System x3100 M3 Type 4253

Problem Determination and Service Guide

System x3100 M3 Type 4253

Problem Determination and Service Guide

Note:

Before using this information and the product it supports, read the general information in Appendix B, “Notices,” on page 125, the *IBM Safety Information* and *IBM Environmental Notices and User's Guide* on the IBM *System x Documentation* CD, and the *Warranty Information* document.

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

Fifth Edition (December 2010)

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 optional devices 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 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 51.
   - 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.

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

Statement 4:

≥ 18 kg (39.7 lb)

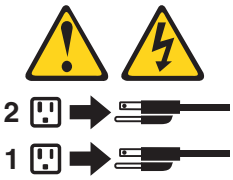
≥ 32 kg (70.5 lb)

≥ 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.

Attention: This server is suitable for use on an IT power distribution system whose maximum phase-to-phase voltage is 240 V under any distribution fault condition.

Statement 11:

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

Statement 12:

CAUTION:
The following label indicates a hot surface nearby.

Statement 13:

DANGER

Overloading a branch circuit is potentially a fire hazard and a shock hazard under certain conditions. To avoid these hazards, ensure that your system electrical requirements do not exceed branch circuit protection requirements. Refer to the information that is provided with your device for electrical specifications.

Statement 26:

CAUTION:
Do not place any object on top of rack-mounted devices.

Attention: This server is suitable for use on an IT power distribution system whose maximum phase-to-phase voltage is 240 V under any distribution fault condition.

Statement 27:

CAUTION:
Hazardous moving parts are nearby.

Chapter 1. Start here

You can solve many problems without outside assistance by following the troubleshooting procedures in this *Problem Determination and Service Guide* and on the IBM Web site. This document describes the diagnostic tests that you can perform, troubleshooting procedures, and explanations of error messages and error codes. The documentation that comes with your operating system and software also contains troubleshooting information.

Diagnosing a problem

Before you contact IBM or an approved warranty service provider, follow these procedures in the order in which they are presented to diagnose a problem with your server:

1. **Determine what has changed.**

   Determine whether any of the following items were added, removed, replaced, or updated before the problem occurred:

   - IBM System x Server Firmware (formerly BIOS firmware)
   - Device drivers
   - Firmware
   - Hardware components
   - Software

   If possible, return the server to the condition it was in before the problem occurred.

2. **Collect data.**

   Thorough data collection is necessary for diagnosing hardware and software problems.

   a. **Document error codes and system-board LEDs.**

      - **System error codes:** See “POST error codes” on page 22 for information about a specific error code.
      - See “System-board LEDs” on page 17 for the location of the system-board LEDs.
      - **Software or operating-system error codes:** See the documentation for the software or operating system for information about a specific error code. See the manufacturer's Web site for documentation.

   b. **Collect system data.**

      Run the diagnostics program to collect information about the hardware, firmware, software, and operating system. Have this information available when you contact IBM or an approved warranty service provider. See “Diagnostic programs, messages, and error codes” on page 39 for the instructions to run the diagnostics program.

      If you need to download the latest version of the diagnostics program, 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/systems/support/.
      2) Under **Product support**, click **System x**.
      3) Under **Popular links**, click **Software and device drivers**.

4) Click **System x3100 M3** to display the list of downloadable files for the server.

3. **Follow the problem-resolution procedures.**

   The four problem-resolution procedures are presented in the order in which they are most likely to solve your problem. Follow these procedures in the order in which they are presented:

   a. **Check for and apply code updates.**

      Most problems that appear to be caused by faulty hardware are actually caused by the server firmware (formerly BIOS firmware), device firmware, or device drivers that are not at the latest levels.

      1) **Determine the existing code levels.**

         Click **Firmware/VPD** to view system firmware levels, or click **Software** to view operating-system levels.

      2) **Download and install updates of code that is not at the latest level.**

         Important: Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.

         To display a list of available updates for your server, go to http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&Indocid=MIGR-4JTS2T or 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.

         a) Go to http://www.ibm.com/systems/support/.

         b) Under **Product support**, click **System x**.

         c) Under **Popular links**, click **Software and device drivers**.

         d) Click **System x3100 M3** to display the list of downloadable files for the server.

         When you click an update, an information page is displayed, including a list of the problems that the update fixes. Review this list for your specific problem; however, even if your problem is not listed, installing the update might solve the problem.

   b. **Check for and correct an incorrect configuration.**

      If the server is incorrectly configured, a system function can fail to work when you enable it; if you make an incorrect change to the server configuration, a system function that has been enabled can stop working.

      1) **Make sure that all installed hardware and software are supported.**

         See http://www.ibm.com/servers/eserver/serverproven/compat/us/ to verify that the server supports the installed operating system, optional devices, and software levels. If any hardware or software component is not supported, uninstall it to determine whether it is causing the problem. You must remove nonsupported hardware before you contact IBM or an approved warranty service provider for support.

      2) **Make sure that the server, operating system, and software are installed and configured correctly.**

         Many configuration problems are caused by loose power or signal cables or incorrectly seated adapters. You might be able to solve the problem by turning off the server, reconnecting cables, reseating

adapters, and turning the server back on. See “Checkout procedure” on page 25 for the instructions to perform the checkout procedures.

If the problem is associated with a specific function (for example, if a RAID hard disk drive is marked offline in the RAID array), see the documentation for the associated controller and management or controlling software to verify that the controller is correctly configured.

Problem determination information is available for many devices such as RAID and network adapters.

For problems with operating systems or IBM software or devices, 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.

a) Go to http://www.ibm.com/systems/support/.
b) Under **Product support**, click **System x**.
c) From the **Product family** list, select **System x3100 M3**.
d) Under **Support & downloads**, click **Documentation**, **Install**, and **Use** to search for related documentation.

c. **Check for service bulletins.**

IBM service bulletins document known problems and suggested solutions. To search for service bulletins, 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/systems/support/.
2) Under **Product support**, click **System x**.
3) From the **Product family** list, select **System x3100 M3**.
4) Under **Support & downloads**, click **Troubleshoot**.

d. **Check for and replace defective hardware.**

If a hardware component is not operating within specifications, it can cause unpredictable results. Most hardware failures are reported as error codes in a system or operating-system log. See “Troubleshooting tables” on page 27 and Chapter 5, “Removing and replacing server components,” on page 55 for more information. Hardware errors are also indicated by LEDs on the system board (see “System-board LEDs” on page 17 for more information).

Troubleshooting procedures are also provided on the IBM Web site. A single problem might cause multiple symptoms. Follow the diagnostic procedure for the most obvious symptom. If that procedure does not diagnose the problem, use the procedure for another symptom, if possible. To locate troubleshooting procedures for your server, 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/systems/support/.
2) Under **Product support**, click **System x**.
3) From the **Product family** list, select **System x3100 M3**.
4) Under **Support & downloads**, click **Troubleshoot**.
5) Under **Diagnostic**, select the troubleshooting procedure for the symptom that you are observing.

For more troubleshooting information, see Chapter 3, “Diagnostics,” on page 19.

If the problem remains, contact IBM or an approved warranty service provider for assistance with additional problem determination and possible hardware replacement. To open an online service request, go to http://www.ibm.com/support/electronic/. Be prepared to provide information about any error codes and collected data.

Undocumented problems

If you have completed the diagnostic procedure and the problem remains, the problem might not have been previously identified by IBM. After you have verified that all code is at the latest level, all hardware and software configurations are valid, and no light path diagnostics LEDs or log entries indicate a hardware component failure, contact IBM or an approved warranty service provider for assistance. To open an online service request, go to http://www.ibm.com/support/electronic/. Be prepared to provide information about any error codes and collected data and the problem determination procedures that you have used.

Chapter 2. Introduction

This *Problem Determination and Service Guide* contains information to help you solve problems that might occur in your IBM® System x3100 M3 Type 4253 server. 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:

- **Consumables:** Purchase and replacement of consumables (components, such as batteries and printer cartridges, that have depleting life) is your responsibility. If IBM acquires or installs a consumable component at your request, you will be charged for the service.
- **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 Information* document.

Related documentation

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

- *Warranty Information*

  This printed document contains the warranty terms and a pointer to the IBM Statement of Limited Warranty on the IBM Web site.
- *Environmental Notices and User Guide*

  This document is in PDF format on the IBM *System x Documentation* CD. It contains translated environmental notices.
- *Safety Information*

  This document is in PDF on the IBM *System x 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.
- *Installation and User's Guide*

  This document is in Portable Document Format (PDF) on the IBM *System x® 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.

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

The System x and BladeCenter Tools Center is an online information center that contains information about tools for updating, managing, and deploying firmware,

device drivers, and operating systems. The System x and BladeCenter 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 comes 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. To check for updated documentation and technical updates, 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/systems/support/.
2. Under **Product support**, click **System x**.
3. Under **Popular links**, click **Software and device drivers** for firmware updates, or click **Publications lookup** for documentation updates.
4. From the **Product family** menu, select **System x3100 M3** and click **Continue**.

Notices and statements in this document

The caution and danger statements in this document are also in the multilingual *Safety Information* document, which is on the IBM *System x 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 might occur.
- **Caution:** These statements indicate situations that can be potentially hazardous to you. A caution statement is placed just before the description of a potentially hazardous procedure step or situation.
- **Danger:** These statements indicate situations that can be potentially lethal or extremely hazardous to you. A danger statement is placed just before the description of a potentially lethal or extremely hazardous procedure step or situation.

Features and specifications

The following information is a summary of the features and specifications for Machine Type 4253. Depending on the server model, some features might not be available, or some specifications might not apply. See the *Problem Determination and Service Guide* on the *System x Documentation* CD for additional information about the server.

Table 1. Features and specifications

Microprocessor:
- One Intel LGA1156 quad-core (Xeon X3400 series) or dual-core (Celeron G1101, Pentium G6950, or Core i3-540) processor
- Designed for LGA 1156 socket
- 32 KB instruction cache, 32 KB data cache, and up to 8 MB L3 cache that is shared among the cores
- Intel 64 architecture

Note:
- Use the Setup utility to determine the type and speed of the microprocessors.
- For a list of supported microprocessors, see http://www.ibm.com/servers/eserver/serverproven/compat/us/.

Memory:
- Minimum: 1 GB
- Maximum: 16 GB
- Types: PC3 (single-rank or dual-rank), ECC, double-data-rate 3 (DDR3), 1066 or 1333 MHz unbuffered SDRAM DIMM
- Connectors: four dual inline memory module (DIMM) connectors, two-way interleaved
- Supports 1 GB, 2 GB, and 4 GB unbuffered DIMMs

Fan:
- One system fan
- One microprocessor fan

Power supply: One fixed 350-watt (100 -127V, 200-240Vac)

Size:
- Height: 438 mm (17.25 in.)
- Depth: 540 mm (21.25 in.)
- Width: 216 mm (8.5 in.)
- Weight: 15 kg (33 lb) to 18 kg (40 lb) depending upon configuration

RAID (depending on model):
- Software RAID capabilities that support RAID levels 0 and 1
  Note: The integrated RAID utility is not supported on Linux operating systems.
- ServeRAID-BR10il v2 SAS/SATA adapter that provides RAID levels 0 and 1

Environment:
- Air temperature:
  - Server on: 10°C to 35°C (50°F to 95°F)
    Altitude: 0 to 914.4 m (3000 ft)
  - Server on: 10°C to 32°C (50°F to 89.6°F)
    Altitude: 914.4 m (3000 ft) to 2133.6 m (7000 ft)
  - Server off: 10°C to 43°C (50°F to 109.4°F)
    Maximum altitude: 2133.6 m (7000.0 ft)
  - Shipping: -40°C to 60°C (-40°F to 140°F)
- Humidity (operating and storage): 8% to 80%
- Particulate contamination:

  Attention: Airborne particulates and reactive gases acting alone or in combination with other environmental factors such as humidity or temperature might pose a risk to the server. For information about the limits for particulates and gases, see “Particulate contamination” on page 127.

Table 1. Features and specifications (continued)

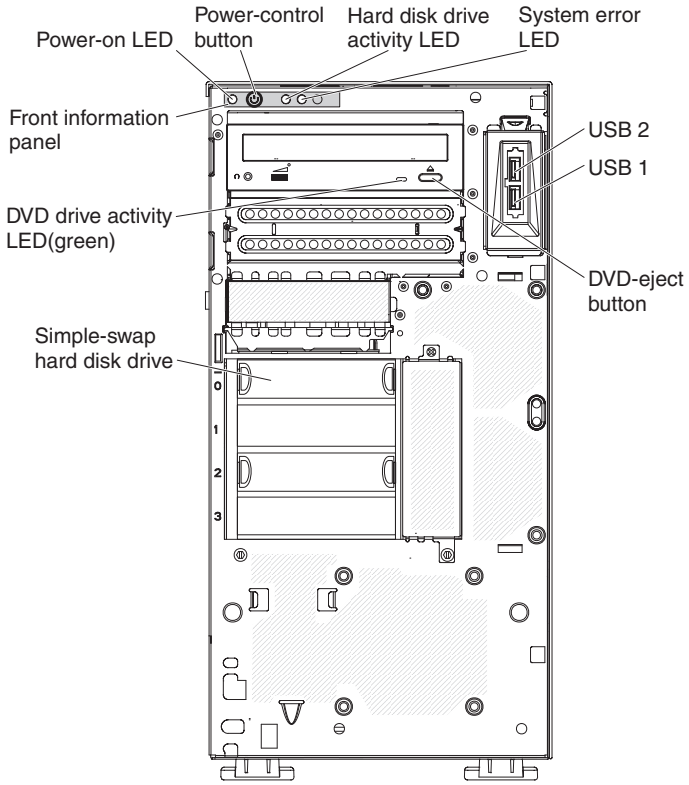
Drives (depending on the model): • Hard disk drives: up to four simple-swap SATA • One of the following SATA attached optical drives: – DVD-ROM – Multi-burner (optional) **Drive bays:** • Two 5.25-inch half-high bays (one optical drive installed). • Four 3.5-inch hard disk drive bays	**Integrated functions:** • Intel 82574L Gb Ethernet controller • Integrated SATA controller • Integrated video controller • Seven Universal Serial Bus (USB) 2.0 ports (two front, four rear of the chassis, and one internal for an optional tape drive) • One serial port • One Ethernet port • Six SATA ports (four for simple-swap hard disk drives and two for the DVD drive and the optional tape drive)	**Heat output:** Approximate heat output: • Minimum configuration: 324 Btu per hour (95 watts) • Maximum configuration: 1484 Btu per hour (435 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: 0.20 kVA (all models) – Maximum: 0.55 kVA
Expansion slots: • One PCI 32-bit/33 MHz slot • One PCI Express x16 slot • One PCI Express x8 slot • One PCI Express x4 slot	**Acoustical noise emissions:** Sound power: 4.8 bel	**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 and LEDs on the front of the server.



Power-control button and power-on LED

Press this button to turn the server on and off manually or to wake the server from a reduced-power state. 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. When this LED is blinking, it indicates that the system is in the ACPI S4 or S5 system status.

Attention: If you are connecting the server to an ac power source for the first time, do not press the power-control button until the power LED flashes.

Hard disk drive activity LED

When this LED is flashing rapidly, 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.

USB connectors

Connect USB devices to these connectors.

DVD-eject button

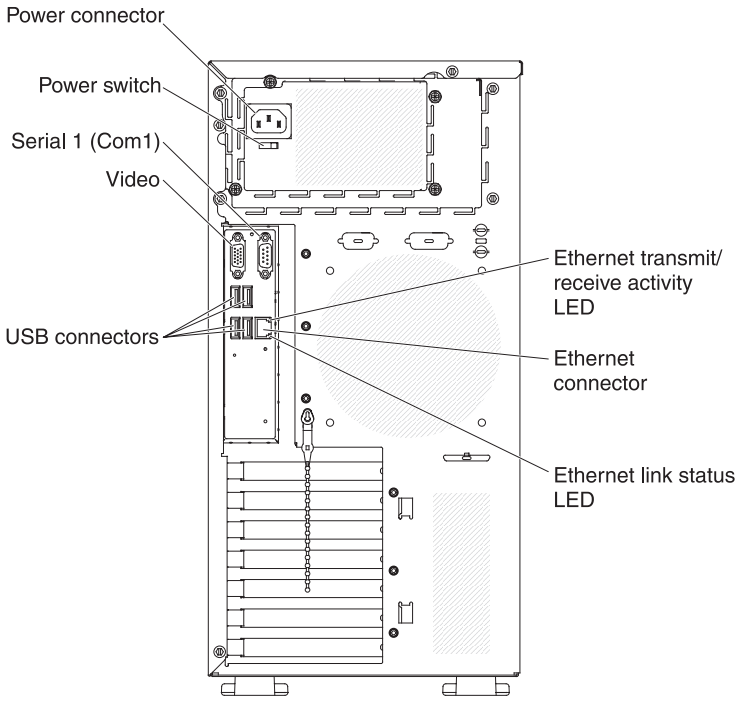
Press this button to release a CD or DVD from the DVD drive.

DVD drive activity LED

When this LED is lit, it indicates that the DVD drive is in use.

Rear view

The following illustration shows the connectors and LEDs on the rear of the server.



Power connector and power switch

Connect the power cord to this connector and press the power switch to the on position to turn on the power supply.

Video connector

Connect a monitor to this connector.

Note: The maximum video resolution is 1280 x 1024 at 60Hz.

Serial connector

Connect a 9-pin serial device to this connector.

USB connectors

Connect USB devices to these connectors.

Ethernet connector

Use the connector to connect the server to a network.

Ethernet transmit/receive activity LED

This LED is on the Ethernet connector on the rear of the server. When this LED is off, it indicates that there is no activity occurring. When this LED is blinking, it indicates that there is activity between the server and the network.

Ethernet link status LED

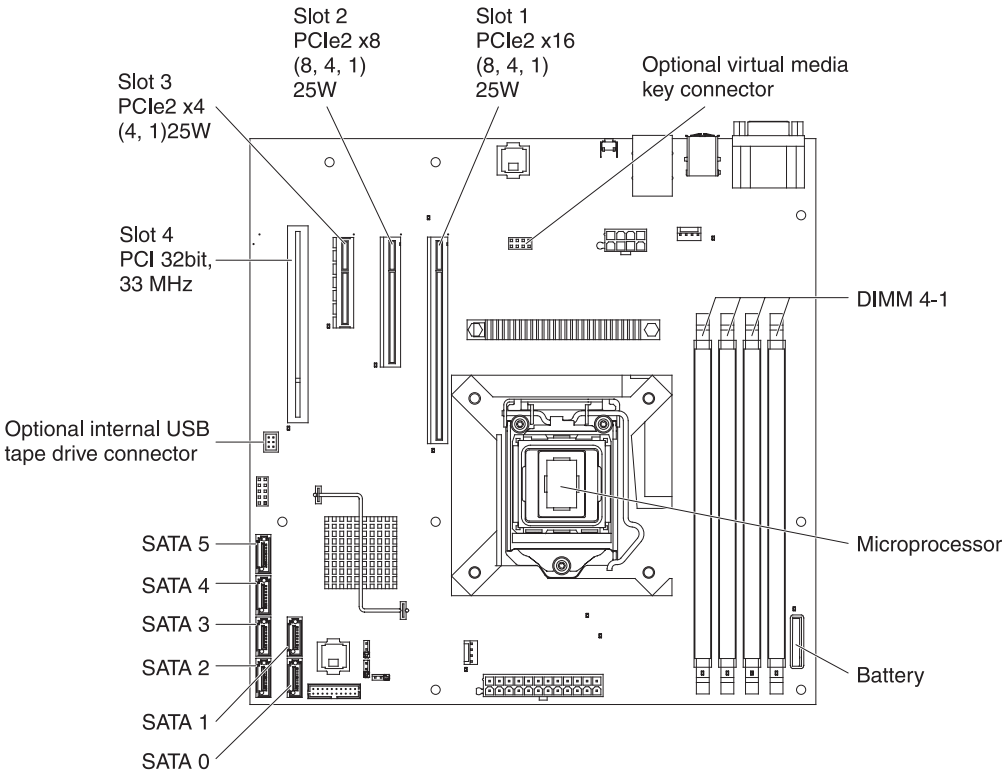
This LED is on the Ethernet connector on the rear of the server. When this LED is lit, it indicates that there is an active connection on the Ethernet port. When this LED is off, it indicates that there is no active connection on the Ethernet port.

Internal LEDs, connectors, and jumpers

The following illustrations show the connectors, LEDs, and jumpers on the internal boards. The illustrations might differ slightly from your hardware.

System-board optional-device connectors

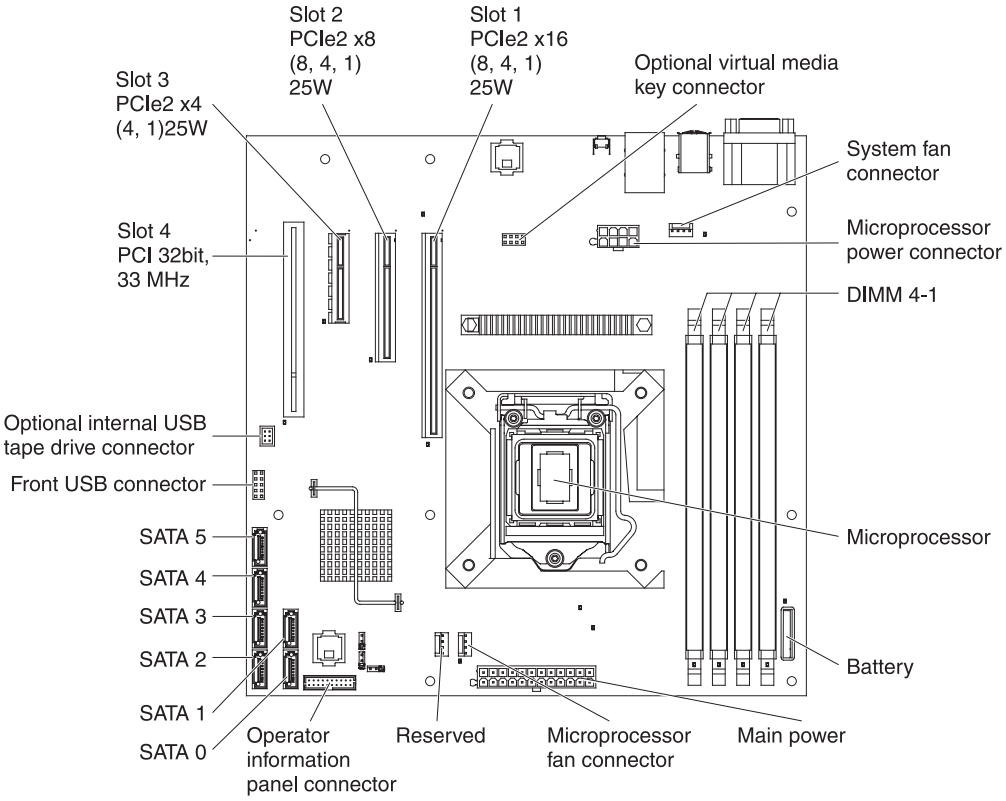
The following illustration shows the optional-device connectors on the system board.

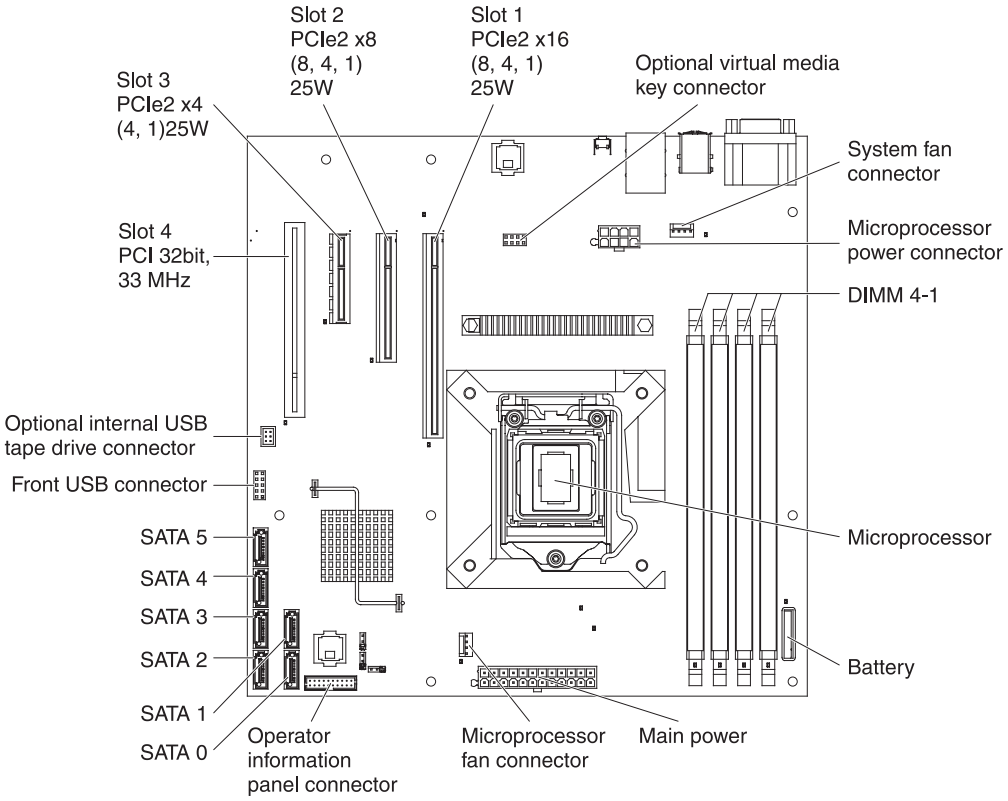


System-board internal connectors

The following illustration shows the internal connectors on the system board.

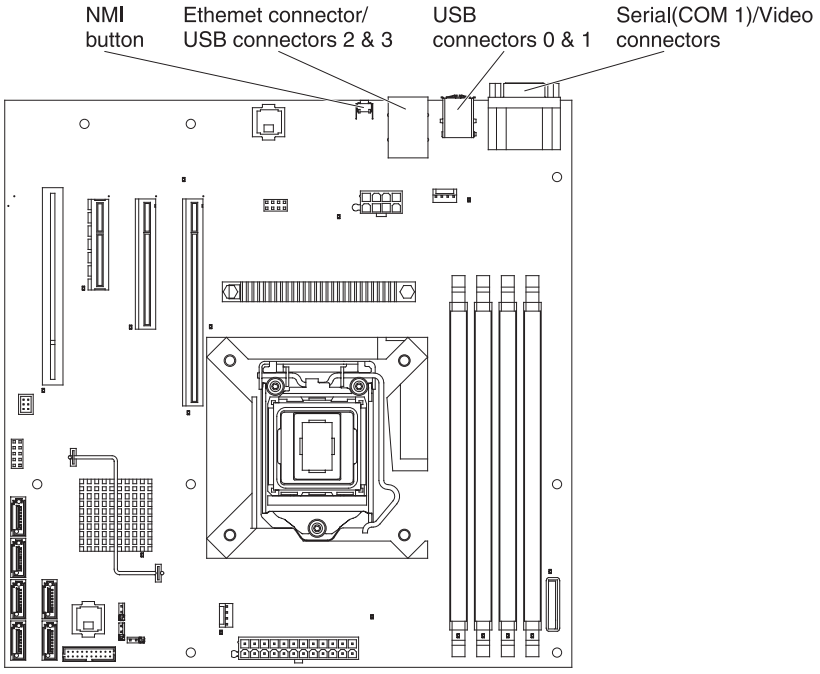
Note: The illustration might differ slightly from your hardware.




Slot 2
PCIe2 x8
(8, 4, 1)
25W
Slot 1
PCIe2 x16
(8, 4, 1)
25W
Optional virtual media
key connector
Slot 3
PCIe2 x4
(4, 1)25W
System fan
connector
Slot 4
PCI 32bit,
33 MHz
Microprocessor
power connector
DIMM 4-1
Optional internal USB
tape drive connector
Front USB connector
Microprocessor
SATA 5
SATA 4
SATA 3
SATA 2
Battery
SATA 1
SATA 0
Operator
information
panel connector
Microprocessor
fan connector
Main power

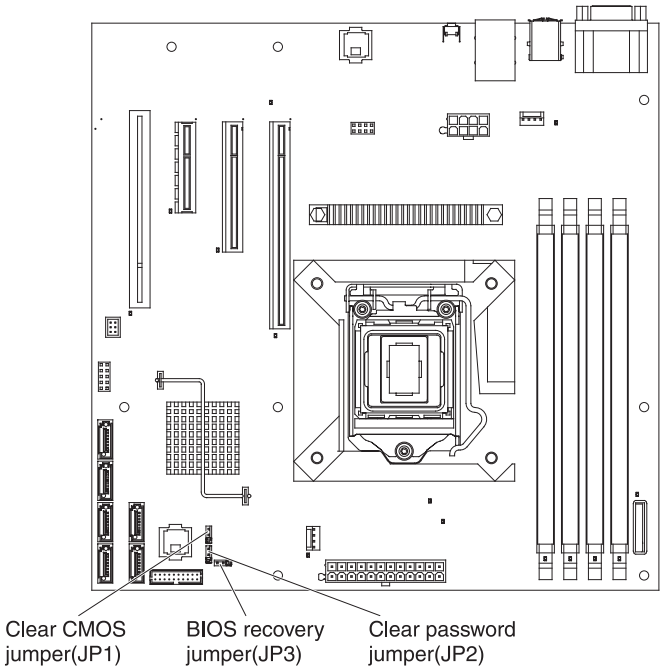
System-board external connectors

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



System-board jumpers

The following illustration shows the jumper blocks on the system board.



Any jumper blocks on the system board that are not shown in the illustration are reserved. The following table describes the function of each jumper block.

Table 2. System board jumpers

Jumper number	Jumper name	Jumper setting
JP1	Clear CMOS jumper	• Pins 1 and 2: Normal (default) - This keeps the CMOS data. • Pins 2 and 3: This clears the CMOS data such as power-on password and administrator password, and loads the default BIOS settings.
JP2	Clear password jumper	• Pins 1 and 2: Normal (default). • Pins 2 and 3: This clears the power-on password and administrator password.
JP3	BIOS recovery jumper	• Pin 1 and 2: Boot normally (default). • Pin 2 and 3: BIOS recovery from a bootable USB key which contains the new BIOS image file.

Table 2. System board jumpers (continued)

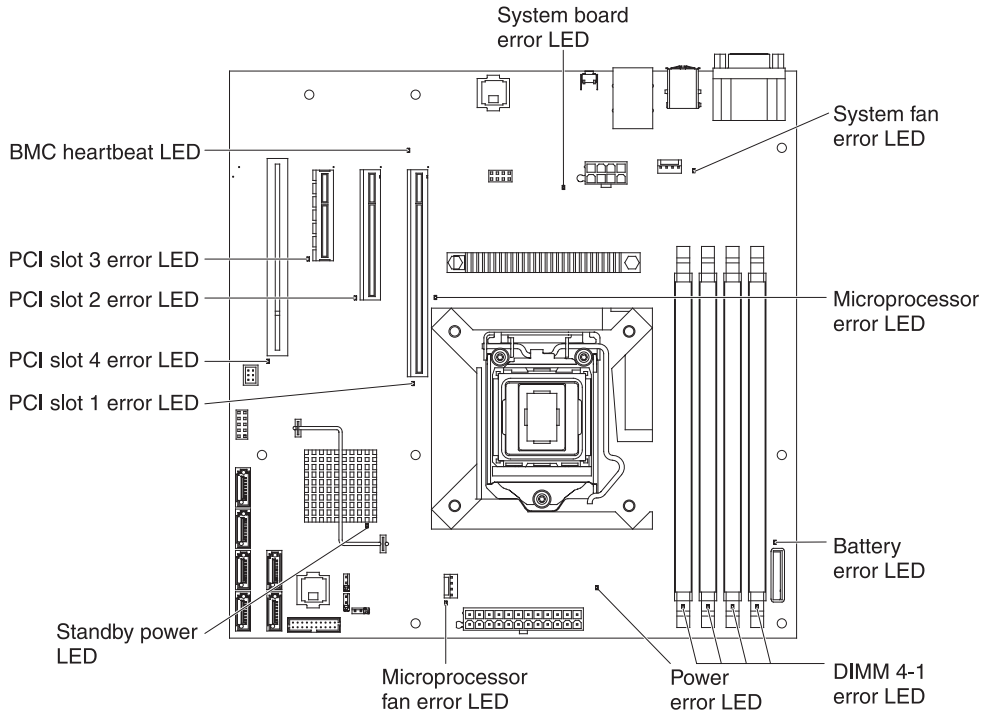
Jumper number	Jumper name	Jumper setting
Notes: • If no jumper is present, the server responds as if the pins are set to 1 and 2. • Changing the position of the BIOS recovery jumper from pins 1 and 2 to pins 2 and 3 before the server is turned on sets the BIOS recovery process. Do not change the jumper pin position after the server is turned on. This can cause an unpredictable problem.		

Important:

1. Before you change any switch settings or move any jumpers, turn off the server; then, disconnect all power cords and external cables. Review the information in "Safety" on page vii, "Installation guidelines" on page 55, and "Handling static-sensitive devices" on page 57.
2. Any system-board switch or jumper blocks that are not shown in the illustrations in this document are reserved.

System-board LEDs

The following illustration shows the light-emitting diodes (LEDs) on the system board.



Chapter 3. Diagnostics

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

If you cannot diagnose and correct the problem by using the information in this chapter, see Appendix A, “Getting help and technical assistance,” on page 123 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” on page 20 for more information.

  Note: You can view all hardware error messages in the system event log through the Setup utility.

- **Troubleshooting tables**

  These tables list problem symptoms and actions to correct the problems. See “Troubleshooting tables” on page 27.

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

  The diagnostic programs are the primary method of testing the major components of the server. The diagnostic programs are on the diagnostics CD. See “Diagnostic programs, messages, and error codes” on page 39 for more information.

Error logs

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

Note: You can view all hardware error messages in the system event log.

The system event log is limited in size. When the log is full, new entries will not overwrite existing entries; therefore, you must periodically clear the system event log through the BMC Web interface or the Setup Utility program (the menu choices are described in the “Setup utility menu choices” on page 114). The BMC Web interface displays up to 512 system event log entries. When you are troubleshooting an error, be sure to clear the system event log so that you can find current errors more easily.

Entries that are written to the system-event log during the early phase of POST or before the Baseboard Management Control (BMC) firmware upgrade is complete show an incorrect date as the default time stamp; however, the date is corrected as POST continues.

Each system event log entry is displayed on its own page. To move from one entry to the next, use the Up Arrow (↑) and Down Arrow (↓) keys.

You can view the contents of the SMBIOS error log and the system event/error log from the Setup utility program. For complete information about using the Setup utility program, see “Setup utility menu choices” on page 114.

To view the error logs, complete the following steps:

1. Turn on the server.
2. When the prompt `Press <F1> to enter Setup` is displayed, press F1.
3. View event logs:
   - Select **Event Logs → View SMBIOS Event Log**
   - Select **Event Logs → View System Event Log**

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 you are prompted, for POST to run.

If POST detects a problem, several beeps might sound, or an error message is displayed. See “POST beep codes” and “POST error codes” on page 22 for more information.

POST beep codes

A beep code is one beep or a series of short beeps that are separated by pauses. A beep code indicates that POST has detected a problem. To determine the meaning of a beep code, see “Memory initialization beep code descriptions.”

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 30 for information about diagnosing microprocessor problems.

Notes:

1. A beep code bigger than 1 indicates the number of long beeps to output in between shorted pauses. For example, a beep code of 3 means the system issues a 400 ms beep, 200 ms delay, 400 ms beep, 200 ms delay, and 400 ms beep.
2. Beep codes in this table represent fatal POST errors that occur during memory or hardware initialization. The CPU will stop processing after the beep sequence is complete.
3. A beep code may represent more than one type of error.

Memory initialization beep code descriptions

The following table describes the beep codes during memory initialization 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 4, "Parts listing, System x3100 M3 Type 4253," on page 49 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	Memory not installed	1. If you just installed memory, make sure that the new memory is correct for your server and that you have installed the correct number of DIMMs (see "Installing a memory module" on page 64for information about installing optional memory modules). 2. Reseat the DIMMs. 3. Replace the following components one at a time, in the order shown, restarting the server each time: a. DIMMs b. (Trained service technician only) Microprocessor c. (Trained service technician only) System board
1	Memory was detected twice	(Trained service technician only) Replace the system board.
2	Recovery started	Information only. Wait for the recovery process to complete.
3	DXEIPL was not found	(Trained service technician only) Replace the system board.
3	DXE core firmware volume was not found	(Trained service technician only) Replace the system board.
4	Recovery failed	(Trained service technician only) Replace the system board.
5	Memory not detected	1. If you just installed memory, make sure that the new memory is correct for your server and that you have installed the correct number of DIMMs (see "Installing a memory module" on page 64). 2. Reseat the DIMMs. 3. Replace the following components one at a time, in the order shown, restarting the server each time: a. DIMMs b. (Trained service technician only) Microprocessor c. (Trained service technician only) System board

Hardware initialization beep code descriptions

The following table describes the beep codes during hardware initialization (after memory checks) 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 4, "Parts listing, System x3100 M3 Type 4253," on page 49 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	Invalid password	1. Make sure that the correct password is being used. 2. Clear password a. Set the clear password jumper (see "System-board jumpers" on page 15) b. Restart the server c. Reseat the clear password jumper after POST 3. (Trained service technician only) Replace the system board.
4	Some of the architectural protocols are not available	(Trained service technician only) Replace the system board.
5	No console output devices are found	1. Check output devices are installed and available. 2. (Trained service technician only) Replace the system board.
5	No console input devices are found	1. Check input devices are installed and available. 2. (Trained service technician only) Replace the system board.
6	Flash update failed	1. Recover the BIOS code: a. Set the BIOS recovery jumper (see "System-board jumpers" on page 15). b. Insert a USB key which contains the new BIOS image file (BIOS.ROM). c. Restart the server. d. Reseat the BIOS recovery jumper after BIOS recovery is completed successfully. 2. (Trained service technician only) Replace the system board.
8	Platform PCI resource requirements cannot be met	(Trained service technician only) Replace the system board.

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 4, "Parts listing, System x3100 M3 Type 4253," on page 49 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
010D0101	SMART command execution failure on primary master hard disk drive	Replace the hard disk drive.
010D0102	SMART command execution failure on primary slave hard disk drive	Replace the hard disk drive.
010D0201	SMART command execution failure on secondary master hard disk drive	Replace the hard disk drive.
010D0202	SMART command execution failure on secondary slave hard disk drive	Replace the hard disk drive.
010E0401	Memory size changed	1. Run the Setup Utility program, select Load Optimized Defaults in the Save & Exit menu. 2. Save the changes and exit from the Setup Utility program. 3. (Trained service technician only) Replace the system board.
00011004	CPU self test failed	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
0001100D	CPU microcode is not found	1. Update the BIOS code again (see "Updating the firmware" on page 113). 2. (Trained service technician only) Reseat the microprocessor. 3. (Trained service technician only) Replace the microprocessor.
00021000	BMC encountered a hard failure	(Trained service technician only) Replace the system board.
0002100B	BMC is in force update mode	(Trained service technician only) Replace the system board.
00021001	BMC encountered a soft failure	(Trained service technician only) Replace the system board.
00021002	BMC encountered a communication error	(Trained service technician only) Replace the system board.
00021007	BMC SDR repository is empty	(Trained service technician only) Replace the system board.
01010003	No console input devices are found	1. Check input devices are installed and available. 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 4, "Parts listing, System x3100 M3 Type 4253," on page 49 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
0300000A	Real-time clock error occurred.	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
03048001	Some of the Architectural Protocols are not available	(Trained service technician only) Replace the system board.
03051000	No Space for Legacy Option ROM	(Trained service technician only) Replace the system board.

Checkout procedure

This section contains a checkout procedure that you should follow to solve hardware problems in the server.

About the checkout procedure

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

- Read the safety information that begins on page “Safety” on page vii.
- The diagnostic programs provide the primary methods of testing the major components of the server, such as the I/O 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 multiple error codes or light path diagnostics LEDs indicate a microprocessor error, the error might be in a microprocessor or in a microprocessor socket. See “Microprocessor problems” on page 30 for information about diagnosing microprocessor problems.
- Before you run the diagnostic programs, you must determine whether the failing server is part of a shared hard disk drive cluster (two or more servers that share 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 that share 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 19. If the server is halted and no error message is displayed, see “Troubleshooting tables” on page 27 and “Solving undetermined problems” on page 45.
- For information about power-supply problems, see “Power problems” on page 34 and “Rear view” on page 10.
- For intermittent problems, check the error log; see “Error logs” on page 19 and “Diagnostic programs, messages, and error codes” on page 39.

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” on page 27.
   f. Check for the following results:
      - Successful completion of POST, which is indicated by a single beep
      - Successful completion of startup, which is indicated by a readable display of the operating-system desktop
3. Did one or more beeps sound?
   - **Yes:** Find the beep code in “POST beep codes” on page 20; if necessary, see “Solving undetermined problems” on page 45.
   - **No:** Find the failure symptom in “Troubleshooting tables” on page 27; if necessary, run the diagnostic programs (see “Starting the diagnostics utility” on page 39). If the diagnostic programs were completed successfully and you still suspect a problem, see “Solving undetermined problems” on page 45.

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 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.

For a list of checkpoint codes for the System x3100 M3 Type 4253 server, see http://w3.pc.ibm.com/helpcenter/infotips/techinfo/MIGR-58350.html.

Troubleshooting tables

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

If you cannot find a problem in these tables, see “Starting the diagnostics utility” on page 39 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:

1. Remove the software or device that you just added.
2. Run the diagnostic tests to determine whether the server is running correctly.
3. Reinstall the new software or new device.

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 4, “Parts listing, System x3100 M3 Type 4253,” on page 49 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 DVD drive is not recognized.	1. Make sure that: • The SATA controller to which the DVD drive is attached is enabled in the Setup utility program. • All cables and jumpers are installed correctly. • The correct device driver is installed for the DVD drive. 2. Run the DVD drive diagnostic programs. 3. Reseat the following components: a. DVD drive b. DVD drive cable c. (Trained service technician only) System board 4. Replace the components listed in step 3 on at a time, in the order shown, restating the server each time.
A DVD is not working correctly.	1. Clean the DVD. 2. Run the DVD drive diagnostic programs. 3. Reseat the DVD drive. 4. Replace the DVD drive.
The 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 DVD drive. 4. Replace the DVD 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 4, "Parts listing, System x3100 M3 Type 4253," on page 49 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 indicator 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.

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 4, "Parts listing, System x3100 M3 Type 4253," on page 49 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.

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 4, "Parts listing, System x3100 M3 Type 4253," on page 49 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.	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. • Make sure the SAS bus and devices are configured correctly and that the last external device in each SAS chain is terminated correctly.

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 4, "Parts listing, System x3100 M3 Type 4253," on page 49 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. • The server and the monitor are turned on. 2. Run the Setup utility program and enable USB support. 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. • The mouse or pointing-device drivers are installed correctly. • The server and the monitor are turned on. • The keyboardless operation and mouse options are enabled in the 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 4, "Parts listing, System x3100 M3 Type 4253," on page 49 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 system board. • The memory modules are seated correctly. • You have installed the correct type of memory. • If you changed the memory, you updated the memory configuration in the Setup Utility program. • All banks of memory are enabled. The server might have automatically disabled a memory bank when it detected a problem, or a memory bank might have been manually disabled. 2. Run the memory diagnostics. 3. 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 "Installing a memory module" on page 64 for information about installing optional memory modules). 4. Reseat the following components: a. DIMMs b. (Trained service technician only) System board 5. Replace the components listed in step 4 one at a time, in the order shown, restarting the server each time.

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 4, "Parts listing, System x3100 M3 Type 4253," on page 49 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 emits a continuous beep during POST, indicating that the startup (boot) microprocessor is not working correctly.	1. (Trained service technician only) Reseat the microprocessor. 2. (Trained service technician only) Replace the microprocessor.

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 4, "Parts listing, System x3100 M3 Type 4253," on page 49 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. (Trained service technician only) Replace the system board.
The screen is blank.	1. Make sure that: • The server is turned on. If there is no power to the server, see "Power problems" on page 34. • 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. 2. Make sure 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 40. 4. Observe the checkpoint LEDs on the system board; if the codes are changing, go to the next step. If the codes are not changing, see "Checkpoint codes (trained service technicians only)" on page 26. 5. See "Solving undetermined problems" on page 45.
Only the cursor appears.	See "Solving undetermined problems" on page 45.
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 "Starting the diagnostics utility" on page 39). • If the server passes the video diagnostics, the video is good; see "Solving undetermined problems" on page 45. • (Trained service technician only) If the server fails the video diagnostics, reseat the system board. • (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 4, "Parts listing, System x3100 M3 Type 4253," on page 49 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 that 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 b. Video adapter (if one is installed) c. (Trained service technician only) System board 3. Replace the components listed in step 2 one at a time, in the order shown, restarting the server each time.
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 113). 2. Reseat the following components: a. Monitor b. Video adapter (if one is installed) c. (Trained service technician only) System board 3. Replace the components listed in step 2 one at a time, in the order shown, restarting the server each time.

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 4, "Parts listing, System x3100 M3 Type 4253," on page 49 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 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 cable connections for the device are secure. 2. If the device comes with test instructions, use those instructions to test the device. 3. If the failing device is a SAS device, make sure that: • The cables for all external SAS devices are connected correctly. • The last device in each SAS chain, or the end of the SAS cable, is terminated correctly. • Any external SAS device is turned on. You must turn on an external SAS device before turning on the server. 4. Reseat the failing device. 5. 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 4, "Parts listing, System x3100 M3 Type 4253," on page 49 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, and the reset 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 power-supply switch on the rear of the server is pressed to the on position. 2. Make sure that the power-control button is working correctly: a. Disconnect the server power cord. b. Reconnect the power cord. c. (Trained service technician only) Reseat the operator information panel cables, and then repeat steps 2a and 2b. If the server starts, reseat the operator information panel. If the problem remains, replace the operator information panel. 3. Make sure that the reset button is working correctly: a. Disconnect the server power cords. b. Reconnect the server power cords. 4. Make sure that: • The power cords are correctly connected the server and to a working electrical outlet. • The type of memory that is installed is correct. • The LEDs on the power supply do not indicate a problem. 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 45.
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. If the problem remains or if you are using an ACPI-aware operating system, suspect the system board.
The server unexpectedly shuts down, and the LEDs on the power switch/LED bracket are not lit.	See "Solving undetermined problems" on page 45.

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 4, "Parts listing, System x3100 M3 Type 4253," on page 49 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 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 "System-board external connectors" on page 14). 2. Reseat the following components: a. Failing serial device b. Serial cable c. (Trained service technician only) System board 3. Replace the components listed in step 2 one at a time, in the order shown, restarting the server each time.

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 4, "Parts listing, System x3100 M3 Type 4253," on page 49 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 receive any error messages while you use 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.

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 4, "Parts listing, System x3100 M3 Type 4253," on page 49 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. Make sure that: • The correct USB device driver is installed. • The operating system supports USB devices. 2. Make sure that the USB configuration options are set correctly in the Setup utility program (see "Setup utility menu choices" on page 114for more information). 3. If you are using a USB hub, disconnect the USB device from the hub and connect it directly to the server.

Error LEDs

The system board has error LEDs that will help to locate the source of the error (see "System-board LEDs" on page 17). Run the diagnostic programs to find out the cause of the error (see "Starting the diagnostics utility" on page 39).

The server is designed so that some 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.

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 57.

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 inside the side cover of the server, which gives an overview of internal components. This information can often provide enough information to correct the error.

The following table describes the LEDs on the system board 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 4, "Parts listing, System x3100 M3 Type 4253," on page 49 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.**

Component LED	Description	Action
DIMM error LEDs	A memory DIMM has failed.	1. Clear the system event logs. If both DIMM 1 and DIMM 3 have the lit error LED or all DIMM error LEDs are lit, clear CMOS data (see "System-board jumpers" on page 15); then, start the server to clear the system event logs. 2. Remove the DIMM that has the lit error LED. 3. Reseat the DIMM. 4. 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
Fan error LEDs	A fan has failed, is operating too slowly, or has been removed.	1. Reseat the failing fan, which is indicated by a lit LED near the fan connector on the system board. 2. Replace the failing fan.
CPU error LED	Microprocessor has failed, is missing, or has been incorrectly installed. **Note:** (Trained service technician only) Make sure that the microprocessor is installed in the correct sequence; see "Installing a microprocessor and fan sink" on page 107.	1. Check the system event log to determine the reason for the lit LED. 2. (Trained service technician) Reseat the failing microprocessor 3. Replace the following components one at a time, in the order shown, restarting the server each time: a. (Trained service technician only) Failing microprocessor b. (Trained service technician only) System board
System-board error LED	System-board CPU VRD and/or power voltage regulators have failed and/or system-board cannot power on.	(Trained service technician only) Replace the system board.
Battery failure LED	Battery low.	1. Replace the CMOS lithium battery, if necessary. 2. (Trained service technician only) Replace the system board.
BMC heartbeat LED	Indicates the status of the BMC process. When the server is connected to power, the BMC code will start to load. When the loading is complete, this LED flashes slowly to indicate that the BMC is fully operational and you can press the power-control button to start the server.	If the LED does not begin flashing within 30 seconds of when the server is connected to power, complete the following steps: 1. (Trained service technician only) Use the BIOS recovery jumper (JP3) to recover the firmware. 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 4, "Parts listing, System x3100 M3 Type 4253," on page 49 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.**

Component LED	Description	Action
PCI slots error LEDs	An error has occurred on a PCI bus or on the system board. An additional LED is lit next to a failing PCI slot.	1. Check the system event log for information about the error. 2. If you cannot isolate the failing adapter through the LEDs and the information in the system event log, remove one adapter at a time, and restart the server after each adapter is removed. 3. If the failure remains, go to http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL for additional troubleshooting information.
Power error LED	Previous ac power lost event or unexpected system shutdown event detected.	1. Check the ac power to the server. 2. Make sure that the power cord is connected to a functioning power source. 3. Check the power cable connections on the system board. 4. Replace the power-supply. 5. (Trained service technician only) Replace the system board.

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 are displayed on the screen and are saved in the test log. A diagnostic text message indicates the status of each completed test, see “Diagnostic text messages” on page 40 for additional information.

Starting the diagnostics utility

Notes:

1. The diagnostics utility does not provide RAID configuration in Linux operating systems.
2. The diagnostics utility will not detect a tape drive connected to the server.

To run the diagnostic utility, 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 `Press <F1> to enter Setup` is displayed, press F1.
4. When the Setup utility menu is displayed, select **Boot**.
5. Note the device that is selected as the first startup device. Later, you must restore this setting.
6. Make sure that the DVD-ROM is selected as the first startup device.
7. Insert the diagnostic CD into the DVD drive.
8. Select **Save & Exit → Save Changes and Exit** and follow the prompts. The diagnostic programs will load.
9. From the diagnostic programs screen, select the test that you want to run, and follow the instructions on the screen.

   For help with the diagnostic programs, press F1. You also can press F1 from within a help screen to obtain online documentation from which you can select different categories. To exit from the help information, press Esc. For more information, refer to the documentation on the diagnostics CD.

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 that indicate a microprocessor error, the error might be in a microprocessor or in a microprocessor socket. See “Microprocessor problems” on page 30 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 buttons **Prev Cat** and **Next Cat** 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.

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: One or more errors caused the test to fail. Additional details are added to the test log.

Aborted: You stopped the test before it was completed.

N/A: The selected device is not available or the current state of the server prevented testing.

<ERROR>: An error not related to testing occurred, or an unexpected return code was received. Additional details are added to the test log.

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

Viewing the test log

To view the summary test log when the tests are completed, use any of the following procedures:

- View the summary test log by pressing F3 or by pressing F2 and select **View Test Log** from the **Test Options** menu. Press Page Up and Page Down to view the entire log.
- View the detailed test log by pressing Tab while the summary test log is displayed. Press Page Up and Page Down to view the entire log.
- In the **Test Log** screen, you can save the test log to a file on a diskette or to the hard disk by pressing F2.

Notes:

1. To create and use a diskette, you must add an optional external diskette drive to the server before initiating the diagnostic programs.
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.
3. The test log data is maintained only while the diagnostic programs are active. When you exit from the diagnostic programs, the test log is cleared. Save the test log to a file on a diskette or to the hard disk if you want to refer to it later.

Recovering from a BIOS update failure

You can recover the BIOS code using the BIOS recovery jumper if the BIOS code in the server has become damaged, such as from a power failure during an update.

You can recover the BIOS code by using a BIOS flash diskette.

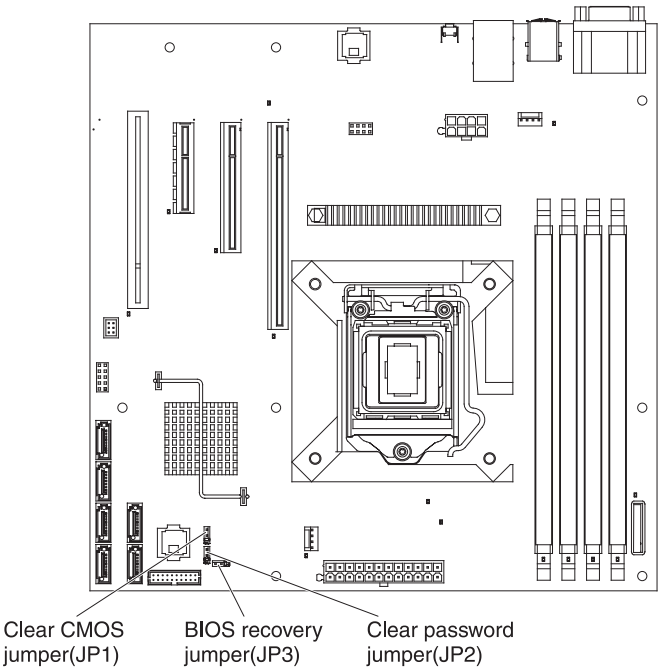
Note: To create and use a diskette, you must add an external USB diskette drive to the server.

To create a BIOS flash diskette for BIOS recovery, complete the following steps:

1. Go to http://www.ibm.com/systems/support/.
2. Under **Product support** , click **System x**.
3. Under **Popular links** list, click **Software and device drivers**.
4. Click **IBM System x3100 M3** to display the matrix of downloadable files for the server.
5. Select the applicable file for BIOS recovery; then, download the file.
6. Copy the BIOS ROM file to a USB flash device.

To recover the BIOS code, complete the following steps:

1. Read the safety information that begins on page vii and “Handling static-sensitive devices” on page 57.
2. Turn off the server and peripheral devices and disconnect all external cables and power cords; then, remove the side cover.
3. Lay the server on its side.
4. Locate the BIOS recovery jumper (JP3 on the system board). Remove any adapters or connectors that impede access to the jumper. The following illustration shows the location of the jumper on the system board.



5. Move the BIOS recovery jumper to pins 2 and 3.
6. Connect the server to the ac power source.
7. Insert a bootable USB key which contains the new BIOS image file (BIOS.ROM).
8. Restart the server.
9. When the recovery process is starts, select **Proceed with flash update** and press Enter. The screen displays the recovery progress.

   Note: You can select **Reset NVRAM** to reset the NVRAM to the default value.

10. When the recovery process is completed, turn off the server.

    Attention: Do not restart or turn off the server until the update process is completed.
11. Remove ac power from the server.
12. Move the BIOS recovery jumper back onto pins 1 and 2.
13. Connect the server to the ac power source.
14. Replace the cover; then, restart the server.

Solving SAS problems

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

For any SAS error message, one or more of the following devices might be causing the problem:

- A failing SAS device (adapter, drive, or controller)
- An incorrect SAS termination jumper setting
- Duplicate SAS IDs in the same SAS chain
- A missing or incorrectly installed SAS terminator
- A defective SAS terminator
- An incorrectly installed cable
- A defective cable

For any SAS error message, follow these suggested actions in the order in which they are listed until the problem is solved:

1. Make sure that external SAS devices are turned on before you turn on the server.
2. Make sure that the cables for all external SAS devices are connected correctly.
3. If an external SAS device is attached, make sure that the external SAS termination is set to automatic.
4. Make sure that the last device in each SAS chain is terminated correctly.
5. Make sure that the SAS 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 45 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 35.

Damaged data in CMOS memory or damaged BIOS code can cause undetermined problems. To reset the CMOS data, use the clear CMOS jumper (J1) to clear the CMOS memory; see “System-board jumpers” on page 15. If you suspect that the BIOS code is damaged, see “Recovering from a BIOS update failure” on page 40.

Check the LEDs on the power supply. If the LEDs indicate that the power supply is 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 one 512 MB DIMM.

   The following minimum configuration is required for the server to turn on:
   - A microprocessor
   - One 1 GB DIMM on the system board
   - A power supply
   - Power cord
   - System board
4. Turn on the server. If the problem remains, suspect the following components in the following order:
   a. System board
   b. Memory module
   c. Microprocessor

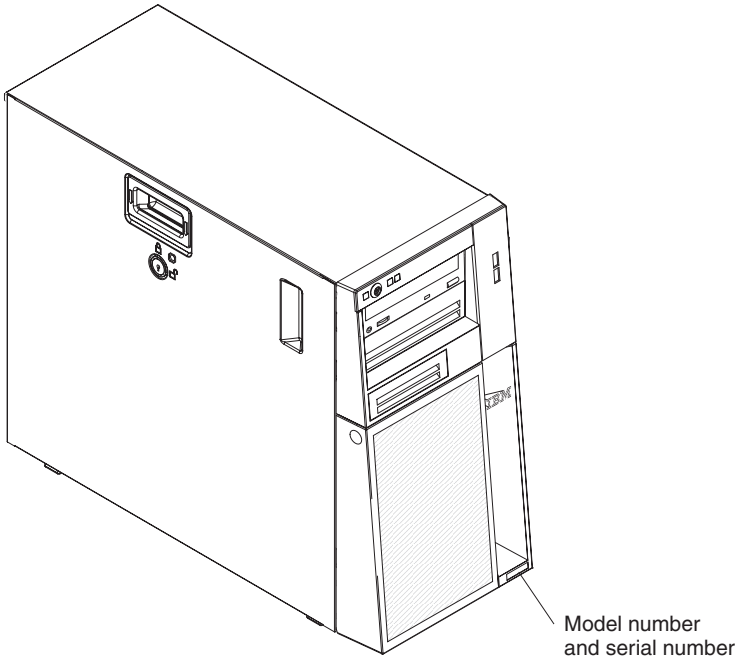
If the problem is solved when you remove an adapter from the server but the problem recurs when you reinstall the same adapter, suspect the adapter; if the problem recurs when you replace the adapter with a different one, suspect the system board.

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.

Problem determination tips

Because of the variety of hardware and software combinations that can encounter, use the following information to assist you in problem determination. If possible, have this information available when requesting assistance from IBM.

The model number and serial number of the server are located on the bottom on the right side of the bezel, as shown in the following illustration.



- Machine type and model
- Microprocessor or hard disk drive upgrades
- Failure symptom
  - Does the server fail the diagnostic tests?
  - What occurs? When? Where?
  - Does the failure occur on a single server or on multiple servers?
  - Is the failure repeatable?
  - Has this configuration ever worked?
  - What changes, if any, were made before the configuration failed?
  - Is this the original reported failure?
- Diagnostic program type and version level
- Hardware configuration (print screen of the system summary)
- BMC firmware level
- Operating system software

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:

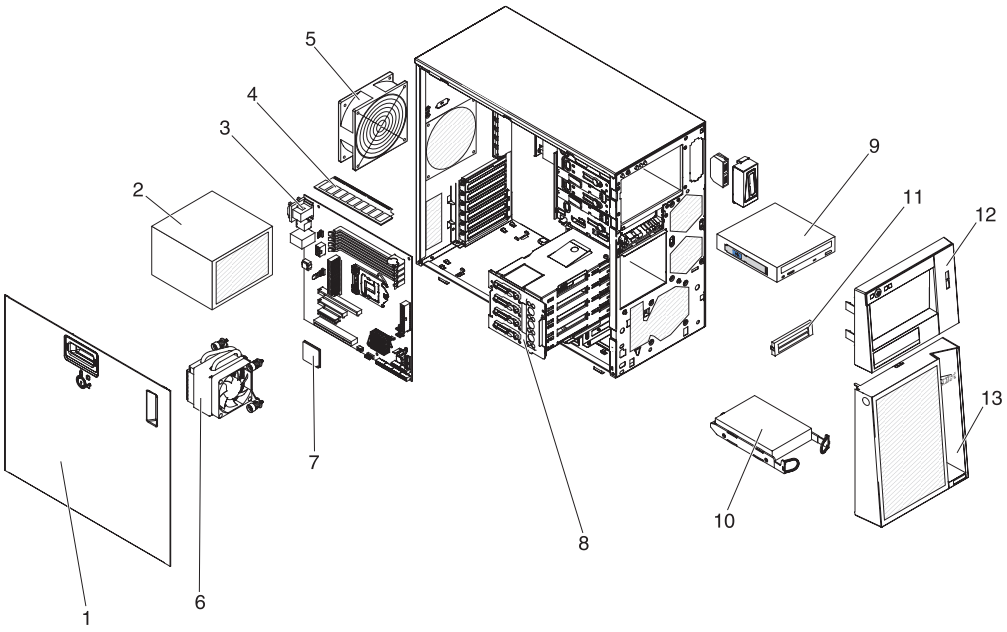
- Machine type and model
- BIOS firmware level

- Adapters and attachments, in the same locations
- Address jumpers, terminators, and cabling
- Software versions and levels
- Diagnostic program type and version level
- Configuration option settings
- Operating-system control-file setup

See Appendix A, “Getting help and technical assistance,” on page 123 for information about calling IBM for service.

Chapter 4. Parts listing, System x3100 M3 Type 4253

The following replaceable components are available for the System x3100 M3 Type 4253 server.



Replaceable server components

Replaceable components are of four types:

- **Consumable part:** Purchase and replacement of consumable parts (components, such as batteries and printer cartridges, that have depleting life) is your responsibility. If IBM acquires or installs a consumable part at your request, you will be charged for the service.
- **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 Information* document.

Table 3. Parts listing, Type 4253

Index	Description	CRU part number (Tier 1)	CRU part number (Tier 2)	FRU part number
1	Cover, side	49Y7271		
2	Power supply, 350 watt, non-redundant			49Y7260
3	System board			49Y7257
4	Memory, 1 GB single-rank PC3-10600 DDR3-1333 LP UDIMM (models 22x, 42x, and 44x)	44T1572		
4	Memory, 2 GB single-rank PC3-10600 DDR3-1333 LP UDIMM (models 62x, B2x, and D2x)	44T1573		
4	Memory, 2 GB dual-rank PC3-10600 DDR3-1333 LP UDIMM	44T1574		
4	Memory, 4 GB dual-rank PC3-10600 DDR3-1333 LP UDIMM	44T1575		
5	System fan		49Y8445	
6	Fan sink, microprocessor			49Y7261
7	Microprocessor, Pentium G6950 2.80GHz, 1066MHz-4MB 2C (73W) (models 42x and 44x)			49Y4646
7	Microprocessor, Celeron G1101 2.26GHz, 1066MHz-2MB 2C (73W) (model 22x)			49Y4645
7	Microprocessor, Core™ i3-540 3.06GHz, 1333MHz-4MB 2C (73W) (model 62x)			59Y3175
7	Microprocessor, Xeon X3450 2.66GHz, 1333MHz-8MB 4C (95W) (model D2x)			49Y4649
7	Microprocessor, Xeon X3430 2.4GHz/, 1333MHz-8MB 4C (95W) (model B2x)			49Y4647
8	Backplate assembly, simple-swap, SATA			69Y1483
8	Backplate assembly, simple-swap, SATA/SAS		69Y1482	
9	DVD-ROM, SATA	43W8466		
9	Multi-burner, SATA	43W8467		
10	Hard disk drive, 250 GB, 3.5-inch, simple-swap	39M4511		

Table 3. Parts listing, Type 4253 (continued)

Index	Description	CRU part number (Tier 1)	CRU part number (Tier 2)	FRU part number
10	Hard disk drive, 500 GB, 3.5-inch simple-swap	39M4517		
10	Hard disk drive, 1000 GB, 3.5-inch simple-swap	43W7625		
11	Filler panel, EMC	49Y7270		
12	Bezel, front assembly, top	49Y7269		
13	Bezel, front assembly, bottom	49Y8454		
	Battery, 3.0 volt	33F8354		
	Virtual media key	49Y7289		
	Chassis			49Y7258
	Simple-swap hard disk drive cage		25R8864	
	Front panel control panel assembly		49Y8456	
	Front USB connector assembly		49Y8449	
	Cable, optical drive, SATA		25R5635	
	Cable, hard disk drive, SATA		49Y7262	
	ServeRAID-BR10il SAS/SATA controller v2 (model D2x)		49Y4737	
	Foot, chassis		13N2985	
	Keyboard, USB, US English	42C0060		
	Mouse, USB	39Y9875		

If you need help with your order, call the toll-free number that is listed on the retail parts page, or contact your local IBM representative for assistance.

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 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
39M5206	China
39M5102	Australia, Fiji, Kiribati, Nauru, New Zealand, Papua New Guinea
39M5123	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
39M5130	Denmark
39M5144	Bangladesh, Lesotho, Macao, Maldives, Namibia, Nepal, Pakistan, Samoa, South Africa, Sri Lanka, Swaziland, Uganda
39M5151	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
39M5158	Liechtenstein, Switzerland
39M5165	Chile, Italy, Libyan Arab Jamahiriya
39M5172	Israel
39M5095 220 - 240 V	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
39M5081 110 - 120 V	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

IBM power cord part number	Used in these countries and regions
39M5219	Korea (Democratic People's Republic of), Korea (Republic of)
39M5199	Japan
39M5068	Argentina, Paraguay, Uruguay
39M5226	India
39M5233	Brazil

Chapter 5. Removing and replacing server components

Replaceable components are of four types:

- **Consumable part:** Purchase and replacement of consumable parts (components, such as batteries and printer cartridges, that have depleting life) is your responsibility. If IBM acquires or installs a consumable part at your request, you will be charged for the service.
- **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 Chapter 4, “Parts listing, System x3100 M3 Type 4253,” on page 49 to determine whether a component is a Tier 1 CRU, Tier 2 CRU, or FRU.

When you install your new server, take the opportunity to download and apply the most recent firmware updates. This step will help to ensure that any known issues are addressed and that your server is ready to function at maximum levels of performance. To download firmware updates for your server, 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/systems/support/.
2. Under **Product support**, click **System x**.
3. Under **Popular links**, click **Software and device drivers** for firmware updates.
4. Click **IBM System x3100 M3** to display the matrix of downloadable files for the server.

For important notes and additional information about installing components, see the *Installation and User's Guide* on the *System x Documentation* CD.

For additional information about tools for updating , managing, and deploying firmware, see the System x and BladeCenter Tools Center at http://publib.boulder.ibm.com/infocenter/toolsctr/v1r0/index.jsp.

For information about the terms of the warranty and getting service and assistance, see the *Warranty 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 57. 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.
- 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.
- When you install optional devices, you might find it easier to work with the server lying on its side.
- When you are finished working on the server, reinstall all safety shields, guards, labels, and ground wires.
- For a list of supported optional devices 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 do not operate the server with a failed fan.

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 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.

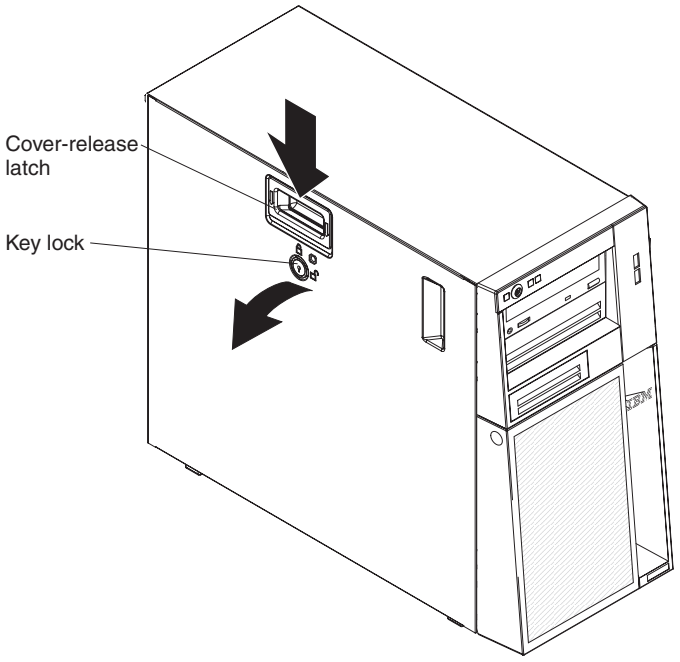
Removing the side cover

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 you turn on the server.

To remove the side cover, complete the following steps:

1. Read the safety information that begins on page vii and “Installation guidelines” on page 55.
2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.
3. Unlock the side cover; then, press the cover-release latch down (as shown in the illustration); then, remove the cover and set it aside.

   Note: The server keys are located on the rear of the server.



4. 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.

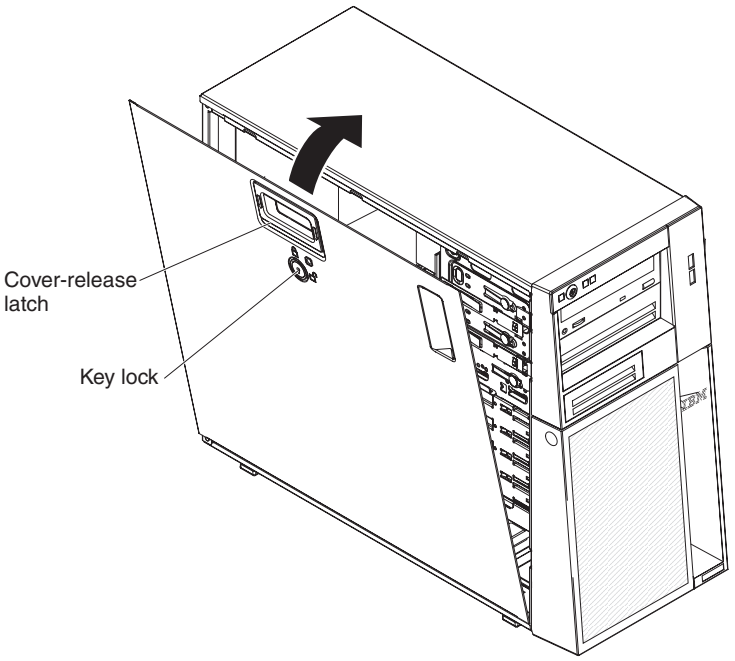
Installing the side cover

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:

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. If you removed the upper and lower bezels, reinstall them before you replace the side cover (see “Installing the upper bezel” on page 63 and “Installing the lower bezel” on page 61).

   Important: The cover lock must be in the unlocked (opened) position before you install the side cover.
3. Position the lip on the bottom edge of the side cover on the ledge on the bottom of the chassis; then, rotate the cover up to the chassis. Press down on the cover release latch and push the cover completely closed until it latches securely into place.



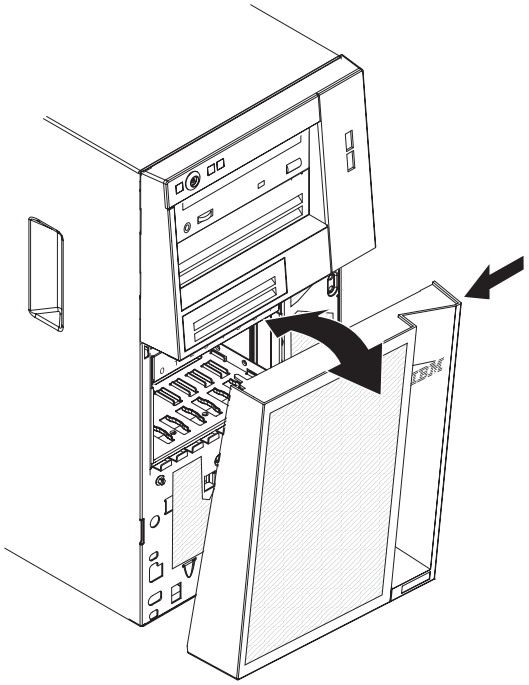
4. Lock the side cover.
5. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Removing the lower bezel

When you work with some devices, such as the drives in bays 4 through 7, you must first remove the lower bezel to access the devices.

To remove the lower bezel, complete the following steps:

1. Read the safety information that begins on page vii and “Installation guidelines” on page 55.
2. If you are replacing a non-hot-swap component, turn off the server and disconnect all attached devices; then, disconnect all power cords and external cables.
3. Unlock the side cover.
4. Press the round blue release button on the right side of the lower bezel and rotate the lower bezel downward to disengage and remove it from the chassis.

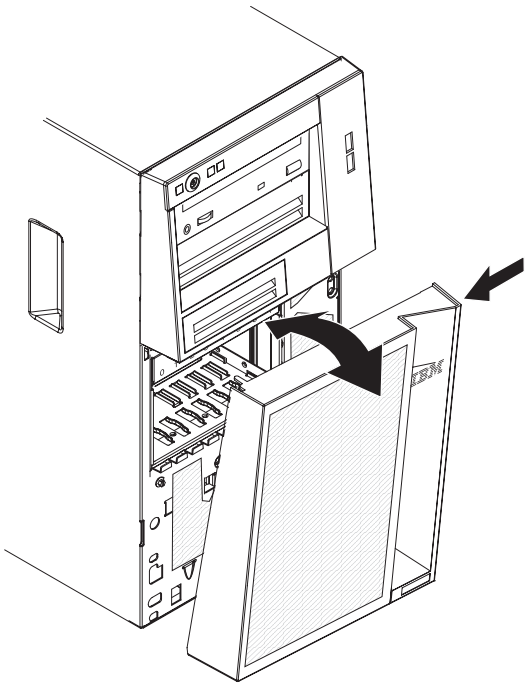


5. If you are instructed to return the lower bezel, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the lower bezel

To install the lower bezel, complete the following steps:

1. Insert the two bottom tabs on the lower bezel into the corresponding holes in the front of the chassis.



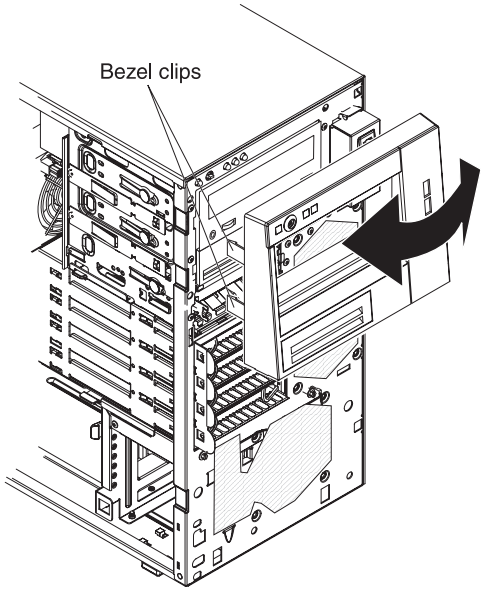
2. Rotate the top of the lower bezel up to the chassis; then, press the round blue release tab on the right side of the lower bezel and completely close the lower bezel until it locks securely into place.
3. Lock the side cover.
4. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Removing the upper bezel

When you work with some devices, such as the drives in bays 1 through 3, you must first remove the upper bezel to access the devices.

To remove the upper bezel, complete the following steps:

1. Read the safety information that begins on page vii and “Installation guidelines” on page 55.
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 and remove the side cover (see “Removing the side cover” on page 58).
4. Remove the lower bezel (see “Removing the lower bezel” on page 60).
5. Carefully pull the two bezel clips on the left side of the upper bezel; then, rotate the upper bezel to the right side of the server to disengage the two right-side tabs from the chassis.

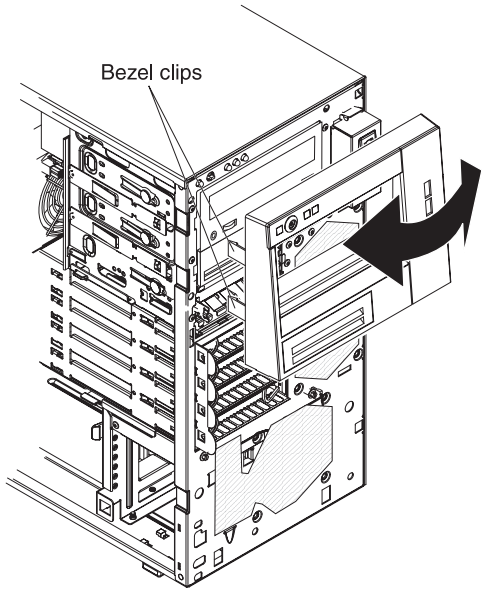


6. If you are instructed to return the upper bezel, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the upper bezel

To install the upper bezel, complete the following steps:

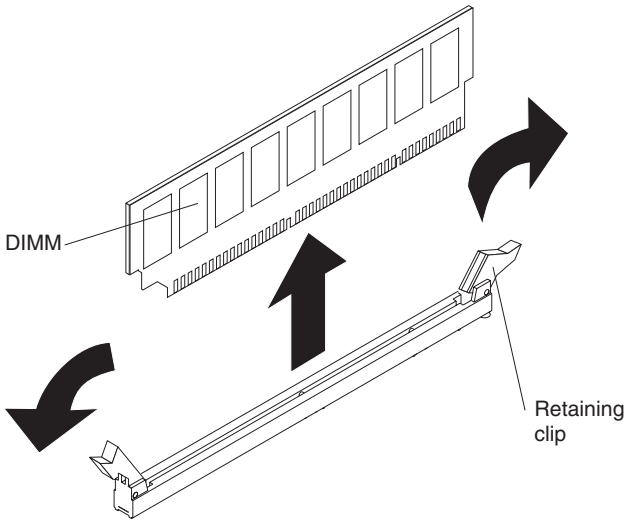
1. Insert the two tabs on the right-side of the upper bezel into the corresponding holes on the right side of the chassis.



2. Rotate the upper bezel to the left side of the chassis until the bezel clips are aligned with the corresponding indentations on the left side of the chassis and it snaps into place.
3. Install the lower bezel (see “Installing the lower bezel” on page 61).
4. Install the side cover (see “Installing the side cover” on page 59).
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 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 55.
2. Turn off the server and all peripheral devices; then, disconnect the power cords and all external cables.
3. Lay the server on its side.
4. Unlock and remove the side cover (see “Removing the side cover” on page 58).
5. Disconnect any cables that impede access to the DIMMs.

   Attention: To avoid breaking the DIMM retaining clips or damaging the DIMM connectors, open and close the clips gently.
6. Carefully open the retaining clips on each end of the DIMM connector and remove the DIMM.

   Note: If you are removing the DIMM from DIMM connector 1, avoid touching the system battery.
7. 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

The following notes describe the types of dual inline memory modules (DIMMs) that the server supports and other information that you must consider when you install DIMMs (see “System-board internal connectors” on page 12 for the location of the DIMM connectors):

- The server supports industry-standard, 1066 or 1333 MHz, PC3-10600-999 (single-rank or dual-rank) double-data-rate 3 (DDR3), unbuffered, synchronous dynamic random-access memory (SDRAM) dual inline memory modules (DIMMs) with error correcting code (ECC). For a list of supported options for the server, see http://www.ibm.com/servers/eserver/serverproven/compat/us/; then, select your country and navigate to the list of options for the server.
- The maximum amount of memory that the server supports is dependent on the type of memory that you install in the server. See “Unbuffered DIMMs (UDIMMs)” on page 65 for more information.
- The amount of usable memory is reduced, depending on the system configuration. A certain amount of memory must be reserved for system

resources. To view the total amount of installed memory and the amount of configured memory, run the Setup utility. For additional information, see “Using the Setup utility” on page 113.

- The maximum memory speed is determined by the combination of the microprocessor, DIMM speed, and the number of DIMMs installed in each channel.
- You can use compatible DIMMs from various manufacturers in the same pair.
- When you install or remove DIMMs, the server configuration information changes. When you restart the server, the system displays a message that indicates that the memory configuration has changed.
- The specifications of a DDR3 DIMM are on a label on the DIMM, in the following format.

  *ggg e*Rx*ff*-PC3-*wwwwwm-aa-bb-cc*

  where:

  ggg is the total capacity of the DIMM (for example, 1GB, 2GB, or 4GB)

  e is the number of ranks

  1 = single-rank

  2 = dual-rank

  4 = quad-rank

  ff is the device organization (bit width)

  4 = x4 organization (4 DQ lines per SDRAM)

  8 = x8 organization

  16 = x16 organization

  wwwww is the DIMM bandwidth, in MBps

  8500 = 8.53 GBps (PC3-1066 SDRAMs, 8-byte primary data bus)

  10600 = 10.66 GBps (PC3-1333 SDRAMs, 8-byte primary data bus)

  m is the DIMM type

  E = Unbuffered DIMM (UDIMM) with ECC (x72-bit module data bus)

  R = Registered DIMM (RDIMM)

  U = Unbuffered DIMM with no ECC (x64-bit primary data bus)

  aa is the CAS latency, in clocks at maximum operating frequency

  bb is the JEDEC SPD Revision Encoding and Additions level

  cc is the reference design file for the design of the DIMM

  Note: To determine the type of a DIMM, see the label on the DIMM. The information on the label is in the format xxxxx nRxxx PC3-xxxxx-xx-xx-xxx. The numeral in the sixth numerical position indicates whether the DIMM is single-rank (n=1) or dual-rank (n=2).

The following sections provide additional information specific to unbuffered DIMMs that you must consider.

Unbuffered DIMMs (UDIMMs)

The following notes provide information that you must consider when you install UDIMMs:

- The memory channels run at the fastest common frequency of the installed DIMMs.
- Using ECC and non-ECC UDIMMs in the server will cause the server to run in non-ECC mode.

- The UDIMM options that are available for the server are 1 GB, 2 GB, and 4 GB memory DIMMs.
- You can install a maximum of 16 GB of memory in the server.
- The server supports up to two single-rank or dual-rank UDIMMs per channel.
- The following table lists the supported UDIMM population.

Table 4. Supported UDIMM population per channel

DIMMs slots per channel	DIMMs installed in each channel	DIMM type	DIMM speed	Ranks per DIMM (any combination)
2	1	Unbuffered DDR3 ECC	1066, 1333	single-rank, dual-rank
2	2	Unbuffered DDR3 ECC	1066, 1333	single-rank, dual-rank

- The following table lists the maximum DIMM population using ranked UDIMM.

Table 5. Maximum memory population using ranked UDIMMs (depending on your model)

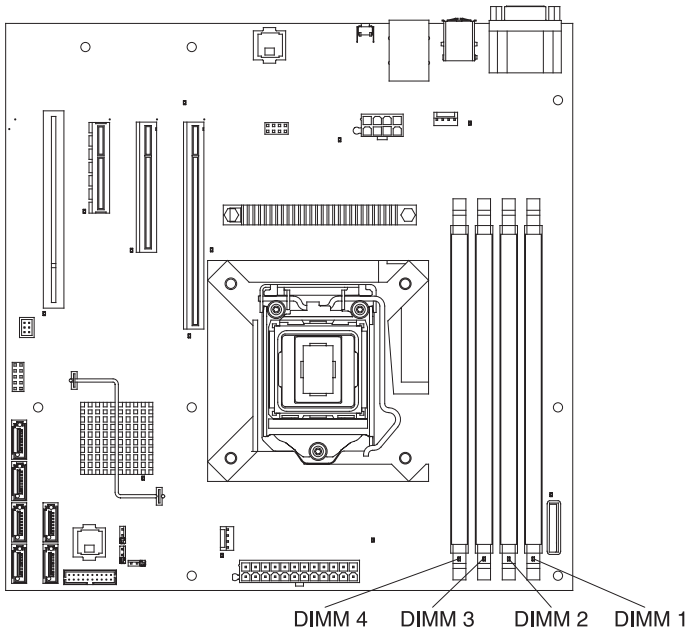
Number of UDIMMs	DIMM type	DIMM size	Total memory
4	single-rank UDIMMs	1 GB	4 GB
4	single-rank UDIMMs	2 GB	8 GB
4	dual-rank UDIMMs	2 GB	8 GB
4	dual-rank UDIMMs	4 GB	16 GB

- The following table lists the UDIMM memory population rule to optimize the system performance.

Table 6. UDIMMs population rule

DIMMs connector 1	DIMMs connector 2	DIMMs connector 3	DIMMs connector 4
populated	empty	empty	empty
populated	empty	populated	empty
populated	populated	populated	populated

The following illustration shows the location of the DIMM connectors on the system board.

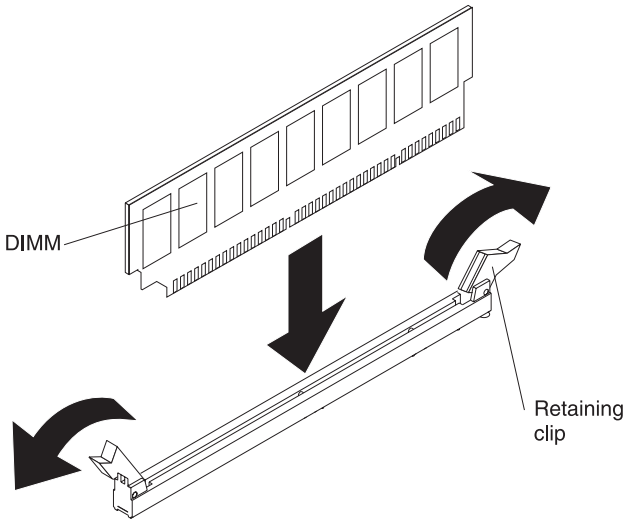


Attention: Static electricity that is released to internal server components when the server is powered-on might cause the server to stop, which could result in the loss of data. To avoid this potential problem, always use an electrostatic-discharge wrist strap or other grounding system when working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

To install a DIMM, complete the following steps:

1. Read the safety information that begins on page vii and “Installation guidelines” on page 55.
2. Turn off the server and peripheral devices and disconnect the power cords and all external cables, if necessary.
3. Unlock and remove the side cover (see “Removing the side cover” on page 58).
4. Open the retaining clip on each end of the DIMM connector. If you are installing a DIMM into DIMM connector 1, avoid touching the system battery.

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

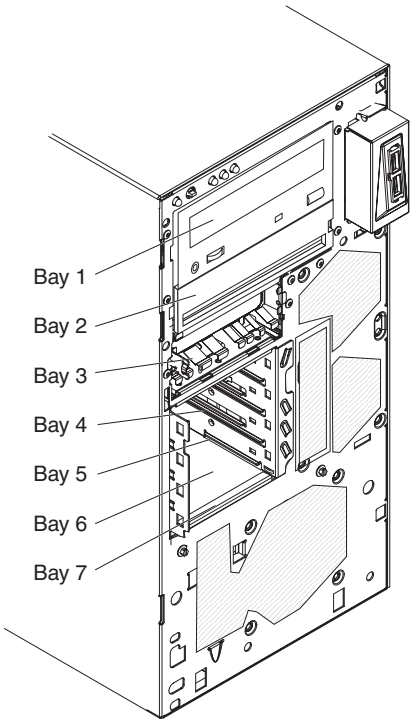


5. Touch the static-protective package that contains the DIMM to any unpainted metal surface on the outside of the server. Then, remove the DIMM from the package.
6. Turn the DIMM so that the DIMM keys align correctly with the connector.
7. Insert the DIMM into the connector by aligning the edges of the DIMM with the slots at the ends of the DIMM connector (see “System-board internal connectors” on page 12 for the location of the DIMM connectors).
8. 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.

   Note: If there is a gap between the DIMM and the retaining clips, the DIMM has not been correctly inserted; open the retaining clips, remove the DIMM, and then reinsert it.
9. If you have another drive to install or remove, do so now.
10. Install the side cover (see “Installing the side cover” on page 59).
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 installing internal drives

The following figure shows the locations of the drive bays in the server.



The following notes describe the types of drives that the server supports and other information that you must consider when installing a drive:

- Make sure that you have all the cables and other equipment that is specified in the documentation that comes with the drive.
- Select the bay in which you want to install the drive.
- Check the instructions that come with the drive to see whether you have to set any switches or jumpers on the drive. If you are installing a SATA device, be sure to set the SATA ID for that device.
- Optional internal or external USB diskette drives, tape drives, DVD-ROM, and multiburner drives are examples of removable-media drives. You can install removable-media drives in bays 1, 2, and 3 only.
- The SATA removable-media drives that you install in bay 1 connects to the SATA 5 connector on the system board and the drive in bay 2 connects to the SATA 4 connector on the system board.
- To install a 3.5-inch drive in a 5.25-inch bay, you must use the 5.25-inch conversion kit.
- The electromagnetic interference (EMI) integrity and cooling of the server are protected by having all bays and PCI and PCI Express slots covered or occupied. When you install a drive, PCI, or PCI Express adapter, save the EMC shield and filler panel from the bay or PCI or PCI Express adapter slot cover in the event that you later remove the device.
- For a complete list of supported optional devices for the server, see http://www.ibm.com/servers/eserver/serverproven/compat/us/.

Power and signal cables for internal drives

The server uses cables to connect SATA attached and simple-swap SATA devices to the power supply and to the system board (see “System-board internal connectors” on page 12 for the location of system-board connectors.) Review the following information before connecting power and signal cables to internal drives:

- The drives that are preinstalled in the server come with power and signal cables attached. If you replace any drives, remember which cable is attached to which drive.
- When you install a drive, make sure that one of the signal cable drive connectors is connected to the drive and that the connector at the other end of the signal cable is connected to the system board or a compatible adapter or controller that you have installed.
- When you route a cable, make sure that it does not block the airflow to the rear of the drives or over the microprocessor or DIMMs.

The following cables are provided:

- **Power cables:** Four-wire power cables connect the drives to the power supply. At the ends of these cables are plastic connectors that can be attached to different drives; these connectors vary in size. Use either a four-wire power cable or SATA power cable with SATA drives, but do not use both at the same time (use one or the other).
- **Signal cables:** Signal cables are typically flat cables, also called ribbon cables, that connect SATA attached, SATA and SAS to the system board. Two or three types of signal cables come with the server:
  - **SATA attached (for optical drives):** The flat SATA-attached signal cable has two connectors. One of these connectors is attached to the optical drive, and one is attached to one of the connectors on the system board.

– **Simple-swap SATA:** Simple-swap SATA models come with four SATA cables that are already connected to the system board and the backplate at the rear of the simple-swap drive cage.

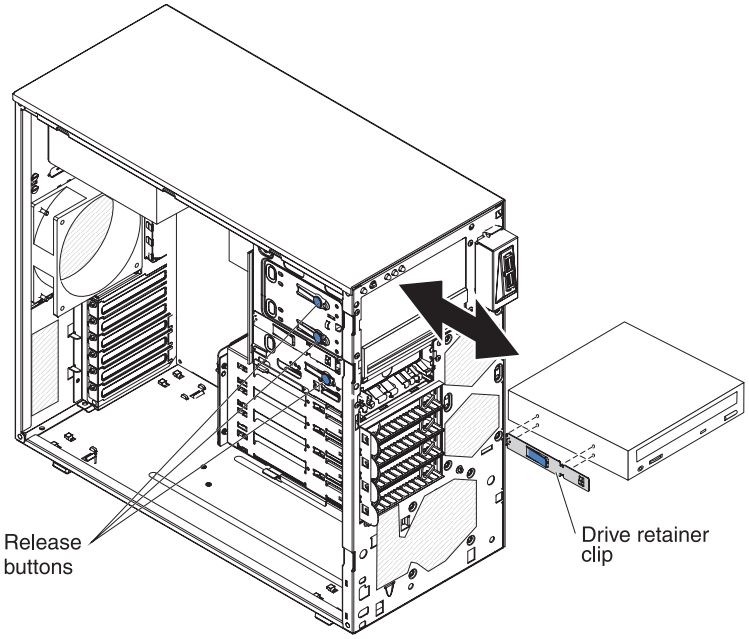
For more information about the requirements for SAS/SATA cables and connecting SAS/SATA devices, see the documentation that comes with these devices.

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

Removing a DVD drive

To remove a DVD drive, complete the following steps:

1. Read the safety information that begins on page vii and “Installation guidelines” on page 55.
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 58).
4. Remove the lower bezel (see “Removing the lower bezel” on page 60).
5. Remove the upper bezel (see “Removing the upper bezel” on page 62).
6. Disconnect the power and signal cables from the drive that is to be removed.
7. Press and hold the blue release button on the side of the bay to release the drive; then, pull the drive out of the front of the server.



8. Remove the drive retainer clip from the side of the drive. Save the clip 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 DVD drive

To install a 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 have checked 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 retainer clip 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.

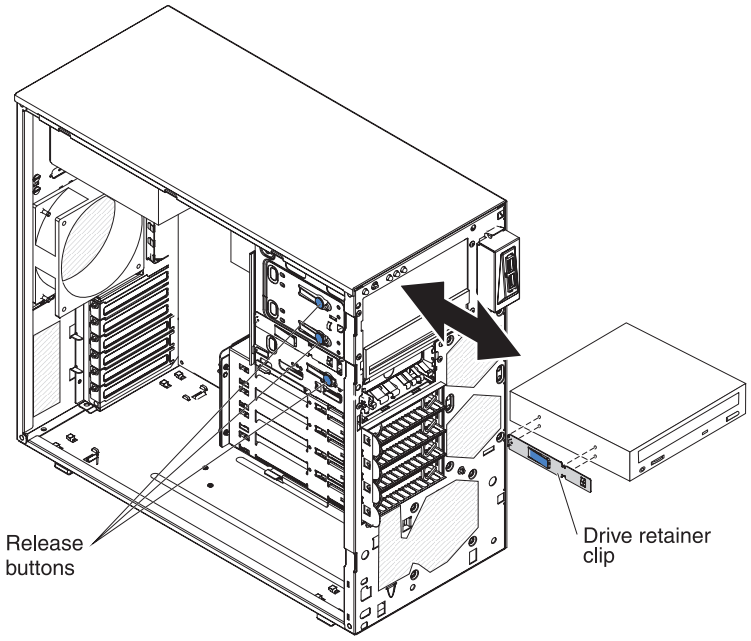
Laser radiation when open. Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam.

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

2. Touch the static-protective package that contains the new DVD drive to any unpainted metal surface on the server; then, remove the DVD drive from the package and place it on a static-protective surface.
3. 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.

4. If you are installing a 3.5-inch drive in bay 2, attach a 5.25-inch conversion kit to the 3.5-inch drive.
5. Remove the drive retainer clip from the side of the drive cage of bay 1 or bay 2. Slide the drive retainer clip to the front to remove it from the drive cage; then, snap the drive retainer clip into the screw holes on the side of the drive.



6. Push the drive into the bay.
7. Connect the power and signal cables to the drive.

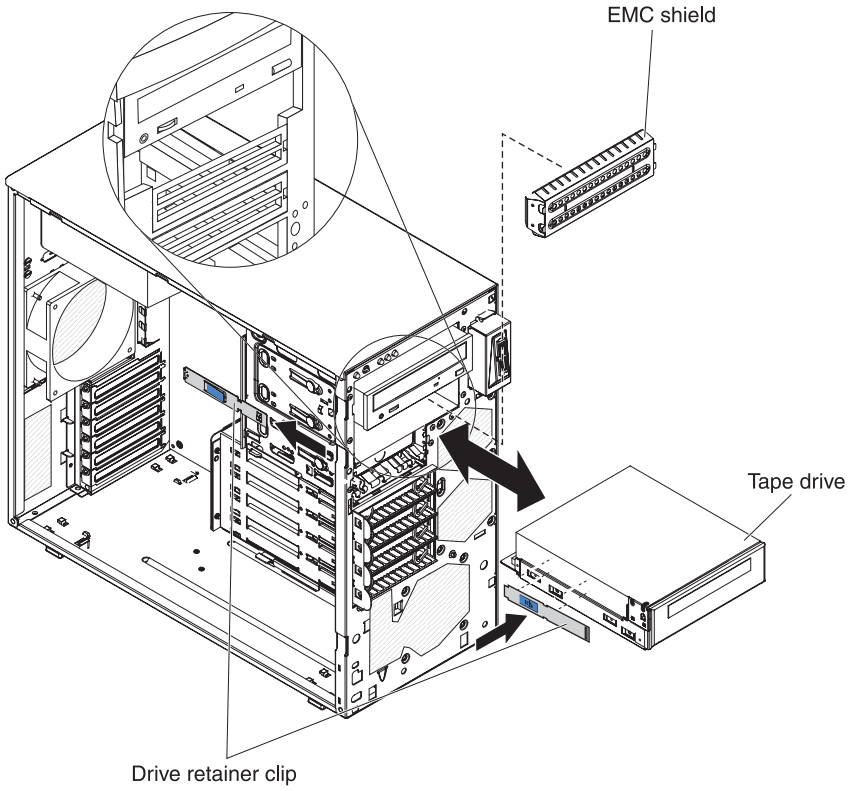
   Note: Route the signal cable so that it does not block the airflow to the rear of the drives or over the microprocessor and dual inline memory modules (DIMMs).
8. If you have another drive to install or remove, do so now.
9. Install the upper bezel (see “Installing the upper bezel” on page 63).
10. Install the lower bezel (see “Installing the lower bezel” on page 61).
11. Install the side cover (see “Installing the side cover” on page 59).
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 tape drive, complete the following steps:

1. Read the safety information that begins on page vii and “Installation guidelines” on page 55.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.
3. Unlock and remove the side cover (see “Removing the side cover” on page 58).
4. Remove the lower bezel (see “Removing the upper bezel” on page 62).
5. Remove the upper bezel (see “Removing the lower bezel” on page 60).
6. Disconnect the power and signal cables from the drive that is to be removed.
7. Press and hold the blue release button on the side of the bay to release the drive (if one is installed); then, pull the drive out of the front of the server.

8. Remove the drive retainer clip from the side of the drive. Save the clip to use when you install the replacement drive.



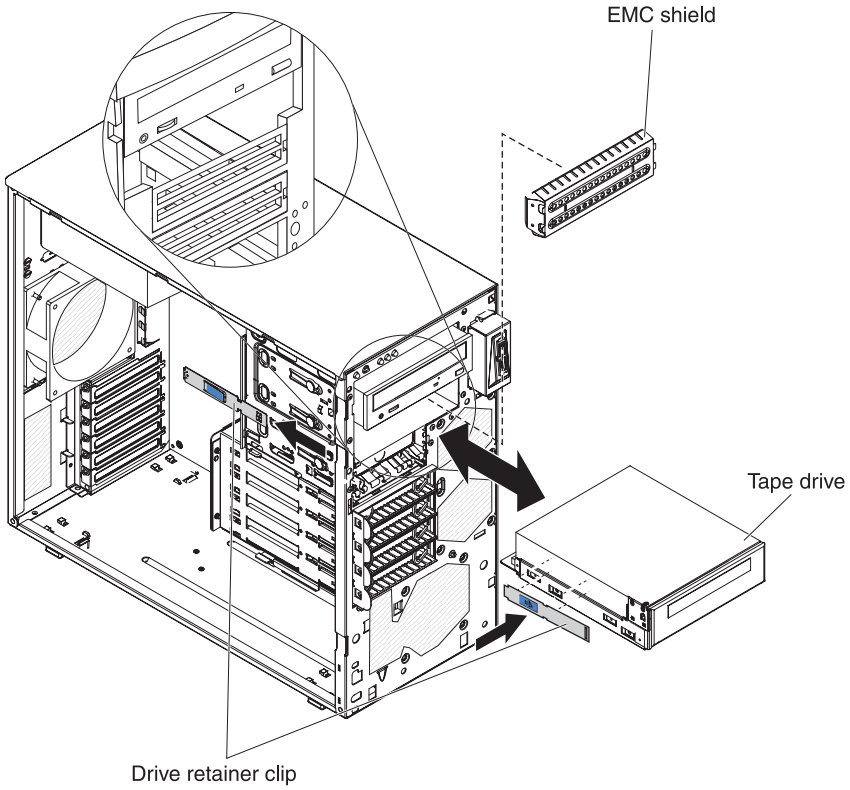
9. If you are instructed to return the drive, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing an optional tape drive

To install an optional tape 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 on the drive.
   - You have removed the drive retainer clip on the side of the old drive and have it available for installation on the new drive.
2. Read the safety information that begins on page vii and “Installation guidelines” on page 55.
3. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.
4. Unlock and remove the side cover (see “Removing the side cover” on page 58).
5. Remove the lower bezel (see “Removing the lower bezel” on page 60).
6. Remove the upper bezel (see “Removing the upper bezel” on page 62).
7. 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.
8. Set any jumpers or switches on the drive according to the documentation that comes with the drive.

9. Remove the drive retainer clip from the side of the drive cage of bay 1 or bay 2. Slide the drive retainer clip to the front to remove it from the drive cage; then, snap the drive retainer clip into the screw holes on the side of the drive.



10. Remove the EMC filler.
11. Push the drive into the bay.

    Note: A tape drive can be installed in bay 1 or bay 2

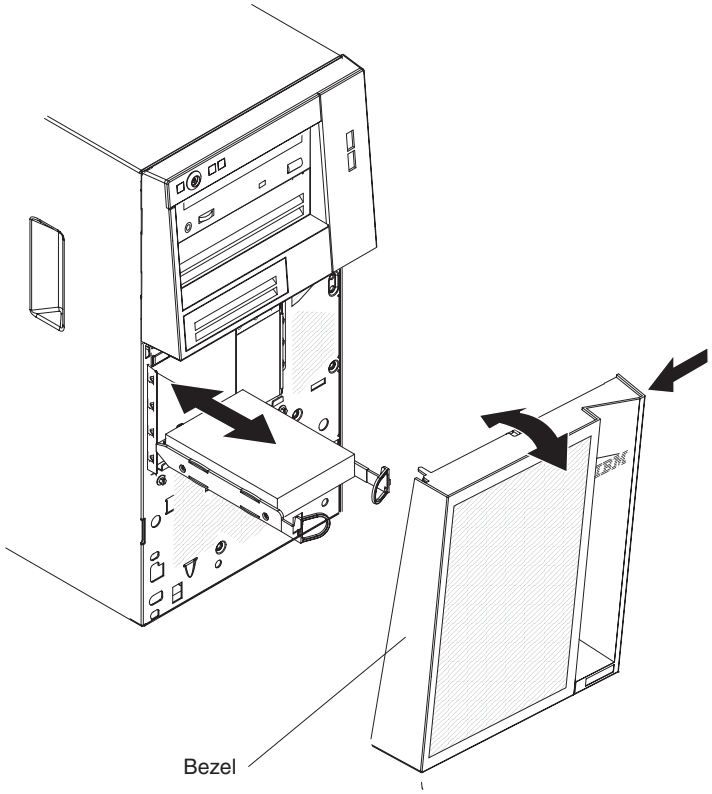
12. Connect one end of the applicable signal cable into the rear of the drive and make sure that the other end of this cable is connected into the applicable connector on the system board (see “System-board internal connectors” on page 12).
13. Route the signal cable so that it does not block the airflow to the rear of the drives or over the microprocessor and dual inline memory modules (DIMMs).
14. Connect the power cable to the rear of the drive. The connectors are keyed and can be inserted only one way.
15. If you have another drive to install or remove, do so now.
16. Install the upper bezel (see “Installing the upper bezel” on page 63).
17. Install the lower bezel (see “Installing the lower bezel” on page 61).
18. Install the side cover (see “Installing the side cover” on page 59).
19. Lock the side cover.
20. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Removing a simple-swap SATA hard disk drive

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

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

1. Read the safety information that begins on page vii and “Installation guidelines” on page 55.
2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.
3. Unlock the side cover and remove the lower bezel (see “Removing the lower bezel” on page 60).
4. Pull the round blue loops of the drive assembly that is to be removed toward each other; then, pull the assembly out of the bay.



5. 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 SATA hard disk drive

The server supports up to four 3.5-inch simple-swap SATA hard disk drives, which are accessible from the front of the server. You must disconnect all power from the server before you remove or install simple-swap drives. Before you install a simple-swap SATA hard disk drive, read the following information:

- Install the drives starting from the top bay to the bottom bay (bay 4, 5, 6, and then 7). The following tables list the IDs of the hard disk drives:

Table 7. IDs of simple-swap drives

Drive bay	ID
4	0
5	1
6	2
7	3

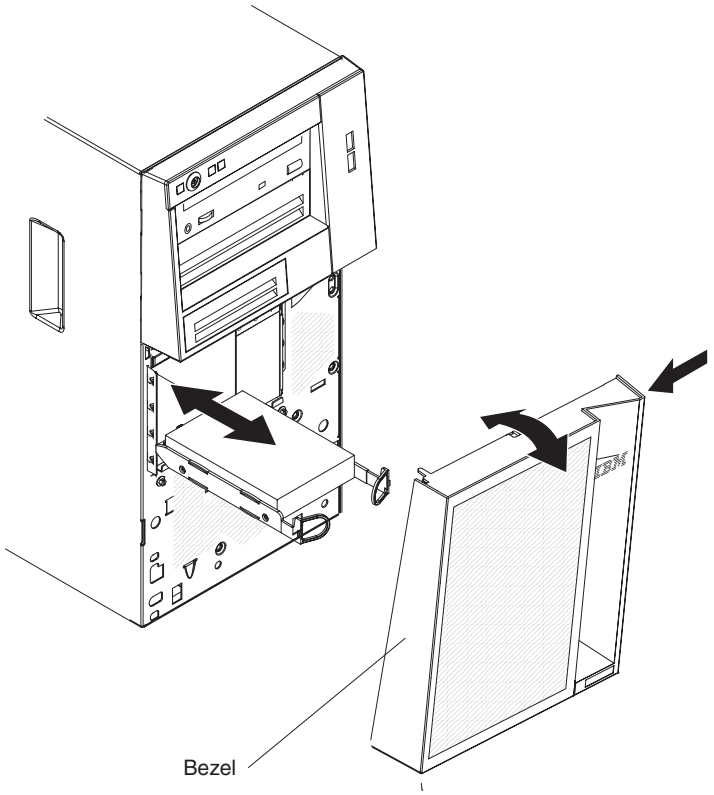
- The simple-swap SATA hard disk drives connect to the SATA 0 through SATA 3 connectors on the system board as follows:
  - Hard disk drive 0 connects to the SATA 0 connector on the system board.
  - Hard disk drive 1 connects to the SATA 1 connector on the system board.
  - Hard disk drive 2 connects to the SATA 2 connector on the system board.
  - Hard disk drive 3 connects to the SATA 3 connector on the system board.

  Note: If you installed a ServeRAID adapter in the server, connect the other end of the SATA signal cable to the connector on the ServeRAID adapter.

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

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

1. Read the safety information that begins on page vii and “Installation guidelines” on page 55.
2. Turn off the server and peripheral devices and disconnect all external cables and power cords.
3. Unlock the side cover and remove the lower bezel (see “Removing the lower bezel” on page 60).
4. 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.
5. Align the drive assembly with the guide rails in the bay (the connector end of the drive goes in first).



6. Pull the round blue 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.

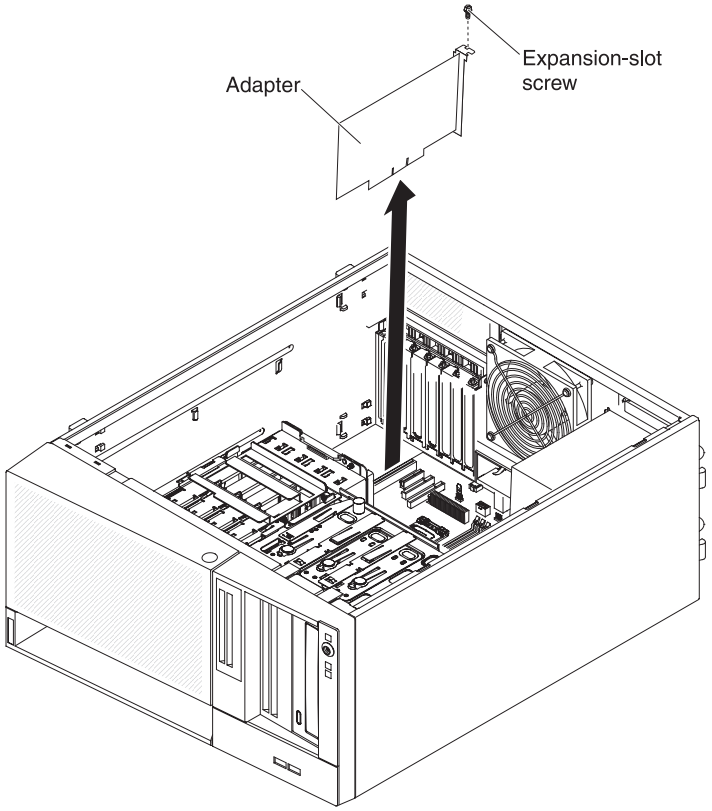
   Note: Do not release the loops on the drive assembly until it is completely seated.
7. If you have another drive to install or remove, do so now.
8. Install the lower bezel (see “Installing the lower bezel” on page 61).
9. Lock the side cover.
10. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Removing 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 55.
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 58).
4. Lay the server on its side.
5. Disconnect any cables from the adapter or any cables that impede access to the adapter.
6. Remove the expansion-slot screw at the rear of the adapter if any.
7. Carefully grasp the adapter by its top edge or upper corners; then, pull the adapter to remove it 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 you are not replacing the adapter, 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

The following notes describe the types of adapters that the server supports and other information that you must consider when you install an adapter. Adapter that the server supports might vary, depending on your server model.

- Locate the documentation that comes with the adapter and follow those instructions in addition to the instructions in this section. If you must change the switch setting or jumper settings on the adapter, follow the instructions that come with the adapter.
- Read the documentation that comes with your operating system.
- The server comes with the following adapter connectors or slots:
  - Slot 1, PCIe2 x16 (8, 4, 1) 25W
  - Slot 2, PCIe2 x8 (8, 4, 1) 25W
  - Slot 3, PCIe2 x4 (4, 1) 25W
  - Slot 4, PCI 32bit, 33MHz
- The server scans slot 1, slot 2, slot 3, and slot 4 to assign system resources. Then, the server starts the PCI devices in the following order, if you have not changed the default startup sequence: slot 1, slot 2, slot 3, and slot 4.

- The 32-bit slot 4 support 5.0 V keyed PCI adapters; they do not support 3.3 V keyed adapters. Universal adapters are supported in slot 4 if they are universally keyed.
- Depending on your server model, ServeRAID-BR10il controller v2 enables hardware RAID levels 0 and 1.
- The server does not support full-length adapters.
- For a list of supported options for the server, see http://www.ibm.com/servers/eserver/serverproven/compat/us/.

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

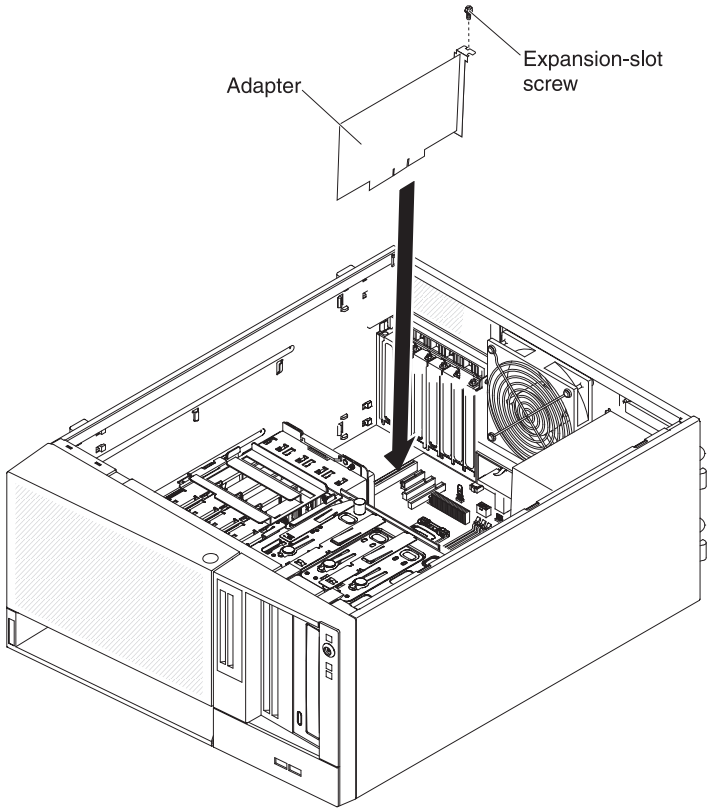
To install an adapter, complete the following steps:

1. Read the safety information that begins on page vii and “Installation guidelines” on page 55.
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 58).
4. Lay the server on its side.
5. Follow the cabling instructions, if any, that come with the adapter. Route the adapter cables before you install the adapter.
6. Follow the instructions that come with the adapter to set jumpers or switches, if any.
7. Remove the screw that secures the expansion-slot cover to the chassis. 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.
8. 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.

9. Carefully grasp the adapter by the top edge or upper corners, and align it with the expansion slot guides; then, press the adapter *firmly* into the expansion slot.

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

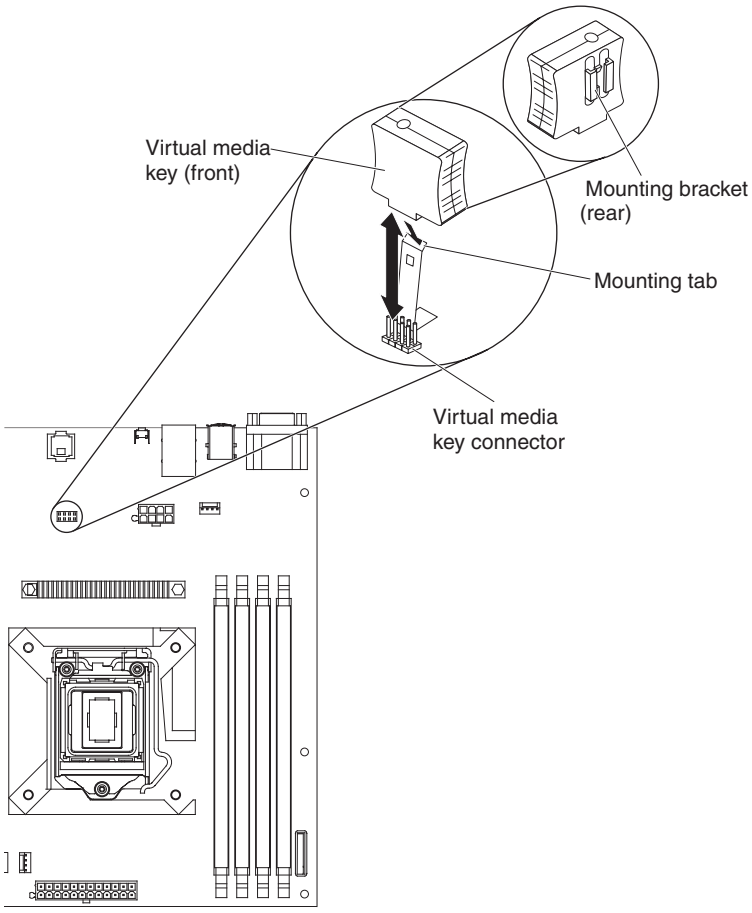


10. Install an expansion-slot screw at the rear of the adapter.
11. Connect any required cables to the adapter. Route the cables so that they do not block the flow of air from the system fan.
12. Install the side cover (see “Installing the side cover” on page 59).
13. Lock the side cover.
14. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Removing the virtual media key

To remove the virtual media key, complete the following steps:

1. Read the safety information that begins on page vii and “Installation guidelines” on page 55.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.
3. Unlock and remove the side cover (see “Removing the side cover” on page 58).
4. Lay the server on its side.
5. Grasp the virtual media key and gently slide it up and off of the mounting tab.

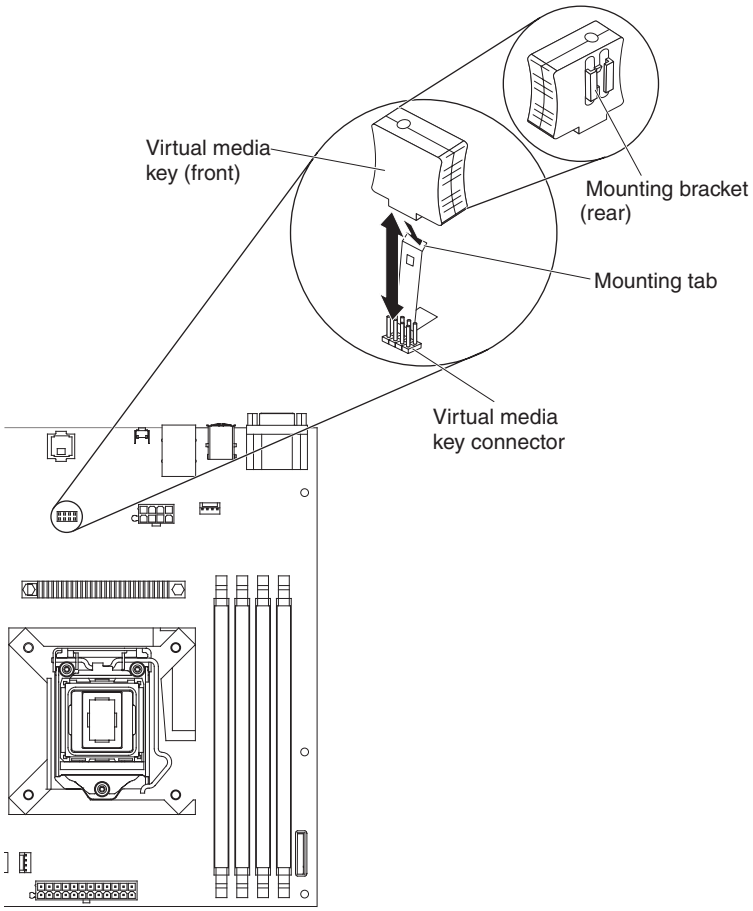


6. If you are instructed to return the virtual media key, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the virtual media key

To install the virtual media key, complete the following steps:

1. Read the safety information that begins on page vii and “Installation guidelines” on page 55.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.
3. Unlock and remove the side cover (see “Removing the side cover” on page 58).
4. Lay the server on its side.
5. Align the virtual media key with the mounting tab and slide it down the tab onto the connector on the system board. Press the virtual media key down into the connector until it is firmly seated on the system board.



6. Install the side cover (see “Installing the side cover” on page 59).
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 system battery

The following notes describe information that you must consider when you replace the battery:

- 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.

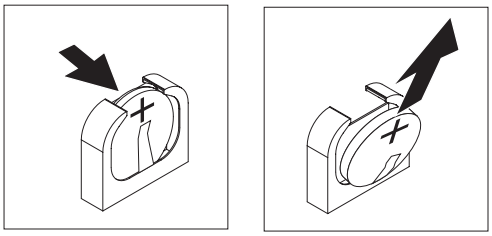
Do not:

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

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

To remove the battery, complete the following steps.

1. Read the safety information that begins on page vii and “Installation guidelines” on page 55.
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 58).
4. Lay the server on its side.
5. Locate the battery on the system board (see “System-board internal connectors” on page 12).
6. Use your thumb and index finger to lift the battery from the socket.



Note: When you remove or install the battery, avoid touching the DIMM installed in DIMM connector 1.

Installing the battery

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

- You must replace the battery with a lithium battery of the same type from the same manufacturer.
- To order replacement batteries, call 1-800-426-7378 within the United States, and 1-800-465-7999 or 1-800-465-6666 within Canada. Outside the U.S. and Canada, call your IBM marketing representative or authorized reseller.
- 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**

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

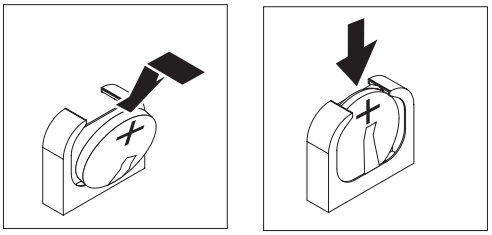
To install the replacement battery, complete the following steps:

1. Follow any special handling and installation instructions that come with the replacement battery.
2. Insert the new battery:

   Note: When you remove or install the battery, avoid touching the DIMM installed in DIMM connector 1.

   a. Orient the battery so that the positive side faces away from the DIMM connectors.

   b. Tilt the battery so that you can insert it into the socket.



   c. 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 59).
4. Lock the side cover.
5. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.
6. Start the Setup utility program and reset the configuration:
   - Set the system date and time.
   - Set the power-on password.
   - Reconfigure the server.

   See “Setup utility menu choices” on page 114for 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.

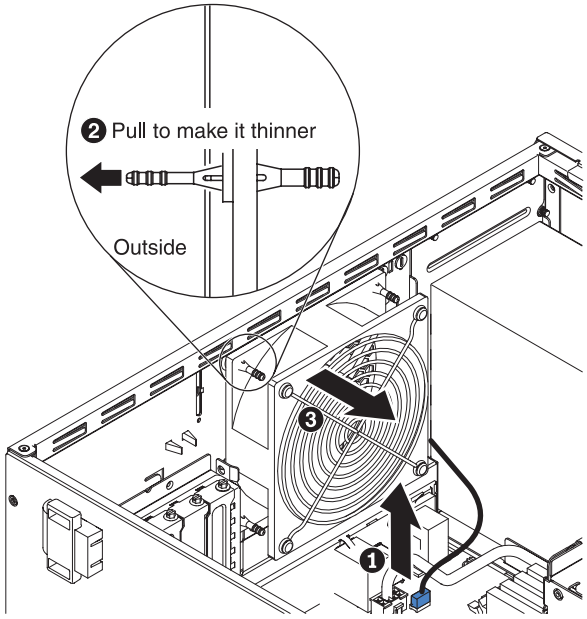
Removing the rear system fan

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 the rear system fan, 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 58).
3. Remove any adapters that impede access to the fan and the fan connector on the system board (see “Removing an adapter” on page 77).
4. Remove the system fan:



   a. Disconnect the fan cable **1** from the system board (see “System-board internal connectors” on page 12).
   b. While you support the system fan with one hand, pull the rubber grommet **2** away from the chassis to make it thinner; then, pull the fan toward the front of the server to remove the rubber grommet **3** through the hole on the chassis.
   c. Lift the system fan up and out of the chassis.
5. If you are instructed to return the fan, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

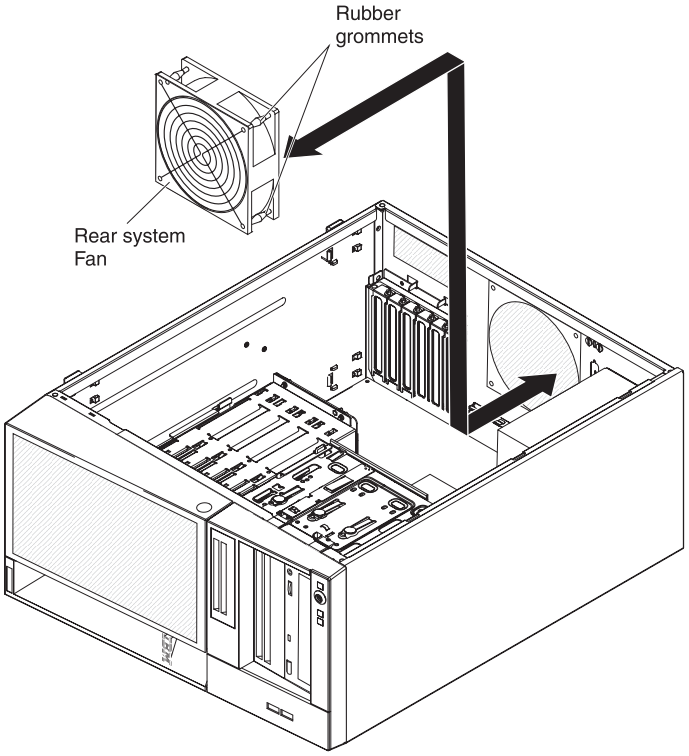
Installing the rear system fan

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 the rear system fan, complete the following steps:

1. The replacement fan comes with the rubber grommets installed; however, they might have come out during shipment. If any of the rubber grommets are missing from the fan, install them on the fan before you continue. Use needle-nosed pliers to pull the grommets through the holes in the fan.
2. Position the fan so that the grommets protrude through the holes in the chassis; then, use needle-nosed pliers to pull the grommets through the holes from outside the chassis.

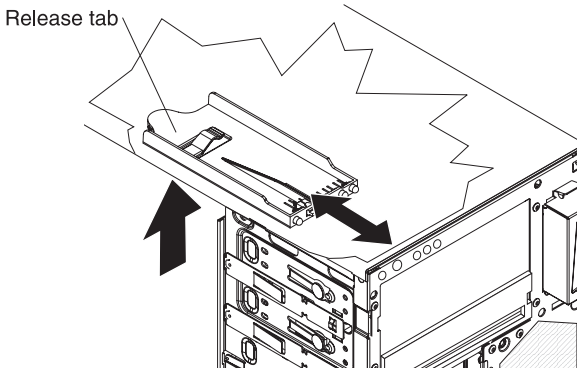


3. Connect the fan cable to the system board (see “System-board internal connectors” on page 12 for the location of the rear fan connector).
4. Install any adapters that you removed (see “Installing an adapter” on page 78).
5. Install the side cover (see “Installing the side cover” on page 59).
6. Lock the side cover.
7. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Removing the front control panel assembly

To remove the front control panel assembly, complete the following steps:

1. Read the safety information that begins on page vii and “Installation guidelines” on page 55.
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 58).
4. Remove the lower bezel (see “Removing the lower bezel” on page 60).
5. Remove the upper bezel (see “Removing the upper bezel” on page 62).
6. Slide the drives in bay 1 and bay 2 forward slightly (see “Removing a DVD drive” on page 70 for more information). It is not necessary to remove these drives.
7. Disconnect the front control panel assembly cable from the system board, and note the routing of the cable (see “System-board internal connectors” on page 12 for the location of the front-panel connector).

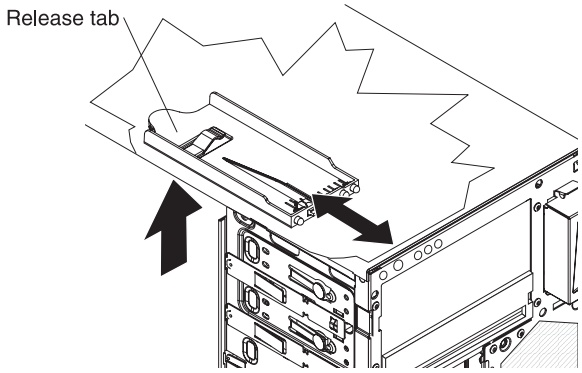


8. Press up on the release tab of the front control panel assembly and pull the assembly toward the rear of the server; then, remove the front control panel assembly from the chassis.
9. If you are instructed to return the front control panel assembly, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the front control panel assembly

To install the front control panel assembly, complete the following steps:

1. Position the front end of the front control panel assembly in the channel above drive bay 1 on the left side of the chassis.

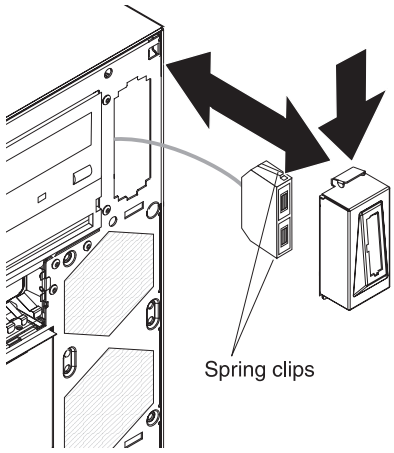


2. Push the front-panel assembly toward the front of the chassis until it clicks into place.
3. Reroute and connect the front control panel assembly cable to the system board (see “System-board internal connectors” on page 12 for the location of the front-panel connector).
4. Push the drives in bay 1 and bay 2 into the drive bays (see “Installing a DVD drive” on page 70 for more information).
5. Install the upper bezel (see “Installing the upper bezel” on page 63).
6. Install the lower bezel (see “Installing the lower bezel” on page 61).
7. Install the side cover (see “Installing the side cover” on page 59).
8. Lock the side cover.
9. 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 55.
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 58).
4. Remove the lower bezel (see “Removing the lower bezel” on page 60).
5. Remove the upper bezel (see “Removing the upper bezel” on page 62).
6. Disconnect the front USB cable from the system board, and note the routing of the cable (see “System-board internal connectors” on page 12 for the location of the front USB connector).
7. 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.

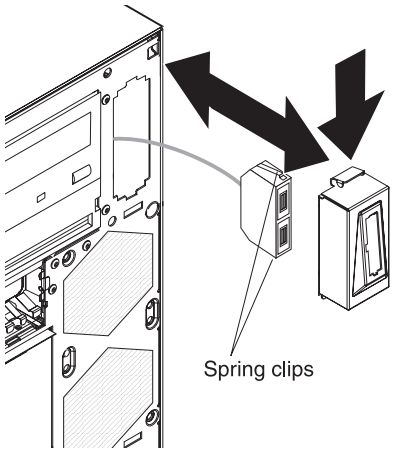


8. Squeeze the spring clips on the sides of the front USB connector assembly and pull the assembly out of the back of the housing.
9. Carefully pull the front USB cable out of the opening in the chassis.
10. If you are instructed to return the front USB connector assembly, follow all packaging instructions, 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 insert the front USB cable through the opening in the front of the chassis.



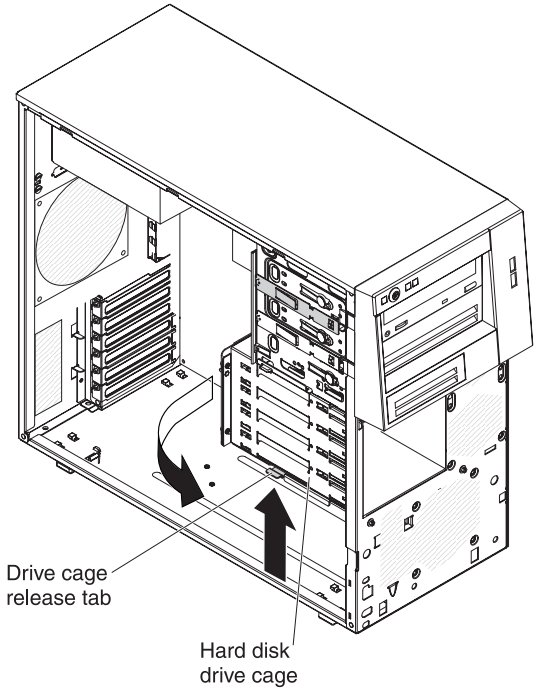
2. Squeeze the spring clips on the sides of the front USB connector assembly and insert the assembly into the housing through the back of the housing.
3. Place the bottom edge of the housing into the bottom of the opening in the chassis; then, tilt the top of the housing into position until it clicks into place.
4. Reroute and connect the front USB cable to the front USB connector on the system board (see “System-board internal connectors” on page 12 for the location of the front USB connector).
5. Install the upper bezel (see “Installing the upper bezel” on page 63).
6. Install the lower bezel (see “Installing the lower bezel” on page 61).
7. Install the side cover (see “Installing the side cover” on page 59).
8. Lock the side cover.

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

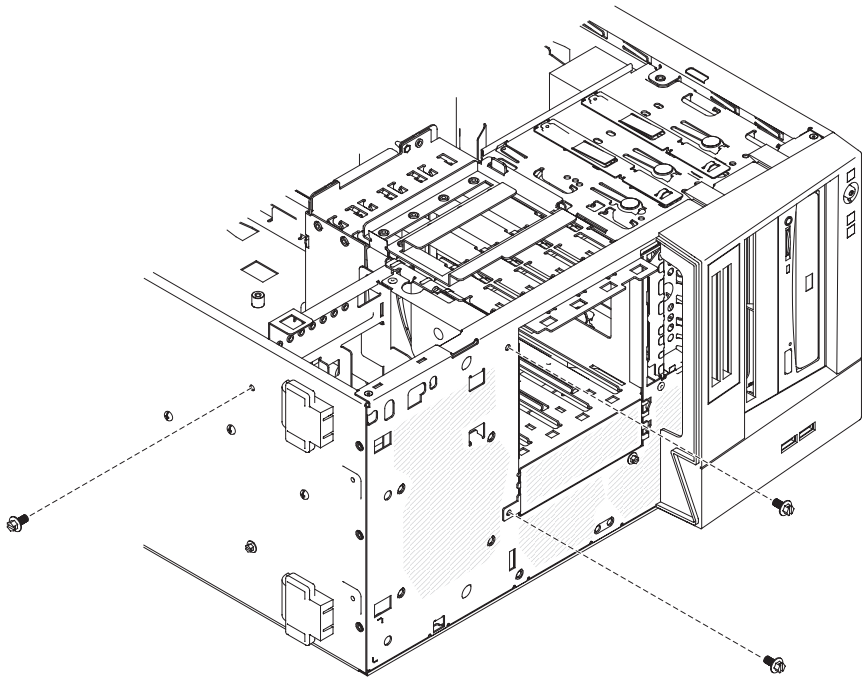
Removing the hard disk drive cage

To remove the hard disk drive cage, complete the following steps:

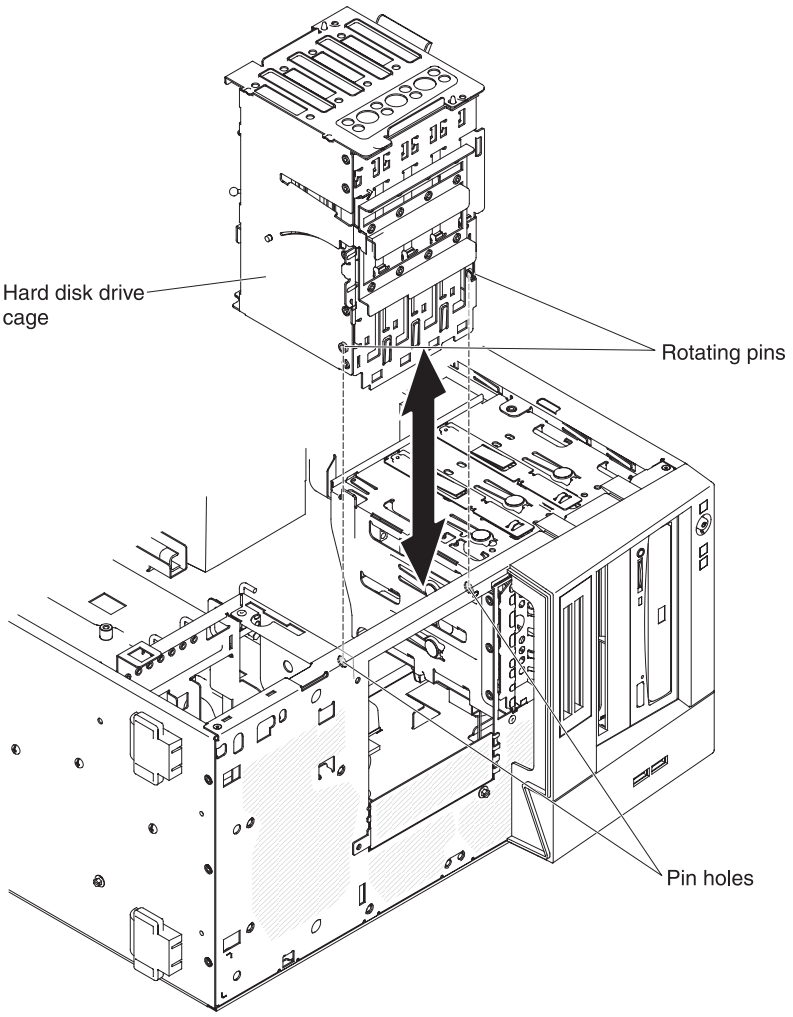
1. Read the safety information that begins on page vii and “Installation guidelines” on page 55.
2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.
3. Unlock and remove the side cover (see “Removing the side cover” on page 58).
4. Remove the lower bezel (see “Removing the lower bezel” on page 60).
5. Remove the simple-swap hard disk drives (see “Removing a simple-swap SATA hard disk drive” on page 75).
6. Disconnect the hard disk signal cables from the system board or the ServeRAID-10il v2 adapter (if one is installed).
7. Disengage the cables from the retention clips.
8. Press and hold the drive cage release tab; then, rotate the drive cage out of the chassis until the cage locks into place.



9. Lay the server on its side.
10. Remove the simple-swap backplate (see “Removing the simple-swap backplate” on page 95).
11. Remove the two screws on the front of the server.



12. Remove one screw from the bottom of the server.
13. Disengage the rotating pins on the drive cage from the pin holes on the chassis and lift to remove the cage from the server.

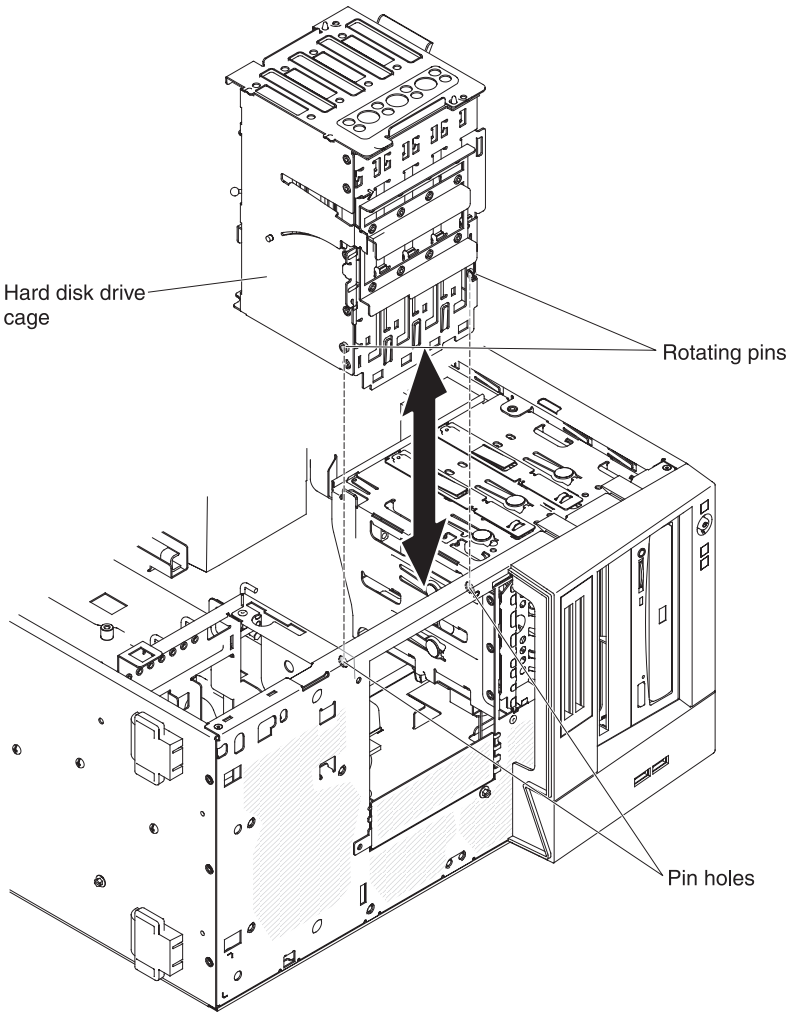


14. If you are instructed to return the drive cage, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

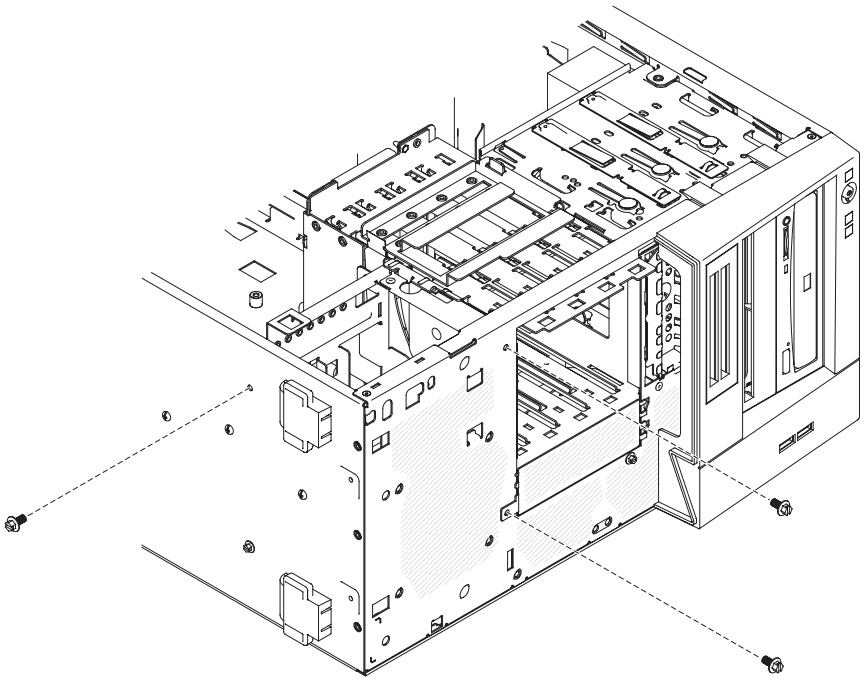
Installing the hard disk drive cage

To install the hard disk drive cage, complete the following steps:

1. Orient the drive cage unit as shown in the illustration.
2. Insert the rotating pins on the drive cage into the corresponding pin holes on the chassis.

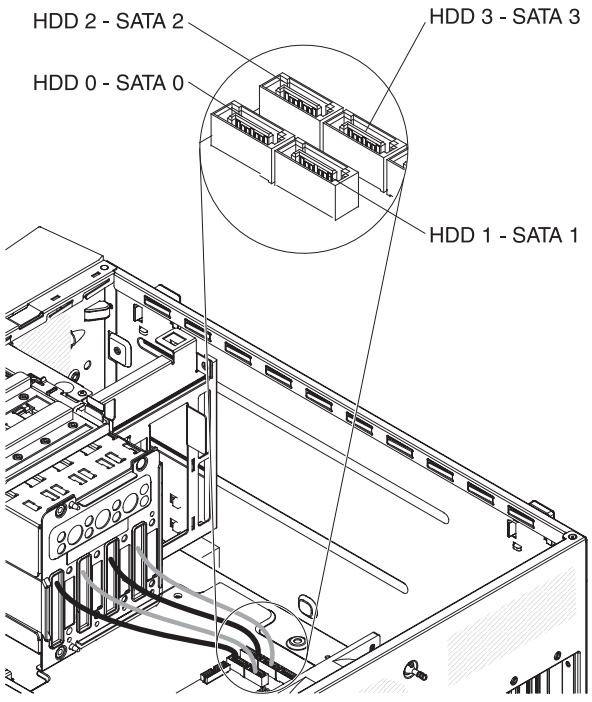


3. Install the two screws on the front of the server.
4. Install the screw on the bottom of the server.



5. Press and hold the drive cage release tab; then, rotate the drive cage into the chassis until the cage locks into place.
6. Install the simple-swap backplate (see “Installing the simple-swap backplate” on page 96).
7. Connect the hard disk drive signal cables to the SATA connectors on the system board or the connector on the ServeRAID-10il v2 adapter (if one is installed).

   The following illustrations shows the SATA connectors on the system board:



8. Secure the cables with the retention clips.
9. Install the side cover (see “Installing the side cover” on page 59).

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

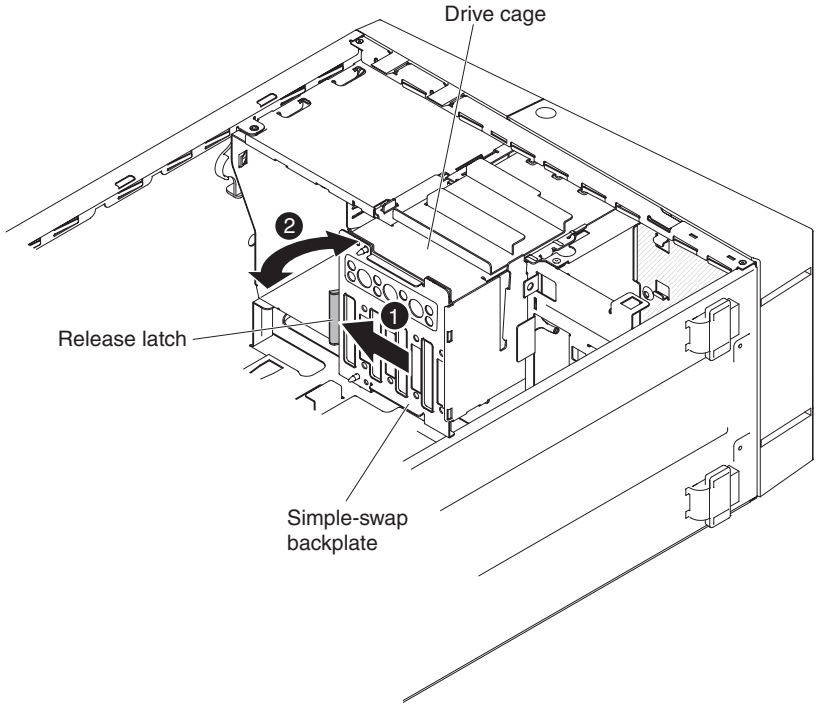
Removing the simple-swap backplate

Important: Before you remove the simple-swap backplate from the server, take the following precautions to save data, firmware, and configuration data:

- Before you make changes to disk drives, disk drive controllers (including controllers that are integrated on the system board), disk drive backplates, or disk drive cables, back up all important data that is stored on hard disks.
- Before you remove any component of a RAID array, back up all RAID configuration information.

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 55.
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 58).
4. Remove the lower bezel (see “Removing the lower bezel” on page 60).
5. Slide the simple-swap hard disk drive forward slightly to disconnect the drive from the backplate (see “Removing a simple-swap SATA hard disk drive” on page 75). It is not necessary to remove these drives.
6. Lay the server on its side.
7. Disconnect the signal cable from the ServeRAID adpater (if one is installed) or disconnect the SATA signal cables from the system board, and note the routing of the cables.
8. Disengage the signal cables from the retention-clips.
9. While pressing the release latch, rotate the backplate away from the drive cage until it is clear of the locating pins.
10. Lift the backplate out of the server and set it aside.

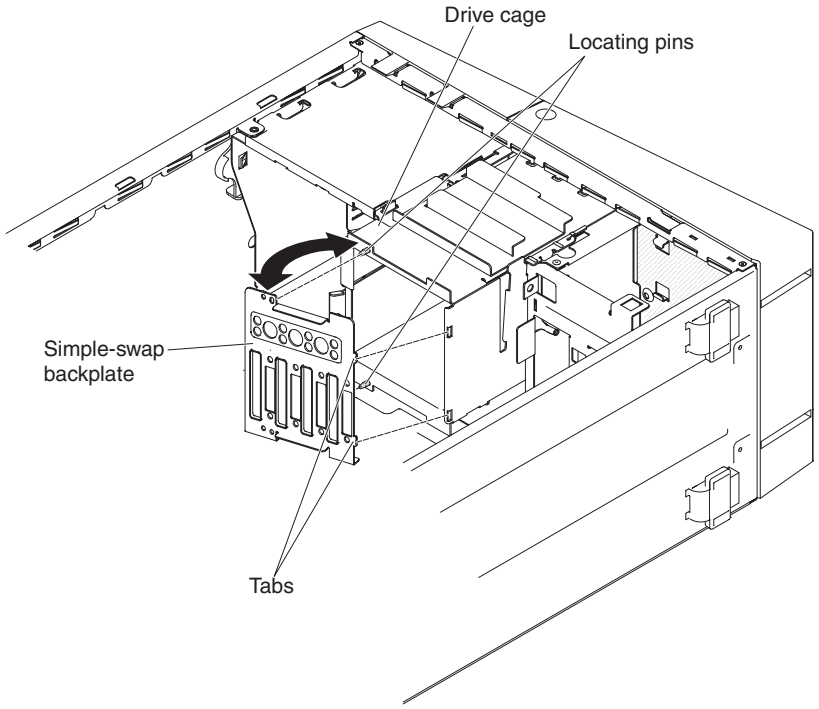


11. If you are instructed to return the backplate, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the simple-swap backplate

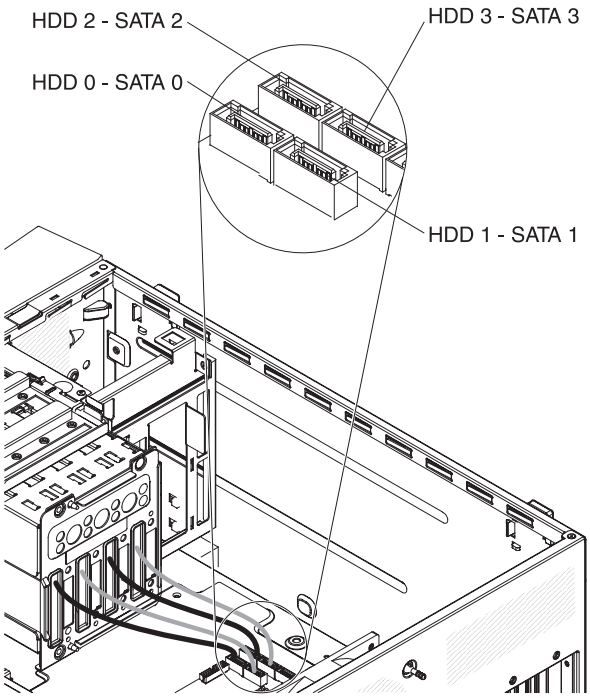
To install the simple-swap hard disk drive backplate, complete the following steps.

1. Insert the two tabs on the backplate into the matching holes on the drive cage.



2. Rotate the backplate toward the drive cage and over the locating pins; then, press the backplate onto the drive cage until the release latch securely engages the backplate.

3. Connect the cables. Do one of the following:
   - Connect the signal cable to the connector on the ServeRAID adapter
   - Connect the other end of the SATA signal cables and power cable to the connectors on the system board (as shown in the following illustration)



4. Route the signal cables so that it does not block the airflow to the rear of the drives or over the microprocessor and dual inline memory modules (DIMMs).
5. Secure the cables with the retention-clips.
6. Install the simple-swap hard disk drives.
7. Install the lower bezel (see “Installing the lower bezel” on page 61).
8. Install the side cover (see “Installing the side cover” on page 59).
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-BR10il SAS/SATA controller v2

Note: ServeRAID-BR10il v2 SAS/SATA adapter is installed in some server models. To remove the ServeRAID-BR10il v2 SAS/SATA adapter, complete the following steps:

1. Read the safety information beginning on page vii, and “Installation guidelines” on page 55.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.
3. Unlock and remove the side cover (see “Removing the side cover” on page 58).
4. Lay the server on its side.
5. Remove the expansion slot screw (if installed) that secures the ServeRAID adapter to the chassis.
6. Disconnect any cables connected to the ServeRAID adapter.

Attention: To avoid breaking the retaining clips or damaging the ServeRAID adapter connector, open and close the clips gently.

7. Carefully grasp the end of the ServeRAID adapter and pull it out of the connector.
8. 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-BR10il SAS/SATA controller v2

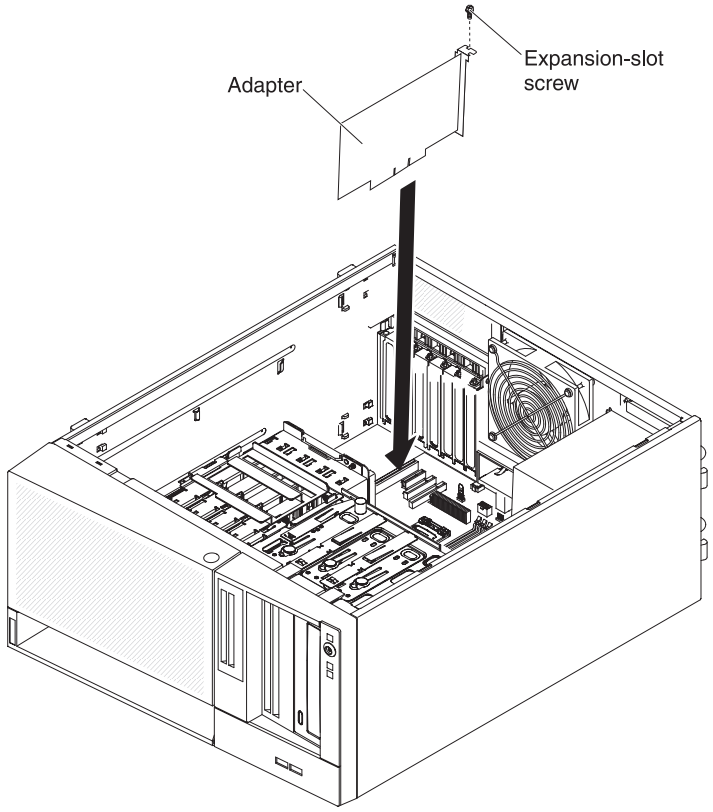
The IBM ServeRAID-BR10il v2 SAS/SATA adapter comes as standard on some server models. The ServeRAID-BR10il v2 adapter must be installed in its dedicated connector, PCI slot 3, on the system board. The ServeRAID-BR10il v2 adapter enables hardware RAID levels 0 and 1. For configuration information, see the ServeRAID documentation at http://www.ibm.com/systems/support/.

Note: If you are upgrading to hardware RAID for the first time, you need to install the hardware RAID upgrade cable kit that contains a new backplate and attached cables. To order the cable kit, contact your IBM marketing representative or authorized reseller.

To install the ServeRAID-BR10il v2 adapter, complete the following steps:

1. Read the safety information beginning on page vii, and “Installation guidelines” on page 55.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.
3. Unlock and remove the side cover (see “Removing the side cover” on page 58).
4. Lay the server on its side.
5. Disconnect any cables from the existing SAS/SATA controller (if one is installed); then, remove the SAS/SATA controller from the server.
6. Touch the static-protective package that contains the ServeRAID-BR10il v2 adapter to any unpainted metal surface on the server. Then, remove the ServeRAID-BR10il v2 adapter from the package.
7. Align the ServeRAID-BR10il v2 adapter so that the keys align correctly with the connector on the system board.

   Attention: Incomplete insertion might cause damage to the system board or the ServeRAID-BR10il v2 adapter.
8. Press the ServeRAID-BR10il v2 adapter firmly into PCI slot 3 on the system board.



9. Install the expansion-slot screw to secure the ServeRAID-BR10il v2 adapter to the chassis.
10. Take the other end of the signal cable that is attached to the drive backplate for drive bays 0 through 3 (as labeled on the front of the drive cage) and connect it to the connector on the ServeRAID-BR10il v2 adapter.
11. Secure the cable with the retention clips.
12. Replace the side cover (see “Installing the side cover” on page 59).
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 and replacing FRUs

Field replaceable units (FRUs) must be installed only by trained service technicians.

Removing the power supply

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

Statement 8:

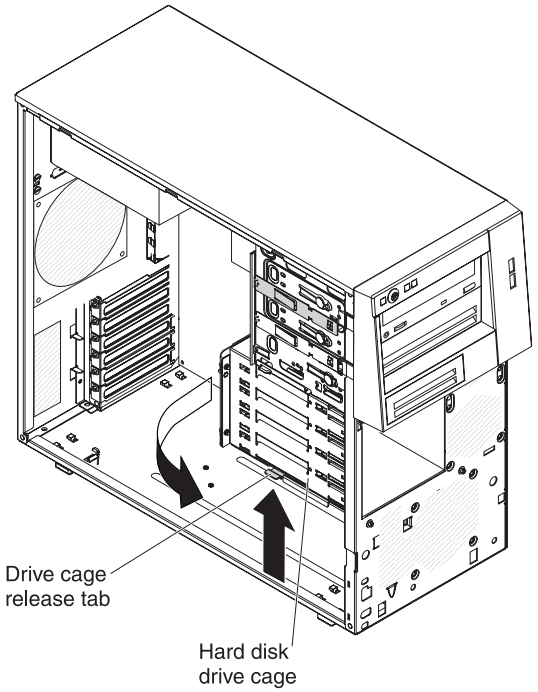
CAUTION:
Never remove the cover on a power supply or any part that has the following label attached.

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.

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

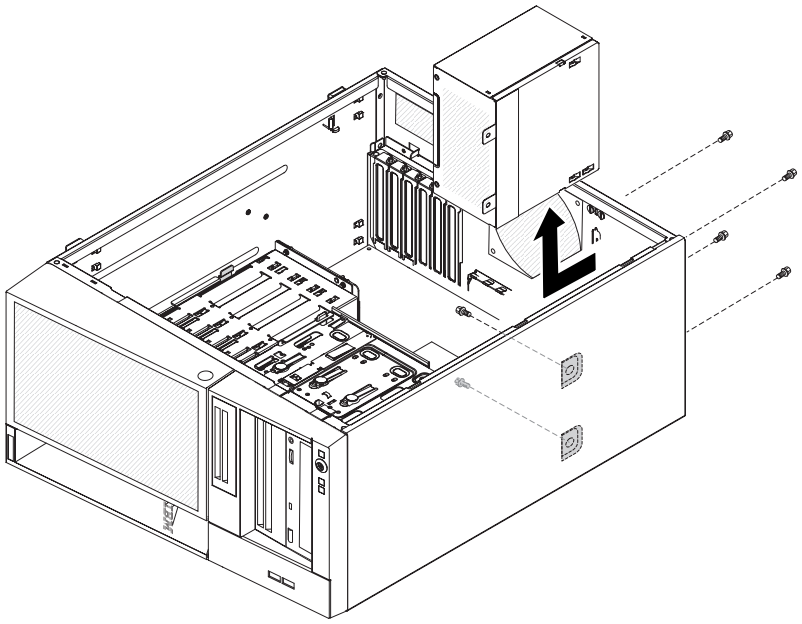
1. Read the safety information that begins on page vii and “Installation guidelines” on page 55.
2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.
3. Unlock and remove the side cover (see “Removing the side cover” on page 58).

   Note: It might be helpful to lay the server on its side for the remainder of this procedure.
4. Remove the lower bezel (see “Removing the lower bezel” on page 60).
5. Remove the simple-swap hard disk drives (see “Removing a simple-swap SATA hard disk drive” on page 75).
6. Lay the server on its side.
7. Disconnect the hard disk SATA signal cables from the system board or the ServeRAID adapter. Note where each SATA cable is connected.
8. Disengage the cables from the retention clips.
9. Press and hold the drive cage release tab; then, rotate the drive cage out of the chassis until the cage locks into place.



10. Disconnect the cables from the power supply to the system board and all internal components. Note the routing of all power-supply cables; you will need to route the power-supply cables the same way when you install the power supply.

    Attention: Support the power supply while you remove the mounting screws. After the screws are removed, the power supply is loose and can damage other components in the server.
11. While you support the power supply, remove the screws that secure it to the chassis; then, lift the power supply out of the chassis. Save the screws to use when you install the replacement power supply.

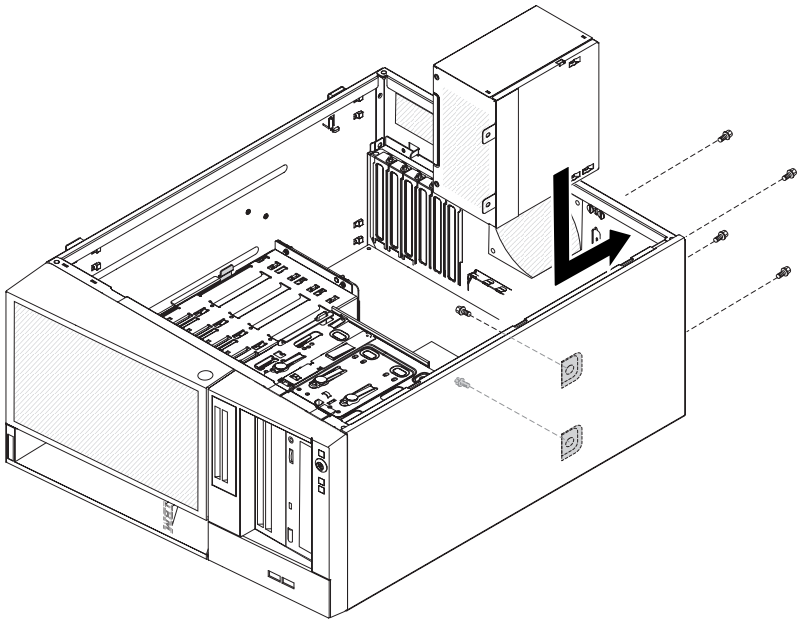


12. If you are instructed to return the power supply, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the power supply

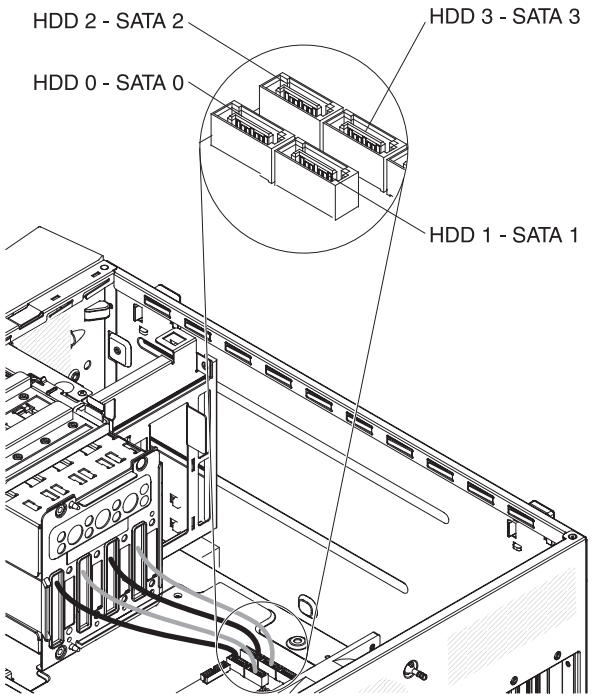
To install a non-hot-swap power supply, complete the following steps:

1. Position the power supply in the chassis so that the screw holes in the power supply are aligned with the corresponding holes in the rear of the chassis.



2. Install the screws that secure the power supply to the chassis.
3. Connect the cables from the power supply to the system board and all internal components (see “System-board internal connectors” on page 12 for the locations of the internal connectors).
4. Press and hold the drive cage release tab; then, rotate the drive cage into the chassis until the cage locks into place.
5. Connect the hard disk SATA signal cables to the system board or the ServeRAID adapter.

   The following illustration shows the hard disk drive SATA connectors on the system board:

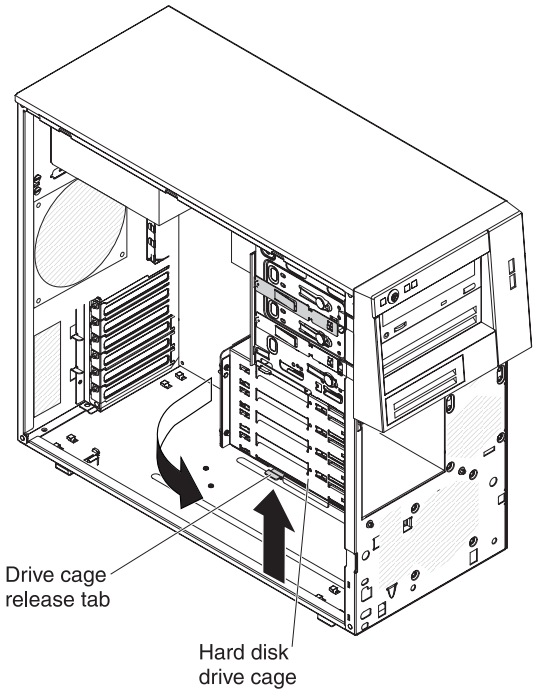


6. Install the simple-swap hard disk drives (see “Installing a simple-swap SATA hard disk drive” on page 76).
7. Install the lower bezel (see “Installing the lower bezel” on page 61).
8. Install the side cover (see “Installing the side cover” on page 59).
9. Lock the side cover.
10. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Removing the microprocessor and fan sink

To remove the microprocessor and fan sink, complete the following steps:

1. Read the safety information that begins on page vii and “Installation guidelines” on page 55.
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 58).
5. Press and hold the drive cage release tab; then, rotate the drive cage out of the chassis until the retaining tab on top of the cage locks into place.

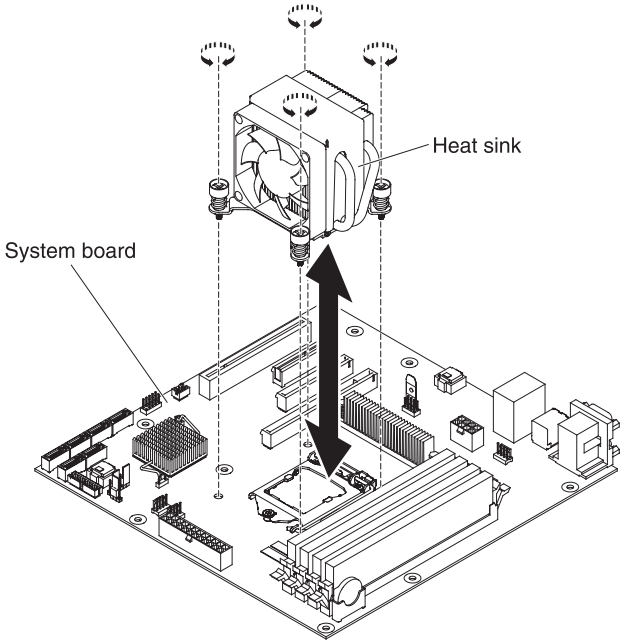


6. Disconnect any cables that impede access to the fan sink and microprocessor.
7. Remove the fan sink from the microprocessor:

   Attention: The fan sink may become very hot during normal operation. Allow time for the fan sink to cool down before you touch it.

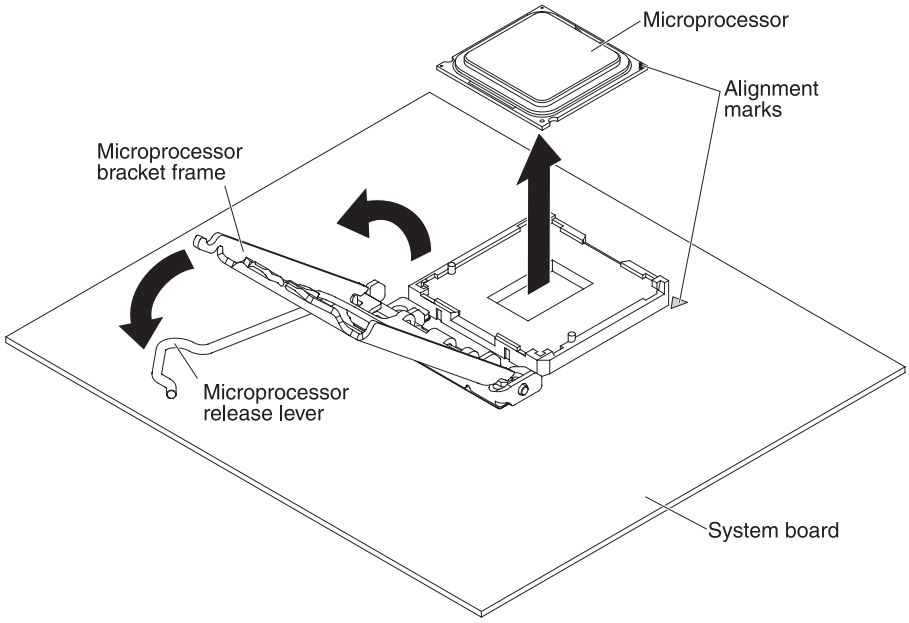
   a. Loosen the screw on one side of the fan sink to break the seal with the microprocessor.
   b. Press firmly on the captive screws and loosen them with a screwdriver.
   c. Use your fingers to gently pull the fan sink from the microprocessor.

   Important: Be careful when you handle the microprocessor and fan sink. If the microprocessor and fan sink will be reused, do not contaminate the thermal material between them.



Attention: The microprocessor retention latch is spring-loaded when the microprocessor is in place. Releasing the latch too quickly or allowing it to spring upward can damage the microprocessor and surrounding components.

8. Release the microprocessor retention latch by pressing down on the end, moving it to the side, and slowly releasing it to the open (up) position.



9. Open the microprocessor bracket frame by lifting up the tab on the top edge.
10. Carefully lift the microprocessor straight up and out of the socket, and place it on a static-protective surface.
11. If you are instructed to return the microprocessor and fan sink, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

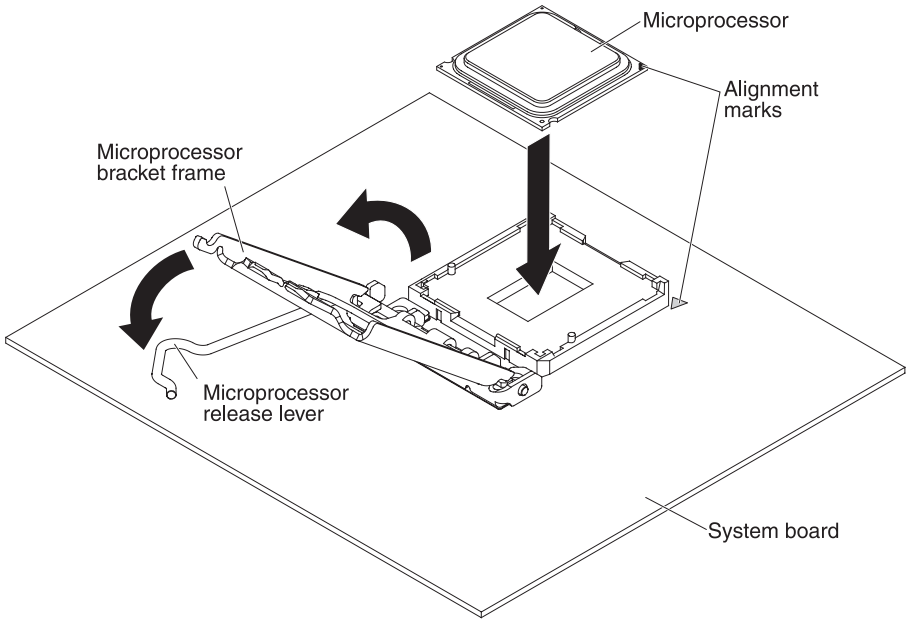
Installing a microprocessor and fan sink

To install the microprocessor and fan 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 grasp the microprocessor and place the microprocessor into the microprocessor socket.

   Note: To maintain 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.
   - A triangle-shaped indicator on one corner of the microprocessor points to a 45-degree angle on the system board.
   - Do not use excessive force when you press the microprocessor into the socket.
5. Close the microprocessor bracket frame; then, close the microprocessor retention latch and lock it securely in place.

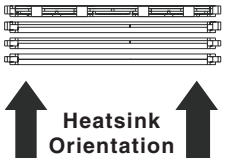


6. Install the fan sink:

   Attention: Do not touch the thermal material on the bottom of the fan sink. Touching the thermal material will contaminate it. If the thermal material on the microprocessor or fan sink becomes contaminated, contact your service technician.

a. Make sure that the thermal material is still on the bottom of the fan sink; then, align the fan sink so that the arrows on the label point toward the DIMMs and place the fan sink on top of the microprocessor, thermal material side down.

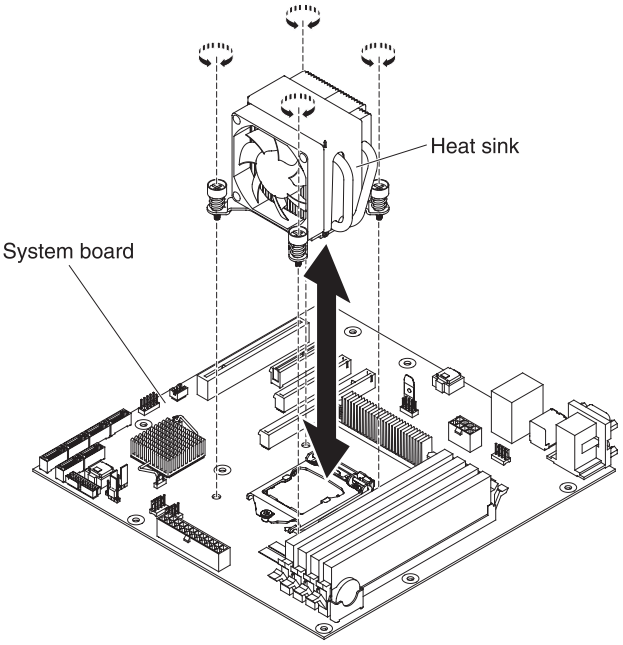
   The following illustration shows the orientation label on the fan sink:



b. Align the screw holes on the fan sink with the holes on the system board.

c. Tighten the screws with a screwdriver, alternating among the screws until they are tight. If possible, each screw should be rotated two full rotations at a time. Repeat until the screws are tight. Do not overtighten the screws by using excessive force.

   Important: Do not touch the thermal material on the bottom of the fan sink. Touching the thermal material will contaminate it. If the thermal material on the microprocessor or fan sink becomes contaminated, contact your service technician.



7. Reconnect any cables that you disconnected during the removal of the old microprocessor.
8. Secure the SATA signal cables with the retention-clips.
9. Install the lower bezel (see “Installing the lower bezel” on page 61).
10. Install the side cover (see “Installing the side cover” on page 59).
11. Lock the side cover.
12. 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 fan 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 fan sink on the same microprocessor that is was removed from, make sure that:

- The thermal grease on the fan sink and microprocessor is not contaminated.
- Additional thermal grease is not added to the existing thermal grease on the fan sink and microprocessor.

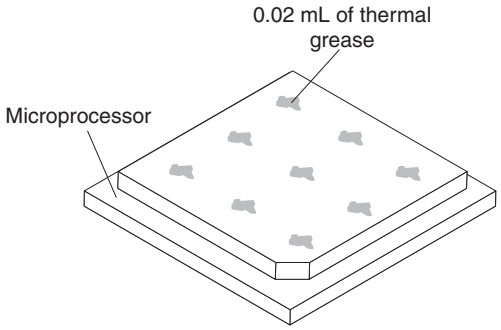
Note:

- Read the Safety information on page vii.
- Read the "Installation guidelines" on page 55.
- Read "Handling static-sensitive devices" on page 57.

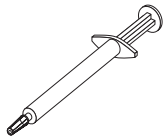
To replace damaged or contaminated thermal grease on the microprocessor and fan sink, complete the following steps:

1. Place the fan 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 fan 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.



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.

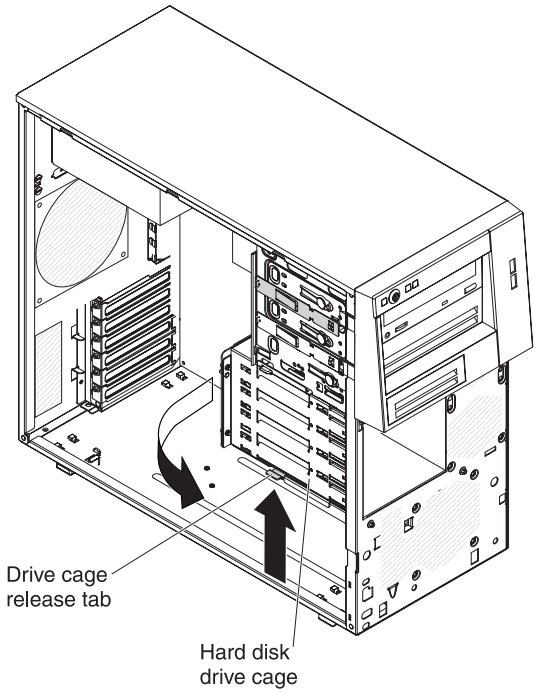


   Note: If the grease is properly applied, approximately half of the grease will remain in the syringe.
6. Install the fan sink onto the microprocessor as described in "Installing a microprocessor and fan sink" on page 107.

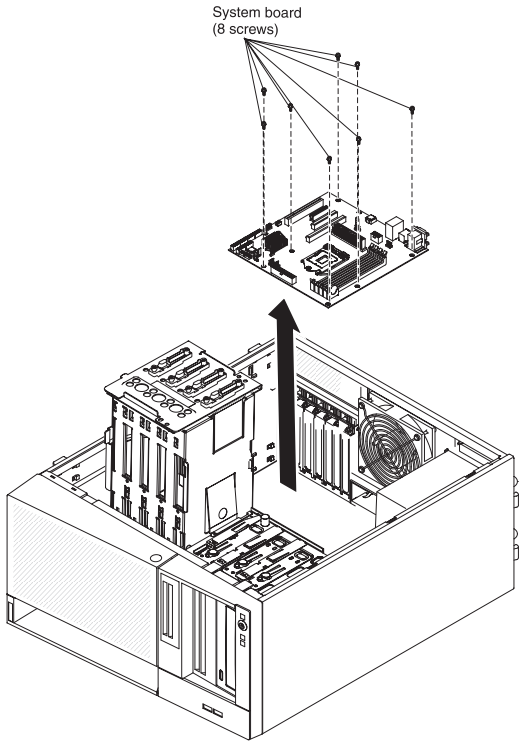
Removing the system board

To remove the system board, complete the following steps:

1. Read the safety information that begins on page vii and “Installation guidelines” on page 55.
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 58).
5. Disengage the cables from any retention-clips.
6. Press and hold the drive cage release tab; then, rotate the drive cage out of the chassis until it locks into place.



7. Note where each cable is connected; then, disconnect all cables from the system board.
8. Remove any of the following components (in addition to others that might not be listed) that are installed on the system board and put them in a safe, static-protective place:
   - Adapters (see “Removing an adapter” on page 77).
   - Virtual media key (see “Removing the virtual media key” on page 80).
   - Microprocessor and fan sink (see “Removing the microprocessor and fan sink” on page 105).
   - DIMMs (see “Removing a memory module” on page 64).
   - Battery (see “Removing the system battery” on page 82).
9. Remove the eight screws that secure the system board to the chassis.

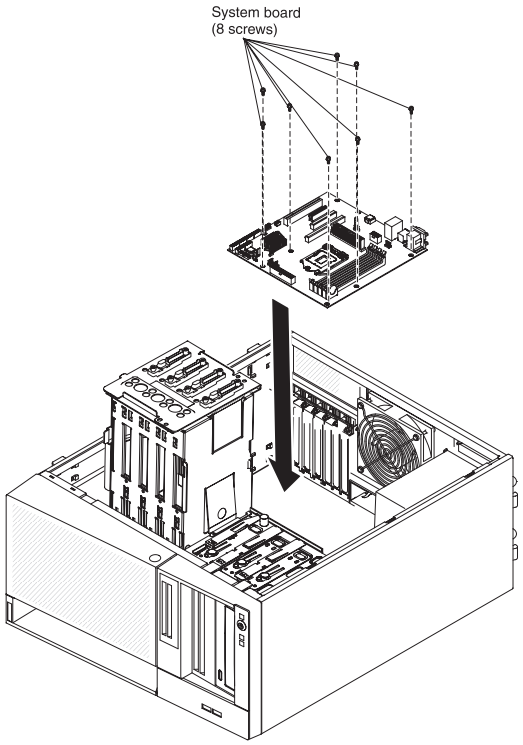


10. Carefully lift the system board out of the server.
11. If you are instructed to return the system board, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the system board

To install the system board, complete the following steps:

1. Touch the static-protective package that contains the system board to any unpainted metal surface on the server. Then, remove the system board from the package.
2. Insert the system board into the chassis and slide it toward the rear of the server until the screw holes on the system board align with the screw holes on the chassis.



3. Install the eight screws that secure the system board to the chassis.
4. Install any of the following components that you removed from the system board:
   - Virtual media key (see “Installing the virtual media key” on page 81).
   - SAS/SATA controller (see “Installing the ServeRAID-BR10il SAS/SATA controller v2” on page 98).
   - Battery (see “Installing the battery” on page 83).
   - DIMMs (see “Removing a memory module” on page 64).
   - Microprocessor and fan sink (see “Installing a microprocessor and fan sink” on page 107).
   - Adapters (see “Installing an adapter” on page 78).
5. Reconnect any cables to the system board that you disconnected during removal (see “System-board internal connectors” on page 12).
6. Rotate the drive cage into the chassis until it locks into place.
7. Secure the cables with the retention-clips.
8. Install the side cover (see “Installing the side cover” on page 59).
9. Lock the side cover.
10. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Chapter 6. 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/systems/support/ to check for the latest level of firmware, such as BIOS code, device drivers, vital product data (VPD) code, and service processor firmware. Download the latest firmware for the server; then, install the firmware, using the instructions that are included with the downloaded files.

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.

- BIOS code is stored in read-only memory (ROM) on the system board.
- Ethernet firmware is stored in ROM on the Ethernet controller on the system board.

Note: To update the VPD code on server components, you must use the VPD Flash Tool. To download the tool and instructions, go to http://www-947.ibm.com/systems/support/supportsite.wss/docdisplay?lndocid=MIGR-5083634&brandind=5000008.

Configuring the server

You can use the following configuration programs to customize the server hardware:

- Setup Utility program
- Boot Menu program
- Intel Gigabit Ethernet Boot Agent
- Ethernet controller configuration

For more information about these programs, see “Configuring the server” in the *Installation and User’s Guide* on the IBM *System x Documentation* CD.

Using the Setup utility

Use the setup utility program to perform the following tasks:

- View configuration information
- View and change assignments for devices and I/O ports
- Set the date and time
- Set the startup characteristics of the server and the order of startup devices
- Set and change settings for advanced hardware features
- View, set, and change settings for power-management features
- View and clear error logs
- Resolve configuration conflicts

Starting the Setup utility

To start the Setup utility, complete the following steps:

1. Turn on the server.

Note: If you are connecting the server to an ac power source for the first time, do not press the power-control button until the power LED flashes.

2. When the prompt `Press <F1> to enter Setup` is displayed, press F1. If you have set an administrator password, you must type the administrator password to access the full Setup utility menu. If you do not type the administrator password, a limited Setup utility menu is available.
3. Select settings to view or change.

Setup utility menu choices

The following choices are on the Setup utility main menu. Depending on the version of the firmware, some menu choices might differ slightly from these descriptions.

- **Main**

  Select this choice to view the revision level and release date of the firmware, total memory information, system language, system date and time, and access level. You can change the system date and time in this menu.

- **Advanced**

  Select this choice to view or change server component settings.

  – **Legacy OpROM Support**

    - **Launch PXE OpROM**

      Select this choice to enable or disable legacy boot option for legacy network devices with option ROM.

    - **Launch Storage OpROM**

      Select this choice to enable or disable legacy boot option for legacy storage devices with option ROM.

  – **PCI Subsystem Settings**

    Select this choice to view or change PCI adapter settings. You can also configure the integrated video controller options.

  – **ACPI Settings**

    Select this choice to enable or disable BIOS ACPI auto configuration and system hibernation option.

    Note: System hibernation may not take effect in some operating systems.

  – **CPU Configuration**

    Select this choice to view or change the processor settings.

  – **SATA Configuration**

    Select this choice to view or change the SATA controller settings.

  – **USB Configuration**

    Select this choice to view or change the USB controller settings.

  – **Super IO Configuration**

    Select this choice to view or change serial port0 settings.

  – **System Information**

    Select this choice to view information about the server. You cannot change settings directly in the system information.

  – **Serial Port Console Redirection**

    Select this choice to enable or disable console port redirection and configure console connection options.

  – **UEFI PXE Boot Support**

    Select this choice to enable or disable the UEFI PXE support.

- **Chipset**

  Select this choice to view and set north bridge and south bridge options.
- **Boot**

  Select this choice to view or boot to devices, including the startup sequence. The server starts from the first boot record that it finds.

  The startup sequence specifies the order in which the server checks devices to find a boot record. The server starts from the first boot record that it finds
- **Security**

  Select this choice to set or clear passwords. See “Passwords” on page 116 for more information.

  – **Administrator Password**

    Select this choice to set an administrator password. An administrator password is intended to be used by a system administrator; it limits access to the full Setup utility menu. If an administrator password is set, the full Setup utility menu is available only if you type the administrator password at the password prompt. For more information, see “Administrator password” on page 116.

  – **User Password**

    Select this choice to set a power-on password. See “Power-on password” on page 116 for more information.
- **Save & Exit**

  Select this choice to save the changes that you have made in the settings and exit from the Setup utility.
- **Event Logs**

  Select this choice to view SMBIOS and system event logs.

  – **View SMBIOS Event Logs**

    Select this choice to enter the SMBIOS event log viewer to view SMBIOS event logs.

  – **View System Event Log**

    Select this choice to enter the system event log viewer to view system event logs.

    Note: You can view all hardware error messages in the system event log viewer.
- **Server Mgmt**

  Select this choice to configure FRB2 timer, SMBIOS and system event log settings, and BMC network settings.

  – **SMBIOS Event Log Settings**

    Select this choice to enable or disable SMBIOS event logging; change SMBIOS event log erasing settings. You must restart your server to make your changes take effect.

  – **System Event Log Settings**

    Select this choice to change system event log deletion settings. You must restart your server to make your changes take effect.

  – **BMC Network Configuration**

    Select this choice to view the system management network interface port, the BMC MAC address, and the current BMC IP address; define the static IP

address, subnet mask, and gateway address for BMC; specify whether to use the static IP address or have DHCP assign the IP address; and save the network changes.

Passwords

From the **Security** menu choice, you can set, change, and delete a power-on password and an administrator password.

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

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

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

Power-on password

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

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

- If an administrator password is set, type the administrator password at the password prompt. Start the Setup utility and reset the power-on password.
- Remove the battery from the server and then reinstall it. See “Removing the system battery” on page 82 for instructions for removing the battery.
- Change the position of the password clear jumper on the system board to reset the power-on password. See “Resetting passwords” on page 117for additional information.

  Attention: Before you change any switch settings or move any jumpers, turn off the server; then, disconnect all power cords and external cables. See the safety information that begins on page “Safety” on page vii. Do not change settings or move jumpers on any system-board switch or jumper blocks that are not shown in this document.

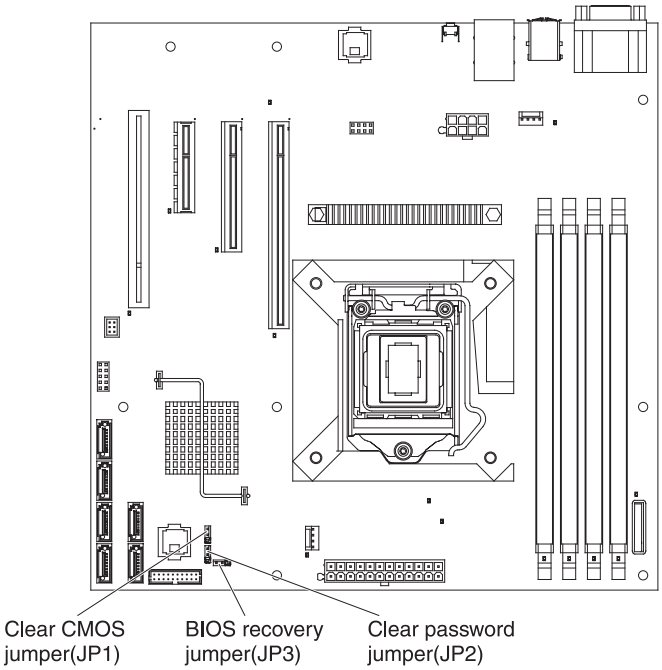
Administrator password

If an administrator password is set, you must type the administrator password for access to the full Setup utility menu. You can use any combination of up to seven characters (A - Z, a - z, and 0 - 9) for the password.

If you forget the administrator password, you can reset it after you change the position of the password clear jumper.

Resetting passwords

If you forget the power-on password or administrator password, you can move the password clear jumper on the system board to pins 2 and 3, to clear the power-on or administrator password check. The jumper location is shown in the following illustration.



Configuring the Gigabit Ethernet controller

The Ethernet controller is integrated on the system board. It provides an interface for connecting to a 10 Mbps, 100 Mbps, or 1 Gbps network and provides full duplex (FDX) capability, which enables simultaneous transmission and reception of data on the network. If the Ethernet port in the server supports 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 when you install a different operating system to enable the operating system to address the controller. For updated information about configuring the controller, complete the following steps:

1. Go to http://www.ibm.com/systems/support/.
2. Under **Product support**, click **System x**.
3. Under **Popular links**, click **Software and device drivers**.
4. From the **Product family** menu, click **System x3100 M3**.

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

Using the Boot Manager program

The Boot Manager program is a built-in, menu-driven configuration utility program that you can use to temporarily redefine the first startup device without changing settings in the Setup utility.

To use the Boot Manager program, complete the following steps:

1. Turn off the server.
2. Restart the server.
3. When the prompt `Press <F12> to select Boot Device` is displayed, press F12. If a bootable USB mass storage device is installed, a submenu item (**USB Key/Disk**) is displayed.
4. Use the Up Arrow and Down Arrow keys to select an item from the **Boot Selection Menu** and press **Enter**.

The next time the server starts, it returns to the startup sequence that is set in the Setup utility.

Installing your operating system

If you have already configured the server hardware, you can complete the following steps to download the latest operating-system installation instructions from the IBM Web site.

Notes:

1. Changes are made periodically to the IBM Web site. The actual procedure might vary slightly from what is described in this document.
2. The server does not support the DataCenter edition of Microsoft Windows Server 2008 R2.

1. Go to http://www.ibm.com/systems/support/.
2. Under **Product support**, click **System x**.
3. From the menu on the left side of the page, click **System x support search**.
4. From the **Task** menu, select **Install**.
5. From the **Product family** menu, select **System x3100 M3**.
6. From the **Operating system** menu, select your operating system, and then click **Search** to display the available installation documents.

Using LSI Configuration Utility program

Use the LSI Configuration Utility program to configure and manage redundant array of independent disks (RAID) arrays. Be sure to use this program as described in this document.

- Use the LSI Configuration Utility program to perform the following tasks:
  - Perform a low-level format on a hard disk drive
  - Create an array of hard disk drives with or without a hot-spare drive
  - Set protocol parameters on hard disk drives

The integrated SAS/SATA controller with RAID capabilities supports RAID arrays. You can use the LSI Configuration Utility program to configure RAID 1 (IM), RAID 1E (IME), and RAID 0 (IS) for a single pair of attached devices. If you install the optional ServeRAID-BR10i SAS/SATA controller v2, it provides RAID levels 0 and 1 support.

In addition, you can download an LSI command-line configuration program from http://www.ibm.com/systems/support/.

When you are using the LSI Configuration Utility program to configure and manage arrays, consider the following information:

- The optional SAS/SATA controller with RAID capabilities supports the following features:
  - Integrated Mirroring (IM) with hot-spare support (also known as RAID 1)

    Use this option to create an integrated array of two disks plus up to two optional hot spares. All data on the primary disk can be migrated.
  - Integrated Striping (IS) (also known as RAID 0)

    Use this option to create an integrated striping array of two to eight disks. All data on the array disks will be deleted.
- 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.
- If you use an optional SAS/SATA controller with RAID capabilities to configure a RAID 1 (mirrored) array after you have installed the operating system, you will lose access to any data or applications that were previously stored on the secondary drive of the mirrored pair.
- If you install a different type of RAID controller, see the documentation that comes with the controller for information about viewing and changing settings for attached devices.

Starting the LSI Configuration Utility program

To start the LSI Configuration Utility program, complete the following steps:

1. Turn on the server.

   Note: If you are connecting the server to an ac power source for the first time, do not press the power-control button until the power LED flashes.
2. When the prompt, press CTRL + C to access the LSI Configuration Utility program. If you have set an administrator password, you are prompted to type the password.
3. To perform storage-management tasks, follow the procedures in the documentation that comes with the SAS/SATA controller.

When you have finished changing settings, press Esc to exit from the program; select **Save** to save the settings that you have changed.

Formatting a hard disk drive

Low-level formatting removes all data from the hard disk. If there is data on the disk that you want to save, back up the hard disk before you perform this procedure.

Note: Before you format a hard disk, make sure that the disk is not part of a mirrored pair.

To format a drive, complete the following steps:

1. From the list of adapters, select the controller (channel) for the drive that you want to format and press Enter.
2. Select **SAS Topology** and press Enter.
3. Select **Direct Attach Devices** and press Enter.

4. To highlight the drive that you want to format, use the Up Arrow and Down Arrow keys. To scroll left and right, use the Left Arrow and Right Arrow keys or the End key. Press Alt+D.
5. To start the low-level formatting operation, select **Format** and press Enter.

Creating a RAID array of hard disk drives

To create a RAID array of hard disk drives, complete the following steps:

1. From the list of adapters, select the controller (channel) for the drives that you want to mirror.
2. Select **RAID Properties**.
3. Select the type of array that you want to create.
4. Use the arrow keys to highlight the first drive in the pair; then, press the Minus (-) or Plus (+) key to change the mirror value to **Primary**.
5. Continue to select the next drive using the Minus (-) or Plus (+) key until you have selected all the drives for your array.
6. Press C to create the disk array.
7. Select **Apply changes and exit menu** to create the array.

Using the RAID Configuration Utility program

The system firmware provides software RAID capabilities that supports RAID levels 0 and 1. The following describes the information you must consider when you configure software RAID:

- To configure software RAID level 0, the total hard disk space on the server must be less than 2 TB.
- To configure software RAID level 1, the total hard disk space on the server must be less than 4 TB.

To start the RAID Configuration Utility program, complete the following steps:

1. Turn on the server.

   Note: If you are connecting the server to an ac power source for the first time, do not press the power-control button until the power LED flashes.
2. When the prompt `Press <F1> to enter Setup` is displayed, press F1. If you have set an administrator password, you are prompted to type the password.
3. Select **Advanced → SATA Configuration** .
4. For **SATA Mode**, select **RAID Mode**.
5. Save the changes and exit the Setup utility.
6. Press CTRL + I to access the RAID Configuration Utility program.
7. Select **Create RAID Volume** and configure the required settings.
8. Save the changes and exit to the main Setup utility menu.
9. Use the **Boot** menu to boot from the CD-ROM/DVD-ROM.
10. Follow the installation instructions to install the operating system.
11. After the operating system installation is complete, install the Intel RAID utility. You can get the instructions and setup file from http://downloadcenter.intel.com/Detail_Desc.aspx?agr=Y&ProdId=2101&DwnldID=18859&lang=eng.

Using the Baseboard Management Controller

The baseboard management controller (BMC) provides basic service-processor environmental monitoring functions. If an environmental condition exceeds a threshold or if a system component fails, the baseboard management controller lights LEDs to help you diagnose the problem. Critical errors are also included in the error log. When the optional Virtual Media Key is installed, BMC provides advanced virtual presence capability for remote server management capabilities

Using the remote presence capability

The remote presence features are integrated functions of the baseboard management controller (BMC). When the optional IBM Virtual Media Key is installed in the server, it activates the remote presence functions: virtual media and keyboard, video, and mouse (KVM). The virtual media key is required to enable the integrated remote presence features. However, you can still access the Web interface without the key.

After the virtual media key is installed in the server, it is authenticated to determine whether it is valid. If the key is not valid, the configuration menu for the remote presence feature will not display in the BMC Web interface.

The virtual media key has an LED. When this LED is lit and green, it indicates that the key is installed and functioning correctly. When the LED is not lit, it indicates that the key might not be installed correctly.

Enabling the remote presence feature

To enable the remote presence feature, complete the following steps:

1. Turn off the server and all attached devices; then, disconnect all power cords and external cables.
2. Install the virtual media key into the dedicated slot on the system board (see “Installing the virtual media key” on page 81).
3. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Note: If you are connecting the server to an ac power source for the first time, do not press the power-control button until the power LED flashes.

Obtaining the IP address for the BMC

To access the Web interface, you need the IP address for the BMC. You can obtain the BMC IP address through the Setup utility. To locate the IP address, complete the following steps:

1. Turn on the server.

   Note: If you are connecting the server to an ac power source for the first time, do not press the power-control button until the power LED flashes.
2. When the prompt `Press <F1> to enter Setup` is displayed, press F1. (This prompt is displayed on the screen for only a few seconds. You must press F1 quickly.) If you have set both a power-on password and an administrator password, you must type the administrator password to access the full Setup utility menu.
3. From the Setup utility main menu, select **Server Mgmt → BMC Network Configuration**.
4. Find the IP address and write it down.

Note: The BMC defaults to DHCP. If a DHCP host is not available, you can select **Static** in **Configuration Source** and specify the IP settings (such as IP address and subnet mask). You may need to obtain this information from your network administrator.

5. Exit from the Setup utility.

Logging on to the Web interface

To log on to the Web interface to use the remote presence functions, complete the following steps:

1. Open a Web browser on a computer that connects to the server and in the **address** or **URL** field, type the IP address or host name of the BMC to which you want to connect.
2. On the Login page, type the user name and password. If you are using the BMC for the first time, you can obtain the user name and password from your system administrator. All login attempts are documented in the event log.

   Note: The BMC is set initially with a user name of USERID and password of PASSW0RD (passw0rd with a zero, not the letter O). You have read/write access. You must change the default password the first time you log on.

BIOS Configuration Utility program

The BIOS Configuration Utility (BCU) program is an alternative to the Setup utility for modifying BIOS settings. Use the BCU program online or out of band to modify BIOS settings from the command line without the need to restart the system to access the Setup utility.

Use the command-line interface to issue setup commands. You can save any of the settings as a file and run the file as a script. The BCU program supports scripting environments through a batch-processing mode.

For more information and to download the BCU program, go to http://www.ibm.com/systems/support/.

Appendix A. Getting help and technical assistance

If you need help, service, or technical assistance or just want more information about IBM products, you will find a wide variety of sources available from IBM to assist you. This 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 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 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 a Business Partner** 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

Appendix B. Notices

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

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

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

IBM Director of Licensing
IBM Corporation
North Castle Drive
Armonk, NY 10504-1785
U.S.A.

INTERNATIONAL BUSINESS MACHINES CORPORATION PROVIDES THIS PUBLICATION “AS IS” WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some states do not allow disclaimer of express or implied warranties in certain transactions, therefore, this statement may not apply to you.

This information could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new editions of the publication. IBM may make improvements and/or changes in the product(s) and/or the program(s) described in this publication at any time without notice.

Any references in this information to non-IBM Web sites are provided for convenience only and do not in any manner serve as an endorsement of those Web sites. The materials at those Web sites are not part of the materials for this IBM product, and use of those Web sites is at your own risk.

IBM may use or distribute any of the information you supply in any way it believes appropriate without incurring any obligation to you.

Trademarks

IBM, the IBM logo, and ibm.com are trademarks or registered trademarks of International Business Machines Corporation in the United States, other countries, or both. If these and other IBM trademarked terms are marked on their first occurrence in this information with a trademark symbol (® or ™), these symbols indicate U.S. registered or common law trademarks owned by IBM at the time this information was published. Such trademarks may also be registered or common law trademarks in other countries. A current list of IBM trademarks is available on the Web at “Copyright and trademark information” at http://www.ibm.com/legal/copytrade.shtml.

Adobe and PostScript are either registered trademarks or trademarks of Adobe Systems Incorporated in the United States and/or other countries.

Cell Broadband Engine is a trademark of Sony Computer Entertainment, Inc., in the United States, other countries, or both and is used under license therefrom.

Intel, Intel Xeon, Itanium, and Pentium are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries.

Java and all Java-based trademarks are trademarks of Sun Microsystems, Inc., in the United States, other countries, or both.

Linux is a registered trademark of Linus Torvalds in the United States, other countries, or both.

Microsoft, Windows, and Windows NT are trademarks of Microsoft Corporation in the United States, other countries, or both.

UNIX is a registered trademark of The Open Group in the United States and other countries.

Other company, product, or service names may be trademarks or service marks of others.

Important notes

This product is not intended to be connected directly or indirectly by any means whatsoever to interfaces of public telecommunications networks nor is it intended to be used in a public services network.

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.

Maximum memory might require replacement of the standard memory with an optional memory module.

IBM makes no representation or warranties regarding non-IBM products and services that are ServerProven®, including but not limited to the implied warranties of merchantability and fitness for a particular purpose. These products are offered and warranted solely by third parties.

IBM makes no representations or warranties with respect to non-IBM products. Support (if any) for the non-IBM products is provided by the third party, not IBM.

Some software might differ from its retail version (if available) and might not include user manuals or all program functionality.

Particulate contamination

Attention: Airborne particulates (including metal flakes or particles) and reactive gases acting alone or in combination with other environmental factors such as humidity or temperature might pose a risk to the server that is described in this document. Risks that are posed by the presence of excessive particulate levels or concentrations of harmful gases include damage that might cause the server to malfunction or cease functioning altogether. This specification sets forth limits for particulates and gases that are intended to avoid such damage. The limits must not be viewed or used as definitive limits, because numerous other factors, such as temperature or moisture content of the air, can influence the impact of particulates or environmental corrosives and gaseous contaminant transfer. In the absence of specific limits that are set forth in this document, you must implement practices that maintain particulate and gas levels that are consistent with the protection of human health and safety. If IBM determines that the levels of particulates or gases in your environment have caused damage to the server, IBM may condition provision of repair or replacement of servers or parts on implementation of appropriate remedial measures to mitigate such environmental contamination. Implementation of such remedial measures is a customer responsibility.

Table 8. Limits for particulates and gases

Contaminant	Limits
Particulate	• The room air must be continuously filtered with 40% atmospheric dust spot efficiency (MERV 9) according to ASHRAE Standard 52.2[1]. • Air that enters a data center must be filtered to 99.97% efficiency or greater, using high-efficiency particulate air (HEPA) filters that meet MIL-STD-282. • The deliquescent relative humidity of the particulate contamination must be more than 60%[2]. • The room must be free of conductive contamination such as zinc whiskers.
Gaseous	• Copper: Class G1 as per ANSI/ISA 71.04-1985[3] • Silver: Corrosion rate of less than 300 Å in 30 days

[1] ASHRAE 52.2-2008 - *Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size*. Atlanta: American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.

[2] The deliquescent relative humidity of particulate contamination is the relative humidity at which the dust absorbs enough water to become wet and promote ionic conduction.

[3] ANSI/ISA-71.04-1985. *Environmental conditions for process measurement and control systems: Airborne contaminants*. Instrument Society of America, Research Triangle Park, North Carolina, U.S.A.

Documentation format

The publications for this product are in Adobe Portable Document Format (PDF) and should be compliant with accessibility standards. If you experience difficulties when you use the PDF files and want to request a Web-based format or accessible PDF document for a publication, direct your mail to the following address:

Information Development
IBM Corporation
205/A015
3039 E. Cornwallis Road
P.O. Box 12195
Research Triangle Park, North Carolina 27709-2195
U.S.A.

In the request, be sure to include the publication part number and title.

When you send information to IBM, you grant IBM a nonexclusive right to use or distribute the information in any way it believes appropriate without incurring any obligation to you.

Electronic emission notices

Federal Communications Commission (FCC) statement

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

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. IBM is not responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

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.

Australia and New Zealand Class A statement

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.

European Union EMC Directive conformance statement

This product is in conformity with the protection requirements of EU Council Directive 2004/108/EC on the approximation of the laws of the Member States relating to electromagnetic compatibility. IBM cannot accept responsibility for any failure to satisfy the protection requirements resulting from a nonrecommended modification of the product, including the fitting of non-IBM option cards.

Attention: This is an EN 55022 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.

Responsible manufacturer:
International Business Machines Corp.
New Orchard Road
Armonk, New York 10504
914-499-1900

European Community contact:
IBM Technical Regulations, Department M456
IBM-Allee 1, 71137 Ehningen, Germany
Telephone: 0049 (0) 7032 15-2937
E-mail: tjahn@de.ibm.com

Germany Class A statement

Deutschsprachiger EU Hinweis:

Hinweis für Geräte der Klasse A EU-Richtlinie zur Elektromagnetischen Verträglichkeit

Dieses Produkt entspricht den Schutzanforderungen der EU-Richtlinie 2004/108/EG zur Angleichung der Rechtsvorschriften über die elektromagnetische Verträglichkeit in den EU-Mitgliedsstaaten und hält die Grenzwerte der EN 55022 Klasse A ein.

Um dieses sicherzustellen, sind die Geräte wie in den Handbüchern beschrieben zu installieren und zu betreiben. Des Weiteren dürfen auch nur von der IBM empfohlene Kabel angeschlossen werden. IBM übernimmt keine Verantwortung für die Einhaltung der Schutzanforderungen, wenn das Produkt ohne Zustimmung der IBM verändert bzw. wenn Erweiterungskomponenten von Fremdherstellern ohne Empfehlung der IBM gesteckt/eingebaut werden.

EN 55022 Klasse A Geräte müssen mit folgendem Warnhinweis versehen werden: “Warnung: Dieses ist eine Einrichtung der Klasse A. Diese Einrichtung kann im Wohnbereich Funk-Störungen verursachen; in diesem Fall kann vom Betreiber verlangt werden, angemessene Maßnahmen zu ergreifen und dafür aufzukommen.”

Deutschland: Einhaltung des Gesetzes über die elektromagnetische Verträglichkeit von Geräten

Dieses Produkt entspricht dem “Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG)”. Dies ist die Umsetzung der EU-Richtlinie 2004/108/EG in der Bundesrepublik Deutschland.

Zulassungsbescheinigung laut dem Deutschen Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG) (bzw. der EMC EG Richtlinie 2004/108/EG) für Geräte der Klasse A

Dieses Gerät ist berechtigt, in Übereinstimmung mit dem Deutschen EMVG das EG-Konformitätszeichen - CE - zu führen.

Verantwortlich für die Einhaltung der EMV Vorschriften ist der Hersteller:

International Business Machines Corp.
New Orchard Road
Armonk, New York 10504
914-499-1900

Der verantwortliche Ansprechpartner des Herstellers in der EU ist:

IBM Deutschland
Technical Regulations, Department M456
IBM-Allee 1, 71137 Ehningen, Germany
Telephone: 0049 (0) 7032 15-2937
E-mail: tjahn@de.ibm.com

Generelle Informationen:

Das Gerät erfüllt die Schutzanforderungen nach EN 55024 und EN 55022 Klasse A.

Japan VCCI Class A statement

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

This is a Class A product based on the standard of the Voluntary Control Council for Interference (VCCI). If this equipment is used in a domestic environment, radio interference may occur, in which case the user may be required to take corrective actions.

Japan Electronics and Information Technology Industries Association (JEITA) statement

高調波ガイドライン適合品

Japanese Electronics and Information Technology Industries Association (JEITA) Confirmed Harmonics Guideline (products less than or equal to 20 A per phase)

Korea Communications Commission (KCC) statement

이기기는 업무용으로 전자파 적합등록을 받은 기기이오니, 판매자 또는 사용자는 이점을 주의하시기 바라며, 만약 잘못 구입하셨을 때에는 구입한 곳에서 비업무용으로 교환하시기 바랍니다.

Please note that this equipment has obtained EMC registration for commercial use. In the event that it has been mistakenly sold or purchased, please exchange it for equipment certified for home use.

Russia Electromagnetic Interference (EMI) Class A statement

ВНИМАНИЕ! Настоящее изделие относится к классу А.
В жилых помещениях оно может создавать радиопомехи, для снижения которых необходимы дополнительные меры

People's Republic of China Class A electronic emission statement

声　　明
此为 A 级产品。在生活环境中，
该产品可能会造成无线电干扰。
在这种情况下，可能需要用户对其
干扰采取切实可行的措施。

Taiwan Class A compliance statement

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

Index

E

F

G

H

I

J

K

L

M

N

O

P

R

S

T

U

V

W

Part Number: 81Y6189

Printed in USA

(1P) P/N: 81Y6189