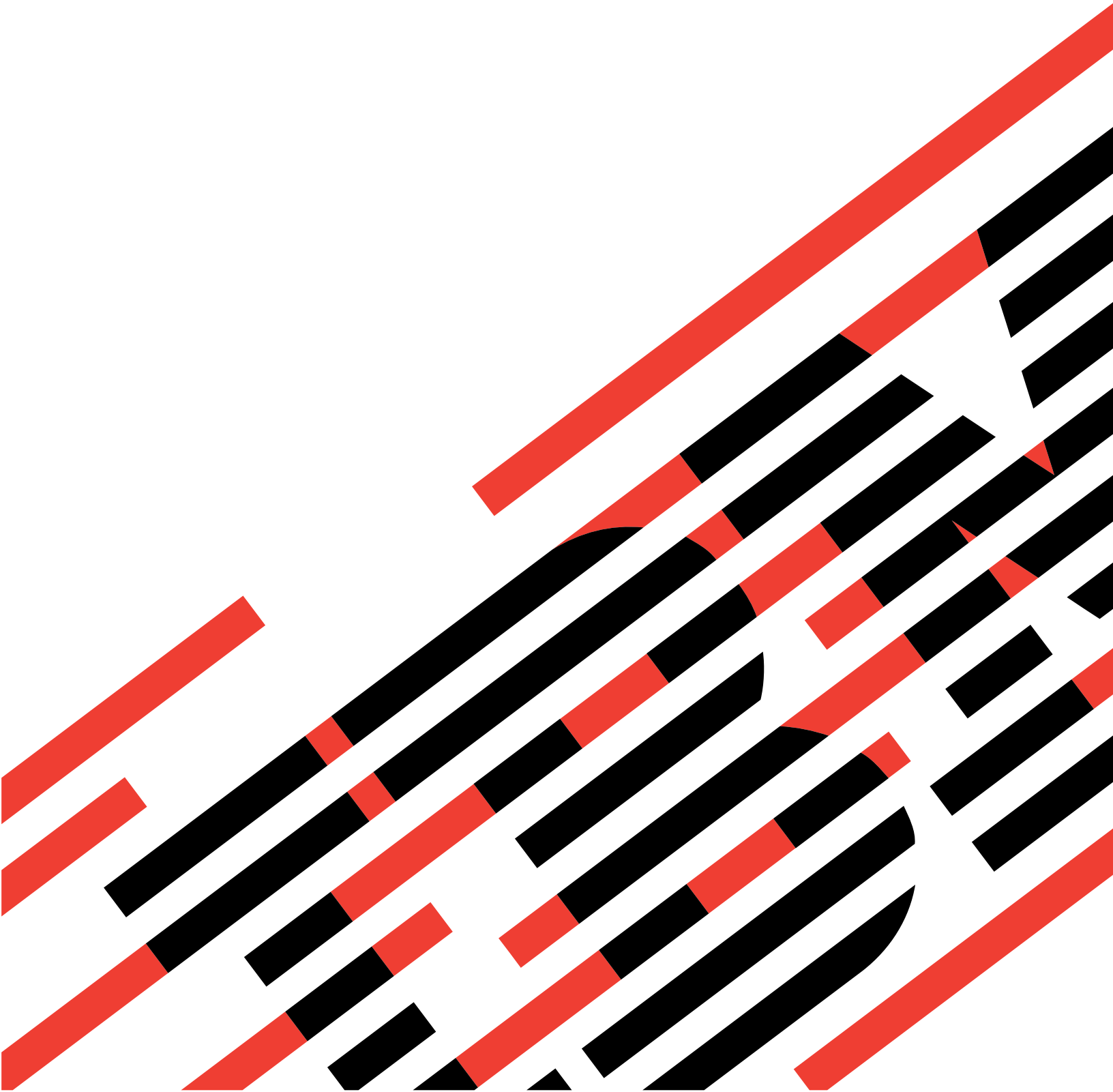
IBM

eserver

xSeries 440 Type 8687

Hardware Maintenance Manual



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Note

Before using this information and the product it supports, read “Notices” on page 236.

The most recent version of this document is available on the World Wide Web at **http://www.ibm.com/pc/support**.

18th Edition (December 2004)

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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® 440 Type 8687 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 201.

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

General checkout

The server diagnostic programs (see “Diagnostic programs and error messages” on page 57.) 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. There might be a short delay between pressing an F key (F1, F2, Esc, etc.) and the execution of the command.
2. For servers that are part of a shared hard disk drive cluster, run one test at a time in looped mode. Do not run all tests in looped mode, because this could enable the hard disk drive diagnostic tests.
3. If multiple error codes are displayed, diagnose the first error code that is displayed.
4. If the server stops with a POST error, see “POST error codes” on page 181.
5. If the server stops and no error is displayed, see “Undetermined problems” on page 192.
6. For power problems, see “Power supply LED errors” on page 180 and “12v bus faults” on page 173.
7. For safety information, see “Safety information” on page 201.
8. For intermittent problems, check the system-error log (see “Error logs” on page 54).

Checkout procedure

Follow the steps in this 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 59).

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 diagnostics” on page 54).
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 174 and “Undetermined problems” on page 192.

If the operating system is not running, do the following:

1. Check the light path (see “Light path diagnostics” on page 54).
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 181).
9. Run diagnostics (see “Starting the diagnostic programs” on page 59).

003 **DID THE DIAGNOSTIC PROGRAM START?**

NO. Find the failure symptom in “Error symptoms” on page 174.

YES. Run the diagnostic programs. If necessary, see “Starting the diagnostic programs” on page 59.

If you receive an error, see “Symptom-to-FRU index” on page 151.

If the diagnostic programs were completed successfully and you still suspect a problem, see “Undetermined problems” on page 192.

If the server does not turn on, see “Error symptoms” on page 174.

General information

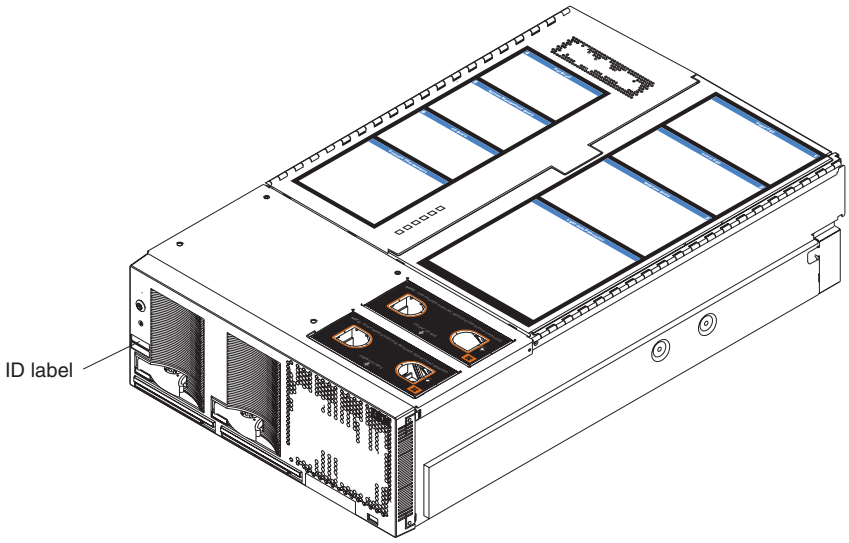
The IBM @server xSeries 440 is a four U-high[1] rack model server for high-volume network transaction processing. This high-performance server, based on IBM Enterprise X-Architecture™ technologies[2], is ideally suited for networking environments that require superior microprocessor performance, efficient memory management, flexibility, and reliable data storage.

Certain models of the xSeries 440 can be cabled together in a 16-way configuration.

The xSeries 440 server contains several IBM Enterprise X-Architecture technologies, that help increase server performance and reliability. The Enterprise X-Architecture technologies provided in this server model include the most recent advancements in X-Architecture features. For more information about Enterprise X-Architecture features, refer to “What your IBM xSeries 440 offers” on page 5 and “Reliability, availability, and serviceability features” on page 7. You can obtain more information about the IBM Enterprise X-Architecture technologies and features at: www.ibm.com/pc/us/eserver/xseries/xarchitecture/enterprise/index.html

If you have access to the World Wide Web, you can obtain up-to-date information about the xSeries 440 model and other IBM server products at the following World Wide Web address: http://www.ibm.com.

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.



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.
2. Enterprise X-Architecture is an IBM design blueprint that takes full advantage of existing IBM technologies to build powerful, scalable and reliable Intel™ processor-based servers. For more information about IBM Enterprise X-Architecture refer to http://www.ibm.com/pc/us/eserver/xseries/xarchitecture/enterprise/index.html.

Features and specifications

The following table provides a summary of the features and specifications for each xSeries 440.

Microprocessor:

- Supports the following microprocessors (depending on your configuration):
  - Up to 8 Intel™ Xeon MP microprocessors

    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 your server.
- IBM XA-32 chip set with integrated memory, I/O, system cache, and remote I/O controllers

Memory:

- Minimum: 2 GB
- Maximum: 32 GB (depending on your configuration)
- Type: 4-way interleaved PC133 MHz, ECC SDRAM, registered DIMMs only
- Supports 512 MB and 1GB dual inline memory modules (DIMMs)
- XceL4 Server Accelerator Cache (up to 64 MB depending on your configuration)

Drives:

- Diskette: 1.44 MB
- CD-ROM: 24X IDE
- Supports up to two internal Ultra160 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 (models 1RX, 2RX, 3RX, 4RX, 5RX, 6RX, 7RX, 3RY, 4RY only)

Power supply:

Two hot-swap power supplies (550 watts at 110 V ac or 1050 watts at 220 V ac)

Cooling:

Four hot-swap fans

- Two 150 mm x 51 mm redundant fans
- Two 150 mm x 38 mm fans

Video:

- S3 Savage4 Pro video on system board
- PCI bus interface
- Compatible with SVGA
- 8 MB SDRAM video memory at 125 MHz

Size (4U):

- Height: 17.8 cm (7 inches, 4U)
- 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 5700 10/100/1000 Ethernet controller
- Light path diagnostics
- Adaptec 7899W Dual Ultra160 SCSI controller
- Remote Supervisor Adapter (service processor)
  - ASM interconnect (peer-to-peer) port
  - Ethernet port
  - Serial port
- IDE controller
- RXE Management Port
- Three USB ports
- Keyboard port
- SCSI port
- Mouse port
- Symmetrical multiprocessor (SMP) Expansion Ports (up to six ports depending on your configuration)
- Two remote I/O expansion enclosure (RXE) Expansion Ports

Acoustical noise emissions:

- Sound power, idling: 6.2 bel maximum
- Sound power, operating: 6.2 bel maximum

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 (47-53 or 57-63 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

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 and in “Safety notices (multi-lingual translations)” on page 205. 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:

- **Notes:** 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.

What the IBM xSeries 440 offers

The design of the server takes advantage of advancements in memory management and data storage. The server includes:

- IBM Enterprise X-Architecture

  Enterprise X-Architecture is an IBM design blueprint that takes full advantage of existing IBM technologies to build the most powerful, scalable, and reliable Intel processor-based servers. For more information about IBM Enterprise X-Architecture, refer to www.ibm.com/pc/us/eserver/xseries/xarchitecture/enterprise/index.html
- Active Memory

  Memory Mirroring offers even greater memory reliability. With the same amount of memory in both memory ports and Memory Mirroring enabled in BIOS code, the data from the first memory port is copied or mirrored in the second, giving you redundant copies of the information stored in memory.
- Memory ProteXion

  This is the equivalent of a hot-spare drive in a RAID array. Memory ProteXion is based in the memory controller, giving the server the ability to sense when a chip on a DIMM has failed and route the data around the failed chip.
- Large system memory

  The memory bus in the server supports up to 32 GB of system memory. The memory controller provides error code correction (ECC) support for up to 32 industry-standard PC133, 3.3 V, 168-pin, 133 megahertz (MHz), registered, synchronous dynamic random access memory (SDRAM) dual inline memory modules (DIMMs).
- XceL4 Server Accelerator Cache
  With up to 64MB of high-performance level-4 system cache, the xSeries 440 introduces XceL4 cache, designed by IBM specifically to alleviate the memory bandwidth demands that the new Intel processors place on the memory

subsystem. XceL4 Server Accelerator Cache also enables speedier access to memory for the PCI-X I/O, Gigabit Ethernet, SCSI and Fibre Channel interfaces, yielding better overall system utilization, and therefore higher throughput.

- Light path diagnostics

  The light path diagnostics feature provides LEDs to assist in isolating problems with the server. A light on the operator information panel is lit if an unusual condition or a problem occurs. If this happens, you can look at the LEDs inside the Light Path Diagnostic drawer and those visible through the cover of the SMP Expansion module to isolate the cause. Under some circumstances, you might need to remove the cover and view LEDs on the printed circuit boards to pinpoint the source of a problem.

- Systems management capabilities

  The server comes with a Remote Supervisor Adapter installed in a dedicated PCI-X slot. This adapter, in conjunction with the systems-management software provided with the server, enables you to manage the functions of the server both locally and remotely. The Remote Supervisor Adapter also provides system monitoring, event recording, and dial-out alert capability.

- Integrated network environment support

  The server comes with an integrated Broadcom Gigabit Ethernet controller. This Ethernet controller has an interface for connecting to 10/100/1000-Mbps networks. The server automatically selects between 10BASE-T and 100/1000BASE-TX environments. The controller provides full-duplex (FDX) capability, which enables simultaneous transmission and reception of data on the Ethernet local area network (LAN). This controller supports Wake on LAN® technology.

- *IBM ServerGuide™* CD

  The ServerGuide™ CD that is included with the server provides programs to help you set up the server and install the network operating system (NOS). The ServerGuide program detects the hardware options that are installed and provides the correct configuration programs and device drivers.

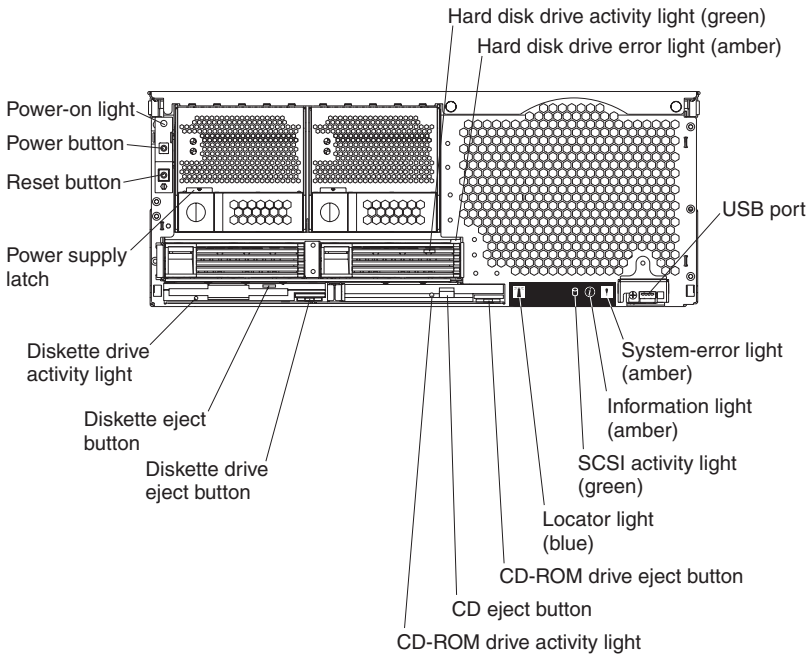
  Note: If the server model came with an operating system installed, such as Microsoft® Windows® 2000 Datacenter Server, see the software documentation provided with the server for configuration information.

  For more information about the ServerGuide CD, see “Using the ServerGuide CD” on page 27.

Server controls and indicators

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

Front view



Power-on light: This green light turns on and stays on when you turn on the server, and it blinks when the server is in Standby mode.

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

Hard disk drive error light: When this amber light is on, it indicates that there is a problem with the hard disk 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 light: When this amber light is on, it indicates a system error has occurred.

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

SCSI activity light: This green light indicates SCSI activity for the internal SCSI bus channel.

Notes:

1. If the on-board SCSI is disabled, the LED will remain illuminated.
2. If the system is equipped with a RAID card or add-in SCSI card and the on-board SCSI is enabled but not connected, the LED will be illuminated during POST and will then turn off.

Locator light: This blue light indicates the primary and secondary servers. This light blinks on the primary server. If the light remains solid, it indicates that server is the secondary server. See “Light path diagnostics” on page 54 for the exact location of this light.

CD-ROM drive eject button: Push this button to release a CD-ROM drive from the server.

CD eject button: Push this button to release a CD from the drive.

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

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

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

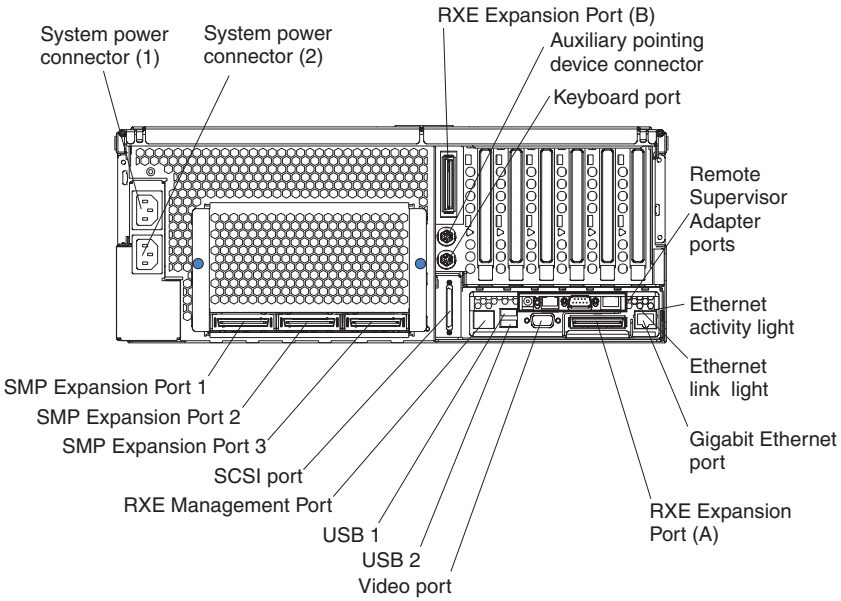
Diskette drive activity light: When this light is on, it indicates that the diskette drive is in use.

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 need to use a pen or the end of a straightened paper clip to press the button.

Power button: Press this button to manually turn the server on or off.

Rear view



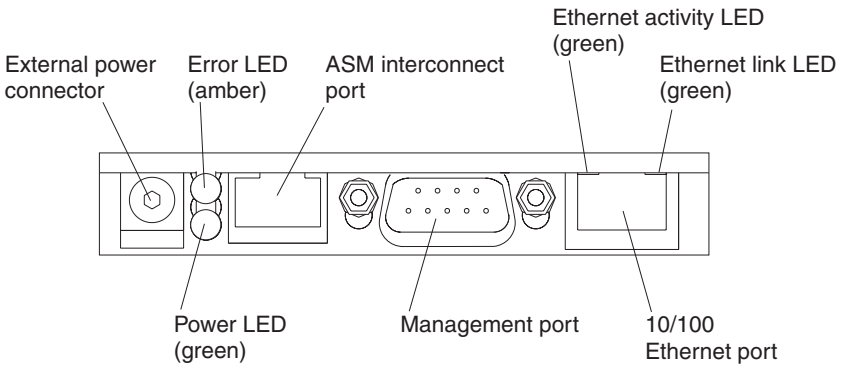
System power connectors (1 and 2): The system power cords are connected to these two connectors to provide power to the system.

RXE Expansion Port (B): Use this port to connect the server to a remote I/O enclosure (models 1RX, 2RX, 3RX, 4RX, 5RX, 6RX, 7RX, 3RY, 4RY only) when two SMP Expansion Modules are installed.

Auxiliary pointing device connector: Signal cables for a mouse, trackball, or other pointing device are connected to the auxiliary pointing device connector.

Keyboard port: Signal cables for a keyboard are connected to the keyboard port.

Remote Supervisor Adapter ports and indicators: This group of ports and indicators located on the back of the server are used for system management information and control.



- **External power connector** - This connector is not supported on this server.
- **Error LED** - This amber light goes on when a system management error has occurred.
- **ASM interconnect port** - Signal cables for managing expansion module resources are connected to this port.
- **Ethernet link light:** This green light, located on the right of the Ethernet port, goes on when there is an active link connection on the Ethernet controller for the Ethernet port.
- **Ethernet activity light:** This green light, located on the left of the Ethernet port, goes on when there is activity on the Ethernet LAN connected to the Ethernet port.
- **10/100 Ethernet port** - Ethernet Signal cables are connected to the Ethernet port.
- **Management port** - Signal cables for modems or other serial devices are connected to this port.
- **Power LED** - This green light goes on and stays on when you plug in the server.

Ethernet activity light: This green light, located on the left of the Gigabit Ethernet port, blinks when there is activity on the Ethernet LAN.

Ethernet link light: This green light, located on the right of the Gigabit Ethernet port, goes on when there is an active link connection on the Gigabit Ethernet controller for Ethernet port 1.

Gigabit Ethernet port: Gigabit Ethernet Signal cables are connected to the Gigabit Ethernet port. This port supports 10/100/1000 Mbps speed connections.

RXE Expansion Port (A): Use this port to connect the server to a remote I/O enclosure (models 1RX, 2RX, 3RX, 4RX, 5RX, 6RX, 7RX, 3RY, 4RY only), when only one SMP Expansion Module is installed.

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

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 (models 1RX, 2RX, 3RX, 4RX, 5RX, 6RX, 7RX, 3RY, 4RY only).

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

SMP Expansion port 3: This port is intended for future use.

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.

Turning on the server

Notes:

1. Pressing the power-control button on either the primary or secondary server in the 16-way configuration (models 1VX, 2VX, 3VX only) will turn on or turn off both servers.
2. When turning on a 16-way configuration server (models 1VX, 2VX, 3VX only), in some instances the system error LED will light (see “Front view” on page 7), indicating that only 12 microprocessors are being detected. If this happens, take the following actions:
   a. Open the light path diagnostics panel (see “Light path diagnostics” on page 54) and verify that the Event Log LED is illuminated.
   b. Check the system error log (see “Viewing the System Error log” on page 60) for these two messages:
      - ″PFA Alert, see preceding error in system error log″
      - ″Upper to lower SMP Expansion Module cable not detected″
   c. Clear the error log, turn off the servers, remove ac power for 30 seconds, reconnect ac power, and restart the servers.
   d. If the symptoms repeat, verify that all cables are connected correctly (see “Working with cables” on page 115); then, repeat steps 2a through 2c above.
   e. If the symptoms persist, run diagnostics (see “Starting the diagnostic programs” on page 59) and follow the recommended actions.

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

- If the power cords are connected to a power source, you can press the power-control button on the front of the server.

  Notes:

  1. You can install a circular disk over the power-control button to prevent accidental manual power-off. This disk, known as the power-control button shield, comes with the server.
  2. After you plug the power cords of the server into the electrical outlets, wait approximately 20 seconds before pressing the power-control button. During

this time, the system-management adapter is initializing; therefore, the power-control button does not respond.

- If the server is turned on and a power failure occurs, the server will restart automatically when power is restored.
- If ac power is present and the server is in Standby mode, the server can be turned on from the Remote Supervisor Adapter user interface.
- When you plug in the server for the first time, Wake on LAN can turn on the server.
- If the server was previously turned on, it must be properly placed in Standby mode for the Wake on LAN feature to turn on the server.

Complete the following steps to manually turn on the server:

1. Review the information in “Safety information” on page 201.
2. Turn on all external devices, such as the monitor.
3. Plug the server power cords into the power source.
4. Press the power-control button on the front of the server.

Note: While the server is powering up, the power-on LED on the front of the server is lit.

Turning off the server

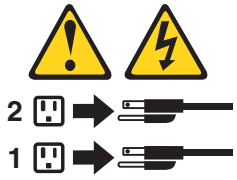
Note: Pressing the power-control button on either the primary or secondary server in the 16-way configuration (models 1VX, 2VX, 3VX only) will turn on or turn off both servers.

Complete the following steps to manually turn off the server:

1. Review the information in “Safety information” on page 201.
2. See your operating system documentation for the proper procedure to shut 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.



3. Press the power-control button on the front of the server. This will put the server in Standby mode.

Note: You might need to press and hold the power-control button for more than 4 seconds to cause an immediate shutdown of the server and to force it into Standby mode. You can use this feature if the operating system stops functioning.

4. Disconnect the server from the power source.

   Note: After disconnecting all the power cords, wait approximately 15 seconds for your system to stop running. Watch for the power-on LED on the front of the server to stop flashing.

Standby mode

Standby mode refers to the condition in which the server is connected to an ac power source but the server operating system is not running and all core logic is shut down except for the service processor. In Standby mode, the server can respond to service processor requests, such as a remote request to turn on the server. When the server is in Standby mode, the power-on LED on the front of the server flashes (when the server is running, the power-on LED stays on and does not flash).

You can put the server in Standby mode in any of the following ways:

- You can press the power-control button on the server. This starts an orderly shutdown of the operating system, if this feature is supported by your operating system.
- The server can be placed in Standby mode from the Remote Supervisor Adapter user interface.

Complete the following steps to put the server into Standby mode:

1. See the operating system documentation for the proper procedure to shut down the operating system.

   Note: Each operating system is different. Read all the documentation about shutting down the operating system before continuing.
2. Press the power-control button on the front of the server.

   Notes:

   a. After you place the server in Standby mode, wait at least 5 seconds before you turn on the server again.

   b. You might need to press and hold the power-control button for more than 4 seconds to cause an immediate shutdown of the operating system and to force it into Standby mode. You can use this feature if the operating system stops functioning.

About the documentation CD

The server comes with a documentation CD, which contains documentation for the server in Portable Document Format (PDF) and includes the IBM Documentation Browser to help you find information quickly.

System requirements

To run the documentation CD, your system must have the following minimum hardware and software:

- Microsoft Windows NT® 4.0 (with Service Pack 3 or later), Windows 98, Windows 2000.
- 100 MHz Intel Pentium® microprocessor.
- 32 MB RAM.

- Adobe Acrobat Reader 3.0 or later. Adobe Acrobat Reader software is included on the documentation CD, and you can install it when you run the IBM Documentation Browser.

Starting the IBM Documentation Browser

Use one of the following procedures to start the Documentation Browser:

- If Autostart is enabled, insert the documentation CD into your CD-ROM drive. The Documentation Browser will start automatically.
- If Autostart is disabled, insert the documentation CD into your CD-ROM drive; then, click **Start** → **Run**. In the **Open** field, type

  ```
  e:/win32.bat
  ```

  where *e* is the drive letter of your CD-ROM drive, and click **OK**.

Using the IBM Documentation Browser

Use the IBM Documentation Browser to browse the contents of the documentation CD, select from a list of available topics, see brief descriptions of the selected topics, and view selected topics using Adobe Acrobat Reader. The Documentation Browser automatically detects the regional settings in use on your system and presents the information in the language for that region (if available). If a topic is not available in the language for that region, the English version is displayed.

Click **Help** for detailed information about using the IBM Documentation Browser.

Complete the following steps to use the Documentation Browser:

1. Select your product from the **Product** drop-down list.

   The **Topics** list appears. It lists all topics that pertain to the selected product. Topics are in folders or under other topics. A plus sign (+) appears beside each folder or topic that has additional topics under it. Click the plus sign to display the additional topics.
2. Click a topic to select it.

   When you select a topic, a description of the topic contents appears in the **Description** field.

   Note: To select multiple topics, press and hold down the Ctrl key while selecting your topics.
3. View selected topics.

   Click **View Book**. Adobe Acrobat Reader starts, and the selected topics are displayed.

Using the search feature

Complete the following steps to use the Documentation Browser search feature:

1. Type a key word in the **Search** field.
2. Click **Search**. The topics containing the search word are listed in order based on the number of occurrences.
3. Click a file to open it.
4. Press Ctrl+F and use the Adobe Acrobat search function to search within the file.

Configuration

The following configuration programs are provided with the server:

- **Configuration/Setup Utility**

  This program is part of the basic input/output system (BIOS) code that comes with the server. You can use this program to configure the serial connector assignment, change the drive startup sequence, set the date and time, and set passwords. See "Using the Configuration/Setup Utility program" on page 16 for more information.

- **SCSISelect Utility**

  With the SCSISelect Utility program, you can configure the devices that are attached to the SCSI controller. Use this program to change default values and to resolve configuration conflicts. See "Using the SCSISelect utility program" on page 25 for more information.

- **ServeRAID™ configuration program**

  This program comes with the optional ServeRAID adapters and with server models that have a ServeRAID adapter preinstalled. If the server has a ServeRAID adapter installed, you must use the ServeRAID configuration program to define and configure the disk-array subsystem *before* you install the operating system. If the server model came with an operating system installed, your disk-array subsystem is already configured. For more information about using the ServeRAID configuration program, see the ServeRAID information on the *IBM Documentation* CD or refer to the IBM *Hardware Maintenance Manual* for the particular ServeRAID SCSI controller under consideration.

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

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

  The *ServerGuide Setup and Installation* CD includes software setup and installation tools that are specifically designed for IBM xSeries 440 servers (models 1RX, 2RX, 3RX, 4RX, 5RX, 6RX, 7RX, 3RY, 4RY only). If you did not purchase a preconfigured server, you can use this CD during the initial installation of the server to configure the server hardware and to simplify your operating system installation. The *ServerGuide* CD also contains a collection of application programs, which you can install after the server is up and running. See "Using the ServerGuide CD" on page 27 for more information.

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

- **Remote Supervisor Adapter configuration process**

  Configuration activities are also required for the Remote Supervisor Adapter. See "Setting up the Remote Supervisor Adapter" on page 30 for information about setting up and cabling the Remote Supervisor Adapter for use with an Advanced System Management (ASM) network. For complete information about cabling, configuring, and using the Remote Supervisor Adapter to manage the server remotely, see "Setting up the Remote Supervisor Adapter" on page 30 and the *Remote Supervisor Adapter User's Guide* on the IBM *xSeries Documentation* CD.

- **Ethernet controller configuration process**

  To configure the integrated Ethernet controller, see “Configuring the Gigabit Ethernet controller” on page 47.

Using the Configuration/Setup Utility program

Configuration/Setup is a menu-driven utility that is part of the BIOS code that comes with the server. You can use it to:

- Change the drive startup sequence
- Enable USB keyboard and mouse support
- Enable Memory Mirroring
- Resolve configuration conflicts
- Set the date and time
- Set passwords

The following sections provide instructions for starting the Configuration/Setup Utility program and descriptions of the menu choices that are available.

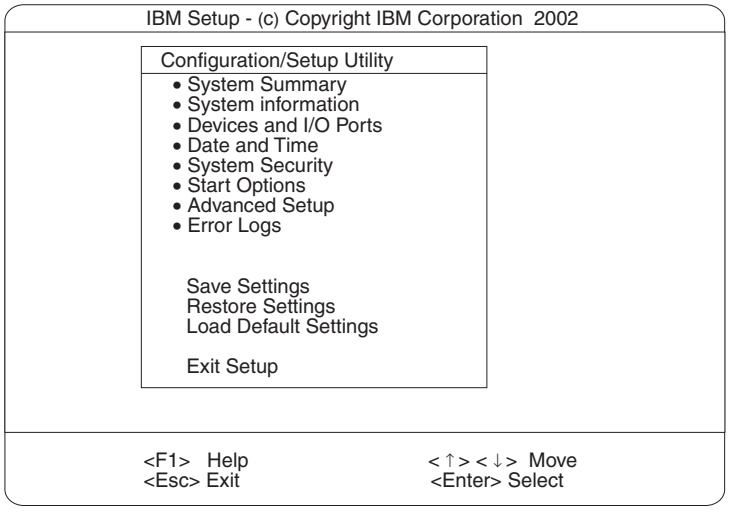
Starting the Configuration/Setup Utility program

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

1. Turn on the server and watch the monitor screen.
2. When the message `Press F1 for Configuration/Setup` appears, press F1.
3. Follow the instructions that appear on the screen.

Choices available from the Configuration/Setup main menu

From the Configuration/Setup Utility main menu, you can select settings that you want to change. The Configuration/Setup Utility main menu is similar to the following illustration.



Notes:

1. You can press F1 to display help information for a selected menu item.
2. The choices on some menus might differ slightly from the ones that are described in this book, depending on the version of BIOS code in the server.
3. For 16-way configurations, many options are managed by the primary server. When separated, each server is managed by its own configuration settings.

When a server that had been partitioned as part of a 16-way environment is separated and runs as a standalone, some choices might revert to their pre-16-way values.

Descriptions of the choices that are available from the main menu are as follows:

- **System Summary**

  Select this choice to display configuration information. This includes the type and speed of the microprocessor and the amount of memory that is installed.

  Changes that you make to configuration settings appear on this summary screen. You cannot edit the fields.

  This choice appears on both the full and limited Configuration/Setup Utility menus.

- **System Information**
  - Product Data

    Select this choice to view system information, such as the machine type and model, the server serial number, and the revision level, date, and build level of the BIOS code, Diagnostics, and ASM Adapter.

  - System Card Data

    Select this choice to view information about the planar, processor cards, I/O planar, power supplies, DASD backplane, and power backplane.

- **Devices and I/O Ports**

  Select this choice to view or change the assignments for devices and input/output ports. This choice appears only on the full Configuration/Setup Utility main menu.

  You can use this choice to enable or disable the integrated SCSI, Ethernet, and Diskette controllers.

  Notes:

  1. The default setting is **Enable** for all the controllers. If you select **Disable**, the system will not configure the disabled device, and the operating system will not detect the device. (This is equivalent to unplugging the device.)
  2. If the integrated SCSI controller is disabled and no other controller for a mass storage device is installed, operating-system startup cannot occur.

  The IDE Configuration Menu is also located in Devices and I/O Ports. This menu is used to enable or disable the primary and secondary IDE channels and to view information about the devices configured on each IDE channel.

- **Date and Time**

  Select this choice to set the system date and time and to change the system time that is sent to the Remote Supervisor Adapter when the server is started. This choice appears only on the full Configuration/Setup Utility main menu.

  The system time is in a 24-hour format (hour:minute:second).

- **System Security**

  Select this choice to set or change the power-on or administrator password. See “Using passwords” on page 19 for more information.

  The Remote Control Security Settings menu is located in System Security. This menu is used to set the Failed Login Threshold and the Automatic Lockout Delay. You can also use this menu to save, change, or delete a remote control password.

- **Start Options**

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

You can also specify whether the server starts with the keyboard number lock on or off.

Note: If you installed a USB keyboard, you might need to use the Configuration/Setup utility to Enable keyboardless operation and prevent the POST error message 301 from being displayed during startup.

The server uses a startup sequence to determine the device from which the operating system starts. For example, you can define a startup sequence that checks for a startable diskette in the diskette drive, then checks the hard disk drive, and then checks a network adapter.

You can enable Wake on LAN and configure the Wake on LAN start sequence. For example, you can define a Wake on LAN startup sequence that checks for a startable CD-ROM in the CD drive, then checks the hard disk drive, and then checks a network adapter.

You also can enable a virus-warning test that checks for changes in the master boot record at startup.

- **Advanced Setup**

  Select this choice to change values for advanced hardware features, such as Memory Settings, CPU Options, PCI Bus Control, PCI Slot/Device Information, and Advanced System Management Processor Settings.

  A message appears above the choices on this menu to alert you that the system might malfunction if these options are configured incorrectly. Follow the instructions on the screen carefully.

  – **System Partition Visibility**

    With certain versions of ServerGuide, you can select this choice to identify if the System Partition is visible. To make the System Partition visible, set this value to **Visible**. To make the System Partition invisible, set this value to **Hidden**. See “Using the ServerGuide CD” on page 27 for additional information on the System Partition.

  – **Memory Settings**

    Select this choice to manually enable or disable a bank of memory and to enable Memory Mirroring.

    If a memory error is detected during POST or memory configuration, the server can automatically disable the failing memory bank and continue operating with reduced memory capacity. If this occurs, you must manually enable the memory bank after the problem is corrected. Select **Memory Settings** from the Advanced Setup menu, use the arrow keys to highlight the bank that you want to enable; then, use the arrow keys to select **Enable**.

  – **CPU Options**

    Select this choice to identify if the microprocessor serial number in the microprocessor is readable, or to set the microprocessor cache mode to disabled, write-back or write-through. Selecting write-back mode will provide better system performance.

    You can also enable the hyper-threading for the microprocessors in the local system.

  – **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.

  – **PCI-X Slot/Device Information**

Select this choice to configure and view information about the PCI-X slots and devices in the server and those located in the remote expansion enclosure, if attached (models 1RX, 2RX, 3RX, 4RX, 5RX, 6RX, 7RX, 3RY, 4RY only).

- **Error Logs**

  Select this choice to view or clear error logs.

  – Select **POST Error Log** to view the three most recent error codes and messages that the system generated during POST.

  – Select **Clear error logs** from the POST Error Log menu to clear the error log.

  – Select **System Event/Error Log** to view the System Error Log. The System Error Log contains all the system error and warning messages that the system has generated. You can use the arrow keys to move between pages in the System Error Log.

- **Save Settings**

  Select this choice to save your customized settings (except PCI slot utility changes).

- **Restore Settings**

  Select this choice to delete your changes (except PCI slot utility changes) and restore the previous settings.

- **Load Default Settings**

  Select this choice to cancel your changes (except PCI slot utility changes) and restore the factory settings.

- **Exit Setup**

  If you have made any changes and not saved them (except PCI slot utility changes), the program will prompt you to save the changes or exit without saving the changes.

Using passwords

The **System Security** choice appears only on the full Configuration/Setup Utility menu. After you select this choice, you can set a power-on password or an administrator password.

Power-on password

After you set a power-on password, you can enable the unattended-start mode. This locks the keyboard and mouse but enables the system to start the operating system. The keyboard and mouse remain locked until you type the correct password.

You can use any combination of up to seven characters (A–Z, a–z, and 0–9) for your power-on password. Keep a record of your password in a secure place. When a power-on password is set, POST does not complete until you type the password. If you forget the power-on password, you can regain access to the server through one of the following methods:

- If an administrator password is set, type the administrator password at the power-on prompt. (If necessary, see “Administrator password” on page 20 for details.) Start the Configuration/Setup Utility program and change the power-on password.
- Remove the battery and then reinstall the battery (see “Replacing the battery” on page 107 for more information).
- Move the jumper on J20 to positions 2 and 3; then, restart the server. This will remove the power-on password. Move the jumper on J20 to positions 1 and 2; then, restart the server and start the Configuration/Setup Utility program to change the power-on password.

Notes:

1. Before changing any switch settings or moving any jumpers, turn off the server; then, disconnect all power cords and external cables.
2. Any system-board switch or jumper blocks that are not shown in the illustrations in this book are reserved.

Administrator password

Select this choice to set an administrator password. The administrator password provides access to all choices on the Configuration/Setup Utility main menu. You can set, change, or delete both the administrator and power-on passwords and allow a power-on password to be changed by the user. You can use any combination of up to seven characters (A–Z, a–z, and 0–9) for your power-on password. Keep a record of your password in a secure place.

Attention: If an administrator password is set and then forgotten, it cannot be overridden or removed. You must replace the system board.

The following table provides a summary of the password features.

Table 1. Power-on and administrator password features

Type of password	Results
Power-on password	• Type the password to complete the system startup. • All choices are available on the Configuration/Setup Utility main menu.
Administrator password	• No password is required to complete the system startup. • Type the password to access the Configuration/Setup Utility program. • All choices are available on the Configuration/Setup Utility main menu.
Administrator *and* power-on password	• You can type either password to complete the system startup. • The administrator password provides access to all choices on the Configuration/Setup Utility main menu. You can set, change, or delete both the administrator and power-on passwords and allow a power-on password to be changed by the user. • The power-on password provides access to a limited set of choices on the Configuration/Setup Utility main menu. This limited access might include changing or deleting the power-on password.

16-way configuration (Models 1VX, 2VX, 3VX only)

The 16-way configuration (available on Models 1VX, 2VX, 3VX) consists of two IBM xSeries 440 servers containing two fully populated symmetrical multiprocessor (SMP) Expansion Modules that are connected to each other with cables and through BIOS settings. In this section, you will find 16-way configuration considerations and an introduction to terms that are specific to the 16-way configuration.

16-way considerations

Before you configure two IBM xSeries 440 servers to operate in a 16-way configuration, review the following:

- You must have four long SMP Expansion cables and two short SMP Expansion cables to properly connect the servers in a 16-way configuration.

- Each server must have two SMP Expansion modules. Each SMP Expansion module must have four Intel Xeon MP microprocessors and at least four DIMMs.
- The Remote Supervisor Adapters on each server must be connected to an Enterprise Network, or to each other with an Ethernet crossover cable, prior to merging the two servers.
- 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.
- When two servers are connected in a 16-way configuration and no video device is connected to the secondary server an error beep code might be heard during startup. This is an acceptable action.
- If two servers are cabled together, the scan order will be the primary server, then the secondary server. The PCI slots are scanned in the following order: PCI-X slots 1, 2, 3, 4, 5, 6 in the primary server then PCI-X slots 7, 8, 9, 10, 11, 12 in the secondary server.

  Important: This PCI-X scan order differs from the one described in the other xSeries 440 publications that came with your server.

16-way terms

This section provides definitions for terms that are specific to the 16-way configuration.

Static partition: A static partition is configured through the partition descriptor found in BIOS. This static partition defines how the servers are connected to share their resources.

Partition descriptor: A partition descriptor defines one server as the secondary server and the other as the primary.

Primary server: A primary server is the startup server. This server has control of the resources assigned to both servers and retains the error logs.

Secondary server: This server is controlled by the primary server.

Installing a 16-way configuration

This section provides the basic information that is needed to install an xSeries 440 16-way configuration.

Important: The steps in this section are intended for the authorized IBM service representative.

Configuring the static partition

If you have not already done so, install both xSeries 440 servers in the same rack cabinet. You must install the primary server directly above the secondary server. See the *Rack Installation Instructions* to install your servers, but do not connect any signal or device cables except power.

Notes:

1. Before you can create or delete a static partition, the Remote Supervisor Adapters must connect 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 merge or unmerge.

2. You must create a static partition on the primary server prior to cabling the servers together.
3. Whenever you delete the static partition, you must remove all the interconnected cables between the servers.
4. When two servers are merged together, the CD-ROM, diskette drive, keyboard, USB ports, mouse, and video are disabled on the secondary server.

Creating a static partition: Once your servers are installed in a rack cabinet, return here and complete the following steps:

1. Connect a pointing device, keyboard, and monitor to each of the two xSeries 440 servers.
2. Using the two short SMP Expansion cables that come with your servers, complete the following steps:
   a. Connect one end of the first SMP Expansion cable to port 3 of the top SMP Expansion Module on the primary server; then, connect the opposite end of the cable to port 3 of the bottom SMP Expansion Module on the primary server.
   b. Connect one end of the second SMP Expansion cable to port 3 of the top SMP Expansion Module on the secondary server; then, connect the opposite end of the cable to port 3 of the bottom SMP Expansion Module on the secondary server.
3. Start the Configuration/Setup Utility program.
   a. Turn on a server and watch the monitor screen.
   b. When the message `Press F1 for Configuration/Setup` appears, press F1.
   c. Select **Advanced Setup** from the menu; then, select **CPU Options** and enable hyper-threading.

      Notes:

      1) It is not necessary to enable hyper-threading in order to run a 16-way configuration; however, if hyper-threading is desired, it must be enabled on both servers.
      2) Any changes to hyperthreading settings must be done *before* merging the systems.

   d. Save and Exit setup.
4. Insert the Remote Supervisor Adapter diskette into the diskette drive.
5. Use the utility on the diskette to assign an IP address to the Remote Supervisor Adapter.

   Note: If you are configuring the secondary server make a note of the IP address. You will need this information later in this procedure.
6. Exit the utility and turn off the server.
7. Repeat steps 3 through 6 on the other server.
8. Connect the Remote Supervisor Adapters of each server to the network or use the Ethernet crossover cable to connect them to each other.
9. Create a static partition.
   a. Turn on the primary server and start the Configuration/Setup Utility as described in step 3.

      Note: Turning on the primary server may also turn on the secondary server. This is an acceptable action. The secondary server does not need to be turned on, but it does need to be connected to a power source.

b. Select **Advanced Setup** from the main menu.

c. Select **Static Partition Settings**.

d. Type the IP address of the Remote Supervisor Adapter in the secondary server in the **Secondary Host Name** field.

e. Select **Save Static Partition Settings** and follow the prompts.

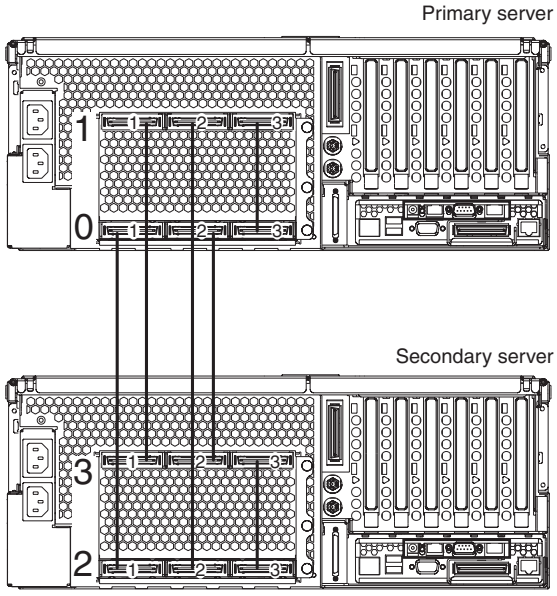
f. Exit the Configuration/Setup Utility Program.

g. Turn off both servers; then, continue with “Cabling the servers.”

Cabling the servers: This section contains instructions on how to cable two xSeries 440 servers together in a 16-way configuration.

1. Label each end of the long SMP Expansion cables according to where they connect to each server (see the following illustration).

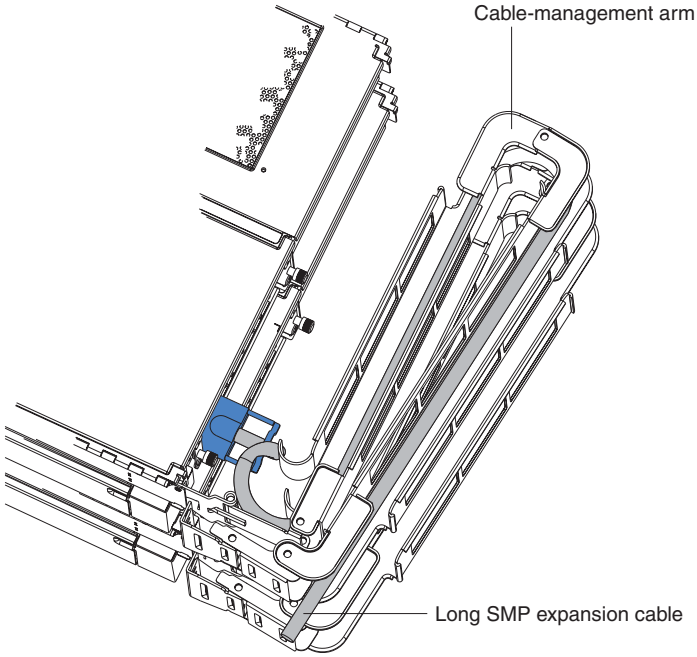
   Note: The SMP Expansion module numbering shown in the following illustration is for reference purposes only. These numbers do not appear on the servers.



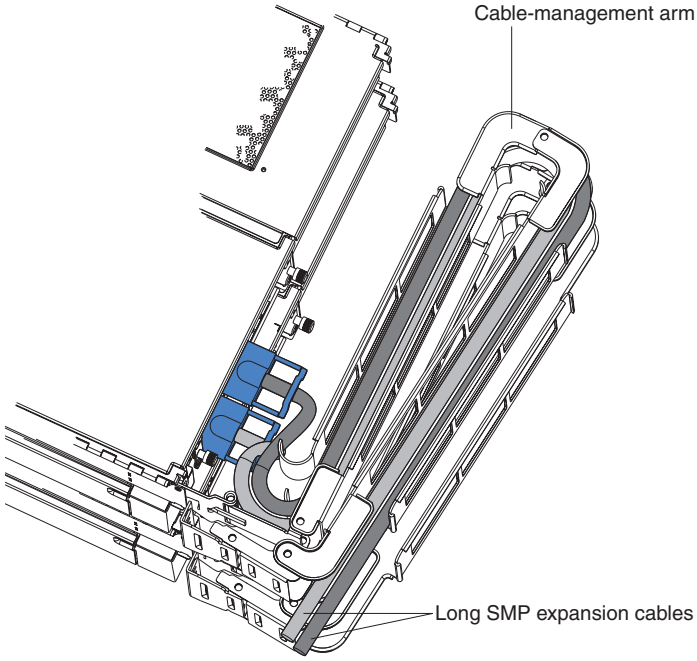
2. Connect the SMP Expansion cables to the primary server.

   a. Connect one end of a long SMP Expansion cable to port 1 of SMP Expansion Module 0 on the primary server; then, route the cable through the

cable-management arm.



b. Connect one end of a long 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.



c. Connect one end of a long 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 a.

d. Connect one end of a long 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 b.

e. Verify that a short SMP Expansion cable is connected between port 3 of SMP Expansion Module 0 and port 3 of SMP Expansion Module 1.

3. 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 short SMP Expansion cable is connected between port 3 of SMP Expansion Module 2 and port 3 of SMP Expansion Module 3.
4. Route any remaining cables through the cable-management arms.
5. Secure the cables in the cable-management arms with the hook-and-loop straps that come with your server.
6. If you are connecting to an IBM RXE-100 Remote Expansion Enclosure, go to “Cabling an RXE-100 Remote Expansion Enclosure to a 16-way system” on page 119 for instructions on how to connect the IBM RXE-100 to a 16-way system; then, return here.
7. Turn on the primary server; then, see the software documentation that comes with your server to install your operating system.

   Important: Do not use ServerGuide to install the operating system that comes with your server.

Deleting a static partition: Complete the following steps to delete the static partition:

1. Start the Configuration/Setup Utility on the primary server.
2. Select **Advanced Setup** from the main menu.
3. Select **Static Partition Settings**.
4. Select **Delete Static Partition Settings**.

   Note: Do not select **Save Static Partition Settings** when you delete the static partition.
5. Exit the Configuration/Setup Utility Program.
6. Turn the servers off and disconnect all interconnecting cables between the two servers.

Using the SCSISelect utility program

SCSISelect is a built-in, menu-driven configuration utility program that you can use to:

- View the default SCSI IDs
- Locate and correct configuration conflicts

The following sections provide instructions for starting the SCSISelect Utility program and descriptions of the menu choices that are available.

Note: If the server has a redundant array of independent disks (RAID) adapter installed, use the configuration method that is supplied with the RAID adapter to view or change SCSI settings for devices attached to the adapter.

Starting the SCSISelect utility program

Complete the following steps to start the SCSISelect Utility program:

1. Turn on the server.
2. When the `<<< Press <CTRL><A> for SCSISelect Utility! >>>` prompt appears, press Ctrl+A.
3. When the message `Would you like to configure the host adapter or run the SCSI disk utility?` appears, make your selection and press Enter.
4. Use the arrow keys to select a choice from the menu.
   - Press Esc to exit the SCSISelect Utility program.
   - Press the F5 key to switch between color and monochrome modes (if your monitor permits).
5. Follow the instructions on the screen to change the settings of the selected items; then, press Enter.

Choices available from the SCSISelect menu

The following choices appear on the SCSISelect Utility menu:

- **Configure/View Host Adapter Settings**

  Select this choice to view or change the SCSI controller settings. To reset the SCSI controller to its default values, press F6; then, follow the on-screen instructions.

  You can view or change the following controller settings:

  – **Host Adapter SCSI ID**

    Select this choice to view the SCSI controller identification (ID), which is usually 7.

  – **SCSI Parity Checking**

    Select this choice to view the assigned value of *Enabled.*

  – **Host Adapter SCSI Termination**

    Select this choice to view the assigned value of *Automatic.*

  – **Boot Device Options**

    Select this choice to configure startable-device parameters. Before you can make updates, you must know the ID of the device whose parameters you want to configure.

  – **SCSI Device Configuration**

    Select this choice to configure SCSI-device parameters. Before you can make updates, you must know the ID of the device whose parameters you want to configure.

    Note: The Maximum Sync Transfer Rate is the transfer rate for Ultra SCSI devices.

    - The transfer rate for Ultra160 low voltage differential (LVD) devices is 160.0 MBps.
    - The transfer rate for Ultra2 SCSI LVD devices is 80.0 MBps.

- The transfer rate for Fast SCSI devices is 20.0 MBps.

– **Advanced Configuration Options**

  Select this choice to view or change the settings for advanced configuration options. These options include support for large hard disk drives and support for drives with Ultra SCSI speeds.

- **SCSI Disk Utilities**

  Select this choice to view the SCSI IDs that are assigned to each device or to format a SCSI device.

  To use the utility program, select a drive from the list. Read the on-screen instructions carefully before making a selection.

  Note: If you press Ctrl+A before the selected drives are ready, an Unexpected SCSI Command Failure screen might appear. Restart the server and watch the SCSISelect messages as each drive starts. After the drive that you want to view or format starts, press Ctrl+A.

Using the ServeRAID configuration programs

A ServeRAID adapter enables you to use multiple physical SCSI hard disk drives as logical drives, operating as a disk array. To enable you to configure the ServeRAID controller, the adapter comes with a CD containing the ServeRAID Manager program and the ServeRAID Mini-Configuration program. For details about using these programs, see the documentation that comes with the ServeRAID adapter.

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

Using the ServerGuide CD

The ServerGuide CD (models 1RX, 2RX, 3RX, 4RX, 5RX, 6RX, 7RX, 3RY, 4RY only) includes easy-to-use software setup tools and installation tools that are specifically designed for the IBM server. The ServerGuide Setup and Installation program detects the server model and hardware options that are installed and uses that information during setup to configure the hardware. The ServerGuide tools simplify network operating system (NOS) installations by providing updated device drivers, and in some cases, installing them automatically.

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

If a newer version of the ServerGuide software is available, you can purchase an update package. For details, see the ServerGuide Updates form that comes with the server, or go to the ServerGuide fulfillment Web site at http://www.ibm.com/pc/qtechinfo.migr-42kppt.html.

The ServerGuide software has the following features to make setup easier:

- An easy-to-use interface
- Diskette-free setup and configuration programs that are based on detected hardware
- Device drivers that are provided for the server model and detected hardware
- NOS partition size and file-system type that are selectable during setup

Features at a glance

Specific features and functions can vary with different versions of the ServerGuide software. To learn more about the version that you have, start the *Setup and Installation* CD and view the online Overview.

The following is a summary of ServerGuide features.

- Sets system date and time.
- Detects the ServeRAID adapter or controller and runs the ServeRAID configuration program.
- Updates the ServeRAID firmware without creating diskettes.
- Detects installed hardware options and provides updated device drivers for most adapters and devices.
- Provides diskette-free installation for Microsoft Windows 2000 Server Family, Windows NT 4.0 Enterprise Edition (single SMP Expansion Module models only), and select Linux operating systems. Windows 2003 is supported under ServerGuide 7.1.
- Includes an online README file with links to tips for the hardware and NOS installation.

Notes:

1. The ServerGuide program requires a supported IBM server with an *enabled* startable (bootable) CD-ROM drive. Not all features are supported on all models.
2. Installation requires the NOS CD.

Setup and configuration overview

When you use the *Setup and Installation* CD, you do not need setup diskettes. You can use the CD to configure any supported IBM server model. The setup program provides a list of tasks that are required to set up the server model. On RAID servers, you can run the ServeRAID Manager program to create logical drives.

Note: Specific features and functions can vary with different versions of the ServerGuide software.

When you start the *Setup and Installation* CD, the following happens:

- You are prompted for the language, country, and keyboard layout. (This information is stored and later passed on to the NOS installation program.)
- The ServerGuide program displays choices for running the configuration programs. For example:
  - The Express Configuration method runs the required programs for the server, based on the hardware that is detected.
  - The Custom Configuration method displays all programs that are available for the server, and you decide which programs to run.
  - The Replicated Configuration method provides the option of duplicating your setup selections to other servers that are the same model.
- If you select the Custom Configuration method, the following programs are optional. If you select the Express Configuration method, some or all of these programs are run, depending on the hardware that is detected.
  - The Set Date and Time feature is provided so that you do not have to use the Configuration/Setup Utility program to access these settings.

  - The Clear Hard Disks program is provided so that you can delete all partitions on all hard disk drives. If the server has a ServeRAID adapter installed, you can select to restore the configuration on the ServeRAID adapter to the factory default settings.
  - The ServerGuide program checks the server BIOS code and microcode (firmware) levels for supported options and then checks the CD for a newer level. CD content can be newer than the hardware. The ServerGuide program can perform a flash update of the BIOS code and supported microcode (firmware) options without the use of diskettes.
  - The ServeRAID configuration program starts, guiding you through the entire configuration process.
  - The Performance Optimizer program easily tunes the server for your environment.
  - The ServerGuide program creates a System Partition on the default drive.
- The ServerGuide program displays a confirmation summary, so that you will know when you have completed all the required tasks. Then, you are ready to install the NOS.

Notes:

1. 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 NOS is installed. See the documentation that comes with the adapter.
2. 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 Remote Supervisor Adapter disk operating system (DOS) utilities, system diagnostics, flash BIOS updates, and other programs.

Note: 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 *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 NOS Installation

The server supports the following network operating systems:

- Windows 2000 Server Family
- Windows 2003 (ServerGuide 7.1)

See “Features at a glance” on page 28 for details about the specific network operating systems supported by ServerGuide.

You can use the ServerGuide program to shorten the installation time. The ServerGuide program provides the necessary device drivers, based on the hardware that you have and the NOS that you are installing. (If you prefer to install the NOS without using ServerGuide, you can do so. (See the important information at “Installing the NOS without ServerGuide” on page 30 for details.) The following is a brief explanation of a typical ServerGuide NOS installation.

Note: Specific features and functions can vary with different versions of the ServerGuide software

- After you have completed the setup process, the operating system installation program starts. (You will need a copy of the NOS CD to complete the installation.)
- The ServerGuide program stores information about the server model, Remote Supervisor Adapter, hard disk controllers, and network adapters. It then checks the CD for newer device drivers. This information is stored and then passed to the NOS installation program.
- The ServerGuide program presents NOS partition options that are based on your NOS selection and the installed hard disk drives.

The ServerGuide program prompts you to insert the NOS CD and restart the server. At this point, the installation program for the NOS (for example, Microsoft Windows 2000) takes control to complete the installation.

Installing the NOS without ServerGuide

If you have already configured the server hardware and you decide not to use the ServerGuide program to install the NOS, download the latest NOS installation instructions:

1. Go to http://www.ibm.com/pc/support.
2. From the **Browse the support site** menu, click **Servers**.
3. From the **Family** menu, click **xSeries 440**.
4. On the left side of the page, click **OS Installation** to see the list of installation instructions for the supported operating systems.
5. From the **Operating System installation by Category** menu, select a supported operating system to see the list of installation instructions.

Setting up the Remote Supervisor Adapter

This section identifies the Remote Supervisor Adapter features, and prerequisites. It also explains how to use the documentation effectively and how to cable and configure the 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 Documentation CD that is shipped with the server.

Note: Use of the keystroke ctrl+] or ctrl+r to remotely simulate Ctrl+Alt+Delete is not supported.

Remote Supervisor Adapter features

The Remote Supervisor Adapter provides the following:

- Continuous health monitoring and control
- Advanced Predictive Failure Analysis® (PFA)
- Configurable notification and alerts
- Event logs that are timestamped, 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 the World Wide Web at http://www.ibm.com/pc/support.

Do 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.
- You must 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 supported Web browsers and browser requirements are:
  - 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.

Using the documentation

The documentation for the Remote Supervisor Adapter includes the following publications on the *IBM Documentation* CD.

- *IBM @server xSeries 440 User's Guide*.
- *Remote Supervisor Adapter User's Guide* for the *IBM @server xSeries 440*.

  This document explains how to configure and use an ASM network to manage the server remotely through either the Web-based interface or the text-based user interface.

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, this enables you to restore the configuration and resume normal operation more quickly. See the *Remote Supervisor Adapter User's Guide* for the *@server xSeries 440,* on the *IBM Documentation* CD for details.

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

Task 2. Perform the initial configuration to enable remote access to the Remote Supervisor Adapter. See "Enabling remote access to the adapter" on page 34. This enables you to:

1. Configure the Ethernet port
2. Configure the serial (COM) port
3. Set up the point-to-point protocol

Task 3. Configure the remote control password to enable the ASM Web interface remote control features. See "Configuring the remote control password" on page 40.

Task 4. Install the ASM device drivers. See "Installing Advanced System Management device drivers" on page 39.

Cabling the Ethernet LAN port and serial 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. Choose 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 41 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 45 before you connect the cables. Then, return here 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 the HTTP protocol	LAN using the Ethernet port	"Cabling the Ethernet LAN port" on page 33
Text-based user interface using the TELNET protocol		

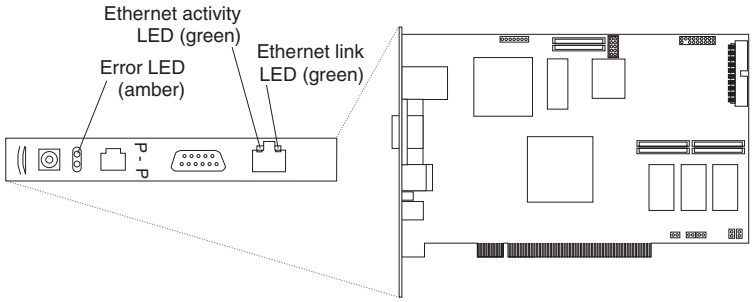
Table 2. Cabling tasks to enable remote access to the Remote Supervisor Adapter (continued)

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	Serial (COM) port	"Cabling the serial (COM) port"
ASM Web interface using point-to-point (PPP) protocol		
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* plug the ASM Interconnect module into 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.



Ethernet link LED
The green Ethernet link LED is lit when the Ethernet cable is connected properly.

Ethernet activity LED
The green Ethernet activity LED flashes when there is Ethernet activity.

If you want to use the serial port connection, continue with "Cabling the serial (COM) port" on page 33; otherwise, go to "Configuring the adapter."

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

Continue with "Configuring the adapter."

Configuring the adapter

This section describes the following:

- Enabling remote access to the Remote Supervisor Adapter
- Installing 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 serial port. From Table 3, choose 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 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 the HTTP protocol	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	Serial (COM) port	"Configuring the serial port for text-based remote access" on page 36 and "Setting up point-to-point protocol" on page 37
ASM Web interface using point-to-point (PPP) protocol		
Text-based user interface using the TELNET protocol over PPP		

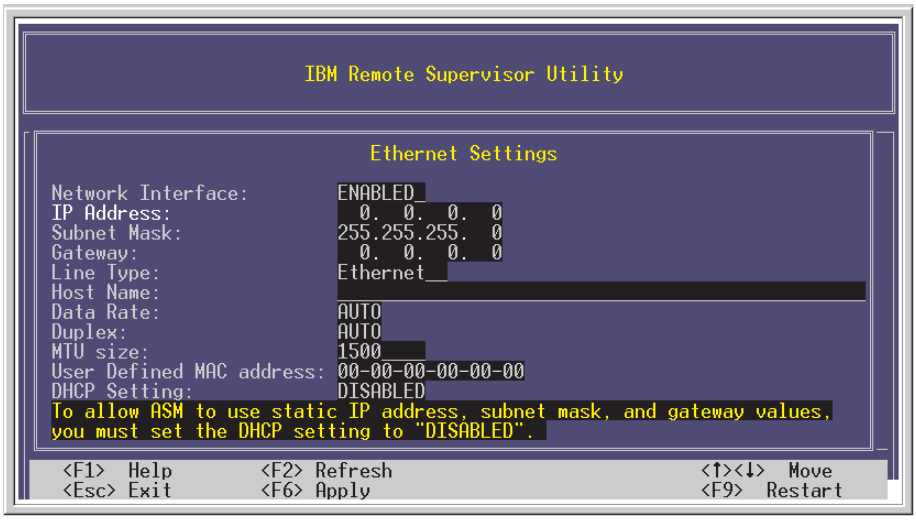
Configuring the Ethernet settings for Web-based remote access: If you have an accessible, active, and configured dynamic host configuration protocol (DHCP) server on the network, the hostname, IP address, gateway address, subnet mask, and DNS server IP address are set automatically. You do not need to 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 serial port, go to "Configuring the serial port for text-based remote access" on page 36; otherwise, go to "Configuring the remote control password" on page 40.

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.
2. The utility starts automatically, displaying the Remote Supervisor Utility window.
3. Use the Up Arrow and Down Arrow keys (↑ and ↓) to select **Configuration Settings**; then, press Enter. The Configuration Settings window opens.
4. 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.



5. 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 hostname of the Remote Supervisor Adapter. The default hostname is ASMA<*burned-in MAC address*>.

   For detailed information about the Ethernet settings, see the *Remote Supervisor Adapter User's Guide* on the *IBM Documentation* CD.
6. Change the DHCP Setting field to **Disabled**. The default value is Enabled.
7. Press F6 to apply the change.
8. Press Esc. After the Warning window opens, press Enter to restart the Remote Supervisor Adapter.
9. Press Esc to return to the Configuration Settings window. If you need to configure the serial port, go to "Configuring the serial port for text-based remote access" on page 36.
10. Press Esc to return to the Utility program main window.
11. Use the arrow keys to select **Exit Utility** from the menu or press Esc to close the Utility program.
12. Remove the diskette from the server. The server restarts automatically.
13. If you also want to configure the serial port, continue with "Configuring the serial port for text-based remote access" on page 36. Otherwise, go to "Installing Advanced System Management device drivers" on page 39.

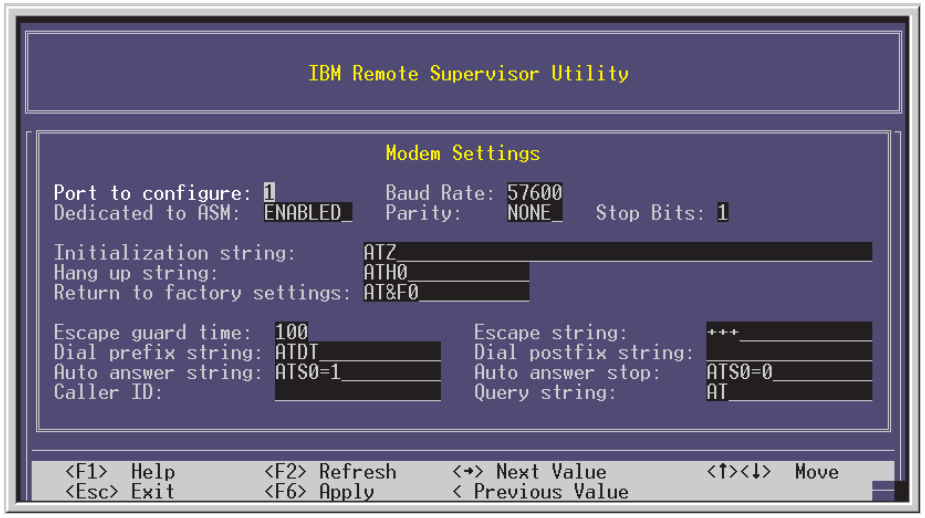
Configuring the serial port for text-based remote access: Complete the following steps to configure the Remote Supervisor Adapter serial port for access using a modem or null modem. If you completed the procedure for configuring the Ethernet port and the Configuration Settings window is open, go to step 4.

1. With the server turned off, insert the diskette with the downloaded utility program into the diskette drive; then, turn on the server.
2. The utility starts automatically, displaying the Remote Supervisor Utility window.
3. Use the Up Arrow and Down Arrow keys (↑ and ↓) to select **Configuration Settings**; then, press Enter.

   The Configuration Settings window opens.
4. 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.



5. Verify the following serial 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 serial 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 serial port remains dedicated to system management and is not returned to the operating system.

   You can dedicate the integrated serial port on the Remote Supervisor Adapter to system management or share it with the operating system. If the serial 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 serial port, you must first install the ASM device drivers as described in “Installing Advanced System Management device drivers” on page 39.

If the serial 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 serial port and modem settings, see the *Remote Supervisor Adapter User's Guide* on the *IBM Documentation* CD.

6. If you made changes to the serial port settings, press F6 to apply the change.
7. 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.”
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 Remote Supervisor Adapter restarts automatically.
11. Continue with “Setting up point-to-point protocol.”

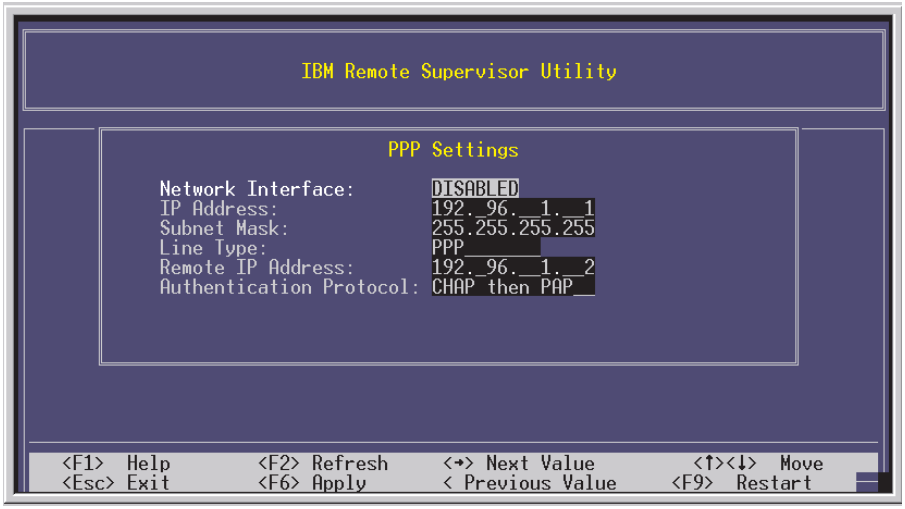
Setting up point-to-point protocol: The Remote Supervisor Adapter serial port supports point-to-point protocol (PPP). PPP enables TCP/IP communication over the serial port, which enables Web-based management and TELNET sessions over a modem. To set up PPP, complete the following steps. If you completed the procedure for configuring the serial port and the Configuration Settings window is open, go to step 4 on page 37.

1. With the server turned off, insert the downloaded utility program into the diskette drive; then, turn on the server.
2. The utility starts automatically, displaying the Remote Supervisor Utility window.
3. Use the Up Arrow and Down Arrow keys (↑ and ↓) to select **Configuration Settings**; then, press Enter.

   The Configuration Settings window opens.
4. 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.



5. 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 serial port in the *Remote Supervisor Adapter User's Guide* on the *IBM Documentation* CD.
6. Press F6 to apply the changes.
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 serial port, go to "Configuring the serial port for text-based remote access" on page 36.
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 diskette drive. The server restarts automatically.

12. 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 the World Wide Web at 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 either Microsoft Windows NT or 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.”

After you install the ASM device drivers, go to “Configuring the remote control password” on page 40 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 CD-ROM drive.
4. Follow the directions that display on the screen.
5. Go to “Configuring the remote control password” on page 40.

Installing Windows NT ASM device drivers: Choose 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 CD-ROM drive).

     Press Enter.
2. Follow the instructions that appear in the window.
3. Go to “Configuring the remote control password.”

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 CD-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 into 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.
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 Documentation* CD. The tasks include the following:

- 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 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 *Remote Supervisor Adapter User's Guide for the xSeries 440* on the Documentation CD.

You must connect an ASM Interconnect module to the Remote Supervisor Adapter and to each xSeries 440 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 plug the ASM Interconnect module into 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. Table 4 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.

Table 4. ASM interconnect network server list

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

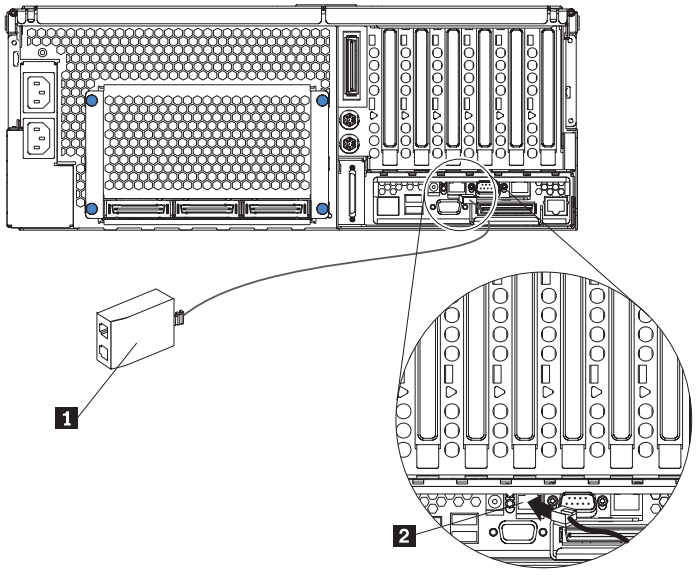
Table 4. ASM interconnect network server list (continued)

Server Name	ASM Interconnect module needed
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

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 45.

Connecting the ASM Interconnect module to the xSeries 440: 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.

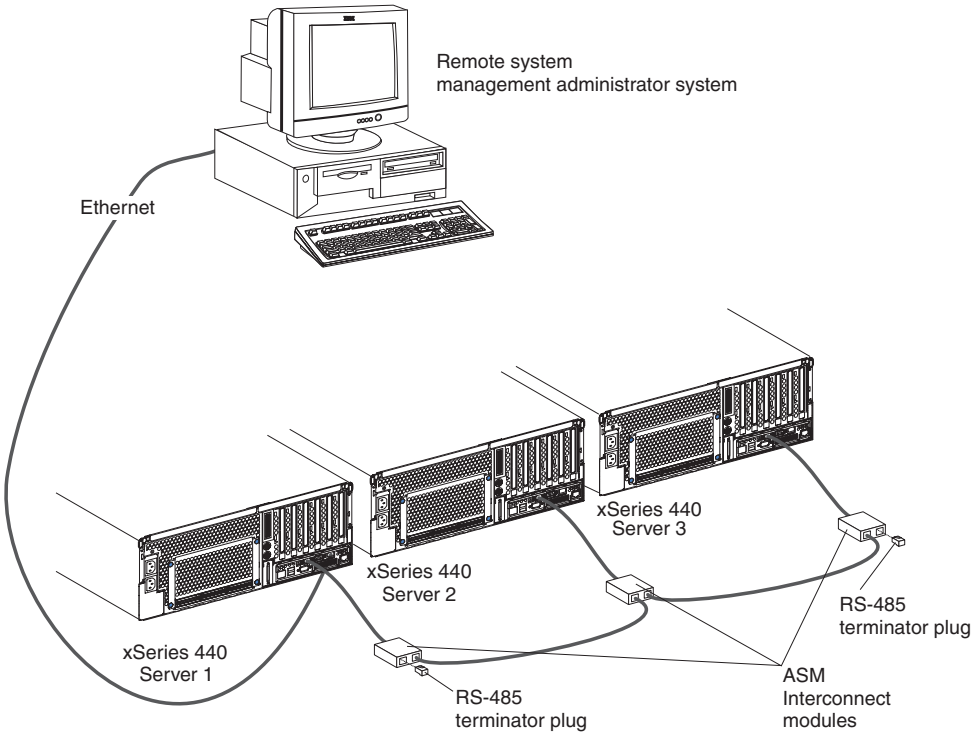


1. Connect the ASM Interconnect module **1** to the Remote Supervisor Adapter ASM interconnect (peer-to-peer) port **2** as shown in the following illustration. This port is on the edge of the Remote Supervisor Adapter that is accessible from the rear of the server and is labeled RS485.
2. Connect one 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 45.

ASM interconnect network configuration examples

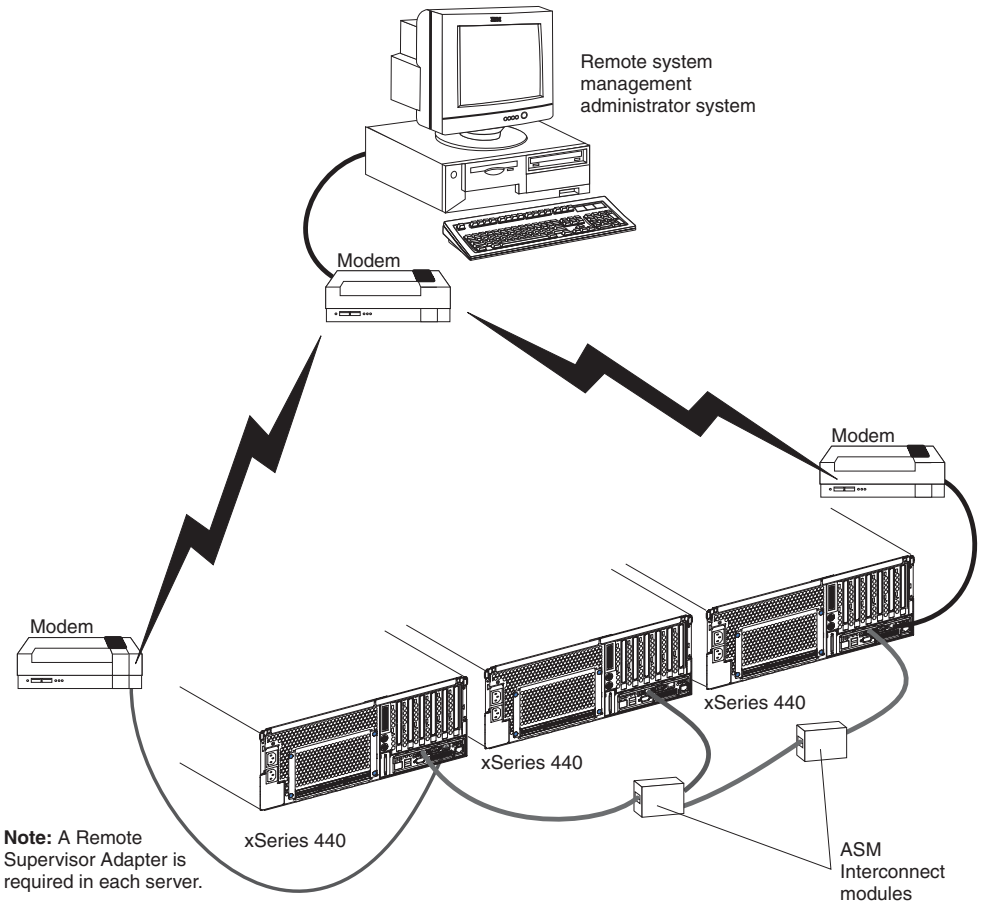
The illustrations in this section show sample ASM interconnect network configurations.

The following illustration shows an Ethernet cable connecting the remote administrator system to the Remote Supervisor Adapter that is installed in an xSeries 440. Server 1 uses the LAN connection to forward system-management data generated by the other xSeries 440s in the ASM interconnect network bus to the remote system-management administrator.



Note: The ASM Interconnect module is connected to the RS485 port on the back panel of the Remote Supervisor Adapter in each server.

The following illustration shows a modem connected to the serial port of the Remote Supervisor Adapter in the xSeries 440 on the left, a modem connected to the serial port of the Remote Supervisor Adapter in the xSeries 440 on the right, and a modem connected to the remote administrator system. Placing modems at opposite ends of the ASM interconnect network bus ensures that if an ASM interconnect connection in the bus fails, all of the servers on the ASM interconnect network have access to a modem to forward system-management data to the remote system-management administrator.



Note: The ASM Interconnect module is connected to the RS485 port on the back panel of the Remote Supervisor Adapter in each server.

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.

High-performance Ethernet modes

Your Ethernet controller supports optional modes, such as teaming, load balancing, fault tolerance, and virtual LANs, which provide higher performance, security, and throughput for the server. These modes apply to the integrated Ethernet controller and to the controllers on supported Ethernet adapters, such as the IBM 10/100/1000 Ethernet Adapter or the IBM 10/100/1000 EtherJet™ PCI family of adapters.

Teaming mode

Your Ethernet controller provides options, called *teaming options*, that apply to supported Ethernet controllers. A team can consist of two or more Ethernet controllers, two Ethernet adapters, or a mix of integrated Ethernet controllers and Ethernet adapters. These options increase throughput and fault tolerance when running with Windows 2000, Windows NT 4.0, Linux, or NetWare 4.1x or later.

- **Adapter fault tolerance** (AFT) provides automatic redundancy for your Ethernet controllers. You can configure either one of the integrated Ethernet controllers or an Ethernet adapter as the primary Ethernet controller. If the primary link fails, the secondary controller takes over. When the primary link is restored to an operational state, the Ethernet traffic switches back to the primary Ethernet controller. Adapter fault tolerance supports from two to four controllers per team.
- **Adaptive load balancing** (ALB) enables you to balance the transmission data flow among two to four controllers. ALB also includes the AFT option. You can use ALB with any 100BASE-TX/1000BASE-T switch.
- **Cisco Fast EtherChannel** (FEC) creates a team of two to four controllers to increase transmission and reception throughput. FEC also includes the AFT option. You can use FEC only with a switch that has FEC capability.

If you use supported Ethernet adapters in the server, refer to the documentation that comes with the adapters for more information about the teaming modes.

Virtual LAN mode

A virtual LAN (VLAN) is a logical grouping of network devices put together as a LAN, regardless of their physical grouping or collision domains. Using VLANs increases network performance and improves network security.

VLANs offer you the ability to group users and devices together into logical workgroups. This can simplify network administration when connecting clients to servers that are geographically dispersed across a building, campus, or enterprise network.

Typically, VLANs are configured at the switch and any computer can be a member of one VLAN per installed network adapter. Your Ethernet controller supersedes this by communicating directly with the switch, enabling multiple VLANs on a single network adapter (up to 64 VLANs).

To set up VLAN membership, your Ethernet controller must be attached to a switch that has VLAN capability.

To join a VLAN from Microsoft Windows NT 4.0:

1. Create a VLAN on the switch. Use the parameters you assign there to join the VLAN from the server. See your switch documentation for more information.
2. Double-click the **Network** icon in the Control Panel window.
3. On the Adapters page, select the adapter you want to be on the VLAN and click **Properties**.
4. Select the **Load Balance/Virtual LAN** tab.
5. Type the VLAN ID and VLAN name. The VLAN ID must match the VLAN ID of the switch. The ID range is from 1 to 1000. The VLAN name is for information only and does not need to match the name on the switch.
6. Click **OK**. Repeat steps 3 through 5 for each VLAN that you want the server to join. The VLANs that you add are listed on the Configuration page.
7. Click **Close** and restart the computer.

Priority Packet mode

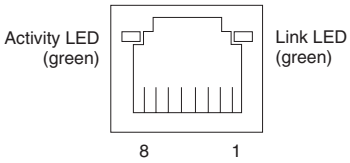
Priority Packet is a traffic-prioritization utility that enables you to set up filters to process high-priority traffic before normal traffic. You can send information from critical nodes or applications with an indicated priority. Because you set this priority at the host or entry point of the network, the network devices can base forwarding decisions on priority information defined in the packet.

IEEE 802.1p is an IEEE standard for tagging, or adding additional bytes of information to packets with different priority levels. Packets are tagged with 4 additional bytes, which increase the packet size and indicate a priority level. When you send these packets out on the network, the higher priority packets are transferred first. Priority packet tagging (also known as Traffic Class Expediting) enables the Ethernet controller to work with other elements of the network (such as switches and routers) to deliver priority packets first. You can assign values to packets based on their priorities when you use the IEEE 802.1p standard for packet tagging. This method requires a network infrastructure that supports packet tagging. The routing devices receiving and transferring these packets on your network must support 802.1p for tagging to be effective.

To enable support for priority packets, you must go to the integrated Ethernet controller Properties **Advanced** tab and enable the **802.1p QOS** feature.

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.



Diagnostics

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

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 upgradable 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 57 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 152 and “POST error codes” on page 181 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 (models 1VX, 2VX, 3VX only) 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 116.

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 61), 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 61).

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.

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 16 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 59 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 7).
2. Proceed to the light path diagnostics panel (see the illustration at step 1 on page 55).
3. Check the lights on the top of the server (see the illustration at step 2 on page 55).
4. Look inside the server, if required.

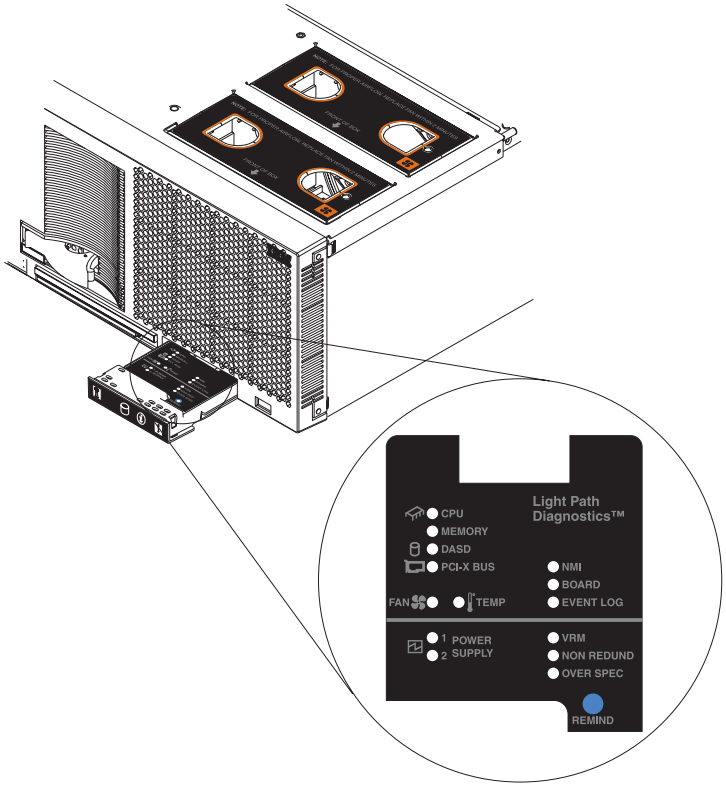
Many errors are first indicated by the illumination of the system-error light in the operator information panel on the front of the server (see “Server controls and indicators” on page 7). If the system-error light is on, one or more lights on top of and/or inside the server might also be on that can 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 201., “Handling electrostatic discharge-sensitive devices” on page 204, and “Working inside a server with power on” on page 71.

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 155.



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 155.

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.

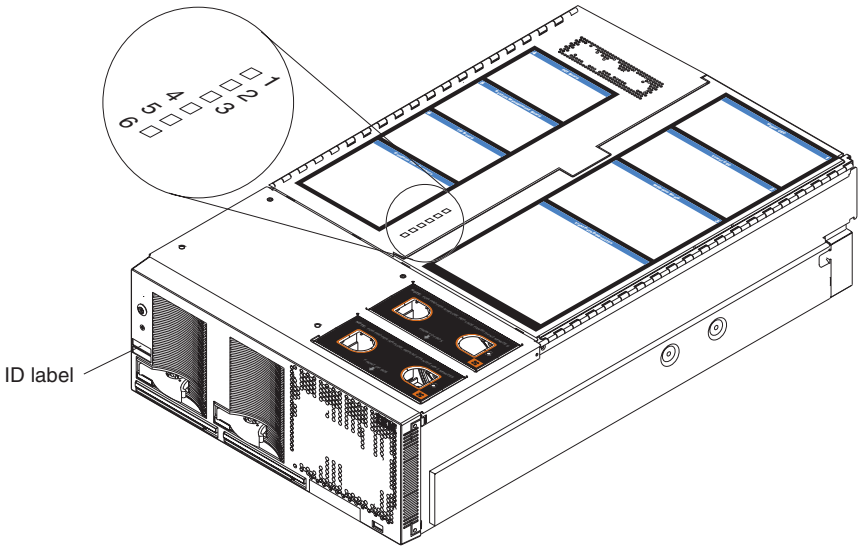


Table 5. Top cover LEDs

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 155, 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.

Small computer system interface (SCSI) messages

If you receive a SCSI error message when running the SCSISelect Utility program, see “SCSI error messages” on page 187 for more information.

If you have verified those items and the problem persists, run the diagnostic programs to obtain additional information about the failing device. See “Starting the diagnostic programs” on page 59.

Note: If the server does not have a hard disk drive, ignore any message that indicates that the BIOS code is not installed.

Diagnostic programs and error messages

The server diagnostic programs are stored in upgradable 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.

Note: When running F2 diagnostics on xSeries 440 memory, a failure or error message will be recorded in both the diagnostics log and the service processor log.

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.

- When running F2 diagnostics on xSeries 440 memory, this parameter will identify the failed memory DIMM as well as identifying the SMP Expansion Module in which the failed memory DIMM is located.

  A parameter of ″0xx″ indicates the lower SMP Expansion Module, and ″1xx″ indicates the upper SMP Expansion Module.

  A typical memory error in the xSeries 440 will be similar to the following:

  ```
  201-200-006-20030506-04-System Memory: Failed
  ```

  In the above example, “006” indicates DIMM slot 6 on the lower SMP Expansion Module. A memory error in DIMM slot 6 on the upper SMP Expansion Module would be recorded as “106”. See diagnostic error codes 201-xxx-Ynn and 201-xxx-Y99 at “Diagnostic error codes” on page 162.

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

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 (models 1VX, 2VX, 3VX only), 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.

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 (models 1VX, 2VX, 3VX only), or with step 3 for all other models.

   Note: For 16-way configuration (models 1VX, 2VX, 3VX only), turn on both servers and watch the screen.

2. For 16-way configuration (models 1VX, 2VX, 3VX only): When the message `Press ESC to bypass partition merge and boot standalone` appears, press ESC; then continue with step 3.
3. When the message `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.

   Note: For 16-way configuration (models 1VX, 2VX, 3VX only), you must connect a pointing device, keyboard, and monitor to the secondary server 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 persists, 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 162..

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 54.

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 440 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 59 of “Starting the diagnostic programs” on page 59). 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 440 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

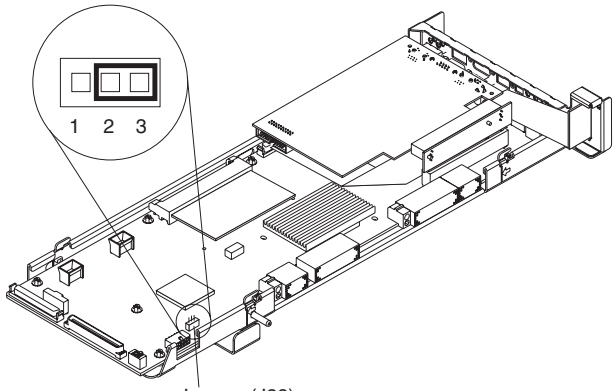
If the BIOS code has become damaged, such as from a power failure during a flash update, you can recover the BIOS code using the BIOS code page jumper and a BIOS flash diskette.

Note: You can obtain a BIOS flash diskette from one of the following sources:

- Use the ServerGuide program to make a BIOS flash diskette.
- Download a BIOS flash diskette from the World Wide Web. 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 72).
2. Remove fans 3 and 4 (see “Fans 3 and 4” on page 105).
3. Locate the BIOS code page jumper (J28) on the I/O board.



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 “Fans 3 and 4” on page 105).
16. Restart the server.
17. Replace the cover (see “Closing the cover” on page 106).

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 system serial 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.

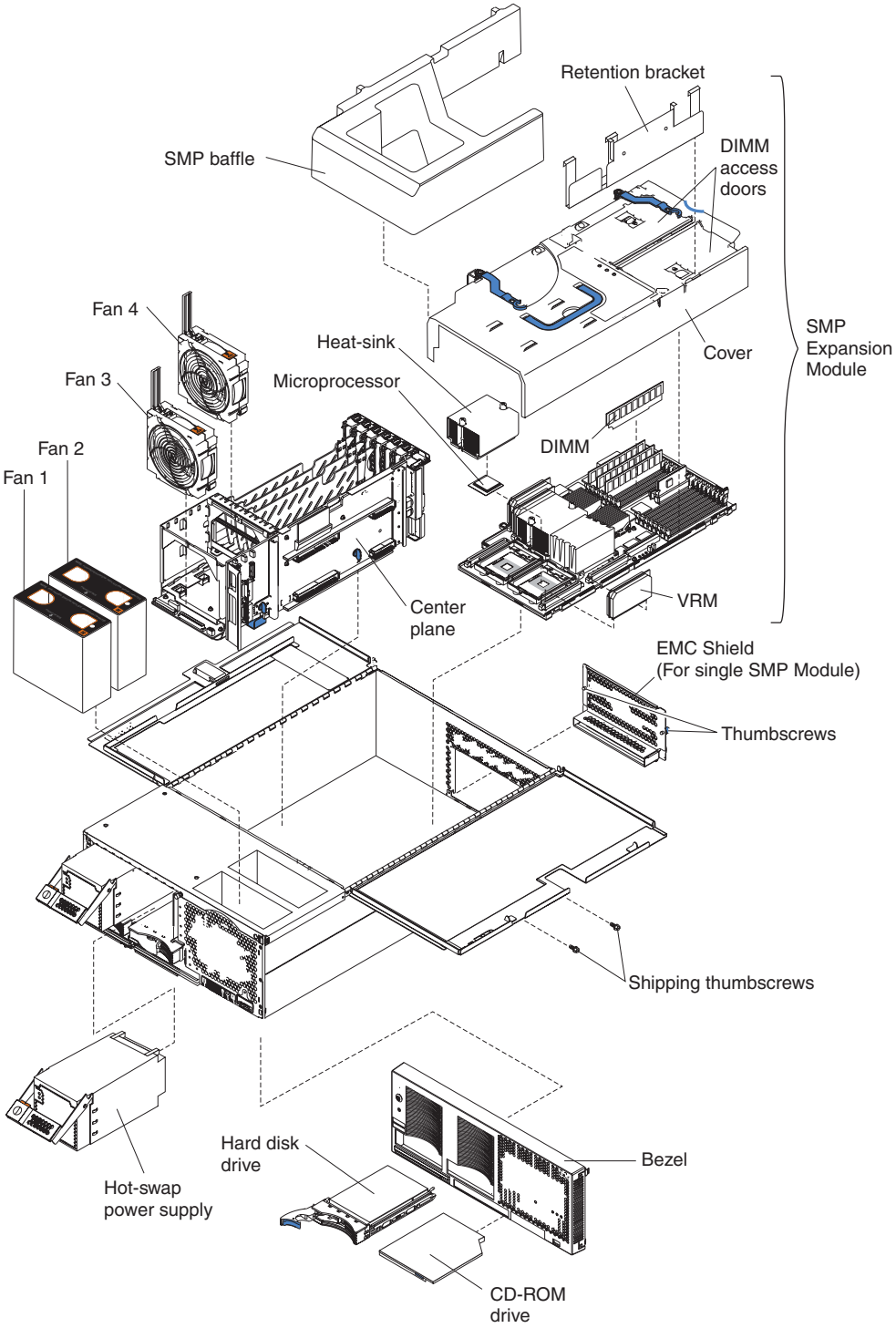
Installing options

This section provides basic information that is needed to install certain components. For a list of supported options for this server, see the ServerProven® list at http://www.ibm.com/pc/compat/.

Major components of the xSeries 440

The illustration in this section shows the locations of major components in the server.

Note: The illustrations in this document might differ slightly from your hardware.



Installation guidelines

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

- Become familiar with the information in “Handling electrostatic discharge-sensitive devices” on page 204 and the safety guidelines provided in “Safety information” on page 201. These guidelines will help you work safely while working with the server or options.
- The orange color on components and labels in the server identifies hot-swap or hot-plug components. You can install or remove these components while the system is running, provided that your system is configured to support this function.
- The blue color on components and labels identifies touch points where you can grip a component, move a latch, and so on.
- Make sure that you have an adequate number of properly grounded electrical outlets for the server, monitor, and any other options that you intend to install.
- Back up all-important data before you make changes to disk drives.
- For a list of supported options for the xSeries 440, refer to http://www.ibm.com/pc/compat/ on the World Wide Web.

Working inside a 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.
- Take care to avoid dropping any metallic objects, such as paper clips, hair pins, or screws, into the server.

System reliability considerations

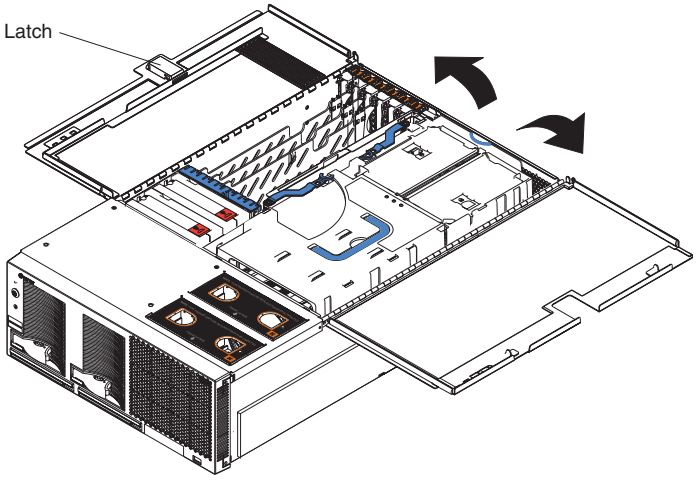
To help ensure proper cooling and system reliability, make sure that:

- Each of the drive bays has either a drive or a filler panel installed.
- There is space around the server to allow the cooling system to work properly.
- Cables for optional adapters are routed according to the instructions that are provided with the adapters.
- All microprocessors are the same size and clock speed.
- When two SMP Expansion modules are installed, they are connected together through the SMP Expansion Ports.
- An SMP baffle is installed on top of the lower SMP Expansion module when only one module is installed.
- For proper cooling, do not leave the cover open for more than 30 minutes.
- A failed fan is replaced within 48 hours.
- The top cover is closed during normal operation.
- Do not remove a defective power supply until a replacement is available.

Opening the cover

Complete the following steps to open the server cover:

1. Review the information in “Installation guidelines” on page 71.



2. Slide the server out from the rack.
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.

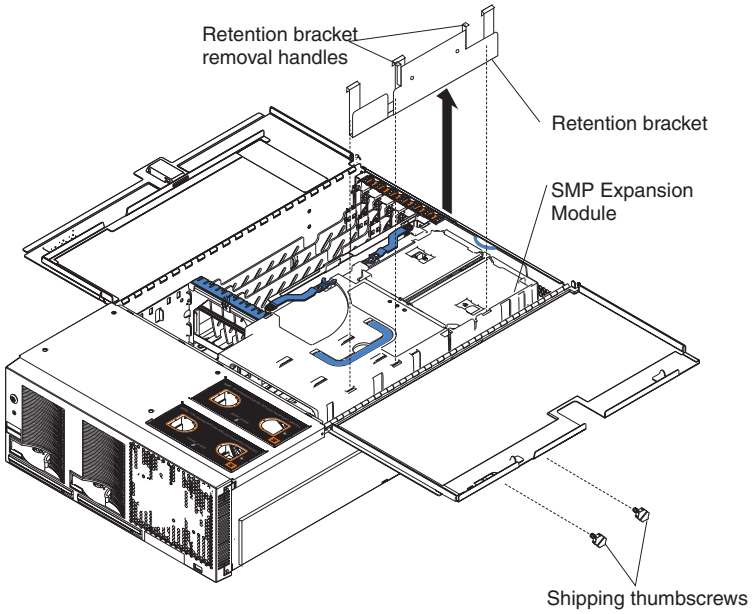
   Attention: For proper cooling and airflow, close the cover before turning on the server. Operating the server for extended periods of time (over 30 minutes) with the cover removed might damage server components.

Retention bracket removal

The server comes with one retention bracket. This bracket is used to secure the SMP Modules in place. It will be easier to remove the SMP Modules if the retention bracket is removed.

Complete the following steps to remove the retention bracket from the server.

1. Remove the shipping screws from the right side of the server.

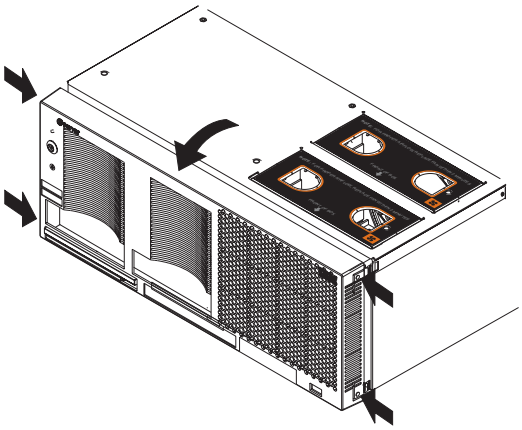


2. Open the cover.
3. Grasp the bracket by the two blue tabs and lift it up and out of the server.

   Note: It is recommended that the retention bracket remain in place during normal operation of the server.

Bezel removal

Complete the following steps to remove the server bezel:



1. Press on two of the tabs at opposite edges of the bezel and pull this edge of the bezel slightly away from the server.

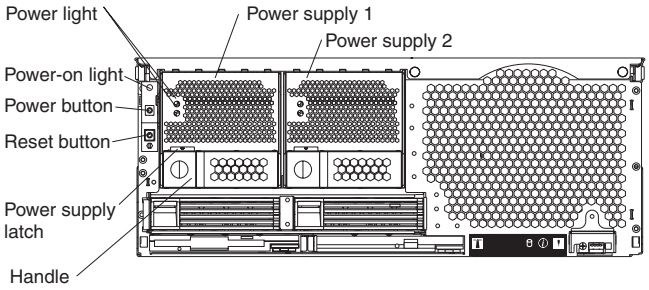
   Note: It may be easier to press the bottom tabs first.
2. Press in on the two tabs at the other edge of the bezel, and pull the bezel off the server. Store the bezel in a safe place.

Complete the following steps to replace the bezel:

1. Align the four tabs with the slots in the server chassis.
2. Press firmly against the front corners of the bezel until it snaps into place.

Hot-swap power supplies

The server comes with two hot-swap power supplies, which can be removed and replaced without turning off the server. This section provides information on how to properly remove and replace these power supplies.



Notes:

1. During normal operation, both power supplies must be installed for proper operation cooling.
2. The xSeries 440 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.

Note:

Before you continue working with power supplies, review the following information.

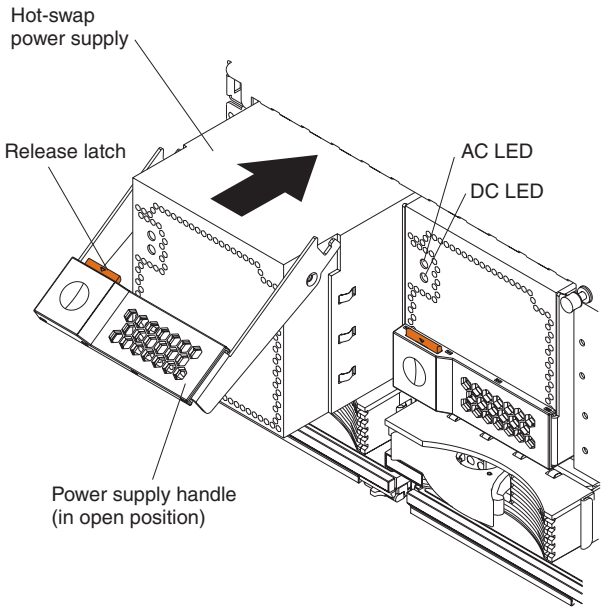
Statement 8

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.

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

1. Review the information in “Installation guidelines” on page 71 and “Safety information” on page 201.
2. Remove the front bezel (see “Bezel removal” on page 74).
3. To remove the power supply from the server, press the release latch; then, lift the handle on the power supply to the open position and pull the power supply out from the server.



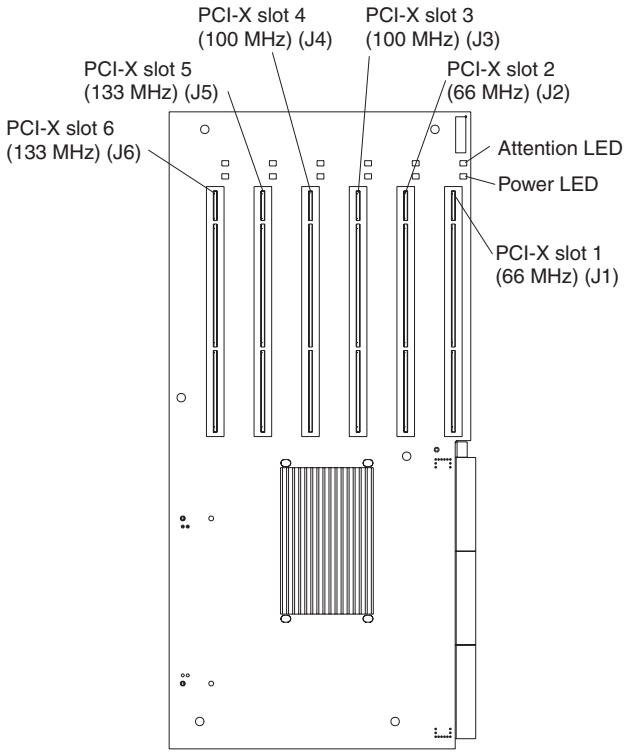
4. To install the new power supply:
   a. Place the handle on the power supply in the open position.
   b. Slide the power supply into the chassis and press the handle to the closed position.
5. Verify that the dc power light and the ac power light on the power supply are lit, indicating that the power supply is operating properly.
6. Replace the front bezel on the server (see “Bezel removal” on page 74 for instructions).

PCI and PCI-X adapters

This section provides information about the expansion slots on the system board and peripheral component interconnect (PCI or PCI-X) adapters.

The following illustration shows the location of the PCI-X expansion slots on the PCI-X board.

Note: The illustrations in this document might differ slightly from your hardware.



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 xSeries 440 server scans devices and PCI-X slots to assign system resources in the following order: CD-ROM drive; disk drives; integrated SCSI devices; PCI-X slots 1, 2, 6, 5, 3, 4; and the integrated Ethernet controller. If an RXE-100 enclosure is attached to the server, the scan continues in sequence with PCI slots 11, 12, 9, 10, 7, 8, 17, 18, 15, 16, 13, and 14.

Note: The scan order for xSeries 440 server models 1VX, 2VX, 3VX in a 16-way configuration is as follows:

- If two servers are cabled together, the scan order will be the primary server, then the secondary server. The PCI slots are scanned in the following order: PCI-X slots 1, 2, 3, 4, 5, 6 in the primary server then PCI-X slots 7, 8, 9, 10, 11, 12 in the secondary server.
- When two servers are cabled together and share an RXE Expansion enclosure the PCI slots are scanned in the following order: PCI-X slots 1, 2, 3, 4, 5, 6 in the primary server then PCI-X slots 7, 8, 9, 10, 11, 12 in the RXE Expansion enclosure; then, PCI-X slots 13, 14, 15, 16, 17, 18 in the secondary server and finally PCI-X slots 19, 20, 21, 22, 23, 24 in the RXE Expansion enclosure.

- 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 any slot, but try to group the PCI-X adapters in separate busses from PCI adapters. If they must share the same bus, the PCI-X device will default to the lower performance PCI mode of operation.
- You can install an adapter with a speed faster than the label on a particular PCI-X slot. However, the device will only operate at the speed indicated on the label.
- 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 additional PCI-X slots to the server by connecting the server to a remote expansion enclosure (models 1RX, 2RX, 3RX, 4RX, 5RX, 6RX, 7RX, 3RY, 4RY only). For more information about the expansion enclosure and how to connect the server to it, refer to the documentation that comes with your expansion enclosure.

Bus	Bus no.	Slot	Supported adapter speed (MHz)
A	2	1	66
A	2	2	66
B	9	3	100 (133 if slot 4 is empty)
B	9	4	100 (133 if slot 3 is empty)
C	7	5	133
D	5	6	133
E	0	—	33 (reserved)
F	1	—	66 (reserved)
Note: BIOS refers to bus numbers in numerical format.			

- The server supports 3.3 V adapters; it does not support 5.0 V adapters.
- 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 system scans PCI-X slots to assign system resources. The system attempts to start the first device found. The search order is: CD-ROM, disk drives, integrated SCSI devices, PCI-X slots (1, 2, 6, 5, 3, 4), and the integrated Ethernet controller.

Note: You can use the Configuration/Setup Utility program to change the boot precedence for the server. Select **Start Options** from the Configuration/Setup Utility program main menu.

Adapter installation

Complete the following steps to install an adapter:

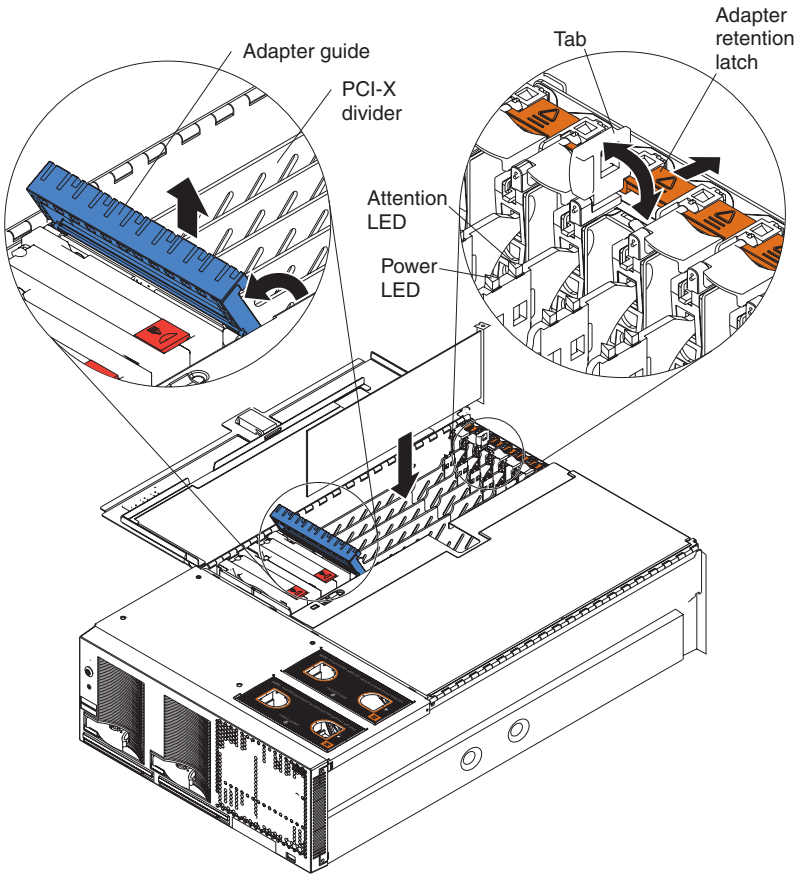
Attention: When you handle static-sensitive devices, take precautions to avoid damage from static electricity. For details on handling these devices, see “Handling electrostatic discharge-sensitive devices” on page 204.

1. Review the information in “Installation guidelines” on page 71, “Working inside a server with power on” on page 71, and “Safety information” on page 201.
2. You must disable the Active PCI-X slots in the server using the operating system before you insert or remove a hot-plug PCI or PCI-X adapter.

   Note: 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.



5. Set any jumpers or switches as described by the adapter manufacturer.
6. Install the adapter:
   a. Open the blue adapter guide by lifting the front edge, as shown in the illustration.
   b. Remove the PCI-X divider from the PCI-X slot by grasping the divider along the top edge and lifting it from the server.
   c. Push the orange adapter retention latch toward the rear of the server and open the tab.
   d. Remove the expansion-slot cover.
   e. Carefully grasp the adapter by its top edge or upper corners and align it with the connector on the PCI-X board.

      Note: Some long adapters have extension handles or brackets installed. Before installing a long adapter, you must remove the extension handle or bracket.

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

      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.

   g. Reinstall the PCI-X dividers between the Active PCI adapter slots.
   h. Push down on the blue adapter guide to keep the adapter steady.
   i. Close the tab. The orange adapter retention latch will click into place, securing the adapter.

7. Connect the internal cables to the adapter. If you are installing a ServeRAID adapter, refer to “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.
10. Enable the slot or turn on the server, depending on your operating system.

Cabling a ServeRAID adapter

Some xSeries 440 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, refer to the 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:

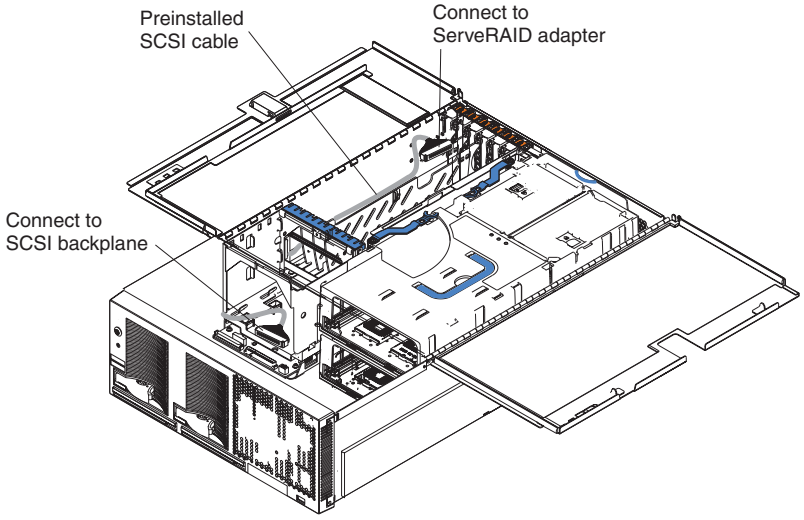
- One end of the first SCSI cable is attached to the connector on the SCSI backplane, and the other end is attached to the connector for the integrated SCSI controller behind fans 3 and 4.
- The second SCSI cable is preinstalled along the inside of the server chassis and both ends are loose inside the server. When you install a ServeRAID adapter, you will connect this cable to the adapter and the SCSI backplane.

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

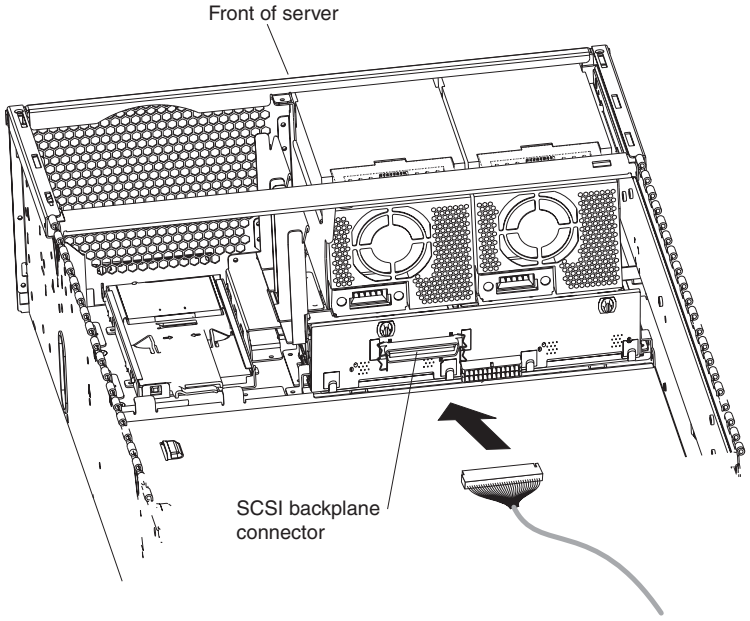
Complete the following steps to cable the ServeRAID adapter.

1. Review the information in “Installation guidelines” on page 71, “Handling electrostatic discharge-sensitive devices” on page 204, and “Safety information” on page 201.
2. Turn off the server and disconnect all power cords and external cables; then, open the server cover (see “Opening the cover” on page 72).
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; then, store this short cable in a safe place for future use.
5. Install the ServeRAID adapter in the PCI-X slot (see“Adapter installation” on page 79).

6. Locate one end of the preinstalled SCSI cable and connect it to the ServeRAID adapter.



7. Locate the other end of the preinstalled SCSI cable and connect it 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.

Drive installation

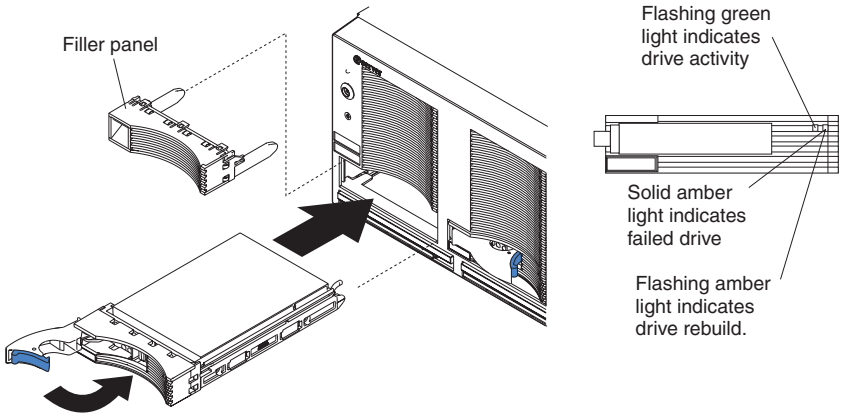
In this section you will find the instructions needed to install or replace a hot-swap hard disk drive, diskette drive, CD-ROM drive, and a DVD-ROM drive.

Hot-swap hard disk drive

Complete the following steps to install or replace a 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 electrostatic discharge-sensitive devices” on page 204.

1. Inspect the drive for any signs of damage.
2. Review the information in “Installation guidelines” on page 71 and “Safety information” on page 201.
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.



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

Diskette drive

Drive considerations:

- The xSeries 440 server supports the installation of up to two diskette drives.
- The diskette drive must be installed in the left drive bay if only one diskette drive is installed.

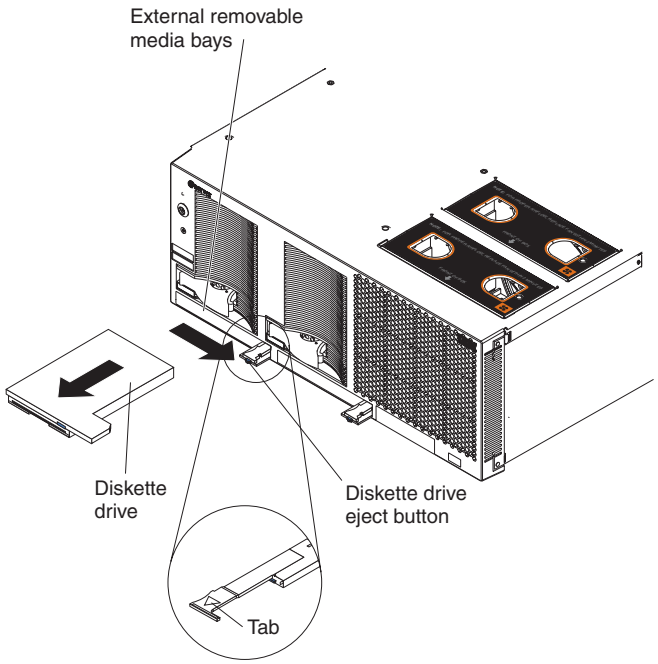
Complete the following steps to remove and install a diskette drive in the server:

1. Review the information in “Installation guidelines” on page 71 and “Safety information” on page 201.

   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 of the device.

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 left external removable media bay.



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

CD-ROM or DVD-ROM drive

Drive considerations:

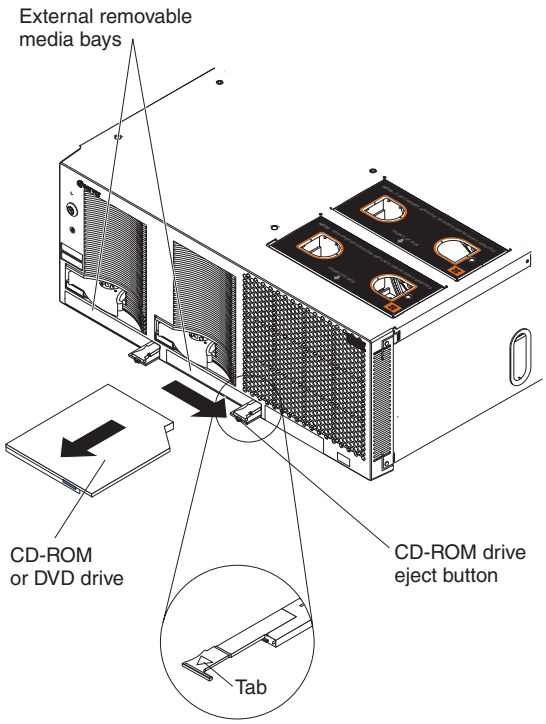
- The xSeries 440 server supports the installation of up to two CD-ROM drives, or two DVD-ROM drives.
- If no other IDE drives are installed, the diskette drive must be installed in the left external removable media bay. CD-ROM or DVD-ROM drives can be installed in either external removable media bay.

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

1. Review the information in “Installation guidelines” on page 71 and “Safety information” on page 201.

   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 CD-ROM or DVD-ROM eject button to the right of the device to be replaced.
4. Using the tab, pull the CD-ROM or DVD-ROM drive partially out of the server; then, grasp the drive and remove it from the server.
5. Install the new CD-ROM or DVD-ROM drive:

a. Inspect the drive for any signs of damage.
b. Slide the CD-ROM or DVD-ROM drive into the drive bay until it stops.



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

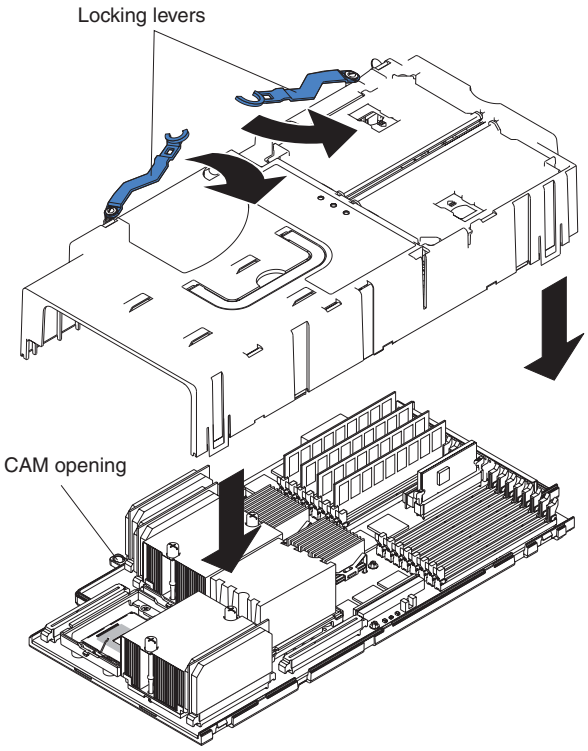
SMP Expansion Module

The SMP Expansion Module contains the XceL4™ system cache, DIMMs, microprocessors, and voltage regulator modules (VRMs) needed to run the server. This section contains the information needed to install and remove the SMP Expansion Module, microprocessors, VRMs, and DIMMs.

SMP Expansion Module considerations:

- Use two hands to install or remove an SMP Expansion Module. Do not allow the expansion module to come in contact with any of the boards, especially the centerplane, while lifting it out or putting it into the server.
- For the server to operate properly, there must be a minimum of one SMP Expansion Module and one SMP baffle installed.
- An SMP Expansion Module must contain at least one microprocessor and four DIMMs.
- If it becomes necessary to remove or install DIMMs do so through the DIMM access doors on the SMP Expansion Module. Refer to “DIMM removal and replacement” on page 93 for the location of the DIMM access doors.
- Before removing or installing SMP Expansion Modules you must remove the electromagnetic compatibility (EMC) shield and SMP Expansion cables from the rear of the server.
- You must run the Configuration/Setup Utility whenever you remove or replace a SMP Expansion Module or one of its associated options.

Note: The illustrations in this document might differ slightly from your hardware.



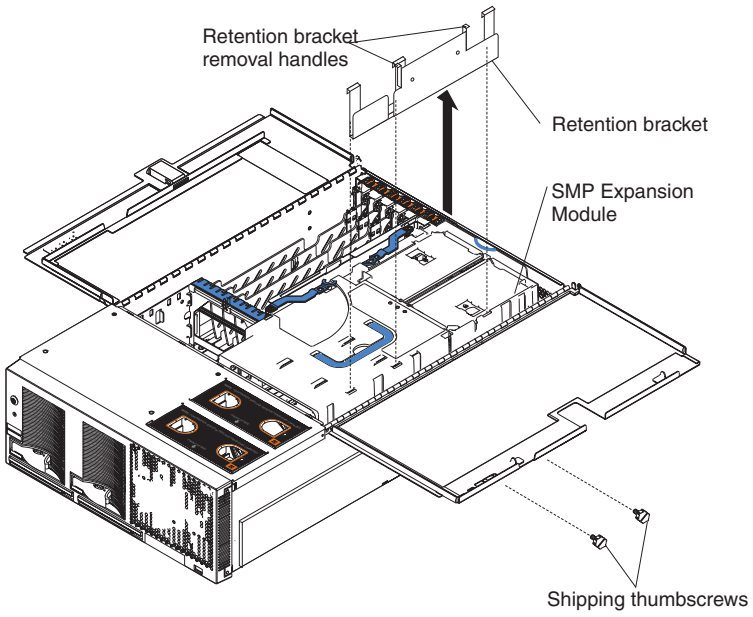
Removing an SMP Expansion Module and cover

While installing options, you might need to remove one or both of the SMP Expansion Modules. This section provides instructions on removing an SMP Expansion Module from the server and removing the cover from the module.

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 16).

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

1. Review the information in “Installation guidelines” on page 71, “Handling electrostatic discharge-sensitive devices” on page 204, and “Safety information” on page 201.
2. Turn off the server and peripheral devices, disconnect the power cords and all external cables from the SMP Expansion Module; then, open the cover (see “Opening the cover” on page 72 for details).
3. If necessary, remove the SMP baffle and retention bracket from the server.
   a. Remove the shipping thumbscrews from the right side of the server.

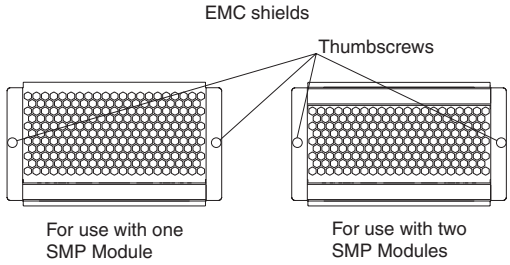


   b. Open the cover.
   c. Grasp the retention bracket by the removal handles and lift it up and out of the server.

      Note: If there is one SMP Module installed, you will need to remove the SMP baffle from the server; then, remove the retention bracket from the lower SMP Module as described in steps 3a through 3c.

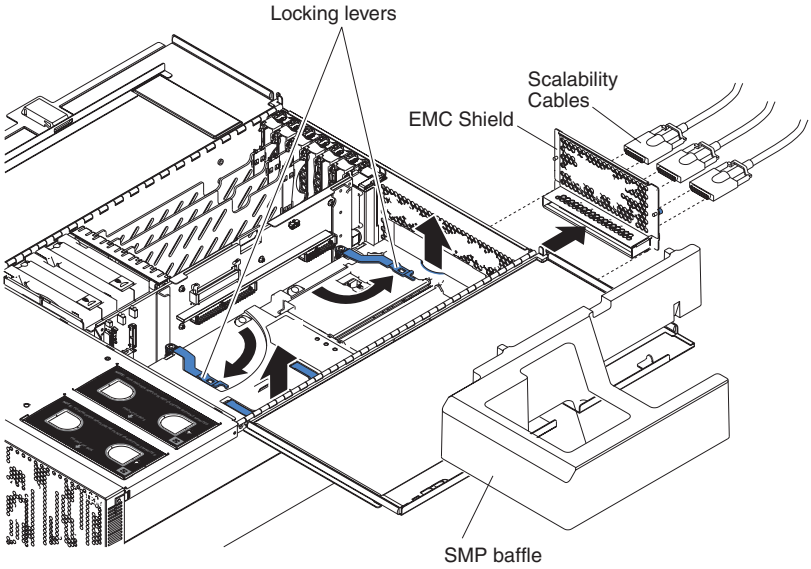
4. To remove the EMC shield from the rear of the server:

a. Remove the blue thumbscrews holding the EMC shield to the server.



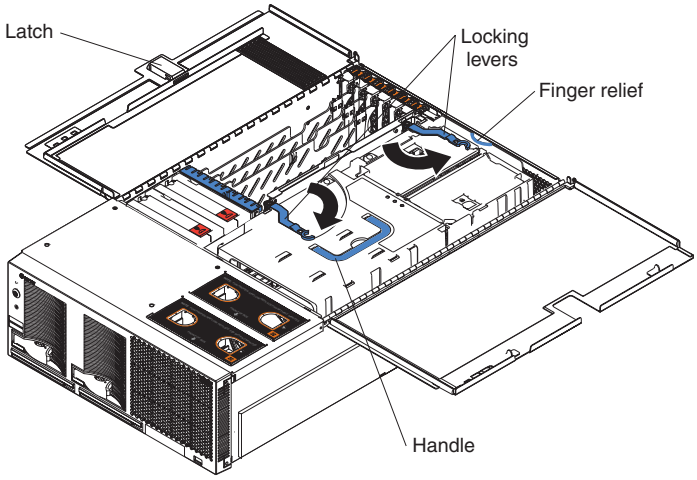
b. Remove the EMC shield from the rear of the server.

Note: The illustrations in this document might differ slightly from your hardware.



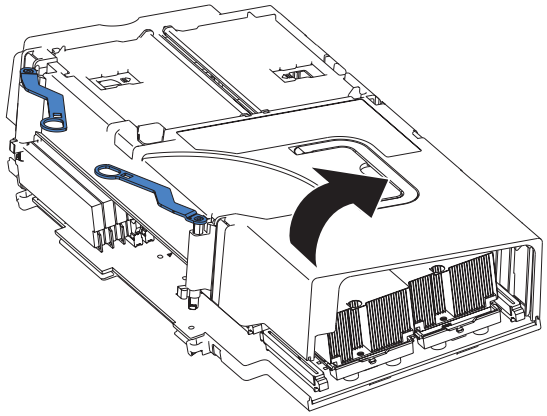
5. Grasp each of the locking levers and lift them up slightly.
6. Working from the right side of the server, rotate the two locking levers toward you until they are fully extended as shown.

Attention: Installing or removing an SMP Expansion Module is a two-handed operation. Do not allow the module to come into contact with the centerplane while removing it from or replacing it into the server. See “Major components of the xSeries 440” on page 70 for an illustration showing the location of the centerplane.



7. Use the handle and the finger relief on the SMP Expansion Module cover to carefully lift the SMP Expansion Module out of the server.

   Note: The illustrations in this document might differ slightly from your hardware.



8. Remove the SMP Expansion Module cover:
   a. Place the SMP Expansion Module on a flat, level surface.
   b. Rotate the two locking levers just beyond the edge of the SMP Expansion Module cover until they stop; then, using the locking levers, lift the cover off the SMP board.

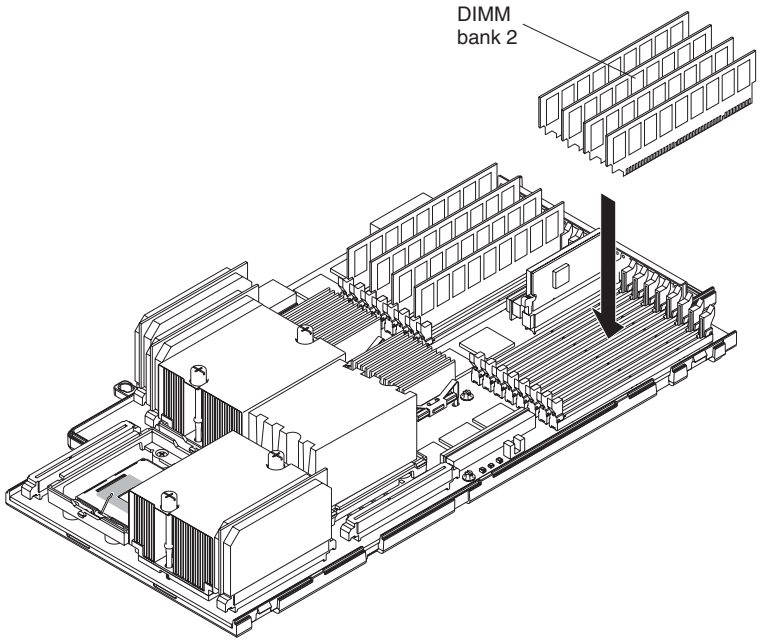
DIMMs

This section contains instructions on how to install, add, and remove DIMMS. It includes information about Active Memory and Memory Mirroring. Before preforming any of the procedures in this section, read the “Safety information” on page 201, “Handling electrostatic discharge-sensitive devices” on page 204, and “DIMM considerations.”

Your xSeries 440 server supports up to sixteen 3.3 V, 168 pin, 133 MHZ ECC SDRAM DIMMs in each SMP Expansion Module. With both SMP Expansion Modules installed, the server can support a maximum of 32 SDRAM DIMMS for a total of 32 GB of memory in the server.

Notes:

1. DIMMs can be removed and replaced through the access doors on the top of the SMP Expansion Module.
2. The illustrations in this document might differ slightly from your hardware.

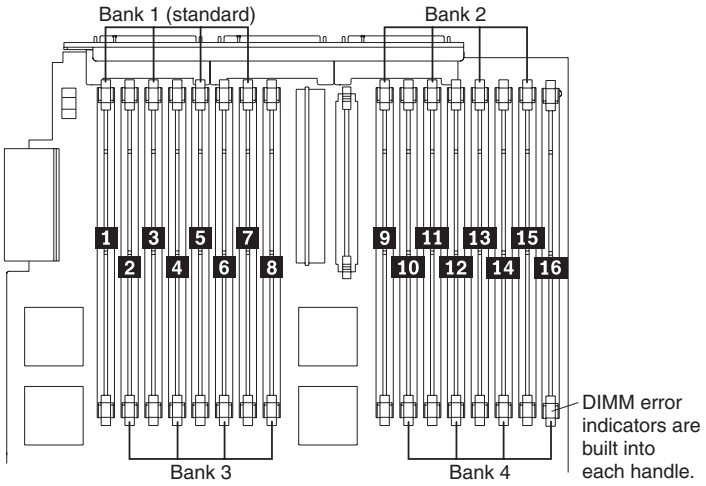


DIMM considerations

Before installing DIMMs, read the following information:

- Your xSeries 440 server supports 512 MB and 1 GB DIMMs, for a maximum of 32 GB of system memory depending on your configuration. See the ServerProven list at http://www.ibm.com/pc/compat/ for a list of memory modules you can use with the server.
- The server comes with four 512 MB DIMMs installed in slots 1, 3, 5, and 7 in the SMP Expansion Module. When installing additional memory modules, you must install four DIMMS at a time and in the order described to maintain performance. (See the following figure for memory connector locations.)
- When installing or removing DIMMs, it must be done in banks of four and in the following order:
  1. Bank 1 = DIMM connectors 1, 3, 5, 7 (J1, J3, J5, J7)
  2. Bank 2 = DIMM connectors 9, 11, 13, 15 (J9, J11, J13, J15)
  3. Bank 3 = DIMM connectors 2, 4, 6, 8 (J2, J4, J6, J8)

4. Bank 4 = DIMM connectors 10, 12, 14, 16 (J10, J12,J14, J16)



- Each DIMM in an individual bank must be of the same size and clock speed to ensure the server will operate properly. For example, in bank 1 the server came with four 512 MB DIMMs installed. In bank 2, you can install four 512 MB or four 1 GB DIMMs.
- 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.
- Memory ports:
  - Memory Port one
    - Bank 1 = DIMM connectors 1, 3, 5, 7
    - Bank 3 = DIMM connectors 2, 4, 6, 8
  - Memory Port two
    - Bank 2 = DIMM connectors 9, 11, 13, 15
    - Bank 4 = DIMM connectors 10, 12, 14, 16
- When you install or remove 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**. If you need instructions, see “Starting the Configuration/Setup Utility program” on page 16.

Active Memory

Active Memory is an IBM feature that improves the reliability of the DIMMs through Memory Mirroring, Memory Scrubbing and Memory ProteXion.

- 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.

  Notes:

  1. For Memory Mirroring to work, you must have the same amount of memory in both memory ports. For more information about the memory ports, refer to “DIMM considerations” on page 90.
  2. When Memory Mirroring is enabled, reported memory is reduced to half of installed memory.

  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 Features**.
   d. Select and enable Memory Mirroring.
   e. Save and exit the Configuration/Setup Utility program.

   Note: If you are enabling Memory Mirroring on a 16-way system and you do not see a message stating that the procedure was successful, start the server as a standalone and check the Configuration/Setup Utility and error log for the memory bank you were mirroring (see "Starting the diagnostic programs" on page 59).

   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.

   If Memory Scrubbing determines the DIMM is damaged beyond use, read and write operations are redirected to the remaining good DIMM. Memory Scrubbing then reports the damaged DIMM and the light path diagnostics display 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, regularly-occurring 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 work in conjunction with each other and do not require Memory Mirroring to be enabled to work properly.

  How does Memory Scrubbing 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, then Memory Scrubbing sends an error message to the light path diagnostics, which then turns on the proper lights and LEDs to guide you to the damaged DIMM. If Memory Mirroring is enabled, then the mirrored copy of the data in the damaged 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.

  How does Memory ProteXion work?

  Once 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.

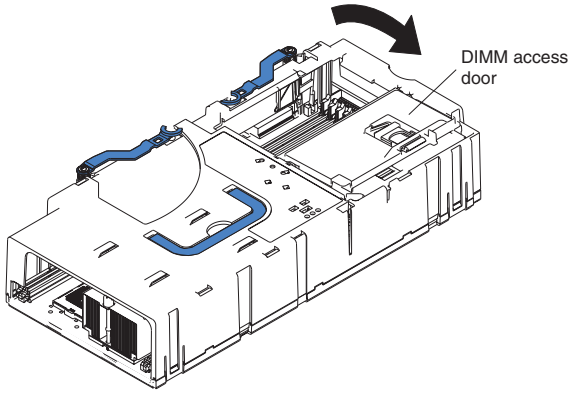
DIMM removal and replacement

This section includes the instructions needed to properly remove and replace DIMMs from the SMP Expansion Module in the server.

Attention: When working with DIMMs or other options, you might need to remove one or both of the SMP Expansion Modules. Before removing an SMP Expansion Module, be sure to turn off the server and peripheral devices; then, disconnect all external cables and power cords.

Complete the following steps to remove a DIMM from the server SMP Expansion Module:

1. Review the information in “Installation guidelines” on page 71, “Handling electrostatic discharge-sensitive devices” on page 204, and “Safety information” on page 201.
2. Turn off the server and peripheral devices, disconnect the power cords, and all external cables from the SMP Expansion Module; then, open the server cover (see “Opening the cover” on page 72 for details).
3. If necessary, remove the top SMP Expansion Module from the server. Refer to “Removing an SMP Expansion Module and cover” on page 87 for instructions.
4. Open the DIMM access door that covers the DIMM you will be removing.

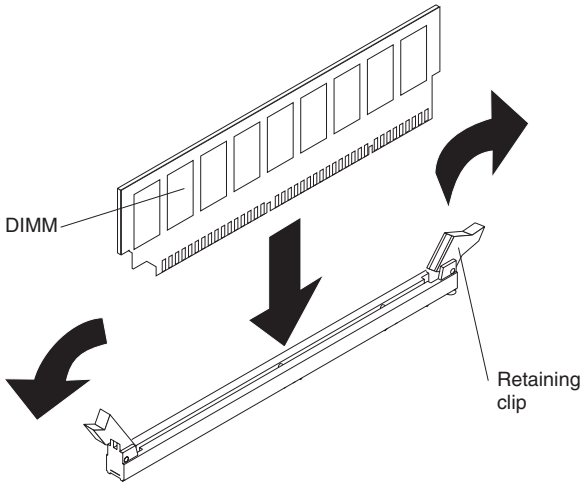


5. Open the retaining clip on each end of the DIMM connector.
6. Lift the DIMM straight up and out of the SMP Expansion Module.
7. Install a new DIMM:
   a. Touch the static-protective package containing the DIMM to any unpainted metal surface on the server. Then, remove the DIMM from the package.

      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.



c. 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.

8. Close the DIMM access door or reinstall the SMP Expansion Module cover (see “Reinstalling an SMP Expansion Module and cover” on page 101).
9. If you have other options to install or remove, do so now.
10. Close the server cover. See “Closing the cover” on page 106.

Note: When you install or remove DIMMs, the server configuration information changes. Therefore, you must change and save the new configuration information by using the Configuration/Setup Utility program (see “Using the Configuration/Setup Utility program” on page 16).

Microprocessors

This section describes how to install and remove microprocessors and VRMs. Before performing any of the procedures in this section, read “Safety information” on page 201, “Handling electrostatic discharge-sensitive devices” on page 204, and “Installation guidelines” on page 71.

Your xSeries 440 Server supports up to two Intel Xeon DP or four Intel Xeon MP microprocessors in each SMP Expansion Module. With both SMP Expansion Modules installed, the server can support a maximum of four Intel Xeon DP or eight Intel Xeon MP microprocessors of the same type and speed.

Notes:

1. Do not install both Intel Xeon MP and Intel Xeon DP microprocessors in the same server or SMP Expansion Module.
2. Read the documentation that comes with the microprocessor to determine if you need to update the server basic input/output system (BIOS) code. For the most current level of BIOS code for the server, go to http://www.ibm.com/pc/support on the World Wide Web (see “Recovering BIOS code” on page 66).
3. Obtain an SMP-capable operating system (optional). For a list of supported operating systems, go to http://www.ibm.com/pc/compat/ on the World Wide Web.

Attention: 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.

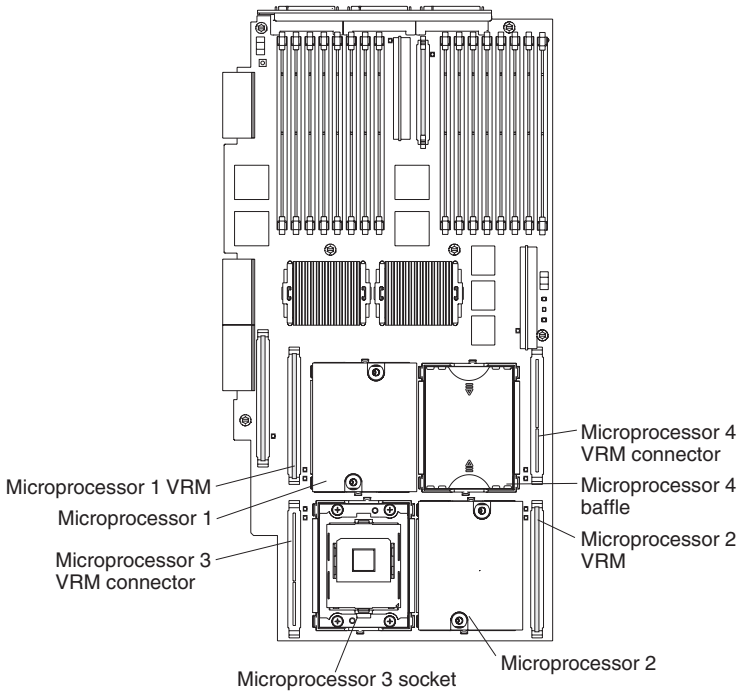
Notes:

1. The microprocessor in socket 1 of the bottom SMP Expansion Module is the startup (boot) microprocessor.
2. Microprocessor sockets must be populated in numeric order, starting with socket 1. If you install the microprocessors in the wrong order, the server will not power on.
3. Microprocessor sockets are populated differently according to which microprocessors are installed:
   - Server models that use Intel Xeon DP microprocessors support a maximum of two microprocessors per SMP Expansion Module, and are installed in microprocessor sockets 1 and 4.
   - Server models that use Intel Xeon MP microprocessors support a maximum of four microprocessors per SMP Expansion Module, and are installed in microprocessor sockets 1 through 4. Always install the heat sink that comes with the microprocessor.
4. Microprocessor socket 4 contains a microprocessor baffle. Do not remove this baffle unless you are installing a microprocessor in socket 4. When you install a microprocessor in socket 4 and remove the baffle, be sure to store the baffle in a safe place for possible future use.

The following illustration shows the locations of the startup microprocessor and its VRM on the SMP board. It also shows the microprocessor baffles and the VRM slots for the other microprocessor sockets.

Notes:

1. The illustrations in this document might differ slightly from your hardware.
2. Remember, Intel Xeon DP microprocessors are supported in microprocessor sockets 1 and 4 only. Intel Xeon MP microprocessor are supported in microprocessor sockets 1, 2, 3, and 4.



Complete the following steps to install a microprocessor:

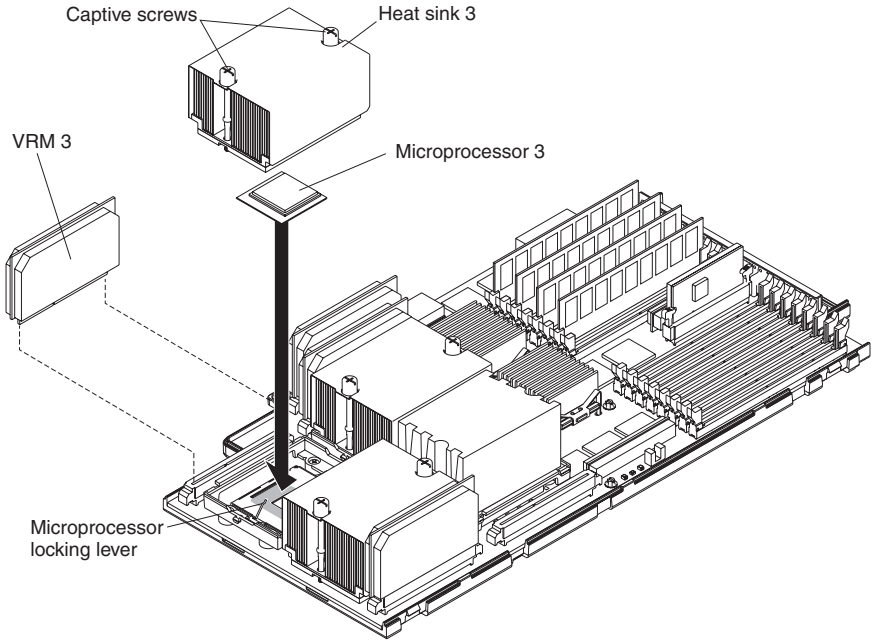
1. Read the “Handling electrostatic discharge-sensitive devices” on page 204 and “Safety information” on page 201.
2. Turn off the server and peripheral devices, disconnect the power cords, and disconnect all external cables from the SMP Expansion Module; then, open the cover (see “Opening the cover” on page 72 for details).
3. 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 an SMP Expansion Module and cover” on page 87.
   Important: Before continuing, you should 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 module. If the microprocessors are installed only in sockets 1 and 4, the server came with Intel Xeon DP microprocessors. If the microprocessors are installed in any other sockets, such as 1 and 2 or 1, 2, and 3, then the server came with Intel Xeon MP microprocessors.

   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 module.

Attention: When you handle static-sensitive devices, take precautions to avoid damage from static electricity. For details on handling these devices, see “Handling electrostatic discharge-sensitive devices” on page 204.

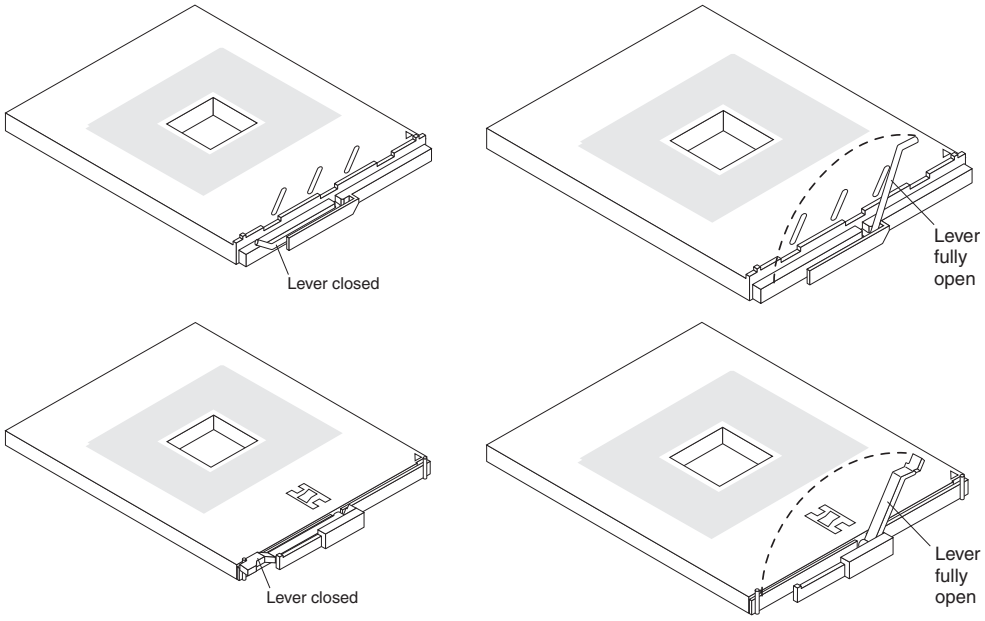
4. If you are installing a new microprocessor, go to step 5 on page 98; otherwise, continue:
   a. Verify that you have selected the correct microprocessor to be replaced. The LED next to the failing microprocessor will be on.

      Attention: Before attempting to remove the heat sink from the microprocessor, note that the heat-conducting grease between the heat sink and the microprocessor might have formed a strong bond. Do not force the components apart; doing so can damage the microprocessor pins. Fully loosen one heat sink captive mounting screw first; then, pull up gently on the heat sink to break the adhesion bond. This helps to break the heat bond and allows one corner of the heat sink to be lifted off of the microprocessor; then, you can loosen the other captive mounting screw and remove the heat sink.



   b. Fully loosen one of the two captive mounting screws on the heat sink; then, pull up gently on the heat sink to break the adhesion bond. This will help to break the heat bond between the heat sink and the processor; then, loosen the other screw and 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. Then, see the documentation provided with the microprocessor option for complete installation instructions.

      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.



d. Remove the microprocessor.

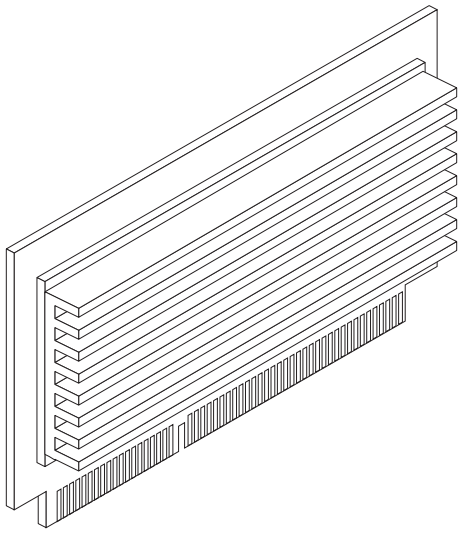
5. Install the VRM in the slot adjacent to the microprocessor socket.

   Attention: If you are installing an additional microprocessor, note that the new microprocessor comes in a kit with a VRM. Some microprocessor options contain a VRM with a clip to secure the VRM in the slot. This clip is not needed for installations in the server and can be discarded. When installing a new microprocessor you must install the VRM that came in the kit.

   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 on.

      2) Grasp the VRM at both upper corners and lift it out of the slot.



   b. Holding the new VRM by the upper corners, orient the VRM so that the connectors match the socket and plug it *firmly* into the slot.

6. If necessary, remove the microprocessor baffle from the microprocessor socket. Keep the microprocessor baffle for possible future use.

7. Touch the static-protective package containing the new microprocessor to any *unpainted* metal surface on the server; then, remove the microprocessor from the package.
8. Install the microprocessor:

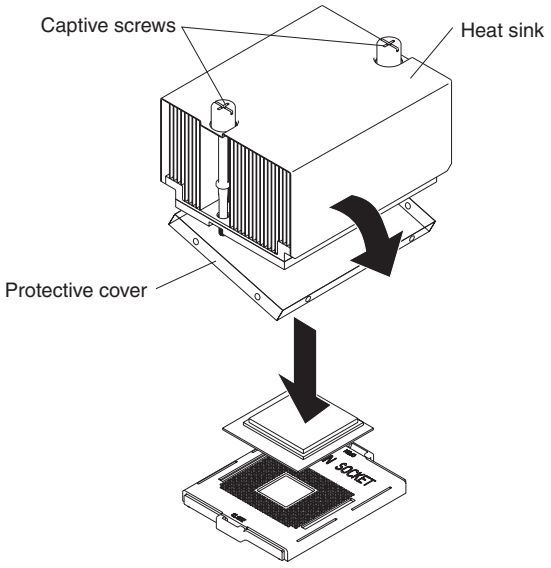
   Important: When installing Intel Xeon DP microprocessors, you must install them in the following order: first, socket 1; then, socket 4. When installing Intel Xeon MP microprocessors, you must install them in the following order: sockets 1, 2, 3, and then 4.

   a. Ensure that the microprocessor locking lever is in the fully open position (approximately 135° angle) to permit plugging in the microprocessor.
   b. Remove the protective cover, label or tape from the microprocessor socket.
   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.
9. If you have installed an additional microprocessor:
   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.



   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.
10. Close the SMP Expansion Module top cover; then, install the module in the server. For details, see “Reinstalling an SMP Expansion Module and cover” on page 101.

Attention: When replacing the SMP Module in the server, set it in carefully, taking care not to damage the components on the centerplane. It may be helpful to insert the SMP Module at a slight angle.

11. Reconnect any cables between the two SMP Modules, if necessary.
12. If you have other options to install or remove, do so now.
13. Close the cover on the server; then, reinstall the server in the rack and connect all external cables. For details, see “Closing the cover” on page 106.
14. Turn on the server.
    Important: If the server will not start after replacing or installing a microprocessor, you might have installed a microprocessor of a different type or the VRM is not installed properly. Verify that you have installed the proper microprocessor and that the VRM is properly installed.

    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 “Using the Configuration/Setup Utility program” on page 16).

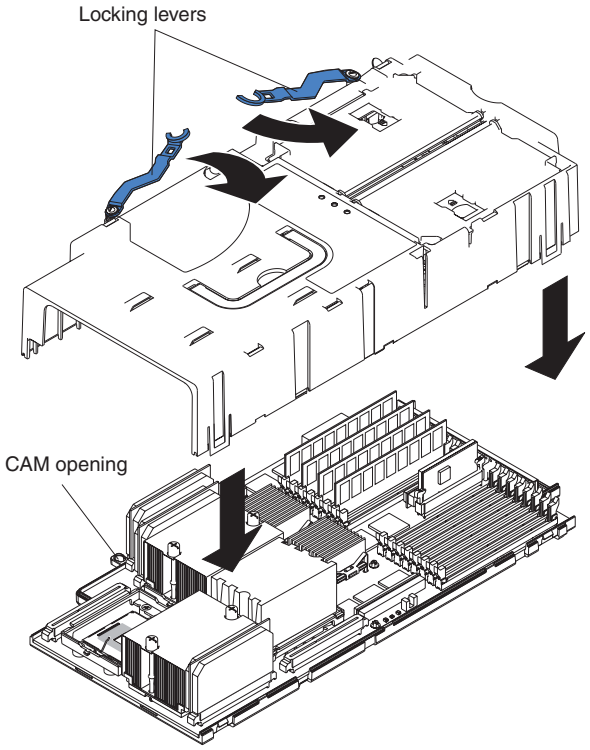
Reinstalling an SMP Expansion Module and cover

After installing options in the SMP Expansion Module, you will need to reinstall the SMP Expansion Module cover and reinstall the SMP Expansion Module in the server.

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 16).

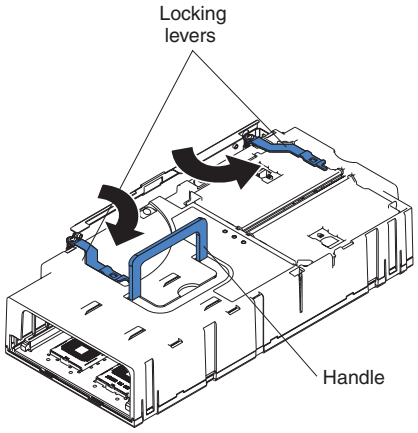
Complete the following steps to reinstall the SMP Expansion Module cover:

1. Install the cover on the SMP Expansion Module:
   a. Set the cover on top of the expansion module.



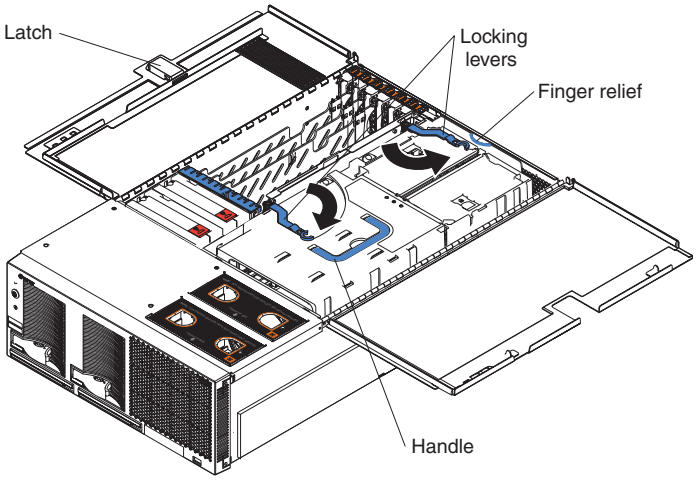
   b. Extend the locking levers as shown in the illustration; then, let the cam on the front of the cover fall into the cam opening on the SMP Expansion Module circuit board.
   c. Release the locking levers and align the rear of the cover with the rear edge of the circuit board.
   d. Press down on the cover until it snaps into place.
   e. Lift slightly on the locking levers and rotate them back until they stop.

Note: The illustrations in this document might differ slightly from your hardware.



2. Install the SMP Expansion Module into the server.

   Attention: Installing or removing an SMP Expansion Module is a two-handed operation. Do not allow the module to come into contact with the centerplane while removing it from or replacing it into the server. See “Major components of the xSeries 440” on page 70 for an illustration showing the location of the centerplane.



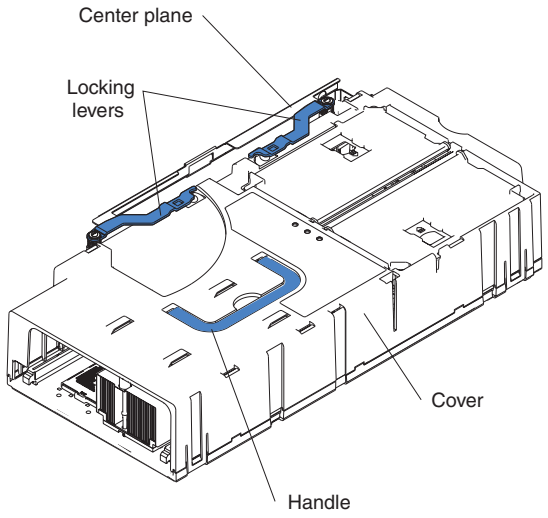
   a. Lift the SMP Expansion Module by its handle and use the finger relief to hold the SMP module steady.

   b. Being careful not to damage surrounding components, hold the SMP Expansion Module on a horizontal plane and lower the module into the server.

   c. Release the handle and gently slide the SMP Expansion Module toward the centerplane until it stops.

   d. Rotate the SMP Expansion Module locking levers forward until the SMP Expansion Module is securely fastened in place. Refer to the following illustration.

Note: The illustrations in this document might differ slightly from your hardware.



Attention: If the server contains only one SMP Expansion Module, be sure to replace the air baffle in place of the second SMP Expansion Module for proper air flow.

e. Install the retention bracket.

Note: If there are two SMP Expansion Modules installed in the server, you must install the retention bracket for each of the Modules. Be sure to install the bottom retention bracket first, then refer to steps 2a on page 102 through 2e for the top Module.

3. If you have other options to install or remove, do so now.
4. Close the cover on the server; then, reinstall the server in the rack and connect all external cables. For details, see “Closing the cover” on page 106 and “SMP Expansion port cabling” on page 116.
5. Turn on the server.

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 16).

Adding a second SMP Expansion Module

To add a second SMP Expansion Module to the server:

1. Follow the instructions at “Reinstalling an SMP Expansion Module and cover” on page 101 to install the module. Store the SMP baffle safely for possible future use.

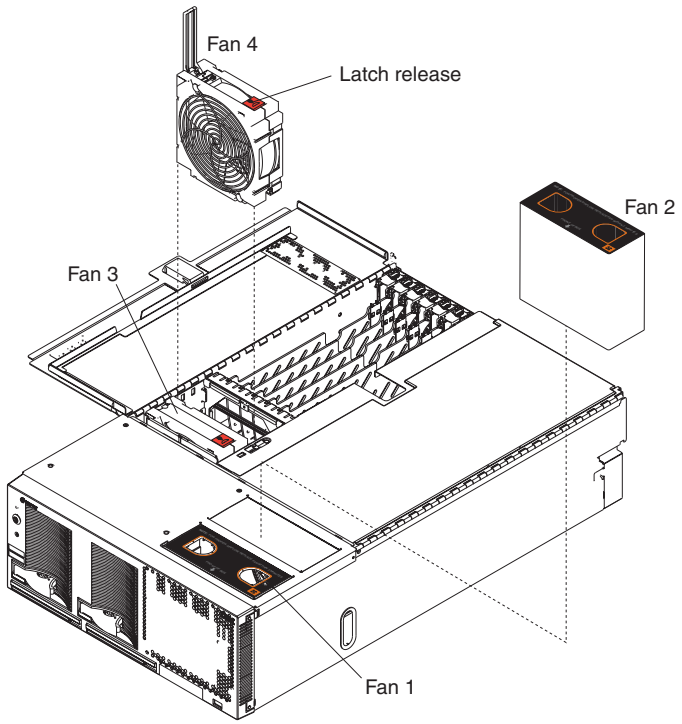
Note: Install microprocessors and VRMs on the SMP Board before the module is installed in the server.

2. Cable the two SMP Expansion Modules together (see “SMP Expansion port cabling” on page 116).

Fans

Your xSeries 440 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 just behind the PCI-X board 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. Refer to the following illustration.

Note: The illustrations in this document might differ slightly from your hardware.



Each fan has a light located on the top left side. When the fan is operating correctly, this light 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.

Fans 1 and 2

As shown in the previous 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 information in “Installation guidelines” on page 71 and “Safety information” on page 201.

   Note: All fans must be replaced with 48 hours of failing.
2. 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.
b. Lift the fan out of the server.

3. Orient the new fan so that the light on the top of the fan is to the right side of the server.
4. Push the replacement fan assembly into the server until it clicks into place.
5. If you have other options to install or remove, do so now.
6. Close the cover. See “Closing the cover” on page 106.

Fans 3 and 4

Fans 3 and 4 are located in front of the I/O board and the PCI-X slots. They are used to cool the hard disk drives, I/O board, and 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 information in “Installation guidelines” on page 71 and “Safety information” on page 201.

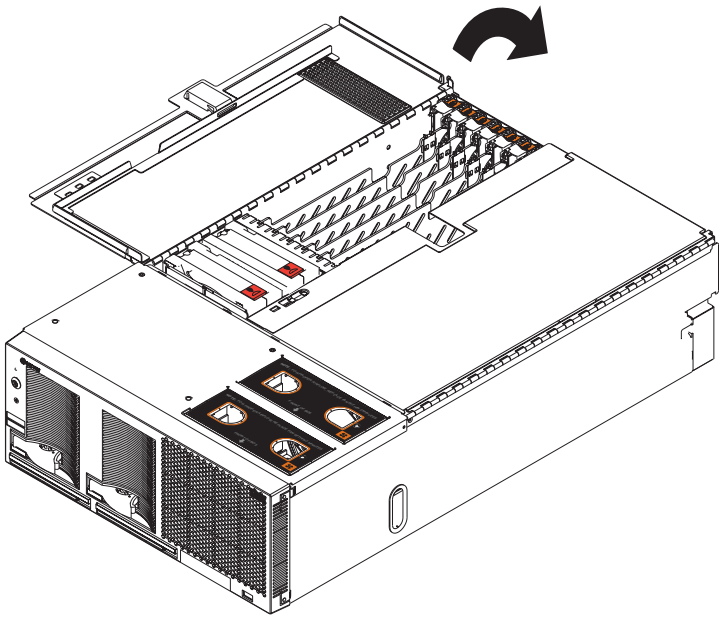
   Note: All fans must be replaced with 48 hours of failing.
2. Remove the fan from the server:
   a. Press the latch release to the right and let the handle come up.

      Note: The illustrations in this document might differ slightly from your hardware.
   b. Grasp the handle and lift the fan out of the server.
3. Orient the new fan so that the latch release on the top of the fan is to the right side of the server.
4. With the handle raised, push the replacement fan assembly into the server until it clicks into place.
5. Push the handle down until it clicks into place under the latch release.
6. If you have other options to install or remove, do so now.
7. Close the cover. See “Closing the cover” on page 106.

Closing the cover

Complete the following steps to install the server cover:

1. Put the right side of the cover in place first; then, put the left side in place. Press down to latch the two halves of the cover in place.



2. Reconnect all external cables and power cords to the server; then, plug the power cords into properly grounded electrical outlets. Refer to the “Rear view” on page 8 and “I/O connectors” on page 109 for more information on connector locations.
3. Turn on the server.

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-IBM-SERV 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.

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.

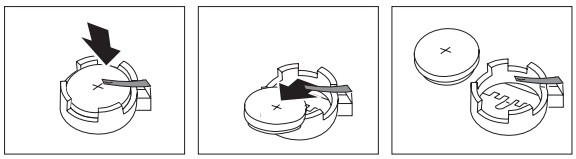
Do not:

- **Throw or immerse into water.**
- **Heat to more than 100°C (212°F)**
- **Repair or disassemble**

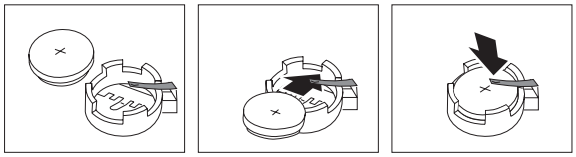
Dispose of the battery as required by local ordinances or regulations.

Complete the following steps to replace the battery:

1. Read “Safety information” on page 201, and follow any special handling and installation instructions supplied with the replacement battery.
2. Turn off the server and peripheral devices, disconnect the power cords, and all external cables from the server; then, open the cover (see “Opening the cover” on page 72 for details).
3. Remove fans 3 and 4 from the server (see “Fans 3 and 4” on page 105 for details).
4. Remove the battery:
   a. Use one finger to lift the battery clip over the battery.
   b. Use one finger to slightly slide the battery out from its socket. The spring mechanism will push the battery out toward you as you slide it from the socket.
   c. Use your thumb and index finger to pull the battery from under the battery clip.
   d. Ensure that the battery clip is touching the base of the battery socket by pressing gently on the clip.



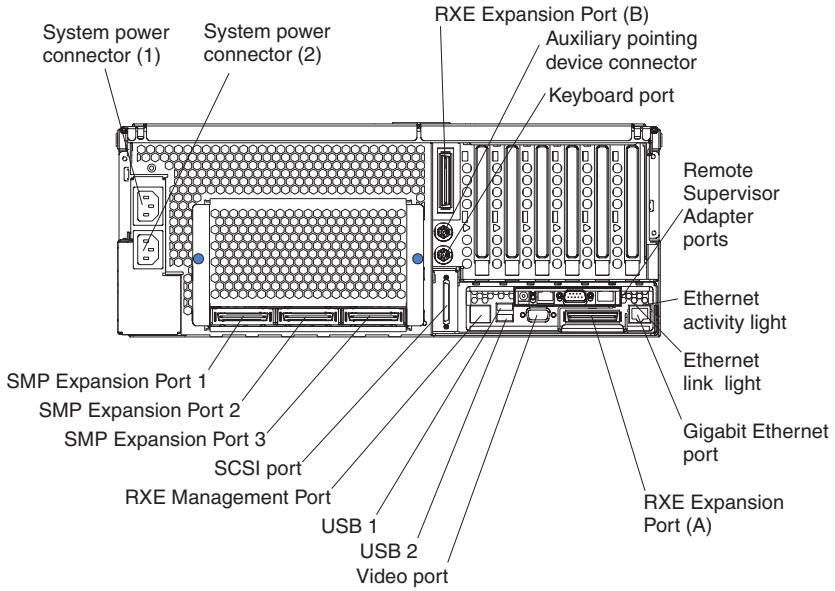
5. Insert the new battery:
   a. Tilt the battery so that you can insert it into the socket, under the battery clip.
   b. As you slide it under the battery clip, press the battery down into the socket.



6. Replace fans 3 and 4.
7. Reinstall the server cover, and connect the cables.
8. Turn on the server.
9. Start the Configuration/Setup Utility program and set configuration parameters.
   - Set the system date and time.
   - Set the power-on password.
   - Reconfigure the server.

I/O connectors

The server has the following I/O connectors:

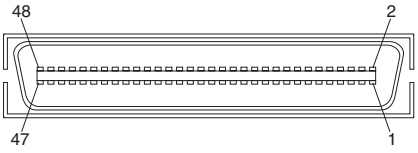


- Power connectors
- RXE Expansion ports
- Auxiliary-device (pointing device) connector
- Keyboard connector
- Remote Supervisor Adapter ports
  - One ASM interconnect (peer-to-peer) port (RJ-14)
  - One Ethernet port (remote server management using network, RJ-45)
  - One management port (remote server management using modem)
  - One external power connector
- Ethernet port
- Video connector
- Universal Serial Bus (USB) connectors
- RXE management port
- SCSI port
- SMP Expansion ports

RXE Expansion port

There are two RXE Expansion Ports that are used to connect the server to a remote I/O enclosure (models 1RX, 2RX, 3RX, 4RX, 5RX, 6RX, 7RX, 3RY, 4RY only).

The following illustration shows the pin-number assignments for the RXE Expansion Port on the end of the cable.



Auxiliary-device (pointing device) connector

Note: When two servers are merged together in a 16-way configuration (models 1VX, 2VX, 3VX only), the auxiliary-device port on the secondary server will no longer operate.

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.

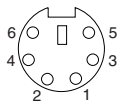


Table 6. Auxiliary-device connector pin-number assignments

Pin	Signal
1	Data
2	Not connected
3	Ground
4	+5 V dc
5	Clock
6	Not connected

Keyboard connector

Note: When two servers are merged together in a 16-way configuration (models 1VX, 2VX, 3VX only).

- The keyboard port on the secondary server will no longer operate.
- 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.

There is one keyboard connector on the rear of the server.

Note: You might need to use the Configuration/Setup utility to enable keyboardless operation to prevent POST error message 301 from being displayed during

startup. For detailed information about this option and how to connect it to the server, refer to the documentation that comes with the option.

The following illustration shows the pin-number assignments for the keyboard connector on the end of the cable.

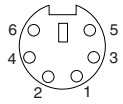


Table 7. Keyboard connector pin-number assignments

Pin	I/O	Signal
1	I/O	Data
2	N/A	Reserved
3	N/A	Ground
4	N/A	+5 V dc
5	I/O	Keyboard clock
6	N/A	Reserved

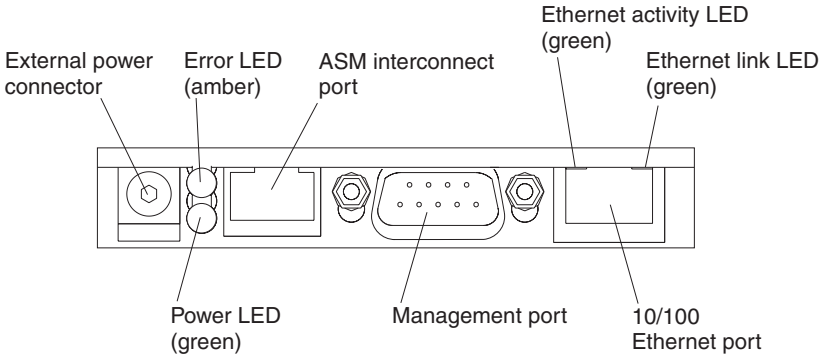
Remote Supervisor Adapter communication ports

The server has four communication ports that are used by the Remote Supervisor Adapter. Three of the ports 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 serial port. To connect the server with another server, use the ASM interconnect port (RJ-14). See the Remote Supervisor Adapter documentation on the *IBM Documentation* CD for more information.

The following illustration shows the communication ports on the Remote Supervisor Adapter.



External power connector

This connector provides power to the Remote Supervisor Adapter, independent of the server power supply.

Note: This connector is not supported on this server.

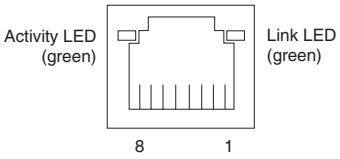
Error LED
The amber Error LED indicates an error on the Remote Supervisor Adapter.

Advanced System Management (ASM) interconnect port
Attach an ASM Interconnect module (which comes with the server) to this port to connect the Remote Supervisor Adapter to the other devices on the ASM Interconnect network.

Ethernet link LED
This green light, located on the right of the Ethernet port, lights when there is an active link connection on the Ethernet controller for the Ethernet port.

Ethernet activity LED
This green light, located on the left of the Ethernet port, lights when there is activity on the Ethernet LAN connected to the Ethernet port.

10/100 Ethernet port
Connect a category 3 or category 5 Ethernet cable to this port to enable a LAN connection or TELNET session. The Ethernet port LEDs on the Remote Supervisor Adapter indicate the link is good and activity is taking place on the network.



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 LEDs
The green power LED indicates the status of the power connection.

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 Ethernet-link status light is on the left. When this green light is on, there is an active connection on the Ethernet port. The Ethernet transmit/receive activity light is on the right. When this amber light is on, there is activity between the server and the network. These lights have the same functions as the Ethernet-link status light and the Ethernet transmit/receive activity light on the rear of the server (see “Server controls and indicators” on page 7).

For information about configuring the Ethernet controller, see “Configuring the Gigabit Ethernet controller” on page 47.

Video connector

Note: When two servers are merged together in a 16-way configuration (models 1VX, 2VX, 3VX only), the video port on the secondary server will no longer operate.

The following illustration shows the pin-number assignments for the 15-pin analog video connector on the rear of the server.

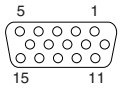


Table 8. Video-port connector pin-number assignments

Pin	Signal	Pin	Signal	Pin	Signal
1	Red	6	Ground	11	Not connected
2	Green or monochrome	7	Ground	12	DDC SDA
3	Blue	8	Ground	13	Horizontal synchronization (Hsync)
4	Not connected	9	+5 V dc	14	Vertical synchronization (Vsync)
5	Ground	10	Ground	15	DDC SDL

Universal Serial Bus ports

Note: When two servers are merged together in a 16-way configuration (models 1VX, 2VX, 3VX only), the USB ports on the secondary server will no longer operate. Disconnect all USB devices from the secondary server prior to merging the two servers.

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.

Note: You might need to use the Configuration/Setup utility to enable keyboardless operation to prevent POST error message 301 from being displayed during startup. For detailed information about this option and how to connect it to the server, refer to the documentation that comes with the option.

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.

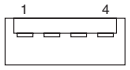


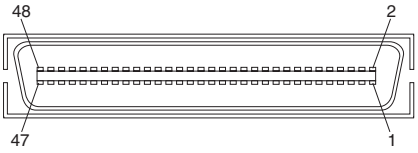
Table 9. USB-port connector pin-number assignments

Pin	Signal
1	VCC
2	-Data
3	+Data
4	Ground

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.



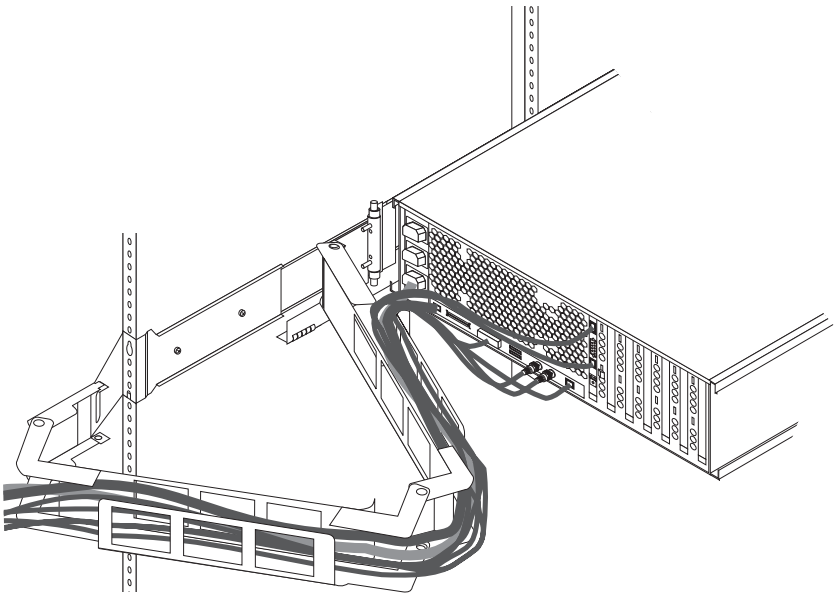
Cabling the server

See “I/O connectors” on page 109 for a description of the I/O connectors on the rear of the server.

The following illustration shows the cable routing for a single server configuration. Detailed cabling instructions follow. For more information on cabling, including the use of the cable management arm (shipped with the server), see the *Rack Installation Instructions* provided with the server.

Notes:

1. The illustrations in this document might differ slightly from your hardware.
2. See the documentation that comes with the options for additional cabling instructions. It might be easier for you to route any cables before you install certain options.
3. If you have just plugged the power cords of the server into an electrical outlet, you must wait 30 seconds before pressing the power-control button.



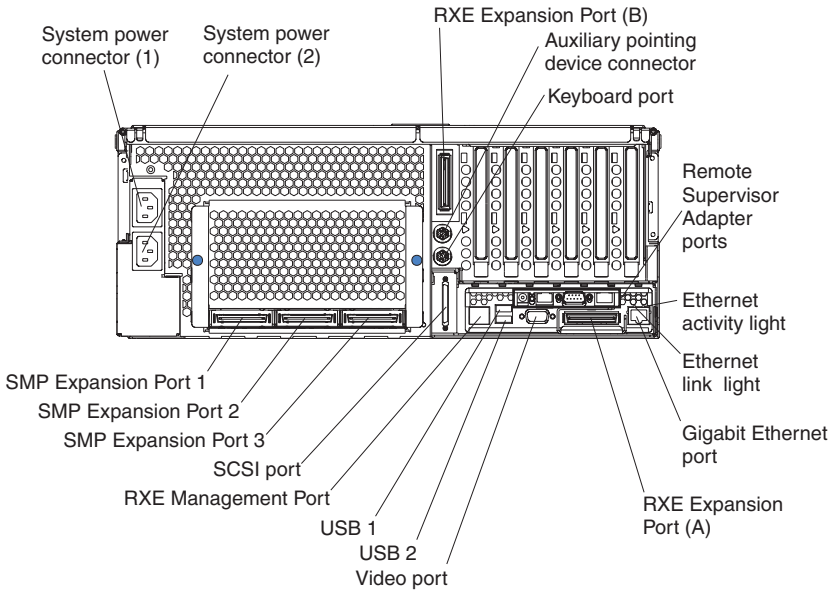
Working with cables

This section describes how to connect cables to the SMP Expansion Port, system power connectors, RXE Expansion Port, SCSI port, USB port, video port, auxiliary pointing device connector, keyboard port, Ethernet port, and RXE Management port. When instructed, see the appropriate documentation for more details.

For details about the locations and functions of all of the ports, indicators, and connectors refer to “Server controls and indicators” on page 7 and “I/O connectors” on page 109.

Notes:

1. If your server model came with an operating system installed, such as Microsoft Windows 2000 Datacenter Server, see the software documentation provided with your server for additional cabling instructions.
2. The illustrations in this document might differ slightly from your hardware.



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.

Notes:

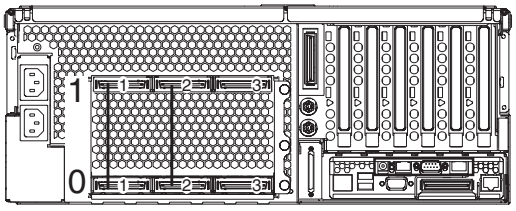
1. Use cable ties to bundle similar cables together.
2. Use hook-and-loop straps to secure the cable bundles to the cable-management arms.
3. When possible, separate data and power cables.

Attention: Do not secure cables too tightly. Overtightening can cause internal damage to the cables.

SMP Expansion port cabling

Each server has up to six SMP expansion ports located on the back, depending on your configuration. Three ports are located on each SMP Expansion Module in the server.

For 16-way SMP Expansion port cabling, see “16-way SMP Expansion port cabling (models 1VX, 2VX, 3VX only)” on page 117.



Note: In the illustration the SMP Expansion Modules are numbered from bottom to top, 0 and 1. Notice that the SMP Expansion Ports are numbered left to right, 1 through 3.

Complete the following steps to cable two SMP Expansion Modules in a single server together for up to 8-way operation:

1. Using the two 25.4 cm (10 in.) long SMP Expansion cables, connect the two SMP Expansion Modules together.

Note: If your server comes with two SMP Expansion Modules, the SMP Expansion cables are included with the server. If you purchased a second SMP Expansion Module separately, the cables are included with the option.

2. Connect one end of the first 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 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.

Notes:

1. When multiple cables are connected between the SMP Expansion Module ports, SMP data is interleaved between the cables for better performance.
2. The SMP Expansion cables are not redundant.
3. If either of the two cables is removed or fails, the server will either turn off or restart, depending on your configuration.
4. The server will start and operate with one cable attached between the two SMP Expansion Modules.

16-way SMP Expansion port cabling (models 1VX, 2VX, 3VX only): Use the following illustration and tables to verify that the SMP Expansion cables are properly connected.

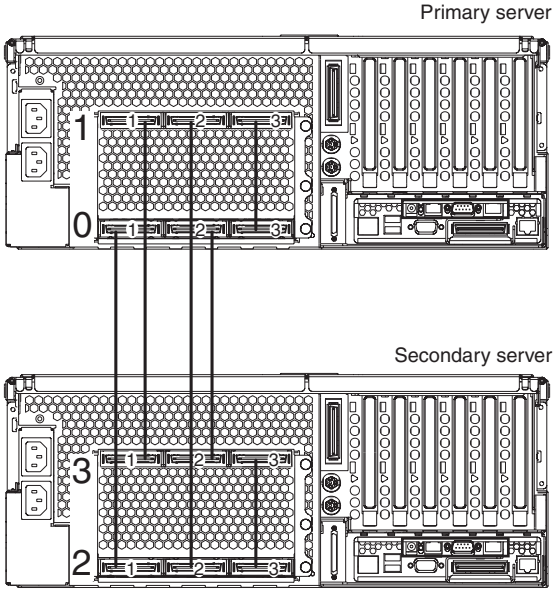


Table 10. Long SMP Expansion Module cable connections

From		To	
SMP Expansion Module	**Port**	**SMP Expansion Module**	**Port**
0	1	2	1
1	1	3	1
0	2	3	2
1	2	2	2

Table 11. Short SMP Expansion Module cable connections

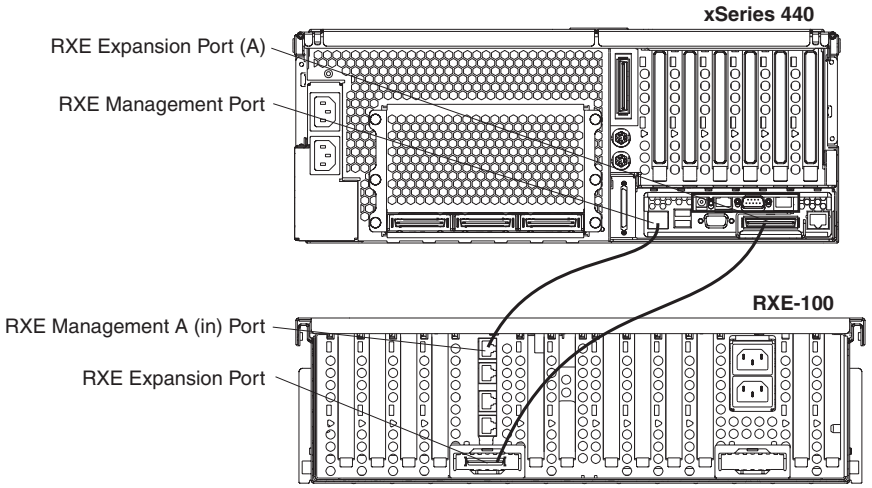
From		To	
SMP Expansion Module	**Port**	**SMP Expansion Module**	**Port**
0	3	1	3
2	3	3	3

RXE Expansion port cabling (models 1RX, 2RX, 3RX, 4RX, 5RX, 6RX, 7RX, 3RY, 4RY only)

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. For detailed information about cabling the RXE Expansion ports, refer to the documentation that comes with the remote I/O enclosure.

Complete the instructions in this section to cable your server to a remote I/O enclosure.

Cabling one SMP Expansion Module:



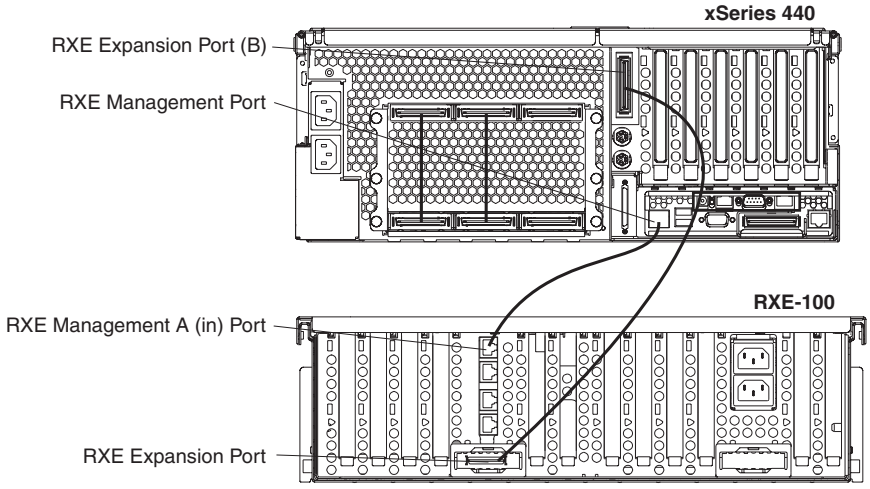
If your server has one SMP Expansion Module installed, complete the following steps:

1. Using an RXE Expansion cable, connect one end of the cable to RXE Expansion Port (A) on the server.
2. Connect the opposite end of the cable to a RXE Expansion port on the remote I/O enclosure.

Note: For information about cabling the RXE Management Ports see “RXE Management port cabling (models 1RX, 2RX, 3RX, 4RX, 5RX, 6RX, 7RX, 3RY, 4RY only)” on page 120.

Cabling two SMP Expansion Modules:

Note: When two SMP Expansion Modules are installed, both of the RXE Expansion ports are active.



If your server has two SMP Expansion Modules installed complete the following steps:

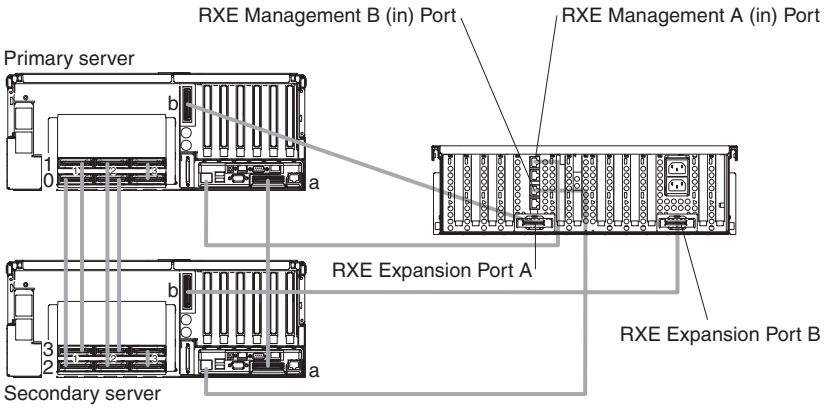
1. Using an RXE Expansion cable, connect one end of the cable to RXE Expansion Port (B) on the server.
2. Connect the opposite end of the cable to an RXE Expansion Port on the remote I/O enclosure.

Cabling an RXE-100 Remote Expansion Enclosure to a 16-way system

Complete the following steps to connect an IBM RXE-100 Remote Expansion Enclosure to a 16-way system (models 1VX, 2VX, 3VX only).

1. Turn on the primary server and start the Configuration/Setup Utility program.
   a. When the message `Press F1 for Configuration/Setup` appears, press F1.
   b. Select **Advanced Setup** from the main menu; then, select **Static Partition Settings**.
   c. Enable **Remote Expansion Enclosure**.
   d. Select **Save Static Partition Settings** and follow the prompts.
   e. Exit the Configuration/Setup Utility Program.
   f. Turn off the primary server.

2. Using an RXE Expansion cable, connect RXE Expansion Port A on the primary server to RXE Expansion Port A on the secondary server.



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 A (in) Port on the RXE-100.
6. Using an RXE Management cable, connect the RXE Management Port on the secondary server to RXE Management B (in) Port on the RXE-100.

Table 12. RXE Expansion cable connections

From		To	
Server	**Port**	**Server/RXE**	**Port**
Primary	A	Secondary	A
Primary	B	RXE	A
Secondary	B	RXE	B

RXE Management port cabling (models 1RX, 2RX, 3RX, 4RX, 5RX, 6RX, 7RX, 3RY, 4RY only)

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.

Complete the following steps to cable the server RXE Management Port to a remote I/O enclosure RXE Management Port:

1. Using an RXE Management cable, connect one end of the cable to the RXE Management port on the server.
2. Connect the opposite end of the cable to the RXE Management port on the remote I/O enclosure.

Notes:

1. The RXE Management cabling is the same for a server with two SMP Expansion Modules.
2. For details about cabling the server to the remote I/O enclosure and how the server and remote I/O enclosure work together, see the documentation that comes with the enclosure.

16-way RXE Management port cabling (models 1VX, 2VX, 3VX only)

Use the following illustration and table to verify that your RXE Management cables are properly connected.

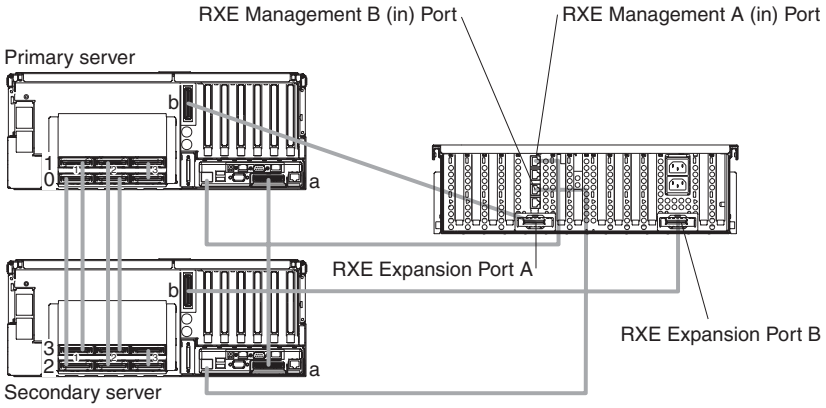


Table 13. RXE Management cable connections

From	To
Server	**RXE Management Port**
Primary	A (in)
Secondary	B (in)

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.

Attach the power supply power cords as follows:

1. Connect a power supply cord to one of the system power connectors on the rear of the server.
2. Plug the other end of the power supply cord into a properly grounded electrical outlet or a primary power unit inside the rack cabinet.

   Note: Plugging the power-supply cords into an electrical outlet might cause the server to start automatically. This is an acceptable action.
3. Refer to “Turning on the server” on page 10 for detailed information about turning on the server.

SCSI cabling

The server has one SCSI port located on the back of the server. Use this port to connect the server to an optional SCSI device such as the IBM FAStT series of extended enclosures. For detailed information about this option and how to connect it to the server, refer to the documentation that comes with the option.

USB cabling

The server has three USB ports, one on the front and two located on the back of the server. Use these ports to connect the server to an optional USB device. For detailed information about this USB option and how to connect it to the server, refer to the documentation that comes with the option.

Note: When two servers are merged together in a 16-way configuration (models 1VX, 2VX, 3VX only), the USB ports on the secondary server will no longer operate. Disconnect all USB devices from the secondary server prior to merging the two servers.

Video cabling

The server has one video port located on the back of the server. Use this port to connect the server to a monitor or optional console. For detailed information about this option and how to connect it to the server, refer to the documentation that comes with the option.

Note: When two servers are merged together in a 16-way configuration (models 1VX, 2VX, 3VX only), the video port on the secondary server will no longer operate.

Auxiliary pointing device cabling

The server has one auxiliary pointing device port located on the back of the server. Use this port to connect the server to a pointing device or optional console. For detailed information about this option and how to connect it to the server, refer to the documentation that comes with the option.

Note: When two servers are merged together in a 16-way configuration (models 1VX, 2VX, 3VX only), the auxiliary pointing device port on the secondary server will no longer operate.

Keyboard cabling

The server has one keyboard port located 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 ports. After installing a USB keyboard, you might need to use the Configuration/Setup utility 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 your server, see the documentation that comes with the option.

Note: When two servers are merged together in a 16-way configuration (models 1VX, 2VX, 3VX only), the keyboard port on the secondary server will no longer operate.

Gigabit Ethernet cabling

The server has one Ethernet port located on the back of the server. Use this port to connect the server to a LAN.

Note: A second Ethernet port is located on the Remote Supervisor Adapter. This port is used for specific supervisory functions and should not be confused with the Gigabit Ethernet port located next to the USB ports.

Remote Supervisor Adapter cabling

The server comes with a Remote Supervisor Adapter. For information about cabling the Remote Supervisor Adapter connectors, see the *User's Guide* on the *IBM Documentation CD.*

Note: The Remote Supervisor Adapter must connect to an Enterprise Network when two servers are connected in a 16-way configuration models 1VX, 2VX, 3VX only). You can alternatively connect the Remote Supervisor Adapters to each other with an Ethernet crossover cable.

FRU information (service only)

Field Replacement Units (FRUs) should be replaced by qualified service personnel only.

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.

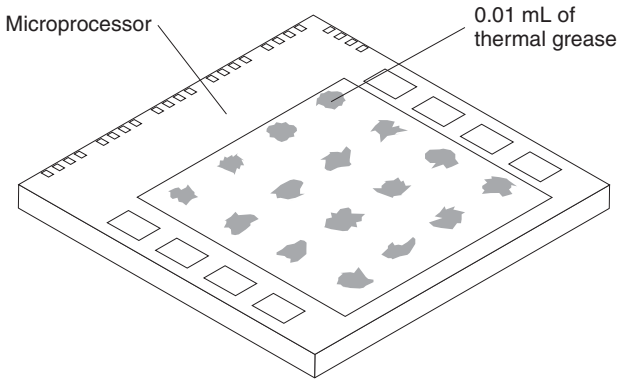
Note:

- Read “Installation guidelines” on page 71.
- Read the safety notices at “Safety notices (multi-lingual translations)” on page 205.
- Read “Handling electrostatic discharge-sensitive devices” on page 204.

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 “Microprocessors” on page 95.

PCI brick

The PCI brick contains the following components:

- Active PCI assembly
- Centerplane
- I/O board
- PCI and PCI-X adapters and spacers
- PCI-X board
- Riser card
- Remote Supervisor Adapter
- VRMs

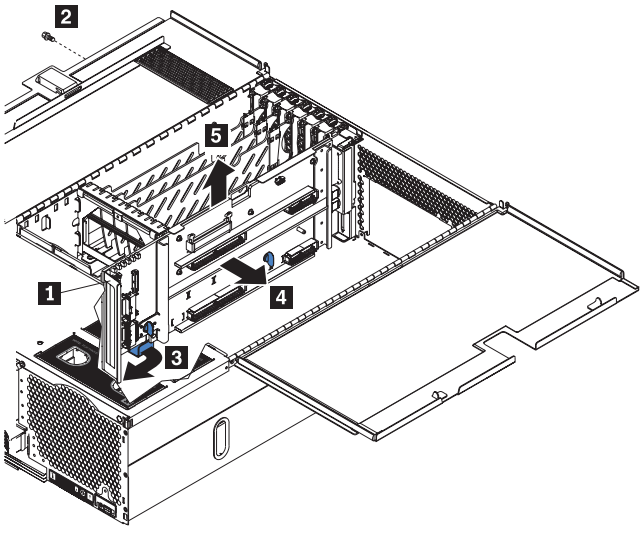
This brick must be removed from the server to access many of these components. Complete the following steps to remove the PCI brick from the server.

Note:

- Read “Installation guidelines” on page 71.
- Read the safety notices at “Safety notices (multi-lingual translations)” on page 205.
- Read “Handling electrostatic discharge-sensitive devices” on page 204.

1. Turn off the server (see “Turning off the server” on page 11) and disconnect all power cords and external cables.
2. Remove the power supplies (see “Hot-swap power supplies” on page 75).
3. Open the top cover (see “Opening the cover” on page 72).
4. Remove the retention bracket, if installed (see “Retention bracket removal” on page 73).
5. Remove the fans (see “Fans” on page 104).
6. Remove the SMP expansion module(s) (see “SMP Expansion Module” on page 86).

   Note: The illustrations in this document might differ slightly from the hardware being serviced.



7. If the system contains a removable cable retainer (**1**), turn thumbscrew to remove it.

8. Remove the shipping screw (2) from the left side of the server, if installed.
9. Disconnect all cables attached to the PCI brick.
10. Disconnect the cables to the DASD backplane (see “DASD backplane” on page 140).

    Note: Failure to disconnect the DASD backplane cables may result in the PCI brick becoming entangled in these cables at step 12.
11. Pivot the release handle (3).
12. Slide the PCI brick as far forward as possible, and then slightly to the right (4).
13. Lift the PCI brick straight up and out of the server (5).
14. To reinstall the PCI brick, reverse the above steps.

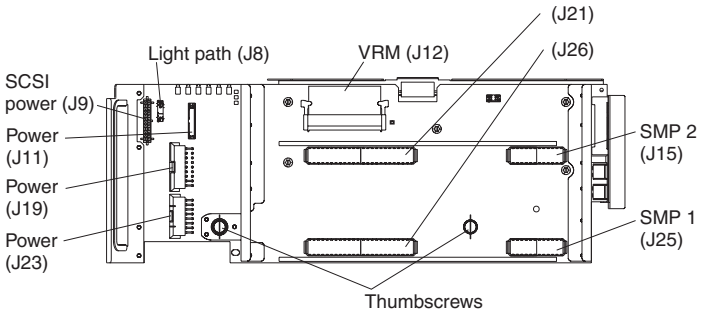
    Note: The PCI brick connects to the chassis with tabs that connect with seven slots on the bottom of the chassis and two slots on the side of the chassis. Line up the tabs on the PCI brick with the slots on the chassis, and then slide the PCI brick into place.

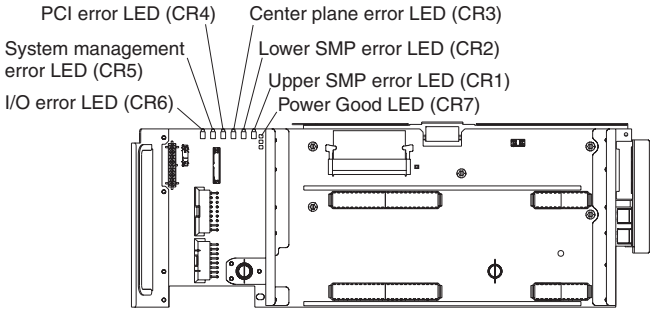
Centerplane

This section illustrates the locations of the connectors and LEDs on the centerplane, as well as providing instructions to replace the centerplane.

Centerplane connectors and LEDs

The following illustrations identify the connectors and LEDs on the centerplane board. The centerplane is used to connect the power and signal paths for each of the two SMP Expansion Modules, the I/O board, and the Remote Supervisor Adapter.





Centerplane replacement

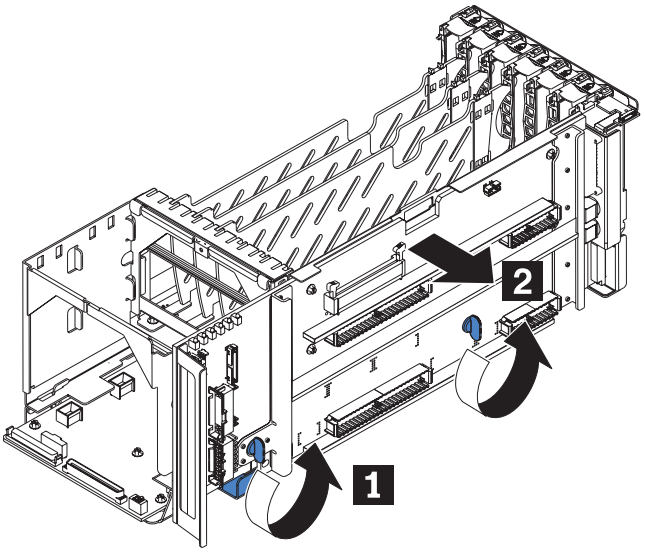
Complete the following steps to remove the centerplane.

Note:

- Read “Installation guidelines” on page 71.
- Read the safety notices at “Safety notices (multi-lingual translations)” on page 205.
- Read “Handling electrostatic discharge-sensitive devices” on page 204.

1. Turn off the server (see “Turning off the server” on page 11) and disconnect all power cords and external cables.
2. Remove the PCI brick from the server (see “PCI brick” on page 125) and place it on a clean work surface.

   Note: The illustrations in this document might differ slightly from the hardware being serviced.



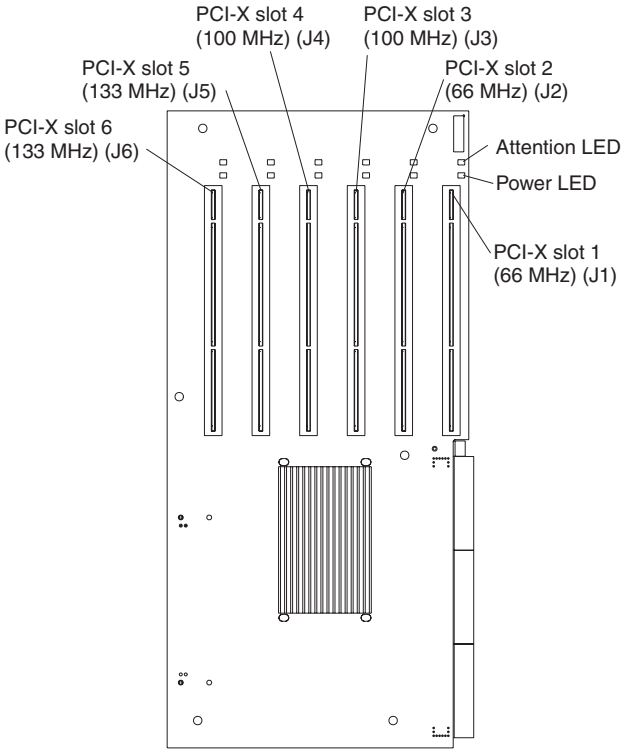
3. Remove the centerplane by turning the two centerplane thumbscrews (**1**) to release it; then, carefully lift the centerplane out of its socket (**2**).
4. To replace the centerplane, reverse the previous steps.

PCI-X board

This section illustrates the internal connectors on the PCI-X board, and provides instructions to replace the PCI-X board.

PCI-X board internal connectors

The following illustration identifies the internal connectors on the PCI-X board. This board enables you to install adapters into the server.



PCI-X board replacement

Complete the following steps to remove the PCI-X board.

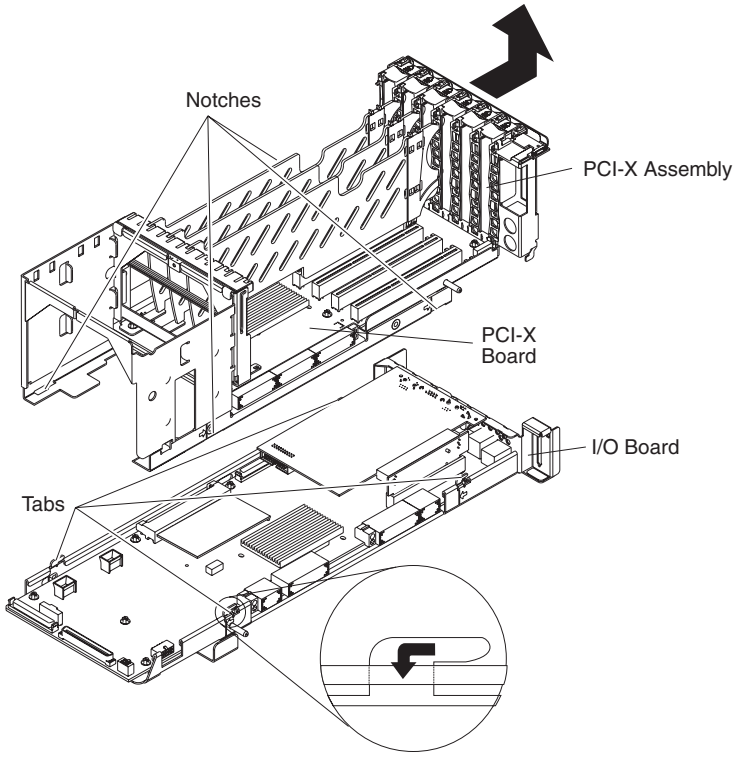
Note:

- Read “Installation guidelines” on page 71.
- Read the safety notices at “Safety notices (multi-lingual translations)” on page 205.
- Read “Handling electrostatic discharge-sensitive devices” on page 204.

1. Turn off the server (see “Turning off the server” on page 11) and disconnect all power cords and external cables.
2. Remove the PCI brick from the server (see “PCI brick” on page 125) 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 77), disconnecting any necessary cables.

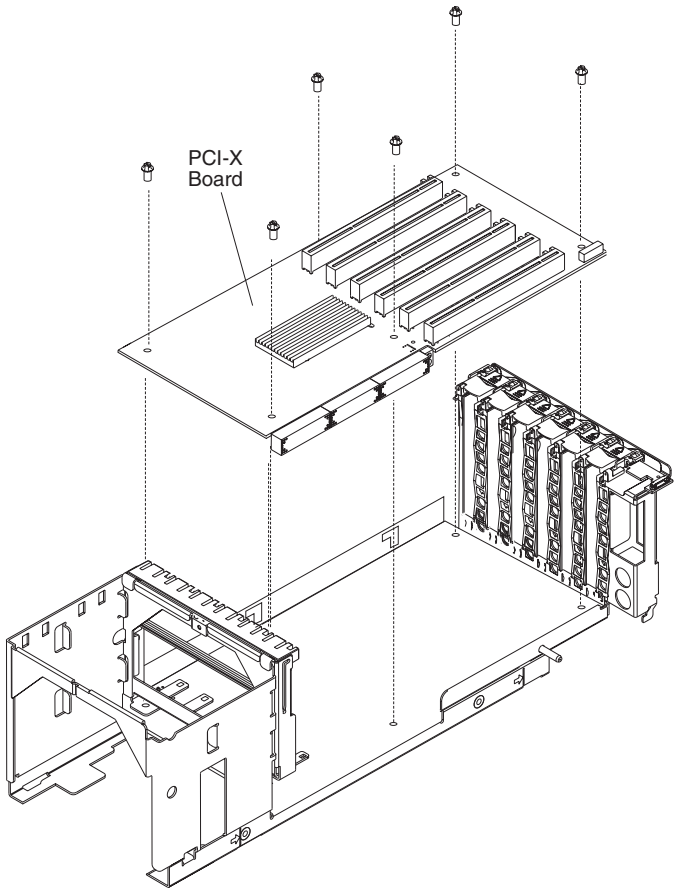
      Note: The illustrations in this document might differ slightly from the hardware being serviced.

   b. Remove the centerplane by turning the two centerplane thumbscrews to release it; then, carefully lift the centerplane out of its socket and place it on a static-protective surface.



   c. 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 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.



5. Remove the six screws that fasten the PCI-X board to the assembly.

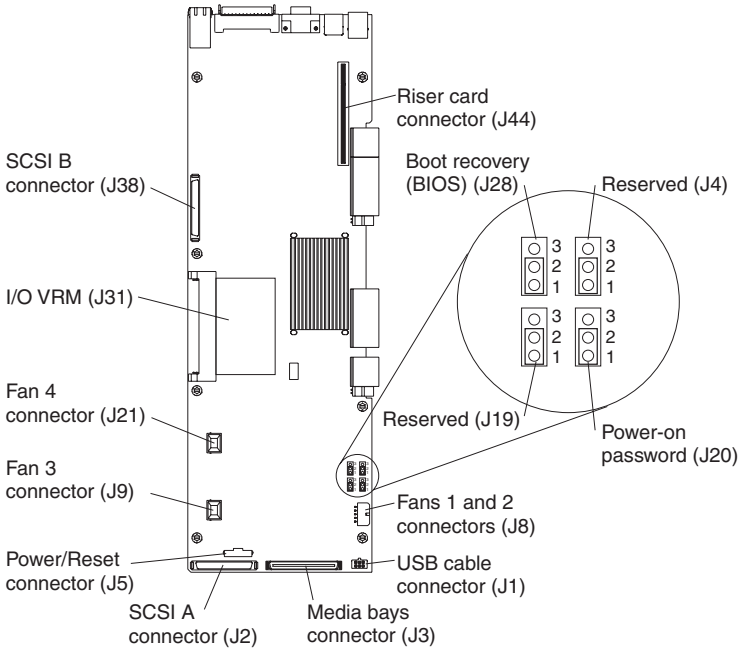
   Note: You may have to move the clear plastic label out of the way.
6. Lift the board up and out of the PCI brick.
7. To replace the PCI-X board, reverse the previous steps.

I/O board

This section illustrates the internal connectors on the I/O board, and provides instructions for I/O board replacement.

I/O board internal connectors

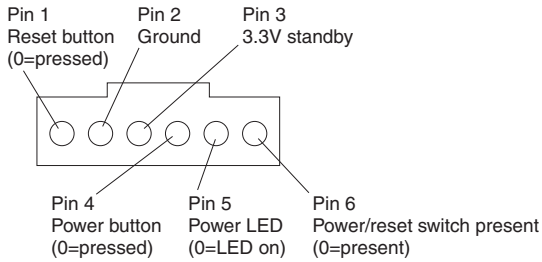
The following illustration identifies the internal connectors on the I/O board. This board supports the input and output ports located on the server.



Note: The default position for J4, J10, J20 and J28 is pins 1 and 2.

Power switch bypass

The power switch can by bypassed (force power on) using the J5 connector on the I/O board.



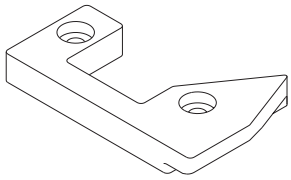
Unplug the J5 connector; then, either connect another power switch or connect pin 6 to pin 4 to simulate a button press.

I/O board replacement

Complete the following steps to remove the I/O board.

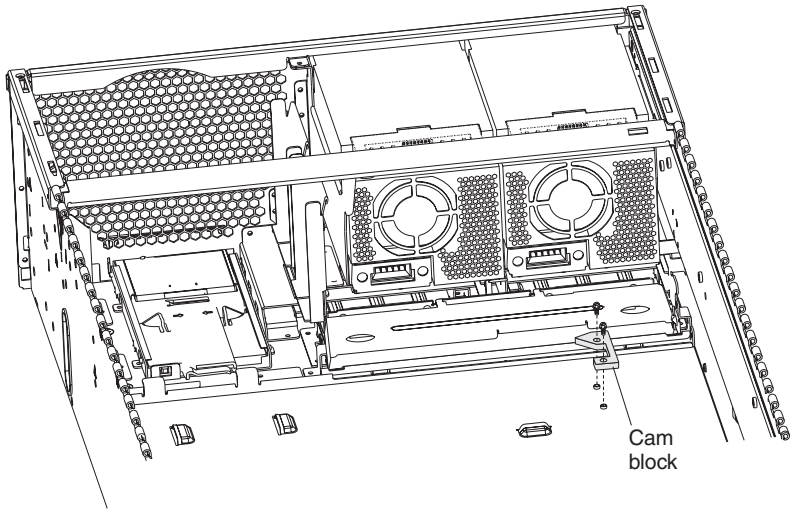
Note: When replacing the I/O board, you must either update the system with the latest Remote Supervisor Adapter firmware code and BIOS code from www.ibm.com/pc/support, or restore the pre-existing firmware and BIOS code that the customer provides on a diskette or CD image.

1. Read “Installation guidelines” on page 71., the safety notices at “Safety notices (multi-lingual translations)” on page 205., and “Handling electrostatic discharge-sensitive devices” on page 204..
2. Turn off the server (see “Turning off the server” on page 11) and disconnect all power cords and external cables.
3. Remove the PCI brick from the server (see “PCI brick” on page 125) and place it on a clean work surface.
4. Remove the centerplane by turning the two centerplane thumbscrews to release it (see “Centerplane” on page 127); then, carefully lift the centerplane out of its socket and place it on a static-protective surface.
5. The replacement I/O board may be shipped with a cam block.



If this is the case, complete the following steps to replace the cam block:

a. Remove the two screws securing the cam block to the chassis and set them in a safe place; then, remove the cam block from the server.



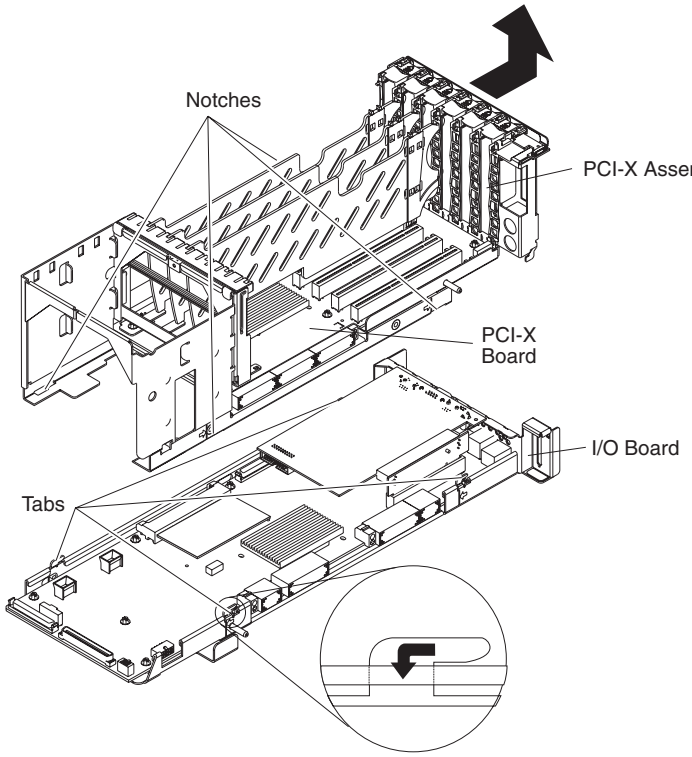
b. Position the replacement cam block in the server so that the apertures in the cam block are aligned with the apertures in the chassis; then, use the screws that were removed in step 5a to secure the cam block to the chassis.

Note: The cam block must be replaced to ensure that the SMP Expansion Modules will install properly in the server.

6. Remove the PCI-X assembly from the I/O board:

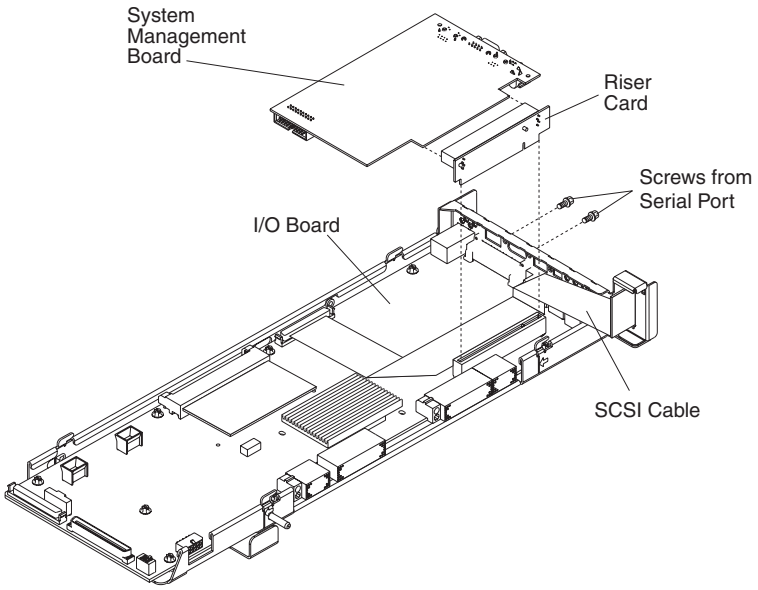
a. Remove any adapters and adapter separators that are installed (see “PCI and PCI-X adapters” on page 77), unplugging any necessary cables.

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.

Note: The illustrations in this document might differ slightly from the hardware being serviced.



c. Pull the Remote Supervisor Adapter out of the riser card, disconnecting any cables, and set it in a safe place.

d. Pull the riser card out of the I/O board, disconnecting any cables.

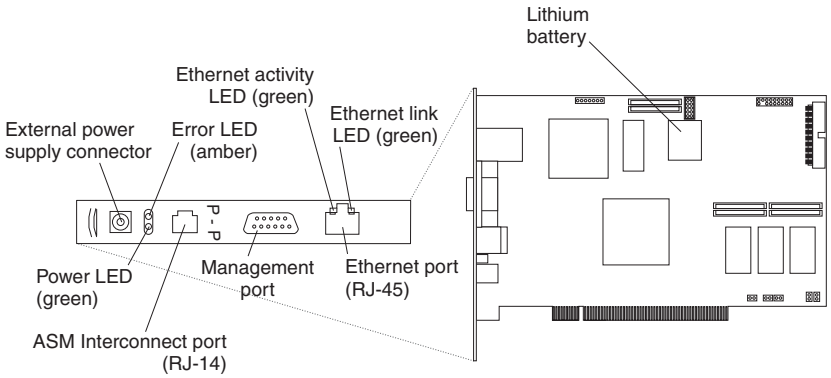
7. To replace the I/O board, reverse the previous steps.

Riser card and Remote Supervisor Adapter

This section illustrates the location of connectors and LEDs on the Remote Supervisor Adapter, and provides instructions for replacement of the Remote Supervisor Adapter and riser card.

Remote Supervisor Adapter component locations

The following illustration identifies the connectors and lights on the Remote Supervisor Adapter.



Riser card and Remote Supervisor Adapter replacement

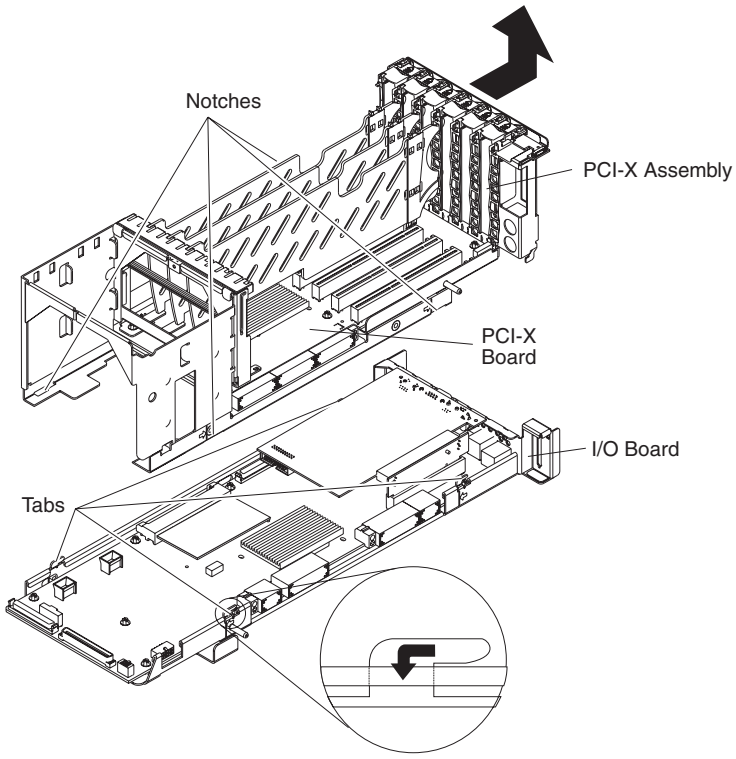
Complete the following steps to remove the riser card.

Note:

- Read “Installation guidelines” on page 71.
- Read the safety notices at “Safety notices (multi-lingual translations)” on page 205.
- Read “Handling electrostatic discharge-sensitive devices” on page 204.

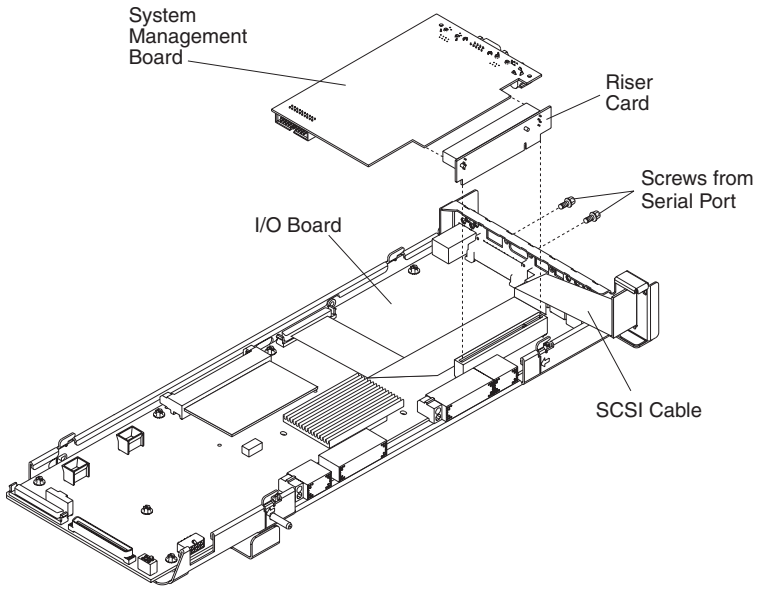
1. Turn off the server (see “Turning off the server” on page 11) and disconnect all power cords and external cables.
2. Remove the PCI brick from the server (see “PCI brick” on page 125) and place it on a clean work surface.
3. Remove the PCI-X assembly from the I/O board:
   a. Remove any adapters and adapter separators that are installed (see “PCI and PCI-X adapters” on page 77), unplugging any necessary cables.

      Note: The illustrations in this document might differ slightly from the hardware being serviced.



   b. Remove the centerplane by turning the two centerplane thumbscrews to release it (see “Centerplane” on page 127); then, carefully lift the centerplane out of its socket and place it on a static-protective surface.
   c. 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.

Note: The illustrations in this document might differ slightly from the hardware being serviced.



d. Remove the serial port screws.

e. Pull the Remote Supervisor Adapter out of the riser card, disconnecting any cables, and set it in a safe place.

f. Pull the riser card out of the I/O board, disconnecting any cables.

4. To replace the riser card and/or the Remote Supervisor Adapter, reverse the previous steps.

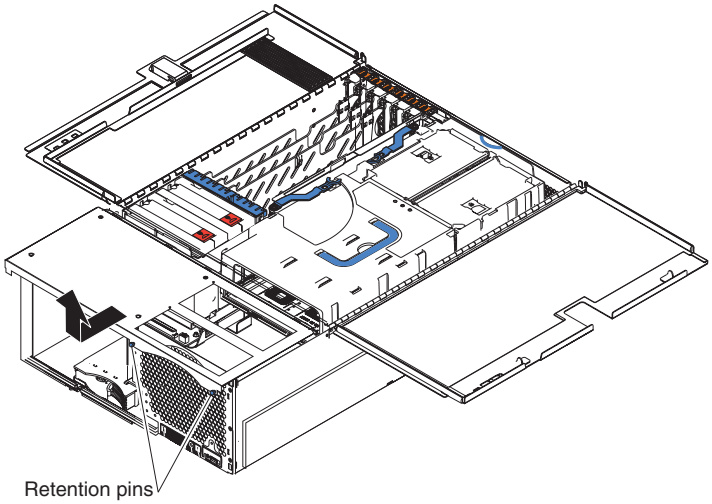
Top cover assembly

Complete the following steps to remove the top cover assembly.

Note:

- Read “Installation guidelines” on page 71.
- Read the safety notices at “Safety notices (multi-lingual translations)” on page 205.
- Read “Handling electrostatic discharge-sensitive devices” on page 204.

1. Turn off the server (see “Turning off the server” on page 11) and disconnect all power cords and external cables.
2. Remove the front bezel (see “Bezel removal” on page 74).



3. Pull the two retaining pins on the top front of the chassis until they loosen.
4. Slide the top cover to the front slightly.
5. 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 the front bezel.

Top power board

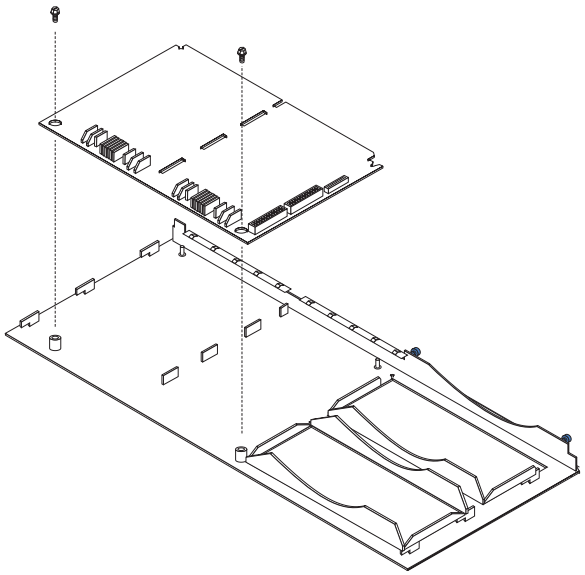
Complete the following steps to remove the top power board.

Note:

- Read “Installation guidelines” on page 71.
- Read the safety notices at “Safety notices (multi-lingual translations)” on page 205.
- Read “Handling electrostatic discharge-sensitive devices” on page 204.

1. Turn off the server (see “Turning off the server” on page 11) and disconnect all power cords and external cables.
2. Remove the top cover assembly (see “Top cover assembly” on page 138) 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

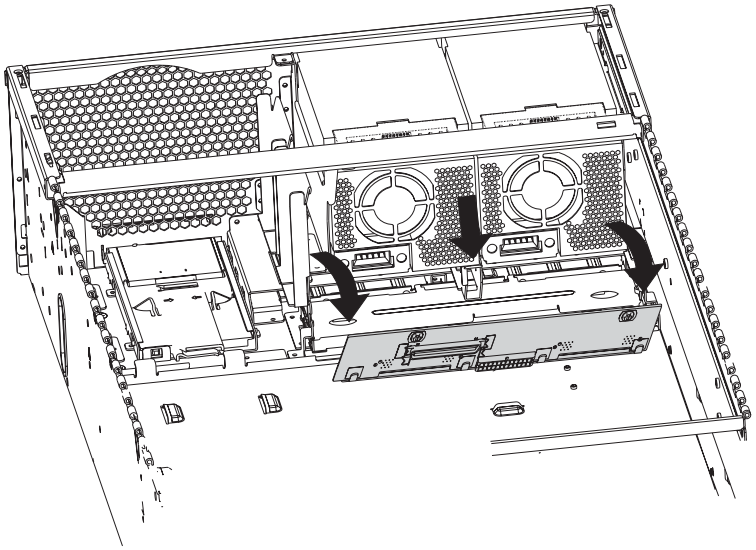
Complete the following steps to remove the DASD backplane.

Note:

- Read “Installation guidelines” on page 71.
- Read the safety notices at “Safety notices (multi-lingual translations)” on page 205.
- Read “Handling electrostatic discharge-sensitive devices” on page 204.

1. Turn off the server (see “Turning off the server” on page 11) and disconnect all power cords and external cables.
2. Open the cover (see “Opening the cover” on page 72).
3. Remove the power supplies (see “Hot-swap power supplies” on page 75).
4. Remove the PCI brick (see “PCI brick” on page 125).

   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

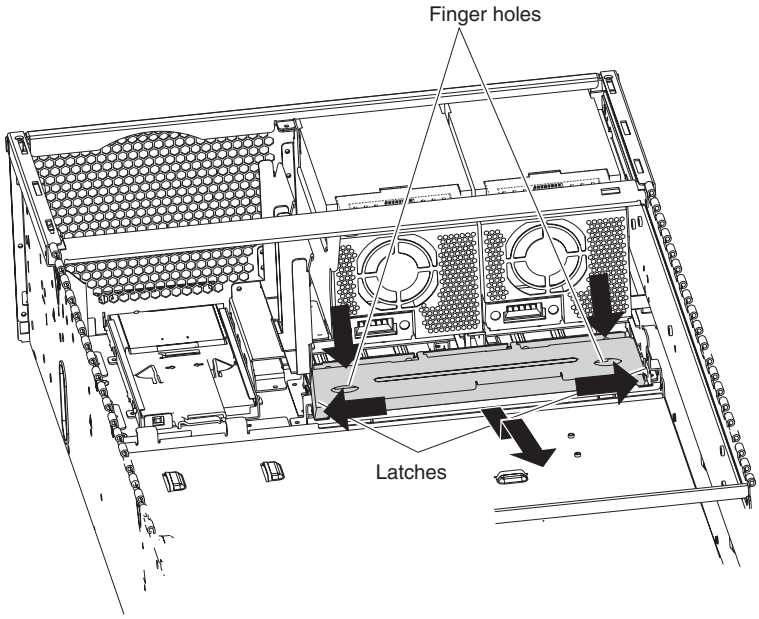
Complete the following steps to remove the media bay card.

Note:

- Read “Installation guidelines” on page 71.
- Read the safety notices at “Safety notices (multi-lingual translations)” on page 205.
- Read “Handling electrostatic discharge-sensitive devices” on page 204.

1. Turn off the server (see “Turning off the server” on page 11) and disconnect all power cords and external cables.
2. Open the cover (see “Opening the cover” on page 72).
3. Remove the DASD backplane (see “DASD backplane” on page 140).

   Note: The illustrations in this document might differ slightly from the hardware being serviced.



4. Insert your fingers in the two thumbholes 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.

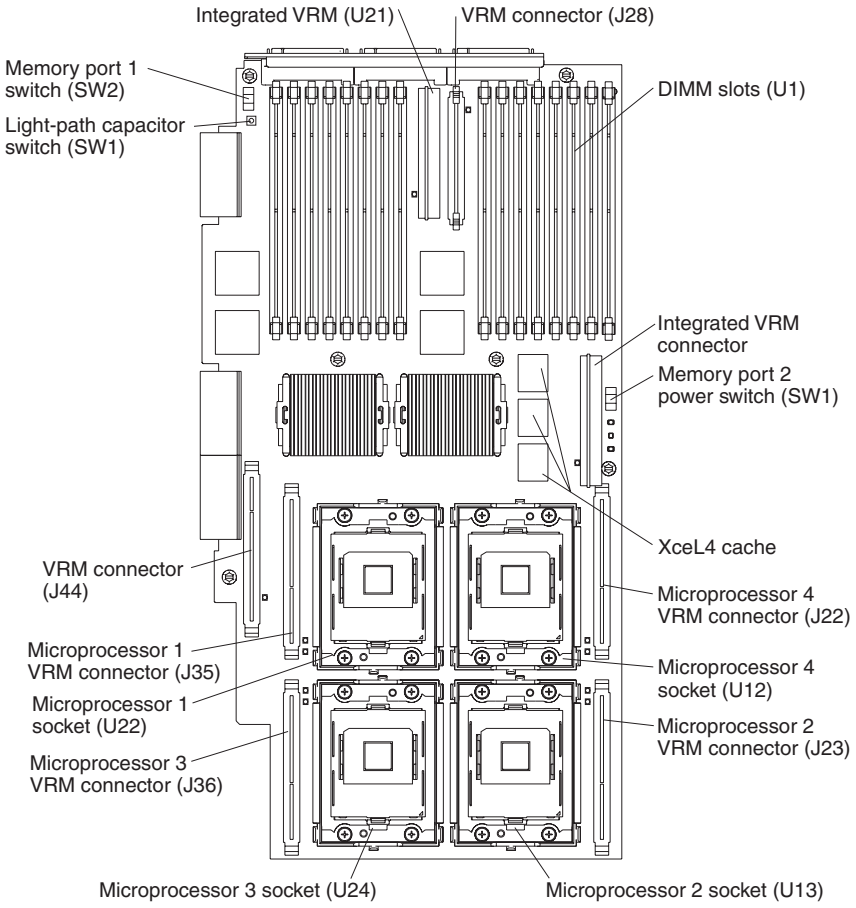
SMP boards

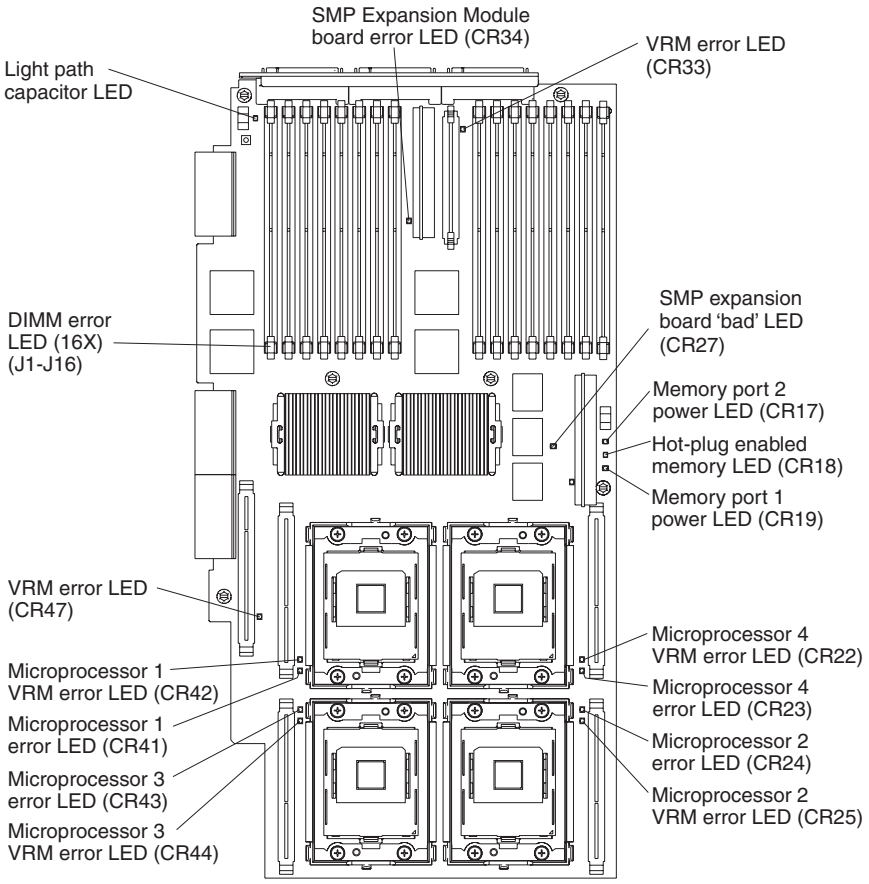
Note: When replacing the SMP board, you must either update the system with the latest firmware or restore the pre-existing firmware that the customer provides on a diskette or CD image.

This section identifies the connectors and LEDs on the SMP Expansion board, and provides instructions for SMP Expansion board replacement.

SMP Expansion Module connectors and LEDs

The following illustrations identify the connectors and LEDs on the SMP Expansion Module.





SMP Expansion board replacement

Complete the following steps to replace an SMP board.

Note:

- Read "Installation guidelines" on page 71.
- Read the safety notices at "Safety notices (multi-lingual translations)" on page 205.
- Read "Handling electrostatic discharge-sensitive devices" on page 204.

1. Turn off the server (see "Turning off the server" on page 11) and disconnect all power cords and external cables.
2. Open the cover (see "Opening the cover" on page 72).
3. Remove the SMP module(s) and cover from which the SMP board will be replaced (see "Removing an SMP Expansion Module and cover" on page 87).
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 "DIMM removal and replacement" on page 93).
   - Microprocessor assemblies and VRMs (see "Microprocessors" on page 95).
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 "Reinstalling an SMP Expansion Module and cover" on page 101).

   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 16).

AC box assembly mechanism

Complete the following steps to remove the AC box assembly mechanism:

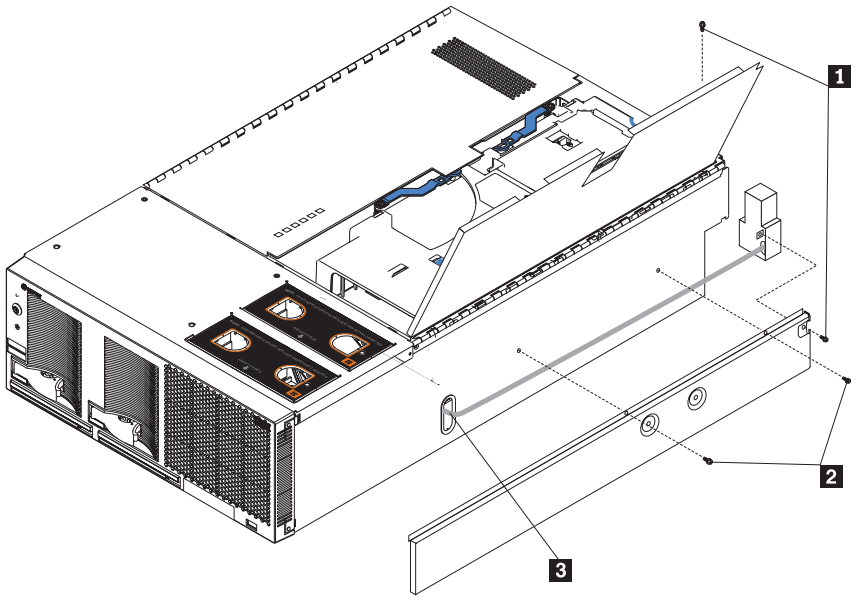
Note:

- Read “Installation guidelines” on page 71.
- Read the safety notices at “Safety notices (multi-lingual translations)” on page 205.
- Read “Handling electrostatic discharge-sensitive devices” on page 204.

1. Turn off the server (see “Turning off the server” on page 11) and disconnect all power cords and external cables.
2. Remove the fans (see “Fans” on page 104).
3. Remove the top cover assembly (see “Top cover assembly” on page 138).
4. Open the top cover (see “Opening the cover” on page 72).
5. Remove the SMP Expansion modules (see “Removing an SMP Expansion Module and cover” on page 87).

   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 16).
6. Remove the PCI brick (see “PCI brick” on page 125).

   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

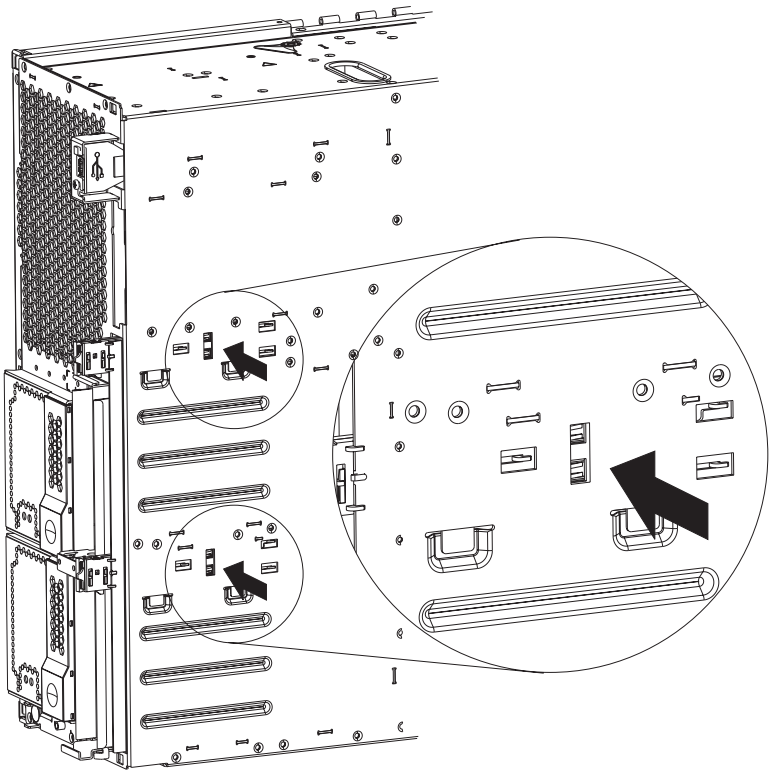
The server contains two media extract mechanisms. Complete the following steps to remove a media extract mechanism from the server.

Note:

- Read “Installation guidelines” on page 71.
- Read the safety notices at “Safety notices (multi-lingual translations)” on page 205.
- Read “Handling electrostatic discharge-sensitive devices” on page 204.

1. Turn off the server (see “Turning off the server” on page 11) and disconnect all power cords and external cables.
2. Remove the drive associated with the media extract mechanism to be removed (see “Drive installation” on page 83).

   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.

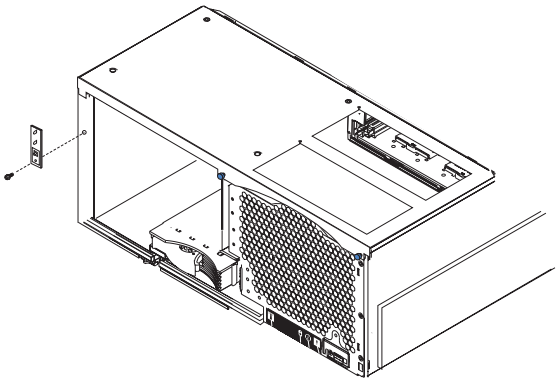
Power/reset card assembly

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 71.
- Read the safety notices at “Safety notices (multi-lingual translations)” on page 205.
- Read “Handling electrostatic discharge-sensitive devices” on page 204.

1. Turn off the server (see “Turning off the server” on page 11) and disconnect all power cords and external cables.
2. Remove the front bezel (see “Bezel removal” on page 74).
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.

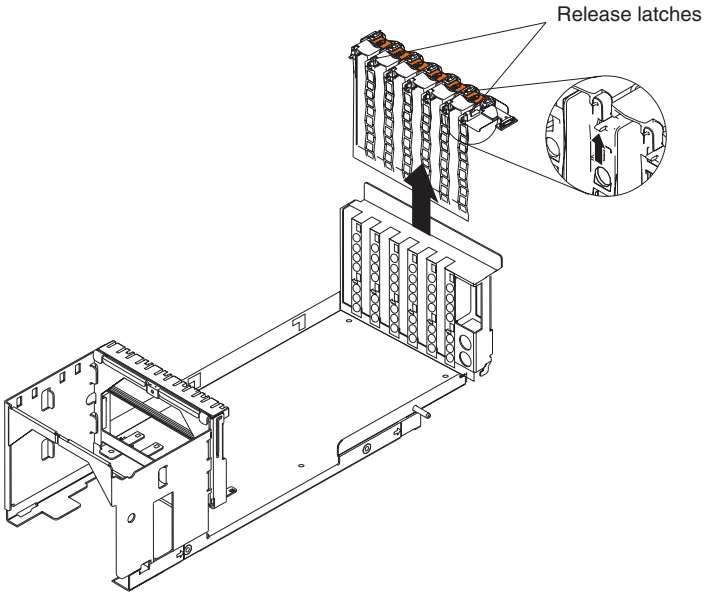
Note:

- Read “Installation guidelines” on page 71.
- Read the safety notices at “Safety notices (multi-lingual translations)” on page 205.
- Read “Handling electrostatic discharge-sensitive devices” on page 204.

Complete the following steps to replace the Active PCI assembly:

1. Turn off the server and disconnect all power cords and external cables; then, remove the top cover (see “Opening the cover” on page 72).
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 106).

Light path card

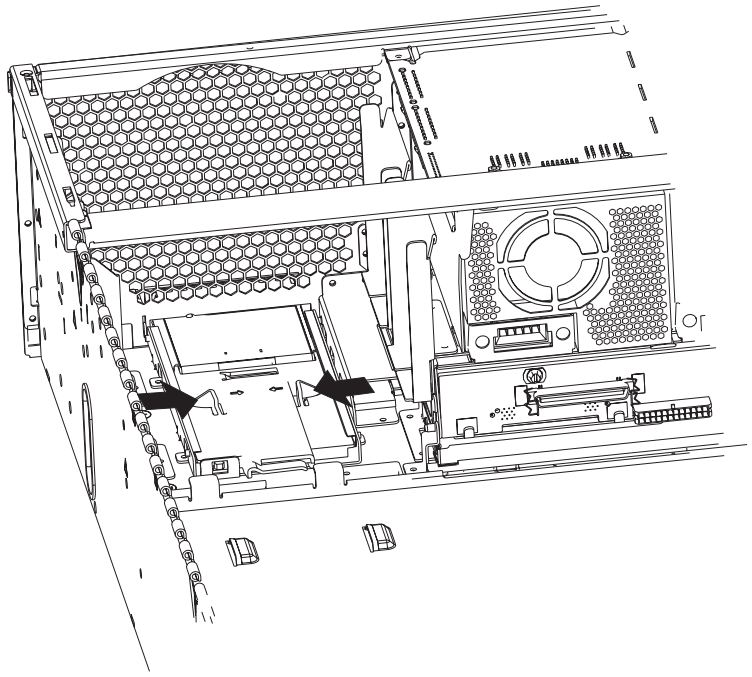
Complete the following steps to remove the light path card.

Note:

- Read “Installation guidelines” on page 71.
- Read the safety notices at “Safety notices (multi-lingual translations)” on page 205.
- Read “Handling electrostatic discharge-sensitive devices” on page 204.

1. Turn off the server (see “Turning off the server” on page 11) and disconnect all power cords and external cables.
2. Remove the two front fans (see “Fans” on page 104).
3. Remove the front bezel (see “Bezel removal” on page 74).
4. Open the cover (see “Opening the cover” on page 72).
5. Remove the top cover assembly (see “Top cover assembly” on page 138) and set it upside-down on a clean work surface.
6. Disconnect the light path cable from the centerplane (see “Centerplane connectors and LEDs” on page 127).
7. 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.



8. Inside the server, squeeze the Light Path card at the arrows to free it from the server.
9. Slide the card the rest of the way out of the server.
10. To replace the Light Path card, reverse the above steps.

Symptom-to-FRU index

This index supports xSeries 440 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 1..

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.

Beep/symptom	FRU/action
1-1-2 (Microprocessor register test has failed.)	1. **Microprocessor** 2. SMP board
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
1-3-2 (First 64 Kb RAM parity test has failed)	1. **DIMM** 2. SMP board
1-4-3 (Interrupt vector loading test has failed)	1. **I/O board** 2. PCI-X 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. Centerplane

Beep/symptom	FRU/action
2-2-3 (CMOS power failure and checksum checks have failed)	1. **Battery** 2. I/O board
2-2-4 (CMOS configuration information validation has failed)	1. **Battery** 2. I/O board
2-3-1 (Screen initialization has failed)	1. **Restart server.** 2. Monitor. 3. I/O board.
2-3-2 (Screen memory test has failed)	• **I/O board**
2-3-3 (Screen retrace tests have failed)	1. **Monitor** 2. I/O board
2-3-4 (Search for video ROM has failed)	• **I/O board**
2-4-1 (Screen test indicates the screen is operable)	• **Information only**
3-1-1 (Timer tick interrupt failed)	• **I/O board**
3-1-2 (Interval timer channel 2 failed)	• **I/O board**
3-1-3 (RAM test has failed above address hex 0FFFF)	1. **DIMM** 2. SMP board
3-1-4 (Time-of-Day clock failed)	1. **Battery** 2. I/O board
3-2-1 (Serial port test has failed.)	1. **I/O board** 2. Centerplane
3-2-2 (Parallel port test has failed)	• **I/O board**
3-2-4 (Comparison of CMOS memory size against actual has failed)	1. **Battery** 2. I/O board
3-3-1 (A memory size mismatch has occurred)	1. **DIMM** 2. SMP board
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)	1. **Install or reseat DIMMS, then reboot.** 2. DIMM. 3. SMP board. 4. I/O board.
3-3-4 (ECC hardware test failed)	1. **DIMM** 2. SMP board
Two short beeps (information only, configuration has changed)	1. **Run Configuration/Setup.** 2. Run diagnostics.

Beep/symptom	FRU/action
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. Centerplane
Repeating short beeps	1. **Keyboard** 2. Centerplane 3. I/O board
Repeating long beeps	• **Reseat DIMMs.**
One long and one short beep	1. **I/O board** 2. Centerplane
One long and two short beeps **Note:** When turning on the 16-way configuration (models 1VX, 2VX, 3VX only), 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. Centerplane
Two long and two short beeps	1. **I/O board** 2. Centerplane

No beep symptoms

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	1. **See "Undetermined problems" on page 192.**
System will not power-up (Power supply ac LED is on)	1. **See "Power supply LED errors" on page 180.** 2. Microprocessor installation sequence (see "Microprocessors" on page 95).

Light Path LED errors

Before replacing any FRU:

1. Run diagnostics and view System Error log.
2. Observe LEDs on boards.

Note: For 16-way configuration (models 1VX, 2VX, 3VX only), run diagnostics on each chassis (boot up standalone), and observe the LEDs on the boards of each chassis.

Level 1 light path

The level 1 light path consists of the system-error LED on the front panel (see “Server controls and indicators” on page 7).

Level 2 light path

The level 2 light path consists of the light path diagnostics panel (see the illustration at step 1 on page 54).

Level 2 Light Path LED	FRU/action
All LEDs off (error log full) **Note:** “See Log” LED may be lit.	1. **System Error log is 75% full; clear the log.** 2. PFA alert; check error log for failure; clear PFA alert; remove ac power for at least 20 seconds, reconnect, then power up system. 3. Run diagnostics.
CPU LED on (failed processor) **Note:** Verify correct installation sequence; see “Microprocessors” on page 95.	1. **Microprocessor 1-8** 2. SMP board
VRM LED on (VRM failure)	1. **VRM 1-8** 2. SMP board
DASD LED on (hot-swap hard drive failure) **Note:** If RAID system, refer to Hardware Maintenance Manual for the specific RAID adapter.	1. **Run diagnostics.** 2. Failing drive (reseat/replace). 3. Be sure the fans are operating correctly and the air flow is good. 4. SCSI backplane.
FAN LED on (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.
MEM LED on (memory error)	1. **Check DIMM error LED on SMP board** **Note:** If there is a DIMM failure, an LED on the SMP board indicates the failing DIMM. Be sure to check both lower and upper SMP Expansion Module assemblies (if installed). 2. DIMM. 3. SMP board.
PCI LED on (adapter failure)	1. **Check System Error log.** 2. Failing adapter. 3. PCI-X board.
PS1 LED on	1. **Power supply 1** 2. Top power board 3. Centerplane

Level 2 Light Path LED	FRU/action
PS2 LED on	1. **Power supply 2** 2. Top power board 3. Centerplane
OVER TEMP LED on (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 4. 3. Examine System Error log. a. System over recommended temperature b. Operator information panel c. DASD over recommended temperature 1) Overheating hard disk drive 2) DASD backplane d. System over recommended temperature for processor *x* (where *x* is processor number) (processor LED also on) 1) Microprocessor *x* 2) SMP board e. Power supply fault / over temp 1) Failing power supply
See Log (non optimal condition)	1. **See System Error log.** 2. See Service Processor log.
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.
SP Bus (Remote Supervisor Adapter)	1. **See System Error log.** 2. Remote Supervisor Adapter card. 3. SMP board.
Non Red (nonredundancy lost)	1. **If PS *x* LED is lit on Level 2 Light Path, follow instructions for that LED.** 2. Failing power supply.
Out of Spec (power supplies’ rating exceeded)	• **Power supply**

Level 3 light path

The level 3 light path consists of the LEDs on the top cover of the server (see the illustration at step 2 on page 54).

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 connectors and LEDs” on page 142). c. Check board for lit level 4 LEDs (CPU, memory, VRM, SMP board LEDs) (see “SMP Expansion Module connectors and LEDs” on page 142). 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 connectors and LEDs” on page 142). c. Check board for lit level 4 LEDs (CPU, memory, VRM, SMP board LEDs) (see “SMP Expansion Module connectors and LEDs” on page 142). 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 (centerplane power)	1. **If level 2 light path VRM LED is on (see the illustration at step 1 on page 54), replace centerplane VRM.** 2. Verify all cables and connectors are properly seated. 3. Centerplane.
4 (PCI-X power)	1. **Check PCI-X board for (see “PCI-X board internal connectors” on page 129) 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 the illustration at step 1 on page 54), 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 (models 1VX, 2VX, 3VX only), 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 181.

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.

SMI message code	Suggested action
1500 (Single bit error occurred: begin scrub)	• **Run memory diagnostics when multiple entries accumulate.**
1501 (Multi-bit error occurred: forcing NMI)	• **Run memory diagnostics.**
1502 (SERR: Addr. or Spec. Cyc. DPE)	• **Run diagnostics on PCI slot and device indicated.**
1503 (SERR: Received Target Abort)	• **Run diagnostics on PCI slot and device indicated.**
1504 (SERR: Device Signaled SERR)	• **Run diagnostics on PCI slot and device indicated.**
1505 (PERR: Master Read parity error)	• **Run diagnostics on PCI slot and device indicated.**
1506 (PERR: Master Write parity error)	• **Run diagnostics on PCI slot and device indicated.**
1507 (PERR: Slave signaled parity error)	• **Run diagnostics on PCI slot and device indicated.**
1509 (SERR / PERR Detected on PCI bus)	• **Run diagnostics on PCI slot and device indicated.**
1510 (SERR: Signaled Target Abort)	• **Run diagnostics on PCI slot and device indicated.**
1511 (MCA: Recoverable Error Detected)	• **Run system diagnostics when multiple entries accumulate.**
1512 (MCA: Unrecoverable Error Detected)	• **Run system diagnostics.**
1513 (MCA: Excessive Recoverable Errors)	• **Run system diagnostics.**
1514 (Rebuilding PCI BUS Map)	• **Information only.**
1515 (Excessive Correctable Memory Errors Detected)	• **Run memory diagnostics.**
1516 (WARNING: Memory Socket ECC Failure)	• **Run memory diagnostics.**
1517 (Recoverable error occurred in L4 cache Node:0***x***) **Note:** Node 00 = primary lower SMP module; Node 01=primary upper SMP module; Node 02=secondary lower SMP module; Node 03=secondary upper SMP module.	1. **Run system diagnostics when multiple entries accumulate.** 2. SMP Board

SMI message code	Suggested action
151802 (Error configuring DIMMS, mismatch detected)	• **Run memory diagnostics, remove any recently added memory DIMMs.**
151803 (Memory ProteXion(C) Event Detected)	• **Run memory/system diagnostics when multiple entries accumulate.**
151805 (Error Reading Port Door Status)	• **Run memory door diagnostics.**
151806 (Memory door opened/closed while memory copy in progress)	• **Information only.**

Service processor messages

Note: In a 16-way configuration (models 1VX, 2VX, 3VX only), 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.

Service Processor message	FRU/action
12V A-H Bus Fault	• **See "12v bus faults" on page 173.**
5V Fault	• **Power backplane**
Cable: Control Panel Not Present	• **Cable to Light Path panel**
Cable: SCSI I2C cable not detected	• **Cable to SCSI backplane**
Cable: Service Processor Not Present	• **ASM adapter**
Center Card Power Fault	• **Centerplane**
CPU 1-8 Over Temperature	• **Check fans and other air blockage.**
Failure reading I2C device. Check devices on bus *x*.	• **Run diagnostics.**
Fan 1-4 Failure	1. **Check fan connection.** 2. Fan.

Service Processor message	FRU/action
Fan 1-4 not detected	1. **Check fan connection.** 2. Fan.
Fan 1-4 Outside Recommended Speed	1. **Check fan connection.** 2. Fan.
Invalid Fan configuration	1. **Check fan connections.** 2. Fans.
Hard Drive 1-2 Fault	• **Run diagnostics.**
Hard Drive 1-2 removal detected	1. **Hard disk drive.** 2. Run diagnostics.
Integrated Systems Management Processor encountered failures upon starting	• **Remove ac power for 20 seconds, reconnect and reboot, and run diagnostics.**
Internal Error CPU 1-8 Fault	• **Run diagnostics/replace failing microprocessor upon multiple entries.**
Invalid CPU configuration	• **Remove last CPU upgrade.**
Lower/Upper CEC Machine Check: x	1. **Run diagnostics.** 2. If multiple entries are logged, SMP Expansion Module.
Lower/Upper CEC Port 0-1 Power Fault	1. **Run diagnostics.** 2. If multiple entries are logged, SMP Expansion Module.
Lower/Upper CEC Scalability Controller Machine Check: x	1. **Run diagnostics.** 2. If multiple entries are logged, SMP Expansion Module.
Native I/O Card Machine Check: x	1. **Run diagnostics.** 2. I/O card.
PCI Card Machine Check: x	1. **Remove PCI adapters and run diagnostics.** 2. I/O card.
PCI Power Good Fault	1. **Remove PCI adapters and run diagnostics.** 2. I/O card.
Power supply x current exceeded max spec value	• **Run diagnostics/replace power supply x.**
Power Supply x Current Fault	• **Replace power supply x.**
Power Supply x Voltage Fault	• **Replace power supply x.**
Power Supply x ac Power Removed, Early Power Off Warning	• **Check ac power inputs.**
Power Supply x dc Good Fault	• **Check/replace power supply x.**
Power Supply x Fan Fault	• **Check/replace power supply x.**
Power Supply x Removed	• **Check/replace power supply x.**
Power Supply x Temperature Fault	• **Check/replace power supply x.**
Processor or VRM Failed	1. **VRM** 2. Microprocessor
Resetting system due to an unrecoverable error	• **Refer to previous log entries.**

Service Processor message	FRU/action
System shutoff due to CPU x over temperature	1. **Heat sink** 2. Fans
System shutoff due to DASD x temperature	1. **SCSI drives** 2. Fans 3. SCSI backplane
System shutoff due to high ambient temperature	1. **Check room temperature.** 2. Fans. 3. Light Path assembly.
Uncorrectable Cache Error Detected. Removed Failed Component(s) from active configuration.	• **Run diagnostics.**
Uncorrectable memory error on bank Jxx	• **Run memory diagnostics.**
VRM x Power Good Fault	• **VRM**

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.

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 and rerun test.
001-250-000 (Test aborted)	1. **Check error log for messages** (see “Error logs” on page 54). 2. SMP board
001-250-001 (Failed SMP Expansion Board ECC)	1. **Check error log for messages** (see “Error logs” on page 54). 2. SMP board 1 (bottom).
001-250-002 (Failed SMP Expansion Board ECC)	1. **Check error log for messages** (see “Error logs” on page 54). 2. SMP board 2 (top).
001-250-099 (Failed SMP Expansion Board ECC)	1. **Check error log for messages** (see “Error logs” on page 54). 2. SMP board 1 (bottom) and 2 (top).

Error code/symptom	FRU/action
001-250-XXX (Test Failed) **Note:** XXX = SMP Board [001=Bottom SMP Board; 002=Top SMP Board; 099=Top and Bottom 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**
015-xxx-001 Failed USB test)	• **I/O board**
015-xxx-015(Failed USB external loopback test)	• **I/O board**
015-xxx-198(USB device connected during USB test)	1. **Remove USB devices, rerun test.** 2. 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.

Error code/symptom	FRU/action
035-253-0nn (ServeRAID controller 0**nn** initialization failure; 0**nn** = 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.)	1. **Check system resources.**
035-255-0nn (Internal Error)	1. **SCSI backplane** 2. SCSI backplane 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-002 (Failed Optional Microprocessor test)	1. **Microprocessor 2** 2. VRM 2
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

Error code/symptom	FRU/action
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. Centerplane
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
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

Error code/symptom	FRU/action
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)
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. **Scaleability 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. Centerplane
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.

Error code/symptom	FRU/action
166-201-000 (ISMP indicates I2C errors on bus A0)	1. **I/O board** 2. Centerplane
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. Centerplane
166-201-004 (ISMP indicates I2C errors on bus A4)	1. **PCI devices on PCI-X card** 2. PCI-X card 3. Centerplane
166-201-005 (ISMP indicates I2C errors on bus A5)	1. **Power supply** 2. Top power board 3. Centerplane
166-201-006 (ISMP indicates I2C errors on bus A6)	1. **PCI devices on PCI-X card** 2. PCI-X card 3. Centerplane 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. Centerplane
166-201-008 (ISMP indicates I2C errors on bus A8)	1. **Light Path card** 2. Light Path cable 3. Centerplane
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)

Error code/symptom	FRU/action
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
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.**

Error code/symptom	FRU/action
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.**
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-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. Centerplane 4. I/O board
180-xxx-002(Failed Diagnostics LED Panel test)	1. **Light path diagnostics card** 2. Centerplane
180-xxx-003 (Failed SMP Expansion Module LED test)	1. **SMP Expansion Module** 2. Scalability cable 3. Centerplane
180-xxx-005 (Failed SCSI Backplane LED test)	1. **SCSI backplane cable** 2. SCSI backplane 3. Centerplane

Error code/symptom	FRU/action
180-xxx-007 (Failed Centerplane LED test)	• **Centerplane**
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
180-361-003 (Failed Fan LED test)	1. **Fan** 2. I/O board
201-xxx-Ynn (failed Memory Test; see "Memory settings" on page 18) **Note:** Y = SMP Board [0=Bottom SMP Board; 1=Top SMP Board]	1. **DIMM nn [nn = failing DIMM] (see System Error log for location)** 2. SMP Board
201-XXX-Y21 (Multiple DIMM failure in Port 1 Bank 1; see "DIMM removal and replacement" on page 93) **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 "DIMM removal and replacement" on page 93) **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 "DIMM removal and replacement" on page 93) **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
201-XXX-Y24 (Multiple DIMM failure in Port 1 Bank 4; see "DIMM removal and replacement" on page 93) **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 "DIMM removal and replacement" on page 93) **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 "DIMM removal and replacement" on page 93) **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 "DIMM removal and replacement" on page 93) **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
201-XXX-Y34 (Multiple DIMM failure in Port 2 Bank 4; see “DIMM removal and replacement” on page 93) **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 problem; see PCDR log. 3. SMP Board xx.
204-210-0xx (Test Failed) **Note:** xxx=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, reload system BIOS. 3. SMP Board xx.
206-xxx-000 (Failed Diskette Drive test)	1. **Diskette drive** 2. Media Bay card
215-xxx-000 (Failed CD-ROM test)	1. **CD-ROM drive** 2. 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 **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**
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**

Error code/symptom	FRU/action
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. Centerplane
302-xxx-xxx (Failed mouse test)	1. **Mouse** 2. Centerplane
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 67).** 2. Check for any loose connections between the loopback plug and the ethernet port.
415-xxx-000 (Failed Modem test)	• **Modem**

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.

Error message	FRU/action
12v A bus fault	1. **VRM on I/O board** 2. I/O board
12v B bus fault	1. **Memory VRM on SMP Board 2 (top)** 2. SMP Board 2 (top)
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
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)
12v E bus fault	1. **Centerplane VRM** 2. VRM on PCI-X board 3. Centerplane 4. PCI-X board
12v F bus fault	1. **Memory VRM on SMP Board 1 (bottom)** 2. SMP Board 1 (bottom)
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)
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)

Error symptoms

Symptom	Suggested action
CD-ROM drive problems CD-ROM drive is not recognized.	Verify that: 1. The IDE channels are enabled in the Configuration/Setup Utility program. 2. All cables and jumpers are installed correctly. 3. The correct device driver is installed for the CD-ROM drive. **Note:** When two servers are merged together the CD-ROM, diskette drive, keyboard, USB ports, mouse, and video are disabled on the secondary server.
Diskette drive problems Diskette drive in-use light stays on, or the system bypasses the diskette drive.	If there is a diskette in the drive, verify that: 1. The diskette drive is enabled in the Configuration/Setup Utility program. 2. The diskette is good and not damaged. (Try another diskette if you have one.) 3. The diskette contains the necessary files to start the server. 4. Your software program is working properly. If the diskette drive in-use light stays on, or the system continues to bypass the diskette drive, replace diskette drive. **Note:** When two servers are merged together the CD-ROM, diskette drive, keyboard, USB ports, mouse, and video are disabled on the secondary server.

Symptom	Suggested action
Expansion enclosure problems The SCSI expansion enclosure used to work but does not work now.	Verify that: 1. The cables for all external SCSI options are connected correctly. 2. The last option in each SCSI chain, or the end of the SCSI cable, is terminated correctly. 3. Any external SCSI option is turned on. You must turn on an external SCSI option before turning on the server. For more information, see your SCSI and expansion enclosure documentation.
Hard disk drive problems Not all drives are recognized by the hard disk diagnostic test (Fixed Disk test).	1. Remove the first drive not recognized and try the hard disk 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 diagnostic.	1. Remove the hard disk drive being tested when the server stopped responding and try the diagnostic again. 2. If the hard disk diagnostic runs successfully, replace the drive you removed with a new one.
Intermittent problems A problem occurs only occasionally and is difficult to detect.	Verify that: 1. All cables and cords are connected securely to the rear of the server and attached options. 2. When the server is turned on, air is flowing from the rear of the server at the fan grill. If there is no air flow, the fan is not working. This causes the server to overheat and shut down. 3. Ensure that the SCSI bus and devices are configured correctly and that the last external device in each SCSI chain is terminated correctly.
Keyboard, mouse, or pointing-device problems. All or some keys on the keyboard do not work.	1. Make sure that the keyboard cable is properly connected to the server. 2. Make sure that the server and the monitor are turned on. 3. Try using another keyboard. **Note:** When two servers are merged together the CD-ROM, diskette drive, keyboard, USB ports, 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 the device drivers are installed correctly. 2. Try using another mouse or pointing device. **Note:** When two servers are merged together the CD-ROM, diskette drive, keyboard, USB ports, mouse, and video are disabled on the secondary server.
USB keyboard, mouse, or pointing-device problems. 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. Make sure that the keyboard cable is properly connected to the server. 3. Make sure that the server and the monitor are turned on. 4. Try using another keyboard. **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 merged together the CD-ROM, diskette drive, keyboard, USB ports, mouse, and video are disabled on the secondary server.

Symptom	Suggested action
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. Try using another mouse or pointing device. **Note:** When two servers are merged together the CD-ROM, diskette drive, keyboard, USB ports, mouse, and video are disabled on the secondary server.
Memory problems	Verify that: 1. The memory modules are seated properly. 2. You have installed the correct type of memory. 3. If you changed the memory, you updated the memory configuration with the Configuration/Setup Utility program. 4. All banks of memory on the DIMMs are enabled. The server might have automatically disabled a DIMM bank when it detected a problem, or a DIMM bank could have been manually disabled.
The amount of system memory displayed is less than the amount of physical memory installed.	Look in the 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: 1. Start the Configuration/Setup Utility program. 2. Enable the DIMM. 3. Save the configuration and restart the server. • If you continue to get this error, replace the DIMM.
Microprocessor problems	The startup (boot) microprocessor is not working properly.
The server emits a continuous tone during POST.	Verify that the startup microprocessor is seated properly. If it is, replace the startup microprocessor.
Monitor problems	Some IBM monitors have their own self-tests. If you suspect a problem with your monitor, see the information that comes with the monitor for adjusting and testing instructions.
Testing the monitor.	1. **Monitor.** 2. Run diagnostics. If diagnostics pass, the problem may be a video driver. 3. Display Adapter / I/O board.

Symptom	Suggested action
The screen is blank.	Verify that: 1. The server power cord is plugged into the server and a working electrical outlet. 2. The monitor cables are connected properly. 3. The monitor is turned on and the brightness and contrast controls are adjusted correctly. 4. Ensure that the monitor is not connected to the secondary server in a merged configuration. **Note:** When two servers are merged together the CD-ROM, diskette drive, keyboard, USB ports, 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 to reset the CMOS values to the default configuration (memory connector or bank of connectors **Enabled**).
The monitor works when you turn on the server but goes blank when you start some application programs.	Verify that: 1. The primary monitor cable is connected to the server. 2. You installed the necessary device drivers for the applications. **Note:** When two servers are merged together the CD-ROM, diskette drive, keyboard, USB ports, mouse, and video are disabled on the secondary server.
The screen is wavy, unreadable, rolling, distorted, or has screen jitter.	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:** 1. To prevent diskette drive read/write errors, be sure the distance between monitors and diskette drives is at least 76 mm (3 in.). 2. Non-IBM monitor cables might cause unpredictable problems. 3. 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.
Wrong characters appear on the screen.	If the wrong language is displayed, update the BIOS code with the correct language.
Option problems An IBM option that was just installed does not work.	Verify that: 1. The server supports the option. 2. You followed the installation instructions that come with the option. 3. The option is installed correctly. 4. You have not loosened any other installed options or cables. 5. You updated the configuration information using the Configuration/Setup utility program. Whenever memory or an option is changed, you must update the configuration.

Symptom	Suggested action
An IBM option that used to work does not work now.	Verify that all of the option hardware and cable connections are secure. If the option comes with its own test instructions, use those instructions to test the option. If the failing option is a SCSI option, verify that: 1. The cables for all external SCSI options are connected correctly. 2. The last option in each SCSI chain, or the end of the SCSI cable, is terminated correctly. 3. Any external SCSI option is turned on. You must turn on an external SCSI option before turning on the server.
Power problems The server unexpectedly shuts down and LEDs on front panel are not lit.	See “12v bus faults” on page 173.
The server does not power on.	**Note:** The xSeries 440 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. Verify that: 1. The power cables are properly connected to the server. 2. The electrical outlet functions properly. 3. The type of memory installed is correct. 4. If you just installed an option, remove it, and restart the server. If the server now turns on, you might have installed more options than the power supply supports. 5. The LEDs on the power supply are on. 6. Verify that microprocessors are installed in the correct sequence.
The server does not power off.	Verify whether you are using an ACPI or non-ACPI operating system. If you are using a non-ACPI operating system: 1. Press Ctrl+Alt+Delete. 2. Turn off the system by using the power-control button.
Software problem Suspected software problem.	To determine if problems are caused by the software, verify that: 1. The server has the minimum memory requirements needed to use the software. For memory requirements, refer to the information that comes with the software. **Note:** If you have just installed an adapter or memory, you might have a memory address conflict. 2. The software is designed to operate on the server. 3. Other software works on the server. 4. The software that you are using works on another system. If you received any error messages when using the software program, refer to the information that comes with the software for a description of the messages and solutions to the problem. If the items above are correct and the problem remains, contact your place of purchase.

Symptom	Suggested action
Universal Serial Bus (USB) port problems A USB device does not work.	Verify that: 1. 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. 2. The correct USB device driver is installed. 3. Your operating system supports USB devices. 4. 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 merged together the CD-ROM, diskette drive, keyboard, USB ports, mouse, and video are disabled on the secondary server.
ServerGuide problems 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) or the ServerGuide System Partition is not present. Run the ServerGuide setup and configuration program, and ensure that setup is complete.

Power supply 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
- Centerplane
- I/O board
- Power reset switch
- Power cord and cables

AC good LED	DC good LED	Front power on light	Power good indicators (center plane)	Description	FRU/action
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 132) 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

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 "Power switch bypass" on page 132) 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 132) 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**

POST error codes

In the following error codes, *X* can be any number or letter.

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

Error code/symptom	FRU/action
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.
164 (Memory configuration changed, see “Memory settings” on page 18.)	1. **Run Configuration/Setup.** 2. DIMM. 3. SMP 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.
185 (Drive startup sequence information corrupted)	1. **Run Configuration/Setup.** 2. 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.
189 (An attempt was made to access the server with invalid passwords)	• **Run Configuration/Setup, enter the administrator password.**
201 (memory controller test)	1. **DIMM** 2. SMP board
289 (DIMM has been disabled by the user or system, see “Memory settings” on page 18.)	1. **Run Configuration/Setup, if disabled by user.** 2. 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. Centerplane 3. I/O board

Error code/symptom	FRU/action
303 (Keyboard controller error)	1. **I/O board** 2. Keyboard 3. Centerplane
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 diagnostics.** 2. Diskette drive. 3. Drive cable. 4. I/O board.
662 (Diskette drive configuration error)	1. **Run Configuration/Setup and diagnostics.** 2. Diskette drive. 3. Drive cable. 4. I/O board.
11xx (Centerplane internal serial port error)	1. **Disconnect external cable on serial port.** 2. Run Configuration/Setup. 3. Centerplane.
1162 (Serial port configuration conflict)	1. **Run Configuration/Setup.**
1301 (I2C cable to front panel not found)	1. **Cable** 2. Front panel 3. Centerplane
1302 (Cable from I/O board to power on and reset switches not found)	1. **Power switch assembly** 2. I/O board
1303 (I2C cable from centerplane to top power board not found)	1. **Cable** 2. Top power board 3. Centerplane
1600 (System Management Processor is not functioning) Do the following before replacing a FRU: • Remove the ac power to the system, wait 20 seconds; then, re-connect the ac power. Wait 30 seconds; then, power-on the system.	• **I/O board**
1601 (The system is able to communicate to the System Management Processor, but the System Management Processor failed to respond at the start of POST.) Do the following before replacing a FRU: 1. Remove the ac power to the system, wait 20 seconds; then, re-connect the ac power. Wait 30 seconds; then, power-on the system. 2. Flash update the Service Processor.	1. **Remote Supervisor Adapter, if installed** 2. I/O board

Error code/symptom	FRU/action
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.
178*x* (Fixed Disk error)	1. **Hard disk drive cables.** 2. Run diagnostics. 3. Hard disk drive adapter. 4. Hard disk drive. 5. I/O board.
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 diagnostics. 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. Centerplane 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

Error code/symptom	FRU/action
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
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.

Error code/symptom	FRU/action
00180700, 00180800 (General PCI error)	1. **PCI-X board** 2. PCI card
00181000 (PCI error)	1. **Remove adapters in PCI slots.** 2. PCI-X board.
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)	1. **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.

SCSI error messages

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, make sure 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.

POST (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 190.

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.

9*ZXX* through B*ZXX* (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 14. 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

Table 14. SCSI identifier (continued)

SCSI Channel Code (z)	Descriptions
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 188 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 188.

f. Disconnect one drive at a time attached to the channel identified in step 2a on page 188; 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.

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.
3300 (ServeRAID-5i only)	• **Install ServeRAID-5i controller in an extended PCI option slot.** See the documentation that came with the server for more information.
3E20 (ServeRAID-5i only)	1. **Remove the ServeRAID-5i controller from its slot and install it in the proper PCI option slot.** 2. Verify that the ServeRAID-5i controller is supported in this server. 3. ServeRAID-5i controller. 4. System board.
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.
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.

Error code/symptom	FRU/action
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 "POST (ISPR) error procedures" on page 188.** 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 "POST (ISPR) error procedures" on page 188.** 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, the Devices List is incorrect, or the system is inoperative.

Notes:
1. If you suspect a software mismatch is causing failures (solid or intermittent), be sure to see “Error symptoms” on page 174.
2. A corrupt CMOS can cause undetermined problems.
3. A corrupt BIOS can cause undetermined problems. See “Recovering BIOS code” on page 66.

Check the LEDs on all the power supplies (see “Power supply LED errors” on page 180). 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 (models 1VX, 2VX, 3VX only), turn on each chassis as a standalone (see “Starting the diagnostic programs” on page 59).
   - 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. 4 x 512 MB DIMMs
   c. 1 power supply
   d. Top power board
   e. 1 SMP board
   f. Centerplane
   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 (models 1VX, 2VX, 3VX only), turn on each chassis as a standalone (see “Starting the diagnostic programs” on page 59).
   - Power supply
   - Top power board
   - SMP board
   - Centerplane
   - PCI-X board
   - I/O board

Notes:

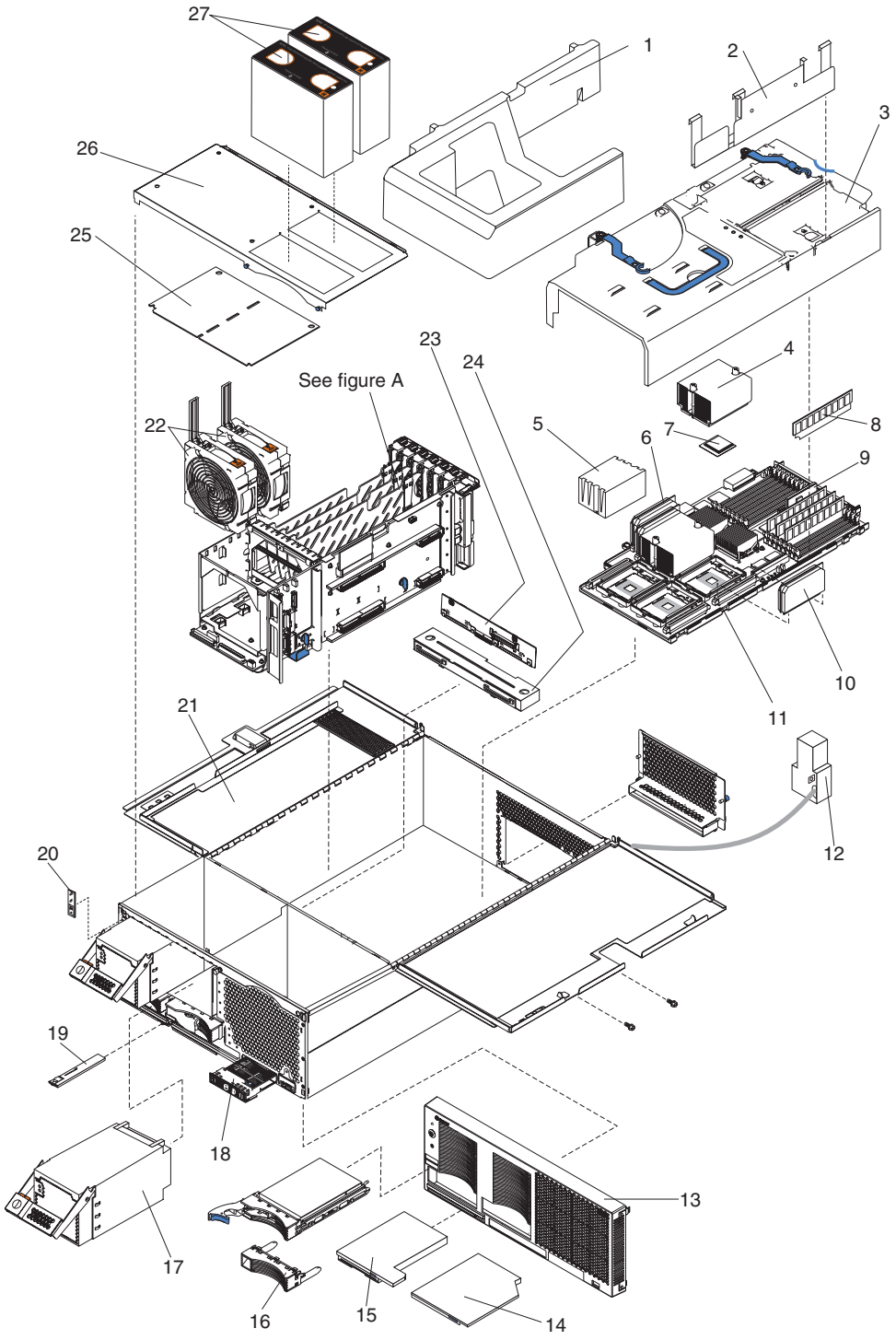
1. If the problem goes away when you remove an adapter from the system, and replacing that adapter does not correct the problem, suspect the PCI-X board.

2. If you suspect a networking problem and all the system tests pass, suspect a network cabling problem external to the system.

Parts listing, xSeries 440, Type 8687

The following Parts information is for the xSeries 440, Type 8687, Models 1RX, 2RX, 3RX, 4RX, 5RX, 6RX, 7RX, 3RY, 4RY, 1VX, 2VX, 3VX.

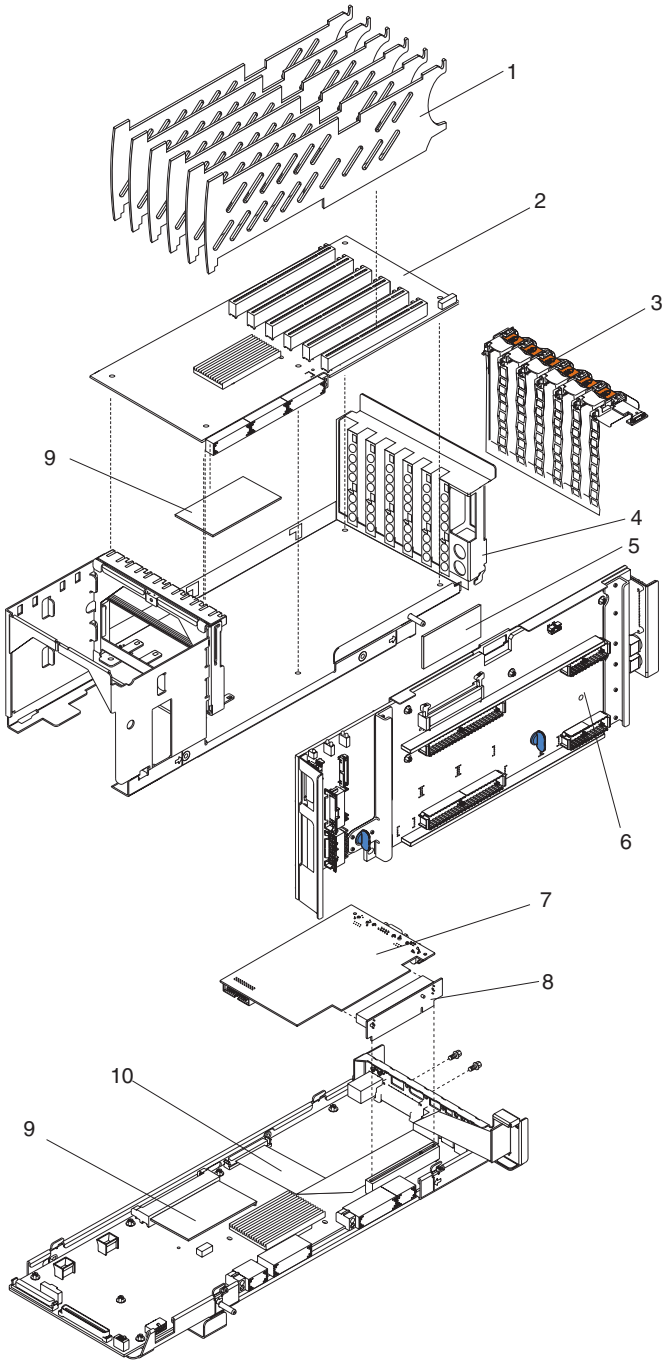
System



Index	xSeries 440 (models 1RX, 2RX, 3RX, 4RX, 5RX, 6RX, 7RX, 3RY, 4RY, 1VX, 2VX, 3VX)	FRU No.	CRU/FRU
1	Baffle, SMP (models 1RX, 2RX, 3RX, 4RX, 5RX, 6RX, 7RX, 3RY, 1VX, 2VX, 3VX)	24P1299	FRU
2	Retention bracket (models 1RX, 2RX, 3RX, 3RY, 4RY, 4RX, 5RX, 6RX, 7RX, 1VX, 2VX, 3VX, 4VX, 5VX, 7VX)	24P1283	FRU
3	SMP cover assembly (all models)	03K9044	CRU
4	Heatsink assembly (models 1RX, 2RX, 3RX, 3RY, 4RY)	25P6309	CRU
4	Heatsink assembly (models 4RX, 5RX, 6RX, 7RX)	49P3151	CRU
5	Heatsink baffle (all models)	24P1284	CRU
6	VRM, 40, 12V (all models)	00N7754	FRU
7	Microprocessor, 100/1400-512 (model 1RX, 1VX)	36L9511	FRU
7	Microprocessor, 100/1500-512 (model 2RX, 2VX)	36L9509	FRU
7	Microprocessor, 100/1600-1M (model 3RX, 3VX)	36L9510	FRU
7	Microprocessor, 400/2400-0K-L3 (modes 3RY, 4RY)	37L3570	FRU
7	Microprocessor, 100/1500-1 MB (model 4RX)	71P9372	FRU
7	Microprocessor, 100/1900-1 MB (models 5RX, 6RX)	71P9373	FRU
7	Microprocessor, 100/2000-2 MB (model 7RX)	71P9374	FRU
8	Memory, 512 DIMM PC133 ECC (models 1RX, 2RX, 3RX, 4RX, 5RX, 7RX, 3RY, 4RY, 1VX, 2VX, 3VX)	33L3325	CRU
8	Memory, 1 GB DIMM (model 6RX)	33L3327	CRU
9	VRM, Memory / Centerplane, 16, 12V (models 1RX, 2RX, 3RX, 4RX, 3RY, 4RY, 1VX, 2VX, 3VX)	74P4343	CRU
10	VRM, Microprocessor, 9.05F, 12V (models 1RX, 2RX, 3RX, 1VX, 2VX, 3VX)	49P2073	CRU
10	VRM, Microprocessor, 9.05P, 12V (models 4RX, 3RY, 6RX, 7RX, 4RY, 4VX, 5VX, 7VX)	49P2129	CRU
11	SMP board (models 1VX, 2VX, 3VX, 4VX, 5VX, 7VX)	90P0011	FRU
11	SMP board (models 1RX, 2RX, 3RX, 3RY, 4RX, 5RX, 6RX, 7RX)	90P0010	FRU
12	AC box assembly mechanism (all models)	49P2990	FRU
13	Bezel, 4U FT (all models)	03K9045	CRU
14	CD-ROM drive (all models)	27L4301	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 (all models)	74P4347	CRU
18	Light Path card (all models)	03K9039	FRU
19	Media extract mechanism (all models)	03K9047	FRU
20	Power/reset card assembly (all models)	59P5814	FRU
21	Chassis, 4UX26″ (all models)	49P2989	FRU
22	PCI fan assembly (all models) See “Figure A” on page 198.	03K9049	CRU
23	Hard disk drive (DASD) card (all models)	03K9037	FRU
24	Media bay card (all models)	03K9036	FRU
25	Top power board (all models)	03K9038	FRU
26	Top cover assembly (all models)	03K9043	FRU
27	SMP fan assembly (all models)	03K9048	CRU
	Cover assembly, CEC (models 4RX, 5RX, 6RX, 7RX, 1AX, 2AX, 3AX, 4AX, 5AX, 7AX)	02R9111	FRU
	Baffle, CEC (all models except 4RY)	02R9132	FRU
	Lift handle (all models)	24P1295	CRU
	Label, GMB (models 4RX, 5RX, 6RX, 7RX, 1AX, 2AX, 3AX, 4AX, 5AX, 7AX, 1RX, 2RX, 3RX, 3RY, 4RY, 1VX, 2VX, 3VX, 4VX, 5VX, 7VX)	73P6296	CRU
	Thermal grease kit (all models)	59P4740	FRU
	Alcohol wipes (all models)	59P4739	FRU
	Cable management arm (all models)	31P6119	FRU
	Battery, 3.0V (all models)	33F8354	FRU

Index	xSeries 440 (models 1RX, 2RX, 3RX, 4RX, 5RX, 6RX, 7RX, 3RY, 4RY, 1VX, 2VX, 3VX)	FRU No.	CRU/FRU
	Left EIA side flange assembly (all models)	00N7190	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 door latch (1); switch, Light Path card (1); slide rails, Light Path card (2); EMC shields (2); VRM clips (2); slotted screws (10) (all models)	24P1217	FRU
	Bracket w/slides (all models)	37L6579	FRU
	VRM clip, right angle (models 1RX, 2RX, 3RX, 4RX, 6RX, 7RX, 3RY, 4RY, 1VX, 2VX, 3VX)	24P1285	FRU
	PDU cord (all models)	36L8886	FRU
	Cable, DC 18 position (all models)	03K9028	FRU
	Cable, cab, active (all models)	03K9329	FRU
	Cable, DC (all models)	03K9330	FRU
	Cable, SCSI (all models)	03K9331	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, 4M (all models except 1VX, 2VX, 3VX, 4VX, 5VX, 7VX)	31P6131	CRU
	Cable, scalability, 2.5M (models 1VX, 2VX, 3VX, 4VX, 5VX, 7VX)	73P6291	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, scalability, 10 in. (model 1VX, 2VX, 3VX, 4RY)	32P8337	CRU

Figure A



Index	xSeries 440 (models 1RX, 2RX, 3RX, 3RY, 4RX, 4RY, 5RX, 6RX, 7RX, 3RY, 4RY, 1VX, 2VX, 3VX)	FRU No.	CRU/FRU
1	PCI spacer (all models)	03K9050	CRU
2	PCI-X board (all models)	02R2399	FRU
3	Active PCI assembly (all models)	21P9910	FRU
4	Frame assembly, PCI-X (all models)	32P8344	FRU
5	VRM, Memory / Centerplane, 16, 12V (models 1RX, 2RX, 3RX, 4RX, 3RY, 4RY, 1VX, 2VX, 3VX, 4VX, 5VX, 7VX)	74P4343	CRU
6	Centerplane (all models)	71P7981	FRU
7	Remote Supervisor Adapter (all models)	59P2952	FRU
8	Riser card (all models)	03K9031	FRU
9	VRM, 40, 12V (all models)	00N7754	FRU
10	I/O board (all models)	73P7931	FRU

Keyboards

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 cords

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)

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. Power-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 machine, 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 listed below, 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 (multi-lingual 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

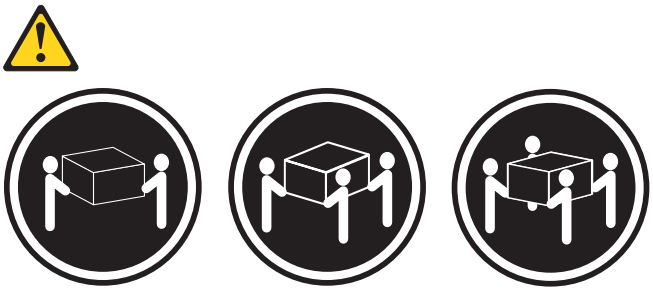
CAUTION:
When laser products (such as CD-ROMs, DVD-ROM drives, fiber optic devices, or transmitters) are installed, note the following:
- **Do not remove the covers. Removing the covers of the laser product could result in exposure to hazardous laser radiation. There are no serviceable parts inside the 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

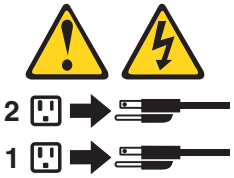


≥18 kg (39.7 lb) ≥32 kg (70.5 lb) ≥55 kg (121.2 lb)

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 10

CAUTION:
Do not place any object weighing more than 82 kg (180 lbs.) on top of rack-mounted devices.

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. 2. Primeiramente, conecte todos os cabos aos dispositivos. 3. Conecte os cabos de sinal aos conectores. 4. Conecte os cabos de alimentação às tomadas. 5. LIGUE os dispositivos.	1. DESLIGUE Tudo. 2. Primeiramente, remova os cabos de alimentação das tomadas. 3. Remova os cabos de sinal dos conectores. 4. Remova todos os cabos dos 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:

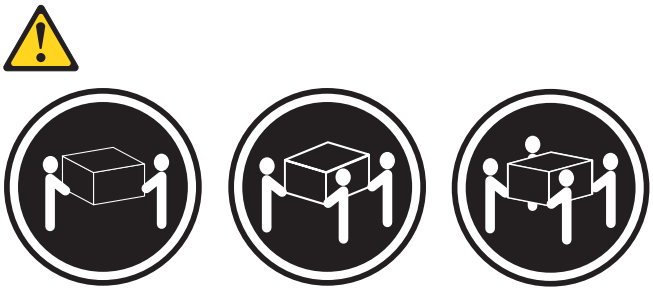
Quando produtos a laser (unidades de CD-ROM, unidades de DVD, dispositivos de fibra ítica, transmissores, etc.) estiverem instalados, observe o seguinte:
- Não remova as tampas. A remoção das tampas de um produto a laser pode resultar em exposição prejudicial à radiação de laser. Nenhuma peça localizada 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)

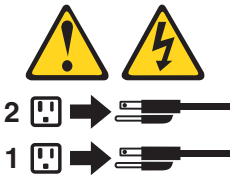
CUIDADO:

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 10

CUIDADO:

Não coloque nenhum objeto com peso superior a 82 kg (180 lbs.) sobre dispositivos montados em rack.

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：	断开连接时：
1. 关闭所有设备。	1. 关闭所有设备。
2. 首先将所有电缆连接至设备。	2. 首先从插座中拔出电源线。
3. 将信号电缆连接至接口。	3. 从接口上拔下信号电缆。
4. 将电源线连接至插座。	

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。

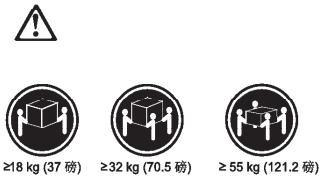
非此处指定的其它控制、调整或与性能有关的操作都有可能导致激光辐射的危险。

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

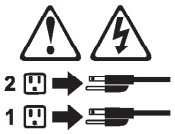


警告：
抬起时请采用安全操作方法。

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拔下热插拔风扇电缆。

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。

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，請勿開啓該設備的電源。
- 在安裝及架構之時，若非非常熟悉，在開啓裝置蓋子之前，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，或開啓其蓋子時，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. 開啓裝置的電源。	

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：

開啓時會產生雷射輻射。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)

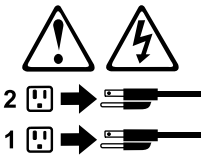
≥ 32 公斤 (70.5 磅)

≥ 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 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)

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. 2. Commencez par brancher tous les cordons sur les unités. 3. Branchez les câbles d'interface sur des connecteurs. 4. Branchez les cordons d'alimentation sur des prises. 5. Mettez les unités sous tension.	1. Mettez les unités hors tension. 2. Débranchez les cordons d'alimentation des prises. 3. Débranchez les câbles d'interface des connecteurs. 4. Débranchez tous les câbles des unités.

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:

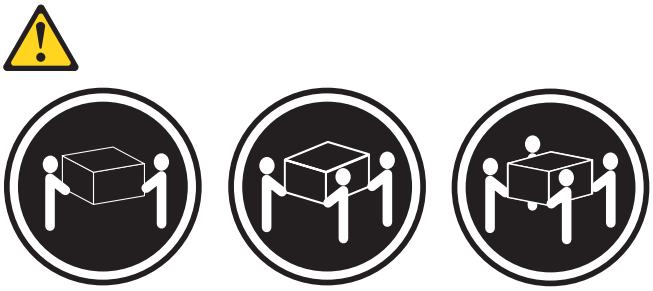
- **N'ouvrez pas ces produits pour éviter une exposition directe au rayon laser. Vous ne pouvez effectuer aucune opération de maintenance à l'intérieur.**
- **Pour éviter tout risque d'exposition au rayon laser, respectez les consignes de réglage et d'utilisation des commandes, ainsi que les procédures 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



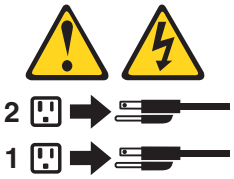
ATTENTION:

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° 10

ATTENTION:

Ne posez pas d'objet dont le poids dépasse 82 kg sur les unités montées en armoire.

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 anschließen:	**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:

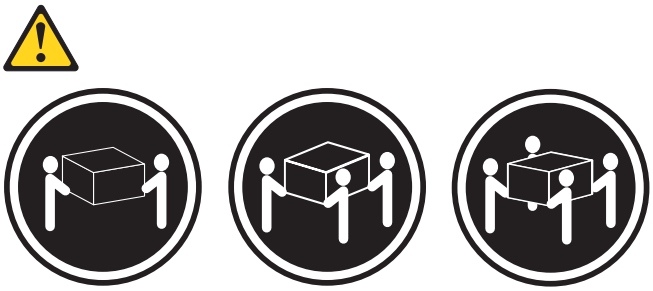
Wenn ein Laserprodukt (z. B. CD-ROM-Laufwerke, DVD-Laufwerke, Einheiten mit Glasfaserkabeln oder Transmitter) installiert ist, beachten Sie folgendes.
- Das Entfernen der Abdeckungen des CD-ROM-Laufwerks kann zu gefährlicher Laserstrahlung führen. Es befinden sich keine Teile innerhalb des CD-ROM-Laufwerks, 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



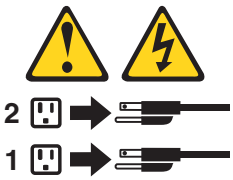
ACHTUNG:

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 10

ACHTUNG:

Keine Gegenstände, die mehr als 82 kg wiegen, auf Rack-Einheiten ablegen.

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. 2. Collegare prima tutti i cavi alle unità. 3. Collegare i cavi di segnale ai connettori. 4. Collegare i cavi di alimentazione alle prese elettriche. 5. ACCENDERE le unità.	1. SPEGNERE tutti i dispositivi. 2. Rimuovere prima i cavi di alimentazione dalle prese elettriche. 3. Rimuovere i cavi di segnale dai connettori. 4. Rimuovere tutti i cavi dalle 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:

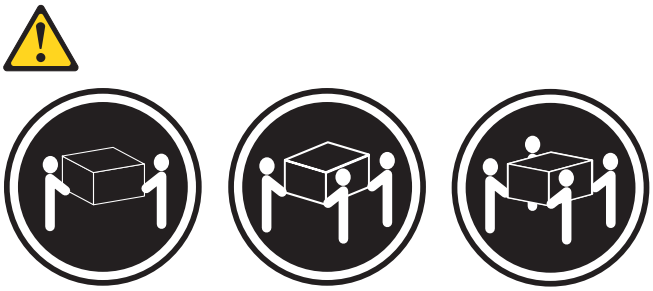
Quando si installano prodotti laser come, ad esempio, le unità DVD, CD-ROM, a fibre ottiche o trasmettitori, prestare attenzione a quanto segue:
- Non rimuovere i coperchi. L'apertura dei coperchi di prodotti laser può determinare l'esposizione a radiazioni laser pericolose. All'interno delle unità non 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



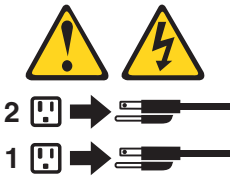
ATTENZIONE:

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 10

ATTENZIONE:

Non poggiare oggetti che pesano più di 82 kg sulla parte superiore delle unità montate in rack.

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 2. まず、装置にすべてのケーブルを接続する。 3. 次に、通信ケーブルをコネクターに接続する 4. その後、電源コンセントに電源コードを接続する 5. 装置の電源を入れる。	1. すべての電源を切る 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から取り外す。 4. その後、装置からすべてのケーブルを取り外す

・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

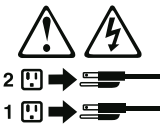

55Kg 以上

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。



・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。

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°C(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.

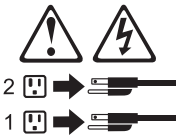
경고문 4

≥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 10

주의:
서랍형 모델의 장치 상단에 82 kg(180 lbs.)이 넘는 물체를 올려 놓지 마십시오.

>82 kg (180 lbs)

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:

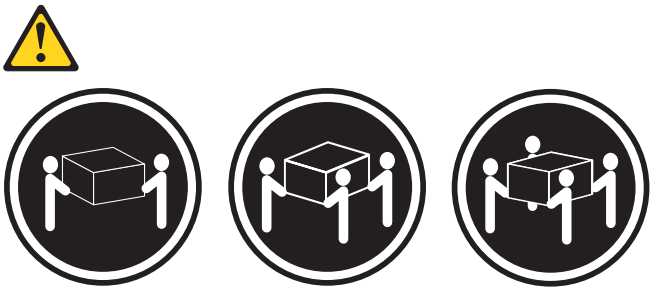
Cuando instale productos láser (como, por ejemplo, CD-ROM, unidades DVD, dispositivos de fibra íptica o transmisores), tenga en cuenta las advertencias siguientes:
- No retire las cubiertas. Si retira las cubiertas del producto láser, puede quedar expuesto a radiaciín láser perjudicial. Dentro del dispositivo 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



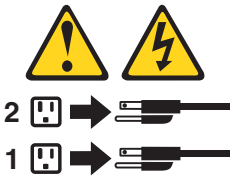
PRECAUCIÓN:

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 10

PRECAUCIÓN:

No coloque ningún objeto que pese más de 82 kg (180 libras) encima de los dispositivos montados en bastidor.

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
- Processor or hard disk upgrades
- Failure symptom
  - Do diagnostics 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?
- Reference/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 Reference/Diagnostics Diskette (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.

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GHz, MHz only measures microprocessor internal clock speed, not application performance. Many factors affect application performance.

When referring to hard disk drive capacity, GB equals one billion bytes. Total user-accessible capacity may vary depending on operating environments.

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e-business logo	Tivoli
FlashCopy	Tivoli Enterprise
IBM	Update Connector
IntelliStation	Wake on LAN
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