System x3400
Types 7973, 7974, 7975, and 7976

IBM

Problem Determination and Service Guide

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Types 7973, 7974, 7975, and 7976

IBM

Problem Determination and Service Guide

Note: Before using this information and the product it supports, read the general information in "Notices" on page 197, and the *Warranty and Support Information* document on the IBM *xSeries Documentation* CD.

Contents

Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الآمنية

Antes de instalar este produto, leia as Informações de Segurança.

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」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

Ennen kuin asennat tämän tuotteen, lue turvaohjeet kohdasta Safety Information.

Avant d'installer ce produit, lisez les consignes de sécurité.

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

Πριν εγκαταστήσετε το προϊόν αυτό, διαβάστε τις πληροφορίες ασφάλειας
(safety information).

.לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות

A termék telepítése előtt olvassa el a Biztonsági előírásokat!

Prima di installare questo prodotto, leggere le Informazioni sulla Sicurezza.

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.

Пред да се инсталира овој продукт, прочитајте информацијата за безбедност.

Les sikkerhetsinformasjonen (Safety Information) før du installerer dette produktet.

Przed zainstalowaniem tego produktu, należy zapoznać się
z książką "Informacje dotyczące bezpieczeństwa" (Safety Information).

Antes de instalar este produto, leia as Informações sobre Segurança.

Перед установкой продукта прочтите инструкции по
технике безопасности.

Pred inštaláciou tohto zariadenia si pečítaje Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

Antes de instalar este producto, lea la información de seguridad.

Läs säkerhetsinformationen innan du installerar den här produkten.

Guidelines for trained service technicians

This section contains information for trained service technicians.

Inspecting for unsafe conditions

Use the information in this section to help you identify potential unsafe conditions in an IBM® product that you are working on. Each IBM product, as it was designed and manufactured, has required safety items to protect users and service technicians from injury. The information in this section addresses only those items. Use good judgment to identify potential unsafe conditions that might be caused by non-IBM alterations or attachment of non-IBM features or options that are not addressed in this section. If you identify an unsafe condition, you must determine how serious the hazard is and whether you must correct the problem before you work on the product.

Consider the following conditions and the safety hazards that 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 a bulging or leaking capacitor.
- Mechanical hazards, such as loose or missing hardware.

To inspect the product for potential unsafe conditions, complete the following steps:

1. Make sure that the power is off and the power cord is disconnected.
2. Make sure that the exterior cover is not damaged, loose, or broken, and observe any sharp edges.
3. Check the power cord:
   - Make sure that the third-wire ground connector is in good condition. Use a meter to measure third-wire ground continuity for 0.1 ohm or less between the external ground pin and the frame ground.
   - Make sure that the power cord is the correct type, as specified in "Power cords" on page 99.
   - Make sure that the insulation is not 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 server for any obvious unsafe conditions, such as metal filings, contamination, water or other liquid, or signs of fire or smoke damage.
7. Check for worn, frayed, or pinched cables.
8. Make sure that the power-supply cover fasteners (screws or rivets) have not been removed or tampered with.

Guidelines for servicing electrical equipment

Observe the following guidelines when servicing electrical equipment:

- Check the area for electrical hazards such as moist floors, nongrounded power extension cords, power surges, and missing safety grounds.
- Use only approved tools and test equipment. Some hand tools have handles that are covered with a soft material that does not provide insulation from live electrical currents.
- Regularly inspect and maintain your electrical hand tools for safe operational condition. Do not use worn or broken tools or testers.
- Do not touch the reflective surface of a dental mirror to a live electrical circuit. The surface is conductive and can cause personal injury or equipment damage if it touches a live electrical circuit.
- Some rubber floor mats contain small conductive fibers to decrease electrostatic discharge. Do not use this type of mat to protect yourself from electrical shock.
- Do not work alone under hazardous conditions or near equipment that has hazardous voltages.
- Locate the emergency power-off (EPO) switch, disconnecting switch, or electrical outlet so that you can turn off the power quickly in the event of an electrical accident.
- Disconnect all power before you perform a mechanical inspection, work near power supplies, or remove or install main units.
- Before you work on the equipment, disconnect the power cord. If you cannot disconnect the power cord, have the customer power-off the wall box that supplies power to the equipment and lock the wall box in the off position.
- Never assume that power has been disconnected from a circuit. Check it to make sure that it has been disconnected.
- If you have to work on equipment that has exposed electrical circuits, observe the following precautions:
  - Make sure that another person who is familiar with the power-off controls is near you and is available to turn off the power if necessary.
  - When you are working with powered-on electrical equipment, use only one hand. Keep the other hand in your pocket or behind your back to avoid creating a complete circuit that could cause an electrical shock.
  - When using a tester, set the controls correctly and use the approved probe leads and accessories for that tester.
  - Stand on a suitable rubber mat to insulate you from grounds such as metal floor strips and equipment frames.
- Use extreme care when measuring high voltages.
- To ensure proper grounding of components such as power supplies, pumps, blowers, fans, and motor generators, do not service these components outside of their normal operating locations.
- If an electrical accident occurs, use caution, turn off the power, and send another person to get medical aid.

Safety statements

Important:

Each caution and danger statement in this documentation begins with a number. This number is used to cross reference an English-language caution or danger statement with translated versions of the caution or danger statement in the *Safety Information* document.

For example, if a caution statement begins with a number 1, translations for that caution statement appear in the *Safety Information* document under statement 1.

Be sure to read all caution and danger statements in this documentation before performing the instructions. Read any additional safety information that comes with your server or optional device before you install the device.

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 procedures.**
> - **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.	1. Turn everything OFF.
2. First, attach all cables to devices.	2. First, remove power cords from outlet.
3. Attach signal cables to connectors.	3. Remove signal cables from connectors.
4. Attach power cords to outlet.	4. Remove all cables from devices.
5. Turn device ON.	

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 drives, fiber optic devices, or transmitters) are installed, note the following:
- **Do not remove the covers. Removing the covers of the laser product could result in exposure to hazardous laser radiation. There are no serviceable parts inside the device.**
- **Use of controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.**

DANGER

> **Some laser products contain an embedded Class 3A or Class 3B laser diode. Note the following.**
>
> **Laser radiation when open. Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam.**

Statement 4:
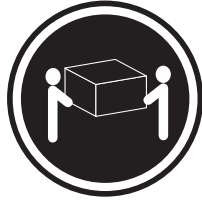
≥ 18 kg (39.7 lb)   ≥ 32 kg (70.5 lb)   ≥ 55 kg (121.2 lb)
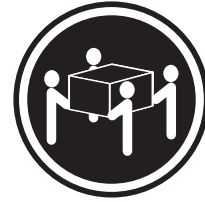
CAUTION:
Use safe practices when lifting.

Statement 5:

CAUTION:
The power control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.
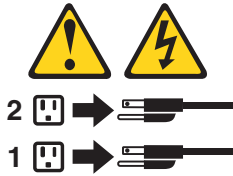
Statement 8:

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

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

Statement 10:

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

>82 kg (180 lb)

Statement 11:

CAUTION:
The following label indicates sharp edges, corners, or joints nearby.

Statement 17:

CAUTION:
The following label indicates moving parts nearby.

Chapter 1. Introduction

This *Problem Determination and Service Guide* contains information to help you solve problems that might occur in the IBM System x3400 Types 7973, 7974, 7975, and 7976. It describes the diagnostic tools that come with the server, error codes and suggested actions, and instructions for replacing failing components.

Replaceable components are of three types:

- **Tier 1 customer replaceable unit (CRU):** Replacement of Tier 1 CRUs is your responsibility. If IBM installs a Tier 1 CRU at your request, you will be charged for the installation.
- **Tier 2 customer replaceable unit:** You may install a Tier 2 CRU yourself or request IBM to install it, at no additional charge, under the type of warranty service that is designated for the server.
- **Field replaceable unit (FRU):** FRUs must be installed only by trained service technicians.

For information about the terms of the warranty and getting service and assistance, see the *Warranty and Support Information* document.

Related documentation

In addition to this document, the following documentation also comes with the server:

- *Installation Guide*

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

  This document is in Portable Document Format (PDF) on the IBM *System x3400 Documentation* CD. It provides general information about the server, including information about features, and how to configure the server. It also contains detailed instructions for installing, removing, and connecting optional devices that the server supports.
- *Rack Installation Instructions*

  This printed document contains instructions for installing the server in a rack.
- *Safety Information*

  This document is in PDF on the IBM *System x3400 Documentation* CD. It contains translated caution and danger statements. Each caution and danger statement that appears in the documentation has a number that you can use to locate the corresponding statement in your language in the *Safety Information* document.
- *Warranty and Support Information*

  This document is in PDF on the IBM *System x3400 Documentation* CD. It contains information about the terms of the warranty and getting service and assistance.

Depending on the server model, additional documentation might be included on the IBM *System x3400 Documentation* CD.

The xSeries Tools Center is an online information center that contains information about tools for updating, managing, and deploying firmware, device drivers, and operating systems. The xSeries Tools Center is at http://publib.boulder.ibm.com/infocenter/toolsctr/v1r0/index.jsp.

The server might have features that are not described in the documentation that you received with the server. The documentation might be updated occasionally to include information about those features, or technical updates might be available to provide additional information that is not included in the server documentation. These updates are available from the IBM Web site. Complete the following steps to check for updated documentation and technical updates.

Note: Changes are made periodically to the IBM Web site. The actual procedure might vary slightly from what is described in this document.

1. Go to http://www.ibm.com/support/.
2. Under **Search technical support**, type 7973, 7974, 7975, or 7976 (depending on your model), and click **Search**.

Notices and statements in this document

The caution and danger statements that appear in this document are also in the multilingual *Safety Information* document, which is on the IBM *System x3400 Documentation* CD. Each statement is numbered for reference to the corresponding statement in the *Safety Information* document.

The following notices and statements are used in this document:

- **Note:** These notices provide important tips, guidance, or advice.
- **Important:** These notices provide information or advice that might help you avoid inconvenient or problem situations.
- **Attention:** These notices indicate potential 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.

Machine Types 7973 and 7974 features and specifications

The following information is a summary of the features and specifications for Machine Types 7973 and 7974. Depending on the server model, some features might not be available, or some specifications might not apply. See the *User's Guide* for more detail information about the specifications and features and the installation of the components.

Table 1. Features and specifications

Microprocessor:
- Intel® Pentium® dual-core processors
- 4 MB shared Level-2 cache
- 667, 1066, or 1333 MHz front-side bus (FSB)

Note: Use the Configuration/Setup Utility program to determine the type and speed of the microprocessors.

Memory:
- Minimum: 1 GB
- Maximum: 32 GB (16 GB in mirrored mode)
- Types: PC2-5300, ECC fully-buffered with double-data-rate 2 (DDR2)
- Connectors: eight dual inline memory module (DIMM) connectors, two-way interleaved

Drives (depending on the model):
- Diskette (optional): External USB diskette drive
- Hard disk drive: SATA
- One of the following IDE drives:
  - CD-ROM
  - CD-RW (optional)
  - DVD-ROM (optional)
  - DVD-ROM/CD-RW (optional)

Drive bays (depending on the model):
- Three half-high 5.25-in. bays (one CD or DVD drive installed) or one half-high CD or DVD drive and one full-high tape drive
- Four 3.5-in. simple-swap bays

Expansion slots (depending on the model):
- Six expansion slots
  - Three PCI Express x8 slots (two x8 links and one x4 link)
  - One PCI 32-bit/33 MHz slot
  - Two PCI-X 64-bit/133 MHz slots

Fans:
Three speed-controlled hot-swap fans

Power supply:
670 watt (90-240 V ac)

Size:
- Height: 440 mm (17.3 in.)
- Depth: 747 mm (29.4 in.)
- Width: 218 mm (8.6 in.)
- Weight: 20 kg (42 lb) to 34 kg (75 lb) depending upon configuration

Integrated functions:
- Baseboard management controller (BMC) or onboard service processor
- Broadcom 5721 10/100/1000 Ethernet controller on the system board with RJ-45 Ethernet port
- Six-port, Serial ATA controller
- Integrated RAID capability (SATA HostRAID)
- Remote Supervisor Adapter II SlimLine
- Two serial ports
- One parallel port
- Four Universal Serial Bus (USB) v2.0 ports (two on front and two on rear)
- Keyboard port
- Mouse port
- ATA-100 single-channel IDE controller (bus mastering)
- ATI ES1000 video controller
  - Compatible with SVGA and VGA
  - 16 MB SDRAM video memory

Diagnostic LEDs:
- Fans
- Memory
- Power supply

Acoustical noise emissions:
- Sound power, idling: 5.6 bel
- Sound power, operating: 6.0 bel

Environment:
- Air temperature:
  - Server on: 10° to 35°C (50° to 95°F) Altitude: 0 to 914 m (2998.0 ft)
  - Server off: -40° to 60°C (-40° to 140°F) Altitude: 0 to 2133 m (7000.0 ft)
- Humidity (operating and storage): 8% to 80%

Heat output:
Approximate heat output in British thermal units (Btu) per hour:
- Minimum configuration: 693 Btu per hour (203 watts)
- Maximum configuration: 1631 Btu per hour (478 watts)

Electrical input:
- Sine-wave input (50 or 60 Hz) required
- Input voltage and frequency ranges automatically selected
- 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: 0.21 kVA (all models)
  - Maximum: 0.49 kVA

Notes:

1. Power consumption and heat output vary depending on the number and type of optional features installed and the power-management optional features in use.

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

Machine Types 7975 and 7976 features and specifications

The following information is a summary of the features and specifications for Machine Types 7975 and 7976. Depending on the server model, some features might not be available, or some specifications might not apply. See the *User's Guide* for more detail information about the specifications and features and the installation of the components.

Table 2. Features and specifications

Microprocessor:
- Supports up to two Intel Xeon dual-core processors or two Intel quad-core processors

  Important: Do not mix dual-core processors and quad-core processors in the same server.
- 4 MB shared Level-2 cache
- 667, 1066, or 1333 MHz front-side bus (FSB)

Note: Use the Configuration/Setup Utility program to determine the type and speed of the microprocessors.

Memory:
- Minimum: 1 GB
- Maximum: 32 GB (16 GB in mirrored mode)
- Types: PC2-5300, ECC fully-buffered with double-data-rate 2 (DDR2)
- Connectors: eight dual inline memory module (DIMM) connectors, two-way interleaved

Drives (depending on the model):
- Diskette (optional): External USB diskette drive
- Hard disk drive: SATA or SAS
- One of the following IDE drives:
  - CD-ROM
  - CD-RW (optional)
  - DVD-ROM (optional)
  - DVD-ROM/CD-RW (optional)

Drive bays (depending on the model):
- Three half-high 5.25-in. bays (one CD or DVD drive installed) or one half-high CD or DVD drive and one full-high tape drive
- Eight 3.5-in. hot-swap hard disk drive bays

  Note: You can install up to eight hot-swap drives when you order the 4-drive backplane option kit.

Expansion slots (depending on the model):
- Six expansion slots
  - Three PCI Express x8 slots (two x8 links and one x4 link)
  - One PCI 32-bit/33 MHz slot
  - Two PCI-X 64-bit/133 MHz slots

Fans: Three speed-control hot-swap fans (standard)

Note: Six fans are required to provide redundancy in hot-swap models; therefore, you must install an additional redundant power and cooling option kit (the option kit comes with a hot-swap power supply and three hot-swap fans) to upgrade to redundant mode.

Power supply:
One of the following power supplies:
- One nonredundant 670 watt (90-240 V ac)
- One 835 watt (90-240 V ac).

  Note: Two 835 watt power supplies provide redundancy in hot-swap models; therefore, you must install an additional redundant power and cooling option kit (the option kit comes with an 835 watt hot-swap power supply and three hot-swap fans) to upgrade to redundant mode.

Size:
- Height: 440 mm (17.3 in.)
- Depth: 747 mm (29.4 in.)
- Width: 218 mm (8.6 in.)
- Weight: 20 kg (42 lb) to 34 kg (75 lb) depending upon configuration

Integrated functions:
- Baseboard management controller (BMC) or onboard service processor
- Broadcom 5721 10/100/1000 Ethernet controller on the system board with RJ-45 Ethernet port
- Dual-channel (four ports per channel) onboard SAS/SATA controller with integrated RAID
- Remote Supervisor Adapter II SlimLine
- Two serial ports
- One parallel port
- Four Universal Serial Bus (USB) v2.0 ports (two on front and two on rear)
- Keyboard port
- Mouse port
- ATA-100 single-channel IDE controller (bus mastering)
- ATI ES1000 video controller
  - Compatible with SVGA and VGA
  - 16 MB SDRAM video memory

Acoustical noise emissions (depending on your model):
- Sound power, idling: 5.6 bel or 6.0 bel
- Sound power, operating: 6.0 bel or 6.1 bel

Diagnostic LEDs:
- Fans
- Memory
- Hard disk drives (redundant models)
- Power supply

Environment:
- Air temperature:
  - Server on: 10° to 35°C (50° to 95°F) Altitude: 0 to 914 m (2998.0 ft)
  - Server off: -40° to 60°C (-40° to 140°F) Altitude: 0 to 2133 m (7000.0 ft)
- Humidity (operating and storage): 8% to 80%

Heat output:
Approximate heat output in British thermal units (Btu) per hour:
- Minimum configuration: 781 Btu per hour (229 watts)
- Maximum configuration: 1910 Btu per hour (560 watts)

Electrical input:
- Sine-wave input (50 or 60 Hz) required
- Input voltage and frequency ranges automatically selected
- 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: 0.23 kVA (all models)
  - Maximum: 0.57 kVA

Notes:

1. Power consumption and heat output vary depending on the number and type of optional features installed and the power-management optional features in use.

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

Server controls, LEDs, and connectors

This section describes the controls, light-emitting diodes (LEDs), and connectors on the front and rear of the server.

Front view

The following illustration shows the controls, LEDs, and connectors on the front of the hot-swap server models.
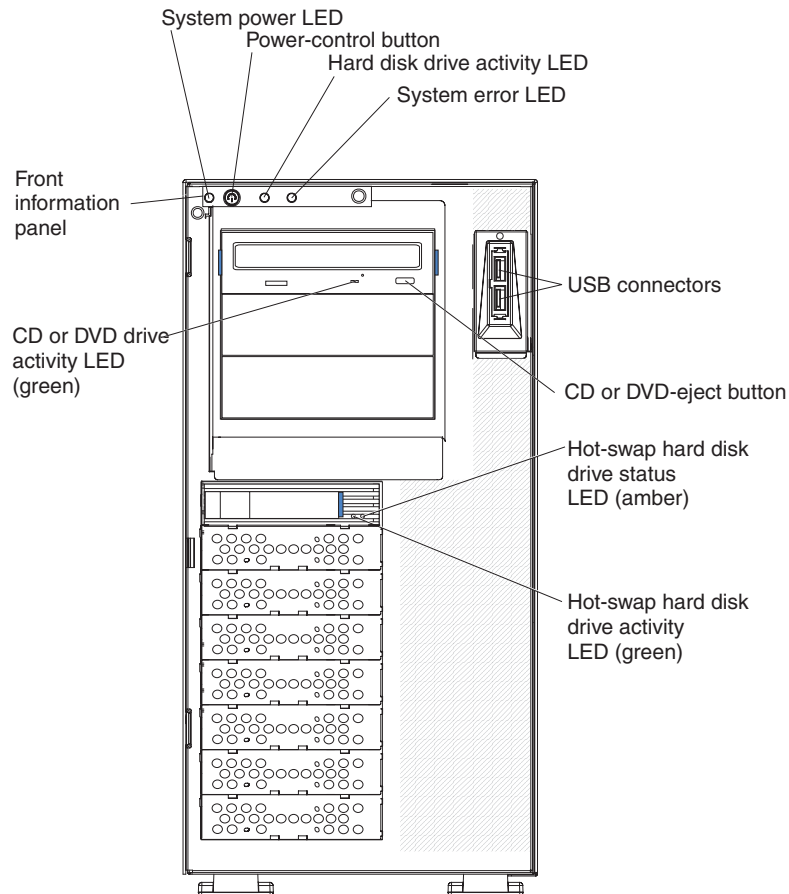
The following illustration shows the controls, LEDs, and connectors on the front of the simple-swap server models.
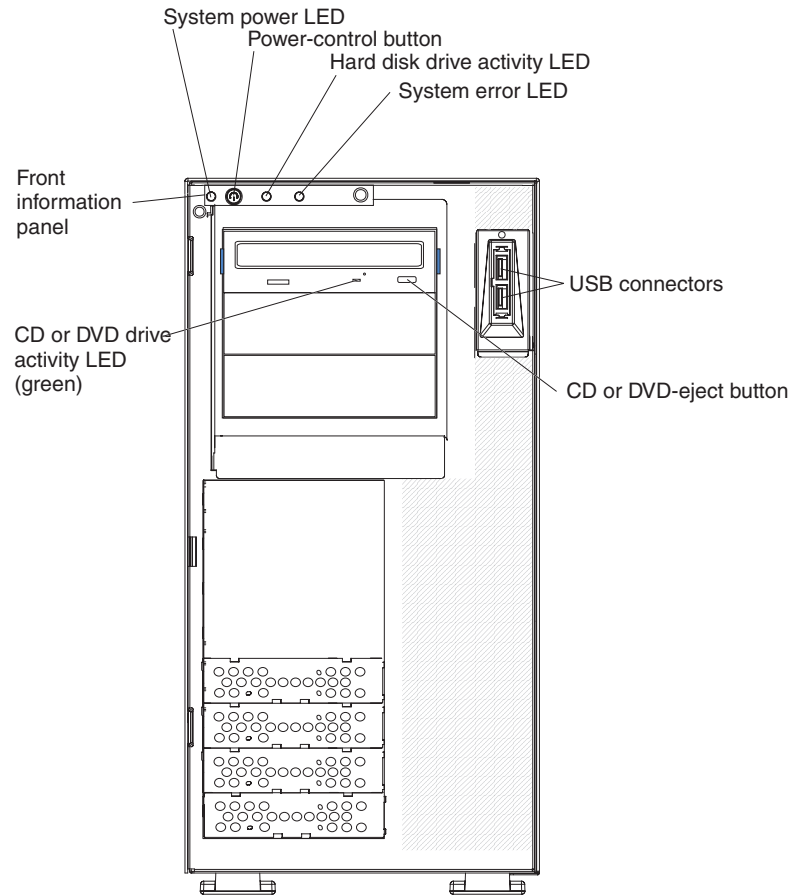
Power-on LED
> When this LED is lit, it indicates that the server is turned on. When this LED is off, it indicates that ac power is not present, or the power supply or the LED itself has failed.

> **Note:** If this LED is off, it does not mean that there is no electrical power in the server. The LED might be burned out. To remove all electrical power from the server, you must disconnect the power cords from the electrical outlets.

Power-control button
> Press this button to turn the server on and off manually.

Hard disk drive activity LED
> When this LED is flashing, it indicates that a hard disk drive is in use.

System-error LED
> When this amber LED is lit, it indicates that a system error has occurred. An LED on the system board might also be lit to help isolate the error. See Chapter 2, "Diagnostics," on page 17 for additional information.

USB connectors
> Connect USB devices to these connectors.

CD or DVD-eject button
> Press this button to release a CD from the CD drive or a DVD from the DVD drive.

CD or DVD drive activity LED
> When this LED is lit, it indicates that the CD drive or DVD drive is in use.

Ethernet transmit/receive activity LED
> This LED is on the Ethernet connector on the rear of the server. When this LED is lit, it indicates that there is activity between the server and the network.

Ethernet link status LED
> This LED is on the Ethernet connector on the rear of the server. When this LED is lit, it indicates that there is an active connection on the Ethernet port.

Hot-swap hard disk drive activity LED (some models)
> On some server models, each hot-swap drive has a hard disk drive activity LED. When this green LED is flashing, it indicates that the drive is in use.
>
> When the drive is removed, this LED also is visible on the SAS backplane, next to the drive connector. The backplane is the printed circuit board behind drive bays 4 through 11.

Hot-swap hard disk drive status LED (some models)
> On some server models, each hot-swap hard disk drive has an amber status LED. If this amber status LED for a drive is lit, it indicates that the associated hard disk drive has failed.
>
> If an optional ServeRAID adapter is installed in the server and the LED flashes slowly (one flash per second), the drive is being rebuilt. If the LED flashes rapidly (three flashes per second), the adapter is identifying the drive.
>
> When the drive is removed, this LED also is visible on the SAS/SATA backplane, below the hot-swap hard disk drive activity LED.

Rear view

The following illustration shows the LEDs and connectors on the rear of the hot-swap power supply models with optional redundant power.

Power cords
AC power LEDs
DCpower LEDs
Mouse
Keyboard
Serial 1 (COM 1)
Parallel
Video
USB 4
USB 3
(RJ45) Ethernet 10/100/1000
(RJ45) Ethernet 10/100 (for Remote Supervisor Adapter II SlimLine)
NMI button
Serial 2 (COM 2)
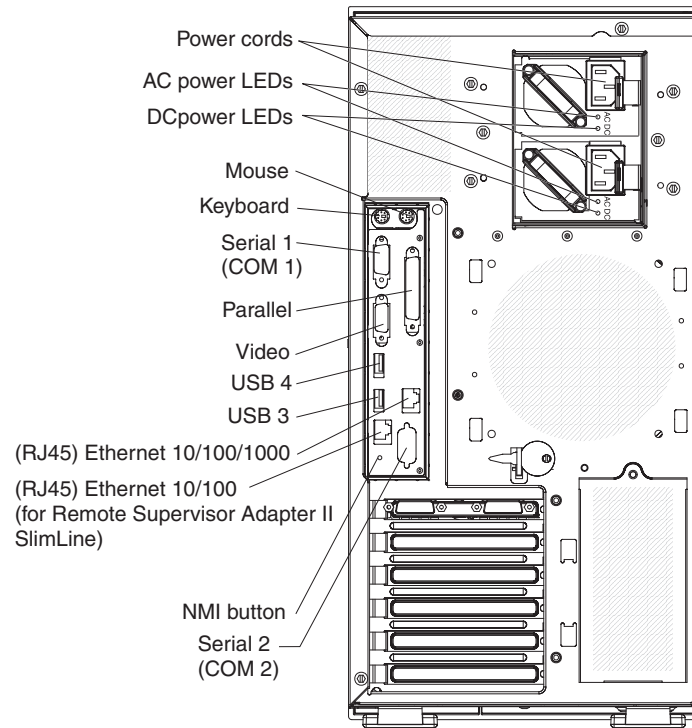
The following illustration shows the connectors on the rear of the non-hot-swap power supply models.

Power cords
Mouse
Keyboard
Serial 1 (COM 1)
Parallel
Video
USB 4
USB 3
(RJ45) Ethernet 10/100/1000
(RJ45) Ethernet 10/100 (for Remote Supervisor Adapter II SlimLine)
NMI button
Serial 2 (COM 2)
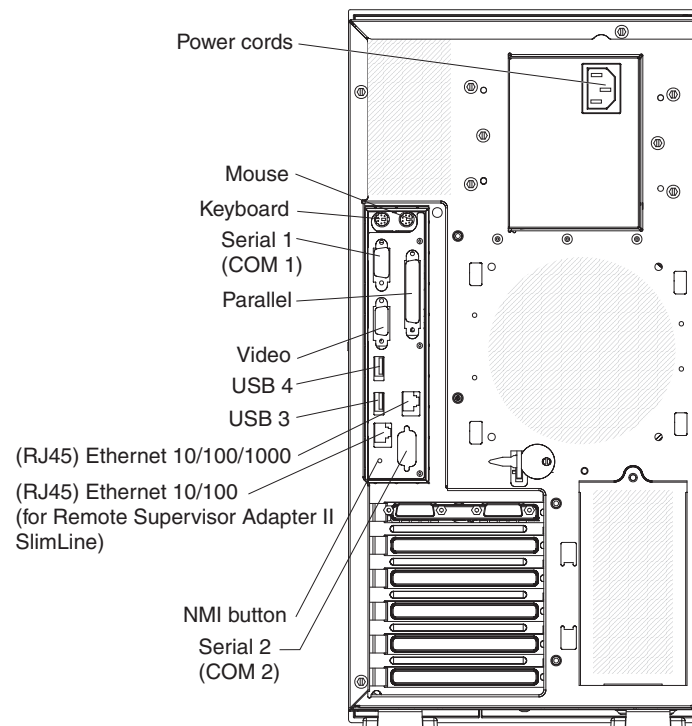
Power-cord connector
Connect the power cord to this connector.

AC power LED
This green LED provides status information about the power supply. During typical operation, both the ac and dc power LEDs are lit. For any other combination of LEDs, see the *Problem Determination and Service Guide* on the IBM *System x3400 Documentation* CD.

DC power LED
This green LED provides status information about the power supply. During typical operation, both the ac and dc power LEDs are lit. For any other combination of LEDs, see the *Problem Determination and Service Guide* on the IBM *System x3400 Documentation* CD.

Mouse connector
Connect a mouse device to this connector.

Keyboard connector
Connect a PS/2 keyboard to this connector.

Serial 1 connector
Connect a 9-pin serial device to this connector.

Parallel connector
Connect a parallel device to this connector.

Video connector
Connect a monitor to this connector.

USB connectors
Connect USB devices to these connectors.

Ethernet connector
Use this connector to connect the server to a network.

Serial 2 connector
Connect a 9-pin serial device to this connector.

Ethernet transmit/receive activity LED
This LED is on the Ethernet connector. When this LED is lit, it indicates that there is activity between the server and the network.

Ethernet link status LED
This LED is on the Ethernet connector. When this LED is lit, it indicates that there is an active connection on the Ethernet port.

Remote Supervisor Adapter II SlimLine connector
Connect the optional Remote Supervisor Adapter II SlimLine card to this connector.

Internal connectors, LEDs, and switches

The following illustrations show the connectors, light-emitting diodes (LEDs), and switches on the system board. The illustrations might differ slightly from your hardware.

System-board internal connectors

The following illustration shows the internal connectors on the system board.
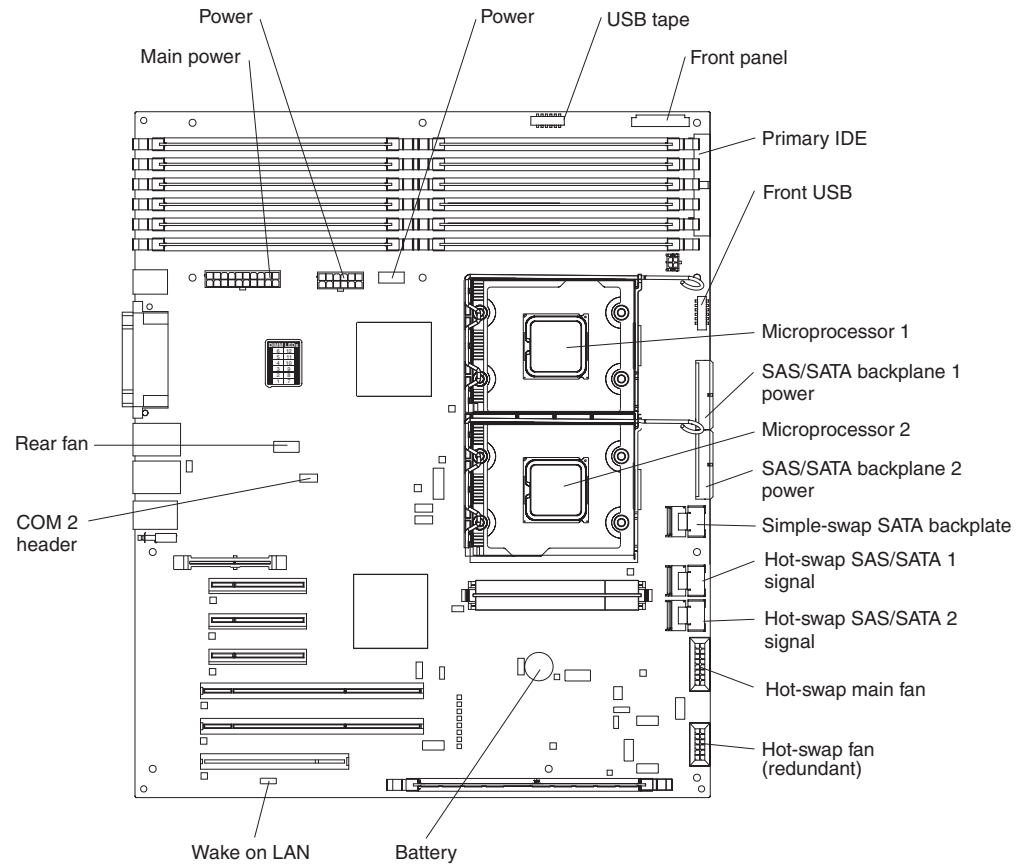
System-board external connectors

The following illustration shows the external input/output (I/O) connectors on the system board.

Mouse

Keyboard

Serial 1 (COM 1)

Parallel

Video

USB 4

USB 3

(RJ45) Ethernet 10/100/1000

(RJ45) Ethernet 10/100 (for Remote Supervisor Adapter II SlimLine)

NMI button

Serial 2 (COM 2)
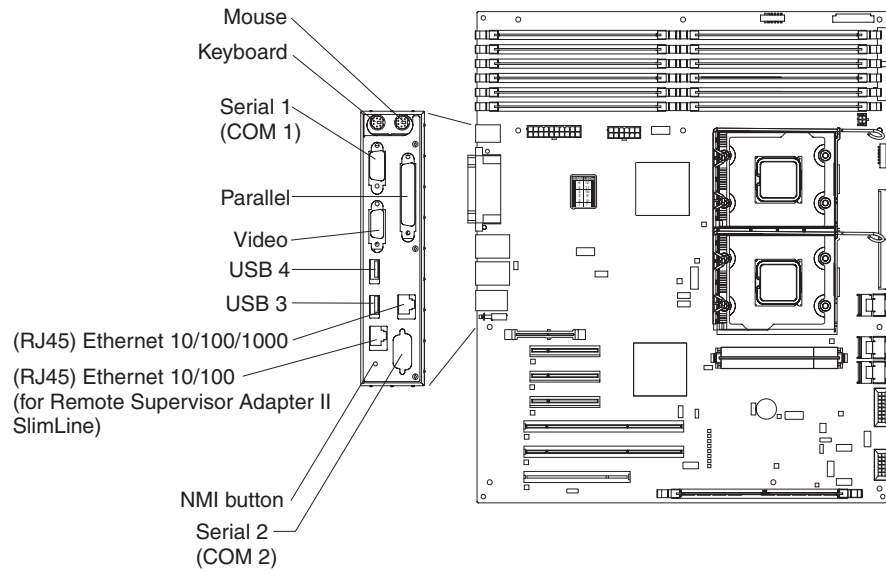
System-board option connectors

The following illustration shows the system-board connectors for user-installable options.
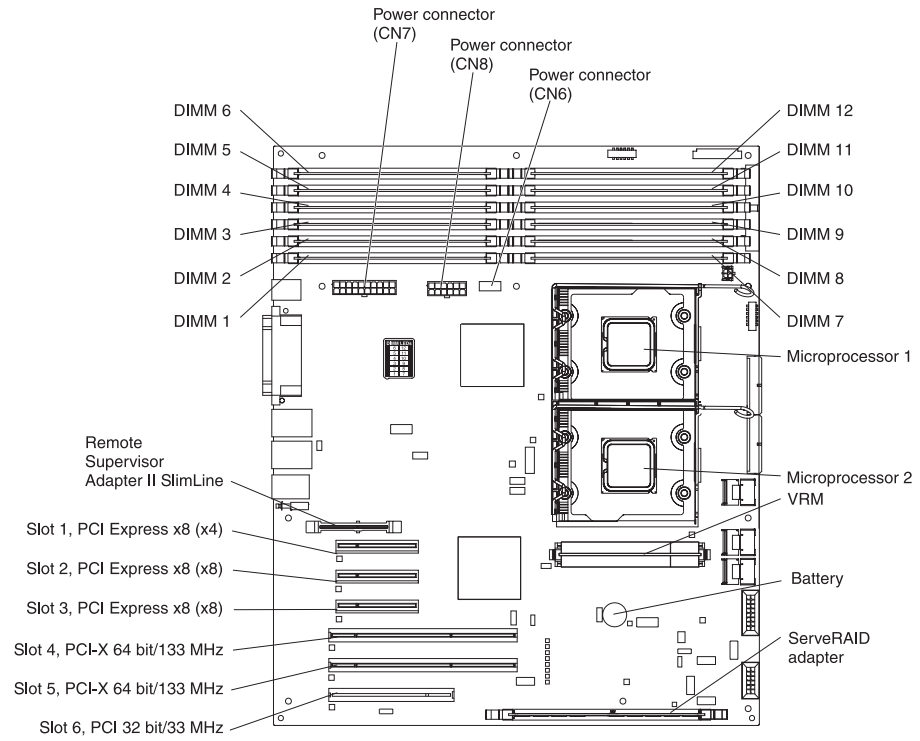
System-board LEDs

The following illustration shows the LEDs on the system board.
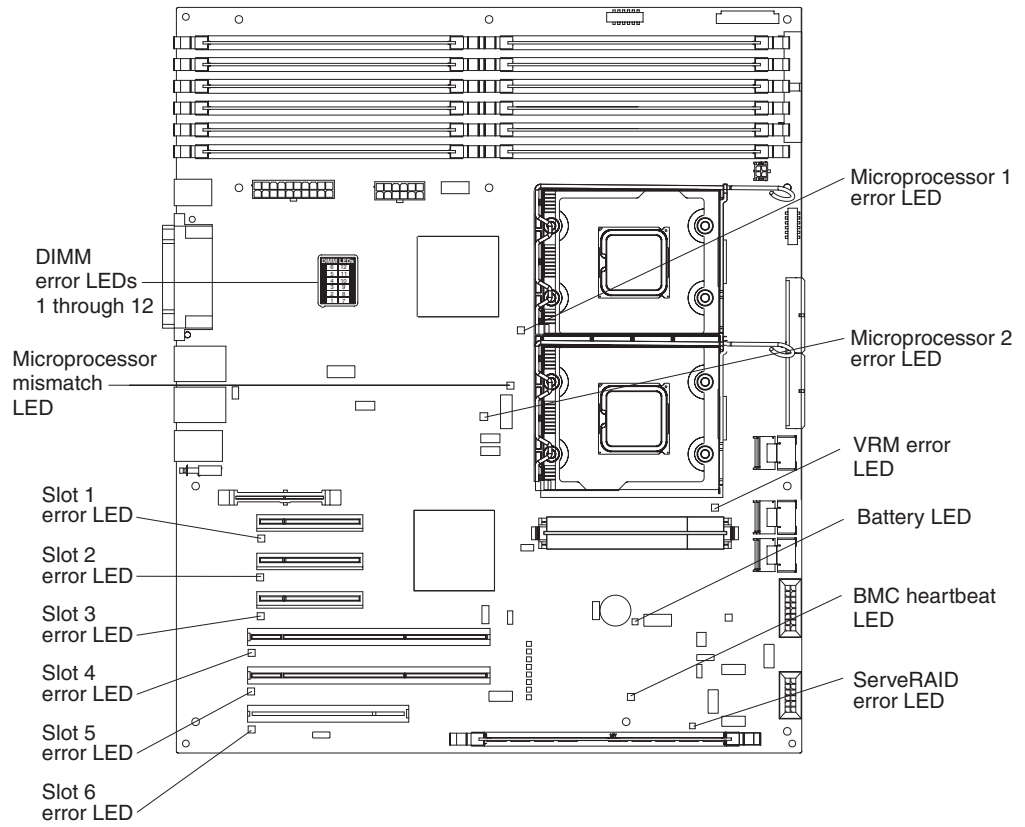
System-board switches

The following illustration shows the switches on the system board.
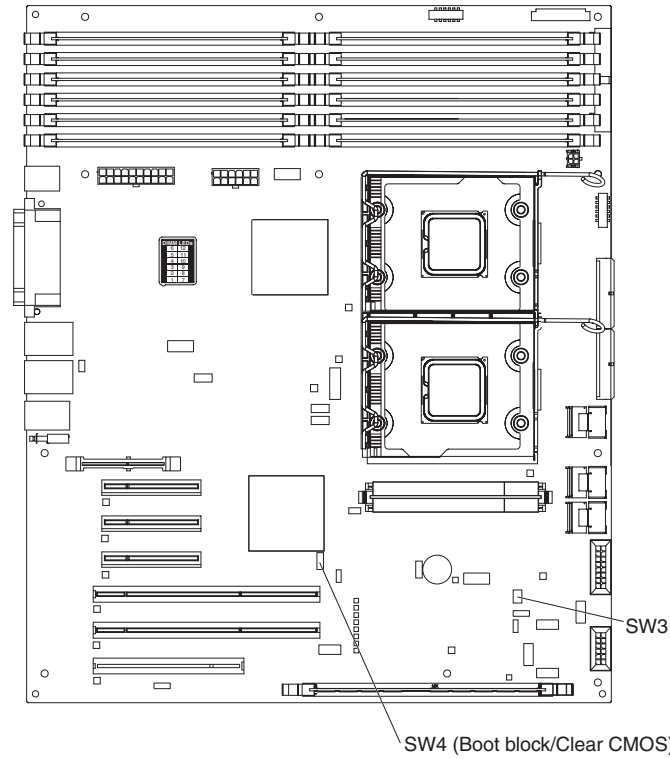
SW3

SW4 (Boot block/Clear CMOS)

The following table describes the function of each pin on the SW4 switch (Boot block/Clear CMOS) on the system board.

Table 3. System board SW4 switch

Switch pin number	Description
1	Boot block: • When this switch is on **1**, this is normal mode. • When this switch is toggled to **On**, this enables the system to recover if the BIOS code becomes damaged. See "Recovering from a BIOS update failure" on page 74 for more information.
2	Clear CMOS: • When this switch is on 2, this keeps the CMOS data. This is normal mode. • When this switch is toggled to **On**, this clears the CMOS data, which clears the power-on password and administrator password.

Chapter 2. Diagnostics

This chapter describes the diagnostic tools that are available to help you solve problems that might occur in the server.

If you cannot locate and correct the problem using the information in this chapter, see "Getting help and technical assistance," on page 195 for more information.

Diagnostic tools

The following tools are available to help you diagnose and solve 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.

- **Troubleshooting tables and procedures**

  This section list problem symptoms and actions to correct the problems. See "Troubleshooting tables and procedures" on page 41.

- **Server LEDs**

  Use the LEDs on the server to diagnose system errors quickly. See "Error LEDs" on page 57 for more information.

- **Diagnostic programs, messages, and error messages**

  The diagnostic programs are the primary method of testing the major components of the server. The diagnostic programs are on the *IBM Enhanced Diagnostics* CD that comes with the server. See "Diagnostic programs, messages, and error codes" on page 60 for more information.

POST

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

If a power-on password is set, you must type the password and press Enter, when prompted, for POST to run.

If POST is completed without detecting any problems, a single beep sounds, and the server startup is completed.

If POST detects a problem, more than one beep might sound, or an error message is displayed. See "POST beep codes" on page 18 and "POST error codes" on page 24 for more information.

POST beep codes

A beep code is a combination of short or long beeps or series of short beeps that are separated by pauses. For example, a "1-2-3" beep code is one short beep, a pause, two short beeps, and pause, and three short beeps. A beep code indicates that POST has detected a problem. If no beep code sounds, see "No-beep symptoms" on page 21.

The following table describes the beep codes and suggested actions to correct the detected problems.

A single problem might cause more than one error message. When this occurs, correct the cause of the first error message. The other error messages usually will not occur the next time POST runs.

Exception: If there are multiple error codes that indicate a microprocessor error, the error might be in a microprocessor or in a microprocessor socket. See "Microprocessor problems" on page 48 for information about diagnosing microprocessor problems.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing, System x3400 Types 7973, 7974, 7975 and 7976," on page 89 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Beep code	Description	Action
1-1-3	CMOS write/read test failed.	1. Reseat the battery. 2. Replace the following components one at a time, in the order shown, restarting the server each time: a. Battery b. (Trained service technician only) System board
1-1-4	BIOS ROM checksum failed.	1. Recover the BIOS code. 2. (Trained service technician only) Replace the system board.
1-2-1	Programmable interval timer failed.	(Trained service technician only) Replace the system board.
1-2-2	DMA initialization failed.	(Trained service technician only) Replace the system board.
1-2-3	DMA page register write/read failed.	(Trained service technician only) Replace the system board.
1-2-4	RAM refresh verification failed.	1. Reseat the DIMMs. 2. Replace the following components one at a time, in the order shown, restarting the server each time: a. DIMMs b. (Trained service technician only) System board

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing, System x3400 Types 7973, 7974, 7975 and 7976," on page 89 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Beep code	Description	Action

1-3-1	First 64 K RAM test failed.	1. Reseat the DIMMs.
		2. Replace the following components one at a time, in the order shown, restarting the server each time:
		  a. DIMMs
		  b. (Trained service technician only) System board

2-1-1	Secondary DMA register test failed.	(Trained service technician only) Replace the system board.
2-1-2	Primary DMA register test failed.	(Trained service technician only) Replace the system board.
2-1-3	Primary interrupt mask register test failed.	(Trained service technician only) Replace the system board.
2-1-4	Secondary interrupt mask register test failed.	(Trained service technician only) Replace the system board.
2-4-1	Video failed, system believed to be operable.	(Trained service technician only) Replace the system board.
3-1-1	Timer interrupt test failed.	(Trained service technician only) Replace the system board.
3-1-2	Timer 2 test failed.	(Trained service technician only) Replace the system board.

3-1-4	Time-of-day clock failed.	1. Reseat the battery.
		2. Replace the following components one at a time, in the order shown, restarting the server each time:
		  a. Battery
		  b. (Trained service technician only) System board

3-3-2	Critical SMBUS error occurred.	1. Reseat the DIMMs.
		2. Replace the following components one at a time, in the order shown, restarting the server each time:
		  a. DIMMs
		  b. (Trained service technician only) System board

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing, System x3400 Types 7973, 7974, 7975 and 7976," on page 89 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Beep code	Description	Action

3-3-3	No operational memory in system.	1. Make sure that the system board contains the correct number and type of DIMMs; install or reseat the DIMMS; then, restart the server.
		Important: In some memory configurations, the 3-3-3 beep code might sound during POST, followed by a blank monitor screen. If this occurs and the **Boot Fail Count** option in the **Start Options** of the Configuration/Setup Utility program is enabled, you must restart the server three times to reset the configuration settings to the default configuration (the memory connector or bank of connectors enabled).
		2. Replace the following components one at a time, in the order shown, restarting the server each time:
		   a. DIMMs
		   b. (Trained service technician only) System board

Two short beeps	Information only, configuration has changed.	1. Run the Configuration/Setup Utility program. 2. Run the diagnostic programs.

No-beep symptoms

The following table describes situations in which no beep code sounds when POST is completed.

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**		
• **See Chapter 3, "Parts listing, System x3400 Types 7973, 7974, 7975 and 7976," on page 89 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**		
• **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**		
No-beep symptom	**Description**	**Action**
No beeps occur, and the server operates correctly.		1. (Trained service technician only) Reseat the front information panel LED cable. 2. (Trained service technician only) Replace the front information panel LED assembly.
No beeps occur, and there is no video.		See "Solving undetermined problems" on page 86.

Error logs

The POST error log contains the three most recent error codes and messages that were generated during POST. The BMC log and the system-event log contain messages that were generated during POST and all system status messages from the service processor.

The following illustration shows an example of a BMC log entry.

```
                  BMC System Event Log
-----------------------------------------------------------
Get Next Entry
Get Previous Entry
Clear BMC SEL


Entry Number=      00005 / 00011
Record ID=         0005
Record Type=       02
Timestamp=         2005/01/25  16:15:17
Entry Details:     Generator ID= 0020
                   Sensor Type= 04
                   Assertion Event
                   Fan
                   Threshold
                   Lower Non-critical - going high

                   Sensor Number= 40
                   Event Direction/Type= 01

                   Event Data= 52 00 1A
```

The BMC log is limited in size. When the log is full, new entries will not overwrite existing entries; therefore, you must periodically clear the BMC log through the Configuration/Setup Utility program (the menu choices are described in the *User's Guide*). When you are troubleshooting an error, be sure to clear the BMC log so that you can find current errors more easily.

Important: After you complete a repair or correct an error, clear the BMC log to turn off the system-error LED on the front of the server.

Entries that are written to the BMC log during the early phase of POST show an incorrect date and time as the default time stamp; however, the date and time are corrected as POST continues.

Each BMC log entry appears on its own page. To display all of the data for an entry, use the Up Arrow (↑) and Down Arrow (↓) keys or the Page Up and Page Down keys. To move from one entry to the next, select **Get Next Entry** or **Get Previous Entry**.

The log indicates an assertion event when an event has occurred. It indicates a deassertion event when the event is no longer occurring.

Some of the error codes and messages in the BMC log are abbreviated.

If you view the BMC log through the Web interface of the optional Remote Supervisor Adapter II SlimLine, the messages can be translated.

You can view the contents of the POST error log, the BMC log, and the system-error log from the Configuration/Setup Utility program. You can view the

contents of the BMC log also from the diagnostic programs. For complete information about using the Configuration/Setup Utility program, see the *User's Guide*.

Viewing error logs from the Configuration/Setup Utility program

For complete information about using the Configuration/Setup Utility program, see the *User's Guide*.

To view the error logs, complete the following steps:

1. Turn on the server.
2. When the prompt `Press F1 for Configuration/Setup` appears, press F1. If you have set both a power-on password and an administrator password, you must type the administrator password to view the error logs.
3. Use one of the following procedures:
   - To view the POST error log, select **Error Logs** → **POST Error Log**.
   - To view the system error log (available only if an optional Remote Supervisor Adapter II SlimLine is installed), select **Error Logs** → **System Event/Error Log**.
   - To view the BMC log, select **Advanced Setup** → **IPMI** → **System Event Log**.

Viewing the BMC log from the diagnostic programs

The BMC log contains the same information, whether it is viewed from the Configuration/Setup Utility program or from the diagnostic programs.

For information about using the diagnostic programs, see "Running the diagnostic programs" on page 60.

To view the BMC log, complete the following steps:

1. If the server is running, turn off the server and all attached devices.
2. Turn on all attached devices; then, turn on the server.
3. When the prompt `F1 for Configuration/Setup` appears, press F1.
4. When the Configuration/Setup Utility menu appears, select **Start Options**.
5. From the **Start Options** menu, select **Startup Sequence Options**.
6. Note the device that is selected as the first startup device. Later, you must restore this setting.
7. Select the **CD-ROM** or **DVD-ROM** (depending on the drive in your server) as the first startup device.
8. Press Esc two times to return to the Configuration/Setup Utility menu.
9. Insert the IBM *Enhanced Diagnostics* CD into the CD or DVD drive.
10. Select **Save & Exit Setup** and follow the prompts. The diagnostics will load.
11. From the top of the screen, select **Hardware Info**.
12. From the list, select **BMC Log**.

POST error codes

The following table describes the POST error codes and suggested actions to correct the detected problems.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing, System x3400 Types 7973, 7974, 7975 and 7976," on page 89 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Error code	Description	Action
062	Three consecutive boot failures using the default configuration.	1. Update the system firmware to the latest level (see "Updating the firmware" on page 185). 2. (Trained service technician only) Replace the system board.
101	Tick timer internal interrupt failure.	(Trained service technician only) Replace the system board.
102	Internal timer channel 2 test failure.	(Trained service technician only) Replace the system board.

151	Real-time clock error.	1. Reseat the battery.
		2. Replace the following components one at a time, in the order shown, restarting the server each time:
		  a. Battery
		  b. (Trained service technician only) System board

161	Real-time clock battery failure.	1. Reseat the battery.
		2. Replace the following components one at a time, in the order shown, restarting the server each time:
		  a. Battery
		  b. (Trained service technician only) System board

162	Invalid configuration information or CMOS random-access memory (RAM) checksum failure.	1. Run the Configuration/Setup Utility program, select **Load Default Settings**, and save the settings.
		2. Reseat the following components:
		  a. Battery
		  b. Failing device (If the device is a FRU, it must be reseated by a trained service technician only.)
		3. Replace the following components one at a time, in the order shown, restarting the server each time:
		  a. Battery
		  b. Failing device (If the device is a FRU, it must be replaced by a trained service technician only.)
		  c. (Trained service technician only) System board

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing, System x3400 Types 7973, 7974, 7975 and 7976," on page 89 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Error code	Description	Action

163	Time of day not set.	1. Run the Configuration/Setup Utility program, select **Load Default Settings**, make sure that the date and time are correct, and save the settings.
		2. Reseat the battery.
		3. Replace the following components one at a time, in the order shown, restarting the server each time:
		  a. Battery
		  b. (Trained service technician only) System board

175	Service processor flash code damaged or not loaded.	1. Restart the server. 2. Update the optional Remote Supervisor Adapter II SlimLine firmware (see "Updating the firmware" on page 185. 3. Replace the optional Remote Supervisor Adapter II SlimLine. 4. (Trained service technician only) Replace the system board.

178	Security hardware error.	1. Run the Configuration/Setup Utility program, select **Load Default Settings**, and save the settings.
		2. Reseat the optional Remote Supervisor Adapter II SlimLine.
		3. Replace the following components one at a time, in the order shown, restarting the server each time:
		  a. Optional Remote Supervisor Adapter II SlimLine
		  b. (Trained service technician only) System board

184	Power-on password damaged.	1. Run the Configuration/Setup Utility program, select **Load Default Settings**, and save the settings.
		2. Reseat the battery.
		3. Replace the following components one at a time, in the order shown, restarting the server each time:
		  a. Battery
		  b. (Trained service technician only) System board

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing, System x3400 Types 7973, 7974, 7975 and 7976," on page 89 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Error code	Description	Action
187	VPD serial number not set.	1. Set the serial number by updating the BIOS code level (see "Updating the firmware" on page 185). 2. Reseat the optional Remote Supervisor Adapter II SlimLine. 3. (Trained service technician only) Replace the system board.
188	Bad VPD CRC #2.	1. Restart the server. 2. Update the firmware (see "Updating the firmware" on page 185. 3. Reseat the optional Remote Supervisor Adapter II SlimLine. 4. (Trained service technician only) Replace the system board.
189	Three attempts were made to access the server with an incorrect password.	Restart the server and enter the administrator password; then, run the Configuration/Setup Utility program and change the power-on password.
196	Processor cache mismatch.	1. Make sure that all microprocessors have the same cache size (see "Using the Configuration/Setup Utility program" on page 186. 2. Update the BIOS code (see "Updating the firmware" on page 185). 3. (Trained service technician only) Reseat microprocessor. 4. (Trained service technician only) Replace microprocessor.
198	Processor speed mismatch.	1. Make sure that all microprocessors have the same speed (see "Using the Configuration/Setup Utility program" on page 186. 2. Update the BIOS code (see "Updating the firmware" on page 185). 3. (Trained service technician only) Reseat microprocessor. 4. (Trained service technician only) Replace microprocessor.
289	A DIMM has been disabled by the user or by the system.	1. If the DIMM was disabled by the user, run the Configuration/Setup Utility program and enable the DIMM. 2. Make sure that the DIMM is installed correctly (see "Installing a memory module" on page 132). 3. Reseat the DIMM. 4. Replace the DIMM.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing, System x3400 Types 7973, 7974, 7975 and 7976," on page 89 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Error code	Description	Action

301	Keyboard or keyboard controller error.	1. If you have installed a USB keyboard, run the Configuration/Setup Utility program and enable keyboardless operation to prevent the POST error message 301 from being displayed during startup.
		2. Reseat the keyboard cable.
		3. Replace the following components one at a time, in the order shown, restarting the server each time:
		  a. Keyboard
		  b. (Trained service technician only) System board

303	Keyboard controller failure.	1. Reseat the keyboard. 2. Replace the keyboard. 3. (Trained service technician only) Replace the system board.

1600	The service processor is not functioning.
	Note: Depending on which device is installed, the service processor is the optional Remote Supervisor Adapter II SlimLine or the BMC.
		1. If the optional Remote Supervisor Adapter II SlimLine is installed:
		  a. Update the Remote Supervisor Adapter II SlimLine firmware.
		  b. Replace the Remote Supervisor II SlimLine.
		2. Update the BMC firmware (see "Updating the firmware" on page 185).
		3. (Trained service technician only) Replace the system board.

1604	Machine type mismatch detected. The error might be displayed after updating the BIOS to version 1.40.	1. Run the Configuration/Setup Utility program, select Load Default Settings, and save the settings. 2. Update the BIOS code to version 1.43 or higher and make sure the machine type information for the server is correct. 3. Update the BMC firmware (see "Updating the firmware" on page 185). 4. (Trained service technician only) Replace the system board.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing, System x3400 Types 7973, 7974, 7975 and 7976," on page 89 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Error code	Description	Action

1762	Fixed disk configuration error.	1. Run the Configuration/Setup Utility program, select **Load Default Settings**, and save the settings.
		2. Reseat the following components:
		  • SAS cables
		  • SAS hard disk drive
		  • SAS backplane
		3. Replace the components listed in step 2 one at a time, in the order shown, restarting the server each time.
		4. (Trained service technician only) Replace the system board.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing, System x3400 Types 7973, 7974, 7975 and 7976," on page 89 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Error code	Description	Action

178*x*	Fixed disk error.
	Note: *x* is the drive that has the error.
		1. Run the hard disk drive diagnostic tests on drive x (see "Running the diagnostic programs" on page 60.
		2. Reseat the hard disk drive cables.
		3. Replace the hard disk drive cables.
		4. Run the hard disk drive diagnostics tests on drive *x*.
		5. Reseat the following components, depending on the server model:
		  • Hot-swap and non-hot-swap models:
		    a. Hard disk drive *x*
		    b. Hard disk drive x cable
		    c. Optional adapter cable
		    d. SAS/SATA backplane
		  • Simple-swap models:
		    a. Hard disk drive *x*
		    b. Hard disk drive *x* cable
		    c. Optional adapter cable
		    d. SATA backplate
		6. Replace the following components one at a time, depending on the server model, in the order shown, restarting the server each time:
		  • Hot-swap and non-hot-swap models:
		    a. Hard disk drive *x*
		    b. Hard disk drive cable
		    c. Optional adapter cable
		    d. SAS/SATA backplane
		  • Simple-swap models:
		    a. Hard disk drive *x*
		    b. Hard disk drive *x* cable
		    c. Optional adapter cable
		    d. SATA backplate
		7. (Trained service technician only) Replace the system board.

1800	Unavailable PCI hardware interrupt.	1. Run the Configuration/Setup Utility program and adjust the adapter settings. 2. Remove each adapter one at a time, restarting the server each time, until the problem is isolated.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing, System x3400 Types 7973, 7974, 7975 and 7976," on page 89 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Error code	Description	Action
1801	A PCI adapter has requested memory resources that are not available.	1. Make sure that no devices have been disabled in the Configuration/Setup Utility program. 2. Change the order of the adapters in the PCI, PCI-X, or PCI Express slots. Make sure that the startup (boot) device is positioned early in the scanning order. (For information about the scanning order, see the *User's Guide* on the IBM *System x3400 Documentation* CD). 3. Make sure that the settings for the adapter and all other adapters in the Configuration/Setup Utility program are correct. If the memory resource settings are not correct, change them. 4. If all memory resources are being used, remove an adapter to make memory available to the adapter. Disabling the BIOS on the adapter should correct the error. See the documentation that comes with the adapter.

1802	No more I/O space is available for a PCI, PCI-X, or PCI Express adapter.	1. Make sure that the settings for the adapter and all other adapters in the Configuration/Setup Utility program are correct.
		2. If the error code indicates a particular PCI, PCI-X, or PCI Express slot or device, remove that device.
		3. Reseat each adapter.
		4. Replace the following components one at a time, in the order shown, restarting the server each time:
		  a. Adapter
		  b. (Trained service technician only) System board

1803	No more memory (above 1 MB for a PCI, PCI-X, or PCI Express adapter).	1. Make sure that the settings for the adapter and all other adapters in the Configuration/Setup Utility program are correct.
		2. If the error code indicates a particular PCI, PCI-X, or PCI Express slot or device, remove that device.
		3. Reseat each adapter.
		4. Replace the following components one at a time, in the order shown, restarting the server each time:
		  a. Adapter
		  b. (Trained service technician only) System board

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing, System x3400 Types 7973, 7974, 7975 and 7976," on page 89 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Error code	Description	Action

1804	No more memory (below 1 MB for a PCI, PCI-X, or PCI Express adapter).	1. Make sure that the settings for the adapter and all other adapters in the Configuration/Setup Utility program are correct.
		2. If the error code indicates a particular PCI, PCI-X, or PCI Express slot or device, remove that device.
		3. Reseat each adapter.
		4. Replace the following components one at a time, in the order shown, restarting the server each time:
		  a. Adapter
		  b. (Trained service technician only) System board

1805	PCI option ROM checksum error.	1. Remove the failing adapter.
		2. Reseat each adapter.
		3. Replace the following components one at a time, in the order shown, restarting the server each time:
		  a. Adapter
		  b. (Trained service technician only) System board

1806	PCI built-in self-test failure.	1. Make sure that the settings for the adapter and all other adapters in the Configuration/Setup Utility program are correct.
		2. If the error code indicates a particular PCI, PCI-X, or PCI Express slot or device, remove that device.
		3. Reseat each adapter.
		4. Replace the following components one at a time, in the order shown, restarting the server each time:
		  a. Adapter
		  b. (Trained service technician only) System board

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing, System x3400 Types 7973, 7974, 7975 and 7976," on page 89 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Error code	Description	Action

1807, 1808	General PCI error.	1. Make sure that no devices have been disabled in the Configuration/Setup Utility program.
		
		 2. Reseat the failing adapter.
		 Note: If an error LED is lit for a specific adapter, reseat that adapter first; if no LEDs are lit, reseat each adapter one at a time, restarting the server each time, to isolate the failing adapter.
		
		 3. Replace the following components one at a time, in the order shown, restarting the server each time:
		   a. Adapter
		   b. (Trained service technician only) System board

1810	PCI error.	1. Make sure that no devices have been disabled in the Configuration/Setup Utility program.
		
		 2. Remove the adapters from the PCI, PCI-X, or PCI Express slots.
		
		 3. Reseat the failing adapter.
		 Note: If an error LED is lit on an adapter, reseat that adapter first; if no LEDs are lit, reseat each adapter one at a time, restarting the server each time, to isolate the failing adapter.
		
		 4. Replace the following components one at a time, in the order shown, restarting the server each time:
		   a. Failing adapter
		   b. (Trained service technician only) System board

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing, System x3400 Types 7973, 7974, 7975 and 7976," on page 89 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Error code	Description	Action

1962	A hard disk drive does not contain a valid boot sector.	1. Make sure that a bootable operating system is installed.
		2. Run the hard disk drive diagnostic tests.
		3. Reseat the following components, depending on the server model:
		  • Hot-swap and non-hot-swap models:
		    a. Hard disk drive
		    b. Hard disk drive cable
		    c. Optional adapter cable
		    d. SAS/SATA backplane
		  • Simple-swap models:
		    a. Hard disk drive
		    b. Hard disk drive cable
		    c. Optional adapter cable
		    d. SATA backplate
		4. Replace the following components one at a time, depending on the server model, in the order shown, restarting the server each time:
		  • Hot-swap and non-hot-swap models:
		    a. Hard disk drive
		    b. Hard disk drive cable
		    c. Optional adapter cable
		    d. SAS/SATA backplane
		  • Simple-swap models:
		    a. Hard disk drive
		    b. Hard disk drive cable
		    c. Optional adapter cable
		    d. SATA backplate
		5. (Trained service technician only) Replace the system board.

2462	Video configuration error occurred.	1. Reseat the video adapter, if one is installed. 2. (Trained service technician only) Replace the system board.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing, System x3400 Types 7973, 7974, 7975 and 7976," on page 89 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Error code	Description	Action
5962	IDE CD or DVD drive configuration error.	1. Run the Configuration/Setup Utility program and load the default settings (see "Using the Configuration/Setup Utility program" on page 186). 2. Reseat the following components: • CD or DVD drive cable • CD or DVD drive 3. Replace the components listed in step 2 one at a time, in the order shown, restarting the server each time. 4. (Trained service technician only) Replace the system board
8603	Pointing-device error.	1. Reseat the pointing device. 2. Replace the following components one at a time, in the order shown, restarting the server each time: a. Pointing device b. (Trained service technician only) System board
00012000	Processor machine check error.	1. (Trained service technician only) Reseat the microprocessor. 2. Replace the following components one at a time, in the order shown, restarting the server each time: a. (Trained service technician only) Microprocessor b. (Trained service technician only) System board
00019501	Processor 1 is not functioning; check VRM and processor LEDs.	1. (Trained service technician only) Reseat microprocessor 1. 2. Replace the following components one at a time, in the order shown, restarting the server each time: a. (Trained service technician only) Microprocessor 1 b. (Trained service technician only) System board

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing, System x3400 Types 7973, 7974, 7975 and 7976," on page 89 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Error code	Description	Action

00019502	Processor 2 is not functioning; check VRM and processor LEDs.	1. (Trained service technician only) Reseat microprocessor 2.
		2. Replace the following components one at a time, in the order shown, restarting the server each time:
		  a. (Trained service technician only) Microprocessor 2
		  b. (Trained service technician only) System board

00019701	Processor 1 failed the built-in self-test (BIST).	1. (Trained service technician only) Reseat microprocessor 1.
		2. Replace the following components one at a time, in the order shown, restarting the server each time:
		  a. (Trained service technician only) Microprocessor 1
		  b. (Trained service technician only) System board

00019702	Processor 2 failed the built-in self-test (BIST).	1. (Trained service technician only) Reseat microprocessor 2.
		2. Replace the following components one at a time, in the order shown, restarting the server each time:
		  a. (Trained service technician only) Microprocessor 2
		  b. (Trained service technician only) System board

01298001	No update data for processor 1.	1. Make sure that all microprocessors have the same cache size (see "Using the Configuration/Setup Utility program" on page 186. 2. Update the BIOS code (see "Updating the firmware" on page 185). 3. (Trained service technician only) Reseat microprocessor 1. 4. (Trained service technician only) Replace microprocessor 1.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing, System x3400 Types 7973, 7974, 7975 and 7976," on page 89 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Error code	Description	Action
01298002	No update data for processor 2.	1. Make sure that all microprocessors have the same cache size (see "Using the Configuration/Setup Utility program" on page 186. 2. Update the BIOS code (see "Updating the firmware" on page 185). 3. (Trained service technician only) Reseat microprocessor 2. 4. (Trained service technician only) Replace microprocessor 2.
01298101	Bad update data for processor 1.	1. Make sure that all microprocessors have the same cache size (see "Using the Configuration/Setup Utility program" on page 186. 2. Update the BIOS code again (see "Updating the firmware" on page 185). 3. (Trained service technician only) Reseat the microprocessor. 4. (Trained service technician only) Replace the microprocessor.
01298102	Bad update data for processor 2.	1. Make sure that all microprocessors have the same cache size (see "Using the Configuration/Setup Utility program" on page 186. 2. Update the BIOS code (see "Updating the firmware" on page 185). 3. (Trained service technician only) Reseat microprocessor 2. 4. (Trained service technician only) Replace microprocessor 2.
01298200	Processor speed mismatch.	Make sure that all microprocessors have the same cache size (see "Using the Configuration/Setup Utility program" on page 186.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing, System x3400 Types 7973, 7974, 7975 and 7976," on page 89 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Error code	Description	Action

I9990301	Hard disk drive boot sector error.	1. Reseat the following components, depending on the server model:
		  • Hot-swap and non-hot-swap models:
		    a. Hard disk drive
		    b. Hard disk drive cable
		    c. Optional adapter cable
		    d. SAS/SATA backplane
		  • Simple-swap models:
		    a. Hard disk drive
		    b. Hard disk drive cable
		    c. Optional adapter cable
		    d. SATA backplate
		2. Replace the following components one at a time, depending on the server model, in the order shown, restarting the server each time:
		  • Hot-swap and non-hot-swap models:
		    a. Hard disk drive
		    b. Hard disk drive cable
		    c. Optional adapter cable
		    d. SAS/SATA backplane
		  • Simple-swap models:
		    a. Hard disk drive
		    b. Hard disk drive cable
		    c. Optional adapter cable
		    d. SATA backplate
		3. (Trained service technician only) Replace the system board.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing, System x3400 Types 7973, 7974, 7975 and 7976," on page 89 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Error code	Description	Action

I9990305	An operating system was not found.	1. Make sure that a bootable operating system is installed. To determine whether an operating system is one of the devices in the startup sequence, run the Configuration/Setup Utility program (see the *User's Guide* on the IBM *System x3400 Documentation* CD).
		2. Run the hard disk drive diagnostic tests.
		3. Reseat the following components, depending on the server model:
		  • Hot-swap models:
		    a. Hard disk drive
		    b. Hard disk drive cable
		    c. Hard disk drive backplane
		  • Simple-swap models:
		    a. Hard disk drive
		    b. Hard disk drive cable
		4. Replace the following components one at a time, depending on the server model, in the order shown, restarting the server each time:
		  • Hot-swap models:
		    a. Hard disk drive
		    b. Hard disk drive cable
		    c. Hard disk drive backplane
		  • Simple-swap models:
		    a. Hard disk drive
		    b. Hard disk drive cable
		5. (Trained service technician only) Replace the system board.

I9990650	AC power has been restored.	1. Reseat the power cords. 2. Check for interruption of the external power. 3. Replace the power cords. 4. For hot-swap models, replace the power supply backplane.

Checkout procedure

The checkout procedure is the sequence of tasks that you should follow to diagnose a problem in the server.

About the checkout procedure

Before performing the checkout procedure for diagnosing hardware problems, review the following information:

- Read the safety information that begins on page vii.

- The diagnostic programs provide the primary methods of testing the major components of the server, such as the system board, ethernet controller, keyboard, mouse (pointing device), serial ports, and hard disk drives. You can also use them to test some external devices. If you are not sure whether a problem is caused by the hardware or by the software, you can use the diagnostic programs to confirm that the hardware is working correctly.

- When you run the diagnostic programs, a single problem might cause more than one error message. When this happens, correct the cause of the first error message. The other error messages usually will not occur the next time you run the diagnostic programs.

  Exception: If there are multiple error codes or LEDs that indicate a microprocessor error, the error might be in a microprocessor or in a microprocessor socket. See "Microprocessor problems" on page 48 for information about diagnosing microprocessor problems.

- Before running the diagnostic programs, you must determine whether the failing server is part of a shared hard disk drive cluster (two or more servers sharing external storage devices). If it is part of a cluster, you can run all diagnostic programs except the ones that test the storage unit (that is, a hard disk drive in the storage unit) or the storage adapter that is attached to the storage unit. The failing server might be part of a cluster if any of the following conditions is true:

  - You have identified the failing server as part of a cluster (two or more servers sharing external storage devices).

  - One or more external storage units are attached to the failing server and at least one of the attached storage units is also attached to another server or unidentifiable device.

  - One or more servers are located near the failing server.

  Important: If the server is part of a shared hard disk drive cluster, run one test at a time. Do not run any suite of tests, such as "quick" or "normal" tests, because this might enable the hard disk drive diagnostic tests.

- If the server is halted and a POST error code is displayed, see "Error logs" on page 22. If the server is halted and no error message is displayed, see "Troubleshooting tables and procedures" on page 41 and "Solving undetermined problems" on page 86.

- For information about power-supply problems, see "Solving power problems" on page 84.

- For intermittent problems, check the error log; see "Error logs" on page 22 and "Diagnostic programs, messages, and error codes" on page 60.

Performing the checkout procedure

To perform the checkout procedure, complete the following steps:

1. Is the server part of a cluster?
   - **No:** Go to step 2.
   - **Yes:** Shut down all failing servers that are related to the cluster. Go to step 2.
2. Complete the following steps:
   a. Turn off the server and all external devices.
   b. Check all cables and power cords.
   c. Set all display controls to the middle positions.
   d. Turn on all external devices.
   e. Turn on the server. If the server does not start, see "Troubleshooting tables and procedures" on page 41.
   f. Check the system-error LED on the control panel. If it is lit, check the LEDs on the system board (see "Error LEDs" on page 57).

      Important: If the system-error LED on the front of the server is lit but there are no other error indications, clear the BMC log. This log does not clear itself, and if it begins to fill up, the system-error LED will be lit. Also, after you complete a repair or correct an error, clear the BMC log to turn off the system-error LED on the front of the server.
   g. Check for the following results:
      - Successful completion of POST, indicated by a single beep
      - Successful completion of startup, indicated by a readable display of the operating-system desktop
3. Did a single beep sound and are there readable instructions on the main menu, or was a POST error code displayed?
   - **Yes:** Find the beep code or error code in "POST beep codes" on page 18 or "POST error codes" on page 24; if necessary, see "Solving undetermined problems" on page 86.
   - **No:** Find the failure symptom in "Troubleshooting tables and procedures" on page 41; if necessary, run the diagnostic programs (see "Running the diagnostic programs" on page 60).
     - If you receive an error, see "Diagnostic error codes" on page 62.
     - If the diagnostic programs were completed successfully and you still suspect a problem, see "Solving undetermined problems" on page 86.

Checkpoint codes (trained service technicians only)

A checkpoint code identifies the check that was occurring when the server stopped; it does not provide error codes or suggest replacement components. Checkpoint codes are shown on the checkpoint display, which is on the system board. By using the checkpoint display, you do not have to wait for the video to initialize each time that you restart the server.

There are two types of checkpoint codes: complex programmable logic device (CPLD) hardware checkpoint codes and BIOS checkpoint codes. The BIOS checkpoint codes might change when the BIOS code is updated.

Troubleshooting tables and procedures

Use the troubleshooting tables and procedures to find solutions to problems that have identifiable symptoms.

If you cannot find the problem in these tables, see "Running the diagnostic programs" on page 60 for information about testing the server.

If you have just added new software or a new optional device and the server is not working, complete the following steps before using the troubleshooting tables and procedures:
1. Check the LEDs on the control panel or the system board (see "Error LEDs" on page 57).
2. Remove the software or device that you just added.
3. Run the diagnostic tests to determine whether the server is running correctly.
4. Reinstall the new software or new device.

CD or DVD drive problems

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing, System x3400 Types 7973, 7974, 7975 and 7976," on page 89 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Symptom	Action

The CD or DVD drive is not recognized.	1. Make sure that:
	  • The IDE channel to which the CD or DVD drive is attached (primary or secondary) is enabled in the Configuration/Setup Utility program.
	  • All cables and jumpers are installed correctly.
	  • The correct device driver is installed for the CD or DVD drive.
	2. Run the CD or DVD drive diagnostic programs.
	3. Reseat the CD or DVD drive cable.
	4. Replace the following components one at a time, in the order shown, restarting the server each time:
	  a. CD or DVD drive cable
	  b. CD or DVD drive
	  c. (Trained service technician only) System board

A CD or DVD is not working correctly.	1. Clean the CD or DVD.
	2. Run the CD or DVD drive diagnostic programs.
	3. Reseat the CD or DVD drive cable.
	4. Replace the following components one at a time, in the order shown, restarting the server each time:
	  a. CD or DVD drive cable
	  b. CD or DVD drive

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**	
• **See Chapter 3, "Parts listing, System x3400 Types 7973, 7974, 7975 and 7976," on page 89 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**	
• **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**	

Symptom	Action

The CD or DVD drive tray is not working.	1. Make sure that the server is turned on.
	2. Insert the end of a straightened paper clip into the manual tray-release opening.
	3. Reseat the CD or DVD drive cable.
	4. Replace the following components one at a time, in the order shown, restarting the server each time:
	   a. CD or DVD drive cable
	   b. CD or DVD drive

Diskette drive problems

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**	
• **See Chapter 3, "Parts listing, System x3400 Types 7973, 7974, 7975 and 7976," on page 89 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**	
• **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**	

Symptom	Action

The optional diskette drive activity LED stays lit, or the server bypasses the diskette drive.	• If there is a diskette in the drive, make sure that:
	  – The diskette drive cables are correctly and securely connected.
	  – The diskette drive is enabled in the Configuration/Setup Utility program.
	  – The diskette is good and not damaged. (Try another diskette if you have one.)
	  – The diskette is inserted correctly in the drive.
	  – The diskette contains the necessary files to start the server.
	  – Your software program is working properly.
	• To prevent diskette drive read/write errors, make sure that the distance between monitors and diskette drives is at least 76 mm (3 in.).
	
	If the problem remains, replace the internal diskette drive.

General problems

• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.	
• See Chapter 3, "Parts listing, System x3400 Types 7973, 7974, 7975 and 7976," on page 89 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).	
• If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.	

Symptom	Action
A cover lock is broken, an LED is not working, or a similar problem has occurred.	If the part is a CRU, replace it. If the part is a FRU, the part must be replaced by a trained service technician.

Fan problems

• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.	
• See Chapter 3, "Parts listing, System x3400 Types 7973, 7974, 7975 and 7976," on page 89 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).	
• If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.	

Symptom	Action

The server fan speed is abnormal. The following errors may occur:
 	
 • 271 09/18/2006 15:20:12 Fan/cooling device 3 Fan
 • Fan 3 Tach): Assertion: Lower Critical - going low
 • Trigger threshold value: 750.00 RPM. Trigger reading: 0.00 RPM.
	1. Before you replace a FRU:
	  a. Power off the server, and make sure that the fan cage is installed correctly.
	  b. Use the following instructions to install the fan cage:
	   1) Make sure that all cables that plug into the system board are connected and routed properly underneath the plastic fasteners.
	   2) Carefully slide the fan cage into both side wall rails until the fan cage lock holes snap into the two latch handles.
	   3) Push down on both sides of the fan cage until it clicks in place.
	 2. If the symptoms remains, contact IBM Service to assist in validating that the following solution is appropriate: Place one more rubber grommet (FRU 44E7524) underneath the fan cage power connector and reinstall the fan cage.

Symptom	Action

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing, System x3400 Types 7973, 7974, 7975 and 7976," on page 89 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Symptom	Action

Abnormal fan noise	1. Before you replace a FRU:
	   a. Power off the server, and make sure that the fan cage is installed correctly.
	   b. Use the following instructions to install the fan cage:
	     1) Make sure that all cables that plug into the system board are connected and routed properly underneath the plastic fasteners.
	     2) Carefully slide the fan cage into both side wall rails until the fan cage lock holes snap into the two latch handles.
	     3) Push down on both sides of the fan cage until it clicks in place.
	     4) Check the microprocessor heat sink and make sure it is installed correctly
	     5) Make sure if the Baseboard Management Controller is updated to the latest version. See http://www-947.ibm.com/systems/support/supportsite.wss/selectproduct?familyind=5312474&brandind=5000008&oldbrand=5000008&oldfamily=0&oldtype=0&taskind=2&matrix=Y&psid=bm
	     6) After the server boots, wait five minutes; then, check the fan to see if the speed gradually slows down.
	2. If the symptoms remains, replace the suspected fan

Hard disk drive problems

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing, System x3400 Types 7973, 7974, 7975 and 7976," on page 89 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Symptom	Action
Not all drives are recognized by the hard disk drive diagnostic test (the Fixed Disk Test).	Remove the drive that is indicated by the diagnostic tests; then, run the hard disk drive diagnostic test again. If the remaining drives are recognized, replace the drive that you removed with a new one.
The server stops responding during the hard disk drive diagnostic test.	Remove the hard disk drive that was being tested when the server stopped responding, and run the diagnostic test again. If the hard disk drive diagnostic test runs successfully, replace the drive that you removed with a new one.
A hard disk drive was not detected while the operating system was being started.	Reseat all hard disk drives and cables; then, run the hard disk drive diagnostic tests again.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing, System x3400 Types 7973, 7974, 7975 and 7976," on page 89 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Symptom	Action
A hard disk drive passes the diagnostic Fixed Disk Test or SCSI Attached Disk Test, but the problem remains.	Run the diagnostic SCSI Attached Disk Test (see "Running the diagnostic programs" on page 60). **Note:** This test is supported on servers with RAID arrays that use the ServeRAID-8k controller or the ServeRAID-8k-I controller or servers with SATA hard disk drives that use the onboard SATA/SAS controller to create RAID arrays. Use the Fixed Disk Test for SATA hard disk drives or servers that have RAID arrays.

Intermittent problems

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing, System x3400 Types 7973, 7974, 7975 and 7976," on page 89 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Symptom	Action
A problem occurs only occasionally and is difficult to diagnose.	1. Make sure that: • All cables and cords are connected securely to the rear of the server and attached devices. • When the server is turned on, air is flowing from the fan grille. If there is no airflow, the fan is not working. This can cause the server to overheat and shut down. 2. Check the system-error log or BMC log (see "Error logs" on page 22).

Keyboard, mouse, or pointing-device problems

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing, System x3400 Types 7973, 7974, 7975 and 7976," on page 89 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Symptom	Action

All or some keys on the keyboard do not work.	1. Make sure that:
	   • The keyboard cable is securely connected.
	   • If you are using a PS/2 keyboard, the keyboard and mouse cables are not reversed.
	   • The server and the monitor are turned on.
	2. If you are using a USB keyboard, run the Configuration/Setup Utility program and enable keyboardless operation to prevent the 301 POST error message from being displayed during startup.
	3. If you are using a USB keyboard and it is connected to a USB hub, disconnect the keyboard from the hub and connect it directly to the server.
	4. Replace the following components one at a time, in the order shown, restarting the server each time:
	   a. Keyboard
	   b. (Trained service technician only) System board

The mouse or pointing device does not work.	1. Make sure that:
	   • The mouse or pointing-device cable is securely connected to the server.
	   • If you are using a PS/2 mouse or pointing device, the keyboard and mouse or pointing-device cables are not reversed.
	   • The mouse or pointing-device drivers are installed correctly.
	   • The server and the monitor are turned on.
	   • The mouse option is enabled in the Configuration/Setup Utility program.
	2. If you are using a USB mouse or pointing device and it is connected to a USB hub, disconnect the mouse or pointing device from the hub and connect it directly to the server.
	3. Replace the following components one at a time, in the order shown, restarting the server each time:
	   a. Mouse or pointing device
	   b. (Trained service technician only) System board

Memory problems

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing, System x3400 Types 7973, 7974, 7975 and 7976," on page 89 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Symptom	Action

The amount of system memory that is displayed is less than the amount of installed physical memory.	1. Make sure that:
	   • No error LEDs are lit on the control-panel assembly or on the system board.
	   • Memory mirroring does not account for the discrepancy.
	   • The memory modules are seated correctly.
	   • You have installed the correct type of memory.
	   • All DIMMs are enabled. The server might have automatically disabled a DIMM when it detected a problem.
	2. Check the POST error log for error message 289:
	   • If a DIMM was disabled by a system-management interrupt (SMI), replace the DIMM.
	3. Run memory diagnostics (see "Running the diagnostic programs" on page 60).
	4. Make sure that there is no memory mismatch when the server is over the minimum memory configuration (one 512 MB DIMM) and that you have installed the correct number of DIMMs (see the *User's Guide* on the IBM *System x3400 Documentation* CD for information about installing memory modules).
	5. Reseat the DIMMs.
	6. Replace the following components one at a time, in the order shown, restarting the server each time:
	   a. DIMMs
	   b. (Trained service technician only) System board

Multiple rows of DIMMs in a branch are identified as failing.	1. Reseat the DIMMs; then, restart the server. 2. Replace the lowest-numbered DIMM pair of those that are identified; then, restart the server. Repeat as necessary. 3. (Trained service technician only) Replace the system board.

Microprocessor problems

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing, System x3400 Types 7973, 7974, 7975 and 7976," on page 89 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Symptom	Action
A microprocessor LED is lit during POST, indicating that the startup (boot) microprocessor is not working correctly.	1. 2. Make sure that the server supports all the microprocessors and that the microprocessors match in speed and cache size. 3. Reseat the following components: a. (Trained service technician only) Microprocessor b. VRM 4. (Trained service technician only) If there is no indication of which microprocessor has failed, isolate the error by testing with one microprocessor at a time. 5. Replace the following components one at a time, in the order shown, restarting the server each time: a. (Trained service technician only) Microprocessor b. (Trained service technician only) System board 6. (Trained service technician only) If there are multiple error codes or LEDs that indicate a microprocessor error, reverse the locations of the microprocessors or with a microprocessor socket.

Monitor or video problems

Some IBM monitors have their own self-tests. If you suspect a problem with your monitor, see the documentation that comes with the monitor for instructions for testing and adjusting the monitor. If you cannot diagnose the problem, call for service.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing, System x3400 Types 7973, 7974, 7975 and 7976," on page 89 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Symptom	Action

Testing the monitor	1. Make sure that the monitor cables are firmly connected.
	2. Try using a different monitor on the server, or try using the monitor that is being tested on a different server.
	3. Run the diagnostic programs. If the monitor passes the diagnostic programs, the problem might be a video device driver.
	4. Reseat the Remote Supervisor Adapter II SlimLine (if one is present).
	5. Replace the following components one at a time, in the order shown, restarting the server each time:
	  a. Remote Supervisor Adapter II SlimLine (if one is present)
	  b. (Trained service technician only) System board

The screen is blank.	1. Make sure that:
	  • The ServeRAID 8K or ServeRAID 8k-I controller is installed in the system.
	  • The server is turned on. If there is no power to the server, see "Power problems" on page 52.
	  • The monitor cables are connected correctly.
	  • The monitor is turned on and the brightness and contrast controls are adjusted correctly.
	  • No beep codes sound when the server is turned on.
	
	  Important: In some memory configurations, the 3-3-3 beep code might sound during POST, followed by a blank monitor screen. If this occurs and the **Boot Fail Count** option in the **Start Options** of the Configuration/Setup Utility program is enabled, you must restart the server three times to reset the configuration settings to the default configuration (the memory connector or bank of connectors enabled).
	2. Make sure that the correct server is controlling the monitor, if applicable.
	3. Make sure that damaged BIOS code is not affecting the video; see "Recovering from a BIOS update failure" on page 74.
	4. See "Solving undetermined problems" on page 86.

The monitor works when you turn on the server, but the screen goes blank when you start some application programs.	1. Make sure that:
	  • The application program is not setting a display mode that is higher than the capability of the monitor.
	  • You installed the necessary device drivers for the application.
	2. Run video diagnostics (see "Running the diagnostic programs" on page 60).
	  • If the server passes the video diagnostics, the video is good; see "Solving undetermined problems" on page 86.
	  • (Trained service technician only) If the server fails the video diagnostics, replace the system board.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing, System x3400 Types 7973, 7974, 7975 and 7976," on page 89 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Symptom	Action
The monitor has screen jitter, or the screen image is wavy, unreadable, rolling, or distorted.	1. If the monitor self-tests show the monitor is working correctly, 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. **Attention:** Moving a color monitor while it is turned on might cause screen discoloration. Move the device and the monitor at least 305 mm (12 in.) apart, and turn on the monitor. **Notes:** a. To prevent diskette drive read/write errors, make sure that the distance between the monitor and any external diskette drive is at least 76 mm (3 in.). b. Non-IBM monitor cables might cause unpredictable problems. 2. Reseat the following components: a. Monitor cable b. Remote Supervisor Adapter II SlimLine (if one is present) 3. Replace the following components one at a time, in the order shown, restarting the server each time: a. Monitor b. Remote Supervisor Adapter II SlimLine (if one is present) c. (Trained service technician only) System board
Wrong characters appear on the screen.	1. If the wrong language is displayed, update the BIOS code with the correct language (see "Updating the firmware" on page 185). 2. Reseat the monitor cable. 3. Replace the following components one at a time, in the order shown, restarting the server each time: a. Monitor b. (Trained service technician only) System board

Optional-device problems

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing, System x3400 Types 7973, 7974, 7975 and 7976," on page 89 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Symptom	Action
An IBM optional device that was just installed does not work.	1. Make sure that: • The device is designed for the server (see http://www.ibm.com/servers/eserver/serverproven/compat/us/). • You followed the installation instructions that came with the device and the device is installed correctly. • You have not loosened any other installed devices or cables. • You updated the configuration information in the Configuration/Setup Utility program. Whenever memory or any other device is changed, you must update the configuration. 2. Reseat the device that you just installed. 3. Replace the device that you just installed.
An IBM optional device that used to work does not work now.	1. Make sure that all of the hardware and cable connections for the device are secure. 2. If the device comes with test instructions, use those instructions to test the device. 3. Reseat the failing device. 4. Replace the failing device.

Power problems

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing, System x3400 Types 7973, 7974, 7975 and 7976," on page 89 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Symptom	Action

The power-control button does not work (the server does not start).
Note: The power-control button will not function until 20 seconds after the server has been connected to ac power.
	1. Make sure that the control-panel assembly power-control button is working correctly:
	  a. Disconnect the server power cords.
	  b. Reconnect the power cords.
	  c. Press the power-control button. If the server does not start, check the power-control button for damage.
	2. Make sure that:
	  • The power cords are correctly connected to the server and to a working electrical outlet.
	  • The power LEDs (AC, DC) are lit correctly.
	  • The server power-on LED on the front information panel is flashing after AC power cord is connected and that it stays on after the power-button is pressed.
	  • The server contains the correct type of DIMMs.
	  • The DIMMs are correctly seated.
	  • A POST beep code did not sound, indicating a memory initialization error.
	  • The LEDs on the power supply do not indicate a problem.
	  • The microprocessor is correctly installed.
	3. Reseat the following components:
	  a. DIMMs
	  b. Power-supply cables to all internal components
	  c. Power supplies (hot-swap models)
	4. Replace the following components one at a time, in the order shown, restarting the server each time:
	  a. DIMMs
	  b. Power supplies (hot-swap models)
	  c. (Trained service technician only) Power supply (non-hot swap models)
	5. If you just installed an optional device, remove it, and restart the server. If the server now starts, you might have installed more devices than the power supply supports.
	6. See "Solving undetermined problems" on page 86.

The server does not turn off.	1. Determine whether you are using an Advanced Configuration and Power Interface (ACPI) or a non-ACPI operating system. If you are using a non-ACPI operating system, complete the following steps:
	  a. Press Ctrl+Alt+Delete.
	  b. Turn off the server by holding the power-control button for 5 seconds.
	  c. Restart the server.
	  d. If the server fails POST and the power-control button does not work, disconnect the ac power cord for 20 seconds; then, reconnect the ac power cord and restart the server.
	2. (Trained service technician only) If the problem remains or if you are using an ACPI-aware operating system, suspect the system board.

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**	
• **See Chapter 3, "Parts listing, System x3400 Types 7973, 7974, 7975 and 7976," on page 89 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**	
• **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**	

Symptom	Action
The server unexpectedly shuts down, and the LEDs on the control-panel assembly are not lit.	See "Solving undetermined problems" on page 86.

Serial port problems

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**	
• **See Chapter 3, "Parts listing, System x3400 Types 7973, 7974, 7975 and 7976," on page 89 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**	
• **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**	

Symptom	Action

The number of serial ports that are identified by the operating system is less than the number of installed serial ports.	1. Make sure that:
	   • Each port is assigned a unique address in the Configuration/Setup Utility program and none of the serial ports is disabled.
	   • The serial port adapter (if one is present) is seated correctly.
	2. Reseat the serial port adapter.
	3. Replace the serial port adapter.

A serial device does not work.	1. Make sure that:
	   • The device is compatible with the server.
	   • The serial port is enabled and is assigned a unique address.
	   • The device is connected to the correct connector (see "Internal connectors, LEDs, and switches" on page 11).
	2. Reseat the following components:
	   a. Failing serial device
	   b. Serial cable
	   c. Remote Supervisor Adapter II SlimLine (if one is present)
	3. Replace the following components one at a time, in the order shown, restarting the server each time:
	   a. Failing serial device
	   b. Serial cable
	   c. Remote Supervisor Adapter II SlimLine (if one is present)
	   d. (Trained service technician only) System board

ServerGuide problems

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**	
• **See Chapter 3, "Parts listing, System x3400 Types 7973, 7974, 7975 and 7976," on page 89 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**	
• **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**	

Symptom	Action
The *ServerGuide Setup and Installation* CD will not start.	• Make sure that the server supports the ServerGuide program and has a startable (bootable) CD or DVD drive. • If the startup (boot) sequence settings have been changed, make sure that the CD or DVD drive is first in the startup sequence. • If more than one CD or DVD drive is installed, make sure that only one drive is set as the primary drive. Start the CD from the primary drive.
The ServeRAID program cannot view all installed drives, or the operating system cannot be installed.	• Make sure that there are no duplicate IRQ assignments. • Make sure that the hard disk drive is connected correctly.
The operating-system installation program continuously loops.	Make more space available on the hard disk.
The ServerGuide program will not start the operating-system CD.	Make sure that the operating-system CD is supported by the ServerGuide program. See the *ServerGuide Setup and Installation* CD label for a list of supported operating-system versions.
The operating system cannot be installed; the option is not available.	Make sure that the operating system is supported on the server. If the operating system is supported, no logical drive is defined (RAID servers). Run the ServerGuide program and make sure that setup is complete.

Software problems

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**	
• **See Chapter 3, "Parts listing, System x3400 Types 7973, 7974, 7975 and 7976," on page 89 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**	
• **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**	

Symptom	Action

You suspect a software problem.	1. To determine whether the problem is caused by the software, make sure that:
	  • The server has the minimum memory that is needed to use the software. For memory requirements, see the information that comes with the software. If you have just installed an adapter or memory, the server might have a memory-address conflict.
	  • The software is designed to operate on the server.
	  • Other software works on the server.
	  • The software works on another server.
	2. If you received any error messages when using the software, see the information that comes with the software for a description of the messages and suggested solutions to the problem.
	3. Contact your place of purchase of the software.

Server boot failure problem

Use the following procedure when the server fails to boot and there are no video symptoms.

1. Do the Power Supply LEDs indicate an error?
   - Yes - See "Power-supply LEDs" on page 58.
   - No - Go to step 2.
2. Do the PCI LED or microprocessor LED indicate an error?
   - Yes - Make sure there is a ServeRAID 8k or ServeRAID 8k-l installed in the server.
   - No - Go to step 3.
3. Reseat all system board connectors, cables, memory, and microprocessors.
   Retest the server with the following minimum configuration:
   - One microprocessor
   - Two 512 MB DIMMs
   - One power supply
   - Power backplane
   - Power cord
   - ServeRAID SAS adapter
   - System board assembly

   Did the no boot symptom remain?
   - Yes - Go to step 4.
   - No - The problem has been corrected.
4. Remove all of the memory DIMMs installed in the server; then, restart sever and check for the following:
   - A memory beep error during POST.
   - One or more fans running

   Did POST generate a memory beep error and one or more fans are running?
   - Yes - Most likely a video problem.
   - No- Go to step 5.
5. Clear CMOS; then, retest the server. Did the memory beep error occur?
   - Yes - Reinstall the memory DIMMs; then, retest the server.
   - No - Go to step 6.
6. Reinstall the memory DIMMs in the server. Did the no boot symptoms remain?
   - Yes - Go to step 7.
   - No - The problem has been corrected.
7. Call IBM Service with the following information:
   - The results you received while performing each step of this procedure
   - A complete list of the hardware inventory of your server.

Universal Serial Bus (USB) port problems

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing, System x3400 Types 7973, 7974, 7975 and 7976," on page 89 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Symptom	Action

A USB device does not work.	1. Run USB diagnostics (see "Running the diagnostic programs" on page 60).
	 2. Make sure that:
	   • The correct USB device driver is installed.
	   • The operating system supports USB devices.
	   • A standard PS/2 keyboard or mouse is not connected to the server. If it is, a USB keyboard or mouse will not work during POST.
	 3. Make sure that the USB configuration options are set correctly in the Configuration/Setup Utility program. (For more information, see the *User's Guide* on the IBM *System x3400 Documentation* CD).
	 4. If you are using a USB hub, disconnect the USB device from the hub and connect it directly to the server.

Error LEDs

The following is an illustration of the system board LEDs.The system board has error LEDs that will help to locate the source of the error. Run the diagnostic programs to find out the cause of the error (see "Running the diagnostic programs" on page 60).
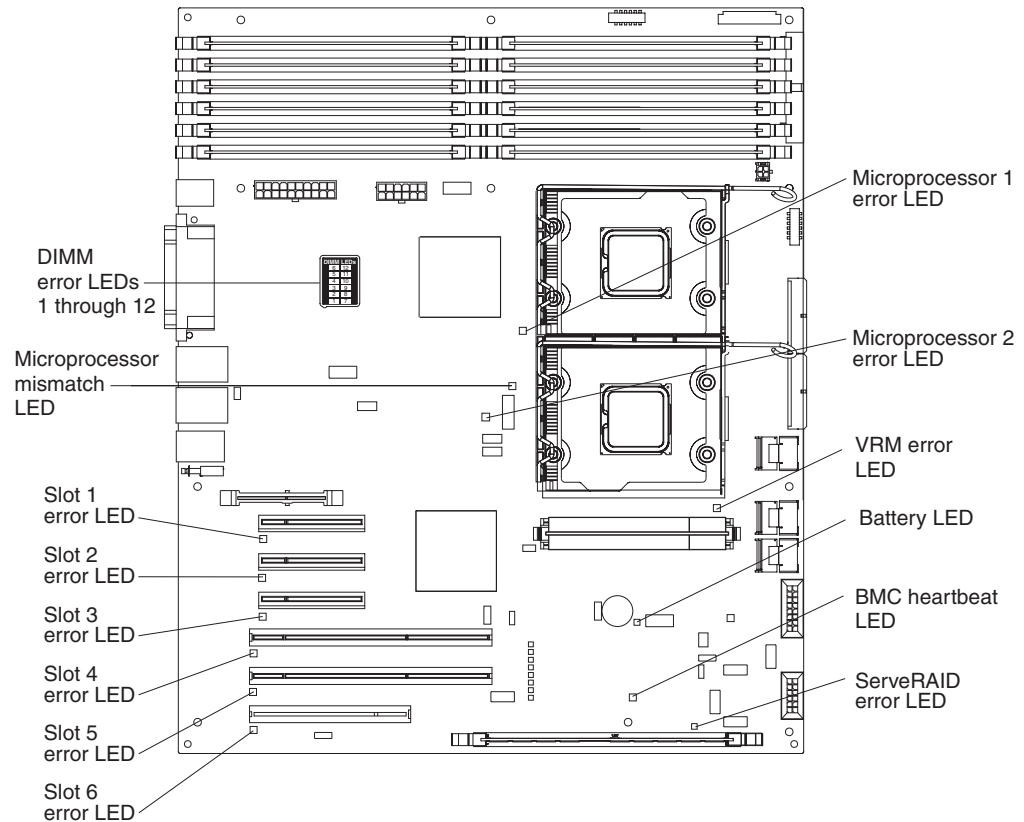
The server is designed so that LEDs remain lit when the server is connected to an ac power source but is not turned on, provided that the power supply is operating correctly. This feature helps you to isolate the problem when the operating system is shut down.

Many errors are first indicated by a lit system-error LED on the control-panel assembly of the server. If this LED is lit, one or more LEDs elsewhere in the server might also be lit and can direct you to the source of the error.

Important: If the system-error LED on the front of the server is lit but there are no other error indications, clear the BMC system event log. This log does not clear itself, and if it begins to fill up, the system-error LED will be lit. Also, after you complete a repair or correct an error, clear the BMC system event log to turn off the system-error LED on the front of the server.

Before working inside the server to view the LEDs, read the safety information that begins on page vii and "Handling static-sensitive devices" on page 103.

If an error occurs, view the server LEDs in the following order:

1. Check the control-panel assembly on the front of the server. If the system-error LED is lit, it indicates that an error has occurred.

2. Check the front and rear of the server to determine whether any component LEDs are lit.

3. Remove the server cover and look inside the server for lit LEDs. Certain components inside the server have LEDs that will be lit to indicate the location of a problem. For example, a DIMM error will light the LED next to the failing DIMM on the system board.

   Look at the system service label on the top of the server, which gives an overview of internal components. This information can often provide enough information to correct the error.

Power-supply LEDs

The following minimum configuration is required for the server to start:
- One microprocessor
- Two 512 MB DIMMs
- One power supply
- Power backplane
- Power cord
- ServeRAID SAS adapter
- System board assembly

The following table describes the problems that are indicated by various combinations of the power-supply LEDs and the power-on LED on the front information panel and suggested actions to correct the detected problems.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing, System x3400 Types 7973, 7974, 7975 and 7976," on page 89 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Power-supply LEDs		Front information panel power-on LED	Description	Action
AC	**DC**			
Off	Off	Off	No power to the server, or a problem with the ac power source.	1. Check the ac power to the server. 2. Make sure that the power cord is connected to a functioning power source. 3. Remove one power supply at a time.
Lit	Off	Off	DC source or power supply power problem.	1. Make sure that the power supply is connected to the power backplane. 2. Remove and replace one power supply at a time. 3. View the system-error log (see "Error logs" on page 22).
Lit	Lit	Off	Standby power problem.	1. View the system-error log (see "Error logs" on page 22). 2. Remove one power supply at a time. 3. (Trained service technician only) Replace the power backplane.
Lit	Lit	Flashing	System power-on problem.	1. View the system-error log (see "Error logs" on page 22). 2. Make sure that the power cables are seated correctly. 3. Press the power-control button on the control-panel. 4. Remove the optional Remote Supervisor Adapter II SlimLine, and try to turn on the server. 5. (Trained service technician only) Reseat the system board. 6. (Trained service technician only) Replace the system board.
Lit	Lit	Lit	The power is good.	No action is necessary.

Diagnostic programs, messages, and error codes

The diagnostic programs are the primary method of testing the major components of the server. As you run the diagnostic programs, text messages and error codes are displayed on the screen and are saved in the test log. A diagnostic text message or error code indicates that a problem has been detected; to determine what action you should take as a result of a message or error code, see the table in "Diagnostic error codes" on page 62.

Running the diagnostic programs

To run the diagnostic programs, complete the following steps:

1. If the server is running, turn off the server and all attached devices.
2. Turn on all attached devices; then, turn on the server.
3. When you see `Press F1 For Configuration/Setup`, press the F1 key.
4. When the Configuration/Setup Utility menu appears, select **Start Options**.
5. From the **Start Options** menu, select **Startup Sequence Options**.
6. Note the device that is selected as the first startup device. Later, you must restore this setting.
7. Select **CD/DVD-ROM** as the first startup device.
8. Press Esc two times to return to the Configuration/Setup Utility menu.
9. Insert the *IBM Enhanced Diagnostics* CD in the CD drive.
10. Select **Save & Exit Setup** and follow the prompts. The diagnostics will load.
11. From the diagnostic programs screen, select the test that you want to run, and follow the instructions on the screen.

    When you are diagnosing hard disk drives, select **SCSI Attached Disk Test** for the most thorough test. Select **Fixed Disk Test** for any of the following situations:

    - You want to run a faster test.
    - The server contains RAID arrays not connected to the onboard SAS/SATA controller.
    - The server contains simple-swap SATA hard disk drives not connected to the integrated SATA controller.

To determine what action you should take as a result of a diagnostic text message or error code, see "Diagnostic error codes" on page 62.

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

A single problem might cause more than one error message. When this happens, correct the cause of the first error message. The other error messages usually will not occur the next time you run the diagnostic programs.

Exception: If there are multiple error codes or LEDs that indicate a microprocessor error, the error might be in a microprocessor or in a microprocessor socket. See "Microprocessor problems" on page 48 for information about diagnosing microprocessor problems.

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

The keyboard and mouse (pointing device) tests assume that a keyboard and mouse are attached to the server. If no mouse or a USB mouse is attached to the server, you cannot use the **Next Cat** and **Prev Cat** buttons to select categories. All other mouse-selectable functions are available through function keys. You can use the regular keyboard test to test a USB keyboard, and you can use the regular mouse test to test a USB mouse. You can run the USB interface test only if no USB devices are attached. The USB test will not run if a Remote Supervisor Adapter II SlimLine is installed.

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

Diagnostic text messages

Diagnostic text messages are displayed while the tests are running. A diagnostic text message contains one of the following results:

Passed: The test was completed without any errors.

Failed: The test detected an error.

User Aborted: You stopped the test before it was completed.

Not Applicable: You attempted to test a device that is not present in the server.

Aborted: The test could not proceed because of the server configuration.

Warning: The test could not be run. There was no failure of the hardware that was being tested, but there might be a hardware failure elsewhere, or another problem prevented the test from running; for example, there might be a configuration problem, or the hardware might be missing or is not being recognized.

The result is followed by an error code or other additional information about the error.

Viewing the test log

To view the test log when the tests are completed, select **Utility** from the top of the screen and then select **View Test Log**. You can also press F3 from the diagnostic menus to view the summary test log. To view the detailed test log, press **Tab** while you are viewing the s summary test log. The test-log data is maintained only while you are running the diagnostic programs. When you exit from the diagnostic programs, the test log is cleared.

To save the test log to a file on a diskette or to the hard disk, click **Save Log** on the diagnostic programs screen and specify a location and name for the saved log file.

Notes:
1. To create and use a diskette, you must add an optional external diskette drive to the server. The diskette drive must be attached when starting the server.
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 can contain other data.

Diagnostic error codes

The following table describes the error codes that the diagnostic programs might generate and suggested actions to correct the detected problems.

If the diagnostic programs generate error codes that are not listed in the table, make sure that the latest levels of BIOS, Remote Supervisor Adapter II SlimLine, and ServeRAID code are installed.

In the error codes, x can be any numeral or letter. However, if the three-digit number in the central position of the code is 000, 195, or 197, *do not* replace a CRU or FRU. These numbers appearing in the central position of the code have the following meanings:

000 The server passed the test. Do not replace a CRU or FRU.

195 The Esc key was pressed to end the test. Do not replace a CRU or FRU.

197 This is a warning error, but it does not indicate a hardware failure; do not replace a CRU or FRU. Take the action that is indicated in the Action column but *do not replace a CRU or a FRU*. See the description of **Warning** in "Diagnostic text messages" on page 61 for more information.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing, System x3400 Types 7973, 7974, 7975 and 7976," on page 89 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Error code	Description	Action
001-198-000	Test aborted.	1. Check the diagnostic logs for messages that indicate the cause of the error, and take the indicated action. 2. From the diagnostic programs, run Quick Memory Test All Banks; then, if an error is detected, take the indicated action. 3. Reinstall and, if necessary, update the BIOS code on the server; then, run the test again (see "Updating the firmware" on page 185).

001-250-00x	Test failed, where
	• x of 0 = ECC logic on system board
	• x of 1 = ECC logic on DIMM
		1. Check the diagnostic logs for messages that indicate the cause of the error, and take the indicated action.
		2. From the diagnostic programs, run Quick Memory Test All Banks; then, if an error is detected, take the indicated action.
		3. From the diagnostic programs, run the ECC test again; then, if an error is detected, take the indicated action.
		4. Reseat the DIMM.
		5. Replace the following components one at a time, in the order shown, restarting the server each time:
		  a. DIMM
		  b. (Trained service technician only) System board

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing, System x3400 Types 7973, 7974, 7975 and 7976," on page 89 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Error code	Description	Action
001-292-000	Core system: failed/CMOS checksum failed.	Load the BIOS default settings by using the Configuration/Setup Utility program, and run the test again (see "Using the Configuration/Setup Utility program" on page 186).
005-xxx-000	Failed video test.	1. Reseat the video adapter, if one is installed. 2. (Trained service technician only) Replace the system board.
011-xxx-000	Failed COM1 serial port test.	1. Check the loopback plug that is connected to the externalized serial port. 2. Check the cable from the externalized serial port to the system board. 3. (Trained service technician only) Replace the system board.
015-xxx-001	Failed USB test.	(Trained service technician only) Replace the system board.
015-xxx-198	Remote Supervisor Adapter II SlimLine installed *or* USB device connected during USB test.	1. If a Remote Supervisor Adapter II SlimLine is installed as an option, remove it and run the test again. 2. Remove all USB devices and run the test again. 3. (Trained service technician only) Replace the system board.

020-xxx-000	Failed PCI Interface test.	1. Reseat the PCI, PCI-X, or PCI Express adapter.
		2. Replace the following components one at a time, in the order shown, restarting the server each time:
		  a. Adapter
		  b. (Trained service technician only) System board

030-265-001	Communication Error.	1. Update the microcode for the Serial Attached SCSI (SAS)/SATA controller (see "Updating the firmware" on page 185). 2. Update the BIOS code (see "Updating the firmware" on page 185). 3. (Trained service technician only) Replace the system board.
030-266-001	A SAS/SATA Channel Error.	1. Update the microcode for the onboard Serial Attached SCSI (SAS)/SATA controller (see "Updating the firmware" on page 185). 2. Update the BIOS code (see "Updating the firmware" on page 185). 3. (Trained service technician only) Replace the system board.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing, System x3400 Types 7973, 7974, 7975 and 7976," on page 89 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Error code	Description	Action
030-267-001	Central Management Seq error.	1. Update the microcode for the Serial Attached SCSI (SAS)/SATA controller (see "Updating the firmware" on page 185). 2. Update the BIOS code (see "Updating the firmware" on page 185). 3. (Trained service technician only) Replace the system board.

035-002-0nn	ServeRAID interface timeout.	1. Make sure that the ServeRAID controller is configured correctly. Obtain the basic and extended configuration status bytes and see the ServeRAID documentation for more information.
		2. Reseat the following components:
		  a. SAS/SATA hard disk drive backplane cable
		  b. ServeRAID controller
		3. Replace the components listed in step 2 one at a time, in the order shown, restarting the server each time.

035-230-001	Battery Low.	Replace the battery module on the RAID controller.
035-231-001	Abnormal Battery Temperature.	Replace the battery module on the RAID controller.
035-285-001	Adapter Communication Error.	1. Update the RAID controller firmware (see "Updating the firmware" on page 185). 2. Reseat the RAID controller. 3. Replace the RAID controller.
035-286-001	Adapter CPU Test Error.	1. Update the RAID controller firmware (see "Updating the firmware" on page 185). 2. Reseat the RAID controller. 3. Replace the RAID controller.
035-287-001	Adapter Local RAM Test Error.	1. Update the RAID controller firmware (see "Updating the firmware" on page 185). 2. Reseat the RAID controller. 3. Replace the RAID controller.
035-288-001	Adapter NVSRAM Test Error.	1. Update the RAID controller firmware (see "Updating the firmware" on page 185). 2. Reseat the RAID controller. 3. Replace the RAID controller.
035-289-001	Adapter Cache Test Error.	1. Update the RAID controller firmware (see "Updating the firmware" on page 185). 2. Reseat the RAID controller. 3. Replace the RAID controller.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing, System x3400 Types 7973, 7974, 7975 and 7976," on page 89 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Error code	Description	Action
035-292-001	Adapter Parameter Set Error.	1. Update the RAID controller firmware (see "Updating the firmware" on page 185). 2. Reseat the RAID controller. 3. Replace the RAID controller.

075-xxx-000	Failed power supply test.	Reseat the following components:
		1. Hot-swap power supply.
		2. Hot-swap power backplane.
		3. Replace the following components (depending on your model):
		  • Hot-swap power supply
		  • (Trained service technician only) Non-hot-swap power supply

089-xxx-001	Failed microprocessor test.	1. Make sure that the BIOS code is at the latest level.
		2. (Trained service technician only) Reseat microprocessor 1.
		3. Replace the following components one at a time, in the order shown, restarting the server each time.
		  a. (Trained service technician only) Microprocessor 1
		  b. (Trained service technician only) System board

089-xxx-002	Failed optional microprocessor test.	1. Make sure that the BIOS code is at the latest level.
		2. (Trained service technician only) Reseat microprocessor 2.
		3. Replace the following components one at a time, in the order shown, restarting the server each time.
		  a. (Trained service technician only) Microprocessor 2
		  b. (Trained service technician only) System board

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing, System x3400 Types 7973, 7974, 7975 and 7976," on page 89 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Error code	Description	Action
166-051-000	System Management: Failed. Unable to communicate with ASM. It may be busy. Run the test again.	1. Update the firmware (BIOS, service processor, and diagnostics; see "Updating the firmware" on page 185). 2. Run the diagnostic test again. 3. Correct other error conditions (including failed systems-management tests and items that are logged in the Remote Supervisor Adapter II SlimLine system-error log) and retry. 4. Disconnect all server and option power cords from the server, wait 30 seconds, reconnect the power cords, and retry. 5. Reseat the Remote Supervisor Adapter II SlimLine. 6. Replace the Remote Supervisor Adapter II SlimLine.
166-060-000	System Management: Failed. Unable to communicate with ASM. It may be busy. Run the test again.	1. Update the firmware (BIOS, service processor, and diagnostics; see "Updating the firmware" on page 185). 2. Run the diagnostic test again. 3. Correct other error conditions (including failed systems-management tests and items that are logged in the Remote Supervisor Adapter II SlimLine system-error log) and retry. 4. Disconnect all server and option power cords from the server, wait 30 seconds, reconnect the power cords, and retry. 5. Reseat the Remote Supervisor Adapter II SlimLine. 6. Replace the Remote Supervisor Adapter II SlimLine.
166-070-000	System Management: Failed. Unable to communicate with ASM. It may be busy. Run the test again.	1. Update the firmware (BIOS, service processor, and diagnostics; see "Updating the firmware" on page 185). 2. Run the diagnostic test again. 3. Correct other error conditions (including failed systems-management tests and items that are logged in the Remote Supervisor Adapter II SlimLine system-error log) and retry. 4. Disconnect all server and option power cords from the server, wait 30 seconds, reconnect the power cords, and retry. 5. Reseat the Remote Supervisor Adapter II SlimLine. 6. Replace the Remote Supervisor Adapter II SlimLine.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing, System x3400 Types 7973, 7974, 7975 and 7976," on page 89 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Error code	Description	Action
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. Run the diagnostic test again. 2. Correct other error conditions (including other failed systems-management tests and items that are logged in the Remote Supervisor Adapter II SlimLine system-error log) and retry. 3. Disconnect all server and option power cords from the server, wait 30 seconds, reconnect the power cords, and retry. 4. Reseat the Remote Supervisor Adapter II SlimLine. 5. Replace the components listed in step 4 one at a time, in the order shown, restarting the server each time.
166-201-000	ISMP indicates I2C errors on bus X.	(Trained service technician only) Replace the system board.

166-201-001	ISMP indicates I2C errors on bus P.	1. (Trained service technician only) Reseat the power backplane.
		2. Replace the following components one at a time, in the order shown, restarting the server each time:
		  a. (Trained service technician only) Power backplane
		  b. (Trained service technician only) System board

166-201-002	ISMP indicates I2C errors on bus I.	(Trained service technician only) Replace the system board.
166-201-003	ISMP indicates I2C errors on bus C.	(Trained service technician only) Replace the system board.

166-201-004	ISMP indicates I2C errors on bus M.	1. Reseat the DIMM.
		2. Replace the following components one at a time, in the order shown, restarting the server each time:
		  a. DIMM
		  b. (Trained service technician only) System board

166-201-005	ISMP indicates I2C errors on bus S.	1. Reseat the SAS/SATA hard disk drive backplane cables.
		2. Replace the following components one at a time, in the order shown, restarting the server each time:
		  a. SAS/SATA hard disk drive backplane
		  b. System board

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing, System x3400 Types 7973, 7974, 7975 and 7976," on page 89 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Error code	Description	Action

166-201-006	ISMP indicates I2C errors on bus O.	1. (Trained service technician only) Control-panel assembly.
		2. Replace the components one at a time, in the order shown, restarting the server each time:
		  a. (Trained service technician only) Control-panel assembly.
		  b. (Trained service technician only) System board

166-201-007	ISMP indicates I2C errors on bus M0.	1. Reseat the DIMM.
		2. Replace the following components one at a time, in the order shown, restarting the server each time:
		  a. DIMM
		  b. (Trained service technician only) System board

166-201-008	ISMP indicates I2C errors on bus M1.	1. Reseat the DIMM.
		2. Replace the following components one at a time, in the order shown, restarting the server each time:
		  a. DIMM
		  b. (Trained service technician only) System board

166-260-000	ASM restart failure.	1. Disconnect all server and option power cords from the server, wait 30 seconds, reconnect the power cords, and retry. 2. Reseat the Remote Supervisor Adapter II SlimLine. 3. Replace the Remote Supervisor Adapter II SlimLine.
166-342-000	System management BIST indicates failed tests.	1. Disconnect all server and option power cords from the server, wait 30 seconds, reconnect the power cords, and retry. 2. Reseat the Remote Supervisor Adapter II SlimLine. 3. Replace the Remote Supervisor Adapter II SlimLine.
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 the server, wait 30 seconds, reconnect the power cords, and retry. 2. Update the BMC firmware (see "Updating the firmware" on page 185). 3. (Trained service technician only) Replace the system board

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing, System x3400 Types 7973, 7974, 7975 and 7976," on page 89 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Error code	Description	Action
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 the server, wait 30 seconds, reconnect the power cords, and retry. 2. Update the BIOS code, BMC, service processor, and diagnostics firmware (see "Updating the firmware" on page 185).

180-197-000	SCSI ASPI driver not installed.	1. Remove the RAID adapter, if one is installed, and run the test again.
		2. Reseat the SAS/SATA hard disk drive backplane cables.
		3. Replace the following components one at a time, in the order shown, restarting the server each time:
		  a. SAS/SATA hard disk drive backplane
		  b. (Trained service technician only) System board

180-361-003	Failed fan LED test.	1. Reseat the fan.
		2. Replace the following components one at a time, in the order shown, restarting the server each time:
		  a. Fan
		  b. (Trained service technician only) System board

180-xxx-000	Diagnostics LED failure.	Run the diagnostic LED test for the failing LED.

180-xxx-001	Failed front LED panel test.	1. Reseat the control-panel assembly cable.
		2. Replace the following components one at a time, in the order shown, restarting the server each time:
		  a. Control-panel assembly cable
		  b. (Trained service technician only) System board

180-xx-002	Failed diagnostics LED panel test.	1. Reseat the control-panel assembly cable.
		2. Replace the following components one at a time, in the order shown, restarting the server each time:
		  a. Control-panel assembly cable
		  b. (Trained service technician only) System board

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing, System x3400 Types 7973, 7974, 7975 and 7976," on page 89 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Error code	Description	Action

180-xxx-005	Failed SCSI backplane LED test.	1. Reseat the following components:
		  a. SAS/SATA hard disk drive
		  b. SAS/SATA hard disk drive backplane cable
		  c. RAID adapter
		2. Replace the following components one at a time, in the order shown, restarting the server each time:
		  a. SAS/SATA hard disk drive backplane
		  b. SAS/SATA hard disk drive backplane cable
		  c. RAID adapter
		  d. (Trained service technician only) System board

180-xxx-006	Failed memory LED test.	1. Reseat the DIMM.
		2. Replace the following components one at a time, in the order shown, restarting the server each time:
		  a. DIMM
		  b. (Trained service technician only) System board

180-xxx-007	Failed power supply fan LED test.	1. Reseat the power supply.
		2. Replace the following components one at a time, in the order shown, restarting the server each time:
		  a. Power supply
		  b. (Trained service technician only) System board

180-xxx-008	Failed I/O board LED test.	(Trained service technician only) Replace the system board.
180-xxx-009	Failed Active™ PCI LED test.	(Trained service technician only) Replace the system board.
201-198-000	Memory Test Aborted: Could not run the test; suspect system board error.	1. Restart the server. 2. Run the diagnostic test again. 3. Reinstall the diagnostic programs (see "Updating the firmware" on page 185). 4. (Trained service technician only) Replace the system board.
201-198-00n	Memory Test Aborted: Could not run the test. **Note:** n = 1-9 (programming error).	1. Restart the server. 2. Run the diagnostic test again. 3. Reinstall the diagnostic programs (see "Updating the firmware" on page 185).

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing, System x3400 Types 7973, 7974, 7975 and 7976," on page 89 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Error code	Description	Action

201-xxx-n99	Failed memory test.
	Note: n = 1-4 (DIMM pair)
	
	99 = Both DIMMs in the pair failed
		1. Reseat the DIMMs.
		2. Replace the following components one at a time, in the order shown, restarting the server each time:
		  a. DIMM pair
		  b. (Trained service technician only) System board

202-xxx-00n	Failed system cache test.	1. (Trained service technician only) Reseat microprocessor n.
		2. Replace the following components one at a time, in the order shown, restarting the server each time:
		  a. (Trained service technician only) Microprocessor n
		  b. (Trained service technician only) System board

215-xxx-000	Failed CD or DVD test.	1. Run the test again with a different CD or DVD.
		2. Reseat the CD or DVD drive cable.
		3. Replace the following components one at a time, in the order shown, restarting the server each time:
		  a. CD or DVD drive
		  b. (Trained service technician only) System board

217-xxx-000	Failed fixed disk test. **Note:** If RAID is configured, the fixed disk number refers to the RAID logical array.	1. Reseat hard disk drive 1. 2. Replace hard disk drive 1.
217-xxx-001	Failed fixed disk test. **Note:** If RAID is configured, the fixed disk number refers to the RAID logical array.	1. Reseat hard disk drive 2. 2. Replace hard disk drive 2.
217-xxx-002	Failed fixed disk test. **Note:** If RAID is configured, the fixed disk number refers to the RAID logical array.	1. Reseat hard disk drive 3. 2. Replace hard disk drive 3.
217-xxx-003	Failed fixed disk test. **Note:** If RAID is configured, the fixed disk number refers to the RAID logical array.	1. Reseat hard disk drive 4. 2. Replace hard disk drive 4.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing, System x3400 Types 7973, 7974, 7975 and 7976," on page 89 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

| Error code	Description	Action

217-198-xxx	Could not establish drive parameters.	1. Reseat the following components, depending on the server model:
		   • Hot-swap models:
		     a. Hard disk drive
		     b. Hard disk drive cable
		     c. SAS/SATA controller cable
		     d. SAS/SATA controller
		   • Simple-swap models:
		     a. Hard disk drive
		     b. Hard disk drive cable
		2. Replace the following components one at a time, depending on the server model, in the order shown, restarting the server each time:
		   • Hot-swap models:
		     a. Hard disk drive
		     b. SAS/SATA controller cable
		     c. SAS/SATA backplane
		     d. SAS/SATA controller
		   • Simple-swap and non-hot-swap models:
		     a. Hard disk drive
		     b. Hard disk drive cable
		3. (Trained service technician only) Replace the system board.

301-xxx-000	Failed keyboard test.
	Note: After installing a USB keyboard, you might have to use the Configuration/Setup Utility program to enable keyboardless operation and prevent the POST error message 301 from being displayed during startup.
		1. Reseat the keyboard cable.
		2. Replace the following components one at a time, in the order shown, restarting the server each time:
		   a. Keyboard
		   b. (Trained service technician only) System board

302-xxx-xxx	Failed mouse test.	1. Reseat the mouse cable.
		2. Replace the following components one at a time, in the order shown, restarting the server each time:
		   a. Mouse
		   b. (Trained service technician only) System board

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing, System x3400 Types 7973, 7974, 7975 and 7976," on page 89 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Error code	Description	Action

305-xxx-xxx	Failed video monitor test.	1. Reseat the monitor cable.
		2. Replace the following components one at a time, in the order shown, restarting the server each time:
		  a. Monitor
		  b. (Trained service technician only) System board

405-xxx-000	Failed Ethernet test on controller on the system board.	1. Run the Configuration/Setup Utility program. Make sure that:
		  • The Ethernet adapter is not disabled.
		  • The BIOS code is at the latest level.
		2. Run the loopback diagnostic.
		3. (Trained service technician only) Replace the system board.

Recovering from a BIOS update failure

If power to the server is interrupted while BIOS code is being updated, the server might not restart correctly or might not display video. If this happens, complete the following steps to recover:

1. Read the safety information that begins on page vii and "Handling static-sensitive devices" on page 103.
2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.
3. Unlock and remove the side cover (see "Removing the side cover" on page 108).
4. Locate pin 1 of the boot block recovery switch SW4 on the system board, and remove any adapters that impede access to the switch (see "Removing an adapter" on page 110).

SW4 (Boot block/Clear CMOS)
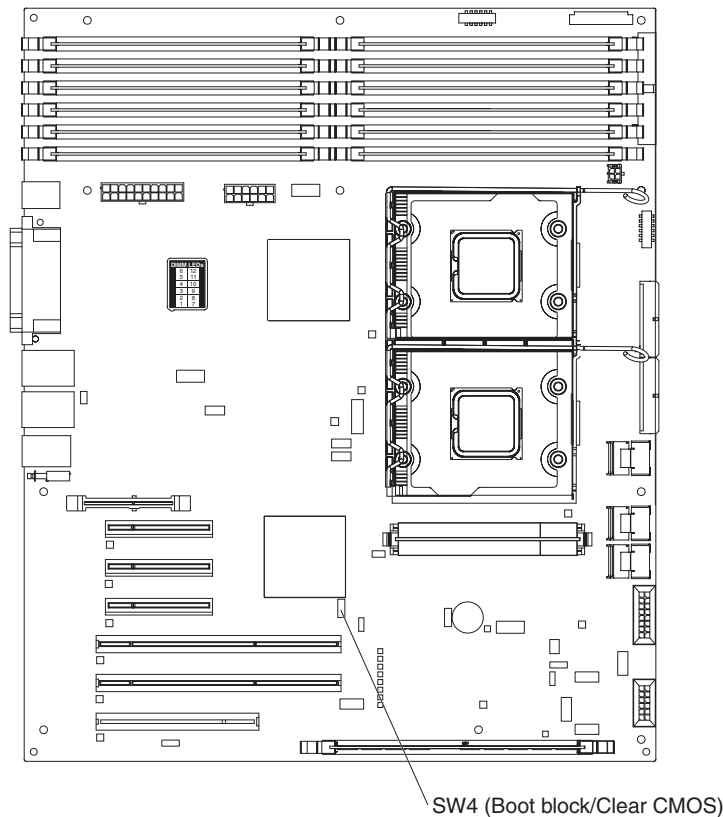
5. Toggle pin 1 of the boot block recovery switch SW4 to **On**.
6. Replace any adapters that you removed (see "Installing an adapter" on page 111); then, install the side cover (see "Installing the side cover" on page 109).
7. Reconnect all external cables and power cords.
8. Insert the update CD into the CD or DVD drive.
9. Turn on the server and the monitor.

   After the update session is completed, remove the CD from the drive and turn off the server.

10. Disconnect all power cords and external cables.
11. Remove the side cover (see "Removing the side cover" on page 108).
12. Remove any adapters that impede access to the boot block recovery switch SW4 (see "Removing an adapter" on page 110).

13. Toggle the boot block recovery switch SW4 to **1**.
14. Replace any adapters that you removed (see "Installing an adapter" on page 111); then, install the side cover (see "Installing the side cover" on page 109).
15. Lock the side cover if it was unlocked during removal.
16. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

The following table describes the function of each pin on the SW4 switch (Boot block/Clear CMOS) on the system board.

Table 4. System board SW4 switch

Switch pin number	Description
1	Boot block: • When this switch is on **1**, this is normal mode. • When this switch is toggled to **On**, this enables the system to recover if the BIOS code becomes damaged.
2	Clear CMOS: • When this switch is on **2**, this is normal mode. This keeps the CMOS data. • When this switch is toggled to **On**, this clears the CMOS data, which clears the power-on password and administrator password.

System-error log messages

A system-error log is generated only if a Remote Supervisor Adapter II SlimLine is installed. The system-error log can contain messages of three types:

Information Information messages do not require action; they record significant system-level events, such as when the server is started.

Warning Warning messages do not require immediate action; they indicate possible problems, such as when the recommended maximum ambient temperature is exceeded.

Error Error messages might require action; they indicate system errors, such as when a fan is not detected.

Each message contains date and time information, and it indicates the source of the message (POST/BIOS or the service processor).

Note: The BMC log, which you can view through the Configuration/Setup Utility program, also contains many information, warning, and error messages.

In the following example, the system-error log message indicates that the server was turned on at the recorded time.

```
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
  Date/Time: 2002/05/07 15:52:03
  DMI Type:
  Source: SERVPROC
  Error Code: System Complex Powered Up
  Error Code:
  Error Data:
  Error Data:
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
```

The following table describes the possible system-error log messages and suggested actions to correct the detected problems.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing, System x3400 Types 7973, 7974, 7975 and 7976," on page 89 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

System-error log message	Action
A system NMI was detected	Make sure that the system software is operating correctly and does not conflict with other software; the system software has created a software NMI, or pressing the NMI button has created a service NMI.
Alert accepted by remote system *x*; type:*y*, ID:*z*	Information only.
Alert accepted from system *x*; type:*y*, sender's ID:*z*	Information only.
Alert ID *x* will be retried by sender; when accepted by a remote system, it will have a different ID	Information only.
Alert not accepted by remote system *x*; type:*y*, ID:*z*	Information only.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing, System x3400 Types 7973, 7974, 7975 and 7976," on page 89 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

System-error log message	Action
Alert not accepted from system *x*; type:*y*, sender's ID:*z*	Information only.
ASM Reset -- reason unknown	Information only.
ASM Reset due to *x*, Instruction Fault: *y*	Information only.
ASM Reset due Watchdog timeout	Information only.
ASM Reset was caused by restoring default values	Information only.
ASM Reset was initiated by the user	Information only.
Cable: Service processor not present	1. Check the pins and connectors on the cable that connects the Remote Supervisor Adapter II SlimLine or other service processor adapter to the Remote Supervisor Adapter SlimLine connector on the system board (see "System-board option connectors" on page 13 for the location of the connector). 2. Reseat the cable (both ends) from the Remote Supervisor Adapter II SlimLine or other service processor adapter to the Remote Supervisor Adapter SlimLine connector on the system board.
Configuration error recovery on the Inter-connect network	Information only.

CPU *x* over temperature	1. Make sure that the heat sink has good airflow and is not obstructed.
	2. Reseat the following components:
	  a. Heat sink cable
	  b. (Trained service technician only) Heat sink

DASD controller removal	1. Make sure that the onboard SAS/SATA controller cable is not damaged. 2. Reseat the onboard SAS/SATA controller cable. 3. Replace the onboard SAS/SATA controller cable.
DHCP failure,no IP@ assigned-RETRYING!,rc=*xxx*,count=*yyy*	Information only.
Dialback failed for userid *w*. Could not connect at phone number *x*, *y*, *z*	Information only.
ENET[*eee*] DHCP-HstNme=*a*,DN=*b*,IP@=*ccc.ccc.ccc.ccc* GW@=*ddd.ddd.ddd.ddd*, NMsk=*fff.fff.fff.fff*, DNS1@=*ggg.ggg.ggg.ggg*, DNS2@=*hhh.hhh.hhh.hhh*	Information only.
ENET[*eee*] IP-Cfg:HstName=*x*, IP@=*ccc.ccc.ccc.ccc*, GW@=*ddd.ddd.ddd.ddd*, NetMsk=*fff.fff.fff.fff*	Information only.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing, System x3400 Types 7973, 7974, 7975 and 7976," on page 89 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

System-error log message	Action

Failure reading an I2C device, possible bus failure	1. Reseat the following components:
	   a. AC power cords
	   b. Hot-swap power supplies (if any are installed)
	   c. (Trained service technician only) Power-supply cables on the system board
	2. (Trained service technician only) Replace the system board.

Fan *x* Failure	1. Make sure that fan *x* is not obstructed. 2. Reseat the fan *x* cable. 3. Replace fan *x*.
Fan *x* Outside Recommended Speed	1. Make sure that fan *x* is not obstructed. 2. Reseat the fan *x* cable. 3. Replace fan *x*.
Flash of *x* by *y* via *z* was successful...*w*	Information only.
Flash of *x* via *z* failed for user *z*...*z*	Information only.
Flash succeeded for *x* (address: *y*)	Information only.

Hard Drive *x* Fault	1. Run the diagnostics programs.
	2. Replace hard disk drive *x*.
	3. Replace the following component, depending on the server model:
	   • Hot-swap models: SAS/SATA backplane
	   • Simple-swap: Hard disk drive *x* cable

Hard drive *x* removal detected.	Reseat hard disk drive *x*.
Internal Error CPU Fault	Information only. If the message remains: 1. (Trained service technician only) Reseat the microprocessor. 2. (Trained service technician only) Replace the microprocessor.
Invalid userid or password received. Userid is *w*, *x*, *y*, *z*	Information only.
LAN: Command Mode tamper triggered. Possible break in attempt	Information only.
LAN: Telnet tamper triggered. Possible break in attempt	Information only.
LAN: Web Server tamper delay triggered. Possible break-in attempt	Information only.
LAN: Ethernet interface is no longer active	Information only.
LAN: Ethernet interface is now active	Information only.
No ISMP Gateway defined for the interconnect network. RSA *x* is Assuming the Gateway	Information only.
OS Watchdog response disabled by *x*	Information only.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing, System x3400 Types 7973, 7974, 7975 and 7976," on page 89 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

System-error log message	Action
OS Watchdog response enabled by *x*	Information only.
PFA Alert, see preceding error in system error log	Information only. See the preceding entry in the system-error log.
Possible ASM reset occurred -- reason unknown	Information only.
Power off	Information only.
Power on	Information only.
PPP[*xxx*] PPP-Cfg, Local-IP@=*aaa.aaa.aaa.aaa*, Remote-IP@=*bbb.bbb.bbb.bbb* NetMsk=*ccc.ccc.ccc.ccc*, Auth=*ddd*	Information only.
PPP_1:Client Connected at *xxx* bps	Information only.
PPP_1:User requested to abort PPP interface	Information only.
Received alert from system *x*; type:*y*, sender's ID:*z*	Information only.
Remote access attempt failed	Information only.
Remote access attempt failed. Invalid userid or password received. Userid is '*x*' from WEB browser at IP@=*yyy.yyy.yyy.yyy*	Information only.
Remote access attempt failed. Invalid userid or password received. Userid is '*x*' from CMD mode client at IP@=*yyy.yyy.yyy.yyy*	Information only.
Remote access attempt failed. Invalid userid or password received. Userid is '*x*' from TELNET client at IP@=*yyy.yyy.yyy.yyy*	Information only.
Remote Login Successful. Login ID:	Information only.
Remote Login Successful. Login ID:'*x*' from CMD mode client at IP@=*yyy.yyy.yyy.yyy*	Information only.
Retried alert accepted from system *x*; type:*y*, sender's ID:*z*	Information only.
Retry count exceeded. Incorrect password entered too many times for userid *w, x, y, z*	Information only.
RS485 broadcast from *x* ignored; more than *y* devices present on the RS485 network	Information only.
RS485 connection to system *x* has ended	Information only.
RS485 network overload has cleared; *x* or fewer devices are present on the RS485 network	Information only.
RSA *x* Became the ISMP Gateway	Information only.
Running the backup ASM main application	Information only.
Secondary Device Event[00 *x* UNKNOWN-*y*]	Information only.
Sending alert to remote system *x*; type:*y*, ID:*z*	Information only.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing, System x3400 Types 7973, 7974, 7975 and 7976," on page 89 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

System-error log message	Action
Serial tamper delay triggered. Possible serial port break-in attempt	Information only.
System board is over recommended temperature	1. Make sure that the fans have good airflow and are not obstructed. 2. (Trained service technician only) Replace the system board.
System board is under recommended temperature	1. Make sure that the fans have good airflow and are not obstructed. 2. (Trained service technician only) Replace the system board.
System Complex Powered Down	Information only.
System error log full	Clear the current logs.

System is over recommended voltage for +3.3V	1. Reseat the following components:
	   a. Hot-swap power supplies (if any are installed)
	   b. (Trained service technician only) Power-supply cables on the system board
	2. (Trained service technician only) Replace the system board.

System is over recommended voltage for 1.5V CPU	1. Reseat the following components:
	   a. Hot-swap power supplies (if any are installed)
	   b. (Trained service technician only) Power-supply cables on the system board
	2. (Trained service technician only) Replace the system board.

System is over recommended voltage on the VRM	(Trained service technician only) Reseat the microprocessor.

System is under recommended voltage for +3.3V	1. Reseat the following components:
	   a. Hot-swap power supplies (if any are installed)
	   b. (Trained service technician only) Power-supply cables on the system board
	2. (Trained service technician only) Replace the system board.

System is under recommended voltage for 1.5V CPU	1. Reseat the following components:
	   a. Hot-swap power supplies (if any are installed)
	   b. (Trained service technician only) Power-supply cables on the system board
	2. (Trained service technician only) Replace the system board.

System is under recommended voltage on the VRM	(Trained service technician only) Reseat the microprocessor.
System log 75% full	Clear the current logs.
System log cleared	Information only.
System Memory Error	1. Reseat the DIMMs. 2. Replace the DIMMs.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing, System x3400 Types 7973, 7974, 7975 and 7976," on page 89 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

System-error log message	Action

System over recommended voltage for +12v	1. Reseat the following components:
	    a. Hot-swap power supplies (if any are installed)
	    b. (Trained service technician only) Power-supply cables on the system board
	 2. (Trained service technician only) Replace the system board.

System over recommended voltage on +2.5v	1. Reseat the following components:
	    a. Hot-swap power supplies (if any are installed)
	    b. (Trained service technician only) Power-supply cables on the system board
	 2. (Trained service technician only) Replace the system board.

System over recommended voltage on continuous +5v	1. Reseat the following components:
	    a. Hot-swap power supplies (if any are installed)
	    b. (Trained service technician only) Power-supply cables on the system board
	 2. (Trained service technician only) Replace the system board.

System shut off due to system board under temperature	1. Make sure that the fans have good airflow and are not obstructed. 2. (Trained service technician only) Replace the system board.

System shutoff due to +12v over voltage	1. Reseat the following components:
	    a. Hot-swap power supplies (if any are installed)
	    b. (Trained service technician only) Power-supply cables on the system board
	 2. (Trained service technician only) Replace the system board.

System shutoff due to +12v under voltage	1. Reseat the following components:
	    a. Hot-swap power supplies (if any are installed)
	    b. (Trained service technician only) Power-supply cables on the system board
	 2. (Trained service technician only) Replace the system board.

System shutoff due to +2.5v over voltage	1. Reseat the following components:
	    a. Hot-swap power supplies (if any are installed)
	    b. (Trained service technician only) Power-supply cables on the system board
	 2. (Trained service technician only) Replace the system board.

System shutoff due to +2.5v under voltage	1. Reseat the following components:
	    a. Hot-swap power supplies (if any are installed)
	    b. (Trained service technician only) Power-supply cables on the system board
	 2. (Trained service technician only) Replace the system board.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing, System x3400 Types 7973, 7974, 7975 and 7976," on page 89 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

System-error log message	Action

System shutoff due to +3.3V over voltage	1. Reseat the following components:
	    a. Hot-swap power supplies (if any are installed)
	    b. (Trained service technician only) Power-supply cables on the system board
	2. (Trained service technician only) Replace the system board.

System shutoff due to +3.3V under voltage	1. Reseat the following components:
	    a. Hot-swap power supplies (if any are installed)
	    b. (Trained service technician only) Power-supply cables on the system board
	2. (Trained service technician only) Replace the system board.

System shutoff due to 1.5V CPU over voltage	1. Reseat the following components:
	    a. Hot-swap power supplies (if any are installed)
	    b. (Trained service technician only) Power-supply cables on the system board
	2. (Trained service technician only) Replace the system board.

System shutoff due to 1.5V CPU under voltage	1. Reseat the following components:
	    a. Hot-swap power supplies (if any are installed)
	    b. (Trained service technician only) Power-supply cables on the system board
	2. (Trained service technician only) Replace the system board.

System shutoff due to board over temperature	1. Make sure that all fans have good airflow and are not obstructed. 2. (Trained service technician only) Replace the system board.

System shutoff due to continuous +5v over voltage	1. Reseat the following components:
	    a. Hot-swap power supplies (if any are installed)
	    b. (Trained service technician only) Power-supply cables on the system board
	2. (Trained service technician only) Replace the system board.

System shutoff due to continuous +5v under voltage	1. Reseat the following components:
	    a. Hot-swap power supplies (if any are installed)
	    b. (Trained service technician only) Power-supply cables on the system board
	2. (Trained service technician only) Replace the system board.

System shutoff due to CPU over temperature	1. Make sure that the heat sink has good airflow and is not obstructed.
	2. Reseat the following components:
	    a. Heat sink cable
	    b. (Trained service technician only) Heat sink

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing, System x3400 Types 7973, 7974, 7975 and 7976," on page 89 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

System-error log message	Action

System shutoff due to VRM over voltage	1. (Trained service technician only) Reseat the microprocessor.
	2. Replace the following components one at a time, in the order shown, restarting the server each time:
	    a. (Trained service technician only) Microprocessor
	    b. (Trained service technician only) System board

System shutoff due to VRM under voltage	1. (Trained service technician only) Reseat the microprocessor.
	2. Replace the following components one at a time, in the order shown, restarting the server each time:
	    a. (Trained service technician only) Microprocessor
	    b. (Trained service technician only) System board

System under recommended voltage for +12v	1. Reseat the following components:
	    a. Hot-swap power supplies (if any are installed)
	    b. (Trained service technician only) Power-supply cables on the system board
	2. (Trained service technician only) Replace the system board.

System under recommended voltage on +2.5v	1. Reseat the following components:
	    a. Hot-swap power supplies (if any are installed)
	    b. (Trained service technician only) Power-supply cables on the system board
	2. (Trained service technician only) Replace the system board.

System under recommended voltage on continuous +5v	1. Reseat the following components:
	    a. Hot-swap power supplies (if any are installed)
	    b. (Trained service technician only) Power-supply cables on the system board
	2. (Trained service technician only) Replace the system board.

System *x* started a RS485 connection with us	Information only.
We started a RS485 connection with remote system *x*	Information only.
We will retry sending alert ID *x*; when accepted by a remote system, it will have a different ID	Information only.
Windows blue screen has been captured	Information only.

Solving SCSI problems

Note: This information also applies to Serial Attached SCSI (SAS) problems.

For any SCSI error message, one or more of the following devices might be causing the problem:
- A failing SCSI device (adapter, drive, or controller)
- An incorrect SCSI termination jumper setting
- A missing or incorrectly installed SCSI terminator
- A defective SCSI terminator
- An incorrectly installed cable
- A defective cable

For any SCSI error message, follow these suggested actions in the order in which they are listed until the problem is solved:
1. Make sure that external SCSI devices are turned on before you turn on the server.
2. Make sure that the cables for all external SCSI devices are connected correctly.
3. If an external SCSI device is attached, make sure that the external SCSI termination is set to automatic.
4. Make sure that the last device in each SCSI chain is terminated correctly.
5. Make sure that the SCSI devices are configured correctly.

Solving power problems

Power problems can be difficult to solve. For example, a short circuit can exist anywhere on any of the power distribution buses. Usually, a short circuit will cause the power subsystem to shut down because of an overcurrent condition. To diagnose a power problem, use the following general procedure:
1. Turn off the server and disconnect all ac power cords.
2. Check for loose cables in the power subsystem. Also check for short circuits, for example, if a loose screw is causing a short circuit on a circuit board.
3. Remove the adapters and disconnect the cables and power cords to all internal and external devices until the server is at the minimum configuration that is required for the server to start (see "Solving undetermined problems" on page 86 for the minimum configuration).
4. Reconnect all ac power cords and turn on the server. If the server starts successfully, replace the adapters and devices one at a time until the problem is isolated.

If the server does not start from the minimum configuration, replace the components in the minimum configuration one at a time until the problem is isolated.

Solving Ethernet controller problems

The method that you use to test the Ethernet controller depends on which operating system you are using. See the operating-system documentation for information about Ethernet controllers, and see the Ethernet controller device-driver readme file.

Try the following procedures:
- Make sure that the correct device drivers, which come with the server are installed and that they are at the latest level.
- Make sure that the Ethernet cable is installed correctly.
  - The 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 servers (without a hub), or if you are not using a hub with X ports, use a crossover cable. 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 whether the hub supports auto-negotiation. If it does not, try configuring the integrated Ethernet controller manually to match the speed and duplex mode of the hub.
- Check the Ethernet controller LEDs on the rear panel of the server. These LEDs indicate whether there is a problem with the connector, cable, or hub.
  - The Ethernet link status LED is lit when the Ethernet controller receives a link pulse from the hub. If the LED is off, there might be a defective connector or cable or a problem with the hub.
  - The Ethernet transmit/receive activity LED is lit 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 installed.
- Check the LAN activity LED on the rear of the server. The LAN activity LED is lit when data is active on the Ethernet network. If the LAN activity LED is off, make sure that the hub and network are operating and that the correct device drivers are installed.
- Check for operating-system-specific causes of 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 but the hardware appears to be working, the network administrator must investigate other possible causes of the error.

Solving undetermined problems

If the diagnostic tests did not diagnose the failure or if the server is inoperative, use the information in this section.

If you suspect that a software problem is causing failures (continuous or intermittent), see "Software problems" on page 54.

Damaged data in CMOS memory or damaged BIOS code can cause undetermined problems. To reset the CMOS data, use the clear CMOS switch to clear the CMOS memory; see "System-board switches" on page 15. If you suspect that the BIOS code is damaged, see "Recovering from a BIOS update failure" on page 74.

Check the LEDs on all the power supplies. If the LEDs indicate that the power supplies are working correctly, complete the following steps:
1. Turn off the server.
2. Make sure that the server is cabled correctly.
3. Remove or disconnect the following devices, one at a time, until you find the failure. Turn on the server and reconfigure it each time.
    *   Any external devices.
    *   Surge-suppressor device (on the server).
    *   Modem, printer, mouse, and non-IBM devices.
    *   Each adapter.
    *   Hard disk drives.
    *   Memory modules. The minimum configuration requirement is two 512 MB DIMM on the system board.
    *   Service processor.

The following minimum configuration is required for the server to start:
*   One microprocessor
*   Two 512 MB DIMM on the system board
*   One power supply
*   Power cord
*   Power backplane
*   ServeRAID SAS adapter
*   System board
4. Turn on the server. If the problem remains, suspect the following components in the following order:
    a. Memory module
    b. Microprocessor
    c. Power backplane
    d. System board

If the problem is solved when you remove an adapter from the server but the problem recurs when you reinstall the same adapter, suspect the adapter; if the problem recurs when you replace the adapter with a different one, suspect the system board.

If you suspect a networking problem and the server passes all the system tests, suspect a network cabling problem that is external to the server.

Calling IBM for service

See "Getting help and technical assistance," on page 195 for information about calling IBM for service.

When you call for service, have as much of the following information available as possible:
- Machine type and model
- Microprocessor and hard disk drive upgrades
- Failure symptoms
  - Does the server fail the diagnostic programs? If so, what are the error codes?
  - What occurs? When? Where?
  - Is the failure repeatable?
  - Has the current server configuration ever worked?
  - What changes, if any, were made before it failed?
  - Is this the original reported failure, or has this failure been reported before?
- Diagnostic program type and version level
- Hardware configuration (print screen of the system summary)
- BIOS code level
- Operating-system type and version level

You can solve some problems by comparing the configuration and software setups between working and nonworking servers. When you compare servers to each other for diagnostic purposes, consider them identical only if all the following factors are exactly the same in all the servers:
- Machine type and model
- BIOS level
- Adapters and attachments, in the same locations
- Address jumpers, terminators, and cabling
- Software versions and levels
- Memory amount, type and configuration
- Diagnostic program type and version level
- Configuration option settings
- Operating-system control-file setup

Chapter 3. Parts listing, System x3400 Types 7973, 7974, 7975 and 7976

The following replaceable components are available for the System x3400 Types 7973, 7974, 7975, and 7976 servers. To check for an updated parts listing on the Web, complete the following steps:

1. Go to http://www.ibm.com/support/.
2. Under **Search technical support** type 7973,7974,7975, or 7976 (depending on your model) and click **Search**.
3. Under **Document type**, select **Parts information** and click **Go**.
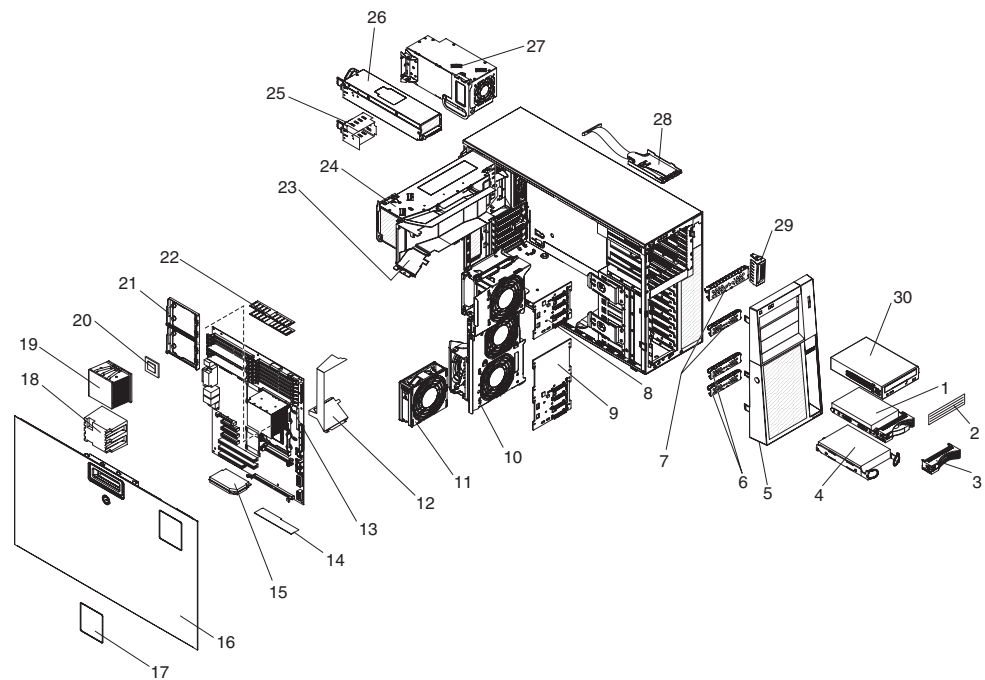
Replaceable server components

Replaceable components are of three types:

- **Tier 1 customer replaceable unit (CRU):** Replacement of Tier 1 CRUs is your responsibility. If IBM installs a Tier 1 CRU at your request, you will be charged for the installation.
- **Tier 2 customer replaceable unit:** You may install a Tier 2 CRU yourself or request IBM to install it, at no additional charge, under the type of warranty service that is designated for your server.
- **Field replaceable unit (FRU):** FRUs must be installed only by trained service technicians.

For information about the terms of the warranty and getting service and assistance, see the *Warranty and Support Information* document on the IBM *System x3400 Documentation* CD.

Table 5. Parts listing, Types 7973, 7974, 7975, 7976 (depending on your model)

Index	Description	CRU part number (Tier 1)	CRU part number (Tier 2)	FRU part number
1	Hard disk drive, 80 GB hard disk drive (type 7973, 7974 optional)	39M4503		
1	Hard disk drive, 160 GB (type 7973, 7974 optional)	39M4507		
1	Hard disk drive, 250 GB (type 7973, 7974 optional)	39M4511		
1	Hard disk drive, 500 GB (type 7973, 7974 optional)	39M4517		
1	Hard disk drive, 36 GB (type 7975, 7976 optional)	39R7346		
1	Hard disk drive, 73 GB, 10K, SAS, hot-swap (type 7975, 7976 optional)	39R7340		
1	Hard disk drive, 73 GB, 15K, SAS, hot-swap (type 7975 model E2x) type 7976 model E5x)	39R7348		
1	Hard disk drive, 80 GB, 7.2K, SATA hot-swap (type 7975, 7976 optional)	39M4521		
1	Hard disk drive, 146 GB, 10K, SAS, hot-swap (type 7975, 7976 optional)	39R7342		
1	Hard disk drive, 146 GB, 15K, SAS, hot-swap (type 7976 model E7x)	39R7350		
1	Hard disk drive, 160 GB, 7.2K, SATA hot-swap (type 7975, 7976 optional)	39M4525		
1	Hard disk drive, 250 GB, 7.2K, SATA hot-swap (type 7975, 7976 optional)	39M4529		
1	Hard disk drive, 300 GB, 10K, SAS, hot-swap (type 7975, 7976 optional)	39R7344		
1	Hard disk drive, 500 GB, SATA (type 7975, 7976 optional)	39M4533		
2	5.25 inch blank bezel	26K7331		
3	3.5 inch blank bezel	39M4375		
4	SATA hard disk drive (optional, varies)			
5	Front bezel	44E3222		
6	Hard disk drive shields, fixed and rotary (type 7973, 7974)	41Y9125		

Index	Description	CRU part number (Tier 1)	CRU part number (Tier 2)	FRU part number
7	EMC shields • 5.25 inch EMC flange, tower top • 5.25 inch EMC flange, tower bottom	39Y8355		
8	SAS/SATA hot-swap hard disk drive backplane (type 7975, 7976 optional)			44E8783
8	SATA simple-swap hard disk drive backplate (type 7973, 7974)			41Y9078
9	SATA simple-swap backplate, with cable assembly			41Y9078
10	Fan Cage, front	41Y9067		
11	Fan, 120 X 38mm	44E4563		
12	Microprocessor duct	39Y8501		
13	System board with tray			44R5619
14	ServeRAID-8k with battery pack (type 7976, model E7x)		25R8076	
15	Power supply VRM (models AC1, MC1, CTO)	24R2694		
16	Side cover assembly with latch and bezel lock (optional)	39Y8362		
17	Diagnostic panel kit, contains: • Blank label • Diagnostics label • Guide rail assembly • Power button • RAID enable cable	41Y9079		
18	Blank heatsink filler			39M6800
19	Heatsink	40K7438		
20	Microprocessor, 1.6 GHz with heatsink (type 7973, models 42x, E4x) (type 7974, model 42x) (type 7975, 7976, models 42x, 4Ax) (type 7975, model E1x) (type 7976, models E1x, E4x)			41Y4275
20	Microprocessor, 1.6 GHz with heatsink (type 7973, 7974, models B2x) type 7975, models B2x B4x) type 7976, models B2x, B4x, EBx)			43W5174
20	Microprocessor, 1.86 GHz with heatsink (type 7973, 7974, model C2x) (type 7975, models C2x, C4x, ECx) type 7976, models C2x C4x)			43W5175
20	Microprocessor, 1.87 GHz without heatsink (type 7973, 7974, model 2Bx, E5x) (type 7975, 7976, models 2Bx, 2Cx)			46C7741
20	Microprocessor, 1.87 GHz with heatsink (type 7973, 7974, model 52x) (type 7975, 7976, models 52x, 5Ax) type 7976, model E2x)			41Y4276
20	Microprocessor, 2.0 GHz with heatsink (type 7973, 7974, model A2x) (type 7975, 7976, models A2x, ABx, E7x)			44R5644
20	Microprocessor, 2.0 GHz with heatsink (type 7973, models 62x, E3x) (type 7974, model 62x) (type 7975, models 62x, 6Ax, E6x) type 7976, models 62x 6Ax E3x)			41Y4277

Table 5. Parts listing, Types 7973, 7974, 7975, 7976 (depending on your model) (continued)

Index	Description	CRU part number (Tier 1)	CRU part number (Tier 2)	FRU part number
20	Microprocessor, 2.0 GHz with heatsink (type 7973, 7974, model F2x) (type 7975, 7976, models F2x, F4x)			43W5182
20	Microprocessor, 2.33 GHz with heatsink (type 7973, 7974, models D2x, E1x) (type 7974, model D2x) (type 7975, 7976, models D2x, DBx)			44R5645
20	Microprocessor, 2.5 GHz with heatsink (type 7973, 7974, model J2x) (type 7975, 7976, models E2x, E5x, J2x JBx)			44R5646
20	Microprocessor, 2.66 GHz with heatsink (type 7973, 7974, model L2x) (type 7975, 7976, models E6x, L2x, LBx)			44R5647
20	Microprocessor, 3.06 GHz with heatsink (type 7973, 7974 model 12x) (type 7975, 7976 models 14x, 16x)			41Y8905
20	Microprocessor, 2.33 GHz with heatsink (optional)			41Y4278
20	Microprocessor, 2.67 GHz with heatsink (optional)			41Y4279
20	Microprocessor, 2.83 GHz with heatsink (models AC1, MC1, CTO)			44R5648
20	Microprocessor, 3.0 GHz with heatsink (optional)			41Y4280
21	Retention module, microprocessor	39M6783		
22	Memory, 512 MB PC5300 ECC (type 7973, 7974, models 12x, 2Bx, 42x, 52x, 62x, A2x, B2x, C2x, D2x, E3x, F2x, J2x, L2x) (type 7975, 7976, models 14x, 16x, 2Bx, 2Cx, 42x, 4Ax, 52x, 5Ax, 62x, 6Ax, A2x, ABx, B2x, B4x, C2x, C4x, D2x, DBx, E1x, E2x, E3x, F2x, F4x, J2x, JBx, L2x, LBx)	39M5781		
22	Memory, 1 GB PC5300 ECC (type 7973, models E1x, E4x, E5x) (type 7975, models ECx E2x E6x) type 7976, models E4x, E5x, E6x, E7x, EBx)	39M5784		
22	Memory, 2 GB PC5300 ECC (optional)	39M5790		
22	Memory, 4 GB PC5300 ECC (optional)	41Y2845		
22	Memory, 1 GB DDR2 (optional)	46C7421		
22	Memory, 2 GB DDR2 (optional)	46C7422		
22	Memory, 4 GB DDR2 (optional)	46C7423		
23	DIMM air duct		39Y8499	
24	Power supply cage, hot-swap (type 7975 models 16x, 2Cx, 4Ax, 5Ax, 6Ax, ABx, B2x, C2x, DBx, E1x, ECx, E2x, E6x, JBx, LBx, F4x) (type 7976 models 16x, 2Cx, 4Ax, 5Ax, 6Ax, ABx, B2x, C2x, DBx, JBx, LBx, F4x, E1x, E2x, E3x, E4x, E5x, E6x, E7x, EBx)			24R2738
25	Filler panel, hot-swap power supply (type 7975 models 16x, 2Cx, 4Ax, 5Ax, 6Ax, ABx, B2x, C2x, DBx, E1x, ECx, E2x, E6x, JBx, LBx, F4x) (type 7976 models 16x, 2Cx, 4Ax, 5Ax, 6Ax, ABx, B2x, C2x, DBx, JBx, LBx, F4x, E1x, E2x, E3x, E4x, E5x, E6x, E7x, EBx)			39Y7391

Index	Description	CRU part number (Tier 1)	CRU part number (Tier 2)	FRU part number
26	Power supply, hot-swap 835 W (type 7975 models 16x, 2Cx, 4Ax, 5Ax, 6Ax, ABx, B2x, C2x, DBx, E1x, ECx, E2x, E6x, JBx, LBx, F4x) (type 7976 models 16x, 2Cx, 4Ax, 5Ax, 6Ax, ABx, B2x, C2x, DBx, JBx, LBx, F4x, E1x, E2x, E3x, E4x, E5x, E6x, E7x, EBx)	24R2731		
27	Power supply assembly, non hot-swap 670 W (type 7973, 7974, all models (7975, 7976, models A2x, 14x, 2Bx, 42x, 52x, 62x, B4x, C4x, D2x, F2x, J2x, L2x)	24R2720		
28	Control panel assembly, with bracket and cables	41Y9083		
29	USB mounting bracket for rack (optional)	41Y9068		
30	Half-high DVD (type 7973 models A2x, B2x, C2x, D2x, F2x, J2x, L2x, 12x, 42x, 52x, 62x, E1x, E3x, E4x) (type 7974 models A2x, B2x, C2x, D2x, F2x, J2x, L2x, 12x, 42x, 52x, 62x) (type 7975 models ABx, A2x, B2x, B4x, C2x, C4x, DBx, D2x, F2x, F4x, JBx, J2x, LBx, L2x, 14x, 16x, 4Ax, 42x, 5Ax, 52x, 6Ax, 62x, E1x, ECx, E6x) (type 7976 models ABx, A2x, B2x, B4x, C2x, C4x, DBx, D2x, F2x, F4x, JBx, J2x, LBx, L2x, 14x, 16x, 4Ax, 42x, 5Ax, 52x, 6Ax, 62x, E1x, E2x, E3x, E4x, E5x, E6x, E7x, Bx)	43W4615		
30	Half-high SATA DVD (type 7975, 7976 optional)	43W8466		
30	48x DVD drive (optional)	39M3515		
30	CD-RW/DVD combo drive (type 7973, 7974, optional)	39M3539		
30	CD-RW/DVD combo drive (type 7973 CTO, E5x) (type 7975, 7976, optional)	43W4575		
30	16x DVD drive (type 7973, 7974, model 2Bx) (type 7975, 7976, models 2Bx, 2Cx)	39M3569		
30	48x CD drive (optional)	39M3517		
30	Mulitbunner DVD drive (optional)	39M3519		
30	Combo (CD-RW/DVD-ROM) drive (optional)	39M0135		
30	Half-high CD drive (optional	42C0953		
30	Half-high DVD drive (type 7973, 7974 optional)	42C0951		
30	Half-high DVD drive (type 7975, 7976 optional)	43W4577		
30	Half-high SATA CR-ROM drive (type 7975, 7976 optional)	43W8467		
	3.5/5.25 inch conversion kit (optional)		32P4743	
	ServeRAID 8k-l (type 7975, 7977, all models except E7x)		25R8079	
	System board tray		41Y9077	
	Bottom cover (optional)		41Y9069	
	Side/top cover	39Y8360		
	Alcohol wipe			59P4739
	Adapter, 3U SCSI	43W4325		
	Adapter, iSCSI (optional)	42C1772		
	Adapter, NetXtreme 1000 (optional)	39Y6081		
	Adapter, Qlogic 10 GB SFP+ SR optical transceiver (optional)	49Y4205		

Table 5. Parts listing, Types 7973, 7974, 7975, 7976 (depending on your model) (continued)

Index	Description	CRU part number (Tier 1)	CRU part number (Tier 2)	FRU part number
	Adapter, NetXtreme II 1000 express ethernet (optional)	39Y6070		
	Adapter, NetXtreme SXG (optional)	39Y6090		
	Adapter, NetXtreme dual (optional)	39Y6095		
	Adapter, NetXtreme II 10 GbE fiber ethernet	42C1792		
	Adapter, NetXtreme ECPG (optional)	39Y6100		
	Adapter, Pro 1000 GT ethernet server (optional)	39Y6107		
	Adapter, Peregrine remote service processor (optional)	46M5966		
	Adapter, Qlogic iSCSI single port PCI-E (optional)	39Y6148		
	Adapter, Qlogic 10 GB ethernet//fcocee dual port converged network (type 7975, 7976 optional)	42C1802		
	Adapter, Qlogic 10 GB SFP+SR optical transceiver (type 7975, 7976 optional)	42C1816		
	Adapter, SAS (type 7975, 7976 optional	25R8071		
	Cover, bay		41Y9043	
	DD S/5 tape drive (optional)	40K2553		
	Blower, DIMM blocker			41Y9081
	Cable, diskette drive interposer		39R9343	
	Cable, DVD signal, IDE			13N2466
	Cable, fan harness (type 7975, 7976 optional)		39Y8341	
	Cable, power LED	41Y9082		
	Cable, SAS power (type 7975, 7976)		39Y8508	
	Cable, SAS/SATA 2 drop (type 7975, 7976, models AC1, CTO, MC1)		46C7660	
	Cable redundant rear 120x38 fans (type 7975, 7976 optional)		39Y8401	
	Cable, SAS signal (type 7975, 7976)	46C4006		
	Cable, SCSI (optional)	25R0048		
	Cable, second serial port		42C1053	
	Cable, standard hot-swap	39Y8400		
	Cable, front panel USB		26K7340	
	Chassis			41Y9084
	Fan air duct, rear	39Y8504		
	Fan cage, rear	41Y9067		
	Fan, rear bracket assembly (optional)	41Y9074		
	Feet, stabilizer, front			26K7345
	Filler bezel (optional)	41Y9071		
	ISC31 adapter (optional)	30R5209		
	Foot, system			13N2985
	Keylock, with alike keys (optional)	26K7363		
	Keylock, with random keys (optional)	26K7364		

Index	Description	CRU part number (Tier 1)	CRU part number (Tier 2)	FRU part number
	Mouse, optical wheel	39Y9875		
	Mouse, 3 button USB optical (optional)	40K9203		
	Power adapter, SATA to standard type 7975, 7976 optional)	43W8495		
	Power converter (type 7975, 7976 optional)	44E8879		
	PRO/1000 GT server ethernet adapter, DP (optional)	73P5109		
	PRO/1000 GT server ethernet adapter, QP (optional)	73P5209		
	Rack bezel assembly (optional)	41Y9072		
	SCSI adapter (optional)	39R8750		
	Shield, system board I/O			41Y9076
	Shield kit (optional)		41Y9070	
	Slide kit (optional)		40K6679	
	Software recovery CD kit		43X1420	
	Remote service processor card (type 7973, 7974, optional) (type 7975, models E6x, ECx) (type 7976, models E4x, E6x, EBx)			
	RSA Slimline bracket (optional)	41Y9086		
	SX adapter (optional)	30R5509		
	System service label	39Y8359		
	Thermal grease			41Y9292

Consumable parts are not covered by the IBM Statement of Limited Warranty. The following consumable part for MT 7233 is available for purchase from the retail store.

Table 6. Consumable parts

Description	Part number
Battery, 3.0 volt	33F8354
Battery, ServeRAID-8k (optional)	25R8088

To order a consumable part, complete the following steps:

1. Go to http://www.ibm.com.
2. From **Products** menu, click **Upgrades, accessories & parts**.
3. Click **Obtain maintenance parts**; then, follow the instructions to order the component from the retail store.

Product recovery CDs

Table 7. Product recovery CDs

Description	CRU part number
Microsoft® Windows® 2003 Small Business Server Standard Edition R2 w/SP2, English	44W4028
Microsoft Windows 2003 Small Business Server Standard Edition R2 w/SP2, French	44W4029
Microsoft Windows 2003 Small Business Server Standard Edition R2 w/SP2, Italian	44W4030
Microsoft Windows 2003 Small Business Server Standard Edition R2 w/SP2, German	44W4031
Microsoft Windows 2003 Small Business Server Standard Edition R2 w/SP2, Spanish	44W4032
Microsoft Windows 2003 Small Business Server Standard Edition R2 w/SP2, Korean	44W4033
Microsoft Windows 2003 Small Business Server Standard Edition R2 w/SP2, Traditional Chinese	44W4034
Microsoft Windows 2003 Small Business Server Standard Edition R2 w/SP2, Simplified Chinese	44W4035
Microsoft Windows 2003 Small Business Server Standard Edition R2 w/SP2, Japanese	44W4036
Microsoft Windows 2003 Small Business Server Premium Edition R2 w/SP2,, English	44W4037
Microsoft Windows 2003 Small Business Server Premium Edition R2 w/SP2, French	44W4038
Microsoft Windows 2003 Small Business Server Premium Edition R2 w/SP2, Italian	44W4039
Microsoft Windows 2003 Small Business Server Premium Edition R2 w/SP2, German	44W4040
Microsoft Windows 2003 Small Business Server Premium Edition R2 w/SP2, Spanish	44W4041
Microsoft Windows 2003 Small Business Server Premium Edition R2 w/SP2, Korean	44W4042
Microsoft Windows 2003 Small Business Server Premium Edition R2 w/SP2, Traditional Chinese	44W4043
Microsoft Windows 2003 Small Business Server Premium Edition R2 w/SP2, Simplified Chinese	44W4044
Microsoft Windows 2003 Small Business Server Premium Edition R2 w/SP2, Japanese	44W4045
Microsoft Windows Server 2003 R2 w/SP2 Standard 32 bit Edition 1-4 Processors, English	44W4046
Microsoft Windows Server 2003 R2 w/SP2 32 bit Standard Edition 1-4 Processors, French	44W4047
Microsoft Windows Server 2003 R2 w/SP2 32 bit Standard Edition 1-4 Processors, Italian	44W4048
Microsoft Windows Server 2003 R2 w/SP2 32 bit Standard Edition 1-4 Processors, German	44W4049
Microsoft Windows Server 2003 R2 w/SP2 32 bit Standard Edition 1-4 Processors, Spanish	44W4050

Table 7. Product recovery CDs (continued)

Description	CRU part number
Microsoft Windows Server 2003 R2 w/SP2 32 bit Standard Edition 1-4 Processors, Traditional Chinese	44W4051
Microsoft Windows Server 2003 R2 w/SP2 32 bit Standard Edition 1-4 Processors, Japanese	44W4052
Microsoft Windows Server 2003 R2 w/SP2 32 bit Standard Edition 1-4 Processors, Simplified Chinese	44W4053
Microsoft Windows Server 2003 R2 w/SP2 32 bit Standard Edition 1-4 Processors, Korean	44W4054
Microsoft Windows Server 2003 R2 w/SP2 Standard 64 bitEdition 1-4 Processors, English	44W4055
Microsoft Windows Server 2003 R2 w/SP2 Standard 64 bit Edition 1-4 Processors, Japanese	44W4056
Microsoft Windows Server 2003 R2 w/SP2 Enterprise 32 bit Edition 1-2 Processors, English	44W4057
Microsoft Windows Server 2003 R2 w/SP2 32 bit Enterprise Edition 1-2 Processors, French	44W4058
Microsoft Windows Server 2003 R2 w/SP2 32 bit Enterprise Edition 1-2 Processors, German	44W4059
Microsoft Windows Server 2003 R2 w/SP2 32 bit Enterprise Edition 1-2 Processors, Spanish	44W4060
Microsoft Windows Server 2003 R2 w/SP2 32 bit Enterprise Edition 1-2 Processors, Simplified Chinese	44W4061
Microsoft Windows Server 2003 R2 w/SP2 32 bit Enterprise Edition 1-2 Processors, Traditional Chinese	44W4062
Microsoft Windows Server 2003 R2 w/SP2 32 bit Enterprise Edition 1-2 Processors, Japanese	44W4063
Microsoft Windows Server 2003 R2 w/SP2 Enterprise 32 bit Edition 1-2 Processors, Korean	44W4064
Microsoft Windows Server 2003 R2 w/SP2 Enterprise 32 bit Edition 1-8 Processors, English	44W4065
Microsoft Windows Server 2003 R2 w/SP2 32 bit Enterprise Edition 1-8 Processors, French	44W4066
Microsoft Windows Server 2003 R2 w/SP2 32 bit Enterprise Edition 1-8 Processors, Italian	44W4067
Microsoft Windows Server 2003 R2 w/SP2 32 bit Enterprise Edition 1-8 Processors, German	44W4068
Microsoft Windows Server 2003 R2 w/SP2 32 bit Enterprise Edition 1-8 Processors, Spanish	44W4069
Microsoft Windows Server 2003 R2 w/SP2 32 bit Enterprise Edition 1-8 Processors, Simplified Chinese	44W4070
Microsoft Windows Server 2003 R2 w/SP2 Enterprise 32 bit Edition 1-8 Processors, Traditional Chinese	44W4071
Microsoft Windows Server 2003 R2 w/SP2 32 bit Enterprise Edition 1-8 Processors, Japanese	44W4072
Microsoft Windows Server 2003 R2 w/SP2 32 bit Enterprise Edition 1-8 Processors, Korean	44W4073

Table 7. Product recovery CDs (continued)

Description	CRU part number
Microsoft Windows Server 2003 R2 w/SP2 Enterprise 64 bit Edition 1-2 Processors, English	44W4074
Microsoft Windows Server 2003 R2 w/SP2 Enterprise 64 bit Edition 1-2 Processors, Japanese	44W4075
Microsoft Windows Server 2003 R2 w/SP2 Enterprise 64 bit Edition 1-8 Processors, English	44W4076
Microsoft Windows Server 2003 R2 w/SP2 Enterprise 64 bit Edition 1-8 Processors, Japanese	44W4077
Microsoft Windows Server 2003 R2 w/SP2 Enterprise 32 bit Edition 1-2 Processors, Italian	44W4078
Microsoft Windows Server 2008 Standard Edition 32/64 bit (1-4 Processor), Multilingual	46C8235
Microsoft Windows Server 2008 Datacenter 32/64 bit, Multilingual	49Y0222
Microsoft Windows Server 2008 Datacenter 32/64 bit, Simplified Chinese	49Y0223
Microsoft Windows Server 2008 Datacenter 32/64 bit, Traditional Chinese	49Y0224
Microsoft Windows Server 2008 Standard Edition 32/64 bit (1-4 Processor), Multilingual	49Y0892
Microsoft Windows Server 2008 Standard Edition 32/64 bit (1-4 Processor), Simplified Chinese	49Y0893
Microsoft Windows Server 2008 Standard Edition 32/64 bit (1-4 Processor), Traditional Chinese	49Y0894
Microsoft Windows Server 2008 Enterprise Edition 32/64 bit (1-8 Processor), Multilingual	49Y0895
Microsoft Windows Server 2008 Enterprise Edition 32/64 bit (1-8 Processor), Simplified Chinese	49Y0896
Microsoft Windows Server 2008 Enterprise Edition 32/64 bit (1-8 Processor), Traditional Chinese	49Y0897

Power cords

For your safety, IBM provides a power cord with a grounded attachment plug to use with this IBM product. To avoid electrical shock, always use the power cord and plug with a properly grounded outlet.

IBM power cords used in the United States and Canada are listed by Underwriter's Laboratories (UL) and certified by the Canadian Standards Association (CSA).

For units intended to be operated at 115 volts: Use a UL-listed and CSA-certified cord set consisting of a minimum 18 AWG, Type SVT or SJT, three-conductor cord, a maximum of 15 feet in length and a parallel blade, grounding-type attachment plug rated 15 amperes, 125 volts.

For units intended to be operated at 230 volts (U.S. use): Use a UL-listed and CSA-certified cord set consisting of a minimum 18 AWG, Type SVT or SJT, three-conductor cord, a maximum of 15 feet in length and a tandem blade, grounding-type attachment plug rated 15 amperes, 250 volts.

For units intended to be operated at 230 volts (outside the U.S.): Use a cord set with a grounding-type attachment plug. The cord set should have the appropriate safety approvals for the country in which the equipment will be installed.

IBM power cords for a specific country or region are usually available only in that country or region.

IBM power cord part number	Used in these countries and regions
39Y8200	China
39Y8128	Australia, Fiji, Kiribati, Nauru, New Zealand, Papua New Guinea
39Y6558	Afghanistan, Albania, Algeria, Andorra, Angola, Armenia, Austria, Azerbaijan, Belarus, Belgium, Benin, Bosnia and Herzegovina, Bulgaria, Burkina Faso, Burundi, Cambodia, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Congo (Democratic Republic of), Congo (Republic of), Cote D'Ivoire (Ivory Coast), Croatia (Republic of), Czech Republic, Dahomey, Djibouti, Egypt, Equatorial Guinea, Eritrea, Estonia, Ethiopia, Finland, France, French Guyana, French Polynesia, Germany, Greece, Guadeloupe, Guinea, Guinea Bissau, Hungary, Iceland, Indonesia, Iran, Kazakhstan, Kyrgyzstan, Laos (People's Democratic Republic of), Latvia, Lebanon, Lithuania, Luxembourg, Macedonia (former Yugoslav Republic of), Madagascar, Mali, Martinique, Mauritania, Mauritius, Mayotte, Moldova (Republic of), Monaco, Mongolia, Morocco, Mozambique, Netherlands, New Caledonia, Niger, Norway, Poland, Portugal, Reunion, Romania, Russian Federation, Rwanda, Sao Tome and Principe, Saudi Arabia, Senegal, Serbia, Slovakia, Slovenia (Republic of), Somalia, Spain, Suriname, Sweden, Syrian Arab Republic, Tajikistan, Tahiti, Togo, Tunisia, Turkey, Turkmenistan, Ukraine, Upper Volta, Uzbekistan, Vanuatu, Vietnam, Wallis and Futuna, Yugoslavia (Federal Republic of), Zaire
39Y8143	Denmark
39Y8167	Bangladesh, Lesotho, Macao, Maldives, Namibia, Nepal, Pakistan, Samoa, South Africa, Sri Lanka, Swaziland, Uganda

IBM power cord part number	Used in these countries and regions
39Y8161	Abu Dhabi, Bahrain, Botswana, Brunei Darussalam, Channel Islands, China (Hong Kong S.A.R.), Cyprus, Dominica, Gambia, Ghana, Grenada, Iraq, Ireland, Jordan, Kenya, Kuwait, Liberia, Malawi, Malaysia, Malta, Myanmar (Burma), Nigeria, Oman, Polynesia, Qatar, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Seychelles, Sierra Leone, Singapore, Sudan, Tanzania (United Republic of), Trinidad and Tobago, United Arab Emirates (Dubai), United Kingdom, Yemen, Zambia, Zimbabwe
39Y8167	Liechtenstein, Switzerland
39Y6561	Chile, Italy, Libyan Arab Jamahiriya
39Y8176	Israel
39Y8242	Antigua and Barbuda, Aruba, Bahamas, Barbados, Belize, Bermuda, Bolivia, Brazil, Caicos Islands, Canada, Cayman Islands, Costa Rica, Colombia, Cuba, Dominican Republic, Ecuador, El Salvador, Guam, Guatemala, Haiti, Honduras, Jamaica, Japan, Mexico, Micronesia (Federal States of), Netherlands Antilles, Nicaragua, Panama, Peru, Philippines, Taiwan, United States of America, Venezuela
39Y8212	Korea (Democratic People's Republic of), Korea (Republic of)
39Y5661	Japan
39Y5639	Argentina, Paraguay, Uruguay
39Y8218	India
39Y8224	Brazil
39Y8236	Antigua and Barbuda, Aruba, Bahamas, Barbados, Belize, Bermuda, Bolivia, Caicos Islands, Canada, Cayman Islands, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Guam, Guatemala, Haiti, Honduras, Jamaica, Mexico, Micronesia (Federal States of), Netherlands Antilles, Nicaragua, Panama, Peru, Philippines, Saudi Arabia, Thailand, Taiwan, United States of America, Venezuela

Chapter 4. Removing and replacing server components

Replaceable components are of three types:

- **Tier 1 customer replaceable unit (CRU):** Replacement of Tier 1 CRUs is your responsibility. If IBM installs a Tier 1 CRU at your request, you will be charged for the installation.
- **Tier 2 customer replaceable unit:** You may install a Tier 2 CRU yourself or request IBM to install it, at no additional charge, under the type of warranty service that is designated for your server.
- **Field replaceable unit (FRU):** FRUs must be installed only by trained service technicians.

See , to determine whether a component is a Tier 1 CRU, Tier 2 CRU, or FRU.

For information about the terms of the warranty and getting service and assistance, see the *Warranty and Support Information* document.

Installation guidelines

Before you remove or replace a component, read the following information:

- Read the safety information that begins on page vii and the guidelines in "Handling static-sensitive devices" on page 103. This information will help you work safely.
- Observe good housekeeping in the area where you are working. Place removed covers and other parts in a safe place.
- If you must start the server while the cover is removed, make sure that no one is near the server and that no other objects have been left inside the server.
- Do not attempt to lift an object that you think is too heavy for you. If you have to lift a heavy object, observe the following precautions:
  – Make sure that you stand safely without slipping.
  – Distribute the weight of the object equally between your feet.
  – Use a slow lifting force. Never move suddenly or twist when you lift a heavy object.
  – To avoid straining the muscles in your back, lift by standing or by pushing up with your leg muscles
- Make sure that you have an adequate number of properly grounded electrical outlets for the server, monitor, and other devices.
- Back up all important data before you make changes to disk drives.
- Have a small flat-blade screwdriver available.
- You do not have to turn off the server to install or replace hot-swap power supplies, hot-swap fans, hot-plug adapters, or hot-plug Universal Serial Bus (USB) devices. However, you must turn off the server before performing any steps that involve removing or installing adapter cables.
- Blue on a component indicates touch points, where you can grip the component to remove it from or install it in the server, open or close a latch, and so on.
- Orange on a component or an orange label on or near a component indicates that the component can be hot-swapped, which means that if the server and operating system support hot-swap capability, you can remove or install the component while the server is running. (Orange can also indicate touch points on hot-swap components.) See the instructions for removing or installing a specific

hot-swap component for any additional procedures that you might have to perform before you remove or install the component.

- When you are finished working on the server, reinstall all safety shields, guards, labels, and ground wires.

- For a list of supported options for the server, see http://www.ibm.com/servers/eserver/serverproven/compat/us/.

System reliability guidelines

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

- Each of the drive bays has a drive or a filler panel and electromagnetic compatibility (EMC) shield installed in it.

- If the server has redundant power, each of the power-supply bays has a power supply installed in it.

- There is adequate space around the server to allow the server cooling system to work properly. Leave approximately 50 mm (2 in.) of open space around the front and rear of the server. Do not place objects in front of the fans. For proper cooling and airflow, replace the server cover before turning on the server. Operating the server for extended periods of time (more than 30 minutes) with the server cover removed might damage server components.

- You have followed the cabling instructions that come with optional adapters.

- You have replaced a failed fan within 48 hours.

- You have replaced a hot-swap drive within 10 minutes of removal.

- You do not run the server without the air baffle installed. Operating the server without the air baffle might cause the microprocessor to overheat.

- The microprocessor socket always contains a microprocessor and heat sink.

- For redundant and hot-swappable operation, the power supplies are connected to 200-240 V ac.

Working inside the server with the power on

Attention: Static electricity that is released to internal server components when the server is powered-on might cause the server to halt, which could result in the loss of data. To avoid this potential problem, always use an electrostatic-discharge wrist strap or other grounding system when working inside the server with the power on.

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

- Avoid wearing 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, necklaces, rings, and loose-fitting wrist watches.

- Remove items from your shirt pocket, such as pens and pencils, that could fall into the server as you lean over it.

- Avoid dropping any metallic objects, such as paper clips, hairpins, and screws, into the server.

Handling static-sensitive devices

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

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

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

Returning a device or component

If you are instructed to return a device or component, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Removing and replacing Tier 1 CRUs

Replacement of Tier 1 CRUs is your responsibility. If IBM installs a Tier 1 CRU at your request, you will be charged for the installation.

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

Removing the bezel

To remove the bezel, complete the following steps:

1. Read the safety information that begins on page vii and "Installation guidelines" on page 101.
2. Unlock the side cover.

   Note: You must unlock the side cover to remove the bezel.
3. Position your finger on the depressed area on the left side of the bezel and rotate the bezel away from the server.
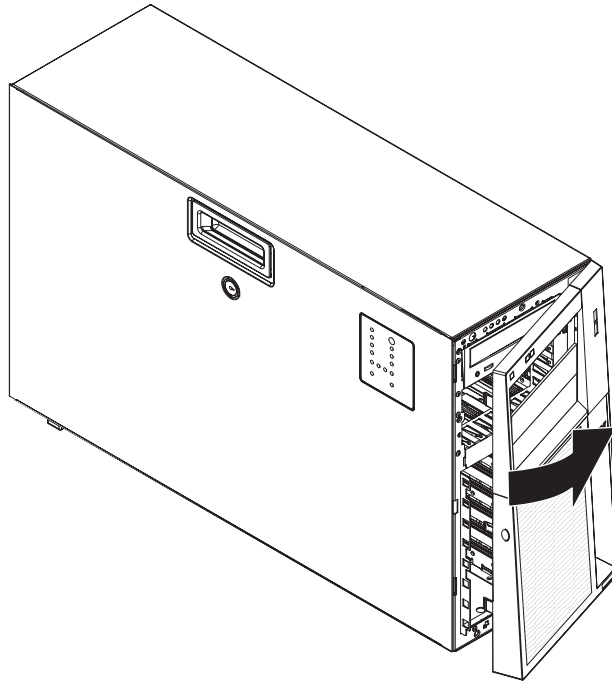
4. Press the retention tabs on the hinge assembly toward each other and pull the hinge assembly out of the chassis.

Retention tabs
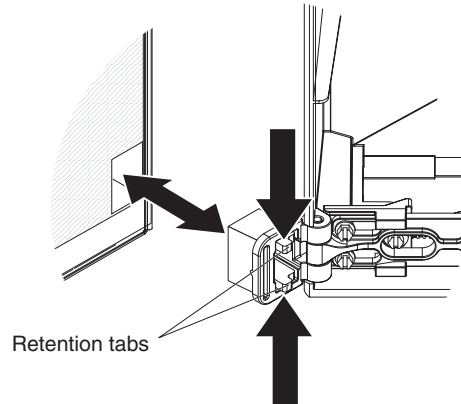
Note: The bezel will also disengage from the chassis hinges if you rotate the bezel beyond 180° or if excessive pressure is applied to the bezel. Do not be alarmed because this is how the bezel was designed. The bezel is designed with breakaway hinges so that you can easily reattach it to the chassis.

Replacing the bezel

To replace the bezel, complete the following steps:

1. Align the hinge assembly with the hinge holes on the chassis.

Bezel

Hinge assembly

Retention tabs
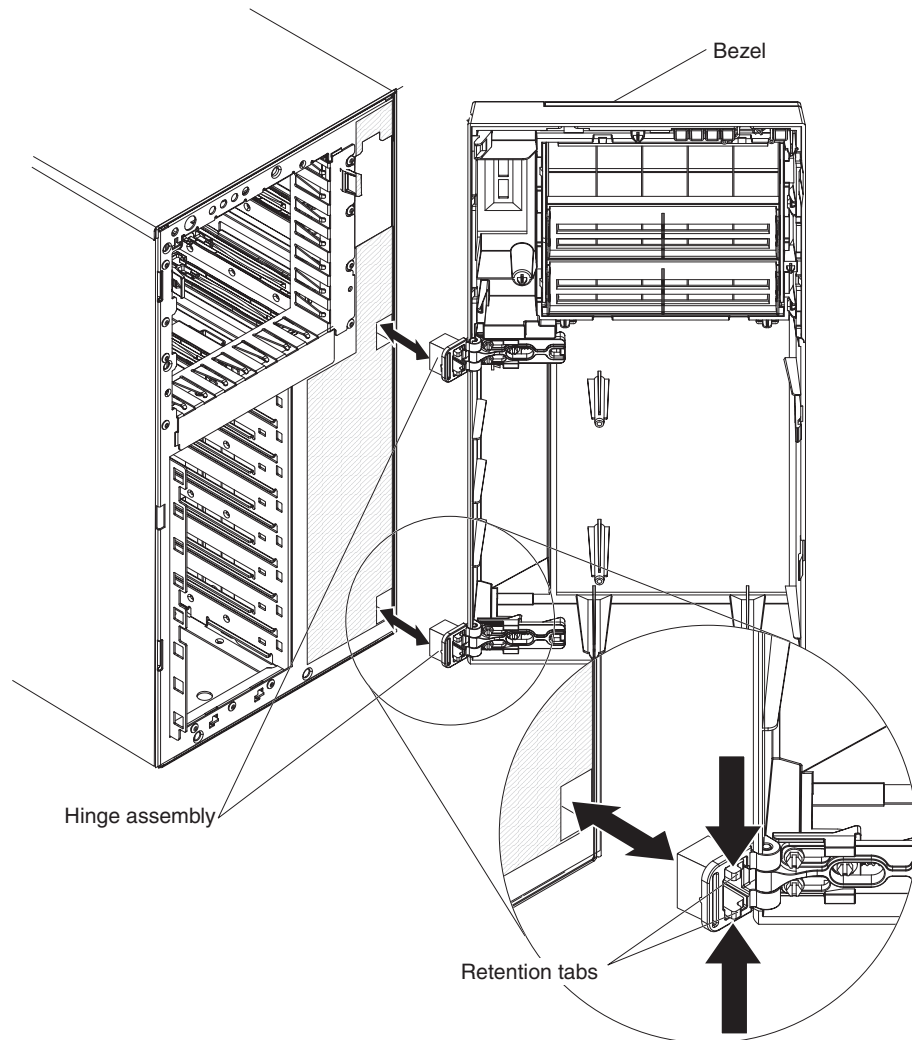
2. Push the hinges into the holes on the chassis until they snap into place.
3. If however, the bezel was removed by detaching the sliding hinge mount from the hinge assembly (using the breakaway method as the bezel was designed to do), complete the following steps to reattach the bezel:

a. Press in on the rear of the sliding hinge mount until it extends beyond the edge of the bezel and hold it in place.

Hinge assembly   Hinge pin   Sliding hinge mount
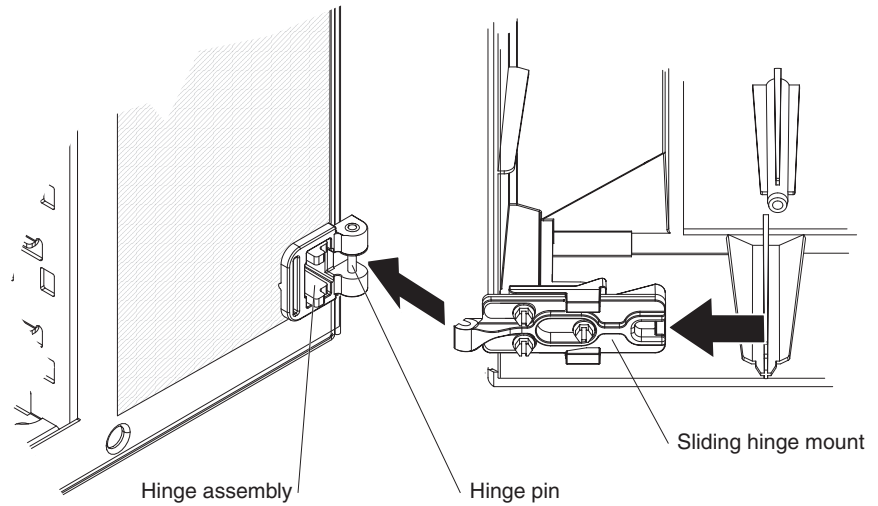
b. Align the sliding hinge mount with the hinge pin on the hinge assembly on the chassis.

c. Press the sliding hinge mount against the hinge pin until the sliding hinge mount snaps onto the hinge pin.

4. Close the bezel.

Removing the side cover

Attention: Operating the server for more than 30 minutes with the side cover removed might damage server components. For proper cooling and airflow, replace the side cover before turning on the server.

To remove the side cover, complete the following steps.
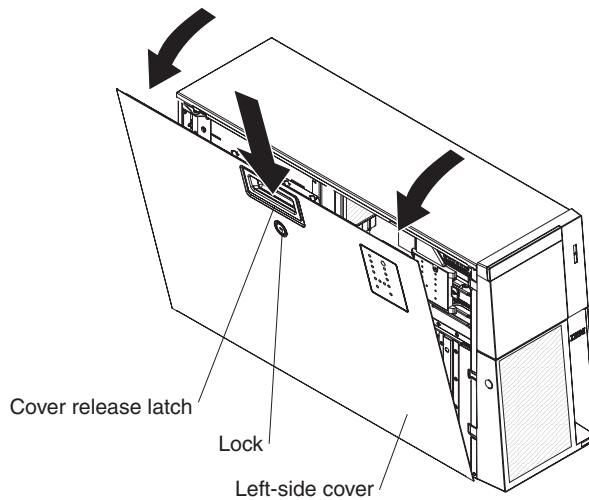
Cover release latch

Lock

Left-side cover

1. Read the safety information that begins on page vii and "Installation guidelines" on page 101.
2. If you are replacing a non-hot-swap component, turn off the server and all attached devices; then, disconnect all power cords and external cables.
3. Unlock the side cover.
4. Press the cover-release latch down, as indicated by the two arrows on the latch, and tilt the top of the side cover away from the chassis.
5. Lift the side cover off the server and set it aside.
6. If you are instructed to return the side cover, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the side cover

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

To install the side cover, complete the following steps.

Cover release latch

Lock

Left-side cover
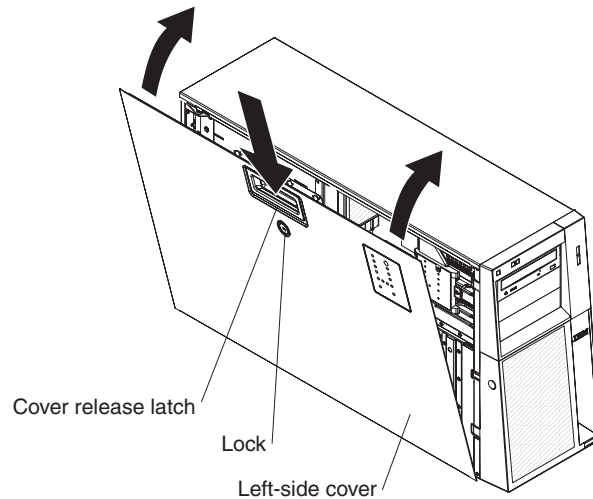
1. Make sure that all cables, adapters, and other components are installed and seated correctly and that you have not left loose tools or parts inside the server. Also, make sure that all internal cables are correctly routed.
2. Insert the bottom edges of the cover into the inside of the chassis and rotate the cover toward the server.
3. Press down on the cover-release latch and close the cover to secure it in place.
4. Lock the side cover.
5. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Removing an adapter

To remove an adapter, complete the following steps.

1. Read the safety information that begins on page vii and "Installation guidelines" on page 101.

2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.

3. Unlock and remove the side cover (see "Removing the side cover" on page 108).

4. Disconnect any cables to the adapter or any cables that impede access to the adapter.

5. Open the rear adapter-retention bracket retention clip and rotate the retention brackets to the open (unlocked) position. If you are removing a full-length adapter, open the front adapter-retention bracket also.

6. Remove the expansion-slot screw at the rear of the adapter (if screws were used).

7. Carefully grasp the adapter by its top edge or upper corners, and pull the adapter from the server.

   Attention: Expansion-slot covers must be installed in all empty slots. This maintains the electronic emissions standards of the computer and ensures proper ventilation of computer components.
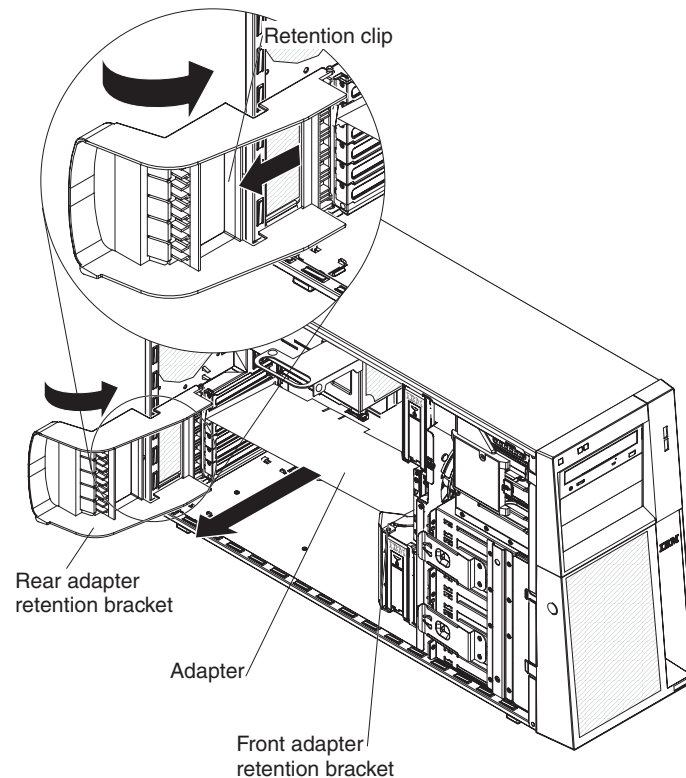
8. If the adapter is not being replaced, install an expansion-slot cover in the expansion-slot opening.

9. If you are instructed to return the adapter, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing an adapter

For information about the types of adapters that the server supports and other information that you might consider when installing an adapter, see the *User's Guide*. See "System-board option connectors" on page 13 for the locations of the expansion slots on the system board.

Note: When you start the server for the first time after installing a Remote Supervisor Adapter II SlimLine, the startup process will take several minutes longer than a typical startup.

To install a replacement adapter, complete the following steps.

1. Check the instructions that come with the adapter for any requirements, restrictions, or cabling instructions. It might be easier to route cables before you install the adapter.
2. Follow the instructions that come with the adapter to set jumpers or switches, if any.
3. Open the rear adapter-retention bracket retention clip and rotate the retention brackets to the open (unlocked) position. If you are installing a full-length adapter, Open the front retention bracket retention clip and rotate the front adapter-retention bracket to the open position.
4. Touch the static-protective package that contains the adapter to any unpainted metal surface on the server. Then, remove the adapter from the static-protective package. Avoid touching the components and gold-edge connectors on the adapter.
5. If you are installing a full-length adapter, remove the blue adapter guide (if any) from the end of the adapter.
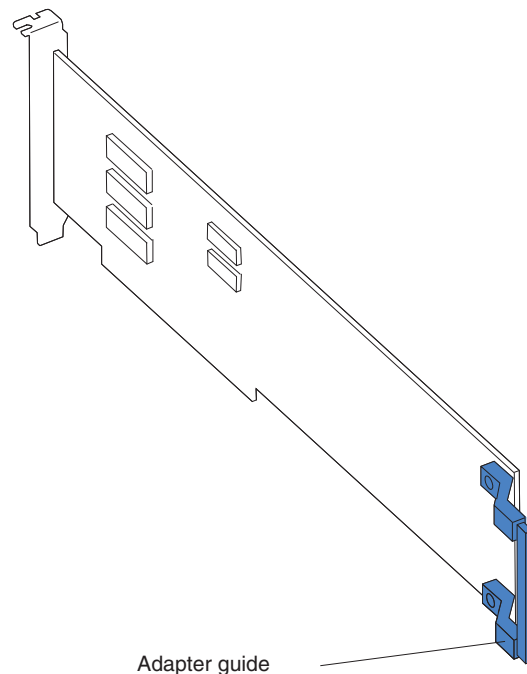
Adapter guide

6. Carefully grasp the adapter by the top edge or upper corner, and move the adapter directly from the static-protective package to the adapter slot. Align the adapter with the expansion slot guides; then, press the adapter firmly into the expansion slot. For a full-length adapter, make sure that the front edge of the adapter is properly seated in the correct slot in the front adapter-retention bracket.

Note: Make sure that the adapter is seated correctly in the expansion slot before you turn on the server. Incomplete installation of an adapter might damage the system board or the adapter.

Rear adapter retention bracket

Adapter

Front adapter retention bracket
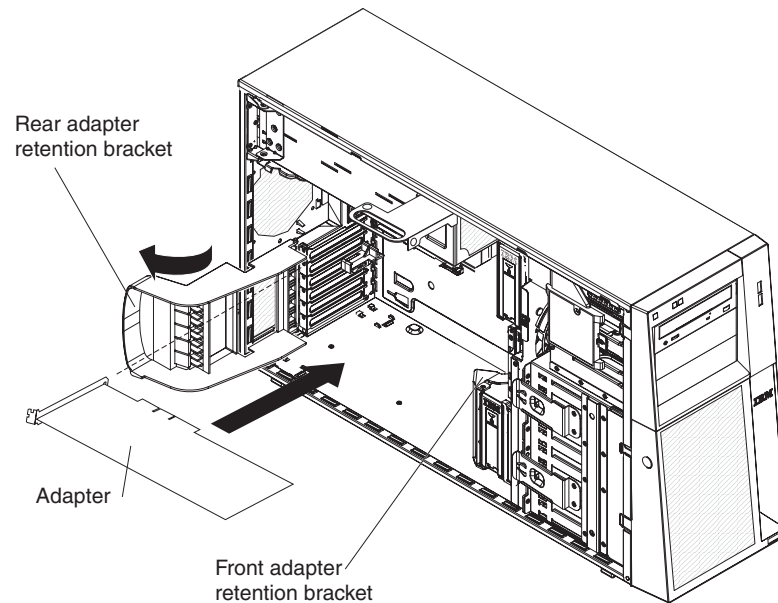
7. Rotate the rear and front adapter-retention brackets to the closed position.
8. Connect required cables to the adapter. Route cables so that they do not block the flow of air from the fans.
9. Install the side cover (see "Installing the side cover" on page 109).
10. Lock the side cover.
11. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Removing and installing internal drives

See the *User's Guide* for information about the types of drives that the server supports. The following figures show the locations of the drive bays in the server.

The following illustration shows the location of the drive bays in the hot-swap server models.
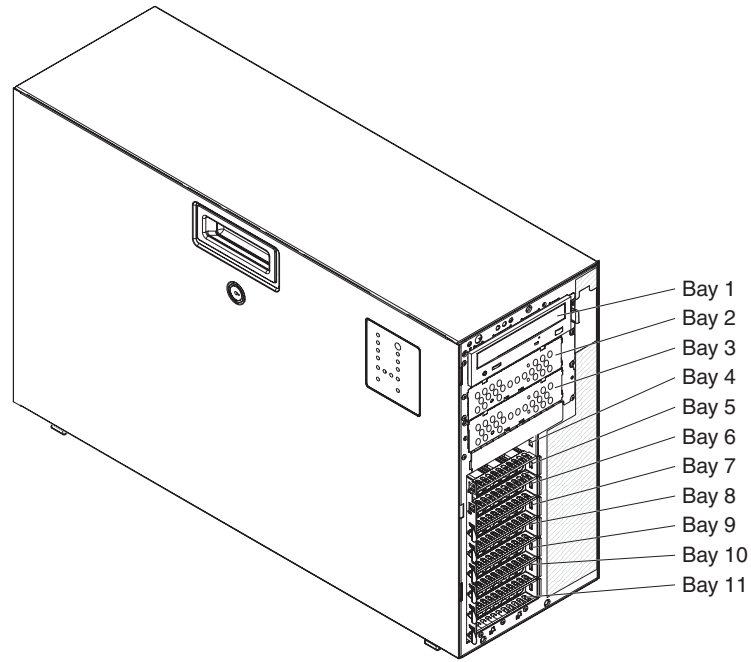
The following illustration shows the location of the drive bays in the simple-swap server models.
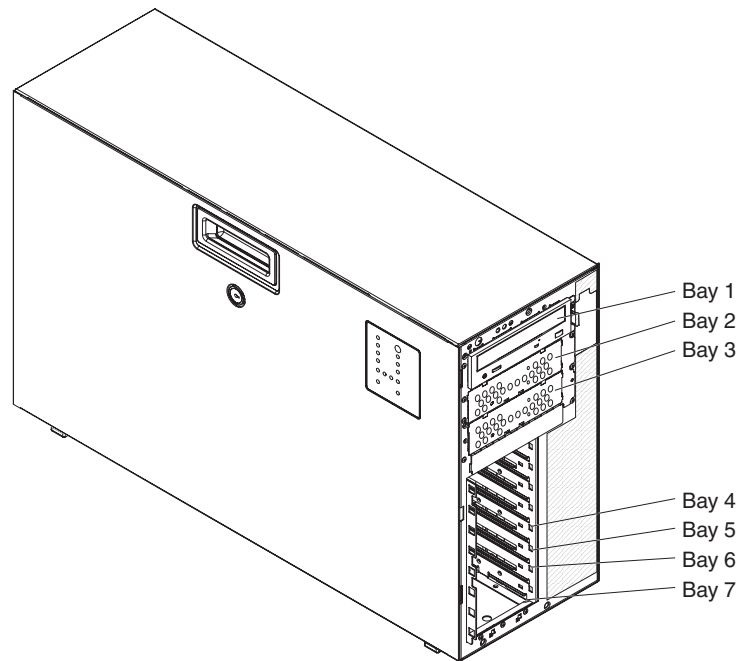
Removing a CD or DVD drive

To remove a CD or DVD drive, complete the following steps.

1. Read the safety information that begins on page vii and "Installation guidelines" on page 101.
2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.
3. Unlock and remove the side cover (see "Removing the side cover" on page 108).
4. Rotate the power-supply cage assembly out of the chassis:
   - Hot-swap models:
     a. Remove the hot-swap power-supply. Press down on the orange release lever and pull the power supply out of the bay, using the handle.
     b. Lift up the power-supply cage handle and pull the power-supply cage assembly all the way up until the retainer latch locks the cage in place on the chassis.
   - Non-hot-swap models, lift up the power-supply cage handle and pull the power-supply cage assembly all the way up until the retainer latch locks the cage in place on the chassis.:
5. Remove the front fan cage assembly (see "Removing the front system fan cage assembly" on page 138.

6. Disconnect the power and signal cables from the drive that is to be removed.
7. Press and hold the blue release buttons on the side of the bay to release the drive; then, pull the drive out of the front of the server.
8. Remove the blue optical drive rails from the side of the drive. Save the optical rails to use when you install the replacement drive.
9. If you are instructed to return the drive, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing a CD or DVD drive

To install a CD or DVD drive, complete the following steps:

1. If you are replacing a removed drive with a new drive, make sure that:
   - You have all the cables and other equipment that is specified in the documentation that comes with the new drive.
   - You check the instructions that come with the new drive to determine whether you must set any switches or jumpers in the drive.
   - You have removed the blue optical drive rails from the side of the old drive and have them available for installation on the new drive.

   Note: If you are installing a drive that contains a laser, observe the following safety precaution.
   Statement 3:

   CAUTION:
   When laser products (such as CD-ROMs, DVD 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.**

   Class 1 Laser Product
   Laser Klasse 1
   Laser Klass 1
   Luokan 1 Laserlaite
   Appareil À Laser de Classe 1

2. Rotate the power-supply cage assembly out of the chassis:
   - Hot-swap models:

a. Remove the hot-swap power-supply. Press down on the orange release lever and pull the power supply out of the bay, using the handle.

b. Lift up the power-supply cage handle and pull the power-supply cage assembly all the way up until the retainer latch locks the cage in place on the chassis.

- Non-hot-swap models, lift up the power-supply cage handle and pull the power-supply cage assembly all the way up until the retainer latch locks the cage in place on the chassis.

3. Remove the front fan cage assembly (see "Removing the front system fan cage assembly" on page 138.
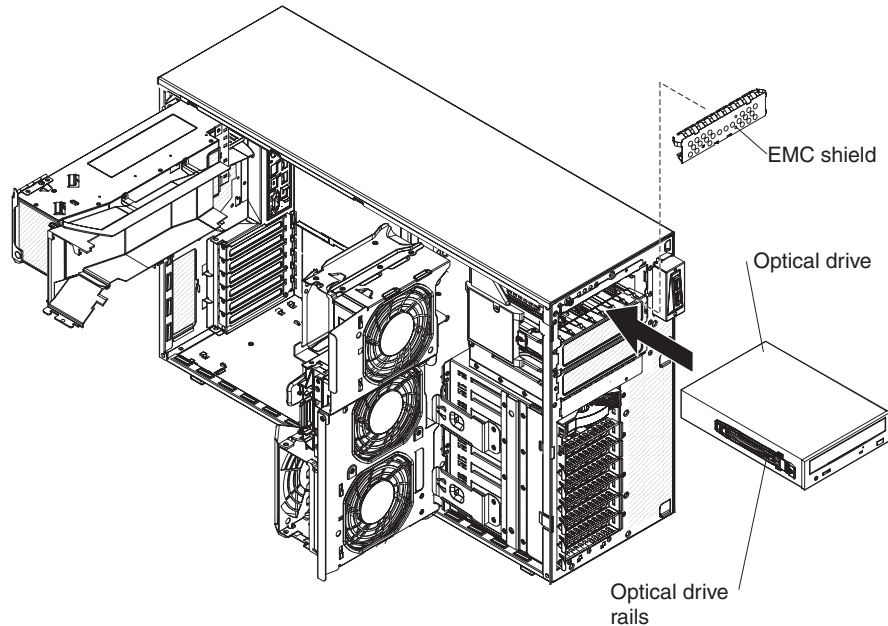
4. Touch the static-protective package that contains the new drive to any unpainted metal surface on the server; then, remove the drive from the package and place it on a static-protective surface.

5. Follow the instructions that come with the drive to set jumpers or switches, if there are any.

    Note: You might find it easier to install the new drive from the front and then attach the cables.

6. Align the holes on the blue optical drive rails with the pins on the side of the drive and snap the optical drive rails onto the drive. Push the drive into the drive bay until it locks into place.

7. Reconnect the power and signal cables to the drive.

    Note: Route the signal cable so that it does not block the airflow to the rear of the drives or over the microprocessor and dual inline memory modules (DIMMs).

8. Press the power-supply cage release tab and rotate the power-supply cage assembly into the chassis until it locks in place.

9. Return the power-supply cage handle to the locked position.

10. If you have a hot-swap model, reinstall the hot-swap power supplies (see "Installing a hot-swap power supply" on page 126).

11. Install the side cover (see "Installing the side cover" on page 109).

12. Lock the side cover.

13. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Removing an optional tape drive

To remove an optional full-high tape drive, complete the following steps:

1. Read the safety information that begins on page vii and "Installation guidelines" on page 101.

2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.

3. Unlock and remove the side cover.

4. Remove the side cover (see "Removing the side cover" on page 108).

5. Remove the bezel (see "Removing the bezel" on page 104.

6. Rotate the power-supply cage assembly out of the chassis:

   - Hot-swap models:

     a. Remove the hot-swap power-supply. Press down on the orange release lever and pull the power supply out of the bay, using the handle.

     b. Lift up the power-supply cage handle and pull the power-supply cage assembly all the way up until the retainer latch locks the cage in place on the chassis.

   - Non-hot-swap models, lift up the power-supply cage handle and pull the power-supply cage assembly all the way up until the retainer latch locks the cage in place on the chassis.:

7. Remove the front fan cage assembly (see "Removing the front system fan cage assembly" on page 138.

Fan cage assembly release buttons

Fan cage assembly
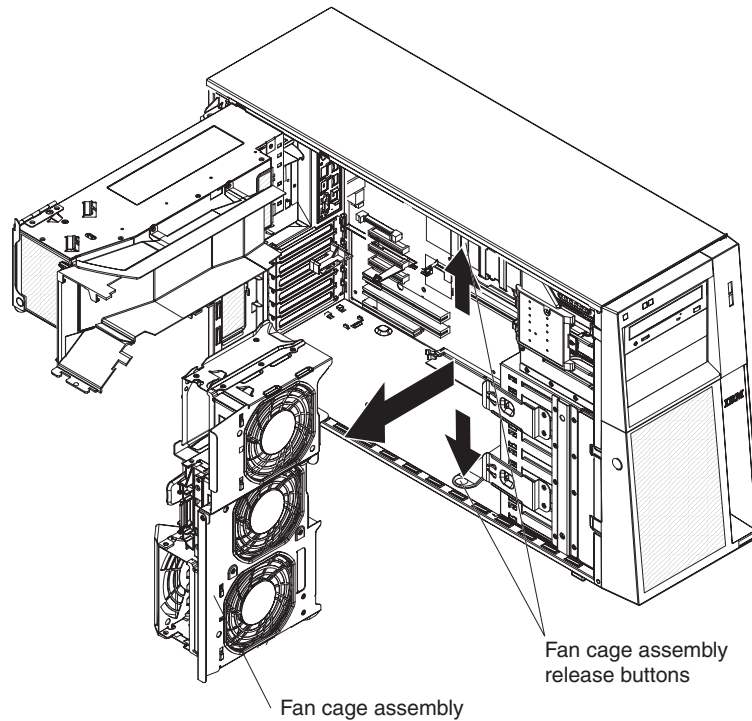
8. Disconnect the tape drive cable from the system board.

9. Remove the screws that secure the tape drive to the server.

10. Gently pull the drive out of the server.

11. If you are instructed to return the tape drive, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing an optional tape drive

To install an optional full-high tape drive, complete the following steps.

1. Read the safety information that begins on page vii and "Installation guidelines" on page 101.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.
3. Unlock and remove the side cover.
4. Remove the bezel (see "Removing the bezel" on page 104.
5. Rotate the power-supply cage assembly out of the chassis:
    - Hot-swap models:
        a. Remove the hot-swap power-supply. Press down on the orange release lever and pull the power supply out of the bay, using the handle.
        b. Lift up the power-supply cage handle and pull the power-supply cage assembly all the way up until the retainer latch locks the cage in place on the chassis.
   - Non-hot-swap models, lift up the power-supply cage handle and pull the power-supply cage assembly all the way up until the retainer latch locks the cage in place on the chassis.:
6. Remove the front fan cage assembly (see "Removing the front system fan cage assembly" on page 138.
7. Remove the EMC shields.
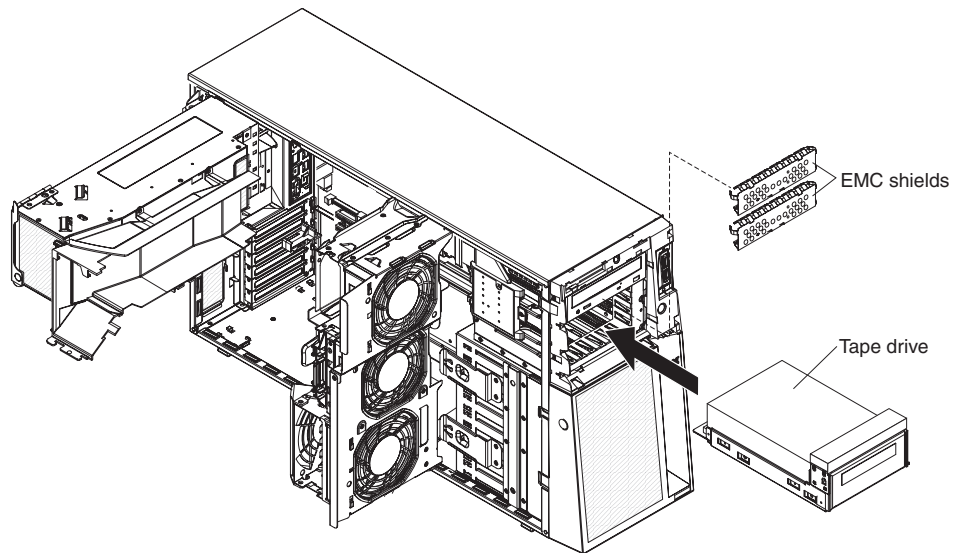
8. Touch the static-protective package that contains the tape drive to any unpainted metal surface on the server; then, remove the tape drive from the package and place it on a static-protective surface.
9. Connect the tape drive cable to the tape drive connector on the system board.
10. Slide the tape drive into the server from the front of the drive cage, then connect the IDE cable to the tape drive.
11. Secure the tape drive to the chassis with the supplied screws.
12. Press the power-supply cage release tab and rotate the power-supply cage assembly into the chassis until it locks in place.

13. Return the power-supply cage handle to the locked position.

14. If you have a hot-swap model, reinstall the hot-swap power supplies (see "Installing a hot-swap power supply" on page 126).

15. Replace the bezel (see "Replacing the bezel" on page 106).

16. Install the side cover (see "Installing the side cover" on page 109).

17. Lock the side cover.

18. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Removing a hot-swap hard disk drive

Attention: To maintain proper system cooling, do not operate the server for more than 10 minutes without either a drive or a filler panel installed in each drive bay.

To remove a hot-swap SAS or hot-swap SATA hard disk drive, complete the following steps.

1. Read the safety information that begins on page vii and "Installation guidelines" on page 101.

   Note: You do not have to turn off the server to remove hot-swap drives from the hot-swap drive bays.

2. Unlock the side cover.

3. Remove the bezel (see "Removing the bezel" on page 104).

4. Rotate the drive tray handle of the drive assembly to the open position.

Hard disk drive

Drive tray

Drive tray handle
(in open position)
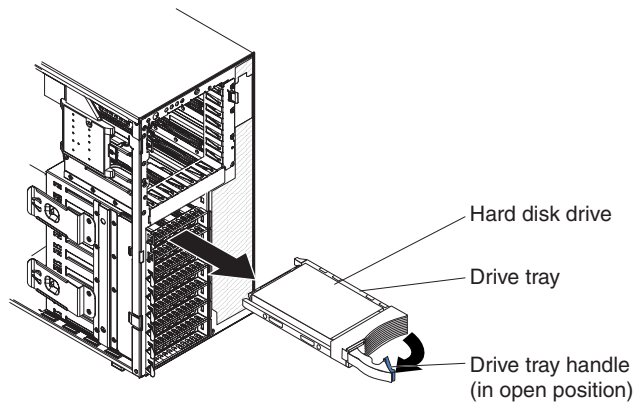
5. Grasp the handle of the drive assembly and pull the assembly out of the bay.

6. If you are instructed to return the drive assembly, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing a hot-swap hard disk drive

Before installing a hot-swap hard disk drive, read the following information:

- The hot-swap drives must be either all SAS hard disk drives or all SATA hard disk drives; do not mix SAS and SATA drives.
- Inspect the drive tray for signs of damage.
- To maintain proper system cooling, do not operate the server for more than 10 minutes without either a drive or a filler panel installed in each drive bay.
- You do not have to turn off the server to install hot-swap drives in the hot-swap drive bays.
- If you want to install the maximum number of hot-swap drives (eight), you will need to order the 4-drive backplane option kit.

To install a hot-swap hard disk drive, complete the following steps.

1. Unlock the side cover.
2. Remove the side cover (see "Removing the side cover" on page 108).
3. Remove the bezel (see "Removing the bezel" on page 104).
4. Remove the EMC shield.
5. Touch the static-protective package that contains the drive to any unpainted metal surface on the server; then, remove the drive from the package and place it on a static-protective surface.
6. Make sure that the drive tray handle is in the open position.
7. Align the drive assembly with the guide rails in the bay; then, carefully slide the drive assembly into the drive bay until the drive snaps into place.
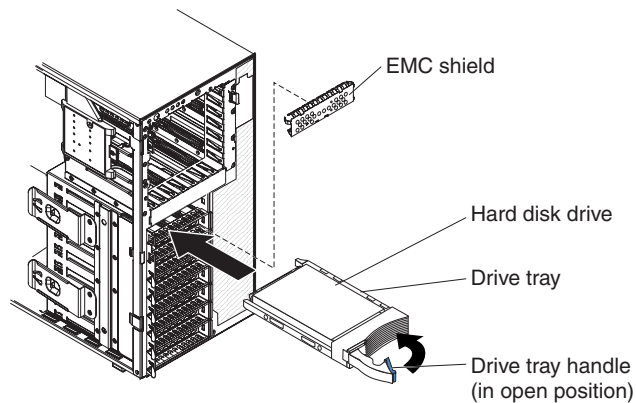
8. Rotate the drive tray handle to the closed position.

9. Check the hard disk drive status indicator to make sure that the hard disk drive is operating correctly. (You might have to restart the server for the drive to be recognized.) If the amber hard disk drive status LED for a drive is lit continuously, it indicates that the drive is faulty and must be replaced. If the amber hard disk drive status LED for a drive is flashing slowly, this indicates that the drive is being rebuilt. If the amber hard disk drive status LED for a drive is flashing rapidly, this indicates that the controller is identifying the drive. If the green hard disk drive activity LED is flashing, this indicates that the drive is in use.

   Note: If the server is configured for RAID operation using an optional ServeRAID controller, you might have to reconfigure the disk arrays after replacing hard disk drives. See the ServeRAID documentation for additional information about RAID operation and complete instructions for using ServeRAID Manager.

10. Closed the bezel.
11. Install the side cover (see "Installing the side cover" on page 109.
12. Lock the side cover.
13. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Removing a simple-swap hard disk drive

Attention: Simple-swap hard disk drives are not hot-swappable. Disconnect all power from the server before removing or installing a simple-swap hard disk drive.

To remove a simple-swap hard disk drive, complete the following steps.

1. Read the safety information that begins on page vii and "Installation guidelines" on page 101.
2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.
3. Unlock the side cover.
4. Remove the side cover (see "Removing the side cover" on page 108).
5. Remove the bezel (see "Removing the bezel" on page 104).
6. Pull the loops of the drive assembly that is to be removed toward each other; then, pull the assembly out of the bay.
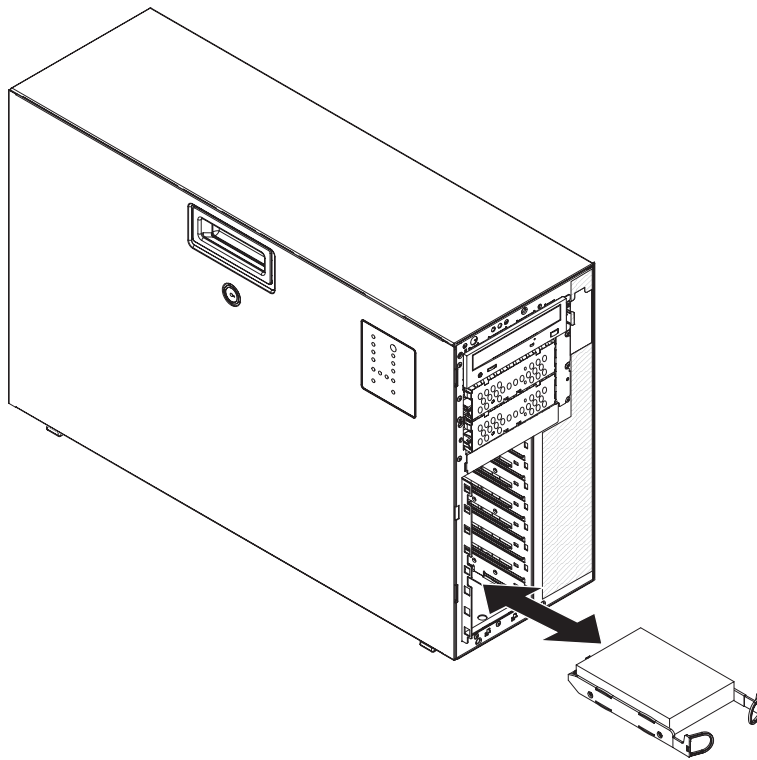
7. If you are instructed to return the drive assembly, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing a simple-swap hard disk drive

Attention: Simple-swap hard disk drives are not hot-swappable. Disconnect all power from the server before removing or installing a simple-swap hard disk drive.

To install a simple-swap hard disk drive, complete the following steps.

1. Read the safety information that begins on page vii and "Installation guidelines" on page 101.
2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.
3. Unlock the side cover.
4. Remove the bezel (see "Removing the bezel" on page 104).
5. Touch the static-protective package that contains the drive to any unpainted metal surface on the server; then, remove the drive from the package and place it on a static-protective surface.
6. Align the drive assembly with the guide rails in the bay.
7. Pull the loops of the drive assembly toward each other; then, carefully slide the drive assembly into the drive bay until it stops and release the loops.

    Note: Do not release the loops on the drive assembly until it is completely seated.
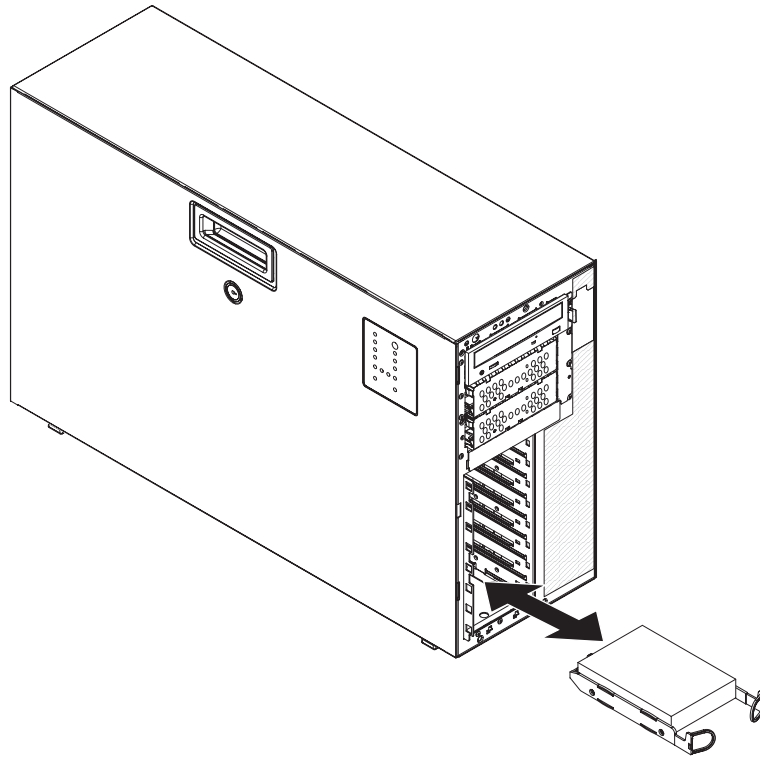
8. Closed the bezel.
9. Lock the side cover.
10. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Removing a hot-swap power supply

This procedure applies only to server models that have hot-swap power supplies. See "Removing a non-hot-swap power supply assembly" on page 126 for information about the removal of a non-hot-swap power supply.

When you remove or install a hot-swap power supply, observe the following precautions.

Statement 8:

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

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

Statement 11:

CAUTION:
The following label indicates sharp edges, corners, or joints nearby.

Statement 17:

CAUTION:
The following label indicates moving parts nearby.

To remove a hot-swap power supply, complete the following steps:

1. Read the safety information that begins on page vii and "Installation guidelines" on page 101.
2. Disconnect the power cord from the power supply that is to be removed.
3. Press down on the orange release latch and pull the power supply out of the bay, using the handle.
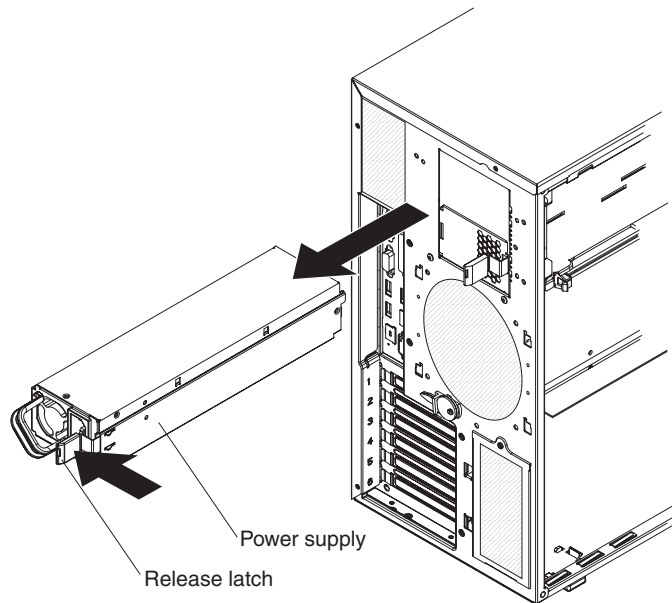
Power supply

Release latch

4. If you are instructed to return the power supply, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing a hot-swap power supply

This procedure applies only to server models that have hot-swap power supplies. See "Installing a non-hot-swap power supply assembly" on page 130 for information about the installation of a non-hot-swap power supply.

To install a hot-swap power supply, complete the following steps:

1. Remove the power supply filler.
2. Place the power supply into the bay guides.
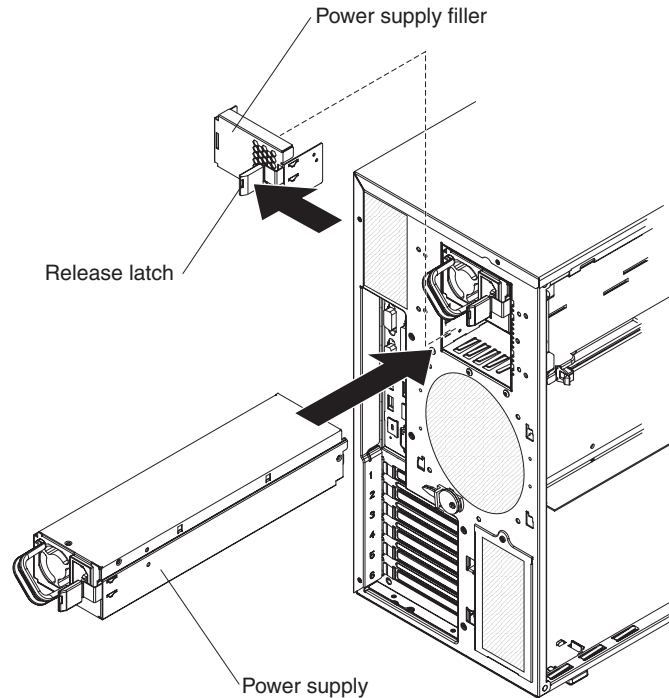
3. Using the handle, push the power supply toward the front of the chassis until it locks into place.
4. Connect one end of the power cord into the connector on the back of the power supply and connect the other end of the power cord into a properly grounded electrical outlet.
5. Make sure that both the ac and dc power LEDs on the rear of the power supply are lit, indicating that the power supply is operating correctly.

Removing a non-hot-swap power supply assembly

This procedure applies only to server models that have a non-hot-swap power supply assembly. See "Removing a hot-swap power supply" on page 124 for information about the removal of a hot-swap power supply.

When you remove or install a non-hot-swap power supply assembly, observe the following precautions.

Statement 8:

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

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

Statement 11:

CAUTION:
The following label indicates sharp edges, corners, or joints nearby.

Statement 17:

CAUTION:
The following label indicates moving parts nearby.

To remove a non-hot-swap power supply assembly, complete the following steps.

1. Read the safety information that begins on page vii and "Installation guidelines" on page 101.

2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.

3. Unlock and remove the side cover (see "Removing the side cover" on page 108).

   Note: It might be helpful to lay the server on its side for the remainder of this procedure.

4. Disconnect the cables from the power supply assembly to the system board and all internal components.

   Attention: Support the power supply assembly while you remove the mounting screws. After the screws are removed, the power supply assembly is loose and can damage other components in the server.

5. Lift up the power supply assembly handle and pull the power supply assembly all the way up until the retainer latch locks the assembly in place on the chassis.

6. While you support the power supply assembly, remove the three screws from the pivot bracket that secure the power supply assembly to the chassis; then, lift the power supply assembly off the chassis. Save the screws to use when you install the replacement power supply assembly.

Power supply retaining screws

Power supply assembly
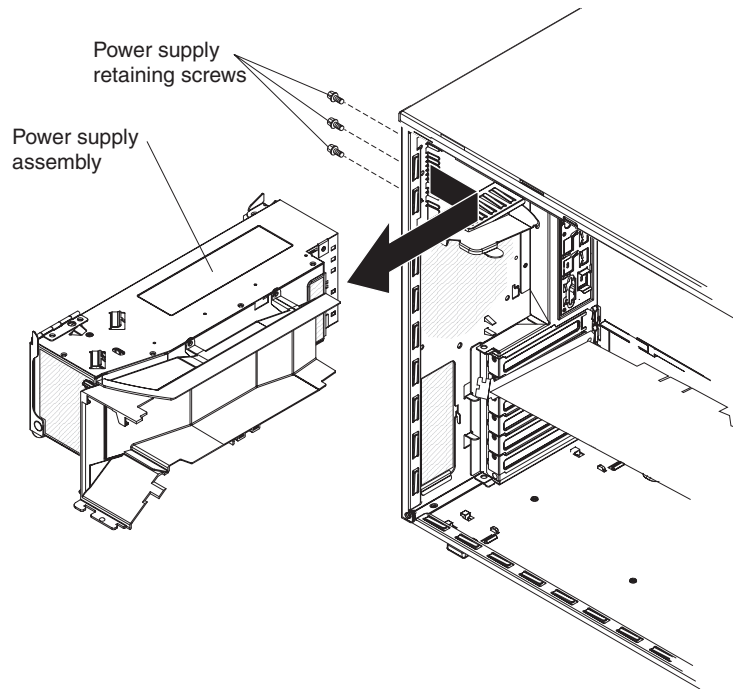
7. If you are instructed to return the power supply assembly, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing a non-hot-swap power supply assembly

To install a non-hot-swap power supply, complete the following steps.

1. Align the screw holes in power supply assembly pivot bracket with the corresponding screw holes on the rear of the chassis.
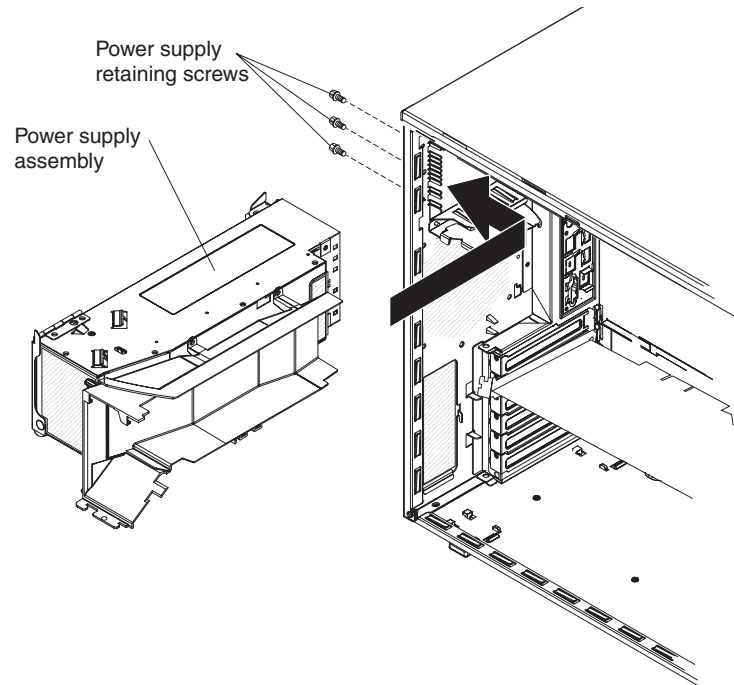
2. While you support the power supply assembly, install the three screws that secure the power supply assembly to the chassis.
3. Press the power supply assembly release tab and rotate the power supply assembly into the chassis until it locks in place.
4. Return the power supply assembly handle to the locked position.
5. Connect the cables from the power supply assembly to the system board and all internal components.
6. Install the side cover (see "Installing the side cover" on page 109).
7. Lock the side cover.
8. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Removing a memory module

To remove a dual inline memory module (DIMM), complete the following steps.

1. Read the safety information that begins on page vii and "Installation guidelines" on page 101.
2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.
3. Unlock and remove the side cover (see "Removing the side cover" on page 108).
4. Rotate the power-supply cage assembly out of the chassis:
   - Hot-swap models:
     a. Remove the hot-swap power-supply. Press down on the orange release lever and pull the power supply out of the bay, using the handle.
     b. Lift up the power-supply cage handle and pull the power-supply cage assembly all the way up until the retainer latch locks the cage in place on the chassis.
   - Non-hot-swap models, lift up the power-supply cage handle and pull the power-supply cage assembly all the way up until the retainer latch locks the cage in place on the chassis.
5. Disconnect any cables that impede access to the DIMMs.
6. Locate the DIMM connector that contains the DIMM that is to be replaced (see "System-board option connectors" on page 13 for DIMM slot locations).

   Attention: To avoid breaking the DIMM retaining clips or damaging the DIMM connectors, open and close the clips gently.
7. Carefully open the retaining clips on each end of the DIMM connector and remove the DIMM.
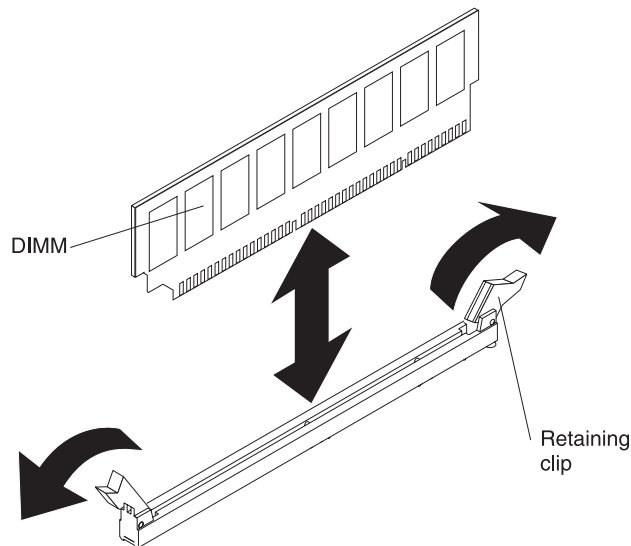
8. If you are instructed to return the DIMM, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing a memory module

Note: If you are replacing a faulty DIMM, make sure that the replacement DIMM is the correct type of memory. If you are adding DIMMs, install the DIMMs in the sequence shown in the following tables. See the *User's Guide* for detailed information about installing memory and the type of memory that is compatible with the server.

Table 8. DIMM upgrade configuration sequence in mirroring mode

Number of DIMMs	DIMM connectors
4	1, 4, 7, 10
8	1, 4, 7, 10, 2, 5, 8, 11
Note: DIMM connectors 3, 6, 9, and 12 are not functional in this server. Do not install DIMMs in these connectors.	

Table 9. DIMM upgrade configuration sequence in non-mirroring mode

Number of DIMMs	DIMM connectors
2	1, 4
4	1, 4, 7, 10
6	1, 4, 7, 10, 2, 5
8	1, 4, 7, 10, 2, 5, 8, 11
Note: DIMM connectors 3, 6, 9, and 12 are not functional in this server. Do not install DIMMs in these connectors.	

To install a DIMM, complete the following steps.

1. Turn off the server and all attached devices; then, disconnect all power cords and external cables.
2. Unlock and remove the side cover (see "Removing the side cover" on page 108).
3. Rotate the power-supply cage assembly out of the chassis:
   - Hot-swap models:
     a. Remove the hot-swap power-supply. Press down on the orange release lever and pull the power supply out of the bay, using the handle.
     b. Lift up the power-supply cage handle and pull the power-supply cage assembly all the way up until the retainer latch locks the cage in place on the chassis.
   - Non-hot-swap models, lift up the power-supply cage handle and pull the power-supply cage assembly all the way up until the retainer latch locks the cage in place on the chassis.
4. Make sure that the retaining clip on both ends of the DIMM connector are fully open.
5. Touch the static-protective package that contains the DIMM to any unpainted metal surface on the server; then, remove the new DIMM from the package.
6. Turn the DIMM so that the DIMM keys align correctly with the connector.

   Attention: To avoid breaking the retaining clips or damaging the DIMM connectors, open and close the clips gently.

DIMM

Retaining
clip
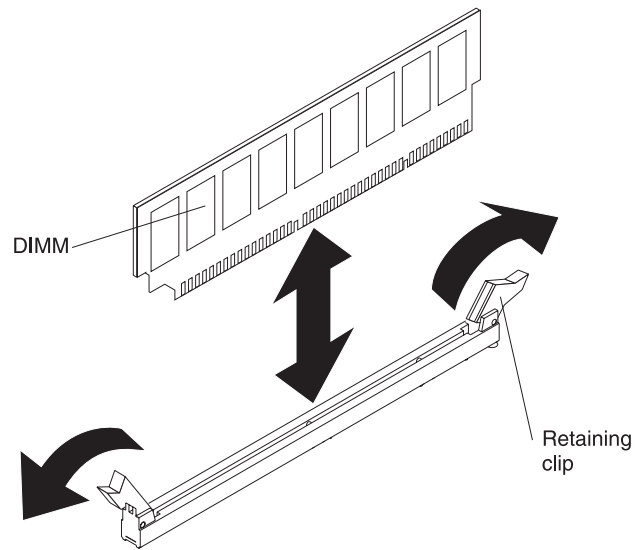
7. Insert the DIMM into the connector by aligning the edges of the DIMM with the slots at the ends of the DIMM connector. Firmly press the DIMM straight down into the connector by applying pressure on both ends of the DIMM simultaneously. The retaining clips snap into the locked position when the DIMM is firmly seated in the connector. If there is a gap between the DIMM and the retaining clips, the DIMM has not been correctly installed. Open the retaining clips, remove the DIMM, and then reinsert it.

8. Reconnect any cables that were disconnected during removal.

9. Press the power-supply cage release tab and rotate the power-supply cage assembly into the chassis until it locks in place.

10. Return the power-supply cage handle to the locked position.

11. If you have a hot-swap model, reinstall the hot-swap power supplies (see "Installing a hot-swap power supply" on page 126).

12. Install the side cover (see "Installing the side cover" on page 109).

13. Lock the side cover.

14. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Removing a hot-swap fan

Attention:

- Replace a failed fan within 48 hours.
- To ensure proper cooling and airflow, do not operate the server for more than 30 minutes with the side cover removed.

To remove a hot-swap fan, complete the following steps.

1. Read the safety information that begins on page vii and "Installation guidelines" on page 101.
2. Unlock and remove the side cover (see "Removing the side cover" on page 108).
3. Take your finger and slide the orange release tab on the fan in the direction indicated by the arrow on the top of the fan to unlock the fan handle. Grasp the fan handle and pull the fan out of the fan cage assembly.
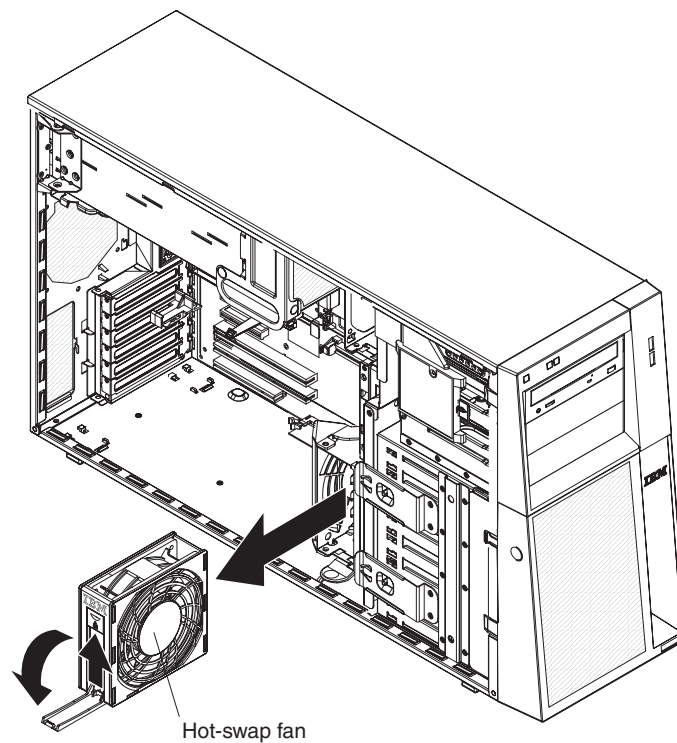
Hot-swap fan

4. If you are instructed to return the fan, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing a hot-swap fan

Attention:

- Replace a failed fan within 48 hours.
- To ensure proper cooling and airflow, do not operate the server for more than 30 minutes with the side cover removed.

To install a hot-swap fan, complete the following steps.

1. Unlock and remove the side cover (see "Removing the side cover" on page 108).
2. Touch the static-protective package that contains the hot-swap fan to any unpainted metal surface on the server; then, remove the fan from the package and place it on a static-protective surface.
3. Align the fan over the bay in which you want to install the fan and lower it into the bay. Press down on the fan until it locks into place; then, close the fan locking handle.
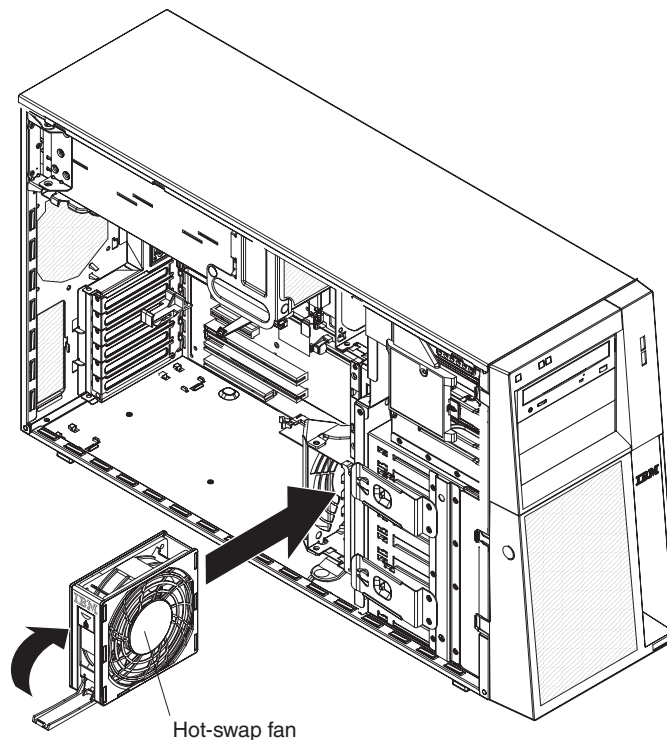
Hot-swap fan

4. Install the side cover (see "Installing the side cover" on page 109).
5. Lock the side cover.
6. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Removing the rear system fan cage assembly with baffle

Attention:

- Replace a failed fan within 48 hours.
- To ensure proper cooling and airflow, do not operate the server for more than 30 minutes with the side cover removed.

To remove the rear system fan cage assembly with baffle, complete the following steps:

1. Read the safety information that begins on page vii and "Installation guidelines" on page 101.
2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.
3. Unlock and remove the side cover (see "Removing the side cover" on page 108).
4. Disconnect the rear system fan cage assembly cable from the system board, making a note of where the cable was connected for later installation.
5. Pull outward on the spring-loaded lock pin and slide the rear system fan cage assembly to the left to release it from the mounting tabs on the chassis; then, remove it from the server.
6. If you are instructed to return the fan cage assembly, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the rear system fan cage assembly with baffle

Attention:

- Replace a failed fan within 48 hours.
- To ensure proper cooling and airflow, do not operate the server for more than 30 minutes with the side cover removed.

To install the rear system fan cage assembly with baffle, complete the following steps:

1. Unlock and remove the side cover (see "Removing the side cover" on page 108).
2. Insert the rear system fan assembly retainer tabs into the corresponding mounting tabs on the chassis; then, slide the rear fan cage assembly to the right until it locks into the mounting tabs on the chassis.

Rear fan assembly
with baffle
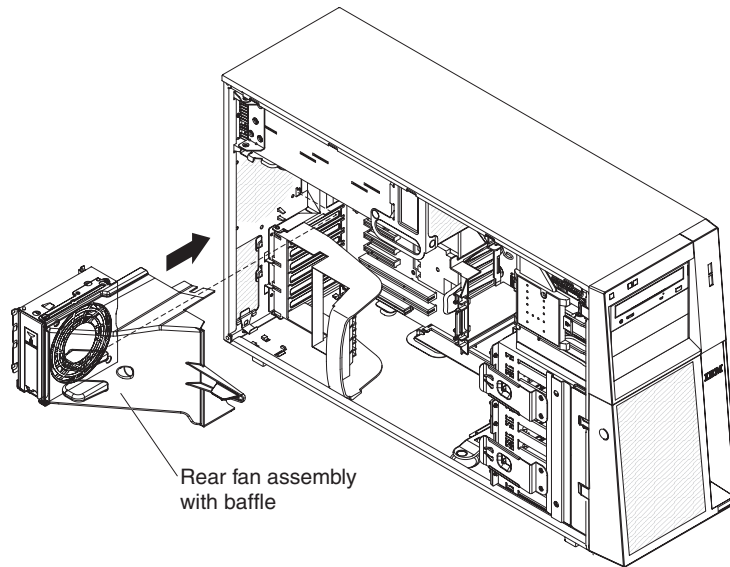
3. Connect the rear fan cage assembly cable to the system board (see "System-board internal connectors" on page 11 for the location of the rear fan assembly connector).
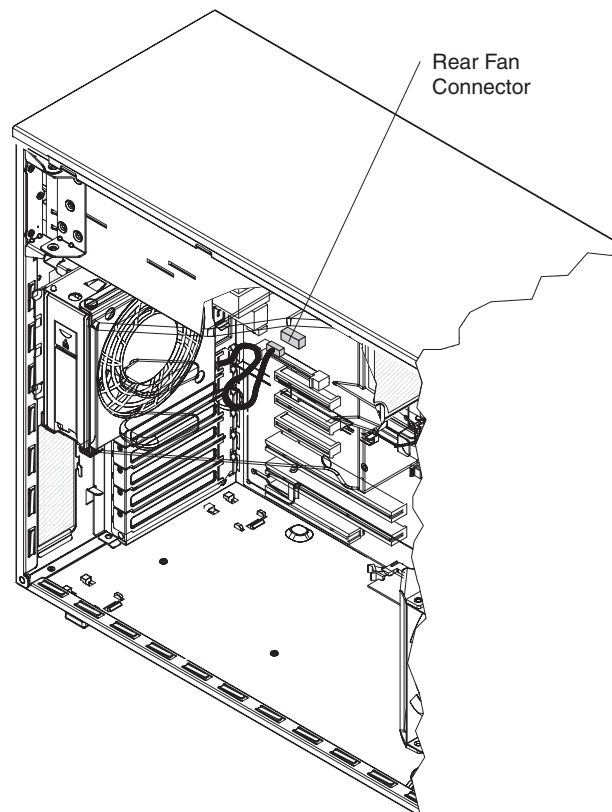
Rear Fan
Connector

4. Install the side cover (see "Installing the side cover" on page 109).
5. Lock the side cover.
6. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Removing the front system fan cage assembly

Attention:

- Replace a failed fan within 48 hours.
- To ensure proper cooling and airflow, do not operate the server for more than 30 minutes with the side cover removed.

To remove the front system fan cage assembly, complete the following steps.

1. Read the safety information that begins on page vii and "Installation guidelines" on page 101.
2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.
3. Unlock and remove the side cover (see "Removing the side cover" on page 108).
4. Rotate the power-supply cage assembly out of the chassis:
   - Hot-swap models:
     a. Remove the hot-swap power-supply. Press down on the orange release lever and pull the power supply out of the bay, using the handle.
     b. Lift up the power-supply cage handle and pull the power-supply cage assembly all the way up until the retainer latch locks the cage in place on the chassis.
   - Non-hot-swap models, lift up the power-supply cage handle and pull the power-supply cage assembly all the way up until the retainer latch locks the cage in place on the chassis.

5. Press in on the fan cage assembly release buttons on both sides of the chassis to release the front system fan cage assembly from the connector on the chassis.

Fan cage assembly release buttons
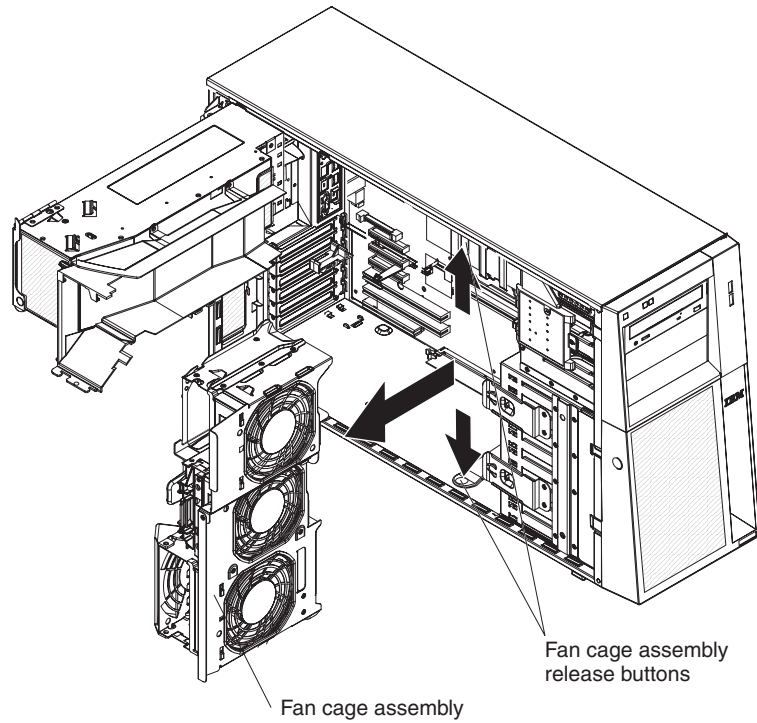
Fan cage assembly

6. Pull the fan cage assembly up and out of the chassis.
7. If you are instructed to return the fan cage assembly, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the front system fan cage assembly

Attention:

- Replace a failed fan within 48 hours.
- To ensure proper cooling and airflow, do not operate the server for more than 30 minutes with the side cover removed.

To install the front system fan cage assembly, complete the following steps.

1. Align the front system fan cage assembly over the fan cage assembly slot and with the connector on the system board.
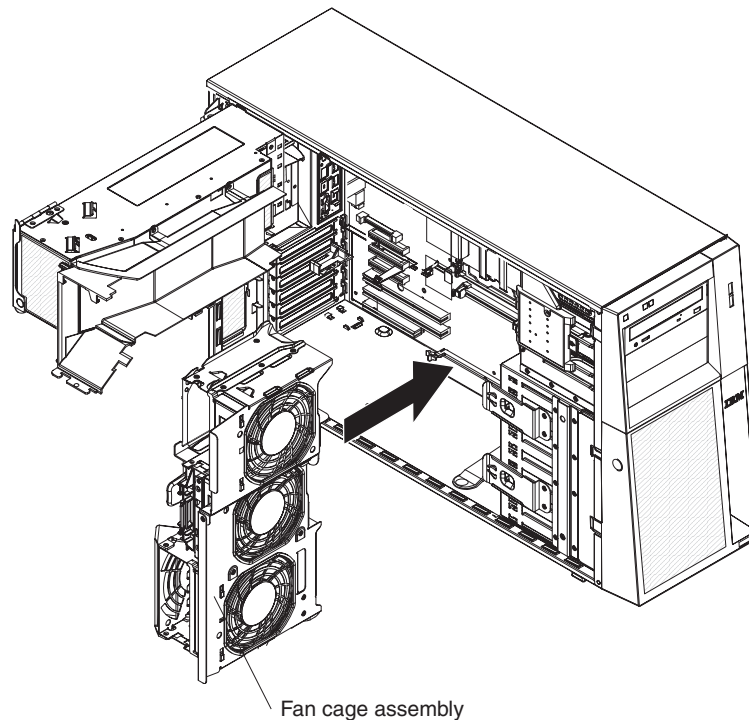
Fan cage assembly

2. Lower the fan cage assembly into the chassis and press down firmly until the fan cage assembly is seated firmly in place.
3. Press the power-supply cage release tab and rotate the power-supply cage assembly into the chassis until it locks in place.
4. Return the power-supply cage handle to the locked position.
5. If you have a hot-swap model, reinstall the hot-swap power supplies (see "Installing a hot-swap power supply" on page 126).
6. Install the side cover (see "Installing the side cover" on page 109).
7. Lock the side cover.
8. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Removing the front USB connector assembly

To remove the front USB connector assembly, complete the following steps.

1. Read the safety information that begins on page vii and "Installation guidelines" on page 101.
2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.
3. Unlock and remove the side cover (see "Removing the side cover" on page 108).
4. Remove the bezel (see "Removing the bezel" on page 104).
5. Disconnect the front USB cable from the system board, noting the routing of the cable (see "System-board internal connectors" on page 11 for the location of the front USB connector).
6. Press down and hold the release tab on the top of the front USB housing; then, tilt the top of the housing away from the chassis and lift the housing out of the opening in the chassis.
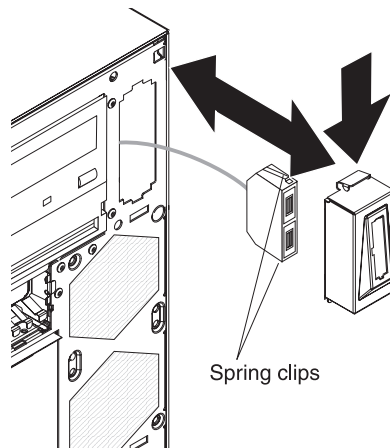
Spring clips

7. Squeeze the spring clips on the sides of the front USB connector assembly and pull the assembly out of the back of the housing.
8. Carefully pull the front USB cable out of the opening in the chassis.
9. If you are instructed to return the front USB connector assembly, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the front USB connector assembly

To install the front USB connector assembly, complete the following steps.

1. Carefully feed the front USB cable through the opening in the front of the chassis.
2. Squeeze the spring clips on the sides of the front USB connector assembly and insert the assembly into the housing through the back of the housing.
3. Place the bottom edge of the housing into the bottom of the opening in the chassis; then, tilt the top of the housing into position until it clicks into place.

Spring clips
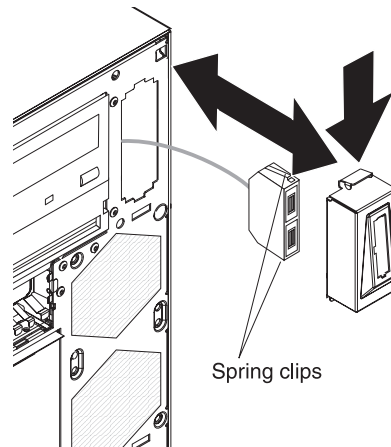
4. Reroute and connect the front USB cable to the system board (see "System-board internal connectors" on page 11 for the location of the front USB connector).
5. Replace the bezel (see "Replacing the bezel" on page 106).
6. Install the side cover (see "Installing the side cover" on page 109).
7. Lock the side cover.
8. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Removing the rear adapter retention bracket

To remove the rear adapter-retention bracket, complete the following steps:

1. Turn off the server and all attached devices; then, disconnect all power cords and external cables.
2. Unlock and remove the side cover (see "Removing the side cover" on page 108).
3. Remove all adapters and place the adapters on static-protective surface.

   Note: You might find it helpful to note where each adapter is installed before removing the adapters.

4. Release the rear adapter-retention bracket by pressing up on the rear adapter retainer bracket and rotate the bracket partially toward the closed position.
5. Grasp the bracket on one side at the hinge point and pull outward (while rotating the bracket slightly toward the front of the server) until the bracket is free of the hinge pin; then, push the bracket in the opposite direction to release the other side of the bracket and remove adapter guide from the server.

Hinge pin

Rear adapter
retention bracket
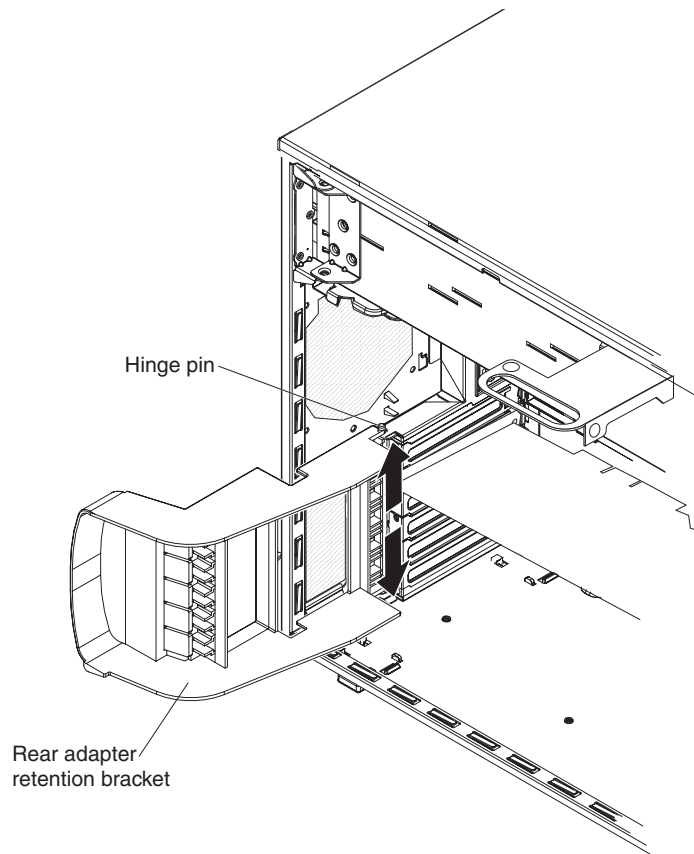
6. If necessary, remove the Remote Supervisor Adapter II SlimLine retention tab and store it for future use.

Installing the rear adapter retention bracket

To install the rear adapter retention bracket, complete the following steps:

1. If you remove the Remote Supervisor Adapter II SlimLine retention tab earlier, reinstall it and any other adapters you might have removed.

2. Position the rear adapter retention bracket so that the hole in one of the hinge points is aligned with the hinge pin on the chassis; then, place the hinge pin through the hole on the chassis.

3. Rotate the adapter guide into place so that the hole in the opposite hinge point snaps into place over the hinge pin on the chassis.

4. Install the side cover (see "Installing the side cover" on page 109).

5. Lock the side cover if it was unlocked during removal.

6. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Removing the front adapter-retention bracket

To remove the front adapter-retention bracket, complete the following steps:

1. Read the safety information that begins on page vii and "Installation guidelines" on page 101.
2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.
3. Unlock and remove the side cover (see "Removing the side cover" on page 108).
4. Open the front and rear adapter-retention brackets.
5. Remove all adapters and place them on a static-protective surface.

   Note: You might find it helpful to note where each adapter is installed before removing the adapters.
6. Grasp one side of the bracket at a hinge point and pull outward (while rotating the bracket slightly toward the rear of the server) until the hinge pin on the bracket is free of the hole; then, push the bracket in the opposite direction to release the other side of the bracket and remove the adapter retention bracket from the server.

Installing the front adapter-retention bracket

To install the front adapter retention bracket, complete the following steps:

1. Insert one of the hinge pins on the front adapter-retention bracket into the metal hinge point on the fan cage assembly.
2. Rotate the other hinge pin into position and push the end of the adapter-retention bracket into the hinge point. The hinge pin will protrude through the hole in the metal hinge point when the adapter-retention bracket is seated correctly.
3. Reinstall any adapters that you removed earlier.
4. Close the front and rear adapter retention brackets.
5. Install the side cover (see "Installing the side cover" on page 109).
6. Lock the side cover.
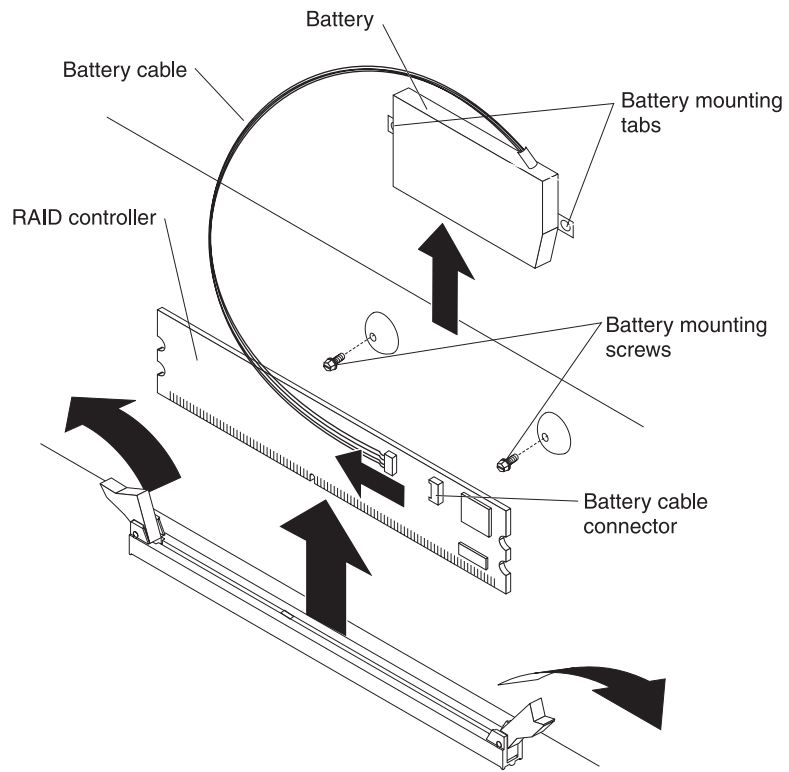7. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Removing the battery

The following notes describe information that you must consider when removing and replacing the battery in the server:

- IBM has designed this product with your safety in mind. The lithium battery must be handled correctly to avoid possible danger. If you replace the battery, you must adhere to the following instructions.

  Note: In the U.S., call 1-800-IBM 4333 for information about battery disposal.

- If you replace the original lithium battery with a heavy-metal battery or a battery with heavy-metal components, be aware of the following environmental consideration. Batteries and accumulators that contain heavy metals must not be disposed of with normal domestic waste. They will be taken back free of charge by the manufacturer, distributor, or representative, to be recycled or disposed of in a proper manner.

- 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 support center or business partner.

  Note: After you replace the battery, you must reconfigure the server and reset the system date and time.

Statement 2:

CAUTION:
When replacing the lithium battery, use only IBM Part Number 33F8354 or an equivalent type battery recommended by the manufacturer. If your system has a module containing a lithium battery, replace it only with the same module type made by the same manufacturer. The battery contains lithium and can explode if not properly used, handled, or disposed of.

Do not:

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

To remove the battery, complete the following steps.

1. Read the safety information that begins on page vii and "Installation guidelines" on page 101.
2. Follow any special handling and installation instructions that come with the battery.
3. Turn off the server and all attached devices; then, disconnect all power cords and external cables.
4. Unlock and remove the side cover (see "Removing the side cover" on page 108).
5. Remove any adapters that impede access to the battery.
6. Locate the battery on the system board (see "System-board internal connectors" on page 11).
7. Remove the battery:

a. Use a fingernail to press the top of the battery clip away from the battery. The battery pops up when it is released.
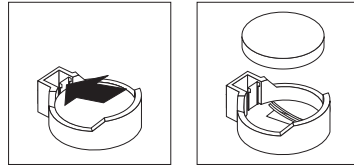
b. Use your thumb and index finger to lift the battery from the socket.

8. Dispose of the battery as required by local ordinances or regulations. See "Battery return program" on page 200 for more information.

Installing the battery

The following notes describe information that you must consider when replacing the battery in the server.

- After you replace the battery, you must reconfigure the server and reset the system date and time.
- To avoid possible danger, read and follow the following safety statement.

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**

To install the battery, complete the following steps.

1. Follow any special handling and installation instructions that come with the replacement battery.
2. Insert the new battery:
   a. Tilt the battery so that you can insert it into the socket on the side opposite the battery clip.
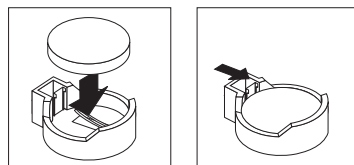
   b. Press the battery down into the socket until it clicks into place. Make sure that the battery clip holds the battery securely.
3. Install the side cover (see "Installing the side cover" on page 109).

4. Lock the side cover if it was unlocked during removal.
5. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

   Note: You must wait approximately 20 seconds after you connect the power cord of the server to an electrical outlet before the power-control button becomes active.
6. Start the Configuration/Setup Utility program and reset the configuration.
   • Set the system date and time.
   • Set the power-on password.
   • Reconfigure the server.

   See "Using the Configuration/Setup Utility program" on page 186 for details.

Removing and replacing Tier 2 CRUs

You may install a Tier 2 CRU yourself or request IBM to install it, at no additional charge, under the type of warranty service that is designated for the server.

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

Removing the ServeRAID 8k-l adapter

To remove the ServeRAID 8k-l adapter, complete the following steps:

1. Read the safety information beginning on page "Safety" on page vii, and "Installation guidelines" on page 101.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables. Remove the side cover (see "Removing the side cover" on page 108).

   Attention: To avoid breaking the retaining clips or damaging the ServeRAID 8k-l adapter connector, open and close the clips gently.
3. Carefully open the retaining clip on each end of the ServeRAID 8k-l adapter connector and remove the adapter from the server.
4. If you are instructed to return the adapter, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the ServeRAID 8k-l adapter

The IBM ServeRAID 8k-l adapter must be installed in its dedicated connector on the system board. See the following illustration for the location of the connector on the system board. The ServeRAID 8k-l adapter is not cabled to the system board and no rerouting of the SCSI cable is required.

To install the ServeRAID 8k-l adapter, complete the following steps:

1. Read the safety information beginning on page "Safety" on page vii, and "Installation guidelines" on page 101.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables. Remove the side cover (see "Removing the side cover" on page 108.

   Attention: To avoid breaking the retaining clips or damaging the ServeRAID-8k-l adapter connector, open and close the clips gently.
3. Open the retaining clip on each end of the ServeRAID 8k-l adapter connector.
4. Touch the static-protective package containing the ServeRAID 8k-l adapter to any unpainted metal surface on the server. Then, remove the ServeRAID 8k-l adapter from the package.
5. Turn the ServeRAID 8k-l adapter so that the ServeRAID 8k-l adapter keys align correctly with the connector.

   Attention: Incomplete insertion might cause damage to the system board or the ServeRAID 8k-l adapter.

ServeRAID-8k-I adapter
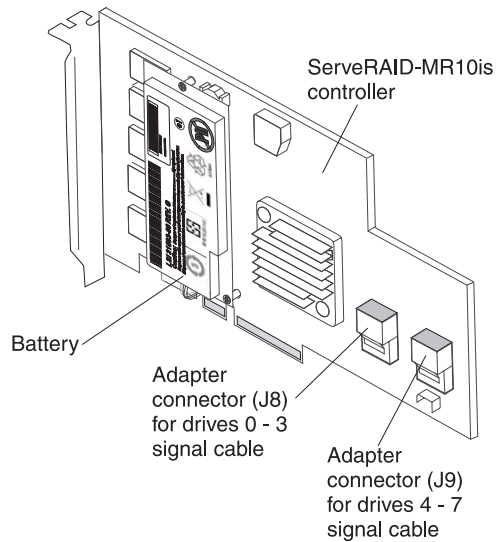
ServeRAID-8k-I connector
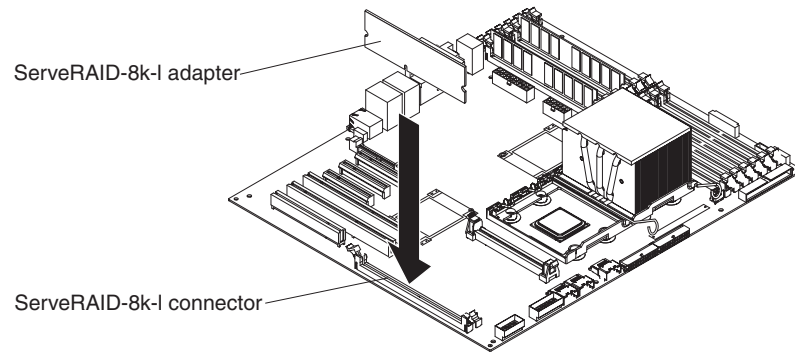
6. Press the ServeRAID 8k-I adapter firmly into the connector.

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

8. Replace the side cover (see "Installing the side cover" on page 109).

9. Lock the side cover.

10. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Removing the ServeRAID-8k adapter

The ServeRAID-8k adapter can be installed only in its dedicated connector on the system board. See the following illustration for the location of the connector on the system board. The ServeRAID-8k adapter is not cabled to the system board, and no rerouting of the SAS or SATA cable is required.

To remove the ServeRAID-8k adapter, complete the following.
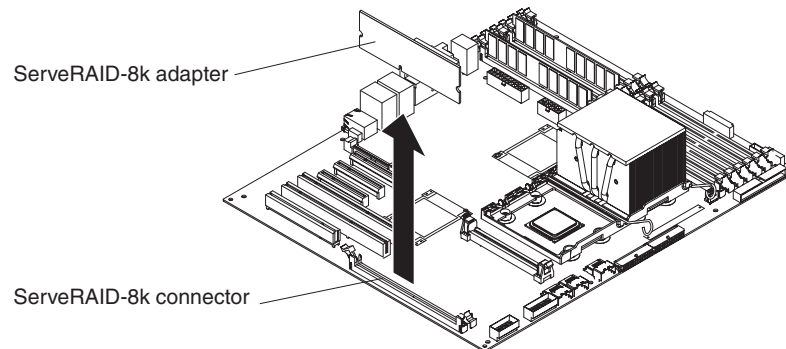
1. Read the safety information that begins on page vii and "Handling static-sensitive devices" on page 103.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables. Remove the left-side cover.

   Attention: To avoid breaking the retaining clips or damaging the ServeRAID-8k adapter connector, open and close the clips gently.
3. Disconnect the battery pack cable from the adapter.
4. Carefully open the retaining clips on each end of the ServeRAID-8k adapter connector and remove the adapter from the server.
5. Remove the screws that secure the battery pack to the chassis; then, remove the battery pack from the server. Be sure not to drop the screws into the server chassis. If you are not going to replace the ServeRAID-8k adapter, reinstall the battery pack mounting screws into the holes in the chassis, otherwise set them aside for future use.

Battery

Battery cable

Battery mounting tabs

RAID controller

Battery mounting screws

Battery cable connector

Installing the ServeRAID-8k adapter

To install the ServeRAID-8k adapter, complete the following steps.

Note: If you install this ServeRAID-8k adapter in simple-swap SATA models, be sure to follow the instructions in this section for cabling.

1. Read the safety information that begins on page vii and "Handling static-sensitive devices" on page 103.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.

   Attention: To avoid breaking the retaining clips or damaging the ServeRAID-8k adapter connector, open and close the clips gently.
3. Remove the side cover (see "Removing the side cover" on page 108.
4. Carefully open the retaining clips on each end of the ServeRAID-8k adapter connector.
5. Touch the static-protective package that contains the ServeRAID-8k adapter to any unpainted metal surface on the server. Then, remove the ServeRAID-8k adapter and battery pack from the package.
6. Connect the battery pack cable to the ServeRAID-8k adapter.
7. Turn the ServeRAID-8k adapter so that the ServeRAID-8k adapter keys align correctly with the connector on the system board..

   Attention: Incomplete insertion might cause damage to the system board or the ServeRAID-8k adapter.

ServeRAID-8k adapter

ServeRAID-8k connector
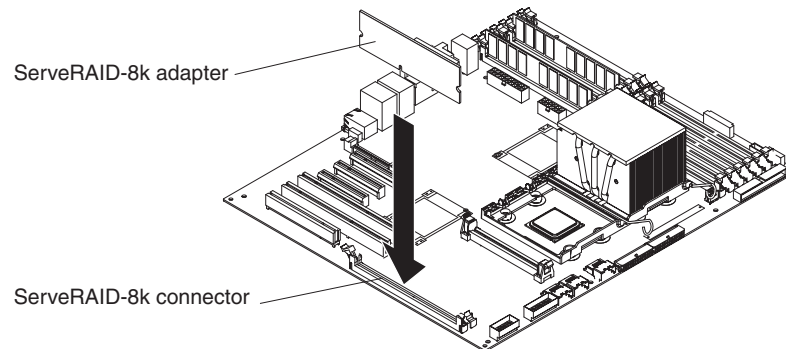
8. Press the ServeRAID-8k adapter firmly into the connector.
9. Mount the battery pack to the chassis, using the two mounting screws.

Battery

Battery cable

Battery mounting tabs

RAID controller

Battery mounting screws

Battery cable connector
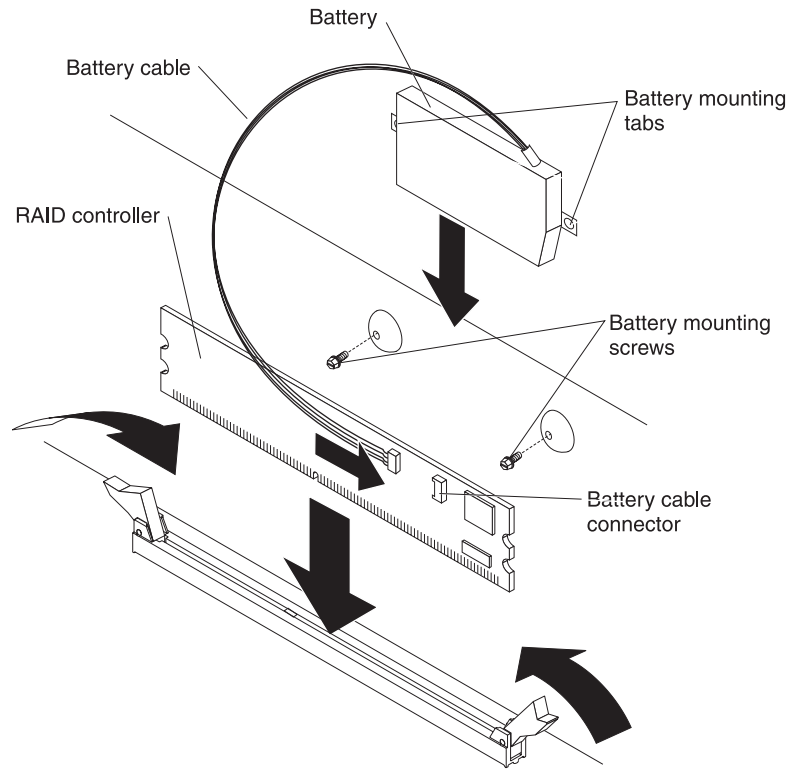
10. Plug the battery pack cable into the connector on the ServeRAID-8k adapter.

11. If you are installing the ServeRAID-8k adapter into a simple-swap SATA model, make the following cabling changes to enable RAID level-5 support:

   a. Disconnect the signal cable from the Simple-swap SATA backplate connector on the system board and connector it to the Hot-swap SAS/SATA 1 connector on the system board. See "System-board internal connectors" on page 11 for the location of these connectors on the system board.

b. Connect the RAID level-5 enabler plug (that came with the system) to the SAS/SATA backplane 1 connector on the system board.
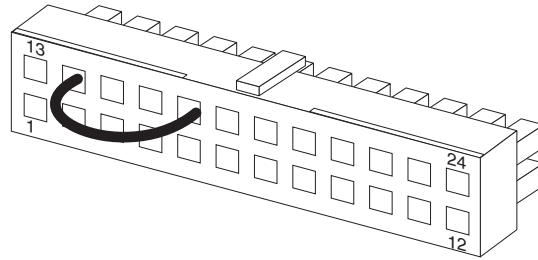
RAID level-5 enabler plug

The following illustration shows how the simple-swap SATA model is cabled when shipped.
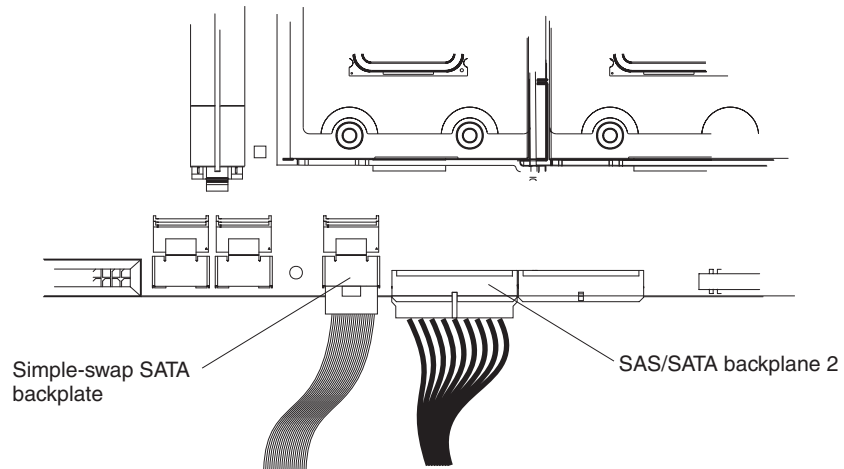
The following illustration shows how the cables must be connected when you install the ServeRAID-8k Controller into the simple-swap SATA model.
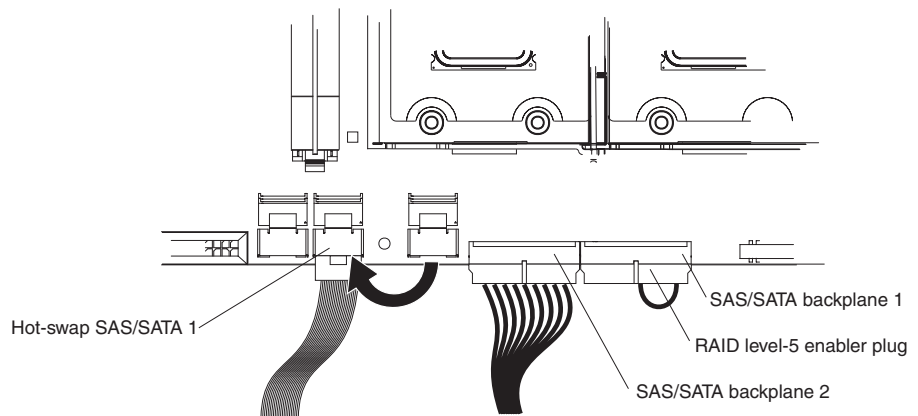
Removing the optional IBM ServeRAID-MR10is VAULT SAS/SATA Controller

The optional IBM ServeRAID-MR10is VAULT SAS/SATA Controller can be installed only in its dedicated connector PCI slot 2 on the system board (see "System-board option connectors" on page 13 for the location of the connector on the system board).

To remove the ServeRAID-MR10is SAS/SATA adapter, complete the following steps:

1. Read the safety information that begins on page vii and "Handling static-sensitive devices" on page 103.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.

   Attention: To avoid breaking the retaining clips or damaging the ServeRAID-MR10is SAS/SATA adapter connector, open and close the clips gently.

3. Remove the side cover (see "Removing the side cover" on page 108.
4. Rotate the rear adapter-retention bracket to the open (unlocked) position.
5. Disconnect any cables connected to the adapter.
6. Carefully open the retaining clips on each end of the ServeRAID-MR10is adapter connector and remove the adapter from the server.

   Attention: To avoid breaking the retaining clips or damaging the ServeRAID-MR10is SAS/SATA adapter connector, open and close the clips gently.

ServeRAID-MR10is controller

PCI slot 2
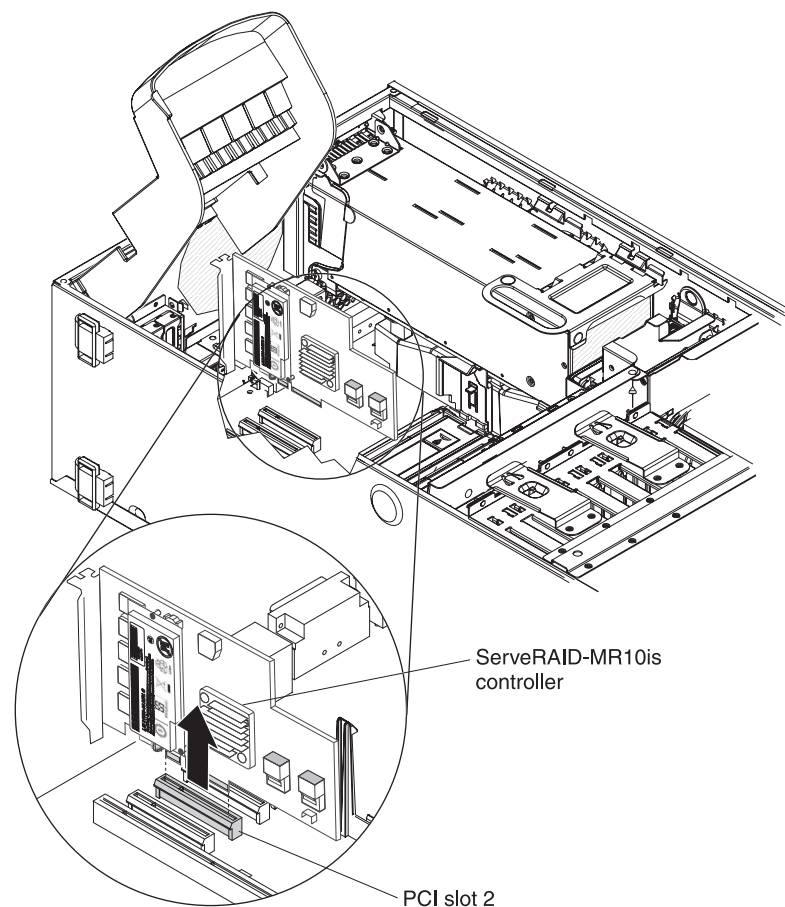
7. If you are instructed to return the adapter, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the optional IBM ServeRAID-MR10is VAULT SAS/SATA Controller

The optional IBM ServeRAID-MR10is VAULT SAS/SATA controller can be installed only in its dedicated PCI slot 2 connector on the system board, and only in server models with eight 3.5-inch hot-swap hard disk drives. See "System-board option connectors" on page 13 for the location of the connector on the system board. The ServeRAID-MR10is SAS/SATA controller is not cabled to the system board. Instructions for routing the cables are described below.

To install the ServeRAID-MR10is SAS/SATA controller and route the cables, complete the following steps:

1. Read the safety information that begins on page vii and "Handling static-sensitive devices" on page 103.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.
3. Remove the side cover (see "Removing the side cover" on page 108.
4. Rotate the rear adapter-retention bracket to the open (unlocked) position.
5. Remove the screw that secures the expansion-slot cover to the chassis (if no adapter is installed in the slot). Store the expansion-slot cover and screw in a safe place for future use.

   Note: Expansion-slot covers must be installed on all vacant slots. This maintains the electronic emissions standards of the server and ensures proper ventilation of server components.
6. Carefully open the retaining clips on each end of the ServeRAID-MR10is adapter connector.

   Attention: To avoid breaking the retaining clips or damaging the ServeRAID-MR10is SAS/SATA adapter connector, open and close the clips gently.
7. Touch the static-protective package that contains the ServeRAID-MR10is adapter to any unpainted metal surface on the server; then, remove the ServeRAID-MR10is adapter from the package and place it on a static-protective surface.

8. Turn the ServeRAID-MR10is adapter so that the ServeRAID-MR10is adapter keys align correctly with the connector on the system board.

   Attention: Incomplete insertion might cause damage to the system board or the ServeRAID-MR10is adapter.

ServeRAID-MR10is controller

PCI slot 2
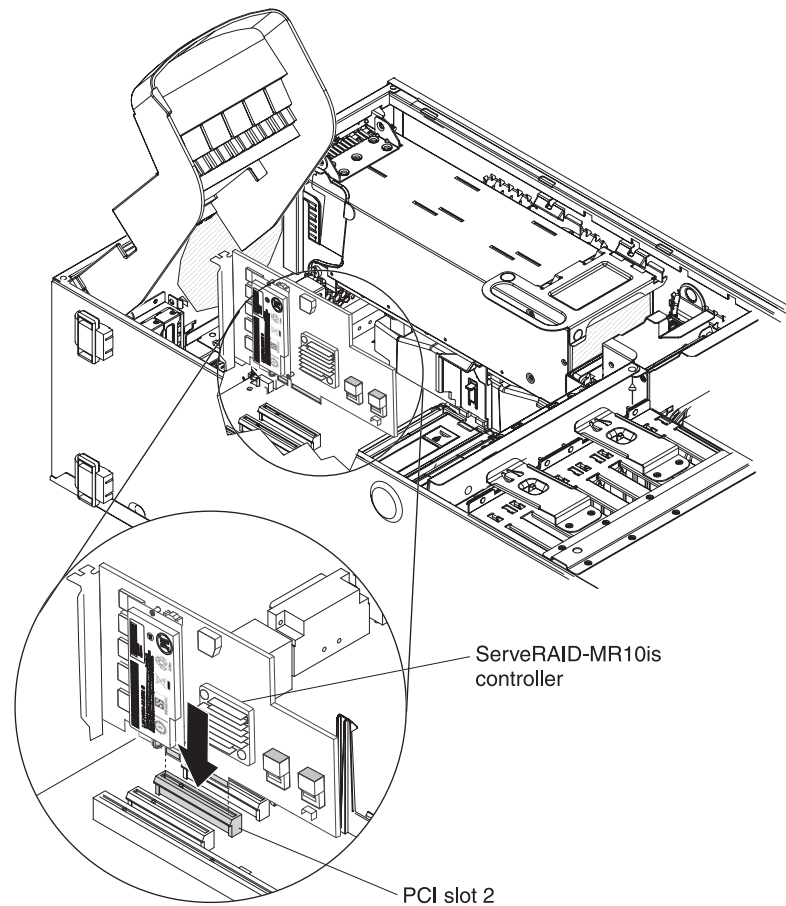
9. Press the ServeRAID-MR10is adapter firmly into the connector on the system board.
10. Rotate the power-supply cage assembly out of the chassis:
    a. Remove the hot-swap power-supply. Press down on the orange release lever and pull the power supply out of the bay, using the handle.
    b. Lift up the power-supply cage handle and pull the power-supply cage assembly all the way up until the retainer latch locks the cage in place on the chassis.
11. Remove the front fan cage assembly (see "Removing the front system fan cage assembly" on page 138).

12. Take the other end of the signal cable that is attached to the drive backplane for drive bays 8 through 11 and route it through the plastic slot on the chassis underneath the front fan cage; then, connect it to connector J9 on the ServeRAID-MR10is SAS/SATA controller.
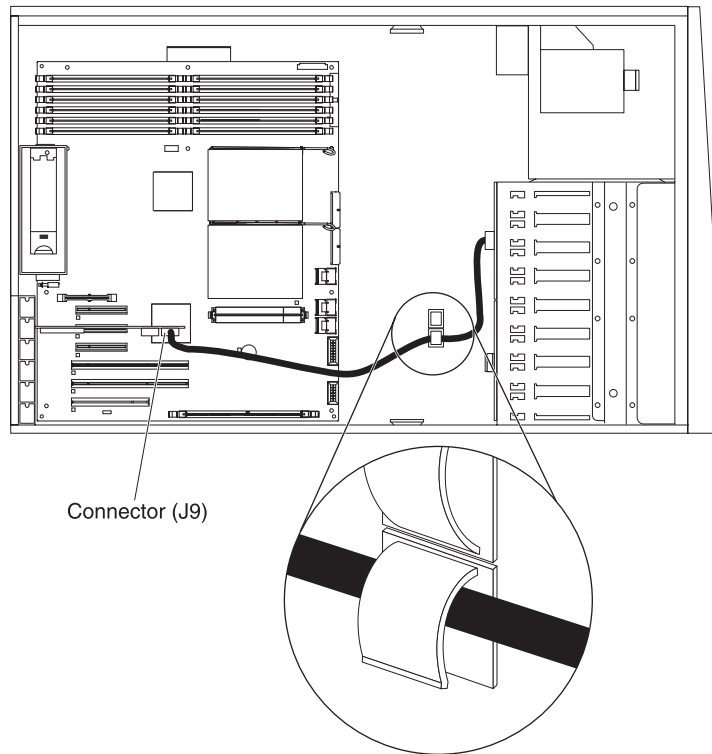
Connector (J9)

The following illustration shows the connectors on the controller to which you connect the signal cables from the drive backplanes.

ServeRAID-MR10is controller

Battery

Adapter connector (J8) for drives 0 - 3 signal cable

Adapter connector (J9) for drives 4 - 7 signal cable

The following illustration shows which end of the cable connects to the backplane and to the controller.

Connects to
ServeRAID-MR10is
controller

Connects to hard disk
drive backplane
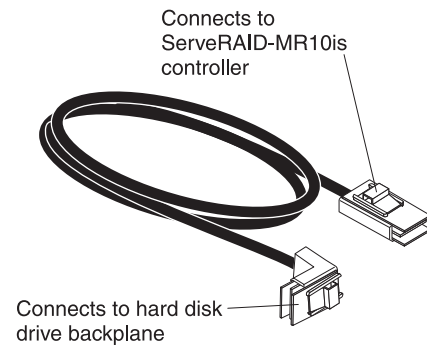
13. Reinstall the front fan cage assembly. Align the front fan cage assembly over the fan cage assembly slot and with the connector on the system board. Lower the fan cage assembly into the chassis and press down firmly until the fan cage assembly is seated firmly in place. Make sure that no cables will be pinched.

14. Take the other end of the signal cable that is attached to the drive backplane for drive bays 4 through 7 and route the cable around the right side of the front fan cage assembly and along the chassis wall (make sure that the cable is in front of the fan cage release tab): then, connect it to connector J8 on the ServeRAID-MR10is SAS/SATA controller.

Connector (J8)

Connector (J9)
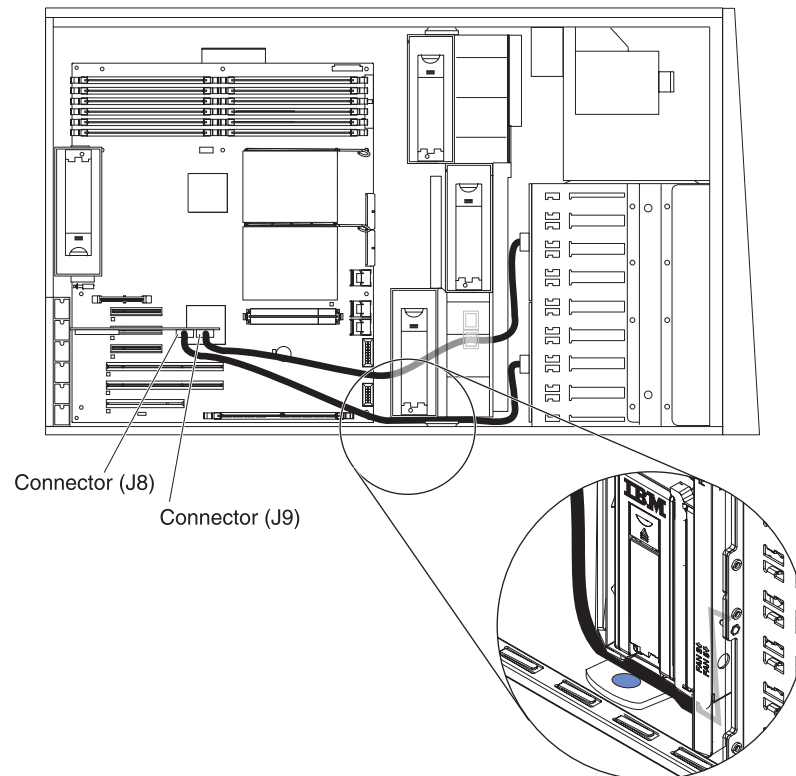
15. Rotate the rear adapter-retention bracket to the closed (locked) position.

16. Rotate the power-supply cage assembly back into the server. Press the power-supply cage release tab and rotate the power-supply cage assembly into the chassis.

17. Reinstall the hot-swap power supplies.

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

19. Replace the side cover (see "Installing the side cover" on page 109).

20. Lock the cover.

21. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Removing the DIMM air duct

To remove the DIMM air duct, complete the following steps.

1. Read the safety information that begins on page vii, and "Handling static-sensitive devices" on page 103.

2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables necessary to replace the device.

3. Unlock and remove the side cover (see "Removing the side cover" on page 108).

4. Rotate the power-supply cage assembly out of the chassis:
   - Hot-swap models:
     a. Remove the hot-swap power-supply. Press down on the orange release lever and pull the power supply out of the bay, using the handle.
     b. Lift up the power-supply cage handle and pull the power-supply cage assembly all the way up until the retainer latch locks the cage in place on the chassis.
   - Non-hot-swap models, lift up the power-supply cage handle and pull the power-supply cage assembly all the way up until the retainer latch locks the cage in place on the chassis.

5. Remove the plastic push-pins that secure the DIMM air duct to the power supply cage.
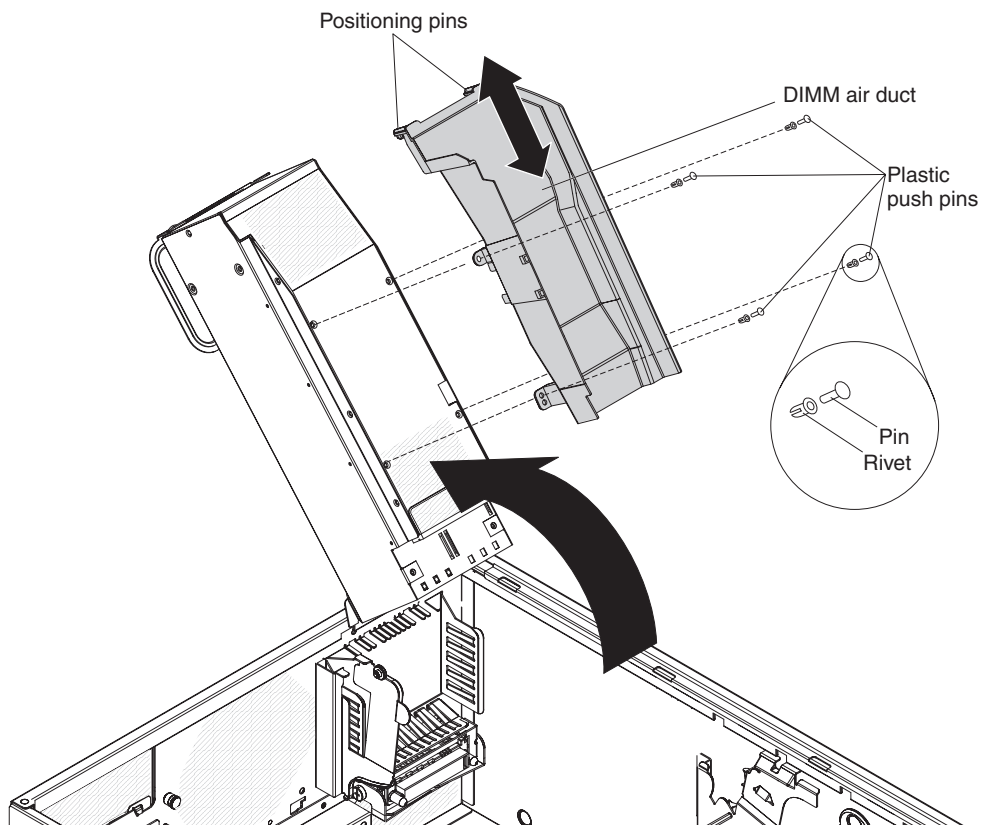
Figure 1. Removing the DIMM air duct

   a. Grasp the top of the plastic push-pins and pull them out of the rivets.

b. Grasp the rivets (seeFigure 1 on page 161) and pull them out of the mounting hole and set them to the side.

Note: If the DIMM air duct in your system is secured with screws, remove the screws.

6. Push the air duct up toward the rear of the power supply cage. Once the positioning pins are free of the power supply cage you can remove the air duct from the server.

Installing the DIMM air duct

To install or replace the DIMM air duct, complete the following steps:

1. Align the positioning pins on the end of the air duct so that they hang over the end of the power supply cage.

2. Slide the air duct down the power supply cage (away from the positioning pins) until the positioning pins lock in place and the mounting holes in the air duct align with the holes in the power supply cage.

3. Use the plastic push-pins and rivets to secure the air duct to the power supply cage (see Figure 1 on page 161). Place the rivets in the mounting holes and then insert the push-pins in the rivets. Press the push-pins all the way down to lock the rivets in place.

Note: If the air duct in your system uses screws, use the screws to secure the air duct to the power supply cage.

Removing the control-panel assembly

To remove the control-panel assembly, complete the following steps.

1. Read the safety information that begins on page vii and "Installation guidelines" on page 101.
2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.
3. Unlock and remove the side cover (see "Removing the side cover" on page 108).
4. Remove the bezel (see "Removing the bezel" on page 104).
5. Rotate the power-supply cage assembly out of the chassis:
   - Hot-swap models:
     a. Remove the hot-swap power-supply. Press down on the orange release lever and pull the power supply out of the bay, using the handle.
     b. Lift up the power-supply cage handle and pull the power-supply cage assembly all the way up until the retainer latch locks the cage in place on the chassis.
   - Non-hot-swap models, lift up the power-supply cage handle and pull the power-supply cage assembly all the way up until the retainer latch locks the cage in place on the chassis.
6. Remove the front fan-cage assembly (see "Removing the front system fan cage assembly" on page 138.
7. Slide the drives in bay 1 and bay 2 forward slightly (see "Removing a CD or DVD drive" on page 114 for more information). It is not necessary to remove these drives.
8. Disconnect the control-panel assembly cable from the system board, noting the routing of the cable (see "System-board internal connectors" on page 11 for the location of the front panel connector).
9. Locate the control-panel assembly release latch just above bay 1.

10. Press up on the release latch of the control-panel assembly and pull the assembly toward the rear of the server. After you pull the assembly out approximately half-way, start turning it downward and pull it out of the chassis.

Release latch

Control panel assembly
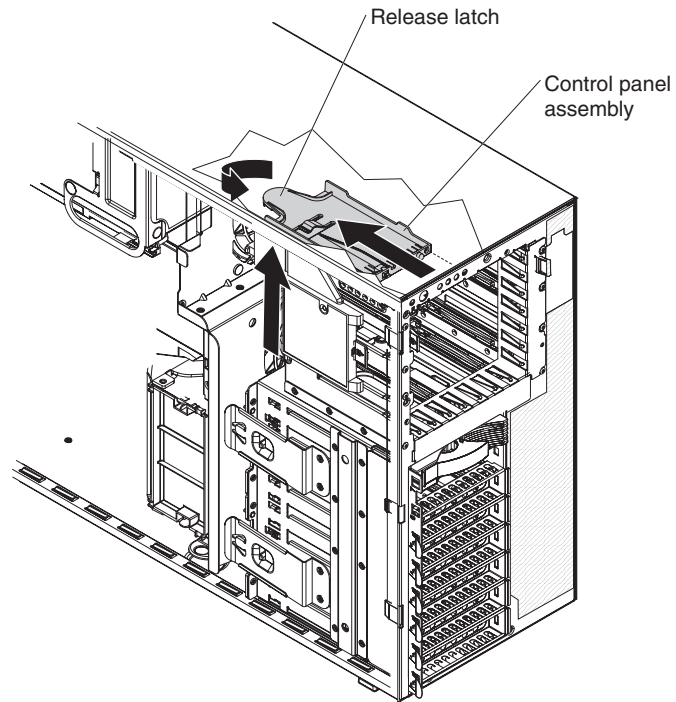
11. If you are instructed to return the control-panel assembly, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the control-panel assembly

To install the control-panel assembly, complete the following steps.

1. Position the front end of the control-panel assembly in the channel above drive bay 1.

2. Slide the control-panel assembly toward the front of the chassis until it clicks into place.

3. Reroute and connect the control-panel assembly cable to the system board (see "System-board internal connectors" on page 11 for the location of the front panel connector).

4. Slide the drives in bay 1 and bay 2 back into the drive bays if you pushed them slightly out earlier (see "Installing a CD or DVD drive" on page 115 for more information).

5. Reinstall the front fan cage assembly (see "Installing the front system fan cage assembly" on page 140.

6. Press the power-supply cage release tab and rotate the power-supply cage assembly into the chassis until it locks in place.

7. Return the power-supply cage handle to the locked position.

8. If you have a hot-swap model, reinstall the hot-swap power supplies (see "Installing a hot-swap power supply" on page 126).

9. Replace the bezel (see "Replacing the bezel" on page 106).

10. Install the side cover (see "Installing the side cover" on page 109).

11. Lock the side cover.

12. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Removing and replacing FRUs

Field replaceable units (FRUs) must be installed only by trained service technicians.

Removing the hot-swap power-supply cage assembly

To remove the hot-swap power-supply cage assembly, complete the following steps.

1. Read the safety information that begins on page vii and "Installation guidelines" on page 101.
2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.
3. Unlock and remove the side cover (see "Removing the side cover" on page 108).
4. Remove the hot-swap power supplies (see "Removing a hot-swap power supply" on page 124).

   Note: It might be helpful to lay the server on its side for the remainder of this procedure.
   Statement 11:

   CAUTION:
   The following label indicates sharp edges, corners, or joints nearby.

   Statement 17:

   CAUTION:
   The following label indicates moving parts nearby.

5. Lift up the power-supply cage handle and pull the power-supply cage assembly all the way up until the retainer latch locks the cage in place on the chassis.
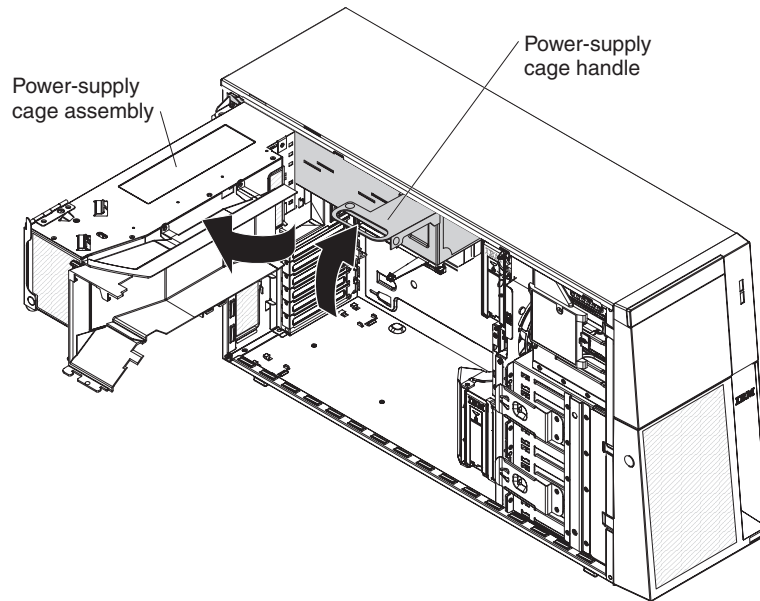
6. While supporting the power-supply cage, remove the three screws from the pivot bracket that secure the power-supply cage to the chassis; then, lift the cage off the chassis.
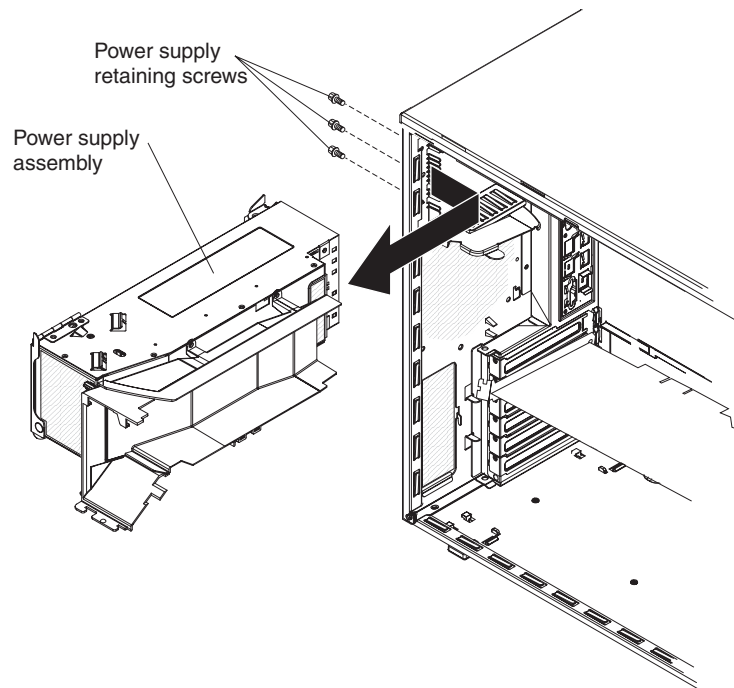
7. If you are instructed to return the power-supply cage, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the hot-swap power-supply cage assembly

To install the hot-swap power-supply cage assembly, complete the following steps.

1. Align the screw holes on the power-supply cage pivot bracket with the corresponding screw holes on the rear of the chassis. Support the cage while you install the three screws to secure the pivot bracket on the power-supply cage to the chassis.
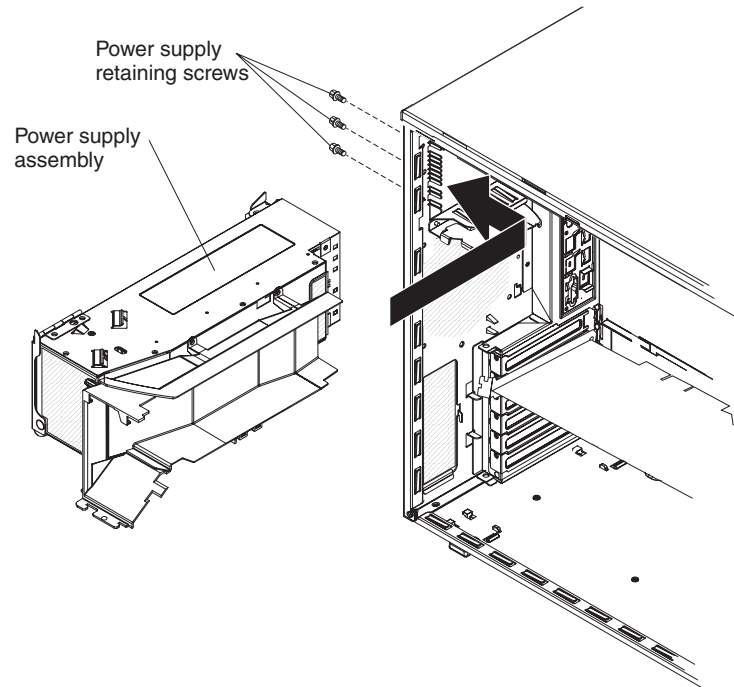
2. Press the power-supply cage release tab and rotate the power-supply cage assembly into the chassis until it locks in place.

Power supply
support bracket

Power supply
release tab
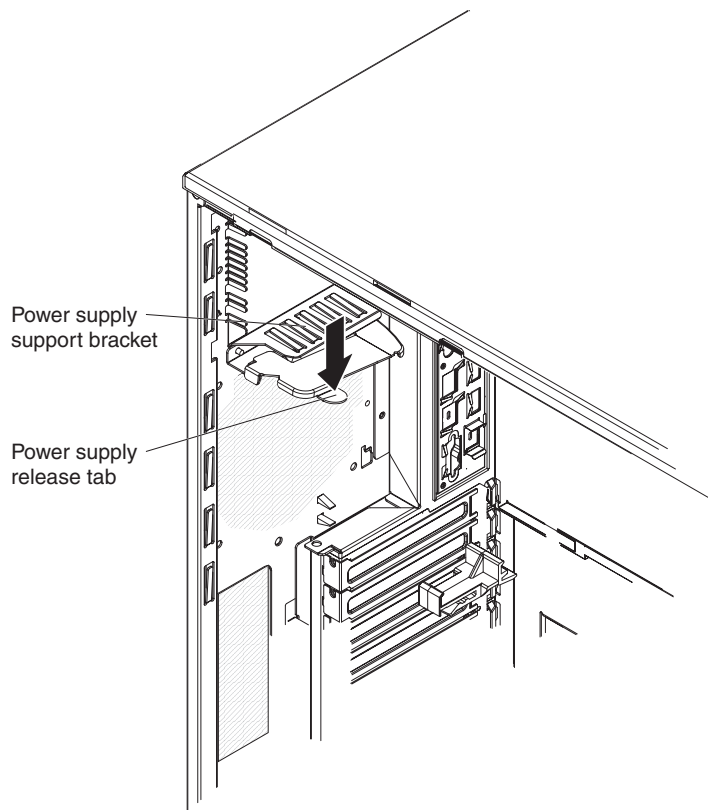
3. Return the power-supply cage handle to the locked position.

4. Reinstall the hot-swap power supplies (see "Installing a hot-swap power supply" on page 126).

5. Install the side cover (see "Installing the side cover" on page 109).

6. Lock the side cover.

7. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Removing the simple-swap backplate

This procedure applies only to server models that have a simple-swap backplate installed on the back of the hard disk drive cage.

To remove the simple-swap backplate, complete the following steps.

1. Read the safety information that begins on page vii and "Installation guidelines" on page 101.

2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.

3. Unlock and remove the side cover (see "Removing the side cover" on page 108).

4. Rotate the power-supply cage assembly out of the chassis:

   • Hot-swap models:

     a. Remove the hot-swap power-supply. Press down on the orange release lever and pull the power supply out of the bay, using the handle.

     b. Lift up the power-supply cage handle and pull the power-supply cage assembly all the way up until the retainer latch locks the cage in place on the chassis.

- Non-hot-swap models, lift up the power-supply cage handle and pull the power-supply cage assembly all the way up until the retainer latch locks the cage in place on the chassis.

5. Remove the front fan-cage assembly (see "Removing the front system fan cage assembly" on page 138.

6. Remove the simple-swap hard disk drives that are installed in the hard disk drive cage (see "Removing a simple-swap hard disk drive" on page 122).

7. Disconnect the combination signal/power cable from the simple-swap backplate.

8. Lift up on the spring-release latch on the side of the drive cage and rotate the simple-swap backplate away from the drive cage until the backplate tabs at the bottom of the drive cage disengage from the chassis.
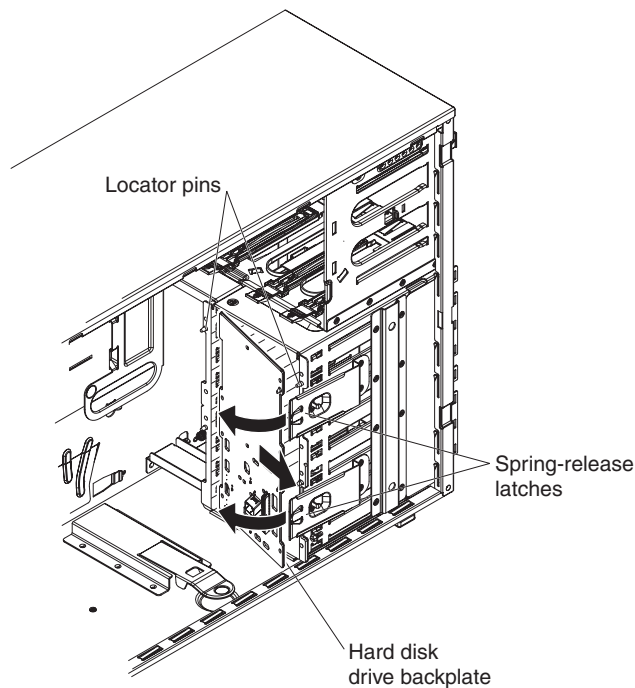
9. Remove the simple-swap backplate and set it aside.

10. If you are instructed to return the simple-swap backplate, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the simple-swap backplate

This procedure applies only to server models that have a simple-swap backplate installed on the back of the hard disk drive cage.

To install the simple-swap backplate, complete the following steps.

1. Insert the bottom tabs of the simple-swap backplate with the slots on the lower lip of the drive cage.
2. Rotate the simple-swap backplate toward the drive cage until it locks in place in the retaining tab of the spring-release latch on the drive cage.
3. Connect the combination signal/power cable the backplate (see "System-board internal connectors" on page 11 for the location of the connectors).
4. Install the simple-swap hard disk drives that were removed from the hard disk drive cage (see "Installing a simple-swap hard disk drive" on page 123).
5. Reinstall the front fan cage assembly (see "Installing the front system fan cage assembly" on page 140.
6. Press the power-supply cage release tab and rotate the power-supply cage assembly into the chassis until it locks in place.
7. Return the power-supply cage handle to the locked position.
8. If you have a hot-swap model, reinstall the hot-swap power supplies (see "Installing a hot-swap power supply" on page 126).
9. Install the side cover (see "Installing the side cover" on page 109).
10. Lock the side cover if it was unlocked during removal.
11. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Removing the SAS/SATA backplane

To remove the SAS/SATA backplane, complete the following steps.

1. Read the safety information that begins on page vii and "Installation guidelines" on page 101.
2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.
3. Unlock and remove the side cover (see "Removing the side cover" on page 108).
4. Remove the hot-swap hard disk drives that are installed in the hard disk drive cage (see "Removing a hot-swap hard disk drive" on page 119).
5. Rotate the power-supply cage assembly out of the chassis:
   - Hot-swap models:
     a. Remove the hot-swap power-supply. Press down on the orange release lever and pull the power supply out of the bay, using the handle.
     b. Lift up the power-supply cage handle and pull the power-supply cage assembly all the way up until the retainer latch locks the cage in place on the chassis.
   - Non-hot-swap models, lift up the power-supply cage handle and pull the power-supply cage assembly all the way up until the retainer latch locks the cage in place on the chassis.:
6. Remove the front fan-cage assembly (see "Removing the front system fan cage assembly" on page 138.
7. Disconnect the power and signal cables from the SAS/SATA backplane.
8. Lift up on the spring-release latch on the side of the drive cage and rotate the SAS/SATA backplane away from the drive cage until the backplane tab disengage from the chassis.

Locator pins

Hard disk drive backplane
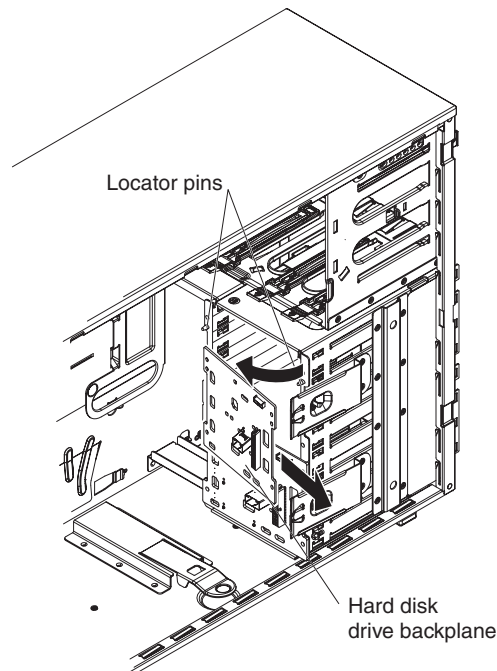
9. If you are instructed to return the SAS/SATA backplane, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the SAS/SATA backplane

To install the SAS/SATA backplane, complete the following steps.

1. Insert the bottom tabs of the SAS/SATA backplane with the slots on the lower lip of the drive cage.
2. Rotate the SAS/SATA backplane toward the drive cage until it locks in place in the retention tab of the spring-release latch on the drive cage.
3. Connect the power and signal cables to the SAS/SATA backplane.
4. Install the hot-swap hard disk drives that were removed from the hard disk drive cage (see "Installing a hot-swap hard disk drive" on page 120).
5. Reinstall the front fan cage assembly (see "Installing the front system fan cage assembly" on page 140.
6. Press the power-supply cage release tab and rotate the power-supply cage assembly into the chassis until it locks in place.
7. Return the power-supply cage handle to the locked position.
8. If you have a hot-swap model, reinstall the hot-swap power supplies (see "Installing a hot-swap power supply" on page 126).
9. Install the side cover (see "Installing the side cover" on page 109).
10. Lock the side cover.
11. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Removing the hot-swap power supply docking cable assembly

To remove the hot-swap power supply docking cable assembly, complete the following steps:

1. Read the safety information that begins on page vii and "Installation guidelines" on page 101.
2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.
3. Unlock and remove the side cover (see "Removing the side cover" on page 108).

    Note: It might be helpful to lay the server on its side for the remainder of this procedure.
4. Remove the power supply from the power supply cage.
5. Lift up the power-supply cage handle and pull the power-supply cage assembly all the way up until the retainer latch locks the cage in place on the chassis.
6. Disconnect the power supply docking cable assembly from the system board.
7. Using a phillips screwdriver, remove the three screws that secure the docking cable to the chassis; then, remove it from the chassis.
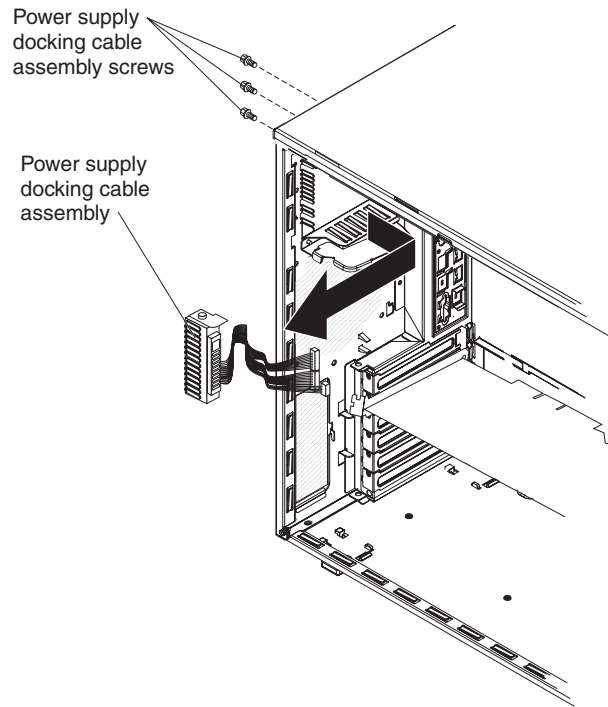
Power supply
docking cable
assembly screws

Power supply
docking cable
assembly

8. If you are instructed to return the power supply, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the hot-swap power supply docking cable assembly

To install a new hot-swap power supply docking cable assembly, complete the following steps:

1. Position the hot-swap power supply docking cable assembly from the inside the server and insert it in the power supply docking cable slot on the rear of the chassis (aligning the holes with the screw holes on the chassis).
2. Secure the hot-swap power supply docking cable assembly to the chassis with the three screws that you removed earlier.
3. Connect the hot-swap power supply docking cable to the system board.
4. Rotate the power supply cage back into the server.
5. Install the power supplies back into the power supply cage.
6. Install the side cover (see "Installing the side cover" on page 109).
7. Lock the side cover.
8. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Removing the microprocessor and heat sink

To remove the microprocessor and heat sink, complete the following steps.

1. Read the safety information that begins on page vii and "Installation guidelines" on page 101.
2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.
3. Turn the server on its side so that it is lying flat, with the cover facing up.
4. Unlock and remove the side cover (see "Removing the side cover" on page 108).
5. Rotate the power-supply cage assembly out of the chassis:
   - Hot-swap models:
     a. Remove the hot-swap power-supply. Press down on the orange release lever and pull the power supply out of the bay, using the handle.
     b. Lift up the power-supply cage handle and pull the power-supply cage assembly all the way up until the retainer latch locks the cage in place on the chassis.
   - Non-hot-swap models, lift up the power-supply cage handle and pull the power-supply cage assembly all the way up until the retainer latch locks the cage in place on the chassis.:
6. Remove the microprocessor air baffle by grasping the two tabs and squeezing them together slightly and lift the baffle out of the server.
7. Rotate the rear system fan air baffle up out of the way by grasping the tab and pulling the baffle all the way up; then, slide it outward over the rear of the server until it locks in place.
8. Disconnect any cables that impede access to the heat sink and microprocessor.
9. Remove the heat sink from the microprocessor:

   Attention: The microprocessor release lever is spring-loaded when the microprocessor is in place. Releasing the lever too quickly or allowing it to spring upward can damage the microprocessor and surrounding components.

   a. Lift the heat-sink locking lever, moving it to the side and slowly releasing it to the open (up) position.

Important: Be careful when you handle the microprocessor and heat sink. If the microprocessor and heat sink will be reused, do not contaminate the thermal material between them.

b. Tip the top of the heat sink toward the front of the server while you slide it away from the lower flange of the retention module; then, remove it from the server. After removal, place the heat sink on its side on a clean, flat surface.

Heat-sink locking lever

Heat-sink
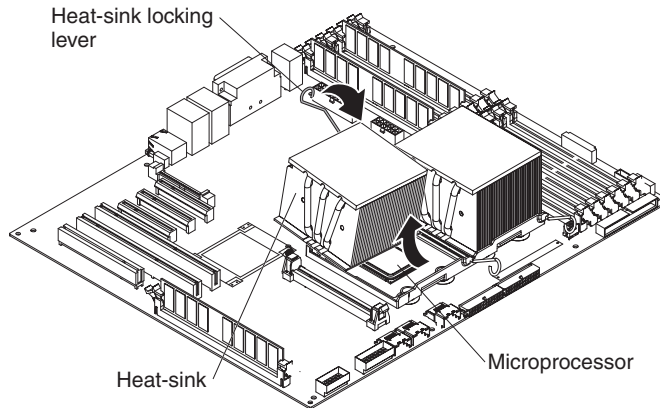
Microprocessor

10. Release the microprocessor release lever by pressing down on the end, moving it to the side, and slowly releasing it to the open (up) position.

Microprocessor release lever (fully open)

Microprocessor bracket frame
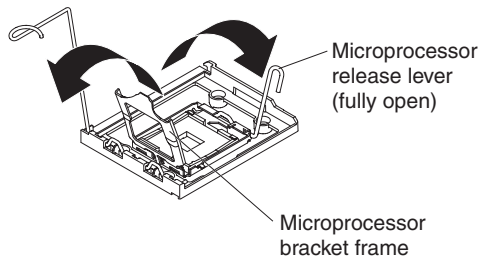
11. Open the microprocessor bracket frame by lifting up the tab on the top edge.
12. Carefully lift the microprocessor straight up and out of the socket, and place it on a static-protective surface.
13. If you are instructed to return the microprocessor and heat sink, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing a microprocessor and heat sink

Important: Some models support dual-core microprocessors or quad-core microprocessors. Do not mix dual-core microprocessors and quad-core microprocessors in the same system. Install all dual-core or all quad-core microprocessors in the server.

To install the microprocessor and heat sink, complete the following steps.
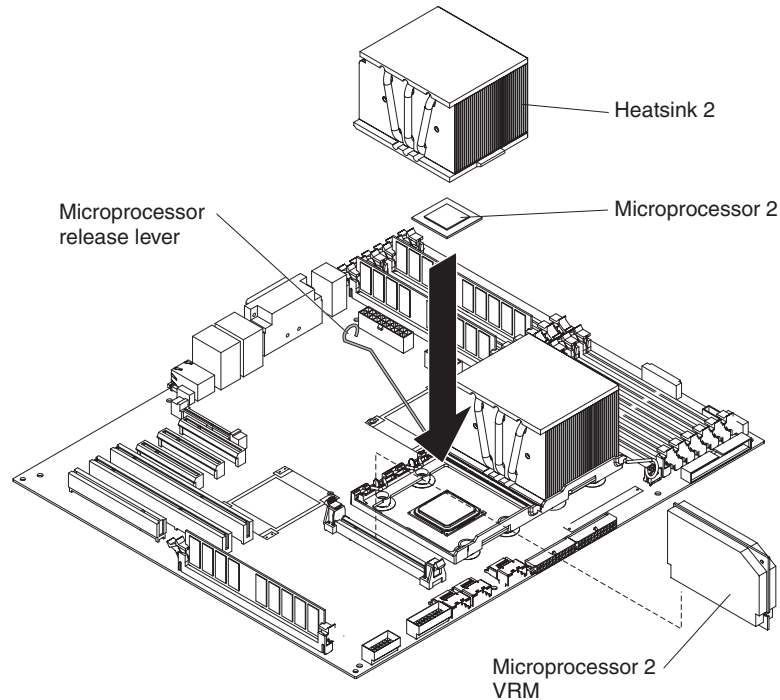
1. Touch the static-protective package that contains the microprocessor to any unpainted metal surface on the server. Then, remove the microprocessor from the package.
2. Remove the protective cover, tape, or label from the surface of the microprocessor socket, if any is present.
3. Rotate the release lever on the microprocessor socket to the fully open position.

   Attention: Make sure that the release 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.
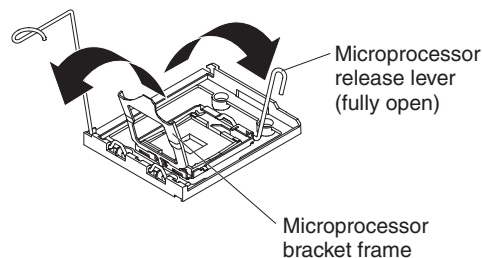
4. Carefully place the microprocessor into the microprocessor socket.

   Note: To maintain the correct orientation between the microprocessor and the microprocessor socket during installation, observe the following information:

   • The microprocessor has two notches that are keyed to two tabs on the sides of the socket.

   • Make sure that the microprocessor is oriented with the notches and alignment marks in the socket before you try to close the lever.
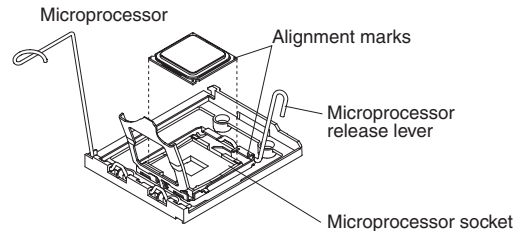
   • Do not use excessive force when pressing the microprocessor into the socket.

5. Close the microprocessor bracket frame; then, close the microprocessor release lever to lock the microprocessor securely in place.

6. Install the heat sink:

   a. Make sure that the heat-sink locking lever is in the fully open position.

      Important: Be careful when you handle the microprocessor and heat sink. Do not contaminate the thermal material between them.

   b. Slide the bottom edge of the heat sink under the lower flange of the retention module; then, place the top of the heat sink onto the top of the retention module.
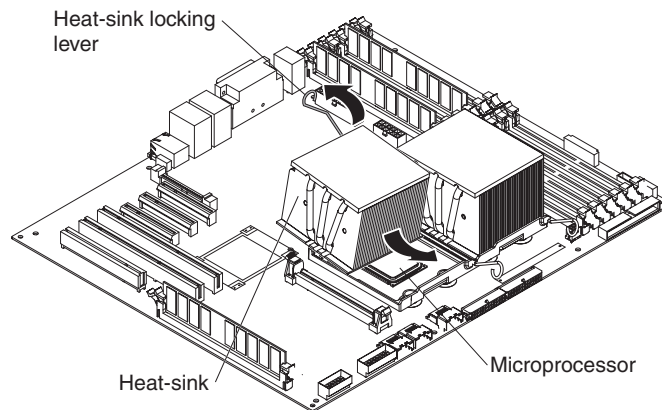
   c. Close the heat-sink locking lever and lock it securely in place.

      Note: If you are installing an additional microprocessor in microprocessor socket 2, you must also install a VRM.

7. If installing a second microprocessor, install a VRM in the VRM connector on the system board.

   a. Open the retaining clips on each end of the VRM connector.

   b. Turn the VRM so that the keys align with the slot.

   c. Insert the VRM into the connector by aligning the edges of the VRM with the slots at the end of the VRM connector. Firmly press the VRM straight

down into the connector by applying pressure on both ends of the VRM simultaneously. The retaining clips snap into the locked position when the VRM is seated in the connector.

8. Reconnect any cables that you disconnected during the removal of the old microprocessor.

9. Reinstall microprocessor air baffle.

10. Rotate the rear system fan air baffle back into the server.

11. Rotate the power supply cage back into the server.

12. If you have a hot-swap model, reinstall the hot-swap power supplies back into the power supply cage.

13. Install the side cover (see "Installing the side cover" on page 109).

14. Lock the side cover.

15. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Thermal grease

The thermal grease must be replaced whenever 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.

When you are installing the heat sink on the same microprocessor that is was removed from, make sure that:

- The thermal grease on the heat sink and microprocessor is not contaminated.
- Additional thermal grease is not added to the existing thermal grease on the heat sink and microprocessor.

Note:

- Read the Safety information on page vii.
- Read the "Installation guidelines" on page 101.
- Read "Handling static-sensitive devices" on page 103.

To replace damaged or contaminated thermal grease on the microprocessor and heat sink, complete the following steps:

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: Make 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.

0.02 mL of thermal grease
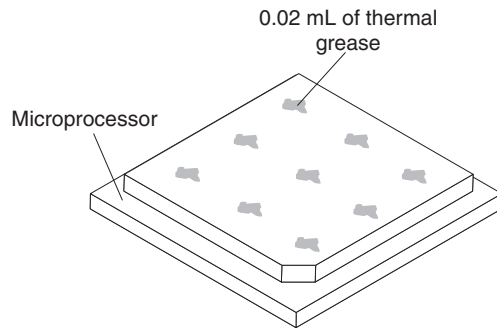
Microprocessor

5. Use the thermal-grease syringe to place 9 uniformly spaced dots of 0.02 mL each on the top of the microprocessor. The outermost dots must be within approximately 5 mm of the edge of the microprocessor, this is to ensure uniform distribution of the grease.
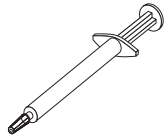
Note: If the grease is properly applied, approximately half of the grease will remain in the syringe.

6. Install the heat sink onto the microprocessor as described in "Installing a microprocessor and heat sink" on page 177.

Removing the system board

To remove the system board, complete the following steps.

1. Read the safety information that begins on page vii and "Installation guidelines" on page 101.

2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.

3. Turn the server on its side so that it is lying flat, with the cover facing up.

4. Unlock and remove the side cover (see "Removing the side cover" on page 108).

5. Rotate the power-supply cage assembly out of the chassis:
   - Hot-swap models:
     a. Remove the hot-swap power-supply. Press down on the orange release lever and pull the power supply out of the bay, using the handle.
     b. Lift up the power-supply cage handle and pull the power-supply cage assembly all the way up until the retainer latch locks the cage in place on the chassis.
   - Non-hot-swap models, lift up the power-supply cage handle and pull the power-supply cage assembly all the way up until the retainer latch locks the cage in place on the chassis.

6. Remove the front fan-cage assembly (see "Removing the front system fan cage assembly" on page 138.

7. Note where each cable is connected; then, disconnect all cables from the system board.

8. Remove any of the following components that are installed on the system board and put them in a safe, static-protective place:
   - Adapters (see "Removing an adapter" on page 110).
   - Microprocessor and heat sink (see "Removing the microprocessor and heat sink" on page 175).
   - DIMMs (see "Removing a memory module" on page 131).

     Note: If you replace the system board and need to remove the DIMM thermal baffles from the non-functional DIMM connectors 3, 6, 9, and 12, use a pointing object and align it through the holes on the end of the DIMM thermal baffles and press down on the release clip to release the thermal baffles.
   - Battery (see "Removing the battery" on page 145).

9. Rotate the rear system fan air baffle up out of the way by grasping the tab and pulling the baffle all the way up; then, slide it outward over the rear of the server until it locks in place.

10. Rotate the system board retention latch toward the rear of the chassis.

11. Slide the system board toward the front of the server to disengage the tabs from the chassis; then, grasp the handles on each side and carefully lift the system board out of the server.
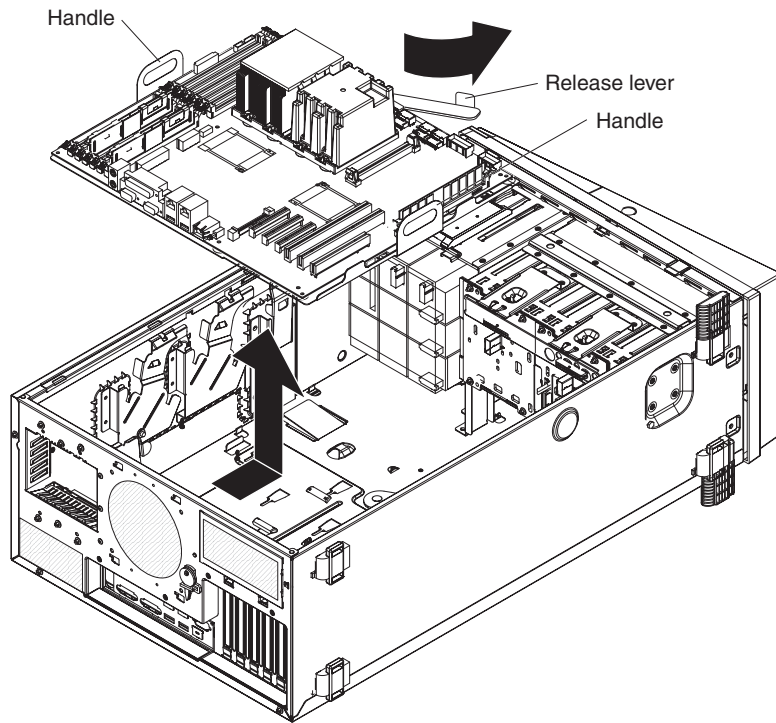
12. Remove the socket covers from the microprocessor sockets on the new system board and place them on the microprocessor sockets of the system board you are removing.

13. If you are instructed to return the system board, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the system board

To install the system board, complete the following steps.

1. Grasp the system board by the handles and insert the system board into the chassis at a slanted angle and slide it toward the rear of the server until it fully locks into place on the chassis.

2. Install any of the following components that were removed from the system board:

   - Battery (see "Installing the battery" on page 146).
   - DIMMs (see "Installing a memory module" on page 132).

     Note: Replace the DIMM thermal baffles also, if you removed them.
   - Microprocessor and heat sink (see "Installing a microprocessor and heat sink" on page 177).
   - Adapters (see "Installing an adapter" on page 111)

3. Reconnect any cables to the system board that you disconnected during removal.

4. Reinstall the front fan cage assembly (see "Installing the front system fan cage assembly" on page 140.

5. Rotate the rear system fan air baffle back into the server.

6. Press the power-supply cage release tab and rotate the power-supply cage assembly into the chassis until it locks in place.

7. Return the power-supply cage handle to the locked position.

8. If you have a hot-swap model, reinstall the hot-swap power supplies (see "Installing a hot-swap power supply" on page 126).

9. Install the side cover (see "Installing the side cover" on page 109).

10. Lock the side cover.

11. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Chapter 5. Configuration information and instructions

This chapter provides information about updating the firmware and using the configuration utilities.

Updating the firmware

The firmware in the server is periodically updated and is available for download on the Web. Go to http://www.ibm.com/support/ to check for the latest level of firmware, such as BIOS code, vital product data (VPD) code, device drivers, and service processor firmware.

When you replace a device in the server, you might have to either update the server with the latest version of the firmware that is stored in memory on the device or restore the pre-existing firmware from a diskette or CD image.

The following items are downloadable from the Web at http://www.ibm.com/support/:
- BIOS code
- Diagnostics programs
- BMC firmware
- Ethernet firmware
- ServeRAID firmware
- SAS/SATA firmware

Major components contain VPD code. You can select to update the VPD code during the BIOS code update procedure.

Configuring the server

The *ServerGuide Setup and Installation* CD provides software setup tools and installation tools that are specifically designed for the server. Use this CD during the initial installation of the server to configure basic hardware features and to simplify the operating-system installation. (See "Using the ServerGuide Setup and Installation CD" on page 186 for more information.)

In addition to the *ServerGuide Setup and Installation* CD, you can use the following configuration programs to customize the server hardware:
- Configuration/Setup Utility program
- RAID configuration programs
  - IBM ServeRAID Configuration Utility program for the following server models:
    - Hot-swap SAS
    - Hot-swap SATA
    - Simple-swap SATA models when the optional ServeRAID-8k Controller is installed
  - Adaptec® RAID (HostRAID™) Configuration Utility program (for simple-swap SATA models with no RAID adapter installed)
  - ServeRAID Manager
- Boot Menu program
- Broadcom Gigabit Ethernet Utility program

For more information about these programs, see "Configuring the server" in the *User's Guide* on the IBM *System x3400 Documentation* CD.

Using the ServerGuide Setup and Installation CD

The *ServerGuide Setup and Installation* CD provides state-of-the-art programs to detect the server model and hardware options that are installed, configure the server hardware, provide device drivers, and help you install the operating system. For information about the supported operating-system versions, see the label on the CD. If the *ServerGuide Setup and Installation* CD did not come with the server, you can download the latest version from http://www.ibm.com/pc/qtechinfo/MIGR-4ZKPPT.html.

To start the *ServerGuide Setup and Installation* CD, complete the following steps:

1. Insert the CD, and restart the server. If the CD does not start, see "ServerGuide problems" on page 54

2. Follow the instructions that appear on the screen to:
   a. Select your language.
   b. Select your keyboard layout and country.
   c. View the overview to learn about ServerGuide features.
   d. View the readme file to review installation tips about the operating system and adapter.
   e. Start the setup and hardware configuration programs.
   f. Start the operating system installation. You will need your copy of the operating-system CD.

Using the Configuration/Setup Utility program

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

- Change interrupt request (IRQ) settings
- Change the startup drive sequence
- Configure serial-port assignments
- Enable USB keyboard and mouse support
- Resolve configuration conflicts
- Set the date and time
- Set passwords and security settings

To start the Configuration/Setup Utility program, complete the following steps:

1. Turn on the server.

2. When the prompt `Press F1 for Configuration/Setup` appears, press F1. If an administrator password has been set, you must type the administrator password to access the full Configuration/Setup Utility menu.

3. Follow the instructions on the screen.

See the *User's Guide* on the IBM *xSeries Documentation* CD for more detailed information about the Configuration/Setup Utility program.

Using the RAID configuration programs

Note: RAID options and HostRAID are not supported on the SCO 6.0 and UnixWare 7.14 operating systems.

Use the IBM ServeRAID Configuration Utility program, Adaptec RAID Configuration Utility program, and ServeRAID Manager to configure and manage redundant array of independent disks (RAID). Be sure to use these programs as described in this document.

The ServeRAID 8k-I SAS Controller that comes with the server (hot-swap SAS and hot-swap SATA models) enables you to configure multiple physical SAS or SATA hard disk drives to operate as logical drives in a disk array. The server comes with a CD containing the ServeRAID Manager program, which you can use to configure the ServeRAID 8k-I SAS Controller. If your server comes with an operating system installed, such as Microsoft Windows 2000 Datacenter Server, see the software documentation that comes with the server for configuration information.

Use these programs to perform the following tasks:
- Perform a low-level format on a hard disk drive
- View or change IDs for attached devices
- Set protocol parameters on hard disk drives
- Monitor operation of the RAID controller
- Configure a redundant array of independent disks (RAID) array
- View or change the RAID configuration and associated devices

Consider the following information when using the RAID configuration programs to configure and manage arrays:
- The integrated SATA controller (simple-swap SATA models) with integrated SATA RAID (also known as HostRAID) supports RAID level-0 and level-1 when two drives are installed. When the maximum four drives are installed, RAID level-10 is also supported. See "Configuring simple-swap SATA RAID (HostRAID)" on page 189.

  Note: In addition, when the maximum four drives and the optional ServeRAID-8k Controller are installed in the simple-swap SATA models, the server can also support RAID level-5. See "Installing the ServeRAID-8k adapter" on page 152 for details about installing and cabling the ServeRAID-8k Controller to enable RAID level-5 support on simple-swap SATA models.
- The onboard SAS/SATA controller (hot-swap SAS and hot-swap SATA models) supports RAID level-0 and level-1 when two drives and the ServeRAID 8k-I controller are installed. When four drives are installed, RAID level-10 is also supported. When you upgrade to the maximum eight drives and the optional ServeRAID-8k controller is installed, RAID levels 1e, 5, and 6 also are supported.
- You can order an optional IBM ServeRAID-MR10is VAULT SAS/SATA Controller that supports RAID levels 0, 1, 5, 6, 10, 50, and 60. You can install the ServeRAID-MR10is SAS/SATA controller only in server models with eight 3.5 inch hot-swap hard disk drives installed. For instructions on how to install the ServeRAID-MR10is SAS/SATA controller, see "Installing the optional IBM ServeRAID-MR10is VAULT SAS/SATA Controller" on page 156 for instructions on how to install this adapter.

  Note: Note: The onboard RAID controller will be disabled by BIOS when the ServeRAID-MR10is SAS/SATA controller is installed in the server.
- Hard disk drive capacities affect how you create arrays. The drives in an array can have different capacities, but the RAID controller treats them as if they all have the capacity of the smallest hard disk drive.

- To help ensure signal quality, do not mix drives with different speeds and data rates.
- To update the firmware and BIOS code for an optional ServeRAID controller, you must use the IBM *ServeRAID Support* CD that comes with the ServeRAID option.
- If you install a different type of RAID controller in the server, use the method that is described in the instructions that come with the controller to view or change settings for attached devices.

Configuring hot-swap SAS, hot-swap SATA, or simple-swap SATA (some models) RAID

Note: RAID options are not supported on the SCO 6.0 and UnixWare 7.14 operating systems.

Use the IBM ServeRAID Configuration Utility program to configure and manage hot-swap SAS or hot-swap SATA redundant array of independent disks (RAID) on the following server models:

- Hot-swap SAS
- Hot-swap SATA
- Simple-swap models with the optional ServeRAID-8k Controller installed

This utility is part of the BIOS code. The IBM ServeRAID Configuration Utility program adds RAID functionality to the onboard SAS/SATA controller. The onboard SAS/SATA controller comes enabled by default.

Using the IBM ServeRAID Configuration Utility program: Use the IBM ServeRAID Configuration Utility to perform the following tasks:

- Configure a redundant array of independent disks (RAID) array
- View or change the RAID configuration and associated devices

For additional information about how to use the IBM ServeRAID Configuration Utility, see the documentation on the IBM *ServeRAID Support* CD.

IBM ServeRAID Configuration Utility menu choices: The following choices are on the IBM ServeRAID Configuration Utility menu:

- **Array Configuration Utility**

  Select this choice to create, manage, or delete arrays, add or delete a hot-spare drive, or initialize drives.

- **SerialSelect Utility**

  Select this choice to configure the controller interface definitions or to configure the physical transfer and SAS or SATA address of the selected drive.

- **Disk Utilities**

  Select this choice to format a disk or verify the disk media. Select a device from the list and read the instructions on the screen carefully before making a selection.

Starting IBM ServeRAID Configuration Utility program: To start the IBM ServeRAID Configuration Utility program, complete the following steps:

1. Turn on the server.
2. When the message `Press <CTRL><A> for IBM ServeRAID Configuration Utility` appears, press Ctrl+A. If you have set an administrative password, you are prompted to type the password.

3. To select a choice from the menu, use the arrow keys to highlight it and press Enter.

Creating a RAID array: To use the IBM ServeRAID Configuration Utility to configure a RAID level-1 array, complete the following steps:

1. From the IBM ServeRAID Configuration Utility program menu, select **Array Configuration Utility**.
2. Select **Create Array**.
3. From the list of ready drives, select the two drives that you want to group into the array.
4. When you are prompted to select the RAID type, select **RAID 0** or **RAID-1**.
5. (Optional) Type an identifier for the array.
6. When you are prompted for the array build method, select **Quick Init**.
7. Follow the instructions on the screen to complete the configuration; then, select **Done** to exit.
8. Restart the server.

Viewing the array configuration: To view information about the RAID array, complete the following steps:

1. Start the IBM ServeRAID Configuration Utility program.
2. From the IBM ServeRAID Configuration Utility window, select **Manage Arrays**.
3. Select an array and press Enter.
4. To exit from the program, press Esc.

For additional information about using the IBM ServeRAID Configuration Utility program to create, configure, and manage arrays, see the documentation on the IBM *ServeRAID Support* CD.

Configuring simple-swap SATA RAID (HostRAID)

Use the Adaptec RAID Configuration Utility program to configure and manage simple-swap SATA redundant array of independent disks (RAID) on simple-swap SATA models with no ServeRAID adapter installed.

This utility is part of the BIOS code. The Adaptec RAID Configuration Utility program adds RAID functionality to the integrated SATA controller. The integrated Serial ATA (SATA) controller comes disabled by default. You must enable it and install the device drivers before you can use it. The device drivers, documentation, and other information are available on the IBM *ServeRAID-8e (Adaptec HostRAID) Support* CD.

Enabling the Serial ATA (SATA) controller: To enable the SATA RAID controller, complete the following steps:

1. Turn on the server.
2. When the prompt `Press F1 for Configuration/Setup` appears, press F1. If you have set an administrator password, you are prompted to type the password.
3. Select **Devices and I/O Ports --> Advanced Chipset Control**.
4. Select **SATA Controller Mode Option**. Change the value to **Enhanced**.
5. Scroll down and select **SATA RAID Enable**.
6. Select **Enabled**.
7. Press Esc; then, select **Yes** to save the changes.

Using the Adaptec RAID Configuration Utility program:

Note: Adaptec RAID (also known as HostRAID) is not supported on the SCO 6.0 and UnixWare 7.14 operating systems.

Use the Adaptec RAID Configuration Utility program to perform the following tasks:

- Configure a redundant array of independent disks (RAID) array
- View or change the RAID configuration and associated devices

For additional information about using the Adaptec RAID Configuration Utility program, see the documentation on the IBM *ServeRAID-8e (Adaptec HostRAID) Support* CD that comes with the server.

Adaptec RAID Configuration Utility menu choices: The following choices are on the Adaptec RAID Configuration Utility menu:

- **Array Configuration Utility**

  Select this choice to create, manage, or delete arrays, add or delete a hot-spare drive, or initialize drives.

- **SerialSelect Utility**

  Select this choice to configure the controller interface definitions or to configure the physical transfer and SATA address of the selected drive.

- **Disk Utilities**

  Select this choice to format a disk or verify the disk media. Select a device from the list and read the instructions on the screen carefully before making a selection.

Starting the Adaptec RAID Configuration Utility program: To start the Adaptec RAID Configuration Utility program, complete the following steps:

1. Turn on the server.
2. When the prompt `Press <CTRL><<A> for Adaptec RAID Configuration Utility` appears, press Ctrl+A.
3. To select a choice from the menu, use the arrow keys to highlight it and press Enter.

Creating a RAID array: To use the Adaptec RAID Configuration Utility program to configure a RAID level-1 array, complete the following steps:

1. Start the Adaptec RAID Configuration Utility program.
2. Select **Array Configuration Utility**.
3. Select **Create Array**.
4. From the list of ready drives, select the two drives that you want to group into the array.
5. When you are prompted to select the RAID level, select **RAID 0** or **RAID-1**.
6. (Optional) Type an identifier for the array.
7. When you are prompted for the array build method, select **Quick Init**.
8. Follow the instructions on the screen to complete the configuration, and select **Done** to exit.
9. Restart the server.

Viewing the array configuration: To view information about the RAID array, complete the following steps:

1. Start the Adaptec RAID Configuration Utility program.
2. Start the Array Configuration Utility.
3. From the Array Configuration Utility window, select **Manage Arrays**.

4. Select an array and press Enter.

5. Press Esc to exit from the program.

For additional information about using the Adaptec RAID Configuration Utility program to create, configure, and manage arrays, see the documentation on the IBM *ServeRAID-8e (Adaptec HostRAID) Support* CD.

Using ServeRAID Manager

Important: RAID options and HostRAID are not supported on the SCO 6.0 and UnixWare 7.14 operating systems.

Use ServeRAID Manager, which is on the IBM *ServeRAID Manager Application* CD, to perform the following tasks:

• Configure a redundant array of independent disks (RAID) array

• Restore a SAS or SATA hard disk drive to the factory-default settings, erasing all data from the disk

• View the RAID configuration and associated devices

• Monitor the operation of the RAID controllers

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

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

Configuring the controller

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

To run ServeRAID Manager in Startable CD mode, turn on the server; then, insert the IBM *ServeRAID Support* CD into the CD or DVD drive. If ServeRAID Manager detects an unconfigured controller and ready drives, the Configuration wizard starts.

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

Using express configuration: To use express configuration, complete the following steps:

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

2. Click **Express configuration**.
3. Click **Next**.
4. In the "Configuration summary" window, review the information. To change the configuration, click **Modify arrays** or **Modify logical drives**.

   Note: Some operating systems have size limitations for logical drives. Before you save the configuration, make sure that the size of the logical drive is appropriate for your operating system.
5. Click **Apply**; when you are asked whether you want to apply the new configuration, click **Yes**. The configuration is saved in the controller and in the physical drives.
6. Exit from ServeRAID Manager and remove the CD from the CD or DVD drive.
7. Restart the server.

Using custom configuration: To use custom configuration, complete the following steps:
1. In the ServeRAID Manager tree, click the controller.
2. Click **Custom configuration**.
3. Click **Next**.
4. In the "Create arrays" window, from the list of ready drives, select the two drives that you want to move into the array.
5. Click the (Add selected drives) icon to add the drives to the array.
6. If you want to configure a hot-spare drive, complete the following steps:
   a. Click the **Spares** tab.
   b. Select the physical drive that you want to designate as the hot-spare drive, and click the icon to add the drive.
7. Click **Next**.
8. In the "Configuration summary" window, review the information. To change the configuration, click **Back**.
9. Click **Apply**; when you are asked whether you want to apply the new configuration, click **Yes**. The configuration is saved in the controller and in the physical drives.
10. Exit from ServeRAID Manager, and remove the CD from the CD or DVD drive.
11. Restart the server.

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

Using the Boot Menu program
The Boot Menu program is a built-in, menu-driven configuration program that you can use to temporarily redefine the first startup device without changing settings in the Configuration/Setup Utility program.

To use the Boot Menu program, complete the following steps:
1. Turn off the server.
2. Restart the server.

3. Press F12.
4. Select the startup device.

The next time the server is started, it returns to the startup sequence that is set in the Configuration/Setup Utility program.

Configuring the Ethernet controller

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

You do not have to set any jumpers or configure the controller. However, you must install a device driver to enable the operating system to address the controller. To find updated information about configuring the controller, complete the following steps.

Note: Changes are made periodically to the IBM Web site. The actual procedure might vary slightly from what is described in this document.

1. Go to http://www.ibm.com/support/.
2. Under **Search technical support**, type 7973, 7974, 7975, or 7976 (depending on the machine type for your server model), and click **Search**.
3. In the **Additional search terms** field, type ethernet, and click **Go**.

Appendix. Getting help and technical assistance

If you need help, service, or technical assistance or just want more information about IBM products, you will find a wide variety of sources available from IBM to assist you. This section contains information about where to go for additional information about IBM and IBM products, what to do if you experience a problem with your system, and whom to call for service, if it is necessary.

Before you call

Before you call, make sure that you have taken these steps to try to solve the problem yourself:

- Check all cables to make sure that they are connected.
- Check the power switches to make sure that the system and any optional devices are turned on.
- Use the troubleshooting information in your system documentation, and use the diagnostic tools that come with your system. Information about diagnostic tools is in the *Problem Determination and Service Guide* on the IBM *Documentation* CD that comes with your system.
- Go to the IBM support Web site at http://www.ibm.com/systems/support/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.

You can solve many problems without outside assistance by following the troubleshooting procedures that IBM provides in the online help or in the documentation that is provided with your IBM product. The documentation that comes with IBM systems also describes the diagnostic tests that you can perform. Most systems, operating systems, and programs come with documentation that contains troubleshooting procedures and explanations of error messages and error codes. If you suspect a software problem, see the documentation for the operating system or program.

Using the documentation

Information about your IBM system and preinstalled software, if any, or optional device is available in the documentation that comes with the product. That documentation can include printed documents, online documents, readme files, and help files. See the troubleshooting information in your system documentation for instructions for using the diagnostic programs. The troubleshooting information or the diagnostic programs might tell you that you need additional or updated device drivers or other software. IBM maintains pages on the World Wide Web where you can get the latest technical information and download device drivers and updates. To access these pages, go to http://www.ibm.com/systems/support/ and follow the instructions. Also, some documents are available through the IBM Publications Center at http://www.ibm.com/shop/publications/order/.

Getting help and information from the World Wide Web

On the World Wide Web, the IBM Web site has up-to-date information about IBM systems, optional devices, services, and support. The address for IBM System x® and xSeries® information is http://www.ibm.com/systems/x/. The address for IBM BladeCenter® information is http://www.ibm.com/systems/bladecenter/. The address for IBM IntelliStation® information is http://www.ibm.com/intellistation/.

You can find service information for IBM systems and optional devices at http://www.ibm.com/systems/support/.

Software service and support

Through IBM Support Line, you can get telephone assistance, for a fee, with usage, configuration, and software problems with System x and xSeries servers, BladeCenter products, IntelliStation workstations, and appliances. For information about which products are supported by Support Line in your country or region, see http://www.ibm.com/services/sl/products/.

For more information about Support Line and other IBM services, see http://www.ibm.com/services/, or see http://www.ibm.com/planetwide/ for support telephone numbers. In the U.S. and Canada, call 1-800-IBM-SERV (1-800-426-7378).

Hardware service and support

You can receive hardware service through your IBM reseller or IBM Services. To locate a reseller authorized by IBM to provide warranty service, go to http://www.ibm.com/partnerworld/ and click **Find Business Partners** on the right side of the page. For IBM support telephone numbers, see http://www.ibm.com/planetwide/. In the U.S. and Canada, call 1-800-IBM-SERV (1-800-426-7378).

In the U.S. and Canada, hardware service and support is available 24 hours a day, 7 days a week. In the U.K., these services are available Monday through Friday, from 9 a.m. to 6 p.m.

IBM Taiwan product service

台灣 IBM 產品服務聯絡方式：
台灣國際商業機器股份有限公司
台北市松仁路 7 號 3 樓
電話：0800-016-888

IBM Taiwan product service contact information:
    IBM Taiwan Corporation
    3F, No 7, Song Ren Rd.
    Taipei, Taiwan
    Telephone: 0800-016-888

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Important notes

Processor speed indicates the internal clock speed of the microprocessor; other factors also affect application performance.

CD or DVD drive speed is the variable read rate. Actual speeds vary and are often less than the possible maximum.

When referring to processor storage, real and virtual storage, or channel volume, KB stands for 1024 bytes, MB stands for 1 048 576 bytes, and GB stands for 1 073 741 824 bytes.

When referring to hard disk drive capacity or communications volume, MB stands for 1 000 000 bytes, and GB stands for 1 000 000 000 bytes. Total user-accessible capacity can vary depending on operating environments.

Maximum internal hard disk drive capacities assume the replacement of any standard hard disk drives and population of all hard disk drive bays with the largest currently supported drives that are available from IBM.

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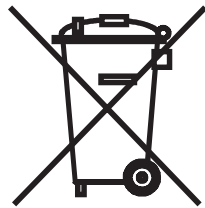
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This appliance is labeled in accordance with European Directive 2002/96/EC concerning waste electrical and electronic equipment (WEEE). The Directive determines the framework for the return and recycling of used appliances as applicable throughout the European Union. This label is applied to various products to indicate that the product is not to be thrown away, but rather reclaimed upon end of life per this Directive.

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Battery return program

This product may contain a sealed lead acid, nickel cadmium, nickel metal hydride, lithium, or lithium ion battery. Consult your user manual or service manual for specific battery information. The battery must be recycled or disposed of properly. Recycling facilities may not be available in your area. For information on disposal of batteries outside the United States, go to http://www.ibm.com/ibm/environment/ products/index.shtml or contact your local waste disposal facility.

In the United States, IBM has established a return process for reuse, recycling, or proper disposal of used IBM sealed lead acid, nickel cadmium, nickel metal hydride, and battery packs from IBM equipment. For information on proper disposal of these batteries, contact IBM at 1-800-426-4333. Have the IBM part number listed on the battery available prior to your call.

For Taiwan: Please recycle batteries.

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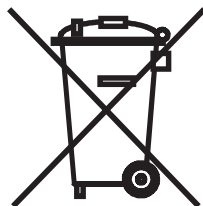
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For California:

Perchlorate material – special handling may apply. See http://www.dtsc.ca.gov/hazardouswaste/perchlorate/.

The foregoing notice is provided in accordance with California Code of Regulations Title 22, Division 4.5 Chapter 33. Best Management Practices for Perchlorate Materials. This product/part may include a lithium manganese dioxide battery which contains a perchlorate substance.

Electronic emission notices

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Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio

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Industry Canada Class A emission compliance statement

This Class A digital apparatus complies with Canadian ICES-003.

Avis de conformité à la réglementation d'Industrie Canada

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

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

United Kingdom telecommunications safety requirement

Notice to Customers

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

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European Community contact:
    IBM Technical Regulations
    Pascalstr. 100, Stuttgart, Germany 70569

Telephone: 0049 (0)711 785 1176
Fax: 0049 (0)711 785 1283
E-mail: tjahn@de.ibm.com

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Das Gerät erfüllt die Schutzanforderungen nach EN 55024 und EN 55022 Klasse A.

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