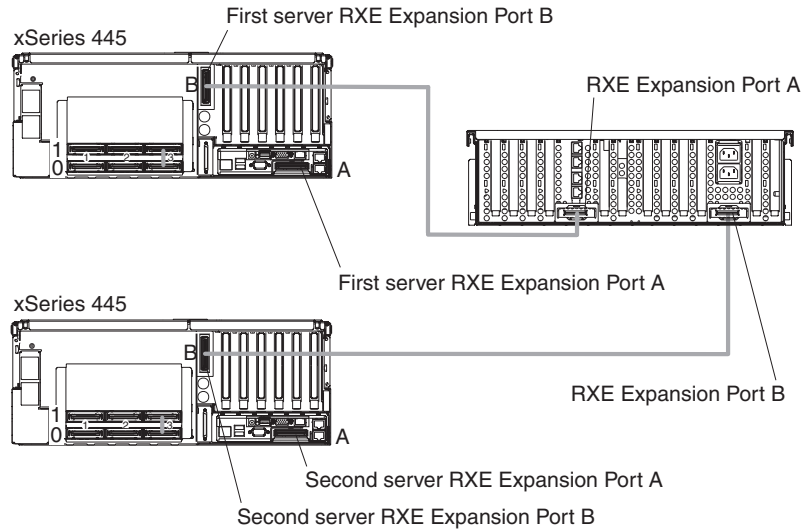
Figure 92. RXE Expansion Port cabling of two stand-alone xSeries 445 servers to a single remote I/O enclosure

4. Connect the opposite end of the cable to RXE Expansion Port A or B on the first server.

   Note: If the server has one SMP Expansion Module installed you must connect the RXE Expansion cable to RXE Expansion Port A on the server. If server has two SMP Expansion Modules installed, connect the cable to RXE Expansion Port B.

5. Using an RXE Expansion cable, connect one end of the cable to RXE Expansion Port B on the remote I/O enclosure.

6. Connect the opposite end of the cable to RXE Expansion Port A or B on the second server.

   Note: When two SMP Expansion Modules are installed, both of the RXE Expansion ports are active.

7. Using an RXE Management cable, connect one end of the cable to the RXE Management Port on one of the servers.
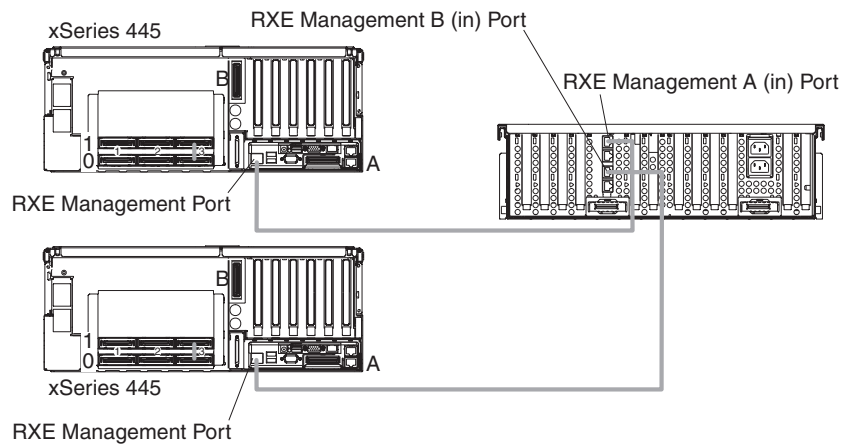
Figure 93. Cabling an RXE Management port - two stand-alone servers

8. Connect the opposite end of the cable to the RXE Management A (in) Port on the remote I/O enclosure. The RXE Management Port cabling is the same for a server with two SMP Expansion Modules.

9. Repeat steps 7 on page 137 and 8 for the second server.

10. Connect all remaining external cables to the server; then, go to "Creating a scalable partition" on page 141 and follow the instructions for creating a scalable partition.

16-way configuration

Complete the following steps to connect an IBM RXE-100 Remote Expansion Enclosure to a 16-way system.

1. Remove the protective covers from the connectors on the ends of the cables.
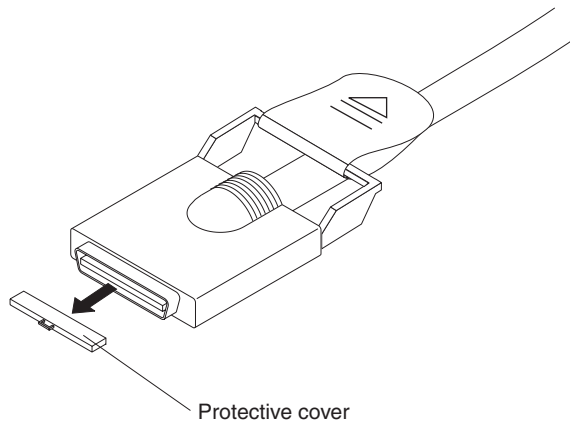
Protective cover

Figure 94. RXE Expansion cable with protective cover

2. Using an RXE Expansion cable, connect RXE Expansion Port A on the primary server to RXE Expansion Port A on the secondary server.
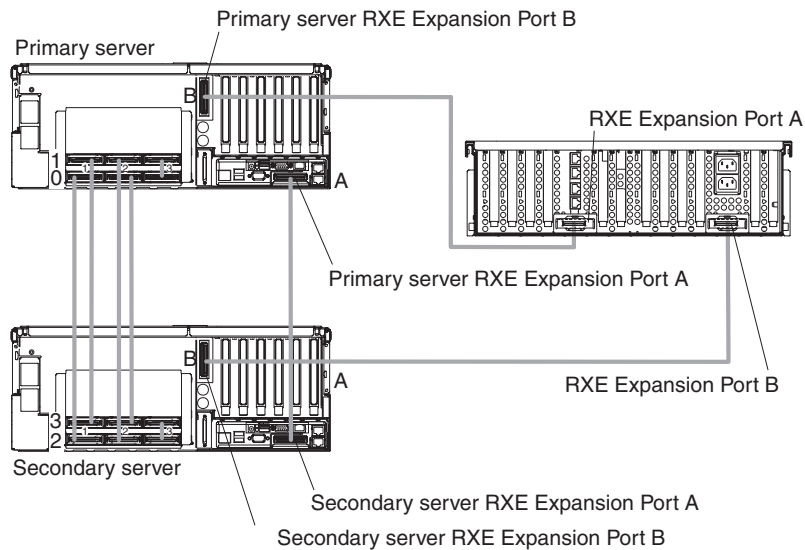
Figure 95. RXE Expansion Port cabling in a 16-way configuration

3. Using an RXE Expansion cable, connect RXE Expansion Port B on the primary server to RXE Expansion Port A on the RXE-100.

4. Using an RXE Expansion cable, connect RXE Expansion Port B on the secondary server to the RXE Expansion Port B on the RXE-100.

5. Using an RXE Management cable, connect the RXE Management Port on the primary server to RXE Management Port A (in) on the RXE-100.

Primary server RXE Management Port

Primary server

RXE Management B (in) Port

RXE Management A (in) Port

Secondary server

Secondary server RXE Management Port
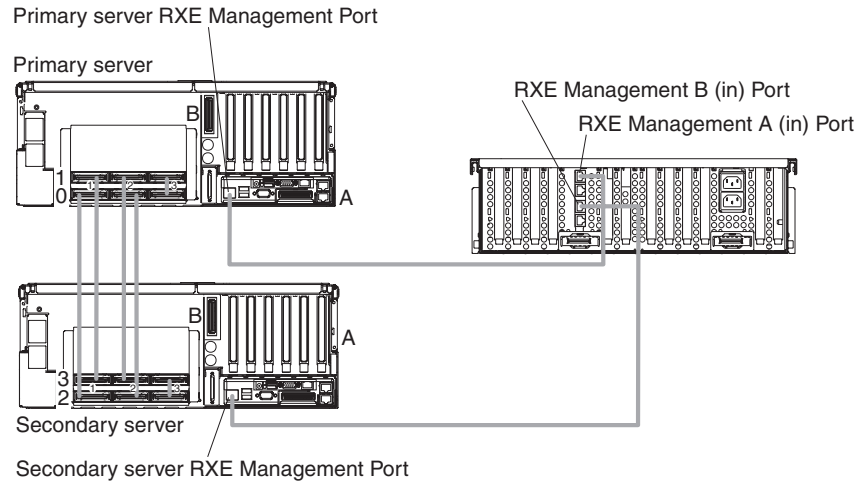
Figure 96. Cabling an RXE Management Port - 16-way configuration

6. Using an RXE Management cable, connect the RXE Management Port on the secondary server to the RXE Management Port B (in) on the RXE-100.

7. Connect all remaining external cables to the server; then, go to "Creating a scalable partition" on page 141 and follow the instructions for creating a scalable partition.

Scalable partitions

There are two methods for creating and managing scalable partitions:

- The Scalable Systems Manager program is an extension to IBM Director that provides a graphical user interface for creating and managing scalable partitions. See the *Scalable Systems Manager Installation and Users Guide* for information on how to use that program to configure scalable partitions on xSeries 445 servers.

- You can use the Configuration/Setup Utility program to configure scalable partitions.

This section provides information and instructions for creating and deleting scalable partitions using the Configuration/Setup Utility program.

Before you create scalable partitions, read the following information:

- Before you can create or delete a scalable partition, the Remote Supervisor Adapters must have an IP address and must be connected to a network or to each other with an Ethernet crossover cable. This connection is needed so that the Remote Supervisor Adapters can communicate and perform the necessary functions for the two servers to create or delete scalable partitions.

Figure 97. Using an Ethernet crossover cable to connect the Remote Supervisor Adapters.

Figure 98. Connecting the Remote Supervisor Adapters to a LAN.

- When creating a scalable partition consisting of an RXE-100, you must create the scalable partition initially through the Configuration/Setup Utility program before you can use Scalable systems Manager.
- When a scalable partition consisting of two servers in a 16-way configuration is created, the DVD-ROM drive, diskette drive, keyboard, USB connectors, mouse, and video are disabled on the secondary server.
- In the Configuration/Setup Utility program Expansion Port A Destination and Expansion Port B Destination refer to the RXE Expansion Port connection from the expansion enclosure to the server.
- In a 16-way configuration, the SMP IDs of the Primary and Secondary Scalable Nodes must be different.

Creating a scalable partition

Complete the following steps to create a scalable partition:

1. If you have not already done so, connect the RXE expansion and RXE management cables between the server and the remote expansion enclosure. See "RXE Expansion and Management Port cabling" on page 133 for information about RXE cabling.
2. Start the Configuration/Setup Utility program.
3. From the main menu, select **Advanced Setup**.
4. Select **Scalable Partition Settings**.
5. Select **Create Scalable Partition Settings**.

6. For 4-way and 8-way, single chassis configurations, complete the following steps:
   a. Select **1 x445 chassis**, as the Scalable System Configuration.
   b. Select the number of PCI-X slots available to the RXE Expansion Port in the remote expansion enclosure. The following choices are available:
      0 - No PCI-X slots are assigned to the RXE Expansion Port.
      6 - Only six of the 12 slots are assigned to the RXE Expansion Port.
      12 - All 12 PCI-X slots are assigned to the RXE Expansion Port.
   c. Complete one of the following procedures, depending on the number of SMP Expansion Modules that are installed:
      • One SMP Expansion Module - If six or 12 PCI-X slots are available, select Primary Scalable Node, Port A for the RXE Port destination.
      • Two SMP Expansion Modules - If six or 12 PCI-X slots are available to port A or port B, select Primary Scalable Node, Port B for the RXE Port destination. If six PCI-X slots are available to port A and six PCI-X slots are available to port B; then, select Primary Scalable Node, Port A for the RXE Port A destination and Primary Scalable Node, Port B for the RXE Port B destination.
   d. Go to step 8.
7. For 16-way, two-chassis configuration, complete the following steps:
   a. Select **2 x445 chassis**, as the Scalable System Configuration.
   b. Enter a Scalable Partition ID **0000 through 9999**.
   c. For the primary boot node select **SMP ID 0**.

   Note: The SMP ID can be 0 or 2, but it must be different from the SMP ID of the secondary x445 scalable node.
   d. Enter the Secondary ASM host name or IP address.
   e. From the **Secondary Scalable Node SMP ID** menu, select **Yes, SMP ID 2**.

   Note: This SMP ID must be different from the SMP ID for the primary boot node.
   f. Select the number of PCI-X slots available to the RXE Expansion Port in the remote expansion enclosure. The following choices are available:
      0 - No PCI-X slots are assigned to the RXE Expansion Port.
      6 - Only six of the 12 slots are assigned to the RXE Expansion Port.
      12 - All 12 PCI-X slots are assigned to the RXE Expansion Port.
   g. If 12 PCI-X slots are available to port A, select Primary Scalable Node, Port B for the RXE Port A destination. If six PCI-X slots are available to port A and six PCI-X slots are available to port B; then, select Primary Scalable Node, Port A for the RXE Port A destination and Primary Scalable Node, Port B for the RXE Port B destination.
8. Select **Write Scalable Partition Settings** and follow the prompts to exit the menu item.
9. Save and Exit the Configuration/Setup Utility Program.

   Note: See the software documentation that comes with your operating system to install your operating system.

Deleting a scalable partition

Complete the following steps to delete the scalable partition:

1. Start the Configuration/Setup Utility on the primary server.
2. From the main menu, select **Advanced Setup**.
3. Select **Scalable Partition Settings**.
4. Select either **Delete ALL Scalable Partition** or **Delete ONLY Local Scalable Partition**.

   Note: Do not select **Write Scalable Partition Settings** when you delete the scalable partition.

5. Exit the Configuration/Setup Utility program.
6. Turn off the servers.
7. If necessary, remove the SMP Expansion cables and reconnect them according to your new configuration. See "Connecting the cables" on page 126 for instructions.
8. Restart the servers.

Power cabling

The server uses two power cords that can be connected to a primary power unit inside the rack cabinet, such as a properly grounded power distribution unit or uninterruptible power supply, or to an external source, such as a properly grounded electrical outlet.

Complete the following steps to attach the power-supply cords:

1. Connect a power-supply cord to one of the system power connectors on the rear of the server.
2. Connect the other end of the power-supply cord to a properly grounded electrical outlet or a primary power unit inside the rack cabinet.

   Note: Connecting the power-supply cords to an electrical outlet might cause the server to start automatically. This is an acceptable action. See "Turning on the server" in the *User's Guide* on the IBM *xSeries Documentation* CD for detailed information about turning on the server.

3. Repeat steps 1 and 2 for the second cable.

   Note: The xSeries 445 server requires a 220 V ac power connection for full power-supply redundancy. Whenever possible, use a 220 V ac connection for all configurations. However, you can use a 110 V ac connection, but without full power-supply redundancy.

SCSI cabling

The server has one SCSI connector located on the back of the server. Use this connector to connect the server to an optional SCSI device such as one of the IBM external storage enclosures. For detailed information about this option and how to connect it to the server, see the documentation that comes with the SCSI device.

USB cabling

The server has three USB connectors, one on the front and two on the back of the server. Use these connectors to connect the server to an optional USB device. For detailed information about this USB option and how to connect it to the server, see the documentation that comes with the option.

Video cabling

The server has one video connector located on the back of the server. Use this connector to connect the server to a monitor or optional console switch. For detailed information about this option and how to connect it to the server, see the documentation that comes with the option.

Important: If the server has a Remote Supervisor Adapter II-EXA installed, you must connect a monitor or console switch to the video port on the adapter. The integrated video controller on the server is disabled for models with a Remote Supervisor Adapter II-EXA installed.

Mouse cabling

The server has one mouse connector located on the back of the server. Use this connector to connect a mouse to the server. For detailed information about this option and how to connect it to the server, see the documentation that comes with the option.

Keyboard cabling

The server has one keyboard connector on the back of the server. Use this port to connect the server to a keyboard or optional console switch. You can also connect a USB keyboard to the server using one of the USB connectors. After installing a USB keyboard, you might need to use the Configuration/Setup Utility program to enable keyboardless operation and prevent the POST error message 301 from being displayed during startup. For detailed information about this option and how to connect it to the server, see the documentation that comes with the option.

Gigabit Ethernet cabling

The server has two Ethernet connectors on the back of the server. Use these connectors to connect the server to a LAN.

Note: A third Ethernet connector is located on the Remote Supervisor Adapter. This connector is used for specific supervisory functions and should not be confused with the Gigabit Ethernet connector located next to the USB connectors.

Remote Supervisor Adapter cabling

The server comes with a Remote Supervisor Adapter or Remote Supervisor Adapter II-EXA. For information about cabling the Remote Supervisor Adapter connectors, see the appropriate *Remote Supervisor Adapter User's Guide* on the IBM *xSeries Documentation* CD.

Chapter 5. I/O connectors and indicators

This chapter provides the information about the I/O connectors and indicators on the server.

The server has the following I/O connectors:
- Universal Serial Bus (USB) connectors
- Keyboard connector
- Video connector
- Auxiliary-device (pointing device) connector
- System management ports
- RXE Expansion Ports
- SCSI port
- SMP Expansion Ports
- Remote Supervisor Adapter ports
    - One ASM interconnect (peer-to-peer) port (RJ-14)
    - One Ethernet port (remote server management using network, RJ-45)
    - One serial port (remote server management using modem)
    - One external power connector
- Ethernet connectors
- Serial port connector (not shown; inhabits PCI slot 1)
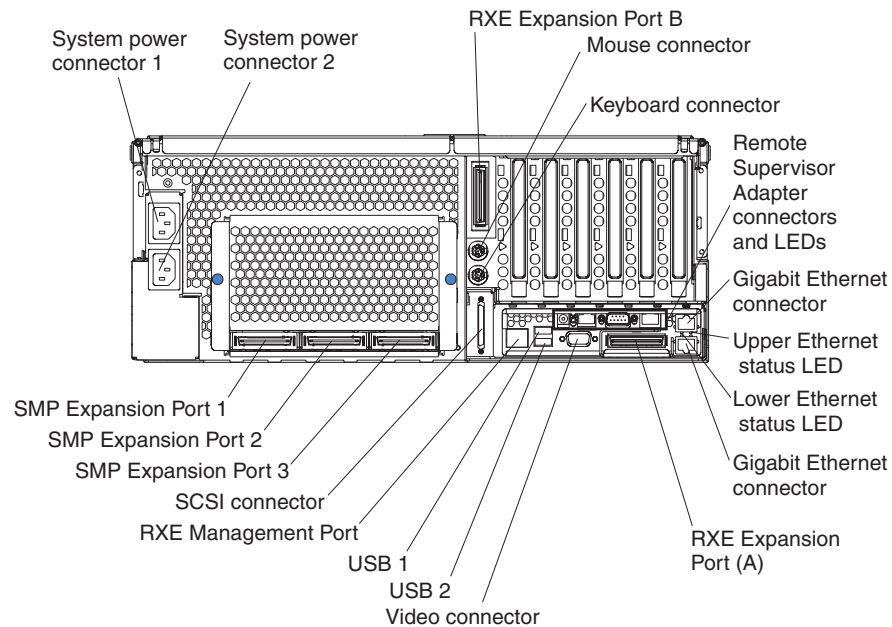
Figure 99. Rear view of xSeries 445 server

Universal Serial Bus ports

The server has three Universal Serial Bus (USB) ports, which are configured automatically. USB is a serial interface standard for telephony and multimedia devices. It uses Plug and Play technology to determine the type of device attached to the connector.

USB cables and hubs

You need a 4-pin cable to connect devices to USB 1, USB 2, and USB 3. If you plan to attach more than three USB devices, you must use a hub to connect the devices. The hub provides multiple connectors for attaching additional external USB devices.

USB technology provides up to 12 Mbps speed with a maximum of 127 external devices and a maximum signal distance of 5 meters (16 ft) per segment.

USB-port connectors

There are two USB-port connectors on the rear of the server and one USB-port connector on the front. These USB-port connectors are used to attach USB compatible devices to the server.

The following illustration shows the pin-number assignments for the USB-port connectors on the server.
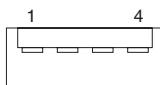
Keyboard connector

There is one keyboard connector on the rear of the server.

Note: If you attach a standard keyboard to the keyboard connector, the USB ports and devices will be disabled during the power-on self-test (POST).

The following illustration shows the pin-number assignments for the keyboard connector on the end of the cable.
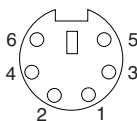
Video connector

The following illustration shows the pin-number assignments for the 15-pin analog video connector on the rear of the server.
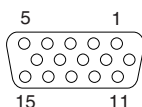
Auxiliary-device (pointing device) connector

There is one auxiliary-device connector that supports a mouse or other pointing device located on the rear of the server just under the keyboard connector.

The following illustration shows the pin-number assignments for the auxiliary-device connector on the end of the cable.
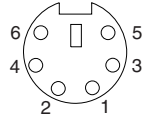
RXE Expansion Port

There are two RXE Expansion Ports that are used to connect the server to a remote I/O enclosure.

The following illustration shows the pin-number assignments for the RXE Expansion Port on the end of the cable.
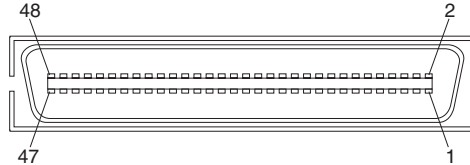
SMP Expansion Port

There are up to six SMP Expansion Ports that are used to interconnect the SMP Modules in the server.

The following illustration shows the pin-number assignments for the SMP Expansion Port on the end of the cable.
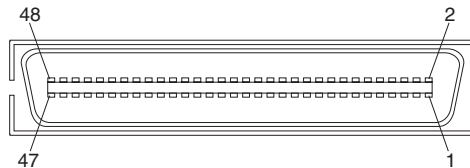
Serial Port

The serial port is shipped with the server in the same box which contained this publication and other components.

The following illustration shows the pin-number assignments for the Serial Port.
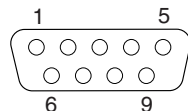
Remote Supervisor Adapter communication ports

The server has four connectors that are used by the Remote Supervisor Adapter or Remote Supervisor Adapter II-EXA. Three of the connectors are located on the adapter and one is located at the lower left corner of the rear panel (as viewed from the rear).

If you want to use the Remote Supervisor Adapter to manage the server remotely or to connect the server to another server, connect the appropriate cables to the Remote Supervisor Adapter ports.

To enable remote server management through a network, use the Remote Supervisor Adapter Ethernet port (RJ-45). To enable remote server management using a modem, use the Remote Supervisor Adapter management port. To connect the server with another server, use the ASM interconnect port (RJ-14). See the appropriate Remote Supervisor Adapter User's Guide on the *IBM Documentation* CD for more information.

Remote Supervisor Adapter II-EXA connectors and LEDs

This group of connectors and LEDs on the back of the server are used for system-management information and control.
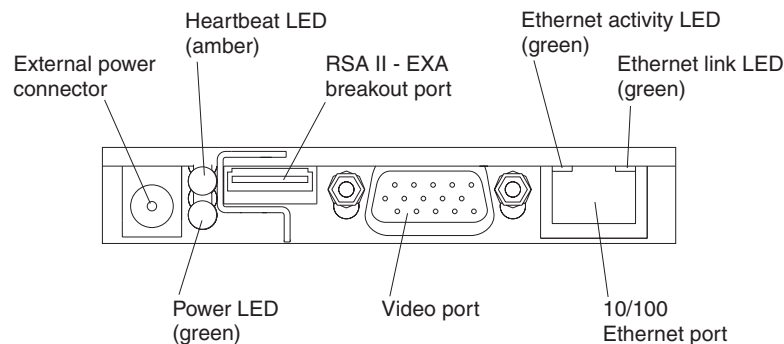
Figure 100. Remote Supervisor Adapter II-EXA connectors and LEDs

- **External power connector:** This connector is used to connect the Remote Supervisor Adapter II-EXA to an external power source.
- **Heartbeat LED:** This amber LED flashes continuously to indicate that there is activity on the Remote Supervisor Adapter II-EXA.
- **RSA II-EXA breakout port:** The RSA II-EXA breakout cable is connected to this port to provide two serial (communication) ports, one USB port, and one RS-485 port with two connectors.
- **Ethernet activity LED:** When the LED is green, there is activity on the Ethernet LAN.
- **Ethernet link LED:** When the LED is green, the link is active.
- **10/100 Ethernet port:** Ethernet Signal cables are connected to the Ethernet port.

- **Video port:** Connect the signal cable for a monitor to this port.

Important: When the Remote Supervisor Adapter II-EXA is installed in place of the Remote Supervisor Adapter, you must connect the monitor or console switch to this video port. The integrated video controller on the server is disabled for models with a Remote Supervisor Adapter II-EXA installed.

- **Power LED:** This green LED comes on and stays on when you plug in the server.

Remote Supervisor Adapter connectors and LEDs

This group of connectors and LEDs on the back of the server are used for system-management information and control.

Figure 101. Remote Supervisor Adapter connectors and LEDs

- **External power connector:** You can connect an optional ac power adapter to this connector.
- **Error LED:** This amber LED is lit when a system-management error has occurred.
- **ASM interconnect port:** Connect signal cables for managing expansion-module resources to this port.
- **Ethernet activity LED:** This green LED is lit when there is activity on the Ethernet LAN.
- **Ethernet link LED:** This green LED is lit when the Ethernet link is active.
- **10/100 Ethernet port:** Connect Ethernet signal cables to this port.
- **Management port:** Connect a serial cable to this port to enable system management through a modem, or connect a null modem cable to this port to enable system management through a workstation or laptop computer.
- **Power LED:** This green LED comes on and stays lit when you plug in the server.

Gigabit Ethernet port

The server comes with an integrated Gigabit Ethernet controller. This controller provides an interface for connecting to 10-Mbps, 100-Mbps, or 1000-Mbps networks and provides full-duplex (FDX) capability, which enables simultaneous transmission and reception of data on the Ethernet local area network (LAN).

To access the Ethernet port, connect a Category 3, 4, or 5 unshielded twisted-pair (UTP) cable to the RJ-45 connector on the rear of the server.

Note: The 100BASE-TX/1000BASE-T Fast Ethernet standard requires that the cabling in the network be Category 5 or higher.

The Ethernet (RJ-45) connector has two lights. The upper Ethernet status LED is on the right and displays the link and activity status for the upper Gigabit Ethernet port. When the LED is green the link is active. When the LED blinks green and amber there is activity on the Ethernet LAN. The lower Ethernet status LED is on the left and displays the link and activity status for the lower Gigabit Ethernet port. When the LED is green the link is active. When the LED blinks green and amber there is activity on the Ethernet LAN (see "Server controls and indicators" on page 4).

Configuring the Gigabit Ethernet controller

The server comes with an integrated Ethernet controller. This controller provides an interface for connecting to 10-Mbps, 100-Mbps, or 1000-Mbps networks and provides full duplex (FDX) capability, which enables simultaneous transmission and reception of data on the Ethernet local area network (LAN).

When you connect the server to the network, the Ethernet controller automatically detects the data-transfer rate (10-Mbps, 100-Mbps, or 1000-Mbps) on the network and then sets the controller to operate at the appropriate rate. In addition, if the Ethernet ports that the server is connected to support auto-negotiation, the Gigabit Ethernet controller will set the appropriate duplex state. That is, the Ethernet controller will adjust to the network data rate, whether the data rate is standard Ethernet (10BASE-T), Fast Ethernet (100BASE-TX/1000BASE-T), half duplex (HDX), or full duplex (FDX). The controller supports half-duplex (HDX) and full-duplex (FDX) modes at both speeds.

Note: See the documentation on the *Broadcom NetXtreme Gigabit Ethernet Software* CD that came with the server for information about configuring the Ethernet controller.

Ethernet port connector

The following illustration shows the pin-number assignments for the RJ-45 connector. These assignments apply to both 10BASE-T and 100/1000BASE-TX devices.

Lower Ethernet status LED — Upper Ethernet status LED
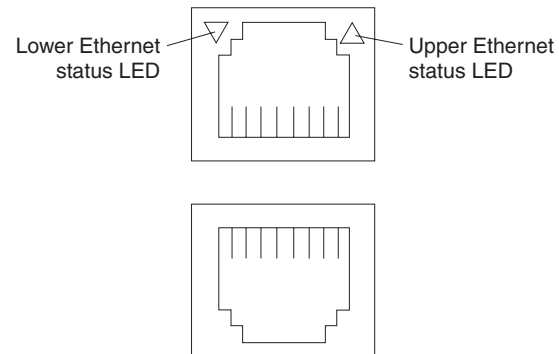
Chapter 6. FRU information (service only)

Field Replacement Units (FRUs) should be replaced by qualified service personnel
only.

Replacing the battery

When replacing the battery you must replace it with a lithium battery of the same type, from the same manufacturer. To avoid possible danger, read and follow the safety statement below.

To order replacement batteries, call 1-800-426-7378 within the United States, and 1-800-465-7999 or 1-800-465-6666 within Canada. Outside the U.S. and Canada, call your IBM reseller or IBM marketing representative.

Note: After you replace the battery, you must reconfigure the server and reset the system date and time.

Statement 2

CAUTION:
When replacing the lithium battery, use only IBM Part Number 33F8354 or an equivalent type battery recommended by the manufacturer. If your system has a module containing a lithium battery, replace it only with the same module type made by the same manufacturer. The battery contains lithium and can explode if not properly used, handled, or disposed of.

Do not:
• **Throw or immerse into water**
• **Heat to more than 100°C (212°F)**
• **Repair or disassemble**

Dispose of the battery as required by local ordinances or regulations.

Note:
  • Read "Installation guidelines" on page 79.
  • Read the safety notices at "Safety notices (multilingual translations)" on page 260.
  • Read "Handling static-sensitive devices" on page 80.

The battery is located on the I/O board. Complete the following steps to replace the battery:

1. Turn off the server and peripheral devices, and disconnect the power cords and all external cables from the server; then, open the cover (see "Opening the cover" on page 82 for details).
2. Remove the PCI brick from the server (see "PCI brick" on page 158) and place it on a clean work surface.
3. Remove the center plane by turning the two center plane thumbscrews to release it (see "Center plane" on page 159); then, carefully lift the center plane out of its socket and place it on a static-protective surface.
4. Remove the PCI-X assembly from the I/O board:
   a. Remove any adapters and adapter separators that are installed (see "PCI and PCI-X adapters" on page 86), unplugging any necessary cables.

      Note: The illustrations in this document might differ slightly from the hardware being serviced.
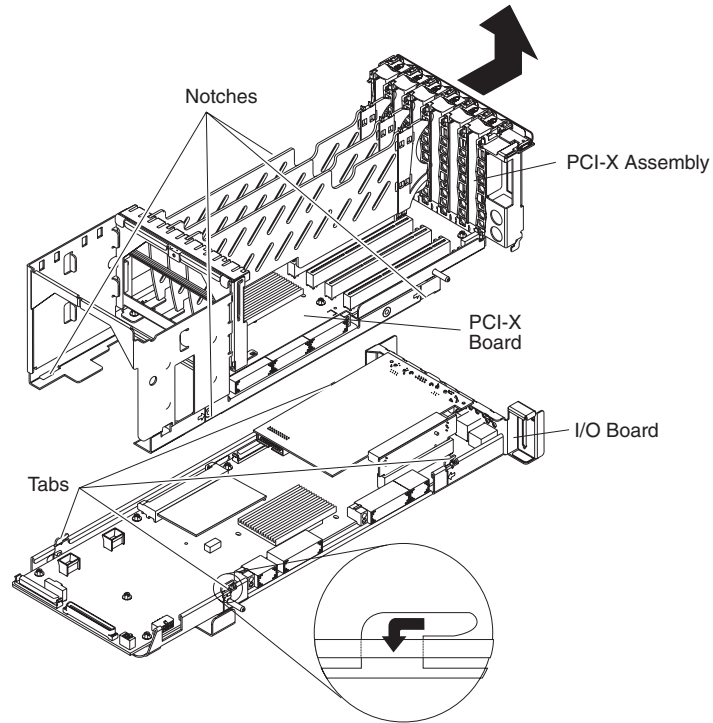
b. Release the PCI-X assembly from the I/O board at the four notches that secure them together, then lift the PCI-X assembly off of the I/O board and set it in a safe place.

5. Remove the battery:

   a. Use one finger to press the top of the battery clip away from the battery.

   b. Lift and remove the battery from the socket.
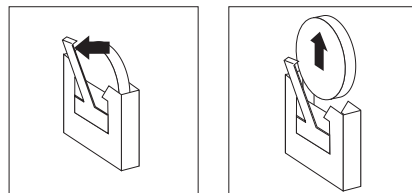
Figure 102. Removing the battery

6. Insert the new battery:

   a. Position the battery so that the positive (+) symbol is facing away from you.

   b. Use one finger to press the top of the battery clip away from the battery.

   c. Press the battery into the socket until it clicks into place. Make sure that the battery clip holds the battery securely.
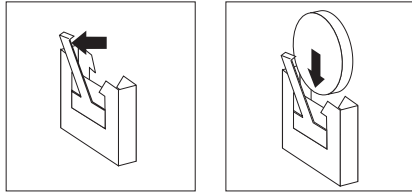
Figure 103. Installing the battery

  7. Reverse the preceding steps to reinstall the components that were removed to access the battery.

  8. Close the server cover, and connect the cables.

  9. Slide the server into the rack enclosure until it stops; then, secure the server in the rack enclosure using the quick release latches.

10. Turn on the server.

11. Start the Configuration/Setup Utility program and set configuration parameters.

- Set the system date and time.
- Set the power-on password.
- Reconfigure the server.

Thermal grease

This section contains information about removing and replacing the thermal grease between the heat sink and the microprocessor. The thermal grease must be replaced anytime the heat sink has been removed from the top of the microprocessor and is going to be reused, or when debris is found in the grease.

Note:
- Read "Installation guidelines" on page 79.
- Read the safety notices at "Safety notices (multilingual translations)" on page 260.
- Read "Handling static-sensitive devices" on page 80.

Complete the following steps to replace damaged or contaminated thermal grease on the microprocessor and heat sink.

1. Place the heat sink on a clean work surface.

2. Remove the cleaning pad from its package and unfold it completely.

3. Use the cleaning pad to wipe the thermal grease from the bottom of the heat sink.

   Note: Be sure that all of the thermal grease is removed.

4. Use a clean area of the cleaning pad to wipe the thermal grease from the microprocessor; then, dispose of the cleaning pad after all of the thermal grease is removed.
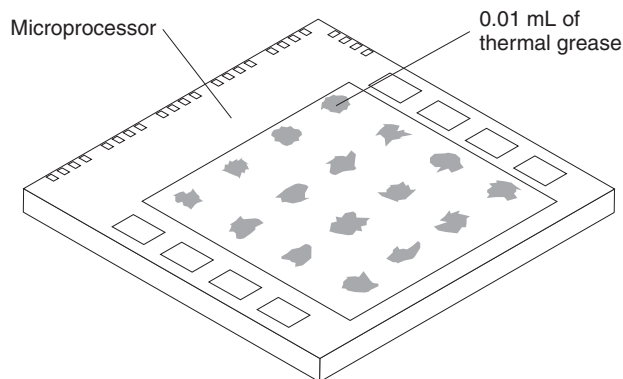
5. Use the thermal grease syringe to place 16 uniformly spaced dots of 0.01mL each on the top of the microprocessor.
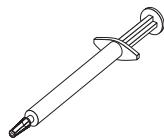
   Note: 0.01mL is one tick mark on the syringe. If the grease is properly applied, approximately half (0.22mL) of the grease will remain in the syringe.

6. Install the heat sink onto the microprocessor as described in "Installing and replacing a microprocessor" on page 116.

PCI brick

The PCI brick contains the following components:
* Active PCI assembly
* Center plane
* I/O board
* PCI and PCI-X adapters and spacers
* PCI-X board
* Riser card
* System Management board
* VRMs

This brick must be removed from the server to access many of these components. Complete the following steps to remove the PCI brick from the server.
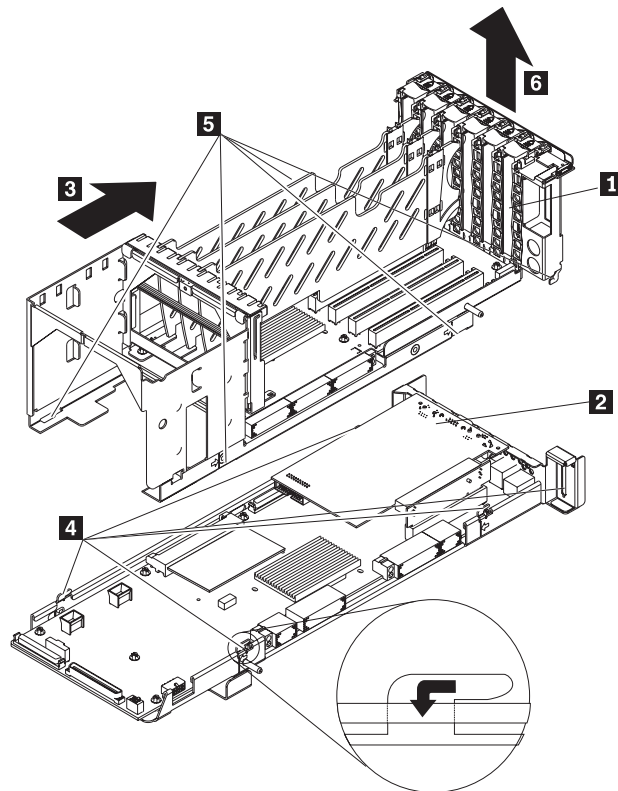
Note:
* Read "Installation guidelines" on page 79.
* Read the safety notices at "Safety notices (multilingual translations)" on page 260.
* Read "Handling static-sensitive devices" on page 80.

1. Turn off the server (see "Turning off the server" on page 10) and disconnect all power cords and external cables.
2. Open the top cover (see "Opening the cover" on page 82).
3. Remove the retention bracket, if installed.
4. Remove the fans (see "Replacing and troubleshooting fans" on page 122).
5. Remove the SMP expansion module(s) (see "SMP Expansion Module" on page 97).

   Note: The illustrations in this document might differ slightly from the hardware being serviced.
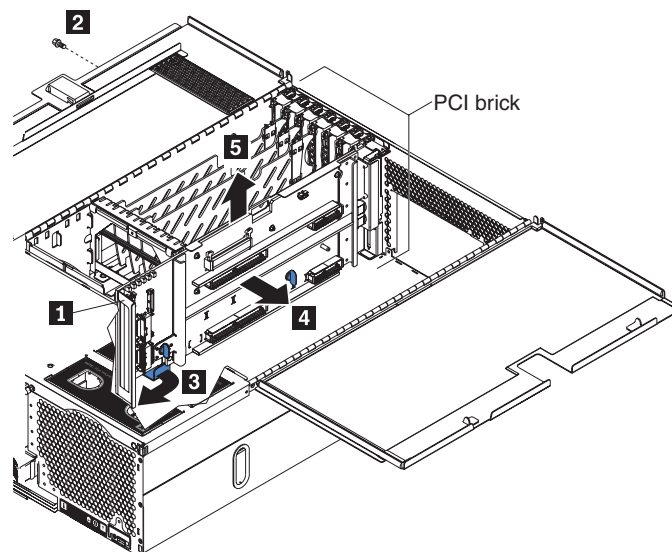
6. If the system contains a removable cable retainer (**1**), turn thumbscrew to remove it.
7. Remove the shipping screw (**2**) from the left side of the server, if installed.
8. Disconnect all cables attached to the PCI brick, including those attached to the center plane and I/O board.

9. Disconnect the cables between the PCI brick and the DASD backplane (see "DASD backplane" on page 175).

   Note: Although the DASD backplane itself does not have to be removed, failure to disconnect the DASD backplane cables may result in the PCI brick becoming entangled in these cables at step 11.

10. Push down on the release handle (**3**) and pull it forward, which causes the PCI brick to slide forward slightly.

11. Continue to slide the PCI brick as far forward as possible, and then slightly to the right (**4**).

12. Lift the PCI brick straight up and out of the server (**5**).

13. To reinstall the PCI brick, reverse the above steps.

   Note: The PCI brick connects to the chassis with tabs that connect with seven slots on the bottom of the chassis and two slots on the side of the chassis. Line up the tabs on the PCI brick with the slots on the chassis, and then slide the PCI brick into place.

Center plane

This section shows the locations of items on the center plane and contains information about removing and replacing the center plane.

Center plane connectors, jumpers and LEDs

The following illustrations identify connectors and LEDs on the center plane. This center plane is used to connect the power and signal paths for the SMP Expansion Module, I/O board, and the Remote Supervisor Adapter.

Center plane connectors and jumpers
The location of connectors and jumpers on the center plane are illustrated in Figure 104.
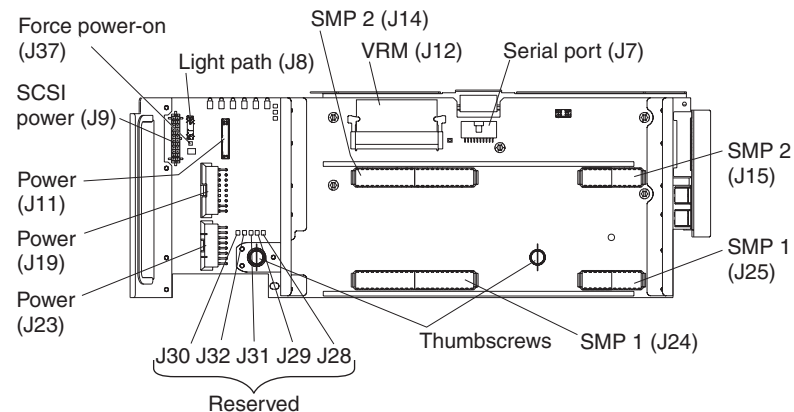
Figure 104. Center plane connectors

Table 6. Reserved center plane jumpers

Reserved Jumper	Description
J28	Scan center plane
J29	Scan center plane and I/O
J30	Scan center plane, I/O and SMP1
J31	Scan center plane, I/O, SMP1 and PCI
J32	Scan all

Center plane LEDs

The location of center plane LEDs are illustrated in Figure 105.
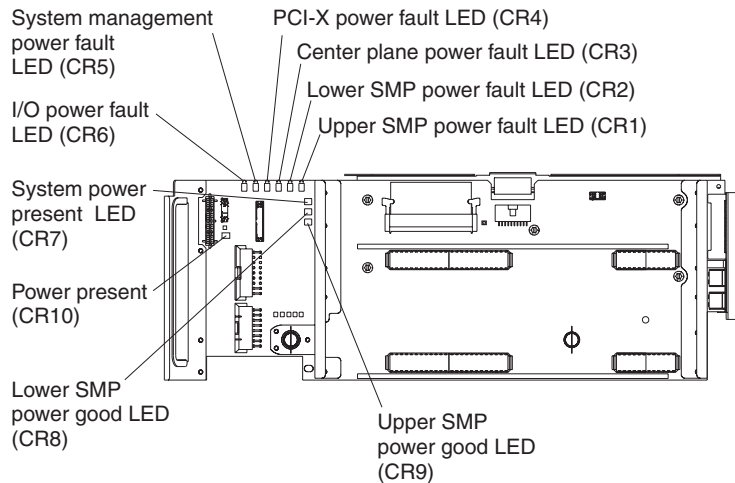
Figure 105. Center plane LEDs

Force power-on

The power switch can be bypassed (force power-on) by turning off the server, disconnecting it from the power source, and placing a jumper block between the pins of J37 on the center plane. Observe the safety precautions at "Installation guidelines" on page 79, "Working inside the server with power on" on page 79, and "Safety information" on page 257.

Center plane replacement

Complete the following steps to remove the center plane.

Note:
- Read "Installation guidelines" on page 79.
- Read the safety notices at "Safety notices (multilingual translations)" on page 260.
- Read "Handling static-sensitive devices" on page 80.

1. Turn off the server (see "Turning off the server" on page 10) and disconnect all power cords and external cables.

2. Remove the PCI brick from the server (see "PCI brick" on page 158) and place it on a clean work surface.

   Note: The illustrations in this document might differ slightly from the hardware being serviced.
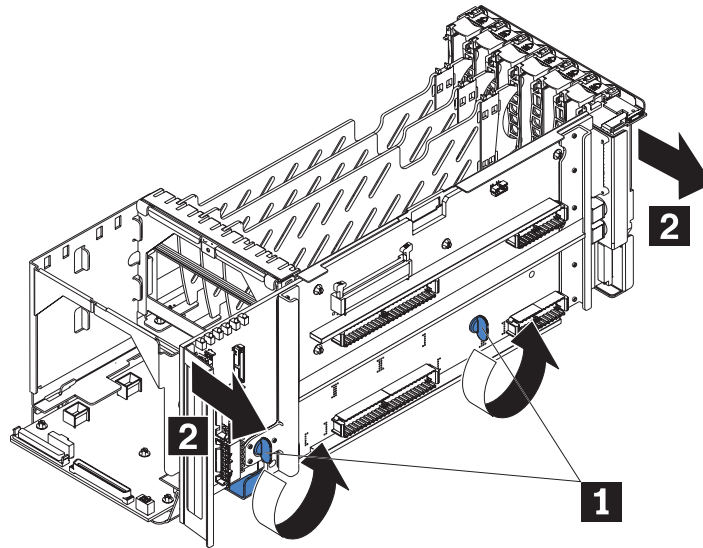
3. Remove the center plane by turning the two center plane thumbscrews (**1**) to release it; then, carefully lift the center plane out of its socket (**2**).

4. To replace the center plane, reverse the previous steps.

PCI-X board

This section shows the locations of items on the PCI-X board and contains information about removing and replacing the PCI-X board.

PCI-X board internal connectors and LEDs

The following illustrations identify the internal connectors, LEDs, and jumper blocks on the PCI-X board. This board enables you to install adapters in the server.
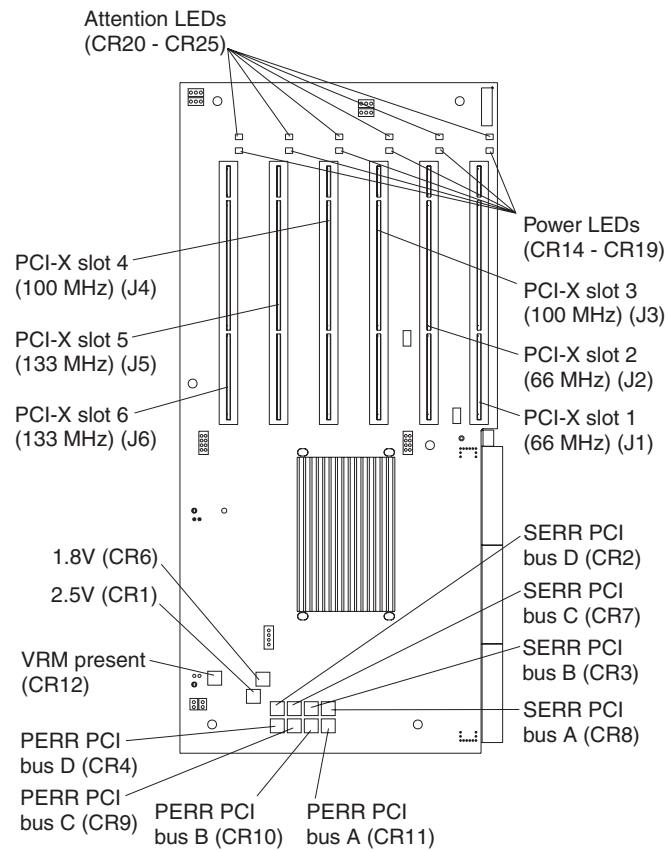
Figure 106. PCI-X board connectors and LEDs

Service jumpers

The following illustration identifies certain jumpers on the PCI-X board that are intended for the use of service technicians only.

Attention: Do not hot-swap PCI adapters if the force power-on jumper is installed; components may be damaged.
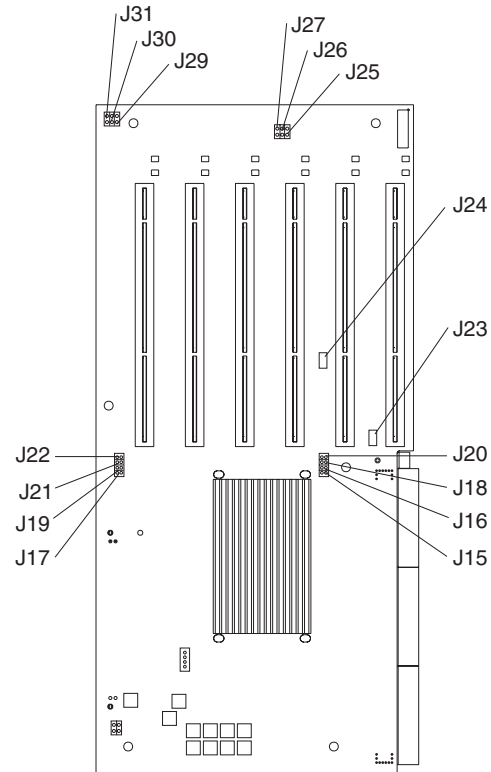
Figure 107. PCI-X board jumpers (service technicians only)

Table 7. PCI-X board jumpers (service technicians only)

Jumper	Description	Jumper	Description
J15	W2 Bus 2 speed select S1	J23	5VAUX cable header
J16	W2 Bus 2 speed select S0	J24	Slot 2 3.4V standby
J17	W2 Bus 0 speed select S1	J25	Force power on slot 1
J18	W1 Bus 2 speed select S1	J26	Force power on slot 2
J19	W2 Bus 0 speed select S0	J27	Force power on slot 3
J20	W1 Bus 2 speed select S0	J29	Force power on slot 4
J21	W2 Bus 1 speed select S0	J30	Force power on slot 5
J22	W2 Bus 1 speed select S1	J31	Force power on slot 6

PCI-X board replacement

Complete the following steps to remove the PCI-X board.

Note:
- Read "Installation guidelines" on page 79.
- Read the safety notices at "Safety notices (multilingual translations)" on page 260.
- Read "Handling static-sensitive devices" on page 80.

1. Turn off the server (see "Turning off the server" on page 10) and disconnect all power cords and external cables.

2. Remove the PCI brick from the server (see "PCI brick" on page 158) and place it on a clean work surface.

3. Remove the PCI-X assembly from the I/O board:

   a. Remove any adapters and dividers that are installed (see "PCI and PCI-X adapters" on page 86), disconnecting any necessary cables.

      Note: The illustrations in this document might differ slightly from the hardware being serviced.

   b. Remove the center plane by turning the two center plane thumbscrews to release it; then, carefully lift the center plane out of its socket and place it on a static-protective surface.
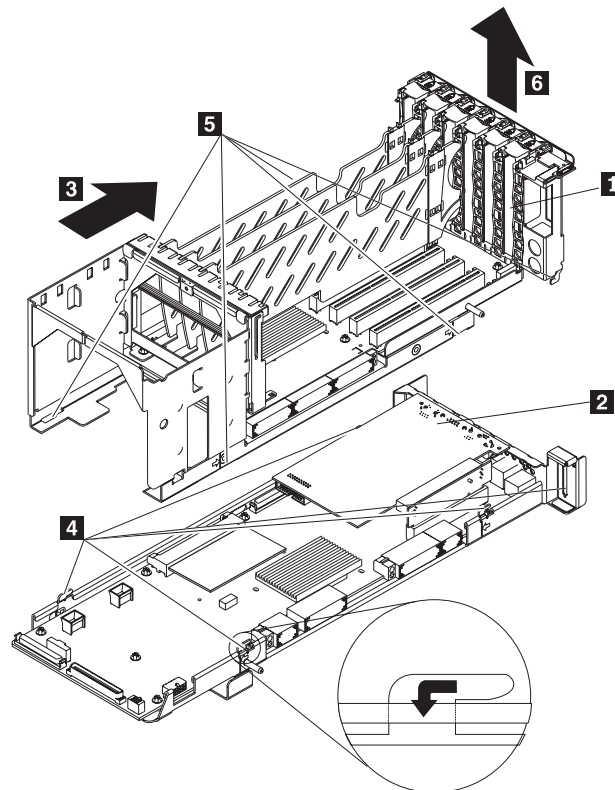
   c. Release the PCI-X assembly (**1**) from the I/O board (**2**) by sliding (**3**) the PCI-X assembly toward the rear of the server so that the five tabs (**4**) in the I/O board are released from the five notches (**5**) in the PCI-X assembly.

   d. Lift the PCI-X assembly off of the I/O board and set it on a safe, clean work surface.

4. Remove any cables that are attached to the PCI-X board.

   Note: The illustrations in this document might differ slightly from the hardware being serviced.
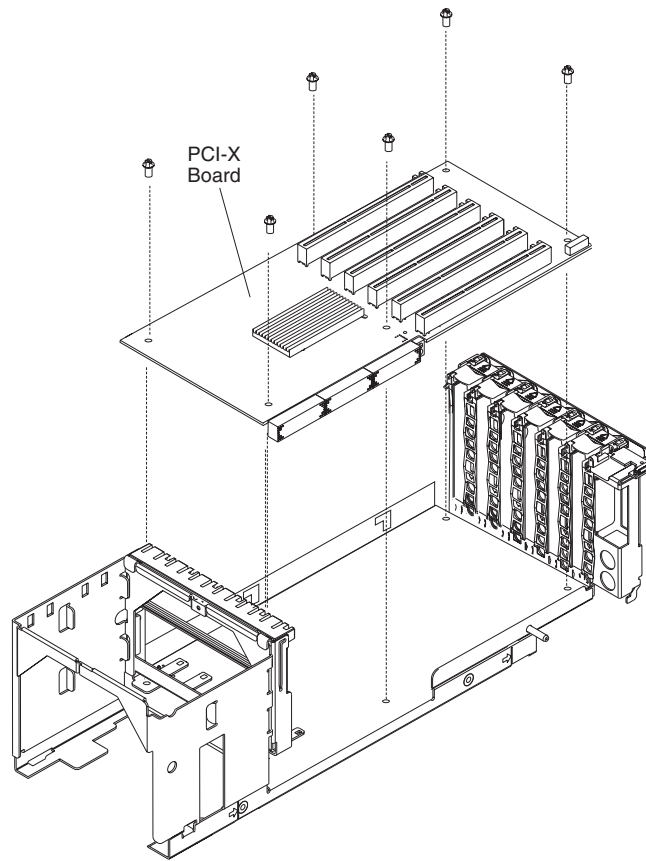
PCI-X
Board

5. Remove the six screws that fasten the PCI-X board to the assembly.

   Note: You might have to move the clear plastic label out of the way.
6. Lift the board up and out of the PCI brick.
7. To replace the PCI-X board, reverse the previous steps.

I/O board

This section shows the locations of items on the I/O board and contains information about removing and replacing the I/O board.

Note: When replacing the I/O board, you must either update the system with the latest firmware or restore the pre-existing firmware that the customer provides on a diskette or CD image.

I/O board internal connectors

The following illustration identifies the internal connectors on the I/O board. This board supports the input and output ports in the server.
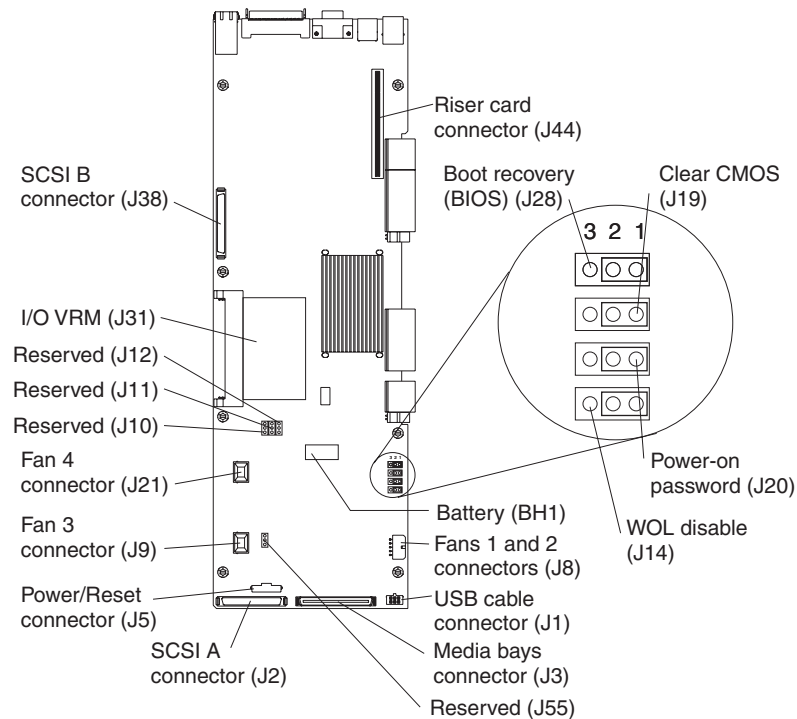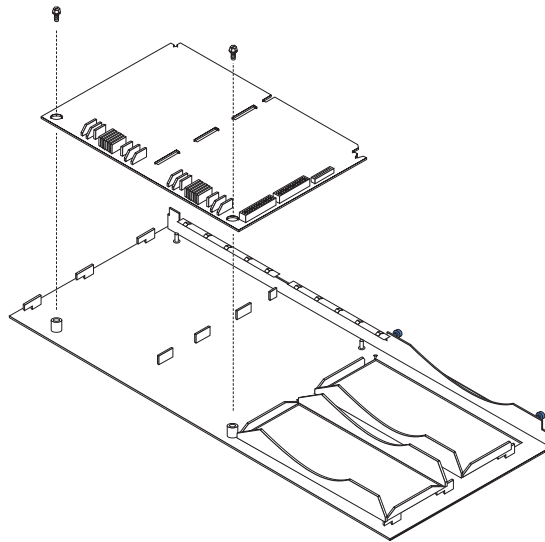

Figure 108. I/O board connectors

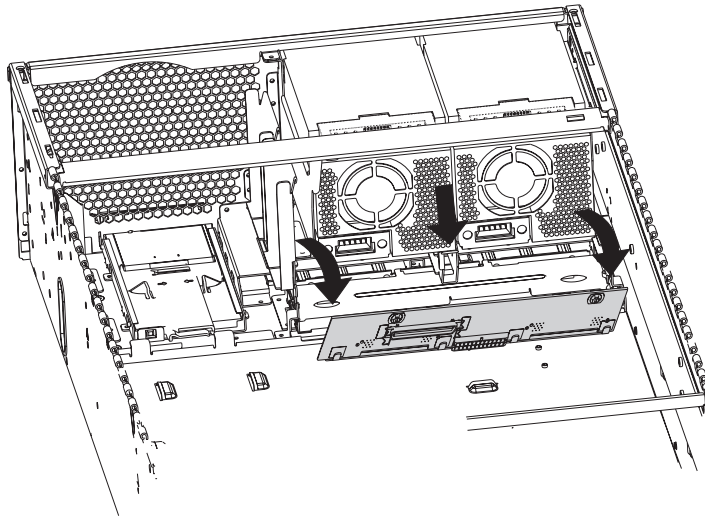## I/O board replacement

Complete the following steps to remove the I/O board.

Note:
- Read "Installation guidelines" on page 79.
- Read the safety notices at "Safety notices (multilingual translations)" on page 260.
- Read "Handling static-sensitive devices" on page 80.

1. Turn off the server (see "Turning off the server" on page 10) and disconnect all power cords and external cables.
2. Remove the PCI brick from the server (see "PCI brick" on page 158) and place it on a clean work surface.
3. Remove the center plane by turning the two center plane thumbscrews to release it (see "Center plane" on page 159); then, carefully lift the center plane out of its socket and place it on a static-protective surface.

4. Remove the PCI-X assembly from the I/O board:

    a. Remove any adapters and adapter separators that are installed (see "PCI and PCI-X adapters" on page 86), unplugging any necessary cables.

       Note: The illustrations in this document might differ slightly from the hardware being serviced.

    b. Remove the center plane by turning the two center plane thumbscrews to release it; then, carefully lift the center plane out of its socket and place it on a static-protective surface.

    c. Release the PCI-X assembly (**1**) from the I/O board (**2**) by sliding (**3**) the PCI-X assembly toward the rear of the server so that the five tabs (**4**) in the I/O board are released from the five notches (**5**) in the PCI-X assembly.

    d. Lift the PCI-X assembly off of the I/O board and set it on a safe, clean work surface.

       Note: The illustrations in this document might differ slightly from the hardware being serviced.

    e. Remove the screws attaching the Remote Supervisor Adapter to the I/O board:
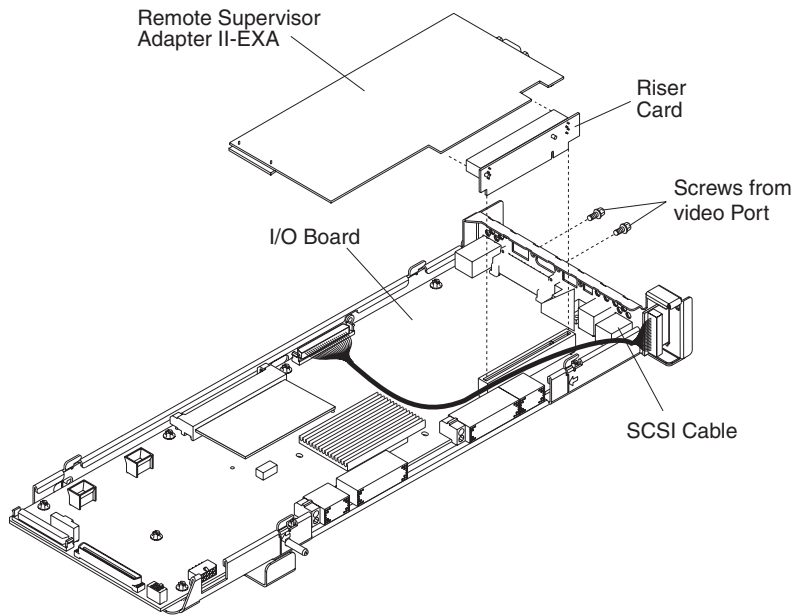
Figure 109. Remote Supervisor Adapter II-EXA model

      1) On models with the Remote Supervisor Adapter II-EXA, use a nut driver to remove the video port screws.
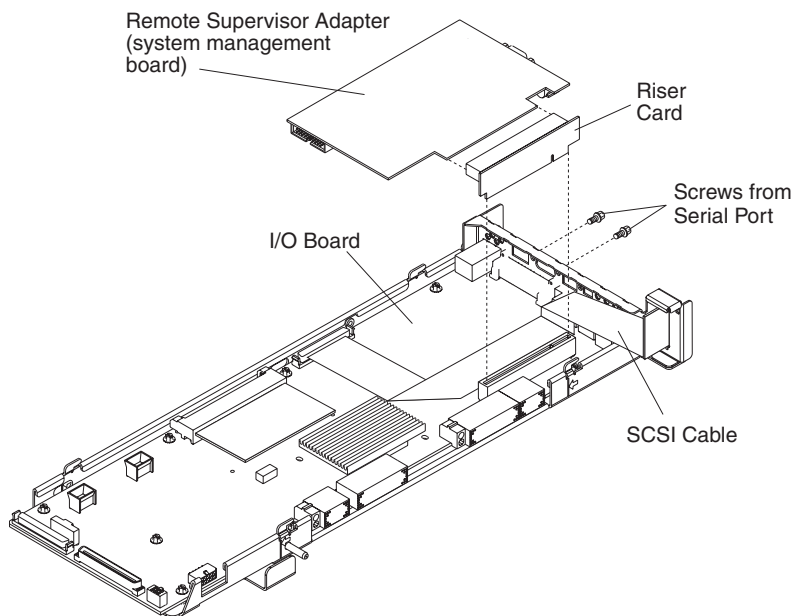
Figure 110. Remote Supervisor Adapter model

      2) On models with the Remote Supervisor Adapter, use a nut driver to remove the serial port screws.

    f. Pull the system management board and the riser card out of the I/O board, disconnecting any cables, and set them in a safe place.

5. To replace the I/O board, reverse the previous steps.

Riser card and Remote Supervisor Adapter (system management board)

This section contains information about removing and replacing the riser card and Remote Supervisor Adapter, and shows the locations of items on the Remote Supervisor Adapter and Remote Supervisor Adapter II-EXA.

Attention: To replace the Remote Supervisor Adapter with the Remote Supervisor Adapter II-EXA, follow the procedures in the IBM xSeries 445 Remote Supervisor Adapter II-EXA *Installation Guide* on the *Documentation* CD. Failure to do so will result in damage to internal components.

Remote Supervisor Adapter component locations

The server may contain either a Remote Supervisor Adapter or a Remote Supervisor Adapter II-EXA. The connectors and LEDs on the two types of adapter are described below.

Remote Supervisor Adapter II-EXA

The following illustration identifies the connectors and LEDs on the Remote Supervisor Adapter II-EXA.
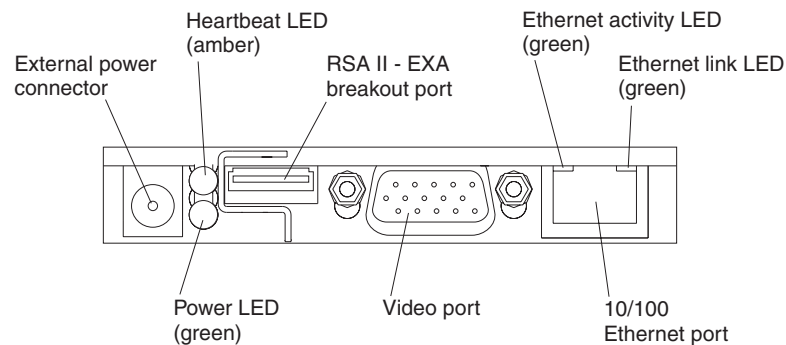
Figure 111. Remote Supervisor Adapter II-EXA connectors and LEDs

Remote Supervisor Adapter component locations

The following illustration identifies the connectors and LEDs on the Remote Supervisor Adapter.
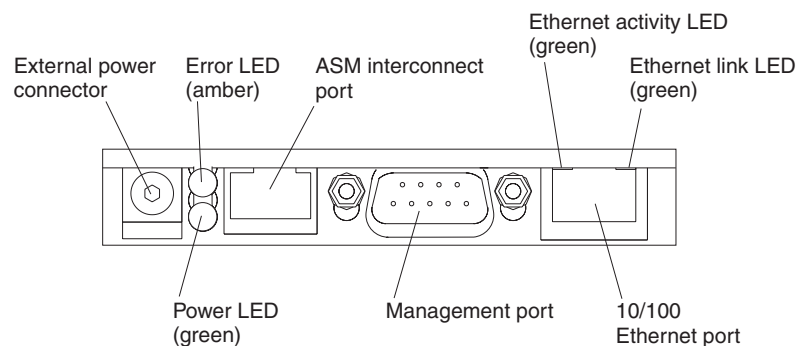
Figure 112. Remote Supervisor Adapter connectors and LEDs

Riser card and Remote Supervisor Adapter replacement

Complete the following steps to remove the riser card.

Note:
- Read "Installation guidelines" on page 79.
- Read the safety notices at "Safety notices (multilingual translations)" on page 260.
- Read "Handling static-sensitive devices" on page 80.

1. Turn off the server (see "Turning off the server" on page 10) and disconnect all power cords and external cables.
2. Remove the PCI brick from the server (see "PCI brick" on page 158) and place it on a clean work surface.
3. Remove the PCI-X assembly from the I/O board:

   a. Remove any adapters and adapter separators that are installed (see "PCI and PCI-X adapters" on page 86), unplugging any necessary cables.

   **Note:** The illustrations in this document might differ slightly from the hardware being serviced.

   b. Remove the PCI-X assembly from the I/O board:

      1) Remove any adapters and adapter separators that are installed (see "PCI and PCI-X adapters" on page 86), unplugging any necessary cables.

         Note: The illustrations in this document might differ slightly from the hardware being serviced.

      2) Remove the center plane by turning the two center plane thumbscrews to release it; then, carefully lift the center plane out of its socket and place it on a static-protective surface.
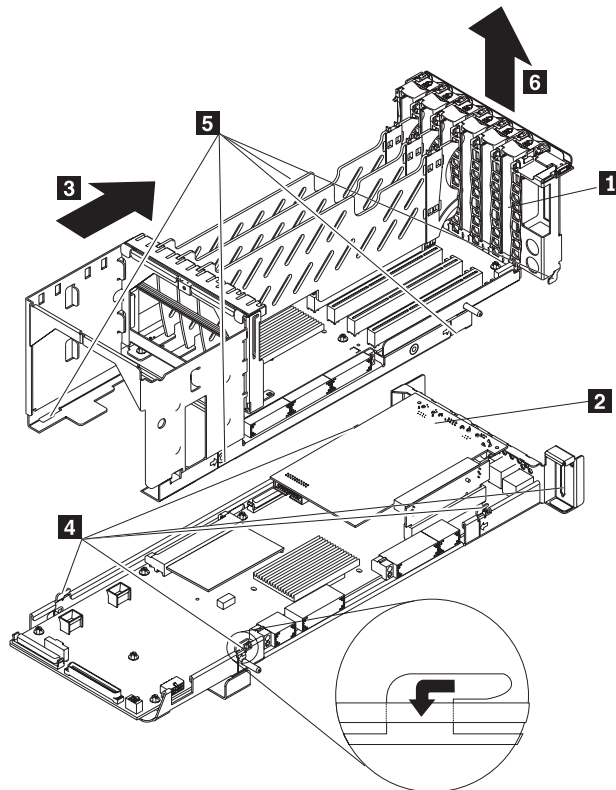
3) Release the PCI-X assembly (**1**) from the I/O board (**2**) by sliding (**3**) the PCI-X assembly toward the rear of the server so that the five tabs (**4**) in the I/O board are released from the five notches (**5**) in the PCI-X assembly.

4) Lift the PCI-X assembly off of the I/O board and set it on a safe, clean work surface.

   Note: The illustrations in this document might differ slightly from the hardware being serviced.

5) Remove the screws attaching the Remote Supervisor Adapter to the I/O board:
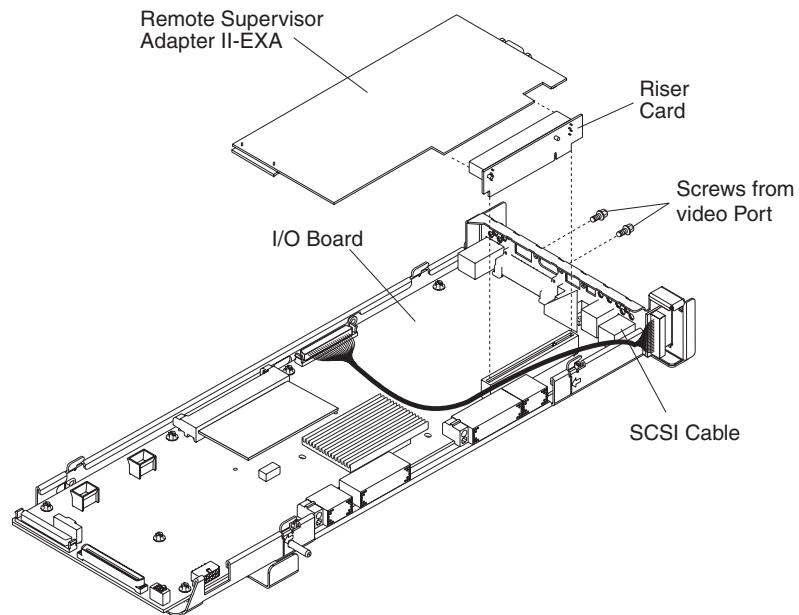
Figure 113. Remote Supervisor Adapter II-EXA model

   a) On models with the Remote Supervisor Adapter II-EXA, use a nut driver to remove the video port screws.
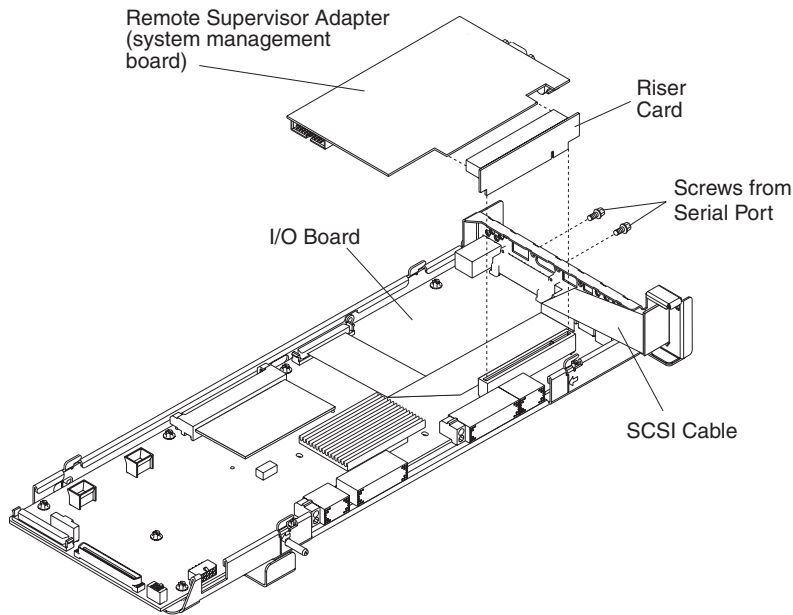
Figure 114. Remote Supervisor Adapter model

b) On models with the Remote Supervisor Adapter, use a nut driver to remove the serial port screws.

6) Pull the Remote Supervisor Adapter and the riser card out of the I/O board, disconnecting any cables, and set them in a safe place.

4. To replace the riser card and/or the Remote Supervisor Adapter, reverse the previous steps.

Top cover assembly

Complete the following steps to remove the top cover assembly.

Note:
- Read "Installation guidelines" on page 79.
- Read the safety notices at "Safety notices (multilingual translations)" on page 260.
- Read "Handling static-sensitive devices" on page 80.

1. Turn off the server (see "Turning off the server" on page 10) and disconnect all power cords and external cables.

2. Remove fans 1 and 2 (see "Replacing fans 1 and 2" on page 122).

3. Remove the front bezel (see "Removing and replacing the bezel" on page 83).

Retention pins
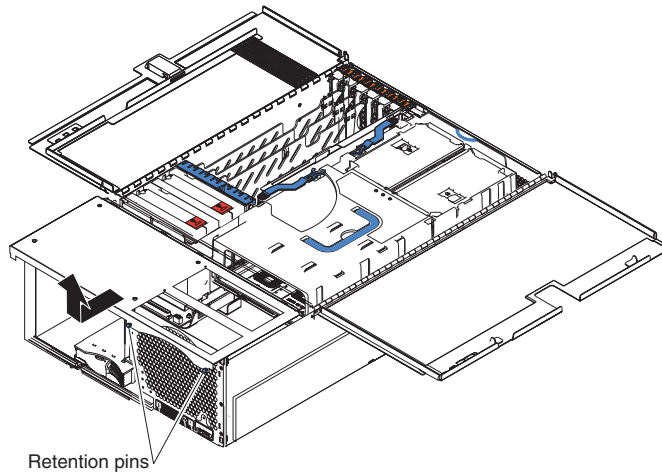
4. Pull the two retaining pins on the top front of the chassis until they loosen.
5. Slide the top cover to the front slightly.
6. Pull the cover up and remove it from the server.

To replace the top cover assembly, complete the following steps:

1. Align the three notches on each side of the cover with the slots in the top of the chassis.
2. Push the cover toward the rear.
3. Push in on the two retaining pins.
4. Replace fans 1 and 2.
5. Replace the front bezel.

Top power board

Complete the following steps to remove the top power board.

Note:
- Read "Installation guidelines" on page 79.
- Read the safety notices at "Safety notices (multilingual translations)" on page 260.
- Read "Handling static-sensitive devices" on page 80.

1. Turn off the server (see "Turning off the server" on page 10) and disconnect all power cords and external cables.
2. Remove the top cover assembly (see "Top cover assembly" on page 172) and set it upside-down on a clean work surface.

   Note: The illustrations in this document might differ slightly from the hardware being serviced.

3. Remove the two screws securing the power board to the top cover.
4. Pull the power board away from the cover.
5. To install the top power board, reverse the above steps.

DASD backplane

Complete the following steps to remove the DASD backplane.

Note:

- Read "Installation guidelines" on page 79.
- Read the safety notices at "Safety notices (multilingual translations)" on page 260.
- Read "Handling static-sensitive devices" on page 80.

1. Turn off the server (see "Turning off the server" on page 10) and disconnect all power cords and external cables.

2. Open the cover (see "Opening the cover" on page 82).

3. Remove the power supplies (see "Removing and replacing a hot-swap power supply" on page 84).

4. Remove the PCI brick (see "PCI brick" on page 158).

   Note: The illustrations in this document might differ slightly from the hardware being serviced.

5. Grasp the edge of the DASD backplane nearest the front of the server and flip the backplane up.

6. Remove the backplane from the server.

7. To install the DASD backplane, reverse the previous steps, making sure to align the pins in the DASD backplane with the notches in the server chassis.

Media bay card

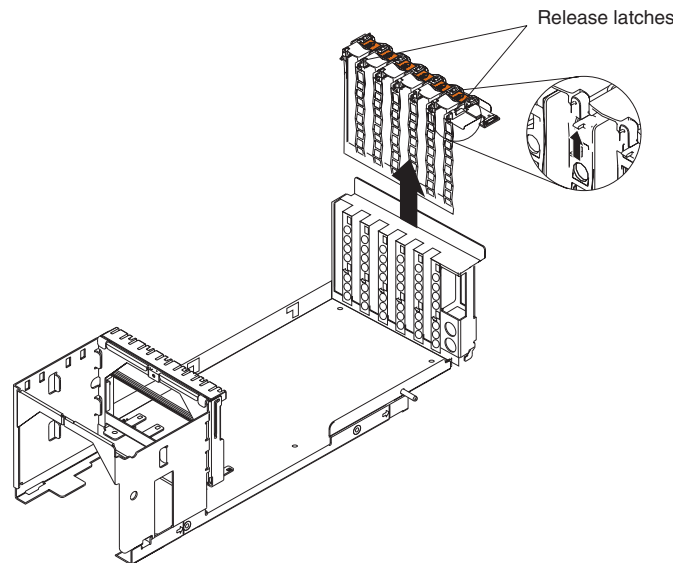Complete the following steps to remove the media bay card.

Note:
- Read "Installation guidelines" on page 79.
- Read the safety notices at "Safety notices (multilingual translations)" on page 260.
- Read "Handling static-sensitive devices" on page 80.

1. Turn off the server (see "Turning off the server" on page 10) and disconnect all power cords and external cables.
2. Open the cover (see "Opening the cover" on page 82).
3. Remove the DASD backplane (see "DASD backplane" on page 175).

   Note: The illustrations in this document might differ slightly from the hardware being serviced.
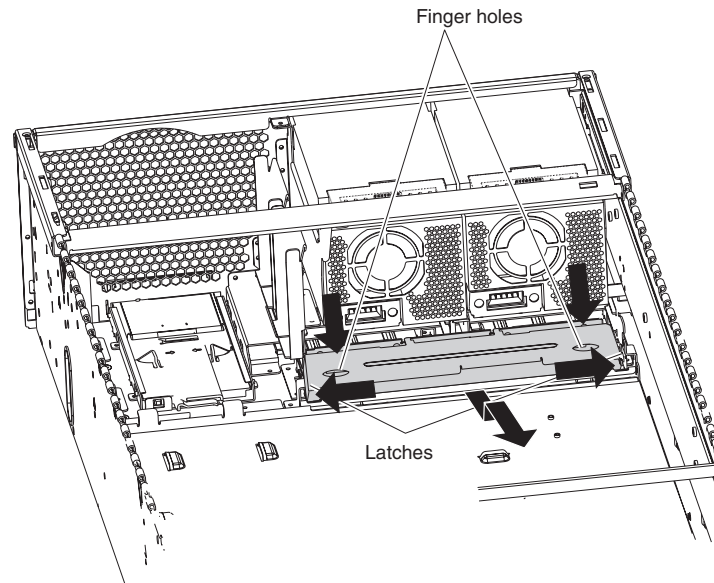
4. Insert your fingers in the two thumb holes and push toward the outside edges of the card until the card is released.
5. Pull the card out of the server.
6. To replace the media bay card, reverse the previous steps.

SMP board

Complete the following steps to replace an SMP board.

Note:
- Read "Installation guidelines" on page 79.
- Read the safety notices at "Safety notices (multilingual translations)" on page 260.
- Read "Handling static-sensitive devices" on page 80.

1. Turn off the server (see "Turning off the server" on page 10) and disconnect all power cords and external cables.
2. Open the cover (see "Opening the cover" on page 82).
3. Remove the SMP module(s) and cover from which the SMP board will be replaced (see "Removing and Installing the SMP Expansion Module and cover" on page 98).
4. Set the SMP module on a static-free, clean work surface and remove the components in the module that will be reused:
   - Memory (see "Removing and replacing DIMMs" on page 108).
   - Microprocessor assemblies and VRMs (see "Installing and replacing a microprocessor" on page 116).
5. Install the components that were removed in the preceding step into the new board.
6. Reinstall the SMP cover, and reinstall the module in the server (see "Removing and Installing the SMP Expansion Module and cover" on page 98).

   Note: When you install or remove SMP Expansion Modules, the server configuration information changes. Therefore, you must change and save the new configuration information by using the Configuration/Setup Utility program (see "Starting the Configuration/Setup Utility program" on page 14).

SMP Expansion Module switches and connectors

This illustration identifies the connectors and switches on the SMP Expansion Module.
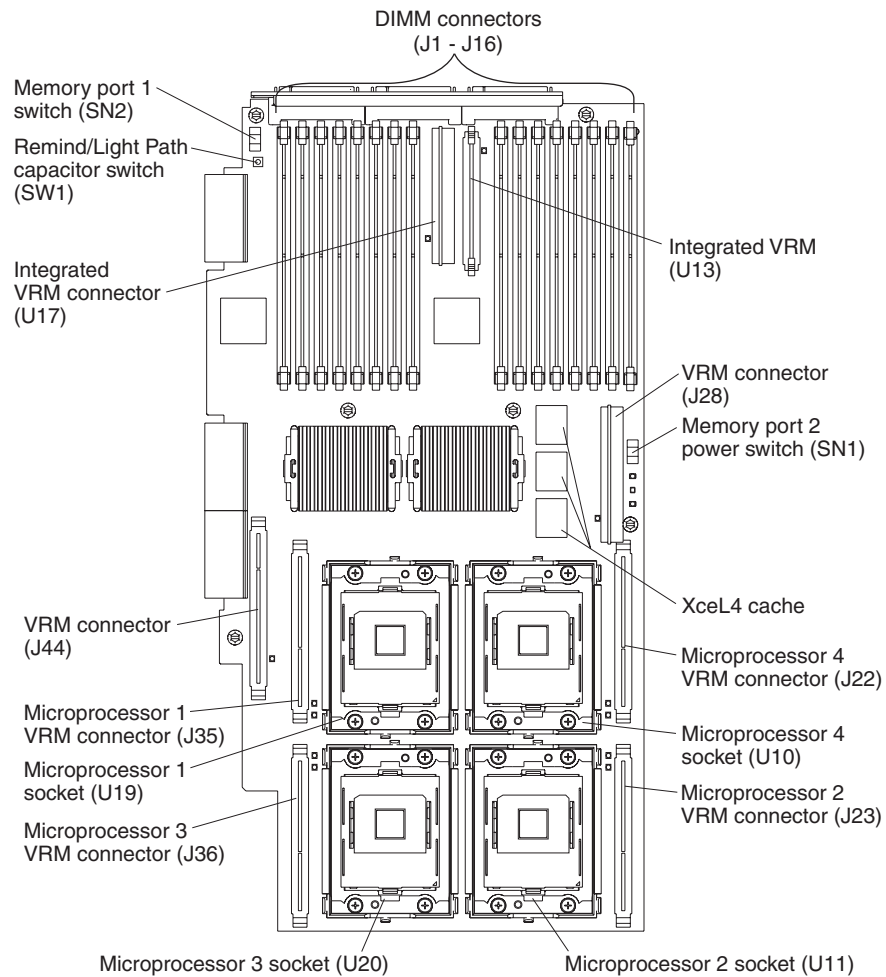
Figure 115. SMP Module connectors

SMP Expansion Module LEDs

This illustration identifies LEDs on the SMP Expansion Module.
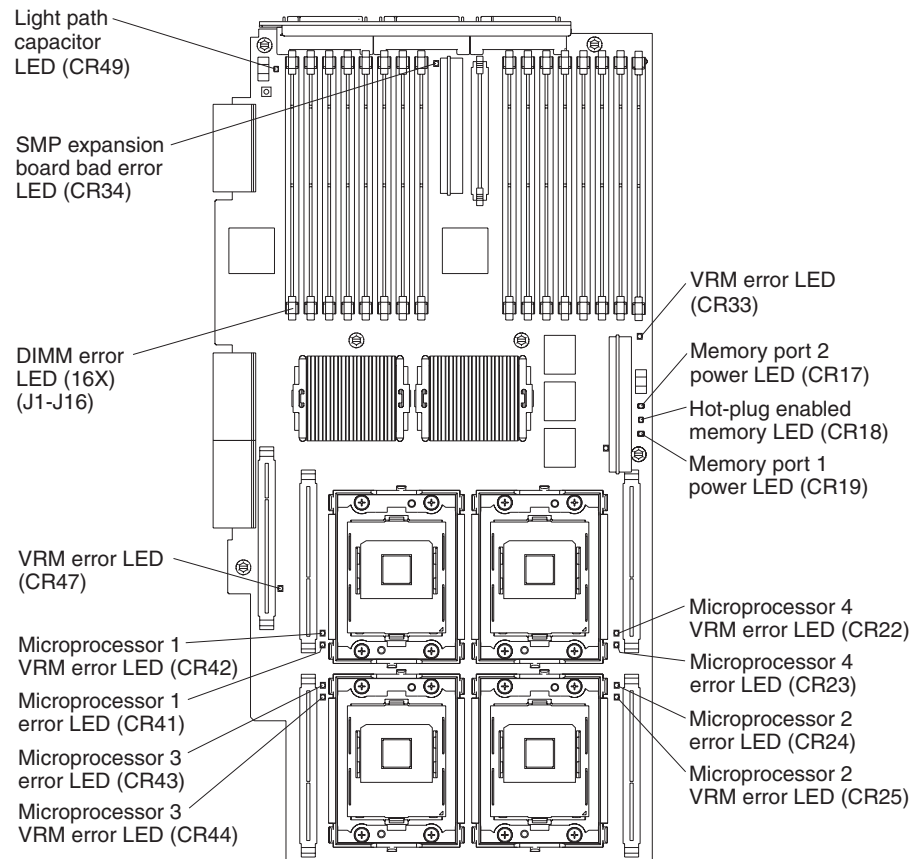
Figure 116. SMP Module LEDs

AC box assembly mechanism

Complete the following steps to remove the AC box assembly mechanism:

Note:

- Read "Installation guidelines" on page 79.
- Read the safety notices at "Safety notices (multilingual translations)" on page 260.
- Read "Handling static-sensitive devices" on page 80.

1. Turn off the server (see "Turning off the server" on page 10) and disconnect all power cords and external cables.

2. Remove the fans (see "Replacing and troubleshooting fans" on page 122).

3. Remove the top cover assembly (see "Top cover assembly" on page 172).

4. Open the top cover (see "Opening the cover" on page 82).

5. Remove the SMP Expansion modules (see "Removing and Installing the SMP Expansion Module and cover" on page 98).

   Note: Whenever the SMP expansion module is removed from the system, the Configuration/Setup Utility program must be run when the SMP expansion module is replaced (see "Starting the Configuration/Setup Utility program" on page 14).

6. Remove the PCI brick (see "PCI brick" on page 158).

   Note: The illustrations in this document might differ slightly from the hardware being serviced.
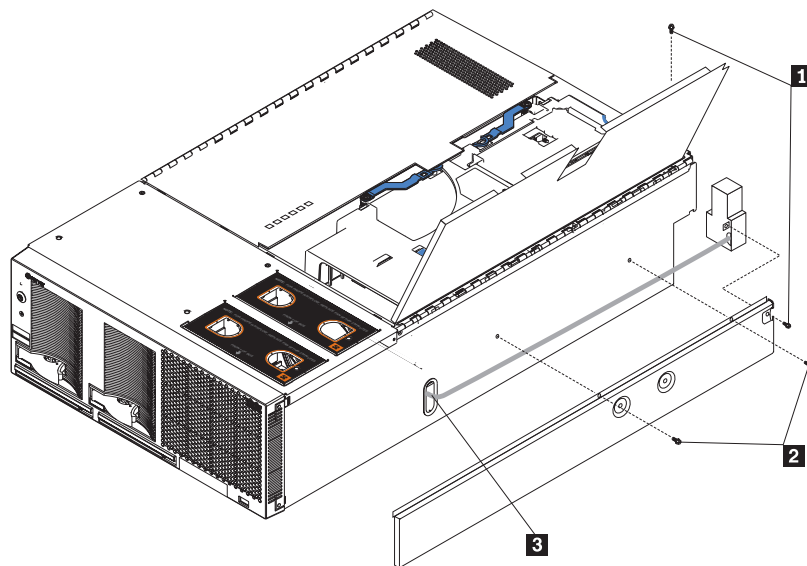
7. Remove the two screws (**1**) that secure the AC box assembly mechanism to the chassis.

8. Remove the two screws (**2**) that secure the side panel to the chassis and lift the panel away from the server.

9. Detach each of the two power connectors near the power supplies:

   a. Using a screwdriver, depress the two tabs on the connector.

   b. Pull the connector toward the rear of the server and detach.

10. Detach the bundled power cable from the chassis:
    a. Pull the bundled power cable through the slot in the crossbar.
    b. Slide the two power connectors through the opening on the side of the server (**3**).
11. Remove the AC box assembly from the server.
12. To install the AC box assembly, reverse the above steps.

    Note: When replacing the side panel:
        a. Line up the tabs on the panel with the notches on the server, then slide back.
        b. Position the bundled cable towards the bottom of the panel before securing the panel.
        c. The screw nearest the rear of the server secures both the panel and the AC box assembly mechanism.

Media extract mechanism

The server contains two media extract mechanisms. Complete the following steps to remove a media extract mechanism from the server.

Note:
- Read "Installation guidelines" on page 79.
- Read the safety notices at "Safety notices (multilingual translations)" on page 260.
- Read "Handling static-sensitive devices" on page 80.

1. Turn off the server (see "Turning off the server" on page 10) and disconnect all power cords and external cables.
2. Remove the drive associated with the media extract mechanism to be removed (see "Installing or replacing a drive" on page 94).

   Note: The illustrations in this document might differ slightly from the hardware being serviced.
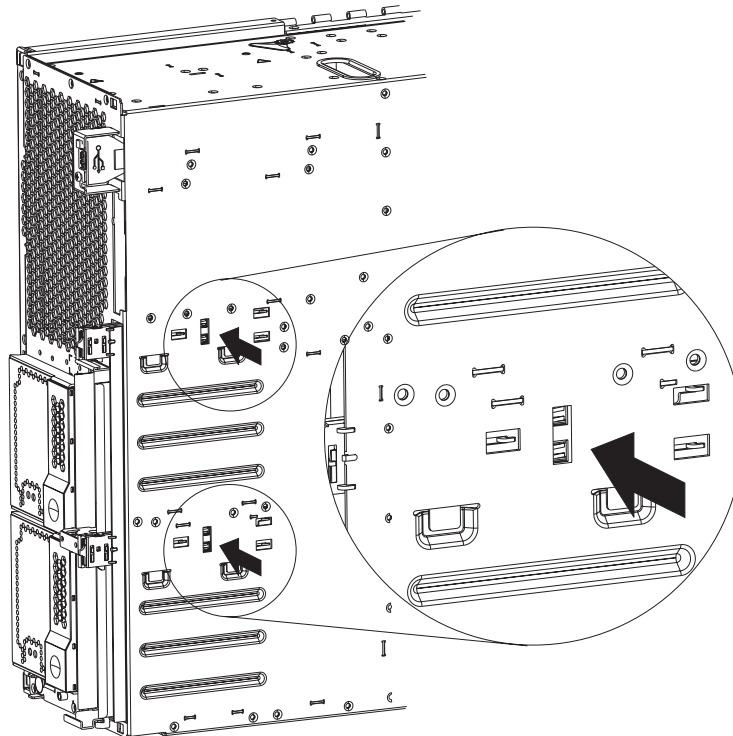
3. With a screwdriver, press the two notches on the media extract mechanism until it pops free of the chassis.
4. Pull the media extract mechanism out of the front of the server.
5. To install the media extract mechanism, reverse the above steps, sliding the media extract mechanism into position until it snaps into place.

   Note: It may be easier to install the media extract mechanism if the drive is installed in the bay before sliding the media extract mechanism into position.

Power/reset card assembly

The power/reset card assembly is located on the left front of the server. Complete the following steps to remove the power/reset card assembly.

Note:
- Read "Installation guidelines" on page 79.
- Read the safety notices at "Safety notices (multilingual translations)" on page 260.
- Read "Handling static-sensitive devices" on page 80.

1. Turn off the server (see "Turning off the server" on page 10) and disconnect all power cords and external cables.

2. Remove the front bezel (see "Removing and replacing the bezel" on page 83).

3. Remove fans 3 and 4 in order to access the power/reset cable.

4. Disconnect the power/reset card cable from the I/O board.
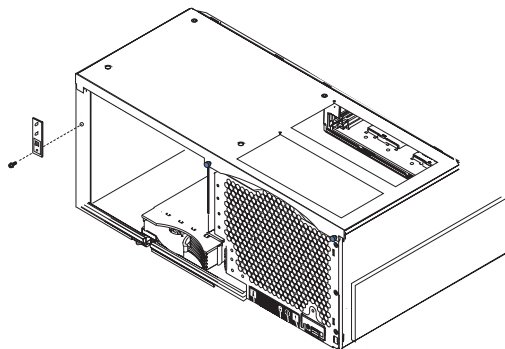
5. Remove the screw that attaches the card to the chassis and carefully set it aside.

6. Remove the card assembly from the server by drawing the cable through the channel in the side of the chassis and out the front.

7. To replace the card assembly, reverse the previous steps, threading the cable through the gap in the chassis.

Active PCI assembly

The Active PCI assembly, mounted on the top rear of the server frame adjacent to the PCI and PCI-X adapters, contains one switch for each of the six adapters. This ensures that power is disconnected from the associated adapter if you attempt to open the adapter latch and remove an adapter.

Note:
- Read "Installation guidelines" on page 79.
- Read the safety notices at "Safety notices (multilingual translations)" on page 260.
- Read "Handling static-sensitive devices" on page 80.

Complete the following steps to replace the Active PCI assembly:

1. Turn off the server (see "Turning off the server" on page 10) and disconnect all power cords and external cables; then, remove the top cover (see "Opening the cover" on page 82).

2. Disconnect the Active PCI assembly cable from the server.

3. Grasp the two adapter switch card release latches and slide the assembly away from the server chassis; then, lift it out of the server.

   Note: The illustrations in this document might differ slightly from the hardware being serviced.

4. To replace the Active PCI assembly, lower the assembly into place so that the lips on the bottom of the EMI shielding material fit into the chassis at the rear of the server, and slide the card into place until the two release latches snap securely. Then, connect the cable from the Active PCI assembly to the board.

5. Replace the top cover (see "Closing the cover" on page 125).

Light path card

Complete the following steps to remove the light path card.

Note:
- Read "Installation guidelines" on page 79.
- Read the safety notices at "Safety notices (multilingual translations)" on page 260.
- Read "Handling static-sensitive devices" on page 80.

1. Turn off the server (see "Turning off the server" on page 10) and disconnect all power cords and external cables.
2. Remove the two front fans (see "Replacing and troubleshooting fans" on page 122).
3. Remove the front bezel (see "Removing and replacing the bezel" on page 83).
4. Open the cover (see "Opening the cover" on page 82).
5. Disconnect the light path cable from the center plane (see "Center plane connectors, jumpers and LEDs" on page 159).
6. From the front of the server, grasp the edge of the light path card, push it in slightly to release the catch mechanism, and then pull it out until it tilts downward.

   Note: The illustrations in this document might differ slightly from the hardware being serviced.
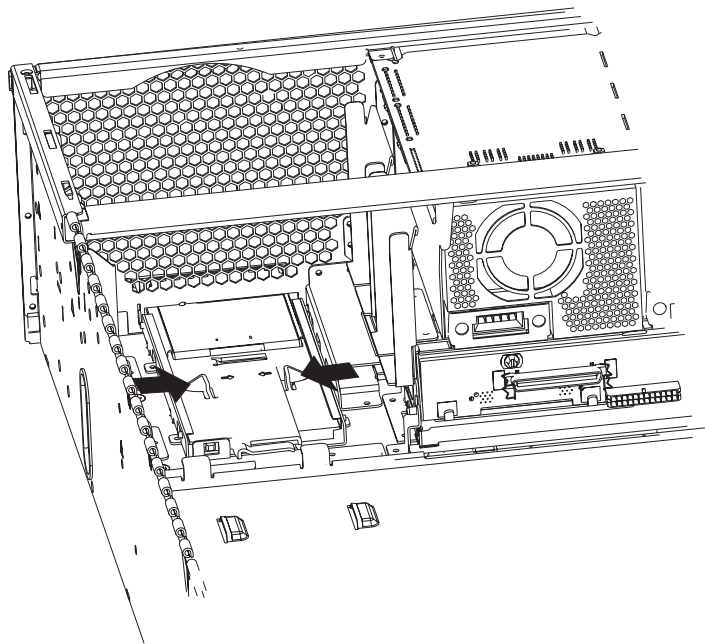
7. Inside the server, squeeze the Light Path card at the arrows to free it from the server.
8. Slide the card the rest of the way out of the server.
9. To replace the Light Path card, reverse the above steps.

Chapter 7. Symptom-to-FRU index

This index supports xSeries 445 servers.

Notes:

1. Check the configuration before you replace a FRU. Configuration problems can cause false errors and symptoms.
2. For IBM devices not supported by this index, refer to the manual for that device.
3. Always start with "General checkout" on page 61.

The Symptom-to-FRU lists symptoms, errors, and the possible causes. The most likely cause is listed first. Use this Symptom-to-FRU index to help you decide which FRUs to have available when servicing the computer.

The symptom-to-FRU index lists symptoms, errors, and the possible causes. The most likely cause is listed first. Use this symptom-to-FRU index to help you decide which FRUs to have available when servicing the computer.

The left-hand column of the tables in this index lists error codes or messages, and the right-hand column lists one or more suggested actions or FRUs to replace.

Note: In tables with more than two columns, more than one column on the left is required to describe the error symptom.

Take the action (or replace the FRU) suggested first in the list of the right-hand column, then try the server again to see if the problem has been corrected before taking further action.

Note: Try reseating a suspected component or reconnecting a cable before replacing the component.

The POST BIOS displays POST error codes and messages on the screen.

Beep symptoms

Beep symptoms are short tones or a series of short tones separated by pauses (intervals without sound). See the following examples.

Beeps	Description
1-2-3	• One beep • A pause (or break) • Two beeps • A pause (or break) • Three beeps
4	Four continuous beeps

One beep after successfully completing POST indicates the system is functioning properly.

Note: See Chapter 8, "Parts listing, Type 8870," on page 249 to determine which components are replaceable by the customer, and which components should be replaced by an IBM field service technician.	
Beep/symptom	**FRU/action**
1-1-3 (CMOS write/read test failed)	1. **Battery** 2. I/O board
1-1-4 (BIOS ROM checksum failed)	**I/O board**
1-2-1 (Programmable Interval Timer failed)	**I/O board**
1-2-2 (DMA initialization failed)	**I/O board**
1-2-3 (DMA page register write/read failed)	**I/O board**
1-2-4 (RAM refresh verification failed)	1. **DIMM** 2. SMP board
1-3-1 (1st 64K RAM test failed)	1. **DIMM** 2. SMP board
2-1-1 (Secondary DMA register failed)	**I/O board**
2-1-2 (Primary DMA register failed)	**I/O board**
2-1-3 (Primary interrupt mask register failed)	1. **I/O board** 2. SMP board
2-1-4 (Secondary interrupt mask register failed)	1. **I/O board** 2. SMP board
2-2-2 (Keyboard controller failed)	1. **I/O board** 2. Center plane
3-1-1 (Timer tick interrupt failed)	**I/O board**
3-1-2 (Interval timer channel 2 failed)	**I/O board**
3-1-4 (Time-of-Day clock failed)	1. **Battery** 2. I/O board

Note: See Chapter 8, "Parts listing, Type 8870," on page 249 to determine which components are replaceable by the customer, and which components should be replaced by an IBM field service technician.	
Beep/symptom	**FRU/action**
3-3-2 (Critical SMBUS error occurred)	1. **Disconnect power cord, wait 30 seconds, retry**. 2. DIMM. 3. SMP board. 4. I/O board.

3-3-3 (No operational memory in system)
Note: This message occurs if at least 64 MB of memory DIMMs in lower SMP Expansion Module is missing or defective.
	1. **Verify that lower SMP Expansion Module contains correct number of DIMMs; install or reseat DIMMS, then reboot.**
	Note: If this error occurs when only two DIMMs are installed in the lower SMP Expansion Module (in slots J1 and J3), complete the following steps:
	  a. Remove the DIMMs from slots J1 and J3 of the lower SMP expansion module, and move them to slots J2 and J4.
	  b. Start the server and, from the Configuration/Setup Utility program, enable the disabled memory bank, save and exit.
	  c. Shut down the server.
	  d. Move the DIMMs from slots J2 and J4 to slots J1 and J3.
	  e. Start the server.
	  f. If the 3-3-3 error still occurs, repeat the above procedure after replacing the recommended FRUs listed below.
	2. DIMM.
	3. SMP board.
	4. I/O board.

Two short beeps (information only, configuration has changed)	1. **Run Configuration/Setup.** 2. Run diagnostic programs.
Three short beeps	1. **DIMM** 2. SMP board 3. I/O board
One continuous beep	1. **Microprocessor** 2. Optional microprocessor 3. SMP board 4. I/O board 5. Center plane
Repeating short beeps	1. **Keyboard** 2. Center plane 3. I/O board
Repeating long beeps	**Reseat DIMMs.**
One long and one short beep	1. **I/O board** 2. Center plane
One long and two short beeps **Note:** When turning on the 16-way configuration, this beep code might sound if no video device is connected to the secondary server. This is an acceptable action.	1. **I/O board** 2. Center plane

Note: See Chapter 8, "Parts listing, Type 8870," on page 249 to determine which components are replaceable by the customer, and which components should be replaced by an IBM field service technician.	
Beep/symptom	**FRU/action**
Two long and two short beeps	1. **I/O board** 2. Center plane

No beep symptoms

Note: See Chapter 8, "Parts listing, Type 8870," on page 249 to determine which components are replaceable by the customer, and which components should be replaced by an IBM field service technician.	
No beep symptom	**FRU/action**
No beep and the system operates correctly.	**Light path card**
No beeps occur after successfully completing POST (Power-On Status is disabled.)	1. **Run Configuration/Setup, set the Start Options Power-On Status to enable.** 2. Light Path card. 3. SMP board.
No ac power (Power supply ac LED is off)	1. **Check the power cord.** 2. Power supply (if two are installed, swap them to determine if one is defective.) 3. Top power board
No beep and no video	**See "Undetermined problems" on page 246.**
System will not power-up (Power supply ac LED is on)	1. **See "Power LED errors" on page 240.** 2. Microprocessor installation sequence (see "Installing and replacing a microprocessor" on page 116).

Light path LED errors

Before replacing any FRU:
1. Observe LEDs on boards.
2. View System-Error log.

Note: For 16-way configuration, each chassis must be powered on as a standalone server to observe the LEDs for the boards of that chassis.

Level 1 light path

The level 1 light path consists of the system-error LED on the front panel (see "Light path diagnostics" on page 65).

Level 2 light path

The level 2 light path consists of the light path diagnostics panel (see Figure 27 on page 66).

Note: See Chapter 8, "Parts listing, Type 8870," on page 249 to determine which components are replaceable by the customer, and which components should be replaced by an IBM field service technician.	
Level 2 light path LED	**FRU/action**
All LEDs off (error log full) **Note:** "Event Log" LED may be lit.	1. **System-Error log is 75% full; analyze the log entries to determine the nature of the error messages.** 2. Save and/or clear the log. 3. For a PFA alert, check error log for failures. 4. To clear a PFA alert; remove ac power for at least 20 seconds; then, reconnect and power up system.
CPU (failed microprocessor) **Note:** Verify correct installation sequence; see "Installing and replacing a microprocessor" on page 116.	**Check event log or follow level 3 light path chart (see "Level 3 light path" on page 193) to determine location of failing level 4 light path LED (CPU).**
MEMORY (memory error)	**Check event log or follow level 3 light path chart (see "Level 3 light path" on page 193) to determine location of failing level 4 light path LED (DIMM).**
DASD (hot-swap hard drive failure) **Note:** If RAID system, refer to Hardware Maintenance Manual for the specific RAID adapter.	1. **Failing drive (reseat/replace).** 2. Be sure the fans are operating correctly and the air flow is good. 3. SCSI backplane.
PCI -X BUS (adapter failure)	1. **Check System Error log.** 2. Failing adapter. 3. PCI-X board.
FAN (fan failure) **Note:** A failing fan can also cause the TEMP and DASD LEDs to be on.	1. **Check individual fan LEDs.** 2. Replace respective fan. 3. SMP board.

TEMP (temperature too high)	1. **If a fan LED is on, replace the fan.**
	 2. Ambient temperature must be within normal operating specifications. See "Features and specifications" on page 3
	 3. Examine System Error log.
	    a. System over recommended temperature
	    b. DASD over recommended temperature
	      1) Overheating hard disk drive
	      2) DASD backplane
	    c. Microprocessor x over recommended temperature (where x is microprocessor number)
	      1) Reseat microprocessor x and heat sink.
	      2) Microprocessor x.
	    d. Power supply fault / over temp
	      • Failing power supply
	    e. Operator information panel

Note: See Chapter 8, "Parts listing, Type 8870," on page 249 to determine which components are replaceable by the customer, and which components should be replaced by an IBM field service technician.	
Level 2 light path LED	**FRU/action**
NMI (nonmaskable interrupt) **Note:** A PCI or MEM LED may also be on.	1. **See System Error log.** 2. If a PCI LED is on, follow the instructions for that LED. 3. If MEM LED is on, follow the instructions for that LED. 4. Restart the server.
BOARD (board failure)	**See top cover LEDs to determine location of failing board.**
EVENT LOG (non optimal condition)	1. **See System Error log.** 2. See Service Processor log.
POWER SUPPLY 1	1. **Power supply 1** 2. Top power board
POWER SUPPLY 2	1. **Power supply 2** 2. Top power board
VRM (VRM failure)	**Check event log or follow level 3 light path chart (see "Level 3 light path" on page 193) to determine location of failing level 4 light path LED (VRM).**
NON REDUND (nonredundancy lost)	1. **If PS x LED is lit on light path diagnostics panel, follow instructions for that LED.** 2. Failing power supply.
OVER SPEC (power supplies' rating exceeded)	1. **Power supply** 2. Top power board

Level 3 light path

The level 3 light path consists of the LEDs on the top cover of the server (see Figure 28 on page 67).

Level 3 light path LED	FRU/action
1 (upper SMP Expansi9on Module)	1. **Check for level 4 light path LEDs on upper SMP board:** a. Disconnect server from power source; then, remove upper SMP Expansion Module and cover. b. Press light path capacitor switch (SW1; see "SMP Expansion Module switches and connectors" on page 178). c. Check board for lit level 4 LEDs (CPU, memory, VRM, SMP board LEDs) (see "SMP Expansion Module LEDs" on page 179). 2. Verify that corresponding module is properly installed. **Note:** If all VRM LEDs are on, check for missing or improperly installed VRM. 3. Reseat/replace corresponding module (DIMM, VRM, or CPU). 4. Upper SMP board.
2 (lower SMP Expansion Module	1. **Check for level 4 light path LEDs on lower SMP board:** a. Disconnect server from power source; remove upper SMP Expansion Module; then, remove lower SMP Expansion module and cover. b. Press light path capacitor switch on lower SMP board (SW1; see "SMP Expansion Module switches and connectors" on page 178). c. Check board for lit level 4 LEDs (CPU, memory, VRM, SMP board LEDs) (see "SMP Expansion Module LEDs" on page 179). 2. Verify that corresponding module is properly installed. **Note:** If all VRM LEDs are on, check for missing or improperly installed VRM. 3. Reseat/replace corresponding module (DIMM, VRM, or CPU). 4. Lower SMP board.
3 (center plane power)	1. **If level 2 light path VRM LED is on (see Figure 27 on page 66), replace center plane VRM.** 2. Verify all cables and connectors are properly seated. 3. Center plane.
4 (PCI-X power)	1. **Check PCI-X board for (see "PCI-X board internal connectors and LEDs" on page 162) for the following lit LEDs: Attention, SERR, PCI-X.** 2. Check Operating System event log. 3. Run corresponding adapter card diagnostics, if available. 4. Adapter. 5. PCI-X board. 6. I/O board.
5 (Remote Supervisor Adapter)	**Remote Supervisor Adapter**
6 (I/O board power)	1. **If level 2 light path VRM LED is on (see Figure 27 on page 66), replace I/O board VRM.** 2. I/O board.

System Error log entries

The system error log is similar to an event log and can contain messages of three major types:

Information Information messages do not require action and record significant system-level events. Example: 'System Complex Powered Up'

Warning Warning messages indicate possible problems but do not require immediate action. Example: 'System over recommended ambient temperature'

Error Error messages indicate system errors that may require attention. Example: 'Fan 2 not detected'

Note: In a 16-way configuration, each chassis generates its own System Error log.

System Error log messages can originate from several sources.
* POST/BIOS
* SMI Handler
* Service Processor

Each entry contains date and time information, which is useful in determining the nature of the occurrence.

POST/BIOS messages

An example of a typical Post/BIOS message is shown below:

```
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
Date/Time: 2002/05/07 12:37:14
DMI Type: 00
Source: POSTBIOS
Error Code: 301
Error Code:
Error Data: Keyboard Error
Error Data:
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
```

This message indicates that a POST error 301 occurred at the recorded time. All of the POST/BIOS error codes can be found at "POST error codes" on page 224.

SMI Handler messages

SMI Handler is special system code that provides system monitoring functions. An example of a sample SMI Handler message is shown below:

```
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
Date/Time: 2002/05/08 03:35:30
DMI Type: 00
Source: SMI Hdlr
Error Code: 00150700 PERR: Slave signaled parity error
Error Code:
Error Data: Bus = 02, Slot = 01, VendID = 1014, DevID = 0302
Error Data:
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
```

This message indicates that a PCI Bus 02 parity error occurred at the recorded time. All of the SMI Handler message codes are listed below.

Note: See Chapter 8, "Parts listing, Type 8870," on page 249 to determine which components are replaceable by the customer, and which components should be replaced by an IBM field service technician.	
SMI message code	**Suggested action**
1500 (Single bit error occurred: begin scrub)	**Information only; run memory diagnostic programs when multiple entries accumulate.**
1501 (Multi-bit error occurred: forcing NMI)	**Run memory diagnostic programs; then, replace indicated memory DIMM.**
1502 (SERR: Addr. or Spec. Cyc. DPE) **Note:** PCI slot 00 indicates I/O board.	1. **Check Operating System event log.** 2. Run adapter card diagnostics, if available. 3. Adapter. 4. PCI-X board. 5. I/O board.
1503 (SERR: Received Target Abort) **Note:** PCI slot 00 indicates I/O board.	1. **Check Operating System event log.** 2. Run adapter card diagnostics, if available. 3. Adapter. 4. PCI-X board. 5. I/O board.
1504 (SERR: Device Signaled SERR) **Note:** PCI slot 00 indicates I/O board.	1. **Check Operating System event log.** 2. Run adapter card diagnostics, if available. 3. Adapter. 4. PCI-X board. 5. I/O board.
1505 (PERR: Master Read parity error) **Note:** PCI slot 00 indicates I/O board.	1. **Check Operating System event log.** 2. Run adapter card diagnostics, if available. 3. Adapter. 4. PCI-X board. 5. I/O board.

Note: See Chapter 8, "Parts listing, Type 8870," on page 249 to determine which components are replaceable by the customer, and which components should be replaced by an IBM field service technician.	
SMI message code	**Suggested action**
1506 (PERR: Master Write parity error) **Note:** PCI slot 00 indicates I/O board.	1. **Check Operating System event log.** 2. Run adapter card diagnostics, if available. 3. Adapter. 4. PCI-X board. 5. I/O board.
1507 (PERR: Slave signaled parity error) **Note:** PCI slot 00 indicates I/O board.	1. **Check Operating System event log.** 2. Run adapter card diagnostics, if available. 3. Adapter. 4. PCI-X board. 5. I/O board.
1509 (SERR / PERR Detected on PCI bus) **Note:** PCI slot 00 indicates I/O board.	1. **Check Operating System event log.** 2. Run adapter card diagnostics, if available. 3. Adapter. 4. PCI-X board. 5. I/O board.
1510 (SERR: Signaled Target Abort) **Note:** PCI slot 00 indicates I/O board.	1. **Check Operating System event log.** 2. Run adapter card diagnostics, if available. 3. Adapter. 4. PCI-X board. 5. I/O board.
1511 (MCA: Recoverable Error Detected)	**Information only; run system diagnostic programs when multiple entries accumulate.**
1512 (MCA: Unrecoverable Error Detected)	1. **Run system diagnostic programs.** 2. Microprocessor x (where x = indicated microprocessor). 3. VRM. 4. SMP Expansion Board containing microprocessor x.
1513 (MCA: Excessive Recoverable Errors)	1. **Run system diagnostic programs.** 2. Microprocessor x (where x = indicated microprocessor). 3. VRM. 4. SMP Expansion Board containing microprocessor x.
1514 (Rebuilding PCI BUS Map)	**Information only.**
1515 (Excessive Correctable Memory Errors Detected)	**Run memory diagnostic programs; then, replace indicated memory DIMM.**
1516 (WARNING: Memory Socket ECC Failure)	**Run memory diagnostic programs; then, replace indicated memory DIMM.**
1517 (Recoverable error occurred in L4 cache Node:0x)	1. **Run system diagnostic programs when multiple entries accumulate.** 2. SMP board associated with excess recoverable errors where Node 00 = primary lower SMP module; Node 01=primary upper SMP module; Node 02=secondary lower SMP module; Node 03=secondary upper SMP module.

Note: See Chapter 8, "Parts listing, Type 8870," on page 249 to determine which components are replaceable by the customer, and which components should be replaced by an IBM field service technician.	
SMI message code	**Suggested action**
151802 (Error configuring DIMMS, mismatch detected)	1. **Remove any recently added memory DIMMs.** 2. Reseat DIMMs. 3. Replace DIMMs one at a time to isolate failure.
151803 (Memory ProteXion(C) Event Detected) **Note:** x refers to SMP expansion module where: • Chassis of: 01=primary SMP module; 02=secondary SMP module. • Node of: 00= primary lower SMP module; 01=primary upper SMP module; 02=secondary lower SMP module; 03=secondary upper SMP module. • Port (rear of server) of: 1=left side; 2=center; 3=right side. • CEC of: 1=lower SMP module; 2=upper SMP module.	**Information only; run memory/system diagnostic programs when multiple entries accumulate.**
151805 (Error Reading Port Door Status)	1. **Run memory door diagnostic programs.** 2. SMP Expansion Module, if indicated.
151806 (Memory door opened/closed while memory copy in progress)	**Information only.**
00151900 (Scalability Port connection disabled between Chassis=0x Node:0x Port:0x and Chassis=0x Node:0x Port:0x) **Note:** x refers to SMP expansion module where: • Chassis of: 01=primary SMP module; 02=secondary SMP module. • Node of: 00= primary lower SMP module; 01=primary upper SMP module; 02=secondary lower SMP module; 03=secondary upper SMP module. • Port (rear of server) of: 1=left side; 2=center; 3=right side. • CEC of: 1=lower SMP module; 2=upper SMP module.	1. **Verify scalability cable connections are secure.** 2. Replace cable. 3. Run diagnostic programs.

Note: See Chapter 8, "Parts listing, Type 8870," on page 249 to determine which components are replaceable by the customer, and which components should be replaced by an IBM field service technician.	
SMI message code	**Suggested action**
00151901(Scalability Port connection restored between Chassis=0x Node:0x Port:0x and Chassis=0x Node:0x Port:0x) **Note:** x refers to SMP expansion module where: • Chassis of: 01=primary SMP module; 02=secondary SMP module. • Node of: 00= primary lower SMP module; 01=primary upper SMP module; 02=secondary lower SMP module; 03=secondary upper SMP module. • Port (rear of server) of: 1=left side; 2=center; 3=right side. • CEC of: 1=lower SMP module; 2=upper SMP module.	**Information only.**

Service processor messages

Note: In a 16-way configuration, be sure to view the service processor logs from each chassis.

An example of a typical service processor message is shown below:

```
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
Date/Time: 2002/05/07 15:52:03
DMI Type:
Source: SERVPROC
Error Code: System Complex Powered Up
Error Code:
Error Data:
Error Data:
-    - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
```

This message indicates simply that the machine was powered up at the recorded time. The possible service processor error messages are listed in the following table.

Note: Try reseating a suspected component or reconnecting a cable before replacing the component.

Note: See Chapter 8, "Parts listing, Type 8870," on page 249 to determine which components are replaceable by the customer, and which components should be replaced by an IBM field service technician.	
Service Processor message	**FRU/action**
110 LSI Logic Corp MPT Boot ROM, No supported devices found	**Hard drive**
12V A Bus Fault	See "12v bus faults" on page 229.
12V B Bus Fault	See "12v bus faults" on page 229.

Note: See Chapter 8, "Parts listing, Type 8870," on page 249 to determine which components are replaceable by the customer, and which components should be replaced by an IBM field service technician.	
Service Processor message	**FRU/action**
12V C Bus Fault	See **"12v bus faults" on page 229.**
12V D Bus Fault	See **"12v bus faults" on page 229.**
12V E Bus Fault	See **"12v bus faults" on page 229.**
12V F Bus Fault	See **"12v bus faults" on page 229.**
12V G Bus Fault	See **"12v bus faults" on page 229.**
12V H Bus Fault	See **"12v bus faults" on page 229.**

5V Fault	1. **If System Power Present indicator (see "Center plane connectors, jumpers and LEDs" on page 159) is ON follow the Light Path to the failing component.**
	2. If the system power present indicator is OFF:
	  a. Power backplane
	  b. Power supplies
	3. Power cables between power backplane and center plane.

Active PCI-X error	1. **PCI-X board.** 2. Failing adapter; remove all adapters and reinstall them one at a time, restarting the server each time, to isolate failing adapter.
ASM Reset due to Data Storage (Store Fault), Instruction Fault	1. **Reload Remote Supervisor Adapter firmware; then, disconnect server from ac power for 20 seconds, reconnect server to ac power, and restart server.** 2. Remote Supervisor Adapter. 3. I/O board.
Cable: Control Panel Not Present.(Control Panel = Lightpath Panel)	1. **Verify that the Light Path panel cable is connected to the center plane** (J8) (see "Center plane connectors, jumpers and LEDs" on page 159) and is undamaged. 2. Log into the RSA and request the temperature from the Light Path panel card to help determine if the system can communicate with the control panel. 3. Cable to Light Path panel card. 4. Light Path panel card. 5. Center plane.
Cable: SCSI I2C cable not detected	1. **Verify that the SCSI I2C cable is connected to the center plane** (connector J9). (The other end of the cable should be connected to the SCSI backplane.) 2. SCSI I2C cable. 3. SCSI backplane. 4. Center plane.

Note: See Chapter 8, "Parts listing, Type 8870," on page 249 to determine which components are replaceable by the customer, and which components should be replaced by an IBM field service technician.

Service Processor message	FRU/action
Cable: Service Processor not present	1. **Try to log into the RSA card either through a null-modem cable or through ethernet.** 2. Look at the back of the system to determine if any LEDs on the RSA card are ON; this will help to determine if the card is receiving power. 3. Service processor card. 4. I/O Board. 5. Right angle connector (connects service processor card to the I/O Board).
Center Card Power Fault **Note:** System Power Present indicator (see "Center plane connectors, jumpers and LEDs" on page 159) should be ON even if the system is OFF (ac still needs to be supplied to the system).	1. **Center plane VRM** 2. Center plane

CPU x over temperature	1. **Verify that:**
	  a. All fans are operating correctly.
	  b. Fan intake areas are clear and well-ventilated.
	  c. Heat sink for the microprocessor is securely fastened.
	  d. Thermal grease on the microprocessor and heat sink are sufficient and making good contact.
	2. Fans 1 & 2.
	3. Heat sink.
	4. Remove old thermal grease and reapply new thermal grease to the heat sink.
	5. Microprocessor.

Environmental Monitor firmware needs updating. No environmental information currently available	1. **Information only.** 2. Update the environmental monitor firmware. 3. Service processor card. 4. I/O Board.
Environmental Monitor Flash Update Failed	1. **Verify that the correct/latest code is being flashed** (go to www.ibm.com/products for latest firmware updates). 2. Reflash the environmental monitor. 3. I/O Board. 4. Service processor card.
Environmental Monitor RAM Error	1. **I/O Board.** 2. Service processor card.
Environmental Monitor ROM Error	1. **I/O Board.** 2. Service processor card.
Failure reading I2C device. Check devices on bus x	**Run diagnostic programs.**

Note: See Chapter 8, "Parts listing, Type 8870," on page 249 to determine which components are replaceable by the customer, and which components should be replaced by an IBM field service technician.	
Service Processor message	**FRU/action**
Fan # Outside Recommended Speed	1. **Verify that fan is fully seated** by lifting the fan out of the system and looking for any interference around the fan. 2. Reinstall the fan and wait a approximately 10 seconds for the fan LED to turn off. 3. Verify that fan intake areas are clear and well-ventilated. 4. Fan. 5. If failing fan is a SMP Module fan, look for damage to the fan cable connected to the I/O Board. 6. I/O Board.
Fan x Failure	1. **Verify that fan is fully seated** by lifting the fan out of the system and looking for any interference around the fan. 2. Reinstall the fan and wait a approximately 10 seconds for the fan LED to turn off. 3. Verify that fan intake areas are clear and well-ventilated. 4. Fan. 5. If failing fan is a SMP Module fan, look for damage to the fan cable connected to the I/O Board. 6. I/O Board.
Fan x not detected	1. **Verify that fan is fully seated** by lifting the fan out of the system and looking for any interference around the fan. 2. Reinstall the fan and wait a approximately 10 seconds for the fan LED to turn off. 3. Verify that fan intake areas are clear and well-ventilated. 4. Fan. 5. If failing fan is a SMP Module fan, look for damage to the fan cable connected to the I/O Board. 6. I/O Board.
Hard drive x fault	1. **Run diagnostic programs.** 2. Hard drive. 3. ServeRAID adapter (if installed). 4. SCSI backplane 5. I/O Board (if hard drives are not connected to a ServeRAID adapter) 6. Center plane

Hard drive x removal detected	1. **If a hard drive has just been removed, message is for information only.**
	2. Run diagnostic programs.
	3. If a hard drive has not just been removed:
	   a. Hard drive
	   b. ServeRAID adapter (if installed)
	   c. SCSI backplane
	   d. I/O Board (if hard drives are not connected to a ServeRAID adapter)
	   e. Center plane

Note: See Chapter 8, "Parts listing, Type 8870," on page 249 to determine which components are replaceable by the customer, and which components should be replaced by an IBM field service technician.

Service Processor message	FRU/action
Integrated Systems Management Processor encountered failures upon starting	1. **Remove ac power for 20 seconds, reconnect, and reboot.** 2. Run diagnostic programs. 3. Service processor card. 4. I/O Board.
Internal error CPU x fault	1. **Verify that microprocessor is fully seated.** 2. Run diagnostic programs. 3. Microprocessor. 4. VRM. 5. SMP Module.
Invalid CPU configuration	1. **If new microprocessors where just installed, verify that they are in the correct configuration** (see "Installing and replacing a microprocessor" on page 116). 2. Microprocessor. 3. VRM. 4. SMP Module. 5. I/O Board.
Invalid Fan configuration	1. **Verify that all four fans are installed.** 2. Verify that fan is fully seated by lifting the fan out of the system and looking for any interference around the fan. 3. Reinstall the fan and wait a approximately 10 seconds for the fan LED to turn off. 4. Verify that fan intake areas are clear and well-ventilated. 5. Fan. 6. If failing fan is a SMP Module fan, look for damage to the fan cable connected to the I/O Board. 7. I/O Board.

Lower CEC +1.8V Fault	1. **If VRM indicator on Light Path card is ON, replace failing microprocessor VRM.**
	 2. Verify that the system power present indicator is ON (see "Center plane connectors, jumpers and LEDs" on page 159).
	 3. If the system power present indicator is OFF:
	   a. Power backplane
	   b. Power supplies
	 4. Microprocessor VRM.
	 5. Microprocessor.
	 6. Lower SMP Module.

Lower CEC +2.5V Fault	1. **Verify that the system power present indicator is ON** (see "Center plane connectors, jumpers and LEDs" on page 159).
	 2. If the system power present indicator is OFF:
	   a. Power backplane
	   b. Power supplies
	 3. VRM J28 on lower SMP Module.
	 4. Lower SMP board.

Note: See Chapter 8, "Parts listing, Type 8870," on page 249 to determine which components are replaceable by the customer, and which components should be replaced by an IBM field service technician.	
Service Processor message	**FRU/action**

Lower CEC +3.3V Fault	1. **Follow the Light Path to determine the failing component.**
	2. Verify that the system power present indicator is ON (see "Center plane connectors, jumpers and LEDs" on page 159).
	3. If the system power present indicator is OFF:
	  a. Power backplane
	  b. Power supplies
	4. VRM J44 on lower SMP Module.
	5. Lower SMP Module.

Lower CEC Machine Check: xxx	1. **Refer to previous log entries.** 2. Examine the Light Path indicators to determine if the error was caused by a microprocessor or a DIMM. 3. Verify that all scalability cables are firmly attached. 4. Run diagnostic programs. 5. Replace component indicated by Light Path indicators. 6. Scalability cables. 7. Lower SMP Module.
Lower CEC Port 0 Power Fault	1. **Verify that the scalability cables are firmly connected.** 2. Run diagnostic programs. 3. Scalability cables. 4. Lower SMP Module. 5. Upper SMP Module.
Lower CEC Port 1 Power Fault	1. **Verify that the scalability cables are firmly connected.** 2. Run diagnostic programs. 3. Scalability cables. 4. Lower SMP Module. 5. Upper SMP Module.
Lower CEC Scalability Controller Machine Check: xxx	1. **Refer to previous log entries.** 2. Examine the Light Path indicators to determine if the error was caused by a microprocessor or a DIMM. 3. Verify that all scalability cables are firmly attached. 4. Run diagnostic programs. 5. Replace component indicated by Light Path indicators. 6. Scalability cables. 7. Lower SMP Module.
Native I/O Card Machine Check: xxx	1. **Run diagnostic programs.** 2. I/O Board. 3. SMP Board.

Note: See Chapter 8, "Parts listing, Type 8870," on page 249 to determine which components are replaceable by the customer, and which components should be replaced by an IBM field service technician.	
Service Processor message	**FRU/action**
PCI Card Machine Check: xxx	1. **Remove adapters and reinstall one at a time, restarting server each time, to isolate faulty adapter.** 2. Run diagnostic programs. 3. Adapter. 4. PCI-X Board. 5. I/O Board. 6. SMP Board.
PCI Power Good Fault	1. **Verify that PCI adapters are properly seated.** 2. Remove PCI adapters and reinstall one at a time, restarting the server each time, to isolate failing adapter. 3. Adapter. 4. PCI-X Board.

Power Supply # Removed	1. **If a power supply has been removed, this message is for information only.**
	2. If a power supply has not been removed:
	  a. Power backplane
	  b. Power supplies

Power supply current exceeded max. spec value	1. **Power supply.** 2. Power backplane
Power supply x 12V over current fault	1. **Power supply.** 2. Power backplane
Power supply x 12V over voltage fault	1. **Power supply.** 2. Power backplane
Power supply x 12V under voltage fault	1. **Power supply.** 2. Power backplane
Power supply x 5V under voltage fault	1. **Power supply.** 2. Power backplane
Power Supply x AC Power Removed, Early Power Off Warning	1. **If ac power has been removed from the system, this message is for information only.** 2. Verify that ac power connections are secure. 3. If ac power has not been removed from the system, verify that the system power is in redundant mode (see "Light path LED errors" on page 190). 4. If system power is not in redundant mode on 110V, switch to 240V. 5. Power supplies. 6. Power backplane.
Power supply x current fault	1. **Power supply.** 2. Power backplane

Note: See Chapter 8, "Parts listing, Type 8870," on page 249 to determine which components are replaceable by the customer, and which components should be replaced by an IBM field service technician.	
Service Processor message	**FRU/action**

Power supply x DC good fault	1. **If System Power Present indicator (see "Center plane connectors, jumpers and LEDs" on page 159) is OFF:**
	   a. Power backplane
	   b. Power supplies
	2. If System Power Present indicator is ON, suspect shorting components; reduce the system to its minimum configuration (see "Undetermined problems" on page 246) and replace components one at a time to isolate fault.

Power supply x fan fault	Power supply
Power supply x temperature fault	1. **Verify that the system fan air intake areas are clear and well ventilated.** 2. Verify that all four system fans are installed and functioning correctly. 3. Power supply. 4. Fans 3 and 4.

Primary I/O Power Fault	1. **Verify that the system power present indicator is ON** (see "Center plane connectors, jumpers and LEDs" on page 159).
	2. If the system power present indicator is OFF:
	   a. Power backplane
	   b. Power supplies
	3. Failing component indicated by Light Path.
	4. VRMs on failing board indicated by the Light Path.

Processor or VRM failed	1. **Failing component indicated by Light Path** 2. Verify that the VRM is firmly seated. 3. Failing microprocessor VRM. 4. Failing microprocessor.

Resetting System Due to an Unrecoverable error	1. **Refer to previous log entries.**
	2. If Light Path indicates memory error, replace failing DIMM.
	3. If Light Path indicates microprocessor error:
	   a. VRM.
	   b. Microprocessor.
	4. SMP Module.

System is over recommended voltage for 3.3V PCI	1. **Remove PCI adapters and reinstall one at a time**, restarting the server each time, to isolate failing adapter. 2. PCI-X VRM. 3. PCI-X Board. 4. I/O Board VRM. 5. I/O Board.
System is under recommended voltage for 3.3V PCI	1. **Remove PCI adapters and reinstall one at a time,** restarting the server each time, to isolate failing adapter. 2. PCI-X VRM. 3. PCI-X Board.

Note: See Chapter 8, "Parts listing, Type 8870," on page 249 to determine which components are replaceable by the customer, and which components should be replaced by an IBM field service technician.	
Service Processor message	**FRU/action**

System Power Good Fault	1. **Refer to previous log entries.**
	2. Verify that the Light Path card indicates a power supply error.
	3. Verify that the ac/dc lights on the power supplies are ON.
	4. Verify that the system power present indicator is ON (see "Center plane connectors, jumpers and LEDs" on page 159).
	5. If the system power present indicator is OFF:
	  a. Power backplane
	  b. Power supplies
	6. Failing component indicated by Light Path.
	7. VRMs on failing board indicated by the Light Path.

System shutoff due to +12V over voltage	1. **Power backplane** 2. Power supplies
System shutoff due to +2.5V over voltage	1. **Center plane VRM** 2. VRM (J28) on Lower SMP Module 3. VRM (J28) on Upper SMP Module
System shutoff due to +2.5V under voltage	1. **Failing component indicated by Light Path** 2. Center plane VRM 3. VRM (J28) on Lower SMP Module 4. VRM (J28) on Upper SMP Module
System shutoff due to 1.8V CPU over voltage	1. **Failing component indicated by Light Path** 2. Failing microprocessor VRM 3. Microprocessor
System shutoff due to 1.8V CPU under voltage	1. **Failing component indicated by Light Path** 2. Failing microprocessor VRM 3. Microprocessor
System shutoff due to 12V under voltage	1. Power backplane 2. Power supplies
System shutoff due to 3.3V PCI over voltage	1. **Remove PCI adapters and reinstall one at a time, restarting the server each time, to isolate failing adapter.** 2. PCI-X VRM. 3. PCI-X Board. 4. I/O Board VRM. 5. I/O Board.
System shutoff due to 3.3V PCI under voltage	1. **Remove PCI adapters and reinstall one at a time, restarting the server each time, to isolate failing adapter.** 2. PCI-X VRM. 3. PCI-X Board.

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Note: See Chapter 8, "Parts listing, Type 8870," on page 249 to determine which components are replaceable by the customer, and which components should be replaced by an IBM field service technician.	
Service Processor message	**FRU/action**
System shutoff due to CPU x over temperature	1. **Verify that all fans are operating correctly** 2. Verify that fan intake areas are clear and well-ventilated. 3. Verify that the heat sink is tightened correctly. 4. Remove old thermal grease and reapply new thermal grease to the heat sink. 5. Heat sink. 6. Fans. 7. Microprocessor.
System shutoff due to high ambient temperature	1. **Verify that the room temperature is within the required range.** 2. Light Path panel card.
Uncorrectable cache error detected. Removed failed components from active configuration.	1. **Run diagnostic programs.** 2. Failing component indicated by Light Path. 3. SMP Module.
Uncorrectable memory error on bank J1 and J3	1. **DIMM** **Notes:** a. Failing DIMM latches will be illuminated. b. Failing memory bank will be disabled. After the failing DIMM has been replaced go into the Configuration/Setup Menu Advanced Options to re-enable the bank. 2. If failing DIMM latch is not illuminated, run memory diagnostic programs. 3. SMP Module.
Uncorrectable memory error on bank J10 and J12	1. **DIMM** **Notes:** a. Failing DIMM latches will be illuminated. b. Failing memory bank will be disabled. After the failing DIMM has been replaced go into the Configuration/Setup Menu Advanced Options to re-enable the bank. 2. If failing DIMM latch is not illuminated, run memory diagnostic programs. 3. SMP Module.
Uncorrectable memory error on bank J13 and J15	1. **DIMM** **Notes:** a. Failing DIMM latches will be illuminated. b. Failing memory bank will be disabled. After the failing DIMM has been replaced go into the Configuration/Setup Menu Advanced Options to re-enable the bank. 2. If failing DIMM latch is not illuminated, run memory diagnostic programs. 3. SMP Module.

Note: See Chapter 8, "Parts listing, Type 8870," on page 249 to determine which components are replaceable by the customer, and which components should be replaced by an IBM field service technician.	
Service Processor message	**FRU/action**

Uncorrectable memory error on bank J14 and J16	1. **DIMM**
	
	  Notes:
	  a. Failing DIMM latches will be illuminated.
	  b. Failing memory bank will be disabled. After the failing DIMM has been replaced go into the Configuration/Setup Menu Advanced Options to re-enable the bank.
	2. If failing DIMM latch is not illuminated, run memory diagnostic programs.
	3. SMP Module.

Uncorrectable memory error on bank J2 and J4	1. **DIMM**
	
	  Notes:
	  a. Failing DIMM latches will be illuminated.
	  b. Failing memory bank will be disabled. After the failing DIMM has been replaced go into the Configuration/Setup Menu Advanced Options to re-enable the bank.
	2. If failing DIMM latch is not illuminated, run memory diagnostic programs.
	3. SMP Module.

Uncorrectable memory error on bank J5 and J7	1. **DIMM**
	
	  Notes:
	  a. Failing DIMM latches will be illuminated.
	  b. Failing memory bank will be disabled. After the failing DIMM has been replaced go into the Configuration/Setup Menu Advanced Options to re-enable the bank.
	2. If failing DIMM latch is not illuminated, run memory diagnostic programs.
	3. SMP Module.

Uncorrectable memory error on bank J6 and J8	1. **DIMM**
	
	  Notes:
	  a. Failing DIMM latches will be illuminated.
	  b. Failing memory bank will be disabled. After the failing DIMM has been replaced go into the Configuration/Setup Menu Advanced Options to re-enable the bank.
	2. If failing DIMM latch is not illuminated, run memory diagnostic programs.
	3. SMP Module.

Uncorrectable memory error on bank J9 and J11	1. **DIMM**
	
	  Notes:
	  a. Failing DIMM latches will be illuminated.
	  b. Failing memory bank will be disabled. After the failing DIMM has been replaced go into the Configuration/Setup Menu Advanced Options to re-enable the bank.
	2. If failing DIMM latch is not illuminated, run memory diagnostic programs.
	3. SMP Module.

Note: See Chapter 8, "Parts listing, Type 8870," on page 249 to determine which components are replaceable by the customer, and which components should be replaced by an IBM field service technician.

Service Processor message	FRU/action

Upper CEC + 3.3V Fault	1. **Follow the Light Path to determine the failing component.**
	2. Verify that the system power present indicator is ON (see "Center plane connectors, jumpers and LEDs" on page 159).
	3. If the system power present indicator is OFF:
	  a. Power backplane
	  b. Power supplies
	4. VRM J44 on upper SMP Module.
	5. Upper SMP Module.

Upper CEC +1.8 Fault	1. **If VRM indicator on Light Path card is ON, replace failing microprocessor VRM.**
	2. Verify that the system power present indicator is ON (see "Center plane connectors, jumpers and LEDs" on page 159).
	3. If the system power present indicator is OFF:
	  a. Power backplane
	  b. Power supplies
	4. Microprocessor VRM.
	5. Microprocessor.
	6. Upper SMP Module.

Upper CEC +2.5V Fault	1. **Verify that the system power present indicator is ON** (see "Center plane connectors, jumpers and LEDs" on page 159).
	2. If the system power present indicator is OFF:
	  a. Power backplane
	  b. Power supplies
	3. VRM J28 on upper SMP Module.
	4. Upper SMP Board.

Upper CEC Machine Check: xxx	1. **Refer to previous log entries.** 2. Examine the Light Path indicators to determine if the error was caused by a microprocessor or a DIMM. 3. Verify that all scalability cables are firmly attached. 4. Run diagnostic programs. 5. Replace component indicated by Light Path indicators. 6. Scalability cables. 7. Upper SMP Module.
Upper CEC Port 0 Power Fault	1. **Verify that the scalability cables are firmly connected.** 2. Run diagnostic programs. 3. Scalability cables. 4. Upper SMP Module. 5. Lower SMP Module.
Upper CEC Port 1 Power Fault	1. **Verify that the scalability cables are firmly connected.** 2. Run diagnostic programs. 3. Scalability cables. 4. Upper SMP Module. 5. Lower SMP Module.

Note: See Chapter 8, "Parts listing, Type 8870," on page 249 to determine which components are replaceable by the customer, and which components should be replaced by an IBM field service technician.	
Service Processor message	**FRU/action**
Upper CEC Scalability Controller Machine Check: xxx	1. **Refer to previous log entries.** 2. Examine the Light Path indicators to determine if the error was caused by a microprocessor or a DIMM. 3. Verify that all scalability cables are firmly attached. 4. Run diagnostic programs. 5. Replace component indicated by Light Path indicators. 6. Scalability cables. 7. Upper SMP Module.
Upper to Lower SMP Expansion Module cable not detected	1. **Cable between SMP1 and SMP2** 2. SMP Expansion board

VRM x Power Good Fault	1. **Follow the Light Path indicators to determine the failing component.**
	2. Verify that the system power present indicator is ON (see "Center plane connectors, jumpers and LEDs" on page 159).
	3. Failing VRM.
	4. Board containing indicated failing VRM.
	5. If the system power present indicator is OFF:
	   a. Power backplane
	   b. Power supplies

The service processor also generates a large number of information, error and warning messages.

If an RXE-100 unit is attached, the service processor may generate further messages specific to this unit. These are listed in the following table and are intended to be self-explanatory.

Diagnostic error codes

Note: In the following error codes, if xxx is 000, 195, or 197, **do not** replace a FRU. The description for these error codes are:

000   The test passed.

195   The **Esc** key was pressed to abort the test.

197   This is a warning error and may not indicate a hardware failure.

For all error codes, replace/follow the FRU/Action indicated.

Note: See Chapter 8, "Parts listing, Type 8870," on page 249 to determine which components are replaceable by the customer, and which components should be replaced by an IBM field service technician.	
Error code/symptom	**FRU/action**
001-198-000 (Test Aborted)	1. **Check error log for messages.** 2. Run Quick Memory Test All Banks. 3. Reload system BIOS code and rerun the test.
001-250-000 (Test aborted)	1. **Check error log for messages** (see "Error logs" on page 65). 2. SMP board
001-250-001 (Failed SMP Expansion Board ECC)	1. **Check error log for messages** (see "Error logs" on page 65). 2. SMP board 1 (bottom).
001-250-002 (Failed SMP Expansion Board ECC)	1. **Check error log for messages** (see "Error logs" on page 65). 2. SMP board 2 (top).
001-250-099 (Failed SMP Expansion Board ECC)	1. **Check error log for messages** (see "Error logs" on page 65). 2. SMP board 1 (bottom) and 2 (top).
001-250-xxx (Test Failed) xxx of 001 = Bottom SMP board; xxx of 002 = Top SMP board; xxx of 099 = Bottom and Top SMP boards	1. **Check error log for messages.** 2. Run Quick Memory Test All Banks. 3. Rerun ECC test. 4. SMP board xxx.
001-292-000 (Core system: failed/CMOS checksum failed)	**Load BIOS defaults and rerun test.**
001-xxx-000 (Failed core tests)	1. **SMP board** 2. I/O board
001-xxx-001 (Failed core tests)	1. **SMP board** 2. I/O board
005-xxx-000 (Failed Video test)	**I/O board**
011-xxx-000 (Failed COM1 Serial Port test)	1. **Center plane** 2. I/O board
015-xxx-001 (Failed USB test)	**I/O board**
015-xxx-015 (Failed USB external loopback test)	**I/O board**

Note: See Chapter 8, "Parts listing, Type 8870," on page 249 to determine which components are replaceable by the customer, and which components should be replaced by an IBM field service technician.	
Error code/symptom	**FRU/action**
015-xxx-198 (Remote Supervisor Adapter II installed) *or* (USB device connected during USB test)	1. **If Remote Supervisor Adapter II is installed as an option, remove it and rerun test.** **Note:** If Remote Supervisor Adapter II is present as a standard installation, do not remove it; the test cannot be run. 2. Remove USB devices and rerun test. 3. I/O board.
020-xxx-000 (Failed PCI Interface test)	1. **PCI-X board** 2. I/O board
020-xxx-001 (Failed Hot-Swap Slot 1 PCI Latch test)	1. **PCI Hot-Swap Latch assembly** 2. PCI-X board
020-xxx-002 (Failed Hot-Swap Slot 2 PCI Latch test)	1. **PCI Hot-Swap Latch assembly** 2. PCI-X board
020-xxx-003 (Failed Hot-Swap Slot 3 PCI Latch test)	1. **PCI Hot-Swap Latch assembly** 2. PCI-X board
020-xxx-004 (Failed Hot-Swap Slot 4 PCI Latch test)	1. **PCI Hot-Swap Latch assembly** 2. PCI-X board
020-xxx-005 (Failed Hot-Swap Slot 5 PCI Latch test)	1. **PCI Hot-Swap Latch assembly** 2. PCI-X board
020-xxx-006 (Failed Hot-Swap Slot 6 PCI Latch test)	1. **PCI Hot-Swap Latch assembly** 2. PCI-X board
030-xxx-000 (Failed Internal SCSI interface test)	1. **Make sure SCSI is not enabled, rerun test.** 2. I/O board.
030-xxx-00n (Failed SCSI test on PCI slot n. Check system error log before replacing a FRU.)	**Adapter in slot n**
035-002-0nn (ServeRAID interface timeout)	1. **ServeRAID controller may not be configured properly.** Obtain the basic and extended configuration status bytes and refer to the ServeRAID Hardware Maintenance Manual for more information. 2. Cable. 3. SCSI backplane. 4. ServeRAID controller.
035-253-0nn (ServeRAID controller 0nn initialization failure; 0nn = the controller number)	1. **ServeRAID controller may not be configured properly.** Obtain the basic and extended configuration status bytes and refer to the ServeRAID Hardware Maintenance Manual for more information. 2. Cable. 3. SCSI backplane. 4. ServeRAID controller.
035-253-s99 (RAID adapter initialization failure)	1. **ServeRAID adapter** 2. SCSI cable
035-254-0nn (Setup error - unable to allocate memory to run test.)	**Check system resources.**

Note: See Chapter 8, "Parts listing, Type 8870," on page 249 to determine which components are replaceable by the customer, and which components should be replaced by an IBM field service technician.	
Error code/symptom	**FRU/action**
035-255-0nn (Internal Error)	1. **SCSI backplane** 2. Cable
035-260-0nn (System to controller interface failure)	1. **ServeRAID adapter** 2. I/O board
035-xxx-cnn (Check System error Log before replacing a FRU. c = ServeRAID channel number, nn = SCSI ID of failing fixed disk drive.)	**Hard disk drive on channel C, SCSI ID nn**
035-xxx-snn (Check System Error Log before replacing a FRU. nn = SCSI ID of failing fixed disk.)	**SCSI disk with ID nn on adapter in slot s**
075-xxx-000 (Failed power supply test)	1. **Power supply** 2. Top power board
089-xxx-001 (Failed Microprocessor test)	1. **Microprocessor 1** 2. VRM 1
089-xxx-002 (Failed Optional Microprocessor test)	1. **Microprocessor 2** 2. VRM 2
089-xxx-003 (Failed Microprocessor test)	1. **Microprocessor 3** 2. VRM 3
089-xxx-004 (Failed Microprocessor test)	1. **Microprocessor 4** 2. VRM 4
089-xxx-005 (Failed Microprocessor test)	1. **Microprocessor 5** 2. VRM 5
089-xxx-006 (Failed Microprocessor test)	1. **Microprocessor 6** 2. VRM 6
089-xxx-007 (Failed Microprocessor test)	1. **Microprocessor 7** 2. VRM 7
089-xxx-008 (Failed Microprocessor test)	1. **Microprocessor 8** 2. VRM 8
091-09x-009 (RXE Expansion Port-B failure; valid only with Port B cable) (where x of 4 = cable or initialization error; x of 5 = transmit error; x of 6 = receive error; x of 7 = ping error, below threshold)	1. **RXE cable B** 2. SMP board (top) 3. RXE Expansion board to which cable is connected (Side A or Side B) 4. Center plane
091-09x-011 (RXE Expansion Port-A failure; valid only with Port A cable) (where x of 4 = cable or initialization error; x of 5 = transmit error; x of 6 = receive error; x of 7 = ping error, below threshold)	1. **RXE cable A** 2. RXE Expansion board to which cable is connected (Side A or Side B) 3. I/O board

Note: See Chapter 8, "Parts listing, Type 8870," on page 249 to determine which components are replaceable by the customer, and which components should be replaced by an IBM field service technician.

Error code/symptom	FRU/action
091-09x-015 (RXE-100, from Side A to Side B failure) (where x of 4 = cable or initialization error; x of 5 = transmit error; x of 6 = receive error; x of 7 = ping error, below threshold)	1. **Side A card in RXE100** 2. Side B card in RXE100
091-09x-016 (RXE-100, Side B Port failure; valid only with Side B cable) (where x of 4 = cable or initialization error; x of 5 = transmit error; x of 6 = receive error; x of 7 = ping error, below threshold)	1. **RXE cable B** 2. Side B card in RXE100
091-09x-027 (RXE Expansion Port B failure; valid only with Port B cable) (where x of 4 = cable or initialization error; x of 5 = transmit error; x of 6 = receive error; x of 7 = ping error, below threshold)	1. **RXE cable B** 2. SMP board (top) 3. RXE Expansion board to which cable is connected (Side A or Side B) 4. Center plane
091-09x-041 (RXE Expansion Port A failure; valid only with Port A cable) (where x of 4 = cable or initialization error; x of 5 = transmit error; x of 6 = receive error; x of 7 = ping error, below threshold)	1. **RXE cable A** 2. RXE Expansion board to which cable is connected (Side A or Side B) 3. I/O board
091-09x-056 (RXE-100, Side A Port failure; valid only with Side A cable) (where x of 4 = cable or initialization error; x of 5 = transmit error; x of 6 = receive error; x of 7 = ping error, below threshold)	1. **RXE cable A** 2. Side A card in RXE100
091-09x-057 (RXE-100, from Side A to Side B failure) (where x of 4 = cable or initialization error; x of 5 = transmit error; x of 6 = receive error; x of 7 = ping error, below threshold)	1. **Side A card in RXE-100** 2. Side B card in RXE-100
091-09x-058 (RXE-100, Side B Port failure; valid only with Side B cable) (where x of 4 = cable or initialization error; x of 5 = transmit error; x of 6 = receive error; x of 7 = ping error, below threshold)	1. **RXE cable B** 2. Side B card in RXE100
091-09x-059 (RXE-100, from Side B to Side A failure) (where x of 4 = cable or initialization error; x of 5 = transmit error; x of 6 = receive error; x of 7 = ping error, below threshold)	1. **Side B card in RXE-100** 2. Side A card in RXE-100
092-09x-000 (SMP1 Port-2 failure) (where x of 3 = cabling error; x of 4 = cable or initialization error; x of 5 = transmit error; x of 6 = receive error; x of 7 = ping error, below threshold)	1. **Scaleability cable 2** 2. SMP board 1 (bottom)
092-09x-001 (SMP1 Port-1 failure) (where x of 3 = cabling error; x of 4 = cable or initialization error; x of 5 = transmit error; x of 6 = receive error; x of 7 = ping error, below threshold)	1. **Scaleability cable 1** 2. SMP board 1 (bottom)

Note: See Chapter 8, "Parts listing, Type 8870," on page 249 to determine which components are replaceable by the customer, and which components should be replaced by an IBM field service technician.	
Error code/symptom	**FRU/action**
092-09x-002 (SMP1 Port-3 failure) (where x of 3 = cabling error; x of 4 = cable or initialization error; x of 5 = transmit error; x of 6 = receive error; x of 7 = ping error, below threshold)	1. **Scaleability cable 3** 2. SMP board 1 (bottom)
092-09x-003 (SMP2 Port-2 failure) (where x of 3 = cabling error; x of 4 = cable or initialization error; x of 5 = transmit error; x of 6 = receive error; x of 7 = ping error, below threshold)	1. **Scaleability cable 2** 2. SMP board 2 (top)
092-09x-004 (SMP2 Port-1 failure) (where x of 3 = cabling error; x of 4 = cable or initialization error; x of 5 = transmit error; x of 6 = receive error; x of 7 = ping error, below threshold)	1. **Scaleability cable 1** 2. SMP board 2 (top)
092-09x-005 (SMP2 Port-3 failure) (where x of 3 = cabling error; x of 4 = cable or initialization error; x of 5 = transmit error; x of 6 = receive error; x of 7 = ping error, below threshold)	1. **Scaleability cable 3** 2. SMP board 2 (top)
092-xxx-xxx (Failed scalability port test)	1. **Scalability cable** 2. SMP board
092-xxx-001 (Failed scalability port test)	1. **Scalability cable** 2. SMP at far end of cable 3. SMP at near end of cable
155-xxx-xxx (Failed Active Memory latch test)	1. **SMP Expansion Module cover** 2. SMP board
165-xxx-xxx (Failed service processor test)	1. **Remote Supervisor Adapter** 2. I/O board 3. Center plane
166-051-000 System Management: Failed (Unable to communicate with ASM. It may be busy. Run the test again.)	1. **Flash latest levels of firmware (BIOS, service processor, diagnostics)** 2. Rerun diagnostic test. 3. Correct other error conditions (including failed system management tests and items logged in Remote Supervisor Adapter system error log) and retry.) 4. Disconnect all server and option power cords from server, wait 30 seconds, reconnect, and retry. 5. Remote Supervisor Adapter.

Note: See Chapter 8, "Parts listing, Type 8870," on page 249 to determine which components are replaceable by the customer, and which components should be replaced by an IBM field service technician.	
Error code/symptom	**FRU/action**
166-060-000 System Management: Failed (Unable to communicate with ASM. It may be busy. Run the test again.)	1. **Flash latest levels of firmware (BIOS, service processor, diagnostics)** 2. Rerun diagnostic test. 3. Correct other error conditions (including failed system management tests and items logged in Remote Supervisor Adapter system error log) and retry.) 4. Disconnect all server and option power cords from server, wait 30 seconds, reconnect, and retry. 5. Remote Supervisor Adapter.
166-070-000 System Management: Failed (Unable to communicate with ASM. It may be busy. Run the test again.)	1. **Flash latest levels of firmware (BIOS, service processor, diagnostics)** 2. Rerun diagnostic test. 3. Correct other error conditions (including failed system management tests and items logged in Remote Supervisor Adapter system error log) and retry.) 4. Disconnect all server and option power cords from server, wait 30 seconds, reconnect, and retry. 5. Remote Supervisor Adapter.
166-198-000 (BIOS cannot detect ASM. Reseat ASM adapter in correct slot) (ASM restart failure. Unplug and cold boot server to reset ASM)	1. **Rerun diagnostic test.** 2. Correct other error conditions (including other failed system management tests and items logged in Remote Supervisor Adapter system error log) and retry. 3. Disconnect all server and option power cords from server, wait 30 seconds, reconnect, and retry. 4. Remote Supervisor Adapter. 5. I/O board.
166-201-000 (ISMP indicates I2C errors on bus A0)	1. **I/O board** 2. Center plane
166-201-001 (ISMP indicates I2C errors on bus A1)	1. **VRMs and microprocessors installed in SMP1 board (bottom)** 2. SMP1 board (bottom)
166-201-002 (ISMP indicates I2C errors on bus A2)	1. **VRMs and microprocessors installed in SMP2 board (top)** 2. SMP2 board (top)
166-201-003 (ISMP indicates I2C errors on bus A3)	1. **I/O board** 2. Remote Supervisor Adapter 3. Center plane
166-201-004 (ISMP indicates I2C errors on bus A4)	1. **PCI devices on PCI-X card** 2. PCI-X card 3. Center plane
166-201-005 (ISMP indicates I2C errors on bus A5)	1. **Power supply** 2. Top power board 3. Center plane

Note: See Chapter 8, "Parts listing, Type 8870," on page 249 to determine which components are replaceable by the customer, and which components should be replaced by an IBM field service technician.

Error code/symptom	FRU/action
166-201-006 (ISMP indicates I2C errors on bus A6)	1. **PCI devices on PCI-X card** 2. PCI-X card 3. Center plane 4. Power supply 5. Top power board
166-201-007 (ISMP indicates I2C errors on bus A7)	1. **DASD backplane** 2. SCSI I2C cable 3. Center plane
166-201-008 (ISMP indicates I2C errors on bus A8)	1. **Light Path card** 2. Light Path cable 3. Center plane
166-201-009 (ISMP indicates I2C errors on bus A1M0)	1. **Microprocessors on SMP1 board (bottom)** 2. SMP1 board (bottom)
166-201-010 (ISMP indicates I2C errors on bus A1M1)	**SMP1 board (bottom)**
166-201-011 (ISMP indicates I2C errors on bus A1M2)	1. **DIMMS 1-8 on SMP1 board (bottom)** 2. SMP1 board (bottom)
166-201-012 (ISMP indicates I2C errors on bus A1M3)	1. **DIMMS 9-16 on SMP1 board (bottom)** 2. SMP1 board (bottom)
166-201-013 (ISMP indicates I2C errors on bus A2M0)	1. **Microprocessors on SMP2 board (top)** 2. SMP2 board (top)
166-201-014 (ISMP indicates I2C errors on bus A2M1)	**SMP2 board (top)**
166-201-015 (ISMP indicates I2C errors on bus A2M2)	1. **DIMMS 1-8 on SMP2 board (top)** 2. SMP2 board (top)
166-201-016 (ISMP indicates I2C errors on bus A2M3)	1. **DIMMS 9-16 on SMP2 board (top)** 2. SMP2 board (top)
166-201-017 (ISMP indicates I2C errors on bus A4J0)	**PCI-X board**
166-201-018 (ISMP indicates I2C errors on bus A4J1)	**PCI-X board**
166-201-020 (ISMP indicates I2C errors on bus A4J3)	**PCI-X board**
166-201-021 (ISMP indicates I2C errors on bus A4J1 PCI Slot 1	1. **Adapter in slot 1** 2. PCI-X board
166-201-022 (ISMP indicates I2C errors on bus A4J1 PCI Slot 2)	1. **Adapter in slot 2** 2. PCI-X board
166-201-023 (ISMP indicates I2C errors on bus A4J1 PCI Slot 3)	1. **Adapter in slot 3** 2. PCI-X board

Note: See Chapter 8, "Parts listing, Type 8870," on page 249 to determine which components are replaceable by the customer, and which components should be replaced by an IBM field service technician.	
Error code/symptom	**FRU/action**
166-201-024 (ISMP indicates I2C errors on bus A4J1 PCI Slot 4)	1. **Adapter in slot 4** 2. PCI-X board
166-201-025 (ISMP indicates I2C errors on bus A4J1 PCI Slot 5)	1. **Adapter in slot 5** 2. PCI-X board
166-201-026 (ISMP indicates I2C errors on bus A4J1 PCI Slot 6)	1. **Adapter in slot 6** 2. PCI-X board
166-201-100 (ISMP indicates I2C errors on RXE bus X)	See *Hardware Maintenance Manual* for IBM RXE-100 Remote Expansion Enclosure.
166-201-101 (ISMP indicates I2C errors on RXE bus P)	See *Hardware Maintenance Manual* for IBM RXE-100 Remote Expansion Enclosure.
166-201-102 (ISMP indicates I2C errors on RXE bus I_A)	See *Hardware Maintenance Manual* for IBM RXE-100 Remote Expansion Enclosure.
166-201-103 (ISMP indicates I2C errors on RXE bus I_B)	See *Hardware Maintenance Manual* for IBM RXE-100 Remote Expansion Enclosure.
166-201-104 (ISMP indicates I2C errors on RXE bus PCI_A)	See *Hardware Maintenance Manual* for IBM RXE-100 Remote Expansion Enclosure.
166-201-105 (ISMP indicates I2C errors on RXE bus F)	See *Hardware Maintenance Manual* for IBM RXE-100 Remote Expansion Enclosure.
166-201-106 (ISMP indicates I2C errors on RXE bus PCI_B)	See *Hardware Maintenance Manual* for IBM RXE-100 Remote Expansion Enclosure.
166-201-107 (ISMP indicates I2C errors on RXE bus PCI_A slot 1)	See *Hardware Maintenance Manual* for IBM RXE-100 Remote Expansion Enclosure.
166-201-108 (ISMP indicates I2C errors on RXE bus PCI_A slot 2)	See *Hardware Maintenance Manual* for IBM RXE-100 Remote Expansion Enclosure.
166-201-109 (ISMP indicates I2C errors on RXE bus PCI_A slot 3)	See *Hardware Maintenance Manual* for IBM RXE-100 Remote Expansion Enclosure.
166-201-110 (ISMP indicates I2C errors on RXE bus PCI_A slot 4)	See *Hardware Maintenance Manual* for IBM RXE-100 Remote Expansion Enclosure.
166-201-111 (ISMP indicates I2C errors on RXE bus PCI_A slot 5)	See *Hardware Maintenance Manual* for IBM RXE-100 Remote Expansion Enclosure.
166-201-112 (ISMP indicates I2C errors on RXE bus PCI_A slot 6)	See *Hardware Maintenance Manual* for IBM RXE-100 Remote Expansion Enclosure.
166-201-113 (ISMP indicates I2C errors on RXE bus PCI_B slot 1)	See *Hardware Maintenance Manual* for IBM RXE-100 Remote Expansion Enclosure.
166-201-114 (ISMP indicates I2C errors on RXE bus PCI_B slot 2)	See *Hardware Maintenance Manual* for IBM RXE-100 Remote Expansion Enclosure.
166-201-115 (ISMP indicates I2C errors on RXE bus PCI_B slot 3)	See *Hardware Maintenance Manual* for IBM RXE-100 Remote Expansion Enclosure.
166-201-116 (ISMP indicates I2C errors on RXE bus PCI_B slot 4)	See *Hardware Maintenance Manual* for IBM RXE-100 Remote Expansion Enclosure.

Note: See Chapter 8, "Parts listing, Type 8870," on page 249 to determine which components are replaceable by the customer, and which components should be replaced by an IBM field service technician.	
Error code/symptom	**FRU/action**
166-201-117 (ISMP indicates I2C errors on RXE bus PCI_B slot 5)	See *Hardware Maintenance Manual* **for IBM RXE-100 Remote Expansion Enclosure.**
166-201-118 (ISMP indicates I2C errors on RXE bus PCI_B slot 6)	See *Hardware Maintenance Manual* **for IBM RXE-100 Remote Expansion Enclosure.**
166-260-000 (ASM restart failure)	1. **Disconnect all server and option power cords from server, wait 30 seconds, reconnect, and retry.** 2. Remote Supervisor Adapter.
166-342-000 (System Management BIST indicates failed tests)	1. **Disconnect all server and option power cords from server, wait 30 seconds, reconnect, and retry.** 2. Remote Supervisor Adapter.
166-400-000 (ISMP Self Test Result failed tests: xxx) where xxx=flash, ROM, or RAM	1. **Disconnect all server and option power cords from server, wait 30 seconds, reconnect, and retry.** 2. (Re)flash ISMP with latest firmware level. 3. I/O board.
166-400-100 (DMC Self Test Result failed tests: xxx) where xxx=flash, ROM, or RAM	1. **Disconnect all server and option power cords from server, wait 30 seconds, reconnect, and retry.** 2. (Re)flash ISMP on RXE with latest firmware level. 3. RXE backplane.
180-197-000 (SCSI ASPI driver not installed)	1. **Remove RAID adapter, if installed, and rerun test.** 2. Center plane. 3. I/O board.
180-xxx-000 (Diagnostics LED failure)	**Run diagnostic LED test for failing LED.**
180-xxx-001 (Failed Front LED panel test)	1. **Light Path Diagnostics card** 2. Power/reset card assembly 3. Center plane 4. I/O board
180-xxx-002 (Failed Diagnostics LED Panel test)	1. **Light Path Diagnostics card** 2. Center plane
180-xxx-003 (Failed SMP Expansion Module LED test)	1. **SMP Expansion Module** 2. Scalability cable 3. Center plane
180-xxx-005 (Failed SCSI Backplane LED test)	1. **SCSI backplane cable** 2. SCSI backplane 3. Center plane 4. I/O board
180-xxx-007 (Failed Center plane LED test)	**Center plane**
180-xxx-008 (Failed I/O board LED test)	**I/O board**
180-xxx-009 (Failed Active PCI LED test)	1. **Active PCI assembly** 2. PCI-X board

Note: See Chapter 8, "Parts listing, Type 8870," on page 249 to determine which components are replaceable by the customer, and which components should be replaced by an IBM field service technician.	
Error code/symptom	**FRU/action**
180-361-003 (Failed Fan LED test)	1. **Fan** 2. I/O board
201-xxx-Ynn (failed Memory Test; see "Removing and replacing DIMMs" on page 108) **Note:** nn = DIMM 1-16 [Port 1: DIMMs 1-8; Port 2: DIMMs 9-16]; Y = SMP Board [0=Bottom SMP Board; 1=Top SMP Board]	1. **Replace DIMM nn [nn = 1-16]** 2. Replace SMP Board Y [Y = 0-1]
201-XXX-Y21 (Multiple DIMM failure in Port 1 Bank 1; see "Removing and replacing DIMMs" on page 108) **Note:** Y = SMP Board [0=Bottom SMP Board; 1=Top SMP Board]	1. **Isolate failing DIMM:** a. Replace a DIMM in bank with a ″known good″ DIMM. b. Rerun memory diagnostic for the failing bank on failing SMP Board. c. If test fails, mark replaced DIMM as ″good″ DIMM. d. If test passes, mark replaced DIMM as ″bad″ DIMM. e. If DIMM tested is ″bad″, remove it and replace it. f. If DIMM tested is ″good″, do not replace it. 2. Repeat steps 1a through 1f with other DIMMs in failing bank until error is fixed. 3. If error is not fixed, replace SMP Board Y.
201-XXX-Y22 (Multiple DIMM failure in Port 1 Bank 2; see "Removing and replacing DIMMs" on page 108) **Note:** Y = SMP Board [0=Bottom SMP Board; 1=Top SMP Board]	1. **Isolate failing DIMM:** a. Replace a DIMM in bank with a ″known good″ DIMM. b. Rerun memory diagnostic for the failing bank on failing SMP Board. c. If test fails, mark replaced DIMM as ″good″ DIMM. d. If test passes, mark replaced DIMM as ″bad″ DIMM. e. If DIMM tested is ″bad″, remove it and replace it. f. If DIMM tested is ″good″, do not replace it. 2. Repeat steps 1a through 1f with other DIMMs in failing bank until error is fixed. 3. If error is not fixed, replace SMP Board Y.
201-XXX-Y23 (Multiple DIMM failure in Port 1 Bank 3; see "Removing and replacing DIMMs" on page 108) **Note:** Y = SMP Board [0=Bottom SMP Board; 1=Top SMP Board]	1. **Isolate failing DIMM:** a. Replace a DIMM in bank with a ″known good″ DIMM. b. Rerun memory diagnostic for the failing bank on failing SMP Board. c. If test fails, mark replaced DIMM as ″good″ DIMM. d. If test passes, mark replaced DIMM as ″bad″ DIMM. e. If DIMM tested is ″bad″, remove it and replace it. f. If DIMM tested is ″good″, do not replace it. 2. Repeat steps 1a through 1f with other DIMMs in failing bank until error is fixed. 3. If error is not fixed, replace SMP Board Y.

Error code/symptom	FRU/action
Note: See Chapter 8, "Parts listing, Type 8870," on page 249 to determine which components are replaceable by the customer, and which components should be replaced by an IBM field service technician.	
201-XXX-Y24 (Multiple DIMM failure in Port 1 Bank 4; see "Removing and replacing DIMMs" on page 108) **Note:** Y = SMP Board [0=Bottom SMP Board; 1=Top SMP Board]	1. **Isolate failing DIMM:** a. Replace a DIMM in bank with a ″known good″ DIMM. b. Rerun memory diagnostic for the failing bank on failing SMP Board. c. If test fails, mark replaced DIMM as ″good″ DIMM. d. If test passes, mark replaced DIMM as ″bad″ DIMM. e. If DIMM tested is ″bad″, remove it and replace it. f. If DIMM tested is ″good″, do not replace it. 2. Repeat steps 1a through 1f with other DIMMs in failing bank until error is fixed. 3. If error is not fixed, replace SMP Board Y.
201-XXX-Y31 (Multiple DIMM failure in Port 2 Bank 1; see "Removing and replacing DIMMs" on page 108) **Note:** Y = SMP Board [0=Bottom SMP Board; 1=Top SMP Board]	1. **Isolate failing DIMM:** a. Replace a DIMM in bank with a ″known good″ DIMM. b. Rerun memory diagnostic for the failing bank on failing SMP Board. c. If test fails, mark replaced DIMM as ″good″ DIMM. d. If test passes, mark replaced DIMM as ″bad″ DIMM. e. If DIMM tested is ″bad″, remove it and replace it. f. If DIMM tested is ″good″, do not replace it. 2. Repeat steps 1a through 1f with other DIMMs in failing bank until error is fixed. 3. If error is not fixed, replace SMP Board Y.
201-XXX-Y32 (Multiple DIMM failure in Port 2 Bank 2; see "Removing and replacing DIMMs" on page 108) **Note:** Y = SMP Board [0=Bottom SMP Board; 1=Top SMP Board]	1. **Isolate failing DIMM:** a. Replace a DIMM in bank with a ″known good″ DIMM. b. Rerun memory diagnostic for the failing bank on failing SMP Board. c. If test fails, mark replaced DIMM as ″good″ DIMM. d. If test passes, mark replaced DIMM as ″bad″ DIMM. e. If DIMM tested is ″bad″, remove it and replace it. f. If DIMM tested is ″good″, do not replace it. 2. Repeat steps 1a through 1f with other DIMMs in failing bank until error is fixed. 3. If error is not fixed, replace SMP Board Y.
201-XXX-Y33 (Multiple DIMM failure in Port 2 Bank 3; see "Removing and replacing DIMMs" on page 108) **Note:** Y = SMP Board [0=Bottom SMP Board; 1=Top SMP Board]	1. **Isolate failing DIMM:** a. Replace a DIMM in bank with a ″known good″ DIMM. b. Rerun memory diagnostic for the failing bank on failing SMP Board. c. If test fails, mark replaced DIMM as ″good″ DIMM. d. If test passes, mark replaced DIMM as ″bad″ DIMM. e. If DIMM tested is ″bad″, remove it and replace it. f. If DIMM tested is ″good″, do not replace it. 2. Repeat steps 1a through 1f with other DIMMs in failing bank until error is fixed. 3. If error is not fixed, replace SMP Board Y.

Note: See Chapter 8, "Parts listing, Type 8870," on page 249 to determine which components are replaceable by the customer, and which components should be replaced by an IBM field service technician.	
Error code/symptom	**FRU/action**

201-XXX-Y34 (Multiple DIMM failure in Port 2 Bank 4; see "Removing and replacing DIMMs" on page 108)
 Note: Y = SMP Board [0=Bottom SMP Board; 1=Top SMP Board]
	1. **Isolate failing DIMM:**
	    a. Replace a DIMM in bank with a ″known good″ DIMM.
	    b. Rerun memory diagnostic for the failing bank on failing SMP Board.
	    c. If test fails, mark replaced DIMM as ″good″ DIMM.
	    d. If test passes, mark replaced DIMM as ″bad″ DIMM.
	    e. If DIMM tested is ″bad″, remove it and replace it.
	    f. If DIMM tested is ″good″, do not replace it.
	 2. Repeat steps 1a through 1f with other DIMMs in failing bank until error is fixed.
	 3. If error is not fixed, replace SMP Board Y.

202-xxx-00n (Failed System Cache test)	1. **Microprocessor n** 2. SMP board
203-xxx-xxx (Failed External Cache test)	1. **Reload BIOS code.** 2. SMP1 board (bottom).
204-198-0xx (Test Aborted) **Note:** xx=SMP board (01=Bottom SMP board; 10=Top SMP board; 11=Bottom SMP board and Top SMP board)	1. **Run Quick Memory Diagnostic All Banks.** 2. System BIOS code problem; see PCDR log.
204-210-0xx (Test Failed) **Note:** xx=SMP board (01=Bottom SMP board; 10=Top SMP board; 11=Bottom SMP board and Top SMP board)	1. **Run Quick Memory Diagnostic All Banks.** 2. If test runs without failure, update system BIOS code. 3. SMP Board xx.
206-xxx-000 (Failed Diskette Drive test)	1. **Rerun test with a different diskette.** 2. Diskette drive 3. Media Bay card
215-xxx-000 (Failed CD-ROM test)	1. **Rerun test with a different CD.** 2. CD-ROM drive 3. Media Bay card
217-xxx-000 (Failed BIOS Fixed Disk test) **Note:** If RAID is configured, the fixed disk number refers to the RAID logical array.	**Hard disk drive 1**
217-xxx-001 (Failed BIOS Fixed Disk test) **Note:** If RAID is configured, the fixed disk number refers to the RAID logical array.	**Hard disk drive 2**
217-xxx-002 (Failed BIOS Fixed Disk test) **Note:** If RAID is configured, the fixed disk number refers to the RAID logical array.	**Hard disk drive 3**
217-xxx-003 (Failed BIOS Fixed Disk test) **Note:** If RAID is configured, the fixed disk number refers to the RAID logical array.	**Hard disk drive 4**
217-xxx-004 (Failed BIOS Fixed Disk test) **Note:** If RAID is configured, the fixed disk number refers to the RAID logical array.	**Hard disk drive 5**

Note: See Chapter 8, "Parts listing, Type 8870," on page 249 to determine which components are replaceable by the customer, and which components should be replaced by an IBM field service technician.	
Error code/symptom	**FRU/action**
217-xxx-005 (Failed BIOS Fixed Disk test) **Note:** If RAID is configured, the fixed disk number refers to the RAID logical array.	**Hard disk drive 6**
217-xxx-006 (Failed BIOS Fixed Disk test) **Note:** If RAID is configured, the fixed disk number refers to the RAID logical array.	**Hard disk drive 7**
217-xxx-007 (Failed BIOS Fixed Disk test) **Note:** If RAID is configured, the fixed disk number refers to the RAID logical array.	**Hard disk drive 8**
217-xxx-008 (Failed BIOS Fixed Disk test) **Note:** If RAID is configured, the fixed disk number refers to the RAID logical array.	**Hard disk drive 9**
217-198-xxx (Could Not Establish Drive Parameters)	1. **Check drive cables and terminators** 2. Hard disk drive
264-xxx-0nn (Failed Tape Drive test)	1. **Tape cartridge** 2. Tape drive 3. Tape drive SCSI cable
264-xxx-999 (nn = SCSI ID of failing Tape Drive)	1. **Tape cartridge,** if user executed the Read/Write Tape Drive test (xxx = 256) 2. SCSI or power cable connected to the tape drive with SCSI ID nn 3. Tape drive with SCSI ID nn (refer to Help and Service Information appendix of tape drive's User Guide) 4. SMP board or SCSI controller (run SCSI controller diagnostic to determine of SCSI bus is functioning properly.)
301-xxx-000 (Failed Keyboard test) **Note:** After installing a USB keyboard, you might need to use the Configuration/Setup Utility program to enable keyboardless operation and prevent the POST error message 301 from being displayed during startup.	1. **Keyboard** 2. Center plane
302-xxx-xxx (Failed mouse test)	1. **Mouse** 2. Center plane
305-xxx-xxx (Failed video monitor test)	1. **Video monitor** 2. I/O board
405-xxx-000 (Failed Ethernet test on controller on I/O board)	1. **Verify that Ethernet is not disabled in BIOS.** 2. Run loopback diagnostic. 3. I/O board.
405-xxx-00n (No good link! Check loopback plug)	1. **Verify that the loopback plug is a gigabit loopback plug (see "Ethernet controller troubleshooting" on page 76).** 2. Check for any loose connections between the loopback plug and the ethernet port.
415-xxx-000 (Failed Modem test)	**Modem**

POST error codes

In the following error codes, X can be any number or letter.

Note: See Chapter 8, "Parts listing, Type 8870," on page 249 to determine which components are replaceable by the customer, and which components should be replaced by an IBM field service technician.	
Error code/symptom	**FRU/action**
062 (Three consecutive boot failures using the default configuration.)	1. **Flash system to latest level.** 2. I/O board.
101, 102 (Tick timer internal interrupt, internal timer channel 2)	**I/O board**
106 (Diskette controller failure)	**I/O board**
114 (Adapter read-only memory (ROM) error)	1. **Remove adapters and reinstall one at a time; replace failing adapter.** 2. I/O board.
151 (Real time clock error)	1. **Battery** 2. I/O board
161 (Real time clock battery error)	1. **Battery** 2. I/O board
162 (Device Configuration Error) **Note:** Be sure to load the default settings and any additional desired settings; then, **save the configuration**	1. **Run Configuration/Setup** 2. Battery 3. Failing device 4. I/O board
163 (Real-Time Clock error)	1. **Run Configuration/Setup.** 2. Battery. 3. I/O board.
175 (Hardware error)	1. **SMP board** 2. I/O board 3. Service processor
177, 178 (Security hardware error)	1. **Run Configuration/Setup.** 2. I/O board. 3. Service processor.
184 (Power-on password corrupted)	1. **Run Configuration/Setup.** 2. Battery. 3. I/O board.
186 (Security hardware control logic failed)	1. **Run Configuration/Setup.** 2. I/O board. 3. Service processor.
187 (VPD serial number not set.)	1. **Set serial number in Setup.** 2. I/O board. 3. Service processor.
188 (Bad EEPROM CRC #2)	1. **Run Configuration/Setup.** 2. I/O board. 3. Service processor.

Note: See Chapter 8, "Parts listing, Type 8870," on page 249 to determine which components are replaceable by the customer, and which components should be replaced by an IBM field service technician.	
Error code/symptom	**FRU/action**
189 (An attempt was made to access the server with invalid passwords)	**Run Configuration/Setup, enter the administrator password.**
289 (DIMM has been disabled by the user or system, see "Memory settings" on page 16)	1. **Run Configuration/Setup, if disabled by user.** 2. Verify proper DIMM installation (see "Removing and replacing DIMMs" on page 108). 3. Disabled DIMM, if not disabled by user.
301 (Keyboard or keyboard controller error) **Note:** After installing a USB keyboard, you might need to use the Configuration/Setup Utility program to enable keyboardless operation and prevent the POST error message 301 from being displayed during startup.	1. **Keyboard** 2. Center plane 3. I/O board
303 (Keyboard controller error)	1. **I/O board** 2. Keyboard 3. Center plane
602 (Invalid diskette boot record)	1. **Diskette** 2. Diskette drive 3. Cable 4. I/O board
604 (Diskette drive error)	1. **Run Configuration/Setup and diagnostic programs.** 2. Diskette drive. 3. Drive cable. 4. I/O board.
662 (Diskette drive configuration error)	1. **Run Configuration/Setup and diagnostic programs.** 2. Diskette drive. 3. Drive cable. 4. I/O board.
11xx (Center plane internal serial port error)	1. **Disconnect external cable on serial port.** 2. Run Configuration/Setup. 3. Center plane.
1762 (Fixed Disk Configuration error)	1. **Hard disk drive cables.** 2. Run Configuration/Setup. 3. Hard disk drive adapter. 4. Hard disk drive. 5. SCSI backplane. 6. I/O board.
178x (Fixed Disk error)	1. **Hard disk drive cables.** 2. Run diagnostic programs. 3. Hard disk drive adapter. 4. Hard disk drive. 5. I/O board.

Note: See Chapter 8, "Parts listing, Type 8870," on page 249 to determine which components are replaceable by the customer, and which components should be replaced by an IBM field service technician.

Error code/symptom	FRU/action
1800 (Unavailable PCI hardware interrupt)	1. **Run Configuration/Setup and adjust adapter settings.** 2. Remove an adapter.
1962 (Drive does not contain a valid boot sector)	1. **Verify a bootable operating system is installed.** 2. Run diagnostic programs. 3. Hard disk drive. 4. SCSI backplane. 5. Cable. 6. I/O board.
2400 (Video controller test failure)	1. **Video Adapter (if installed)** 2. I/O board
2462 (Video memory configuration error)	1. **Video Adapter (if installed)** 2. I/O board
5962 (IDE CD-ROM configuration error)	1. **Run Configuration/Setup.** 2. CD-ROM drive. 3. IDE cable. 4. I/O board.
8603 (Pointing Device Error)	1. **Pointing device** 2. Center plane 3. I/O board
0001295 (ECC circuit check)	1. **DIMM** 2. SMP board
00012000 (Processor machine check error)	1. SMP board 2. PCI-X board 3. I/O board
00019501 (Processor 1 is not functioning - check VRM and processor LEDs)	1. **VRM 1** 2. Microprocessor 1 3. SMP board
00019502 (Processor 2 is not functioning - check VRM and processor LEDs)	1. **VRM 2** 2. Microprocessor 2 3. SMP board
00019503 (Processor 3 is not functioning - check VRM and processor LEDs)	1. **VRM 3** 2. Microprocessor 3 3. SMP board
00019504 (Processor 4 is not functioning - check VRM and processor LEDs)	1. **VRM 4** 2. Microprocessor 4 3. SMP board
00019701 (Processor 1 failed BIST)	1. **Microprocessor 1** 2. VRM1 3. SMP board

Note: See Chapter 8, "Parts listing, Type 8870," on page 249 to determine which components are replaceable by the customer, and which components should be replaced by an IBM field service technician.	
Error code/symptom	**FRU/action**
00019702 (Processor 2 failed BIST)	1. **Microprocessor 2** 2. VRM2 3. SMP board
00019703 (Processor 3 failed BIST)	1. **Microprocessor 3** 2. VRM3 3. SMP board
00019704 (Processor 4 failed BIST)	1. **Microprocessor 4** 2. VRM4 3. SMP board
00180100 (A PCI adapter has requested memory resources that are not available)	1. **Reorder the adapters in the PCI slots. It is important that your boot device is positioned early in the scan order so that it is executed by POST.** 2. Ensure that the PCI adapter and all other adapters are set correctly in the Configuration/Setup Utility program. If the memory resource settings are not correct, change the settings. 3. If all memory resources are being used, you might need to remove an adapter to make memory available to the PCI adapter. Disabling the adapter BIOS on the adapter should correct the error. Refer to documentation provided with the adapter.
00180200 (No more I/O space available for PCI adapter)	1. **Run Configuration/Setup.** 2. Failing adapter. 3. PCI-X board.
00180300 (No more memory (above 1MB for PCI adapter))	1. **Run Configuration/Setup.** 2. Failing adapter. 3. PCI-X board.
00180400 (No more memory (below 1MB for PCI adapter))	1. **Run Configuration/Setup.** 2. Move the failing adapter to slot 1 or 2. 3. Failing adapter. 4. PCI-X board.
00180500 (PCI option ROM checksum error)	1. **Remove failing PCI card.** 2. PCI-X board.
00180600 (PCI built-in self test failure)	1. **Run Configuration/Setup.** 2. Move the failing adapter to slot 1 or 2. 3. Failing adapter. 4. PCI-X board.
00180700, 00180800 (General PCI error)	1. **Verify that no devices have been disabled in CMOS.** 2. PCI-X board 3. PCI card
00181000 (PCI error)	1. **Remove adapters in PCI slots.** 2. PCI-X board.

Note: See Chapter 8, "Parts listing, Type 8870," on page 249 to determine which components are replaceable by the customer, and which components should be replaced by an IBM field service technician.	
Error code/symptom	**FRU/action**
01295085 (ECC checking hardware test error)	1. **Microprocessor** 2. DIMM 3. SMP board
01298001 (No update data for processor 1)	1. **Ensure all microprocessors are the same cache size.** 2. Reflash BIOS code. 3. Microprocessor 1.
01298002 (No update data for processor 2)	1. **Ensure all microprocessors are the same cache size.** 2. Reflash BIOS code. 3. Microprocessor 2.
01298004 (No update data for processor 3)	1. **Ensure all microprocessors are the same cache size.** 2. Reflash BIOS code. 3. Microprocessor 3.
01298005 (No update data for processor 4)	1. **Ensure all microprocessors are the same cache size.** 2. Reflash BIOS code. 3. Microprocessor 4.
01298101 (Bad update data for processor 1)	1. **Ensure all microprocessors are the same cache size.** 2. Reflash BIOS code. 3. Microprocessor 1.
01298102 (Bad update data for processor 2)	1. **Ensure all microprocessors are the same cache size.** 2. Reflash BIOS code. 3. Microprocessor 2.
01298103 (Bad update data for processor 3)	1. **Ensure all microprocessors are the same cache size.** 2. Reflash BIOS code. 3. Microprocessor 3.
01298104 (Bad update data for processor 4)	1. **Ensure all microprocessors are the same cache size.** 2. Reflash BIOS code. 3. Microprocessor 4.
0I298200 (Processor speed mismatch)	• **Ensure all microprocessors are the same cache size.**
I9990301 (Fixed disk sector error)	1. **Hard disk drive** 2. SCSI backplane 3. Cable 4. I/O board
I9990650 (AC power has been restored)	1. **Check cables.** 2. Check for interruption of power supply. 3. Power cable. 4. Top power board.

12v bus faults

These bus faults generally prohibit an orderly shutdown of the server. If the server fails, the indicator lights on the front of the server are not lit, and the server will not power-down using the power button:

1. Disconnect power cord from power source, wait 20 seconds, and reconnect.
2. Turn on the server.
3. Check error logs for one of the following error messages and take the indicated actions.

Note: See Chapter 8, "Parts listing, Type 8870," on page 249 to determine which components are replaceable by the customer, and which components should be replaced by an IBM field service technician.	
Error message	**FRU/action**
12v A bus fault	1. **VRM on I/O board** 2. I/O board 3. Top power board
12v B bus fault	1. **Memory VRM on SMP Board 2 (top)** 2. SMP Board 2 (top) 3. Top power board
12v C bus fault	1. **Microprocessor VRM 1 on SMP Board 2 (top)** 2. Microprocessor VRM 4 on SMP Board 2 (top) 3. SMP Board 2 (top) 4. Hard disk drive (DASD) card 5. Top power board
12v D bus fault	1. **Microprocessor VRM 2 on SMP Board 2 (top)** 2. Microprocessor VRM 3 on SMP Board 2 (top) 3. SMP Board 2 VRM (J44) 4. SMP Board 2 (top) 5. Top power board
12v E bus fault	1. **Center plane VRM** 2. VRM on PCI-X board 3. Center plane 4. PCI-X board 5. Top power board
12v F bus fault	1. **Memory VRM on SMP Board 1 (bottom)** 2. SMP Board 1 (bottom) 3. Top power board
12v G bus fault	1. **Microprocessor VRM 1 on SMP Board 1 (bottom)** 2. Microprocessor VRM 4 on SMP Board 1 (bottom) 3. SMP Board 1 (bottom) 4. Top power board
12v H bus fault	1. **Microprocessor VRM 2 on SMP Board 1 (bottom)** 2. Microprocessor VRM 3 on SMP Board 1 (bottom 3. SMP Board 1 VRM (J44) 4. SMP Board 1 (bottom) 5. Top power board

Error symptoms

You can use the error symptom table to find solutions to problems that have definite symptoms.

If you cannot find the problem in the error symptom charts, go to "Starting the diagnostic programs" on page 70 to test the computer.

If you have just added new software or a new option and the computer is not working, complete the following steps before using the error symptom charts:

1. Remove the software or device that you just added.
2. Run the diagnostic tests to determine if the computer is running correctly.
3. Reinstall the new software or new device.

In the following table, if the entry in the FRU/action column is a suggested action, perform that action; if it is the name of a component, reseat the component and replace it if necessary. The most likely cause of the symptom is listed first.

Note: See Chapter 8, "Parts listing, Type 8870," on page 249 to determine which components are replaceable by the customer, and which components should be replaced by an IBM field service technician.	
DVD-ROM drive problems	
Symptom	**FRU/action**

DVD-ROM drive is not recognized.	1. **Verify that:**
	  • The IDE channel to which the DVD-ROM drive is attached (primary or secondary) is enabled in the Configuration/Setup Utility program.
	  • All cables and jumpers are installed correctly.
	  • The correct device driver is installed for the DVD-ROM drive.
	2. Run DVD-ROM drive diagnostic programs.
	3. DVD-ROM drive.
	4. Cable.
	5. Media bay card.
	6. I/O board.
	
	Note: When two servers are connected in a 16-way configuration, the DVD-ROM drive, diskette drive, keyboard, USB ports (except for Remote Supervisor Adapter II-EXA functionality), mouse, and video are disabled on the secondary server.

CD is not working properly.	1. **Clean the DVD.** 2. Run DVD-ROM drive diagnostic programs. 3. DVD-ROM drive.
DVD-ROM drive tray is not working. (The computer must be turned on.)	1. **Insert the end of a straightened paper clip into the manual tray-release opening.** 2. Run DVD-ROM drive diagnostic programs. 3. DVD-ROM drive.

Note: See Chapter 8, "Parts listing, Type 8870," on page 249 to determine which components are replaceable by the customer, and which components should be replaced by an IBM field service technician.	
Diskette drive problems	
Symptom	**FRU/action**
Diskette drive activity LED stays on, or the system bypasses the diskette drive.	1. **If there is a diskette in the drive, verify that:** • The diskette drive is enabled in the Configuration/Setup utility program. • The diskette is good and not damaged. (Try another diskette if you have one.) • The diskette is inserted correctly in the drive. • The diskette contains the necessary files to start the server. • The software program is working properly. • The cable is installed correctly (in the proper orientation). 2. To prevent diskette drive read/write errors, be sure the distance between monitors and diskette drives is at least 76 mm (3 in.). 3. Run diskette drive diagnostic programs. 4. Cable. 5. Diskette drive. 6. I/O board. **Note:** When two servers are connected in a 16-way configuration, the DVD-ROM drive, diskette drive, keyboard, USB ports (except for Remote Supervisor Adapter II-EXA functionality), mouse, and video are disabled on the secondary server.

Note: See Chapter 8, "Parts listing, Type 8870," on page 249 to determine which components are replaceable by the customer, and which components should be replaced by an IBM field service technician.	
Expansion enclosure problems	
Symptom	**FRU/action**
The SCSI expansion enclosure used to work but does not work now.	1. **Verify that:** • The cables for all external SCSI options are connected correctly. • The last option in each SCSI chain, or the end of the SCSI cable, is terminated correctly. • Any external SCSI option is turned on. You must turn on an external SCSI option before turning on the computer. 2. For more information, see your SCSI expansion enclosure documentation.

Note: See Chapter 8, "Parts listing, Type 8870," on page 249 to determine which components are replaceable by the customer, and which components should be replaced by an IBM field service technician.	
Hard disk drive problems	
Symptom	**FRU/action**
Not all drives are recognized by the hard disk drive diagnostic test (Fixed Disk test).	1. **Remove the first drive not recognized and try the hard disk drive diagnostic test again.** 2. If the remaining drives are recognized, replace the drive you removed with a new one.
System stops responding during hard disk drive diagnostic test.	1. **Remove the hard disk drive being tested when the computer stopped responding and try the diagnostic test again.** 2. If the hard disk drive diagnostic test runs successfully, replace the drive you removed with a new one.

Note: See Chapter 8, "Parts listing, Type 8870," on page 249 to determine which components are replaceable by the customer, and which components should be replaced by an IBM field service technician.	
General problems	
Symptom	**FRU/action**
Problems such as broken cover locks or indicator LEDs not working	• **Broken CRU/FRU**

Note: See Chapter 8, "Parts listing, Type 8870," on page 249 to determine which components are replaceable by the customer, and which components should be replaced by an IBM field service technician.	
Intermittent problems	
Symptom	**FRU/action**

A problem occurs only occasionally and is difficult to detect.	1. **Verify that:**
	  • All cables and cords are connected securely to the rear of the server and attached options.
	  • When the server is turned on, air is flowing from the rear of the server at the fan grill. If there is no airflow, the fan is not working. This causes the computer to overheat and shut down.
	  • Ensure that the SCSI bus and devices are configured correctly and that the last external device in each SCSI chain is terminated correctly.
	2. Check the system error log.

Note: See Chapter 8, "Parts listing, Type 8870," on page 249 to determine which components are replaceable by the customer, and which components should be replaced by an IBM field service technician.	
Keyboard, mouse, or pointing-device problems (non-USB)	
Symptom	**FRU/action**

All or some keys on the keyboard do not work.	1. **Verify that:**
	  • The keyboard cable is securely connected to the system, and the keyboard and mouse cables are not reversed.
	  • Both the server and the monitor are turned on.
	2. Keyboard.
	3. Center plane.
	4. I/O board.
	
	Note: When two servers are connected in a 16-way configuration, the DVD-ROM drive, diskette drive, keyboard, USB ports (except for Remote Supervisor Adapter II-EXA functionality), mouse, and video are disabled on the secondary server.

The mouse or pointing device does not work.	1. **Verify that:**
	  • The mouse or pointing-device cable is securely connected, and that the keyboard and mouse cables are not reversed.
	  • The mouse device drivers are installed correctly.
	  • Both the computer and the monitor are turned on.
	2. Mouse or pointing device.
	3. Center plane.
	4. I/O board.
	
	Note: When two servers are connected in a 16-way configuration, the DVD-ROM drive, diskette drive, keyboard, USB ports (except for Remote Supervisor Adapter II-EXA functionality), mouse, and video are disabled on the secondary server.

Note: See Chapter 8, "Parts listing, Type 8870," on page 249 to determine which components are replaceable by the customer, and which components should be replaced by an IBM field service technician.	
USB keyboard, mouse, or pointing-device problems	
Symptom	**FRU/action**
All or some keys on the keyboard do not work.	1. **You must connect a ps/2 keyboard to the primary server.** Do not connect a USB keyboard when two servers are connected in a 16-way configuration. 2. Verify that the keyboard cable is securely connected to the system, and the keyboard and mouse cables are not reversed. 3. Verify that the server and the monitor are turned on. 4. Keyboard. 5. I/O board. **Notes:** 1. After installing a USB keyboard, you might need to use the Configuration/Setup Utility to enable keyboardless operation to prevent the POST error message 301 from being displayed during startup. 2. When two servers are connected in a 16-way configuration, the DVD-ROM drive, diskette drive, keyboard, USB ports (except for Remote Supervisor Adapter II-EXA functionality), mouse, and video are disabled on the secondary server.
The USB mouse or USB pointing device does not work.	1. **Verify that the mouse or pointing-device USB cable is securely connected and the device drivers are installed correctly.** 2. Make sure that the system and the monitor are turned on. 3. Ensure that the USB mouse support is enabled in BIOS. 4. If a USB hub is in use, disconnect the USB device from the hub and connect it directly to the server. 5. Ensure that the USB device is not connected to the secondary server in a merged configuration. 6. Mouse or pointing device. 7. I/O board. **Note:** When two servers are connected in a 16-way configuration, the DVD-ROM drive, diskette drive, keyboard, USB ports (except for Remote Supervisor Adapter II-EXA functionality), mouse, and video are disabled on the secondary server.

Note: See Chapter 8, "Parts listing, Type 8870," on page 249 to determine which components are replaceable by the customer, and which components should be replaced by an IBM field service technician.	
Memory problems	
Symptom	**FRU/action**

The amount of system memory displayed is less than the amount of physical memory installed.	1. **Verify that:**
	  • Memory mirroring does not account for the mismatch (see Note on page 108).
	  • The memory modules are seated properly.
	  • You have installed the correct type of memory.
	  • If you changed the memory, you updated the memory configuration with the Configuration/Setup Utility program.
	  • All banks of memory on the DIMMs are enabled. The computer might have automatically disabled a DIMM bank when it detected a problem or a DIMM bank could have been manually disabled.
	2. Check POST error log for error message 289:
	  • If the DIMM was disabled by a system-management interrupt (SMI), replace the DIMM.
	  • If the DIMM was disabled by the user or by POST:
	    a. Start the Configuration/Setup Utility program.
	    b. Enable the DIMM.
	    c. Save the configuration and restart the computer.
	3. DIMM.
	4. SMP board.

Memory hot-add / hot-replace is not functional.	Verify that: 1. The BIOS code is up to date. 2. Fastpath memory is disabled.

Note: See Chapter 8, "Parts listing, Type 8870," on page 249 to determine which components are replaceable by the customer, and which components should be replaced by an IBM field service technician.	
Microprocessor problems	
Symptom	**FRU/action**
The computer emits a continuous tone during POST. (The startup (boot) microprocessor is not working properly.)	1. **Verify that the startup microprocessor is seated properly.** 2. Startup microprocessor. 3. Microprocessor VRM.

Note: See Chapter 8, "Parts listing, Type 8870," on page 249 to determine which components are replaceable by the customer, and which components should be replaced by an IBM field service technician.	
Monitor problems	
Symptom	**FRU/action**
Testing the monitor.	**See the information that comes with the monitor** for adjusting and testing instructions. (Some IBM monitors have their own self-tests.) 1. **Monitor.** 2. Run diagnostic programs. If diagnostic programs pass, the problem may be a video driver. 3. I/O board.

Note: See Chapter 8, "Parts listing, Type 8870," on page 249 to determine which components are replaceable by the customer, and which components should be replaced by an IBM field service technician.	
Monitor problems	
Symptom	**FRU/action**

The screen is blank.	1. **Verify that:**
	   • The computer power cord is plugged into the server, and into a working electrical outlet or power distribution unit.
	   • The monitor cables are connected properly.
	     Note: For server models with a Remote Supervisor Adapter II-EXA installed, the integrated video controller on the server is disabled. You must connect the monitor to the video port on the Remote Supervisor Adapter II-EXA.
	   • The monitor is turned on and the Brightness and Contrast controls are adjusted correctly.
	
	   Note: When two servers are connected in a 16-way configuration, the DVD-ROM drive, diskette drive, keyboard, USB ports (except for Remote Supervisor Adapter II-EXA functionality), mouse, and video are disabled on the secondary server.
	   Important: In some memory configurations, the 3-3-3 beep code might sound during POST followed by a blank display screen. If this occurs and the **Boot Fail Count** feature in the Start Options of the Configuration/Setup Utility program is set to **Enabled** (its default setting), you must restart the server three times to force the system BIOS code to reset the CMOS values to the default configuration (memory connector or bank of connectors enabled).
	2. Make sure that damaged BIOS code is not affecting the video; see "Recovering BIOS code" on page 75.
	3. If you have verified these items and the screen remains blank, replace:
	   a. Monitor
	   b. I/O board

Only the cursor appears.	• **See "Undetermined problems" on page 246.**

The monitor works when you turn on the computer but goes blank when you start some application programs.	1. **Verify that:**
	   • The application program is not setting a display mode higher than the capability of the monitor.
	   • The primary monitor cable is connected to the server.
	   • You installed the necessary device drivers for the applications.
	2. Monitor.
	3. I/O board.
	
	Note: When two servers are connected in a 16-way configuration, the DVD-ROM drive, diskette drive, keyboard, USB ports (except for Remote Supervisor Adapter II-EXA functionality), mouse, and video are disabled on the secondary server.

Note: See Chapter 8, "Parts listing, Type 8870," on page 249 to determine which components are replaceable by the customer, and which components should be replaced by an IBM field service technician.	
Monitor problems	
Symptom	**FRU/action**

The screen is wavy, unreadable, rolling, distorted, or has screen jitter.	1. **If the monitor self-tests show the monitor is working properly, consider the location of the monitor.** Magnetic fields around other devices (such as transformers, appliances, fluorescent lights, and other monitors) can cause screen jitter or wavy, unreadable, rolling, or distorted screen images. If this happens, turn off the monitor. (Moving a color monitor while it is turned on might cause screen discoloration.) Then move the device and the monitor at least 305 mm (12 in.) apart. Turn on the monitor.
	
	Notes:
	  a. To prevent diskette drive read/write errors, be sure the distance between monitors and diskette drives is at least 76 mm (3 in.).
	  b. Non-IBM monitor cables might cause unpredictable problems.
	  c. An enhanced monitor cable with additional shielding is available for the 9521 and 9527 monitors. For information about the enhanced monitor cable, contact your IBM reseller or IBM marketing representative.
	
	2. Monitor.
	3. I/O board.

Wrong characters appear on the screen.	1. **If the wrong language is displayed, update the BIOS code with the correct language.** 2. Monitor. 3. I/O board.
No video.	1. **Verify that the correct machine is selected, if applicable.** 2. Make sure all cables are locked down.

Note: See Chapter 8, "Parts listing, Type 8870," on page 249 to determine which components are replaceable by the customer, and which components should be replaced by an IBM field service technician.	
Option problems	
Symptom	**FRU/action**

An IBM option that was just installed does not work.	1. **Verify that:**
	  • The option is designed for the server (see the ServerProven list on the World Wide Web at http://www.ibm.com/pc/compat/).
	  • You followed the installation instructions that came with the option.
	  • The option is installed correctly.
	  • You have not loosened any other installed options or cables.
	  • You updated the configuration information in the Configuration/Setup Utility program. Whenever memory or an option is changed, you must update the configuration.
	
	2. Option you just installed.

Note: See Chapter 8, "Parts listing, Type 8870," on page 249 to determine which components are replaceable by the customer, and which components should be replaced by an IBM field service technician.	
Option problems	
Symptom	**FRU/action**
An IBM option that used to work does not work now.	1. **Verify that all of the option hardware and cable connections are secure.** 2. If the option comes with its own test instructions, use those instructions to test the option. 3. If the failing option is a SCSI option, verify that: • The cables for all external SCSI options are connected correctly. • The last option in each SCSI chain, or the end of the SCSI cable, is terminated correctly. • Any external SCSI option is turned on. You must turn on an external SCSI option before turning on the computer. 4. Failing option.

Note: See Chapter 8, "Parts listing, Type 8870," on page 249 to determine which components are replaceable by the customer, and which components should be replaced by an IBM field service technician.	
Power problems	
Symptom	**FRU/action**
Power switch does not work and reset button, if supported, does work.	1. **Reseat connector.** 2. Power switch card. 3. I/O board.
The server does not turn on.	**Note:** The xSeries 445 server requires a 220 V power connection for full power-supply redundancy. Whenever possible, use a 220 V connection for all configurations. However, you can use a 110 V connection without power-supply redundancy. 1. **Verify that:** • The power cables are properly connected to the computer. • The electrical outlet functions properly. • The type of memory installed is correct. • If you just installed an option, remove it, and restart the computer. If the computer now turns on, you might have installed more options than the power supply supports. • The LEDs on the power supply are on. • Verify that microprocessors are installed in the correct sequence. 2. Override front panel power button: a. Disconnect server power cords. b. Reconnect power cords. If computer turns on: • Operator information panel If computer does not turn on, see "Power LED errors" on page 240. 3. See "Undetermined problems" on page 246.
The server does not turn off.	1. **Verify whether you are using an ACPI or non-ACPI operating system.** If you are using a non-ACPI operating system: a. Press Ctrl+Alt+Delete. b. Turn off the system by holding the power-control button for 4 seconds. c. If computer fails during BIOS POST and power-control button does not work, remove the ac power cord. 2. If the problem remains or if you are using an ACPI-aware operating system, suspect the I/O board.

Note: See Chapter 8, "Parts listing, Type 8870," on page 249 to determine which components are replaceable by the customer, and which components should be replaced by an IBM field service technician.	
Power problems	
Symptom	**FRU/action**
The server unexpectedly shuts down and the LEDs on the front panel are not lit.	**See "12v bus faults" on page 229.**

Note: See Chapter 8, "Parts listing, Type 8870," on page 249 to determine which components are replaceable by the customer, and which components should be replaced by an IBM field service technician.	
Serial port problems	
Symptom	**FRU/action**

The number of serial ports identified by the operating system is less than the number of serial ports installed.	1. **Verify that:**
	  • Each port is assigned a unique address by the Configuration/Setup Utility program and none of the serial ports is disabled.
	  • The serial-port adapter, if you installed one, is seated properly.
	2. Failing serial port adapter.

A serial device does not work.	1. **Verify that:**
	  • The device is compatible with the computer.
	  • The serial port is enabled and is assigned a unique address.
	  • The device is connected to the correct port (see Chapter 5, "I/O connectors and indicators," on page 145).
	2. Failing serial device.
	3. Serial cable.
	4. Center plane.
	5. I/O board.

Note: See Chapter 8, "Parts listing, Type 8870," on page 249 to determine which components are replaceable by the customer, and which components should be replaced by an IBM field service technician.	
Software problem	
Symptom	**FRU/action**

Suspected software problem.	1. **To determine if problems are caused by the software, verify that:**
	  • The server has the minimum memory needed to use the software. For memory requirements, see the information that comes with the software.
	    Note: If you have just installed an adapter or memory, you might have a memory address conflict.
	  • The software is designed to operate on the server.
	  • Other software works on the server.
	  • The software that you are using works on another server.
	If you received any error messages when using the software program, see the information that comes with the software for a description of the messages and suggested solutions to the problem.
	2. If you have verified these items and the problem remains, contact your place of purchase.

Note: See Chapter 8, "Parts listing, Type 8870," on page 249 to determine which components are replaceable by the customer, and which components should be replaced by an IBM field service technician.	
Universal Serial Bus (USB) port problems	
Symptom	**FRU/action**
A USB device does not work.	**Verify that:** - You are not trying to use a USB device during POST if you have a standard (non-USB) keyboard attached to the keyboard port. **Note:** If a standard (non-USB) keyboard is attached to the keyboard port, the USB is disabled and no USB device will work during POST. - The correct USB device driver is installed. - The operating system supports USB devices. - If a USB hub is in use, disconnect the USB device from the hub and connect it directly to the server. **Note:** When two servers are connected in a 16-way configuration, the DVD-ROM drive, diskette drive, keyboard, USB ports (except for Remote Supervisor Adapter II-EXA functionality), mouse, and video are disabled on the secondary server.

Note: See Chapter 8, "Parts listing, Type 8870," on page 249 to determine which components are replaceable by the customer, and which components should be replaced by an IBM field service technician.	
ServerGuide problems	
Symptom	**FRU/action**
Setup and Installation CD will not start.	**Ensure that the system is a supported server with a startable (bootable) CD-ROM drive.** - If the startup (boot) sequence settings have been altered, ensure that the CD-ROM drive is first in the startup sequence. - If more than one CD-ROM drive is installed, ensure that only one drive is set as the primary drive. Start the CD from the primary drive.
ServeRAID program cannot view all installed drives – or – cannot install NOS.	**Ensure that there are no duplicate SCSI IDs or IRQ assignments.** - Ensure that the hard disk drive is connected properly.
The Operating System Installation program continuously loops.	**Make more space available on the hard disk.**
ServerGuide will not start *your* NOS CD.	**Ensure that the NOS CD you have is supported by the ServerGuide program.** See the CD label for a list of supported NOS versions.
Cannot install NOS – option is unavailable.	**Ensure that the NOS is supported on the server.** If the NOS is supported, either there is no logical drive defined (ServeRAID systems). Run the ServerGuide setup and configuration program, and ensure that setup is complete.

Power LED errors

Use the power supply LED information on the following page to troubleshoot power supply problems.

Note: The minimum configuration required for the DC Good light to come on is:
- Power supply
- Top power board
- AC power box
- Power cord and cables

AC good LED	DC good LED	Front power on light	Power good indicators (center plane)	Description	FRU/action
Note: See Chapter 8, "Parts listing, Type 8870," on page 249 to determine which components are replaceable by the customer, and which components should be replaced by an IBM field service technician.					

Off	Off	Off	Off	No power to system or ac problem.	1. **Check ac power to system.**
					2. Isolate by removing one power supply at a time.
					3. Unplug the three power connectors to center plane (J11, J19, J23).
					   a. Inspect cables.
					   b. Top power board.

On	Off	Off	Off	DC source power problem	1. **View service processor error logs through serial connection of remote supervisor adapter.**
					2. Isolate with single SMP Expansion Module.
					3. Unplug the three power connectors to the center plane (J11, J19, J23):
					   a. If dc LED lights, go to step 4.
					   b. If dc LED does not light:
					     1) Power supply.
					     2) Top power board.
					4. Reconnect the three power connectors to the center plane; then, isolate the failing FRU by disconnecting:
					   • Center plane light path cable and SCSI power cable (J8, J9)
					   • PCI adapters
					   • Fans 1 and 2
					   • I/O board cable attachments (J1, J2, J3, J8) (see "I/O board internal connectors" on page 166)
					5. If no LEDs are lit after step 4, replace the following:
					   a. Center plane VRM
					   b. Center plane
					   c. PCI-X board and VRM
					   d. I/O board and VRM
					   e. Remote Supervisor Adapter

Note: See Chapter 8, "Parts listing, Type 8870," on page 249 to determine which components are replaceable by the customer, and which components should be replaced by an IBM field service technician.

AC good LED	DC good LED	Front power on light	Power good indicators (center plane)	Description	FRU/action

On	On	Blinking	Off	Standby power problem	1. **View service processor error logs through serial connection of remote supervisor adapter.**
					2. Force power-on (see "Force power-on" on page 160) to eliminate suspect power/reset card.
					3. Isolate with single SMP Expansion Module.
					4. Disconnect the following items from the center plane in order to isolate the failing FRU:
					  • Center plane light path cable and SCSI power cable (J8, J9)
					  • PCI adapters
					  • Fans 1 and 2
					  • I/O board cable attachments (J1, J2, J3, J8) (see "I/O board internal connectors" on page 166)
					5. If no LEDs are lit after step 4, replace the following:
					  a. Center plane VRM
					  b. Center plane
					  c. PCI-X board and VRM
					  d. I/O board and VRM
					  e. Remote Supervisor Adapter

On	On	Off	Off	Power/reset card problem	1. **Power/reset card (front panel) and cable** 2. I/O board
On	On	On	On	Power is OK.	**N/A**

SCSI error messages

Note: See Chapter 8, "Parts listing, Type 8870," on page 249 to determine which components are replaceable by the customer, and which components should be replaced by an IBM field service technician.	
Error message	**FRU/action**
All SCSI Errors One or more of the following might be causing the problem: • A failing SCSI device (adapter, drive, controller) • An improper SCSI configuration or SCSI termination jumper setting • Duplicate SCSI IDs in the same SCSI chain • A missing or improperly installed SCSI terminator • A defective SCSI terminator • An improperly installed cable • A defective cable	1. **External SCSI devices must be powered-on before you power-on the server.** 2. The cables for all external SCSI devices are connected correctly. 3. If you have attached an external SCSI device to the server, verify that the external SCSI termination is set to automatic. 4. The last device in each SCSI chain is terminated correctly. 5. The SCSI devices are configured correctly.

ServeRAID (ISPR) error procedures

Use the ISPR error procedures to help you solve ServeRAID problems. A complete list of error codes is listed at "ServeRAID error codes" on page 244.

Note: Where the ISPR Error Procedures refer to a hard disk drive backplane, see the chapter of this publication that concerns service replaceable units.

EF10 (Default ISPR)
1. No ISPR error present.

9ZXX through BZXX (SCSI bus error caused either by cables, termination, defective drives, etc.)
1. Isolate between SCSI subsystem and controller by disconnecting all hard disk drive cables from suspect card, and reboot.
   CAUTION:
   Do not press F5. Doing so changes the server's configuration.
   If an ISPR error is still present, perform the following actions until the error is no longer present:
   a. Reseat the controller
   b. Replace the controller

   Notes:
   a. SCSI channel cable details, if any, appear elsewhere in this publication.
   b. The adapter/controller detects a configuration change. **Do not** choose **Save Changes**. Instead, press **F10** to bypass any options to this effect.
2. If ISPR error is **EF10** after disconnecting cables:
   a. Identify which channel is causing the error by the second digit (Z) of the original ISPR code as indicated in the following table:

Note: ServeRAID-4H controllers have 4 channels; ServeRAID-4L and -4Lx controllers have only one channel; and ServeRAID-4M and -4Mx controllers have 2 channels. ServeRAID-5i controllers have no channels. The ServeRAID-5i uses the channel connectors of the server's onboard integrated SCSI controller.

Table 8. SCSI identifier

SCSI Channel Code (z)	Descriptions
1	Channel 1
2	Channel 2
3	Channel 1 & 2
4	Channel 3
5	Channel 1 & 3
6	Channel 2 & 3
7	Channel 1, 2, & 3
8	Channel 4
9	Channel 1 & 4
A	Channel 2 & 4
B	Channel 1, 2, & 4
C	Channel 3 & 4
D	Channel 1, 3, & 4
E	Channel 2, 3, & 4
F	Channel 1, 2, 3, & 4

b. Confirm that the channel(s) identified from the error in step 2a on page 242 is (are) the cause of the error by verifying that the error presents itself *only* when the offending channel is reconnected.

c. Check termination of identified channel.

   Note: SCSI channel termination details, if any, appear elsewhere in this publication.

d. Check for proper backplane jumper configuration.

   Note: SCSI channel jumper details, if any, appear elsewhere in this publication.

e. Check for proper cabling configuration in systems that use hard disk drive status cables. Reconnect all cables removed in step 1 on page 242.

f. Disconnect one drive at a time attached to the channel identified in step 2a on page 242; then, reboot to determine which drive is causing the error.

g. Replace hard disk drive cable.

h. Replace hard disk drive backplane.

FFFF or other code not listed

1. Place download jumpers on the controller and try to flash the firmware code to the card.

2. Isolate between SCSI subsystem and controller by disconnecting all hard disk drive cables attached to the suspect card, and reboot.
   CAUTION:
   Do not press F5. Doing so will change the server's configuration.

If ISPR code is **EF10** after disconnecting cables, follow the steps below until the error is eliminated:

    a.   Identify which channel is causing the error by reconnecting cables one at a time and rebooting until the error returns.

    b.   Check termination of identified channel in step 2a.

> **Note:** SCSI channel termination details, if any, appear elsewhere in this publication.

    c.   Disconnect one drive at a time attached to channel identified in step 2a and reboot each time to determine which drive is causing the problem.

    d.   Replace hard disk drive cable attached to channel identified in step 2a.

    e.   Replace backplane attached to channel identified in step 2a.

3. If original ISPR code is still present after disconnecting all hard disk drive cables and rebooting, perform the following actions until the error is no longer present:
   - Reseat the controller
   - Replace the controller

ServeRAID error codes

In the following error codes, x can be any number or letter.

Note: See Chapter 8, "Parts listing, Type 8870," on page 249 to determine which components are replaceable by the customer, and which components should be replaced by an IBM field service technician.	
Error code/symptom	**FRU/action**
1xxx (Microcode checksum error)	**ServeRAID controller**
2xxx (Code DRAM error)	1. **Install download jumpers, flash latest level BIOS and firmware for controller. Remove jumpers.** 2. ServeRAID controller.
3000-31xx(Code DRAM error)	1. **Install download jumpers, flash latest level BIOS and firmware for controller. Remove jumpers.** 2. ServeRAID controller.
3200 (Code DRAM error)	1. **Install download jumpers, flash latest level BIOS code and firmware for controller. Remove jumpers.** 2. ServeRAID controller.
3E2x	1. **Reseat the ServeRAID controller.** 2. Flash latest level of BIOS code and firmware for controller. 3. ServeRAID-5i controller. 4. Integrated RAID controller on server).
4xxx thru 5xxx (Code DRAM error)	1. **Install download jumpers, flash latest level BIOS code and firmware for controller; then, remove jumpers.** 2. ServeRAID controller.
6xxx (Cache DRAM error) (ServeRAID-4H only)	1. **Reseat daughter card.** 2. Install download jumpers, flash latest level BIOS code and firmware for controller; then, remove jumpers. 3. ServeRAID controller.

Note: See Chapter 8, "Parts listing, Type 8870," on page 249 to determine which components are replaceable by the customer, and which components should be replaced by an IBM field service technician.	
Error code/symptom	**FRU/action**
7xxx thru 8xxx (Host/local PCI bus interface error)	1. **Flash latest level of BIOS code and firmware for controller.** 2. If ServeRAID-4x controller, replace controller. 3. If ServeRAID-5i controller, integrated RAID controller on the server.
9003	1. **Flash latest level of BIOS code and firmware for controller.** 2. Confirm that this controller is a supported option for this system. 3. ServeRAID controller. 4. Integrated RAID controller on the server).
9xxx thru BZxx (SCSI bus error caused by cables, termination, defective drives, etc.). Z refers to the specific channel or channels that cause the error.	1. **Follow indications at "ServeRAID (ISPR) error procedures" on page 242. Follow those instructions before continuing with the next steps listed in this index.** 2. Hard disk drive cable. 3. Hard disk drive backplane. 4. Hard disk drive. 5. ServeRAID controller.
EFFE (Firmware code corrupt or download jumpers are in place)	1. **Flash latest level BIOS and firmware for controller; then, remove jumpers.** 2. ServeRAID controller.
FFFF or other code not listed	1. **Follow indications at "ServeRAID (ISPR) error procedures" on page 242.** 2. Hard disk drive cable. 3. Hard disk drive backplane. 4. Hard disk drive. 5. ServeRAID controller.

Undetermined problems

You are here because the diagnostic tests did not identify the failure or because the system is inoperative.

If you suspect that a software problem is causing failures (continuous or intermittent), see "Error symptoms" on page 230..

Damaged data in CMOS memory or damaged BIOS code can cause undetermined problems. If you suspect that the BIOS code is damaged, see "Recovering BIOS code" on page 75.

Check the LEDs on all the power supplies (see "Power LED errors" on page 240). If the LEDs indicate the power supplies are working correctly, return here and do the following:
1. Power-off the server.
2. Be sure the system is cabled correctly.
3. Remove or disconnect the following (one at a time) until you find the failure (power-on the computer and reconfigure each time).

    Note: For 16-way configuration, turn on each chassis as a standalone (see "Starting the diagnostic programs" on page 70).
    *   Any external devices
    *   Surge suppressor device (on the computer)
    *   Modem, printer, mouse, or non-IBM devices
    *   Each adapter
    *   Hard disk drives
    *   Memory modules (minimum requirement = 1 GB (4 x 512 MB DIMMs))

Note: Minimum operating requirements are:
    a. 1 microprocessor with VRM
    b. 2 x 512 MB DIMMs
    c. 1 power supply
    d. Top power board
    e. 1 SMP board
    f. Center plane
    g. I/O board
    h. PCI-X board
4. Power-on the computer. If the problem remains, suspect the following FRUs in the order listed:

    Note: For 16-way configuration, turn on each chassis as a standalone server (see "Starting the diagnostic programs" on page 70).
    *   SMP board
    *   Center plane
    *   PCI-X board
    *   I/O board

Notes:
1.   If the problem goes away when you remove an adapter from the system, and replacing that adapter does not correct the problem, suspect the PCI-X board.
2.   If you suspect a networking problem and all the system tests pass, suspect a network cabling problem external to the system.

Problem determination tips

Due to the variety of hardware and software combinations that can be encountered, use the following information to assist you in problem determination. If possible, have this information available when requesting assistance from Service Support and Engineering functions.

- Machine type and model
- Microprocessor or hard disk upgrades
- Failure symptom
  - Do diagnostic programs fail?
  - What, when, where, single, or multiple systems?
  - Is the failure repeatable?
  - Has this configuration ever worked?
  - If it has been working, what changes were made prior to it failing?
  - Is this the original reported failure?
- Diagnostics version
  - Type and version level
- Hardware configuration
  - Print (print screen) configuration currently in use
  - BIOS level
- Operating system software
  - Type and version level

Note: To eliminate confusion, identical systems are considered identical only if they:
1. Are the exact machine type and models
2. Have the same BIOS level
3. Have the same adapters/attachments in the same locations
4. Have the same address jumpers/terminators/cabling
5. Have the same software versions and levels
6. Have the same diagnostics code (version)
7. Have the same configuration options set in the system
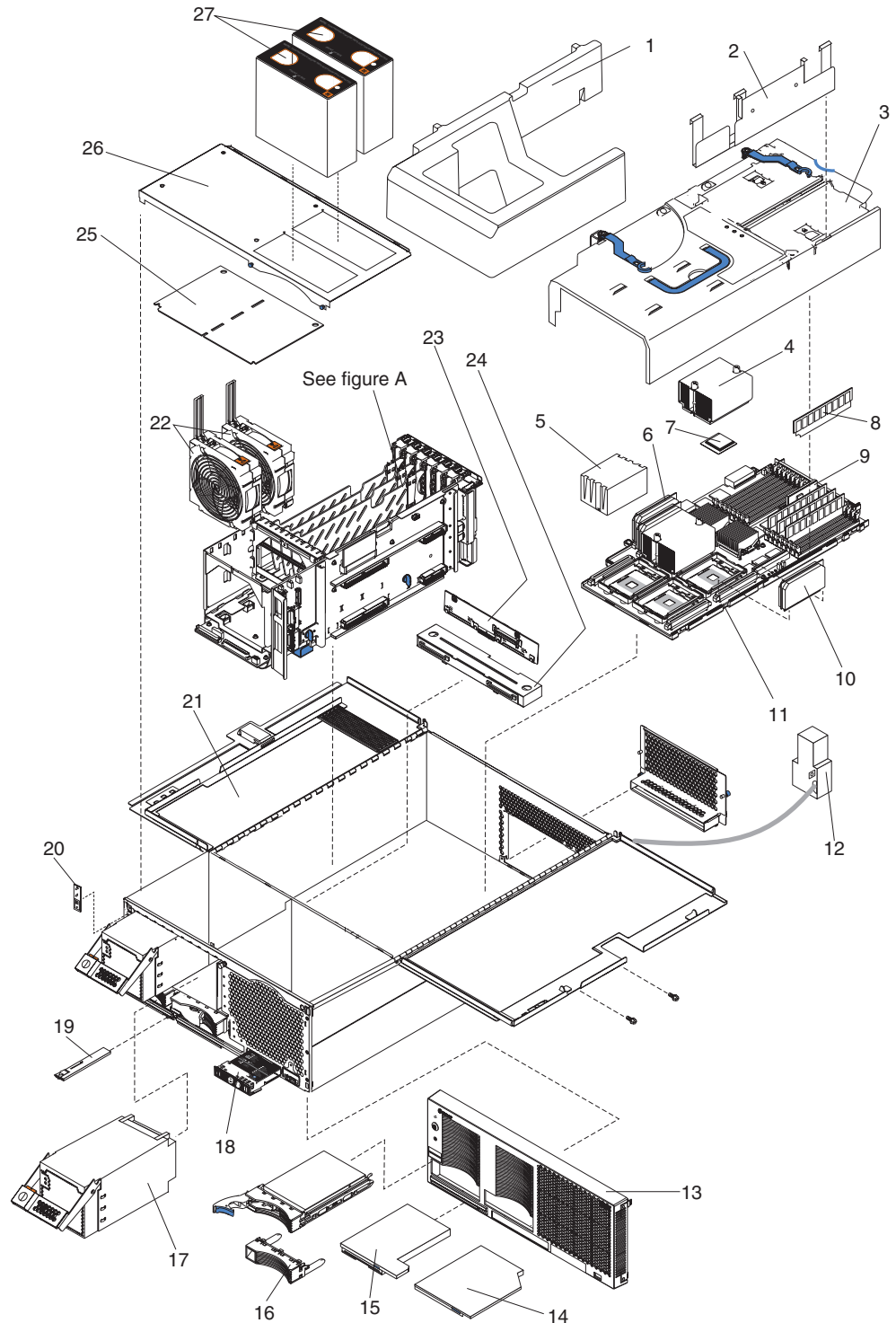8. Have the same setup for the operation system control files

Comparing the configuration and software set-up between ″working″ and ″non-working″ systems will often lead to problem resolution.

Chapter 8. Parts listing, Type 8870

The following Parts information is for the xSeries 445, Type 8870, models 12X, 1AX, 1BX, 1RX,22X, 2AX,2BX, 2RX, 3EX, 3RY, 42X, 4AX, 4BX, 4EX, 4RX, 4RY.
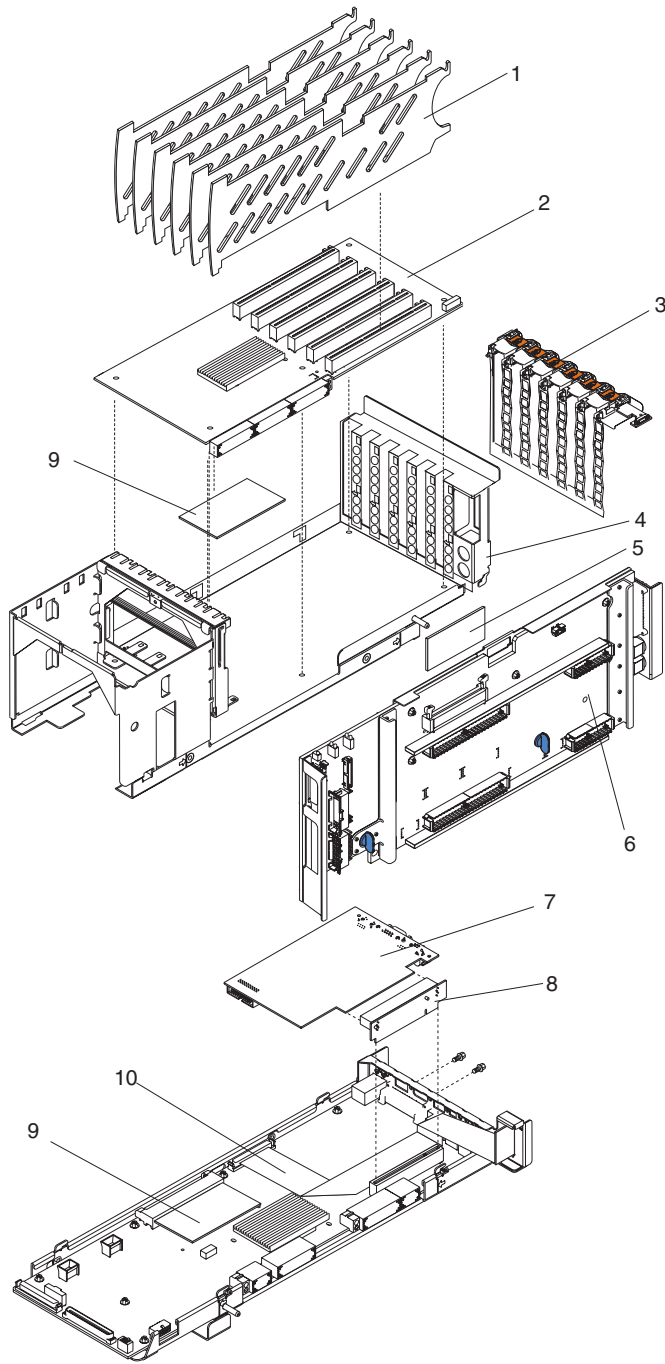
System

See figure A

Index	xSeries 445 (models 12X, 1AX, 1BX, 1RX, 22X, 2AX, 2BX, 2RX, 3EX, 3RY, 42X, 4AX, 4BX, 4EX, 4RX, 4RY)	FRU No.	CRU/FRU
1	Baffle, SMP (all models)	02R9132	FRU
2	Retention bracket (models 1AX, 1RX, 2AX, 2RX, 3RY, 4AX, 4RX,4RY)	24P1283	FRU
3	SMP cover assembly (all models)	03K9044	CRU
4	Heat sink assembly (models 3EX, 3RY, 4EX, 4RY)	25P6309	CRU
4	Heat sink assembly (models 12X, 1AX, 1BX, 1RX, 22X, 2AX, 2BX, 2RX, 42X, 4AX, 4BX, 4RX)	49P3151	CRU
5	Heat sink baffle (all models)	24P1284	CRU
6	VRM, 12V/40A (SMP board VRM) (models 12X, 1AX, 1BX, 1RX, 22X, 2AX, 2BX, 2RX, 3EX, 3RY, 42X, 4AX, 4BX, 4EX, 4RX, 4RY)	49P2120	FRU
7	Microprocessor, 400/3000-0K-L3 (models 3EX, 3RY, 4EX, 4RY)	02R1976	FRU
7	Microprocessor, 400/2500-1 MB (models 2AX, 2RX)	49P3168	FRU
7	Microprocessor, 400/2000-1 MB (models 1AX, 1RX)	49P3167	FRU
7	Microprocessor, 400/2800-2 MB (models 4AX, 4RX)	49P3169	FRU
7	Microprocessor, 400/2.2-2 MB (models 12X, 1BX)	26K5854	FRU
7	Microprocessor, 400/2.7-2 MB (models 22X, 2BX)	26K5855	FRU
7	Microprocessor, 400/3.0-4 MB (models 42X, 4BX)	26K5856	FRU
8	Memory, 512 PC2100 (models 12X, 1RX, 22X, 2RX, 3EX, 3RY, 42X, 4EX, 4RX, 4RY, DSX, ESX, FSX)	09N4307	CRU
9	VRM, memory / center plane (all models)	74P4343	FRU
10	VRM 9.1 (microprocessor VRM) (models 1AX, 1RX, 2AX, 2RX, 3EX, 3RY, 4AX, 4EX, 4RX, 4RY)	49P2010	FRU
10	VRM 9.1 (High E) (models 12X, 1BX, 22X, 2BX, 42X, 4BX)	74P4480	FRU
11	SMP board (models 1AX, 1RX, 2AX, 2RX, 3EX, 3RY, 4AX, 4EX, 4RX, 4RY)	26K3109	FRU
11	SMP board (all models)	13M7910	FRU
12	AC box assembly mechanism (all models)	49P2990	FRU
13	Bezel, 4U FT (all models)	24P1259	CRU
14	DVD-ROM drive, primary (all models)	27L4351	CRU
14	DVD-ROM drive, alternate (all models)	27L4355	CRU
15	Diskette drive, primary (all models)	08K9606	CRU
15	Diskette drive, alternate (all models)	08K9607	CRU
16	Bezel, slim hard disk drive (all models)	06P6245	FRU
17	Power supply with mounting, 1050W (models 1AX, 1RX, 2AX, 2RX, 3RY, 4AX, 4RX, 4RY)	74P4347	CRU
17	Power supply with mounting, 1200W (models 12X, 1BX, 22X, 2BX, 3EX, 42X, 4BX, 4EX)	74P4354	CRU
18	Light path card (all models)	03K9039	FRU
19	Media extract mechanism (all models)	03K9047	FRU
20	Power/reset card assembly (all models)	73P6310	FRU
21	Chassis (all models)	73P6302	FRU
22	PCI fan assembly (all models)	03K9049	CRU
	See "Figure A" on page 252.		
23	SCSI backplane (all models)	59P3678	FRU
24	Media bay card (all models)	90P4495	FRU
25	Top power board (all models)	26K5017	FRU
26	Top cover assembly (all models)	03K9043	FRU
27	SMP fan assembly (all models)	03K9048	CRU
	Lift handle (all models)	24P1295	CRU
	Label group (models 1AX, 1RX, 2AX, 2RX, 3RY, 4AX, 4RX, 4RY)	49P3172	CRU
	Service label (models 12X, 1BX, 22X, 2BX, 3EX, 42X, 4BX, 4EX)	90P4466	CRU
	Thermal grease kit (all models)	59P4740	FRU
	Alcohol wipes (all models)	59P4739	FRU
	Cable management arm (all models)	73P6282	FRU
	Battery, 3.0V (all models)	33F8354	FRU
	Left EIA side flange assembly (all models)	00N7190	FRU

Index	xSeries 445 (models 12X, 1AX, 1BX, 1RX, 22X, 2AX, 2BX, 2RX, 3EX, 3RY, 42X, 4AX, 4BX, 4EX, 4RX, 4RY)	FRU No.	CRU/FRU
	Right EIA side flange assembly (all models)	00N7192	FRU
	Miscellaneous parts kit (contains: I/O brackets (3); small EMC clips (10); adapter arm bracket cable (1); PCI card guide (1); PCI card guide bracket (1); PCI door latch (1); switch, Light Path card (1); slide rails, Light Path card (2); EMC shields (2); VRM clips (2); slotted M3.5 screw (1) (all models)	73P6303	FRU
	Bracket w/slides (all models)	37L6579	FRU
	VRM clip, right angle (models 1AX, 1RX, 2AX, 2RX, 3RY, 4AX, 4RX, 4RY)	24P1285	FRU
	Dust cover (models 12X, 1BX, 22X, 2BX, 3EX, 42X, 4BX, 4EX)	90P4469	CRU
	Terminator (models 12X, 1BX, 22X, 2BX, 3EX, 42X, 4BX, 4EX)	59P2951	CRU
	PDU cord (all models)	36L8886	FRU
	Power cord (models 12X, 1BX, 22X, 2BX, 3EX, 42X, 4BX, 4EX)	1838574	CRU
	Cable, DC 18 pos. (all models)	03K9028	FRU
	Cable, Active PCI (all models)	24P1067	FRU
	Cable, dc (all models)	03K9330	FRU
	Cable, external serial (all models)	02R0723	FRU
	Cable, SCSI (all models)	24P1063	FRU
	Cable, SCSI RAID (all models)	02R0715	FRU
	Cable, light path (all models)	03K9332	FRU
	Cable, media bay (all models)	03K9333	FRU
	Cable, SMP fan (all models)	03K9334	FRU
	Cable, I2C (all models)	03K9335	FRU
	Cable, USB (all models)	03K9336	FRU
	Cable, scalability, 2.5M (optional)	73P6293	CRU
	Cable, ext. SCSI (all models)	32P8314	CRU
	Cable, pigtail, SMP fan assembly (all models)	32P8328	FRU
	Cable, I2C SCSI (all models)	32P8335	FRU
	Cable, Remote Supervisor Adapter II EXA (models 12X, 1BX, 22X, 2BX, 3EX, 42X, 4BX, 4EX)	73P9281	FRU
	Cable, scalability, 10 in. (models 4EX, 4RY)	32P8337	CRU

Figure A

Index	xSeries 445 (models 12X, 1AX, 1BX, 1RX, 22X, 2AX, 2BX, 2RX, 3EX, 3RY, 42X, 4AX, 4BX, 4EX, 4RX, 4RY)	FRU No.	CRU/FRU
1	PCI spacer (all models)	03K9050	CRU
2	PCI board (all models)	71P9028	FRU
3	Active PCI assembly (all models)	73P6869	FRU
4	Frame assembly, PCI-X (all models)	49P3171	FRU
5	VRM, memory / center plane (all models)	74P4343	FRU
6	Center plane (all models)	71P8989	FRU
	Remote Supervisor Adapter II-EXA (models 12X, 1BX, 22X, 2BX, 3EX, 42X, 4BX, 4EX)	73P9246	FRU
7	Remote Supervisor Adapter (models 1AX, 1RX, 2AX, 2RX, 3RY, 4AX, 4RX, 4RY)	59P2952	FRU
8	Riser card (all models)	03K9031	FRU
9	VRM, memory / center plane (all models)	74P4343	FRU
10	I/O board (models 12X, 1BX, 22X, 2BX, 3EX, 42X, 4BX, 4EX)	26K5915	FRU
10	I/O board (models 1AX, 1RX, 2AX, 2RX, 3RY, 4AX, 4RX, 4RY)	71P9029	FRU

Keyboard CRUs

Keyboard	FRU No.
US English	37L2551
French Canadian	37L2552
LA Spanish	37L2553
Arabic	37L2555
Belgium/French	37L2556
Belgium/UK	37L2557
Bulgarian	37L2558
Czech	37L2559
Danish	37L2560
Dutch	37L2561
French	37L2562
German	37L2563
Greek	37L2564
Hebrew	37L2565
Hungarian	37L2566
Korean	02K0901
Iceland	37L2567
Italy	37L2568
Norwegian	37L2569
Polish	37L2570
Portuguese	37L2571
Romanian	37L2572
Russian	37L2573
Serbian/Cyrillic	37L2574
Slavic	37L2575
Spanish	37L2576
Swedish/Finn	37L2577
Swiss, F/G	37L2578
Turkish (179)	37L2579
Turkish (440)	37L2580
UK English	37L2581
Yugosl/Lat	37L2582
US English-EMEA	37L2583
Chinese/US	37L2585
Thailand	37L2587
French Canadian	37L0913

Power cord FRUs

For your safety, IBM provides a power cord with a grounded attachment plug to use with this IBM product. To avoid electrical shock, always use the power cord and plug with a properly grounded outlet.

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

For units intended to be operated at 115 volts: Use a UL-listed and CSA-certified cord set consisting of a minimum 18 AWG, Type SVT or SJT, three-conductor cord, a maximum of 15 feet in length and a parallel blade, grounding-type attachment plug rated 15 amperes, 125 volts.

For units intended to be operated at 230 volts (U.S. use): Use a UL-listed and CSA-certified cord set consisting of a minimum 18 AWG, Type SVT or SJT, three-conductor cord, a maximum of 15 feet in length and a tandem blade, grounding-type attachment plug rated 15 amperes, 250 volts.

For units intended to be operated at 230 volts (outside the U.S.): Use a cord set with a grounding-type attachment plug. The cord set should have the appropriate safety approvals for the country in which the equipment will be installed.

IBM power cords for a specific country or region are usually available only in that country or region.

Power cord	FRU No.
China (PRC)	01K9851
Japan	01K9853
Thailand	12J5120
Israel	12J5122
Bangladesh, Burma, India, Pakistan, South Africa, Sri Lanka	12J5124
Chile, Ethiopia, Italy, Libya, Somalia	12J5126
Argentina, Australia, New Zealand, Papua New Guinea, Paraguay, Uruguay, Western Samoa	12J5128
Antigua, Bahrain, Brunei, Channel Islands, China (Hong Kong S.A.R.), Cyprus, Dubai, Fiji, Ghana, Iraq, Ireland, Kenya, Kuwait, Malawi, Malaysia, Malta, Nepal, Nigeria, Polynesia, Qatar, Sierra Leone, Singapore, Tanzania, Uganda, United Kingdom, Yemen, Zambia	12J5987
Afghanistan, Algeria, Andorra, Angola, Austria, Belgium, Benin, Bulgaria, Burkina Faso, Burundi, Cameroon, Central African Rep., Chad, China (Macau S.A.R.), Czech Republic, Egypt, Finland, France, French Guiana, Germany, Greece, Guinea, Hungary, Iceland, Indonesia, Iran, Ivory Coast, Jordan, Lebanon, Luxembourg, Malagasy, Mali, Martinique, Mauritania, Mauritius, Monaco, Morocco, Mozambique, Netherlands, New Caledonia, Niger, Norway, Poland, Portugal, Romania, Senegal, Slovakia, Spain, Sudan, Sweden, Syria, Togo, Tunisia, Turkey, former USSR, Vietnam, former Yugoslavia, Zaire, Zimbabwe	55H6643
Denmark, Switzerland, Liechtenstein	55H6646
Bahamas, Barbados, Bermuda, Bolivia, Brazil, Canada, Cayman Islands, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Korea (South), Liberia, Mexico, Netherlands Antilles, Nicaragua, Panama, Peru, Philippines, Saudi Arabia, Suriname, Taiwan, Trinidad (West Indies), Venezuela	76H4865
United States of America	6952301 (110) 1838574 (220) 36L8886 (220V/15A)

Chapter 9. Related service information

Note: The service procedures are designed to help you isolate problems. They are written with the assumption that you have model-specific training on all computers, or that are familiar with the computers, functions, terminology, and service information provided in this manual.

Safety information

The following section contains the safety information that you need to be familiar with before servicing an IBM computer.

General safety

Follow these rules to ensure general safety:
- Observe good housekeeping in the area of the machines during and after maintenance.
- When lifting any heavy object:
    1. Ensure you can stand safely without slipping.
    2. Distribute the weight of the object equally between your feet.
    3. Use a slow lifting force. Never move suddenly or twist when you attempt to lift.
    4. Lift by standing or by pushing up with your leg muscles; this action removes the strain from the muscles in your back. *Do not attempt to lift any objects that weigh more than 16 kg (35 lb) or objects that you think are too heavy for you.*
- Do not perform any action that causes hazards to the customer, or that makes the equipment unsafe.
- Before you start the machine, ensure that other service representatives and the customer's personnel are not in a hazardous position.
- Place removed covers and other parts in a safe place, away from all personnel, while you are servicing the machine.
- Keep your tool case away from walk areas so that other people will not trip over it.
- Do not wear loose clothing that can be trapped in the moving parts of a machine. Ensure that your sleeves are fastened or rolled up above your elbows. If your hair is long, fasten it.
- Insert the ends of your necktie or scarf inside clothing or fasten it with a nonconductive clip, approximately 8 centimeters (3 inches) from the end.
- Do not wear jewelry, chains, metal-frame eyeglasses, or metal fasteners for your clothing.

    Remember: Metal objects are good electrical conductors.
- Wear safety glasses when you are: hammering, drilling soldering, cutting wire, attaching springs, using solvents, or working in any other conditions that might be hazardous to your eyes.
- After service, reinstall all safety shields, guards, labels, and ground wires. Replace any safety device that is worn or defective.
- Reinstall all covers correctly before returning the machine to the customer.

Electrical safety

CAUTION:
Electrical current from power, telephone, and communication cables can be hazardous. To avoid personal injury or equipment damage, disconnect the attached power cords, telecommunication systems, networks, and modems before you open the server covers, unless instructed otherwise in the installation and configuration procedures.

Observe the following rules when working on electrical equipment.

Important: Use only approved tools and test equipment. Some hand tools have handles covered with a soft material that does not insulate you when working with live electrical currents.

Many customers have, near their equipment, rubber floor mats that contain small conductive fibers to decrease electrostatic discharges. Do not use this type of mat to protect yourself from electrical shock.

- Find the room emergency power-off (EPO) switch, disconnecting switch, or electrical outlet. If an electrical accident occurs, you can then operate the switch or unplug the power cord quickly.
- Do not work alone under hazardous conditions or near equipment that has hazardous voltages.
- Disconnect all power before:
  - Performing a mechanical inspection
  - Working near power supplies
  - Removing or installing main units
- Before you start to work on the machine, unplug the power cord. If you cannot unplug it, ask the customer to power-off the wall box that supplies power to the machine and to lock the wall box in the off position.
- If you need to work on a machine that has exposed electrical circuits, observe the following precautions:
  - Ensure that another person, familiar with the power-off controls, is near you.

    Remember: Another person must be there to switch off the power, if necessary.
  - Use only one hand when working with powered-on electrical equipment; keep the other hand in your pocket or behind your back.

    Remember: There must be a complete circuit to cause electrical shock. By observing the above rule, you may prevent a current from passing through your body.
  - When using testers, set the controls correctly and use the approved probe leads and accessories for that tester.
  - Stand on suitable rubber mats (obtained locally, if necessary) to insulate you from grounds such as metal floor strips and machine frames.

  Observe the special safety precautions when you work with very high voltages; these instructions are in the safety sections of maintenance information. Use extreme care when measuring high voltages.
- Regularly inspect and maintain your electrical hand tools for safe operational condition.
- Do not use worn or broken tools and testers.
- *Never assume* that power has been disconnected from a circuit. First, *check* that it has been powered-off.

- Always look carefully for possible hazards in your work area. Examples of these hazards are moist floors, nongrounded power extension cables, power surges, and missing safety grounds.
- Do not touch live electrical circuits with the reflective surface of a plastic dental mirror. The surface is conductive; such touching can cause personal injury and machine damage.
- Do not service the following parts with the power on when they are removed from their normal operating places in a machine:
  - Power supply units
  - Pumps
  - Blowers and fans
  - Motor generators

  and similar units. (This practice ensures correct grounding of the units.)
- If an electrical accident occurs:
  - Use caution; do not become a victim yourself.
  - Switch off power.
  - Send another person to get medical aid.

Safety inspection guide

The intent of this inspection guide is to assist you in identifying potentially unsafe conditions on these products. Each machine, as it was designed and built, had required safety items installed to protect users and service personnel from injury. This guide addresses only those items. However, good judgment should be used to identify potential safety hazards due to attachment of non-IBM features or options not covered by this inspection guide.

If any unsafe conditions are present, you must determine how serious the apparent hazard could be and whether you can continue without first correcting the problem.

Consider these conditions and the safety hazards they present:
- Electrical hazards, especially primary power (primary voltage on the frame can cause serious or fatal electrical shock).
- Explosive hazards, such as a damaged CRT face or bulging capacitor
- Mechanical hazards, such as loose or missing hardware

The guide consists of a series of steps presented in a checklist. Begin the checks with the power off, and the power cord disconnected.

Checklist:
1. Check exterior covers for damage (loose, broken, or sharp edges).
2. Turn off the computer. Disconnect the power cord.
3. Check the power cord for:
   a. A third-wire ground connector in good condition. Use a meter to measure third-wire ground continuity for 0.1 ohm or less between the external ground pin and frame ground.
   b. The power cord should be the appropriate type as specified in the parts listings.
   c. Insulation must not be frayed or worn.
4. Remove the cover.
5. Check for any obvious non-IBM alterations. Use good judgment as to the safety of any non-IBM alterations.
6. Check inside the unit for any obvious unsafe conditions, such as metal filings, contamination, water or other liquids, or signs of fire or smoke damage.
7. Check for worn, frayed, or pinched cables.

8. Check that the power-supply cover fasteners (screws or rivets) have not been removed or tampered with.

Handling electrostatic discharge-sensitive devices

Any computer part containing transistors or integrated circuits (ICs) should be considered sensitive to electrostatic discharge (ESD). ESD damage can occur when there is a difference in charge between objects. Protect against ESD damage by equalizing the charge so that the server, the part, the work mat, and the person handling the part are all at the same charge.

Notes:

1. Use product-specific ESD procedures when they exceed the requirements noted here.

2. Make sure that the ESD-protective devices you use have been certified (ISO 9000) as fully effective.

When handling ESD-sensitive parts:
- Keep the parts in protective packages until they are inserted into the product.
- Avoid contact with other people.
- Wear a grounded wrist strap against your skin to eliminate static on your body.
- Prevent the part from touching your clothing. Most clothing is insulative and retains a charge even when you are wearing a wrist strap.
- Use the black side of a grounded work mat to provide a static-free work surface. The mat is especially useful when handling ESD-sensitive devices.
- Select a grounding system, such as those in the following list, to provide protection that meets the specific service requirement.

    Note: The use of a grounding system is desirable but not required to protect against ESD damage.
    - Attach the ESD ground clip to any frame ground, ground braid, or green-wire ground.
    - Use an ESD common ground or reference point when working on a double-insulated or battery-operated system. You can use coax or connector-outside shells on these systems.
    - Use the round ground-prong of the ac plug on ac-operated computers.

Grounding requirements

Electrical grounding of the computer is required for operator safety and correct system function. Proper grounding of the electrical outlet can be verified by a certified electrician.

Safety notices (multilingual translations)

The caution and danger safety notices in this section are provided in the following languages:
- English
- Brazilian/Portuguese
- Chinese
- French
- German
- Italian
- Japanese
- Korean
- Spanish

Important: All caution and danger statements in this IBM documentation begin with a number. This number is used to cross reference an English caution or danger statement with translated versions of the caution or danger statement in this section.

For example, if a caution statement begins with a number 1, translations for that caution statement appear in this section under statement 1.

Be sure to read all caution and danger statements before performing any of the instructions.

Statement 1

DANGER

Electrical current from power, telephone and communication cables is hazardous.

To avoid a shock hazard:

- **Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.**
- **Connect all power cords to a properly wired and grounded electrical outlet.**
- **Connect to properly wired outlets any equipment that will be attached to this product.**
- **When possible, use one hand only to connect or disconnect signal cables.**
- **Never turn on any equipment when there is evidence of fire, water, or structural damage.**
- **Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedure**s.
- **Connect and disconnect cables as described in the following table when installing, moving, or opening covers on this product or attached devices.**

To Connect	To Disconnect
1. Turn everything OFF. 2. First, attach all cables to devices. 3. Attach signal cables to connectors. 4. Attach power cords to outlet. 5. Turn device ON.	1. Turn everything OFF. 2. First, remove power cords from outlet. 3. Remove signal cables from connectors. 4. Remove all cables from devices.

Statement 2

CAUTION:
When replacing the lithium battery, use only IBM Part Number 33F8354 or an equivalent type battery recommended by the manufacturer. If your system has a module containing a lithium battery, replace it only with the same module type made by the same manufacturer. The battery contains lithium and can explode if not properly used, handled, or disposed of.

Do not:
* **Throw or immerse into water**
* **Heat to more than 100°C (212°F)**
* **Repair or disassemble**

Dispose of the battery as required by local ordinances or regulations.

Statement 3

CAUTION:
When laser products (such as CD-ROMs, DVD-ROM drives, fiber optic devices, or transmitters) are installed, note the following:
* **Do not remove the covers. Removing the covers of the laser product could result in exposure to hazardous laser radiation. There are no serviceable parts inside the device.**
* **Use of controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.**
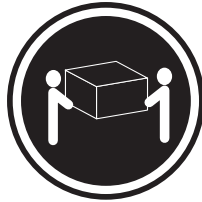
DANGER

> **Some laser products contain an embedded Class 3A or Class 3B laser diode. Note the following:**
>
> **Laser radiation when open. Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam.**
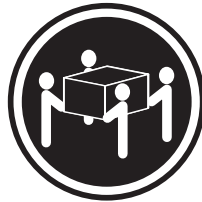
Statement 4

≥18 kg (39.7 lb)   ≥32 kg (70.5 lb)   ≥55 kg (121.2 lb)

CAUTION:
Use safe practices when lifting.

Statement 5

CAUTION:
The power control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.
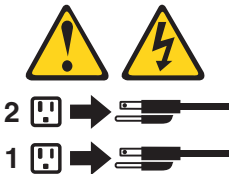
Statement 8

CAUTION:
Never remove the cover on a power supply or any part that has the following label attached.

Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.

Statement 10

CAUTION:
Do not place any object weighing more than 82 kg (180 lbs.) on top of rack-mounted devices.

Statement 13

DANGER

Overloading a branch circuit is potentially a fire hazard and a shock hazard under certain conditions. To avoid these hazards, ensure that your system electrical requirements do not exceed branch circuit protection requirements. Refer to the information that is provided with your IBM device for electrical specifiacations.

Statement 14

CAUTION:
Hazardous voltage, current, and energy levels might be present. Only a qualified service technician is authorized to remove the covers where the following label is attached.

Importante:

Todas as instruções de cuidado e perigo da IBM documentation começam com um número. Este número é utilizado para fazer referência cruzada de uma instrução de cuidado ou perigo no idioma inglês com as versões traduzidas das instruções de cuidado ou perigo encontradas nesta seção.

Por exemplo, se uma instrução de cuidado é iniciada com o número 1, as traduções para aquela instrução de cuidado aparecem nesta seção sob a instrução 1.

Certifique-se de ler todas as instruções de cuidado e perigo antes de executar qualquer operação.

Instrução 1

PERIGO

A corrente elétrica proveniente de cabos de alimentação, de telefone e de comunicações é perigosa.

Para evitar risco de choque:
* Não conecte ou desconecte cabos e não realize instalação, manutenção ou reconfiguração deste produto durante uma tempestade com raios.
* Conecte todos os cabos de alimentação a tomadas elétricas corretamente instaladas e aterradas.
* Conecte todos os equipamentos ao qual esse produto será conectado a tomadas corretamente instaladas.
* Sempre que possível, utilize apenas uma das mãos para conectar ou desconectar cabos de sinal.
* Nunca ligue qualquer equipamento quando existir evidência de danos por fogo, água ou na estrutura.
* Desconecte cabos de alimentação, sistemas de telecomunicação, redes e modems antes de abrir as tampas dos dispositivos, a menos que especificado de maneira diferente nos procedimentos de instalação e configuração.
* Conecte e desconecte cabos conforme descrito na seguinte tabela, ao instalar ou movimentar este produto ou os dispositivos conectados, ou ao abrir suas tampas.

Para Conectar:	Para Desconectar:
1. DESLIGUE Tudo.	1. DESLIGUE Tudo.
2. Primeiramente, conecte todos os cabos aos dispositivos.	2. Primeiramente, remova os cabos de alimentação das tomadas.
3. Conecte os cabos de sinal aos conectores.	3. Remova os cabos de sinal dos conectores.
4. Conecte os cabos de alimentação às tomadas.	4. Remova todos os cabos dos dispositivos.
5. LIGUE os dispositivos.	

Instrução 2

CUIDADO:

Ao substituir a bateria de lítio, utilize apenas uma bateria IBM, Número de Peça 33F8354 ou uma bateria de tipo equivalente, recomendada pelo fabricante. Se o seu sistema possui um móídulo com uma bateria de lítio, substitua-o apenas pelo mesmo tipo de mídulo, do mesmo fabricante. A bateria contém lítio e pode explodir se não for utilizada, manuseada e descartada de maneira correta.

Não:
- Jogue ou coloque na água
- Aqueça a mais de 100°C (212°F)
- Conserte nem desmonte

Para descartar a bateria, entre em contato com a área de atendimento a clientes IBM, pelo telefone (011) 889-8986, para obter informações sobre como enviar a bateria pelo correio para a IBM.

Instrução 3

PRECAUCIÓN:

Quando produtos a laser (unidades de CD-ROM, unidades de DVD, dispositivos de fibra ítica, transmissores, etc.) estiverem instalados, observe o seguinte:
- Não remova as tampas. A remoção das tampas de um produto a laser pode resultar em exposição prejudicial à radiação de laser. Nenhuma peça localizada no interior do dispositivo pode ser consertada.
- A utilização de controles ou ajustes ou a execução de procedimentos diferentes dos especificados aqui pode resultar em exposição prejudicial à radiação.
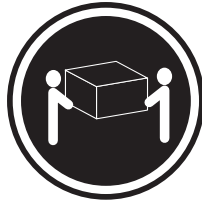
PERIGO

Alguns produtos a laser contêm um diodo laser da Classe 3A ou Classe 3B embutido. Observe o seguinte:

Radiação de laser quando aberto. Não olhe diretamente para o raio a olho nu ou com instrumentos íticos, e evite exposição direta ao raio.
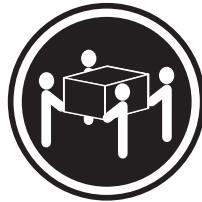
Instrução 4

≥18 kg (39.7 lb)   ≥32 kg (70.5 lb)   ≥55 kg (121.2 lb)

CUIDADO:

Ao levantar a máquina, faça-o com segurança.

Instrução 5

CUIDADO:

Os botões Liga/Desliga localizados no dispositivo e na fonte de alimentação não desligam a corrente elétrica fornecida ao dispositivo. O dispositivo também pode ter mais de um cabo de alimentação. Para remover toda a corrente elétrica do dispositivo, assegure que todos os cabos de alimentação estejam desconectados da fonte de energia elétrica.
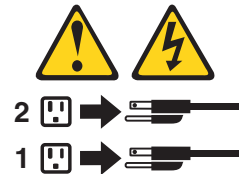
Instrução 8

CUIDADO:

Nunca remova a tampa de uma fonte de alimentação ou de qualquer peça que tenha esta etiqueta afixada.

Níveis perigosos de voltagem, corrente e energia estão presentes em qualquer componente que tenha esta etiqueta afixada. Nenhuma peça localizada no interior desses componentes pode ser consertada. Se você suspeitar de algum problema em alguma dessas peças, entre em contato com um técnico IBM.

Instrução 10

CUIDADO:

Não coloque nenhum objeto com peso superior a 82 kg (180 lbs.) sobre dispositivos montados em rack.

Instrução 13

PRECAUCIÓN:

A sobrecarga em um circuito derivado apresenta um risco potencial de incêndio e de choque sob determinadas condi ções. Para evitar estes riscos, assegure que os requisitos elétricos de seu sistema não excedam os requisitos de prote ção do circuito derivado. Para conhecer as especifica ções elétricas, consulte as informa ções fornecidas com seu dispositivo IBM.

Instrução 14

CUIDADO:

Níveis perigosos de voltagem, corrente e energia podem estar presentes. Apenas um técnico qualificado de manuten ção está autorizado a remover as tampas em que esta etiqueta esteja afixada.

重要：

> Server Library 中的所有提醒和危险条款前都有一个数字标识。该数字是用来交叉引用一个英文的提醒和危险条款及本部分中的与之对应的已翻译成其它文字的提醒和危险条款。
>
> 例如，如果一个提醒条款前的数字为 1，则本部分中相应的译文也带有标号 1。
>
> 在执行任何指示的操作之前，请确保您已经阅读了全部提醒和危险条款。

声明 1

⚠ ⚡

危险

> 电源、电话和通信电缆中带有危险电流。
>
> 为避免电击：
>
> 雷电期间不要拆接电缆或安装、维修及重新配置本产品。
>
> 将所有电源线连接至正确布线并已安全接地的电源插座上。
>
> 将应与本产品连接的所有设备连接至正确布线的插座上。
>
> 尽量只使用单手拆接信号电缆。
>
> 有水、火及结构损坏迹象时，请勿打开任何设备。
>
> 除非在安装配置过程中有明确指示，否则，打开设备机盖前应先断开与电源线、远程通信系统、网络和调制解调器的所有连接。
>
> 安装、移动或打开本产品及其附带设备的机盖时，应按下表所述连接和断开电缆。

> 连接时：
>
> 1. 关闭所有设备。
>
> 2. 首先将所有电缆连接至设备。
>
> 3. 将信号电缆连接至接口。
>
> 4. 将电源线连接至插座。

> 断开连接时：
>
> 1. 关闭所有设备。
>
> 2. 首先从插座中拔出电源线。
>
> 3. 从接口上拔下信号电缆。

声明 2

警告:

更换锂电池时，只能使用 IBM 产品号 33F8354 或者是厂商推荐的等同类型的电池。

如果系统模块中含有锂电池，则只能使用同一厂商制造的同一类型的模块进行更换。电池中含有锂，如果使用、拿放或处理不当，可能会发生爆炸。

请勿对电池进行下列操作：
扔入或浸入水电　　　。
加热超过 100　（212 F）
进行修理或分解
请按本地法规要求处理电池。

声明 3

警告:

安装激光产品（如 CD-ROM、DVD 驱动器、光纤设备或送话器）时，应注意以下事项：

不要拆除外盖。拆除激光产品的外盖可能会导致激光辐射的危险，本设备中没有用户可维修的部件。

非此处指定的其它控制、调整或与性能有关的操作都有可能导致激光辐射的危险。

危险

某些激光产品中包含内嵌的 3A 级或 3B 级激光二极管。请注意以下事项。

打开时会产生激光辐射。不要直视光束，不要使用光学仪器直接观看光束，避免直接暴露于光束之下。

声明 4

≥18 kg (37 磅)　　≥32 kg (70.5 磅)　　≥ 55 kg (121.2 磅)

警告：
抬起时请采用安全操作方法。

声明 5

警告：

使用设备上的电源控制按钮和电源上的开关都不能断开本设备上的电流。
另外，本设备可能带有多条电源线。如要断开设备上的所有电流，请确
保所有电源线均已与电源断开连接。

声明 6

警告：

如果在电源线连接设备的一端安装了固定松紧夹，则必须将电源线的另一端连接至
使用方便的电源。

声明 7

警告：

如果设备带有外门，则在移动或抬起设备前应将其拆除或固定
以避免造成人员伤害。外门支撑不了设备的重量。

声明 8

警告：
不要拆除电源外盖或贴有下列标签的任何部件。

贴有此标签的组件内部存在高电压、高电流的危险。这些组件中
没有用户可维修的部件。如果怀疑其中的部件存在问题，应与服
务技术人员联系。

声明 9

警告：

为避免人员伤害，拆除设备上的风扇前应拨下热插拨风扇电缆。

声明 10

警告：

机柜安装的设备上面不能放置重于 82kg（180 磅）的物品。

> 82 kg (180 磅)

声明 11

警告：

下面的标签表明附近有锋利的边、角或接头。

声明 12

警告：
下面的标签表明附近有高热表面。

声明 13

危险

分支电路过载在某些情况下可能导致火灾和电击。
为避免这些危险，请确保您系统的电力需求不超出分支电路
保护需求。请参阅随 **IBM** 设备提供的信息以了解电气规范。

声明 14

注意：
可能存在危险的电压、电流和能级。
只有合格的维修技术人员才可打开贴有以下标签的舱盖。

重要資訊：

Server Library 中所有「注意」及「危險」的聲明均以數字開始。此一數字是用來作為交互參考之用，英文「注意」或「危險」聲明可在本節中找到相同內容的「注意」或「危險」聲明的譯文。

例如，有一「危險」聲明以數字 1 開始，則該「危險」聲明的譯文將出現在本節的「聲明」1 中。

執行任何指示之前，請詳讀所有「注意」及「危險」的聲明。

聲明 1

危險

電源、電話及通信電纜上所產生的電流均有危險性。

欲避免電擊危險：

－在雷雨期間，請勿連接或切斷本產品上的任何電纜線，或安裝、維修及重新架構本產品。
－請將電源線接至接線及接地正確的電源插座。
－請將本產品隨附的設備連接至接線正確的插座。
－儘可能使用單手來連接或切斷信號電纜線。
－當設備有火燒或泡水的痕跡，或有結構性損害時，請勿開啟該設備的電源。
－在安裝及架構之時，若非非常熟悉，在開啟裝置蓋子之前，請切斷電源線、電信系統、網路及數據機。
－在安裝、移動本產品或附加裝置，或開啟其蓋子時，請依照下表中「連接」及「切斷」電纜線的步驟執行。

連接：	切斷：
1. 關閉所有開關。	1. 關閉所有開關。
2. 先將所有電纜線接上裝置。	2. 先自電源插座拔掉電源線。
3. 將信號電纜接上接頭。	3. 拔掉接頭上的所有信號電纜。
4. 再將電源線接上電源插座。	4. 再拔掉裝置上的所有電纜線。
5. 開啟裝置的電源。	

聲明 2

注意：
更換鋰電池時，只可使用 IBM 零件編號 33F8354 的電池，或製造商建議之相當類型的電池。若系統中具有包含鋰電池的模組，在更換此模組時，請使用相同廠商製造的相同模組類型。如未正確使用、處理或丟棄含有鋰的電池時，可能會引發爆炸。

請勿將電池：
－ 丟入或浸入水中
－ 加熱超過 100 ℃ (212 ℉)
－ 修理或拆開

請遵照當地法令規章處理廢棄電池。

聲明 3

注意：
安裝雷射產品 (如 CD-ROM、DVD 光碟機、光纖裝置或發射器) 時，請注意下列
事項：

- 請勿移開蓋子。移開雷射產品的蓋子，您可能會暴露於危險的雷射輻射之下。
  裝置中沒有需要維修的組件。
- 不依此處所指示的控制、調整或處理步驟，您可能會暴露於危險的輻射之下。

危險

有些雷射產品含有內嵌式 Class 3A 或 Class 3B 雷射二極體。請注意
下列事項：

開啟時會產生雷射輻射。請勿凝視光束，不要使用光學儀器直接觀
察，且應避免直接暴露在光束下。

聲明 4

≥ 18 公斤 (37 磅)　≥ 32 公斤 (70.5 磅)　≥ 55 公斤 (121.2 磅)

注意：

抬起裝置時，請注意安全措施。

聲明 5

注意：
裝置上的電源控制按鈕及電源供應器上的電源開關均無法關閉裝置上的電
流。
本裝置可能有一條以上的電源線。如要移除裝置上的所有電流，請確認所
有電源線已與電源分離。

聲明 8

注意：
嚴禁移除電源供應器的蓋子，或任何貼有下列標籤的組件。

貼有此標籤的元件內均有危險的電壓、電流及能源。這些元件中沒有需要
維修的組件。若察覺問題發生在上述組件時，請與服務人員聯絡。

聲明 10

注意：
請勿將任何重量超過 82 公斤 (180 磅) 的物品置於已安裝機架的裝置上方。

> 82 公斤 (180 磅)

聲明 13

危險

分支電路超載可能會引發火災，在特定情況下會有電擊之
虞。為避免這些危險發生，請確定您的系統電力需求不超
過分支電路的保護需求。請參閱 IBM 電力規格裝置所附的
資訊。

聲明 14

注意：
可能會有危險的電壓、電流或能源量。僅授權合格的維修
技師在貼上以下標籤之處移除外殼。

Important:

Toutes les consignes Attention et Danger indiquées dans la bibliothèque IBM documentation sont précédées d'un numéro. Ce dernier permet de mettre en correspondance la consigne en anglais avec ses versions traduites dans la présente section.

Par exemple, si une consigne de type Attention est précédée du chiffre 1, ses traductions sont également précédées du chiffre 1 dans la présente section.

Prenez connaissance de toutes les consignes de type Attention et Danger avant de procéder aux opérations décrites par les instructions.

Notice n° 1

DANGER

Le courant électrique passant dans les câbles de communication, ou les cordons téléphoniques et d'alimentation peut être dangereux.

Pour éviter tout risque de choc électrique:
- Ne manipulez aucun câble et n'effectuez aucune opération d'installation, d'entretien ou de reconfiguration de ce produit au cours d'un orage.
- Branchez tous les cordons d'alimentation sur un socle de prise de courant correctement câblé et mis à la terre.
- Branchez sur des socles de prise de courant correctement câblés tout équipement connecté à ce produit.
- Lorsque cela est possible, n'utilisez qu'une seule main pour connecter ou déconnecter les câbles d'interface.
- Ne mettez jamais un équipement sous tension en cas d'incendie ou d'inondation, ou en présence de dommages matériels.
- Avant de retirer les carters de l'unité, mettez celle-ci hors tension et déconnectez ses cordons d'alimentation, ainsi que les câbles qui la relient aux réseaux, aux systèmes de télécommunication et aux modems (sauf instruction contraire mentionnée dans les procédures d'installation et de configuration).
- Lorsque vous installez ou que vous déplacez le présent produit ou des périphériques qui lui sont raccordés, reportez-vous aux instructions ci-dessous pour connecter et déconnecter les différents cordons.

Connexion	Déconnexion
1. Mettez les unités hors tension.	1. Mettez les unités hors tension.
2. Commencez par brancher tous les cordons sur les unités.	2. Débranchez les cordons d'alimentation des prises.
3. Branchez les câbles d'interface sur des connecteurs.	3. Débranchez les câbles d'interface des connecteurs.
4. Branchez les cordons d'alimentation sur des prises.	4. Débranchez tous les câbles des unités.
5. Mettez les unités sous tension.	

Notice n° 2

ATTENTION:

Remplacez la pile au lithium usagée par une pile de référence identique exclusivement - voir la référence IBM - ou par une pile équivalente recommandée par le fabricant. Si votre système est doté d'un module contenant une pile au lithium, vous devez le remplacer uniquement par un module identique, produit par le même fabricant. La pile contient du lithium et présente donc un risque d'explosion en cas de mauvaise manipulation ou utilisation.
- **Ne la jetez pas à l'eau.**
- **Ne l'exposez pas à une température supérieure à 100 °C.**
- **Ne cherchez pas à la réparer ou à la démonter.**

Pour la mise au rebut, reportez-vous à la réglementation en vigueur.

Notice n° 3

ATTENTION:

Si des produits laser sont installés (tels que des unités de CD-ROM ou de DVD, des périphériques contenant des fibres optiques ou des émetteurs-récepteurs), prenez connaissance des informations suivantes:
- **N'ouvrez pas ces produits pour éviter une exposition directe au rayon laser. Vous ne pouvez effectuer aucune opération de maintenance à l'intérieur.**
- **Pour éviter tout risque d'exposition au rayon laser, respectez les consignes de réglage et d'utilisation des commandes, ainsi que les procédures décrites dans le présent document.**

DANGER

Certains produits laser contiennent une diode laser de classe 3A ou 3B. Prenez connaissance des informations suivantes:

Rayonnement laser lorsque le carter est ouvert. évitez de regarder fixement le faisceau ou de l'observer à l'aide d'instruments optiques. évitez une exposition directe au rayon.

Notice n° 4
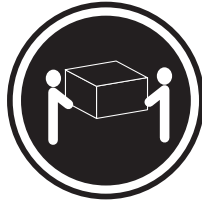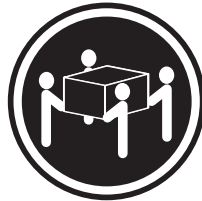
≥18 kg (39.7 lb)   ≥32 kg (70.5 lb)   ≥55 kg (121.2 lb)

ATTENTION:

Faites-vous aider pour soulever ce produit.

Notice n° 5

ATTENTION:

Le bouton de mise sous tension/hors tension de l'unité et l'interrupteur d'alimentation du bloc d'alimentation ne coupent pas l'arrivée de courant électrique à l'intérieur de la machine. Il se peut que votre unité dispose de plusieurs cordons d'alimentation. Pour isoler totalement l'unité du réseau électrique, débranchez tous les cordons d'alimentation des socles de prise de courant.

Notice n° 8

ATTENTION:

N'ouvrez jamais le bloc d'alimentation ou tout élément sur lequel e apposée l'étiquette ci-dessous.

Des tensions et des courants dangereux sont présents à l'intérie de tout composant sur lequel est apposée cette étiquette. Ces éléments ne peuvent pas être réparés. Si vous pensez qu'ils peuvent être à l'origine d'un incident, prene contact avec un technicien de maintenance.

Notice n° 10

ATTENTION:

Ne posez pas d'objet dont le poids dépasse 82 kg sur les unités montées en armoire.

Notice n° 13

DANGER

La surcharge d'un circuit de dérivation peut entraîner un risque d'incendie ou de choc électrique sous certaines conditions. Pour éviter ces risques, assurez-vous que les besoins électriques de votre système ne sont pas supérieurs aux capacités de votre circuit de dérivation. Pour les spécifications électriques, reportez-vous aux informations fournies avec votre unité IBM.

Notice n° 14

ATTENTION:

Des tensions et des courants dangereux peuvent ê tre présents. Seul un technicien de maintenance qualifié est autorisé à retirer les carters signalés par l'étiquette ci-dessous.

Wichtig:

Alle Sicherheitshinweise in dieser IBM documentation beginnen mit einer Nummer. Diese Nummer verweist auf einen englischen Sicherheitshinweis mit den übersetzten Versionen dieses Hinweises in diesem Abschnitt.

Wenn z. B. ein Sicherheitshinweis mit der Nummer 1 beginnt, so erscheint die übersetzung für diesen Sicherheitshinweis in diesem Abschnitt unter dem Hinweis 1.

Lesen Sie alle Sicherheitshinweise, bevor Sie eine Anweisung ausführen.

Hinweis 1

VORSICHT

Elektrische Spannungen von Netz-, Telefon- und Datenübertragungsleitungen sind gefährlich.

Aus Sicherheitsgründen:
- Bei Gewitter an diesem Gerät keine Kabel anschließen oder lösen. Ferner keine Installations-, Wartungs- oder Rekonfigurationsarbeiten durchführen.
- Gerät nur an eine Schutzkontaktsteckdose mit ordnungsgemäß geerdetem Schutzkontakt anschließen.
- Alle angeschlossenen Geräte ebenfalls an Schutzkontaktsteckdosen mit ordnungsgemäß geerdetem Schutzkontakt anschließen.
- Signalkabel möglichst einhändig anschließen oder lösen.
- Keine Geräte einschalten, wenn die Gefahr einer Beschädigung durch Feuer, Wasser oder andere Einflüsse besteht.
- Die Verbindung zu den angeschlossenen Netzkabeln, Telekommunikationssystemen, Netzwerken und Modems ist vor dem öffnen des Gehäuses zu unterbrechen. Es sei denn, dies ist in den zugehörigen Installations- und Konfigurationsprozeduren anders angegeben.
- Nur nach den nachfolgend aufgeführten Anweisungen arbeiten, die für Installation, Transport oder öffnen von Gehäusen von Personal Computern oder angeschlossenen Einheiten gelten.

Kabel anschlie*β*en:	Kabel lösen:
1. Alle Geräte ausschalten und Netzstecker ziehen. 2. Zuerst alle Kabel an Einheiten anschließen. 3. Signalkabel an Anschlußbuchsen anschließen. 4. Netzstecker an Steckdose anschließen. 5. Gerät einschalten.	1. Alle Geräte ausschalten. 2. Zuerst Netzstecker von Steckdose lösen. 3. Signalkabel von Anschlußbuchsen lösen. 4. Alle Kabel von Einheiten lösen.

Hinweis 2

ACHTUNG:

Eine verbrauchte Batterie nur durch eine Batterie mit der IBM Teilenummer 33F8354 oder durch eine vom Hersteller empfohlene Batterie ersetzen. Wenn Ihr System ein Modul mit einer Lithium-Batterie enthält, ersetzen Sie es immer mit dem selben Modultyp vom selben Hersteller. Die Batterie enthält Lithium und kann bei unsachgemäßer Verwendung, Handhabung oder Entsorgung explodieren.

Die Batterie nicht:
- mit Wasser in Berührung bringen.
- über 100 C erhitzen.
- reparieren oder zerlegen.

Die örtlichen Bestimmungen für die Entsorgung von Sondermüll beachten.

Hinweis 3

ACHTUNG:

Wenn ein Laserprodukt (z. B. CD-ROM-Laufwerke, DVD-Laufwerke, Einheiten mit Glasfaserkabeln oder Transmitter) installiert ist, beachten Sie folgendes.
- Das Entfernen der Abdeckungen des CD-ROM-Laufwerks kann zu gefährlicher Laserstrahlung führen. Es befinden sich keine Teile innerhalb des CD-ROM-Laufwerks, die vom Benutzer gewartet werden müssen. Die Verkleidung des CD-ROM-Laufwerks nicht öffnen.
- Steuer- und Einstellelemente sowie Verfahren nur entsprechend den Anweisungen im vorliegenden Handbuch einsetzen. Andernfalls kann gefährliche Laserstrahlung auftreten.

VORSICHT

Manche CD-ROM-Laufwerke enthalten eine eingebaute Laserdiode der Klasse 3A oder 3B. Die nachfolgend aufgeführten Punkte beachten.

Laserstrahlung bei geöffneter Tür. Niemals direkt in den Laserstrahl sehen, nicht direkt mit optischen Instrumenten betrachten und den Strahlungsbereich meiden.

Hinweis 4

≥18 kg   ≥32 kg   ≥55 kg

ACHTUNG:

Beim Anheben der Maschine die vorgeschriebenen Sicherheitsbestimmungen beachten.

Hinweis 5

ACHTUNG:

Mit dem Betriebsspannungsschalter an der Vorderseite des Servers und dem Betriebsspannungsschalter am Netzteil wird die Stromversorgung für den Server nicht unterbrochen. Der Server könnte auch mehr als ein Netzkabel aufweisen. Um die gesamte Stromversorgung des Servers auszuschalten, muß sichergestellt werden, daß alle Netzkabel aus den Netzsteckdosen herausgezogen wurden.

Hinweis 8

ACHTUNG:

Die Abdeckung oder eine Komponente eines Netzteils, die wie nachfolgend aufgeführt gekennzeichnet ist, darf keinesfalls entfernt werden.

In Komponenten, die so gekennzeichnet sind, können gefährliche Spannungen anliegen. In diesen Komponenten sind keine Teile vorhanden, die vom Benutzer gewartet werden müssen. Besteht der Verdacht, dass an einem dieser Teile ein Fehler aufgetreten ist, ist ein IBM Kundendiensttechniker zu verständigen.

Hinweis 10

ACHTUNG:

Keine Gegenstände, die mehr als 82 kg wiegen, auf Rack-Einheiten ablegen.

Hinweis 13

VORSICHT

Durch überlastung des Netzstromkreises besteht unter bestimmten Bedingungen die Gefahr eines Brandes und eines elektrischen Schlages. Um solche Gefahrenquellen zu vermeiden, sollten Sie daher sicherstellen, dass die Spannungswerte Ihres Systems nicht über den aus Sicherheitsgründen festgelegten Werten des Netzstromkreises liegen. Weitere Informationen hierzu finden Sie in der Dokumentation, die Sie zusammen mit der IBM Einheit erhalten haben.

Hinweis 14

ACHTUNG:

Es können gefährliche Spannungen und Ströme auftreten. Die Abdeckungen, die durch folgendes Etikett gekennzeichnet sind, dürfen nur von einem qualifizierten Mitarbeiter des technischen Kundendienstes entfernt werden.

Importante:

Tutti gli avvisi di attenzione e di pericolo riportati nella pubblicazione IBM documentation iniziano con un numero. Questo numero viene utilizzato per confrontare avvisi di attenzione o di pericolo in inglese con le versioni tradotte riportate in questa sezione.

Ad esempio, se un avviso di attenzione inizia con il numero 1, la relativa versione tradotta è presente in questa sezione con la stessa numerazione.

Prima di eseguire una qualsiasi istruzione, accertarsi di leggere tutti gli avvisi di attenzione e di pericolo.

Avviso 1

PERICOLO

La corrente elettrica circolante nei cavi di alimentazione, del telefono e di segnale è pericolosa.

Per evitare il pericolo di scosse elettriche:
- Non collegare o scollegare i cavi, non effettuare l'installazione, la manutenzione o la riconfigurazione di questo prodotto durante i temporali.
- Collegare tutti i cavi di alimentazione ad una presa elettrica correttamente cablata e munita di terra di sicurezza.
- Collegare qualsiasi apparecchiatura collegata a questo prodotto ad una presa elettrica correttamente cablata e munita di terra di sicurezza.
- Quando possibile, collegare o scollegare i cavi di segnale con una sola mano.
- Non accendere qualsiasi apparecchiatura in presenza di fuoco, acqua o se sono presenti danni all'apparecchiatura stessa.
- Scollegare i cavi di alimentazione, i sistemi di telecomunicazioni, le reti e i modem prima di aprire i coperchi delle unità, se non diversamente indicato nelle procedure di installazione e configurazione.
- Collegare e scollegare i cavi come descritto nella seguente tabella quando si effettuano l'installazione, la rimozione o l'apertura dei coperchi di questo prodotto o delle unità collegate.

Per collegare:	Per scollegare:
1. SPEGNERE tutti i dispositivi.	1. SPEGNERE tutti i dispositivi.
2. Collegare prima tutti i cavi alle unità.	2. Rimuovere prima i cavi di alimentazione dalle prese elettriche.
3. Collegare i cavi di segnale ai connettori.	3. Rimuovere i cavi di segnale dai connettori.
4. Collegare i cavi di alimentazione alle prese elettriche.	4. Rimuovere tutti i cavi dalle unità.
5. ACCENDERE le unità.	

Avviso 2

⚠️

ATTENZIONE:

Quando si sostituisce la batteria al litio, utilizzare solo una batteria IBM con numero parte 33F8354 o batterie dello stesso tipo o di tipo equivalente consigliate dal produttore. Se il sistema di cui si dispone è provvisto di un modulo contenente una batteria al litio, sostituire tale batteria solo con un tipo di modulo uguale a quello fornito dal produttore. La batteria contiene litio e può esplodere se utilizzata, maneggiata o smaltita impropriamente.

Evitare di:
• Gettarla o immergerla in acqua
• Riscaldarla ad una temperatura superiore ai 100°C
• Cercare di ripararla o smontarla

Smaltire secondo la normativa in vigore (D.Lgs 22 del 5/2/9) e successive disposizioni nazionali e locali.

Avviso 3

⚠️

ATTENZIONE:

Quando si installano prodotti laser come, ad esempio, le unità DVD, CD-ROM, a fibre ottiche o trasmettitori, prestare attenzione a quanto segue:
• Non rimuovere i coperchi. L'apertura dei coperchi di prodotti laser può determinare l'esposizione a radiazioni laser pericolose. All'interno delle unità non vi sono parti su cui effettuare l'assistenza tecnica.
• L'utilizzo di controlli, regolazioni o l'esecuzione di procedure non descritti nel presente manuale possono provocare l'esposizione a radiazioni pericolose.

⚠️

PERICOLO

Alcuni prodotti laser contengono all'interno un diodo laser di Classe 3A o Classe 3B. Prestare attenzione a quanto segue:

Aprendo l'unità vengono emesse radiazioni laser. Non fissare il fascio, non guardarlo direttamente con strumenti ottici ed evitare l'esposizione diretta al fascio.

Avviso 4

≥18 kg   ≥32 kg   ≥55 kg

ATTENZIONE:

Durante il sollevamento della macchina seguire delle norme di sicurezza.

Avviso 5

ATTENZIONE:

Il pulsante del controllo dell'alimentazione situato sull'unità e l'interruttore di alimentazione posto sull'alimentatore non disattiva la corrente elettrica fornita all'unità. L'unità potrebbe disporre di più di un cavo di alimentazione. Per disattivare la corrente elettrica dall'unità, accertarsi che tutti i cavi di alimentazione siano scollegati dalla sorgente di alimentazione.
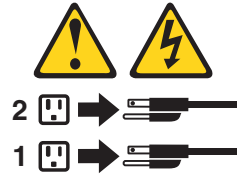
Avviso 8

ATTENZIONE:

Non togliere mai il coperchio di un alimentatore o qualsiasi parte su cui è posta la seguente etichetta.

Tensioni pericolose, corrente e livelli di energia sono presenti all'interno del componente su cui è posta questa etichetta. All'interno di questi componenti non vi sono parti su cui effettuare l'assistenza tecnica. Se si sospetta un problema in una di queste parti, rivolgersi ad un tecnico di manutenzione.

Avviso 10

ATTENZIONE:

Non poggiare oggetti che pesano più di 82 kg sulla parte superiore delle unità montate in rack.

Avviso 13

PERICOLO

Il sovraccarico di un impianto elettrico può generare un pericolo di incendio o di scosse elettriche in determinate situazioni. Per evitare questi pericoli, verificare che i requisiti elettrici del sistema non superino i requisiti di protezione dell'impianto elettrico. Per le specifiche elettriche, consultare le informazioni fornite con il dispositivo IBM.

Avviso 14

ATTENZIONE:

E' possibile che siano presenti livelli pericolosi di tensione, corrente ed energia. Solo i tecnici qualificati sono autorizzati a rimuovere i coperchi sui quali è posta la seguente etichetta.

重要:

Netfinity Server ライブラリーにあるすべての注意および危険の記述は
数字で始まります。この数字は、英語版の注意および危険の記述と翻訳さ
れた注意および危険の記述を相互参照するために使用します。

例えば、もし注意の記述が数字の 1 で始まってる場合は、その注意の翻訳は、
記述 1 の下にあります。

手順を実施する前に、すべての注意.

・記述　1

⚠ 危険

感電を防止するため、雷の発生時には、いかなるケーブルの
取り付けまたは取り外しも行わないでください。また導入、
保守、再構成などの作業も行わないでください。

感電を防止するため：

    – 電源コードは正しく接地および配線が行われている
     電源に接続してください。

    – 本製品が接続されるすべての装置もまた正しく配線
     された電源に接続されている必要があります。

できれば、信号ケーブルに取り付けまたは取り外しのとき
は片方の手のみで行うようにしてください。これにより、
電位差がある二つの表面に触ることによる感電を防ぐことが
できます。

電源コード、電話ケーブル、通信ケーブルからの電流は身体に
危険を及ぼします。設置、移動、または製品のカバーを開けたり
装置を接続したりするときには、以下のようにケーブルの接続 、
取り外しを行ってください。

接続するには	取り外すには
1. すべての電源を切る	1. すべての電源を切る
2. まず、装置にすべての ケーブルを接続する。	2. まず、電源コンセントから 電源コードを取り外す
3. 次に、通信ケーブルを コネクターに接続する	3. 次に、通信ケーブルを コネクターから取り外す。
4. その後、電源コンセントに 電源コードを接続する	4. その後、装置からすべての ケーブルを取り外す
5. 装置の電源を入れる。	

・記述 2

⚠ 注意

本製品には、システム・ボード上にリチウム電池が使用さ
れています。電池の交換方法や取り扱いを誤ると、発熱、
発火、破裂のおそれがあります。
電池の交換には、IBM部品番号33F8354の電池またはメーカー
推奨の同等の電池を使用してください。
交換用電池の購入については、お買い求めの販売店または
弊社の営業担当までお問い合わせください。
電池は幼児の手の届かない所に置いてください。
万一、幼児が電池を飲み込んだときは、直ちに医師に相談
してください。
以下の行為は絶対にしないでください。
－水にぬらすこと
－100度C 以上の過熱や焼却
－分解や充電
－ショート
電池を廃棄する場合、および保存する場合にはテープなど
で絶縁してください。他の金属や電池と混ざると発火、
破裂の原因となります。電池は地方自治体の条例、または
規則に従って廃棄してください。ごみ廃棄場で処分される
ごみの中に捨てないでください。

・記述 3

⚠ 注意

レーザー製品(CD-ROM、DVD、または光ファイバー装置または
送信器などが組み込まれている場合は、下記に御注意ください。

- ここに記載されている制御方法、調整方法、または性能を超えて使用
  すると、危険な放射線を浴びる可能性があります。

- ドライブのカバーを開けると、危険な放射線を浴びる可能性があります。
  ドライブの内部に修理のために交換可能な部品はありません。カバーを
  開けないでください。

⚠ 危険

一部 CD-ROM ドライブは、Class 3A または Class 3B レーザー・
ダイオードを使用しています。次の点に注意してください。

CD-ROMドライブのカバーを開けるとレーザーが放射されます。
光線をみつめたり、光学器械を使って直接見たりしないで
ください。また直接光線を浴びないようにしてください。

・記述 4

⚠ 注意

18Kg 以上   32Kg 以上   55Kg 以上

装置を持ち上げる場合は、安全に持ち上げる方法に従ってください。

・記述 5

⚠ 注意 ⚡

サーバーの前面にある電源制御ボタンは、サーバーに供給された
電流を遮断しません。
サーバーには、複数の電源コードが接続されているかもしれません。
サーバーから電流を完全に遮断するために、すべての電源コードが
電源から取り外されていることを確認してください。

2
1
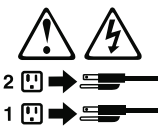
・記述 8

⚠ 注意

この機器のなかにある電源のカバーは取り外さないでください。
また、下記のラベルが貼られているいかなる部品（電源のバック・
プレーンおよびＡＣボックス）も取り外さないでください。

電源、電源のバックプレーンおよび AC ボックスの内部には
危険な電圧、電流およびエネルギーがあり危険です。
電源、電源のバックプレーンおよび AC ボックスの内部には
保守部品はありません。
これらの部品に問題があるときは販売店または保守サービス会社
にご連絡ください。

・記述 10

⚠ 注意

ラック・モデルのサーバーの上に 82 Kg 以上の物を置かないで
ください。

・記述 13

⚠ ⚡

危険

電源回路に過電流が流れると、ある条件のもとでは火災や
感電を起す危険があります。このような危険を避けるため
には、ご使用のシステムの消費電力が電源回路の保護要件
を超えない範囲におさえる必要があります。IBM 機器の消
費電力については付属の資料の「仕様」のページをご覧く
ださい。

・記述 14

⚠

注意

危険な電圧、電流、エネルギーが存在します。次のラベルが貼
られているカバーを開けるのは、教育を受けたサービス技術者
だけに許されています。

⊗ ⚡

중요:

본 *Server Library*에 있는 모든 주의 및 위험 경고문은 번호로
시작합니다. 이 번호는 영문 주의 혹은 위험 경고문과 이 절에 나오는
번역된 버전의 주의 혹은 위험 경고문을 상호 참조하는 데 사용됩니다.

예를 들어, 주의 경고문이 번호 1로 시작하면, 번역된 해당 주의
경고문을 본 절의 경고문 1에서 찾아볼 수 있습니다.

모든 지시사항을 수행하기 전에 반드시 모든 주의 및 위험 경고문을
읽으십시오.

경고문 1

위험

전원, 전화 및 통신 케이블로부터 흘러 나오는 전류는
위험합니다.

전기 충격을 피하려면:

- 뇌우를 동반할 때는 케이블의 연결이나 철수, 이 제품의
  설치, 유지보수 또는 재구성을 하지 마십시오.

- 모든 전원 코드를 적절히 배선 및 접지해야 합니다.

- 이 제품에 연결될 모든 장비를 적절하게 배선된 콘센트에
  연결하십시오.

- 가능한한 신호 케이블을 한 손으로 연결하거나
  끊으십시오.

- 화재, 수해 또는 구조상의 손상이 있을 경우 장비를 켜지
  마십시오.

- 설치 및 구성 프로시저에 다른 설명이 없는 한, 장치 덮개를
  열기 전에 연결된 전원 코드, 원거리 통신 시스템, 네트워크
  및 모뎀을 끊어 주십시오.

- 제품 또는 접속된 장치를 설치, 이동 및 덮개를 열 때
  다음 설명에 따라 케이블을 연결하거나 끊도록 하십시오.

연결하려면:	연결을 끊으려면:
1. 모든 스위치를 끕니다.	1. 모든 스위치를 끕니다.
2. 먼저 모든 케이블을 장치에 연결합니다.	2. 먼저 콘센트에서 전원 코드를 뽑습니다.
3. 신호 케이블을 커넥터에 연결합니다.	3. 신호 케이블을 커넥터에서 제거합니다.
4. 콘센트에 전원 코드를 연결합니다.	4. 장치에서 모든 케이블을 제거합니다.
5. 장치 스위치를 켭니다.	

경고문 2

주의:

리튬 배터리를 교체할 때는 IBM 부품 번호 33F8354 또는 제조업체에서
권장하는 동등한 유형의 배터리를 사용하십시오. 시스템에 리튬 배터리를
갖고 있는 모듈이 있으면 동일한 제조업체에서 생산된 동일한 모듈
유형으로 교체하십시오. 배터리에 리튬이 있을 경우 제대로 사용, 처리
또는 처분하지 않으면 폭발할 수 있습니다.

다음을 주의하십시오.

- 던지거나 물에 담그지 않도록 하십시오.
- 100℃(212°F) 이상으로 가열하지 마십시오.
- 수리하거나 분해하지 마십시오.

지역 법령이나 규정의 요구에 따라 배터리를 처분하십시오.

경고문 3

주의:
레이저 제품(**CD-ROMs, DVD** 드라이브, 광 장치 또는 트랜스미터 등과
같은)이 설치되어 있을 경우 다음을 유의하십시오.

- 덮개를 제거하지 마십시오. 레이저 제품의 덮개를 제거했을 경우
위험한 레이저 광선에 노출될 수 있습니다. 이 장치 안에는 서비스를
받을 수 있는 부품이 없습니다.

- 여기에서 지정하지 않은 방식의 제어, 조절 또는 실행으로 인해 위험한
레이저 광선에 노출될 수 있습니다.

위험

일부 레이저 제품에는 클래서 3A 또는 클래스 3B 레이저
다이오드가 들어 있습니다. 다음을 주의하십시오.

열면 레이저 광선에 노출됩니다. 광선을 주시하거나 광학 기계를
직접 쳐다보지 않도록 하고 광선에 노출되지 않도록 하십시오.

경고문 4

≥18 kg (37 lbs)　　≥ 32 kg (70.5 lbs)　　≥　55 kg (121.2 lbs)

주의:
기계를 들 때는 안전하게 들어 올리십시오.

경고문 5

주의:
장치의 전원 제어 버튼 및 전원 공급기의 전원 스위치는 장치에
공급되는 전류를 차단하지 않습니다. 장치에 둘 이상의 전원 코드가
연결되어 있을 수도 있습니다. 장치에서 모든 전류를 차단하려면
모든 전원 코드가 전원으로부터 차단되어 있는 지 확인하십시오.

경고문 8

주의:
다음 레이블이 붙어 있는 전원 공급기나 부품의 덮개를 제거하지
마십시오.

이 레이블이 부착되어 있는 컴포넌트 안에는 위험한 전압, 전류 및
에너지 레벨이 있습니다. 이 컴포넌트 안에는 서비스 받을 수
있는 부품이 없습니다. 이들 부품에 문제가 있을 경우 서비스
기술자에게 문의하십시오.

경고문 10

주의:
서랍형 모델의 장치 상단에 82 kg(180 lbs.)이 넘는 물체를 올려
놓지 마십시오.

> 82 kg (180 lbs)

경고문 **13**

위험

분기 회로가 과부화되면 특정 상황에서 화재와 전기 충격이
발생할 수 있습니다. 이러한 충격을 방지하려면 귀하의
시스템 전기 요구량이 분기 회로 보호 요구량을 초과하지
않도록 하십시오. 전기 사양에 대해서는 **IBM** 디바이스와
함께 제공되는 정보를 참조하십시오.

경고문 **14**

주의:
위험한 전압, 전류 및 에너지 레벨이 있을 수 있습니다. 다음
레이블이 붙어있는 커버는 공인된 서비스 기술자만이 제거
할 수 있습니다.

Importante:

Todas las declaraciones de precauciín de esta IBM documentation empiezan con un número. Dicho número se emplea para establecer una referencia cruzada de una declaraciín de precauciín o peligro en inglés con las versiones traducidas que de dichas declaraciones pueden encontrarse en esta secciín.

Por ejemplo, si una declaraciín de peligro empieza con el número 1, las traducciones de esta declaraciín de precauciín aparecen en esta secciín bajo Declaraciín 1.

Lea atentamente todas las declaraciones de precauciín y peligro antes de llevar a cabo cualquier operaciín.

Declaración 1

PELIGRO

La corriente eléctrica de los cables telefínicos, de alimentaciín y de comunicaciones es perjudicial.

Para evitar una descarga eléctrica:
- No conecte ni desconecte ningún cable ni realice las operaciones de instalaciín, mantenimiento o reconfiguraciín de este producto durante una tormenta.
- Conecte cada cable de alimentaciín a una toma de alimentaciín eléctrica con conexiín a tierra y cableado correctos.
- Conecte a tomas de alimentaciín con un cableado correcto cualquier equipo que vaya a estar conectado a este producto.
- Si es posible, utilice una sola mano cuando conecte o desconecte los cables de sent.al.
- No encienda nunca un equipo cuando haya riesgos de incendio, de inundaciín o de daños estructurales.
- Desconecte los cables de alimentaciín, sistemas de telecomunicaciones, redes y mídems conectados antes de abrir las cubiertas del dispositivo a menos que se indique lo contrario en los procedimientos de instalaciín y configuraciín.
- Conecte y desconecte los cables tal como se describe en la tabla siguiente cuando desee realizar una operaciín de instalaciín, de traslado o de apertura de las cubiertas para este producto o para los dispositivos conectados.

Para la conexin	Para la desconexiín
1. APÁGUELO todo. 2. En primer lugar, conecte los cables a los dispositivos. 3. Conecte los cables de señal a los conectores. 4. Conecte cada cable de alimentaciín a la toma de alimentaciín. 5. ENCIENDA el dispositivo.	1. APÁGUELO todo. 2. En primer lugar, retire cada cable de alimentaciín de la toma de alimentaciín. 3. Retire los cables de señal de los conectores. 4. Retire los cables de los dispositivos.

Declaración 2

PRECAUCIÓN:

Cuando desee sustituir la batería de litio, utilice únicamente el número de pieza 33F8354 de IBM o cualquier tipo de batería equivalente que recomiende el fabricante. Si el sistema tiene un mídulo que contiene una batería de litio, sustitúyalo únicamente por el mismo tipo de mídulo, que ha de estar creado por el mismo fabricante. La batería contiene litio y puede explotar si el usuario no la utiliza ni la maneja de forma adecuada o si no se desprende de la misma como corresponde.

No realice las acciones siguientes:
- Arrojarla al agua o sumergirla
- Calentarla a una temperatura que supere los 100°C (212°F)
- Repararla o desmontarla

Despréndase de la batería siguiendo los requisitos que exija el reglamento o la legislaciín local.

Declaración 3

PRECAUCIÓN:

Cuando instale productos láser (como, por ejemplo, CD-ROM, unidades DVD, dispositivos de fibra íptica o transmisores), tenga en cuenta las advertencias siguientes:
- No retire las cubiertas. Si retira las cubiertas del producto láser, puede quedar expuesto a radiaciín láser perjudicial. Dentro del dispositivo no existe ninguna pieza que requiera mantenimiento.
- El uso de controles o ajustes o la realizaciín de procedimientos que no sean los que se han especificado aquí pueden dar como resultado una exposiciín perjudicial a las radiaciones.

PELIGRO

Algunos productos láser contienen un diodo de láser incorporado de Clase 3A o de Clase 3B. Tenga en cuenta la advertencia siguiente.

Cuando se abre, hay radiaciín láser. No mire fijamente el rayo ni lleve a cabo ningún examen directamente con instrumentos ípticos; evite la exposiciín directa al rayo.

Declaración 4
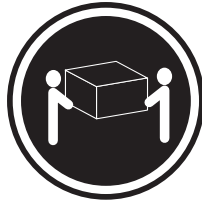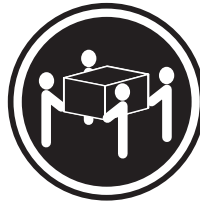
≥18 kg   ≥32 kg   ≥55 kg

PRECAUCIÓN:

Tome medidas de seguridad al levantar el producto.

Declaración 5

PRECAUCIÓN:

El botín de control de alimentaciín del dispositivo y el interruptor de alimentaciín de la fuente de alimentaciín no apagan la corriente eléctrica suministrada al dispositivo. Es posible también que el dispositivo tenga más de un cable de alimentaciín. Para eliminar la corriente eléctrica del dispositivo, asegúrese de desconectar todos los cables de alimentaciín de la fuente de alimentaciín.
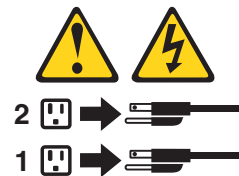
Declaración 8

PRECAUCIÓN:

No retire nunca la cubierta de una fuente de alimentación ni ninguna pieza que tenga adherida la etiqueta siguiente.

Existen niveles perjudiciales de energía, corriente y voltaje en los componentes que tienen adherida esta etiqueta. Dentro de estos componentes no existe ninguna pieza que requiera mantenimiento. Si sospecha que alguna de estas piezas tiene un problema, póngase en contacto con un técnico de servicio.

Declaración 10

PRECAUCIÓN:

No coloque ningún objeto que pese más de 82 kg (180 libras) encima de los dispositivos montados en bastidor.

Declaración 13

PELIGRO

La sobrecarga de una conexión puede resultar potencialmente en peligro de fuego y peligro de descarga bajo ciertas condiciones. Para evitar estos peligros, compruebe que los requisitos eléctricos de su sistema no excedan los requisitos de seguridad de la conexión. Consulte la información que viene con el dispositivo de IBM para obtener las especificaciones eléctricas.

Declaración 14

PRECAUCIÓN:

Es posible que haya niveles peligrosos de energía, voltaje o corriente. Sólo está autorizado a extraer las cubiertas que llevan la siguiente etiqueta un técnico de servicio cualificado.

Appendix A. Getting help and technical assistance

If you need help, service, or technical assistance or just want more information about IBM products, you will find a wide variety of sources available from IBM to assist you. This appendix contains information about where to go for additional information about IBM and IBM products, what to do if you experience a problem with your xSeries or IntelliStation® system, and whom to call for service, if it is necessary.

Before you call

Before you call, make sure that you have taken these steps to try to solve the problem yourself:

- Check all cables to make sure that they are connected.
- Check the power switches to make sure that the system is turned on.
- Use the troubleshooting information in your system documentation, and use the diagnostic tools that come with your system. Information about diagnostic tools is in the *Hardware Maintenance Manual and Troubleshooting Guide* on the IBM *xSeries Documentation* CD or in the *Hardware Maintenance Manual* on the IBM *IntelliStation Documentation* CD.
- Go to the IBM Support Web site at http://www.ibm.com/pc/support/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.

You can solve many problems without outside assistance by following the troubleshooting procedures that IBM provides in the online help or in the publications that are provided with your system and software. The information that comes with your system also describes the diagnostic tests that you can perform. Most xSeries and IntelliStation systems, operating systems, and programs come with information that contains troubleshooting procedures and explanations of error messages and error codes. If you suspect a software problem, see the information for the operating system or program.

Using the documentation

Information about your IBM xSeries or IntelliStation system and preinstalled software, if any, is available in the documentation that comes with your system. That documentation includes printed books, online books, readme files, and help files. See the troubleshooting information in your system documentation for instructions for using the diagnostic programs. The troubleshooting information or the diagnostic programs might tell you that you need additional or updated device drivers or other software. IBM maintains pages on the World Wide Web where you can get the latest technical information and download device drivers and updates. To access these pages, go to http://www.ibm.com/pc/support/ and follow the instructions. Also, you can order publications through the IBM Publications Ordering System at
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When referring to processor storage, real and virtual storage, or channel volume, KB stands for approximately 1000 bytes, MB stands for approximately 1 000 000 bytes, and GB stands for approximately 1 000 000 000 bytes.

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Avis de conformité à la réglementation d'Industrie Canada

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Part Number: 02R2730

Printed in USA