IBM System x3610 Type 7942

Problem Determination and Service Guide

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Note: Before using this information and the product it supports, read the general information in Appendix B, “Notices,” on page 115 and the *Warranty and Support Information* document on the IBM *System x Documentation* CD.

Fifth Edition (March 2009)

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 40.
   - 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 you service electrical equipment:

- Check the area for electrical hazards such as moist floors, nongrounded power extension cords, 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 you use 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 you measure high voltages.
- To ensure proper grounding of components such as power supplies, pumps, blowers, 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 document is labeled 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 is labeled “Statement 1”, translations for that caution statement are in the *Safety Information* document under “Statement 1.”

Be sure to read all caution and danger statements in this document before you perform the procedures. Read any additional safety information that comes with the 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)

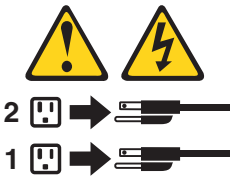
≥ 32 kg (70.5 lb)

≥ 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.

Statement 26:

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

Statement 27:

CAUTION:
Hazardous moving parts are nearby.

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.

Important: This product is not suitable for use with visual display workplace devices according to Clause 2 of the German Ordinance for Work with Visual Display Units.

Chapter 1. Introduction

This *Problem Determination and Service Guide* contains information to help you solve problems that might occur in your IBM® System x3610 Type 7942 server. It describes the diagnostic tools that come with the server, error codes and suggested actions, and instructions for replacing failing components.

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

Replaceable components are of three types:

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

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

Related documentation

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

- *Installation Guide*

  This document is in Portable Document Format (PDF) on the IBM *System x Documentation* CD. It contains instructions for setting up the server and basic instructions for installing some optional devices.
- *User's Guide*

  This document is in 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.
- *Rack Installation Instructions*

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

  This document is in PDF on the IBM *System 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.
- *Warranty and Support Information*

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

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

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

The server might have features that are not described in the documentation that you received with the server. The documentation might be updated occasionally to include information about those features, or technical updates might be available to provide additional information that is not included in the server documentation. These updates are available from the IBM Web site. 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 **Publications lookup**.
4. From the **Product family** menu, select **System x3610** and click **Continue**.

Notices and statements in this document

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

Features and specifications

The following information is a summary of the features and specifications of the server. Depending on the server model, some features might not be available, or some specifications might not apply.

Racks are marked in vertical increments of 4.45 cm (1.75 inches). Each increment is referred to as a unit, or “U.” A 1-U-high device is 1.75 inches tall.

Notes:

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

2. The sound 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.

Table 1. Features and specifications

Microprocessor:
- One Intel® LGA 771 dual core or quad core, depending on the server model:
  - Dual core: Xeon 5100 series, or later
  - Quad core: Xeon 5300 series, or later
- Support for up to two microprocessors
- Support for Intel Extended Memory 64 Technology (EM64T)

Note:
- Use the BIOS Setup Utility program to determine the type and speed of the microprocessor.
- See http://www.ibm.com/servers/eserver/serverproven/compat/us/ for a list of supported microprocessors.

Memory:
- Six DIMM connectors
- Minimum: 512 MB
- Maximum: 16 GB
- Type: Registered double-data-rate 2 (DDR2) dual inline memory modules (DIMMs)
- Sizes: 512 MB, 1 GB, 2 GB, or 4 GB
- Chipkill™ supported on x4 memory

Drives:

CD/DVD: SATA

Expansion bays:
- Six 3.5-inch hard disk drive bays, containing one of the following configurations:
  - SAS: Up to six 3.5-inch hot-swap SAS hard disk drives
  - SATA: Up to six 3.5-inch hot-swap SATA hard disk drives
- One 5.25-inch Ultrabay Enhanced bay

Expansion slots:
- Two PCI Express x8 slots, low-profile
- Two PCI 3.3 v or 5 v half-length slots, low-profile

Fans:

Three

Power supplies:
- 600 watts (100 - 240 V ac)
- Minimum: One
- Maximum: Two - provide redundant power

Size (2 U):
- Height: 85.4 mm (3.36 in.)
- Depth: 705 mm (27.8 in.)
- Width: 443.6 mm (17.5 in.)
- Weight: approximately 21.09 kg (46.5 lb) to 29.03 kg (64 lb) depending upon configuration

Integrated functions:
- Baseboard management controller
- Two Broadcom 5722 Gigabit Ethernet controllers with Wake on LAN® support
- One SAS RAID controller that supports RAID levels 0, 1, 1E
- One serial port
- Six Universal Serial Bus (USB) ports (two on front and four on rear of server), v2.0 supporting v1.1
- One VGA video port
- One PS/2 mouse port
- One PS/2 keyboard port
- Two Ethernet ports
- One systems-management port

Note: In messages and documentation, the term *service processor* refers to the baseboard management controller.

Video controller:
- ASPEED Technology AST1100

Environment:
- Air temperature:
  - Server on: 10° to 35°C (50.0° to 95.0°F); altitude: 0 to 914.4 m (3000 ft). Decrease system temperature by 0.75°C for every 1000-foot increase in altitude.
  - Server off: 10° to 43°C (50.0° to 109.4°F); maximum altitude: 2133 m (7000 ft)
  - Shipment: -40° to +60°C (-40° to 140°F); maximum altitude: 2133 m (7000 ft)
- Humidity:
  - Server on/off: 8% to 80%
  - Shipment: 5% to 100%

Acoustical noise emissions:
- Declared sound power, idle: 6.8 bel
- Declared sound power, operating: 6.8 bel

Heat output:

Approximate heat output in British thermal units (Btu) per hour:
- Minimum configuration: 1230 Btu per hour (360 watts)
- Maximum configuration: 3312 Btu per hour (970 watts)

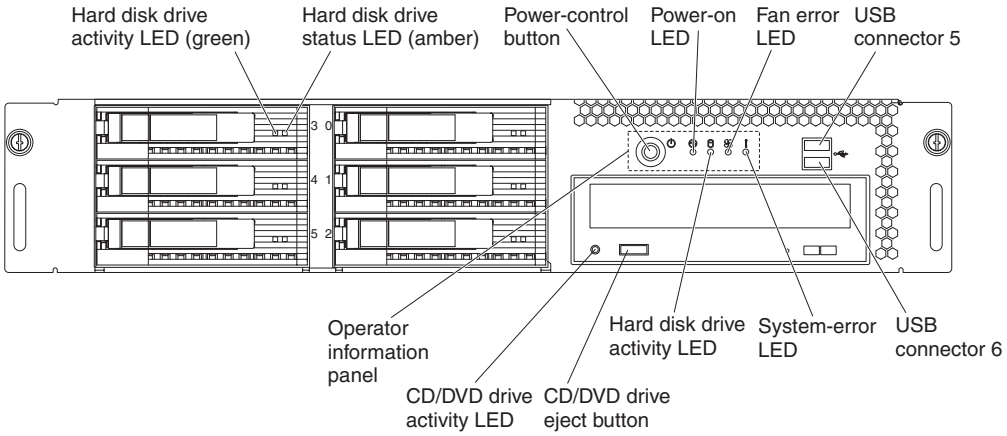
Electrical input:
- Sine-wave input (50-60 Hz) required
- Input voltage range automatically selected
- Input voltage low range:
  - Minimum: 100 V ac
  - Maximum: 127 V ac
- Input voltage high range:
  - Minimum: 200 V ac
  - Maximum: 240 V ac
- Input kilovolt-amperes (kVA) approximately:
  - Minimum: 0.29 kVA
  - Maximum: 1.00 kVA

Server controls, LEDs, and power

This section describes the controls and light-emitting diodes (LEDs) and how to turn the server on and off.

Front view

The following illustration shows the controls, light-emitting diodes (LEDs), and connectors on the front of the server.



Hard disk drive activity LED: Each hot-swap hard disk drive has an activity LED. When this LED is flashing, it indicates that the drive is in use.

Hard disk drive status LED: On some server models, each hot-swap hard disk drive has a status LED. When this LED is lit, it indicates that the drive has failed. When this LED is flashing slowly (one flash per second), it indicates that the drive is being rebuilt as part of a RAID configuration. When the LED is flashing rapidly (three flashes per second), it indicates that the controller is identifying the drive.

Operator information panel: This panel contains controls and LEDs.

The following controls and LEDs are on the operator information panel:

- **Power-control button:** Press this button to turn the server on and off manually. A power-control-button shield comes installed on the server to prevent the server from being turned off accidentally.
- **Power-on LED:** When this LED is lit, it indicates that the server is turned on. When this LED is off, it indicates that the server is turned off, or that power is not present, or that the power supply or the LED itself has failed.

  Note: If this LED is off, it does not mean that there is no electrical power in the server. The LED might be burned out. To remove all electrical power from the server, you must disconnect the power cord from the electrical outlet.
- **Hard disk drive activity LED:** When this LED is flashing, it indicates that a hard disk drive is in use.
- **Fan error LED:** When this LED is lit, it indicates that a fan has failed.
- **System-error LED:** When this LED is lit, it indicates that a system error has occurred. An error LED (amber) on the system board that is lit or an LED on the hard disk drive backplane or system board that is off when it should be on can help isolate the error.

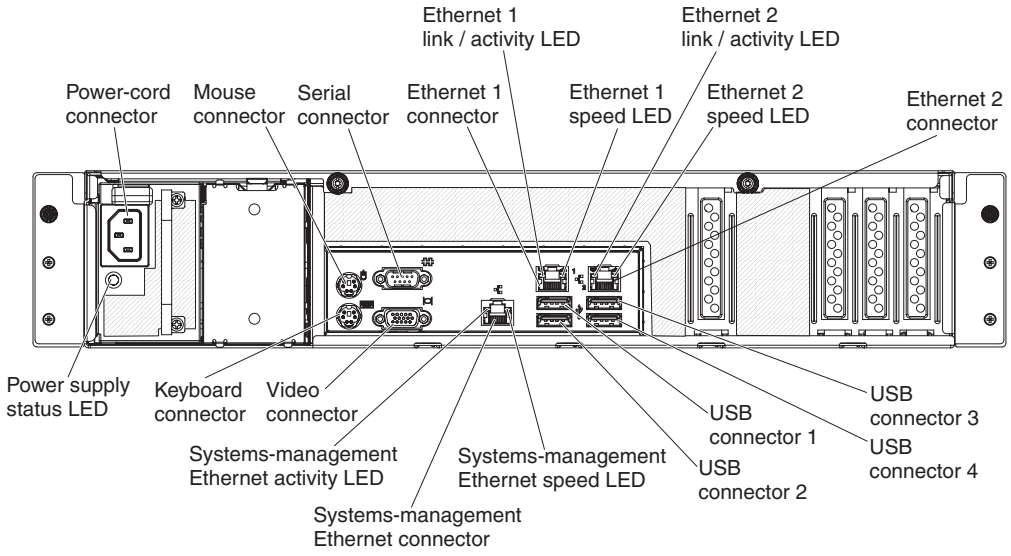
USB connectors: Connect a USB device, such as USB mouse, keyboard, or other USB device, to either of these connectors.

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

CD/DVD drive activity LED: When this LED is lit, it indicates that the CD-RW/DVD drive is in use.

Rear view

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



Power-cord connector: Connect the power cord to this connector.

Mouse connector: Connect a PS/2 mouse to this connector.

Serial connector: Connect a 9-pin serial device to this connector. The BMC can take control of the serial port to perform text console redirection and to redirect serial traffic, using Serial over LAN (SOL).

Ethernet connectors: Use either of these connectors to connect the server to a network.

Ethernet link/activity LED: This LED is on each Ethernet connector. When this LED is lit, it indicates that there is an active link connection on the 10BASE-T, 100BASE-TX, or 1000BASE-TX interface for the Ethernet port. When this LED is flashing, it indicates that the server is transmitting to or receiving signals from the Ethernet LAN that is connected to the Ethernet port.

Ethernet speed LED: When this LED is lit and is amber, it indicates that the Ethernet network speed is 1 Gbps. When this LED is lit and is green, it indicates that the Ethernet network speed is 10 Mbps or 100 Mbps.

USB connectors: Connect a USB device, such as USB mouse, keyboard, or other USB device, to any of these connectors.

Systems-management Ethernet speed LED: When this LED is lit and is amber, it indicates that the Ethernet network speed is 1 Gbps. When this LED is lit and is green, it indicates that the Ethernet network speed is 10 Mbps or 100 Mbps.

Systems-management Ethernet connector: Use this connector to connect the server to a network for systems-management information control.

Systems-management Ethernet activity LED: When this LED is flashing, it indicates that the server is transmitting to or receiving signals from the network for systems-management information control that is connected to the systems-management Ethernet port.

Video connector: Connect a monitor to this connector.

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

Power supply status LED: When the power supply status LED is green (lit or flashing), it indicates that sufficient ac power is coming into the power supply through the power cord and that the power supply is functional. When the power supply status LED is amber (lit or flashing), it indicates a problem with the power supply. If the LED is amber, see “Power supply LEDs” on page 108.

Server power features

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

Turning on the server

Approximately 5 seconds after the server is connected to power, the power-control button becomes active, and one or more fans might start running to provide cooling while the server is connected to power. You can turn on the server and start the operating system by pressing the power-control button.

The server can also be turned on in any of the following ways:

- If a power failure occurs while the server is turned on, the server will restart automatically when power is restored.
- If your operating system supports the Wake on LAN feature, the Wake on LAN feature can turn on the server.

Note: When 4 GB or more of memory (physical or logical) is installed, some memory is reserved for various system resources and is unavailable to the operating system. The amount of memory that is reserved for system resources depends on the operating system, the configuration of the server, and the configured PCI options.

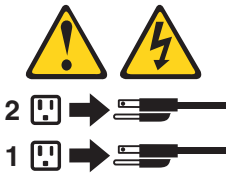
Turning off the server

When you turn off the server and leave it connected to power, the server can respond to requests from the service processor, such as a remote request to turn on the server. While the server remains connected to power, one or more fans might continue to run. To remove all power from the server, you must disconnect it from the power source.

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

Statement 5:

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



The server can be turned off in any of the following ways:

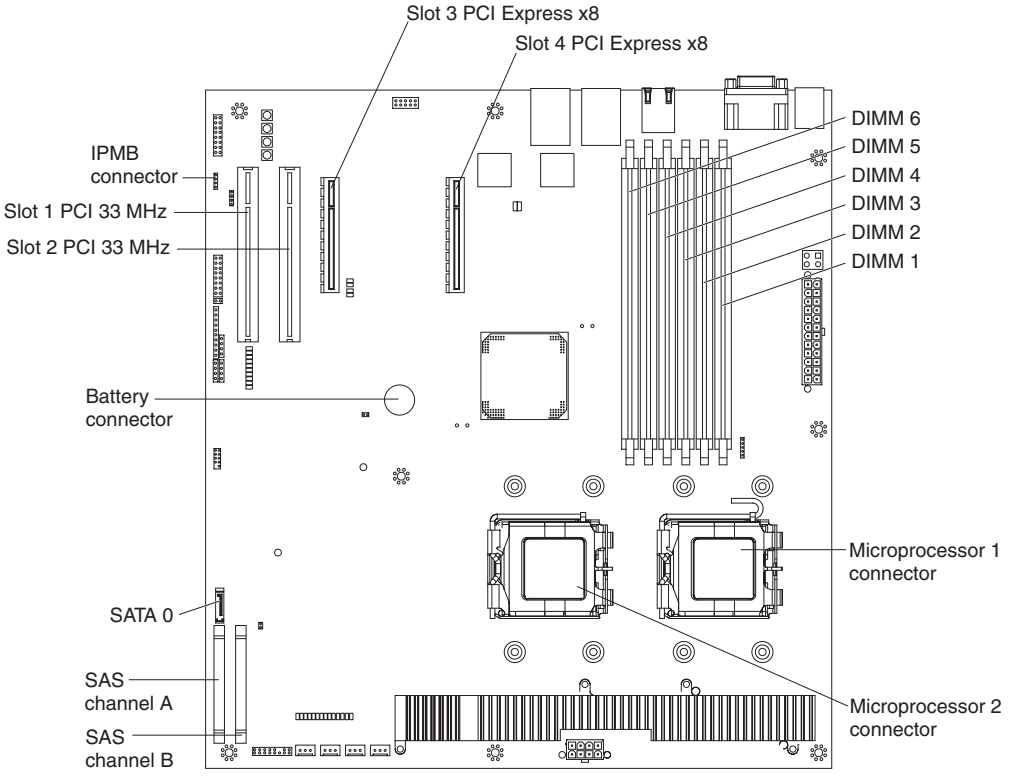
- You can turn off the server from the operating system, if your operating system supports this feature. After an orderly shutdown of the operating system, the server will be turned off automatically.
- You can press the power-control button to start an orderly shutdown of the operating system and turn off the server, if your operating system supports this feature.
- If the operating system stops functioning, you can press and hold the power-control button for more than 4 seconds to turn off the server.
- The service processor can turn off the server as an automatic response to a critical system failure.
- You can turn off the server through a request from the service processor.

Internal connectors, LEDs, and switches

The illustrations in this section show the LEDs, connectors, and switches (buttons) on the internal boards. The illustrations might differ slightly from your hardware.

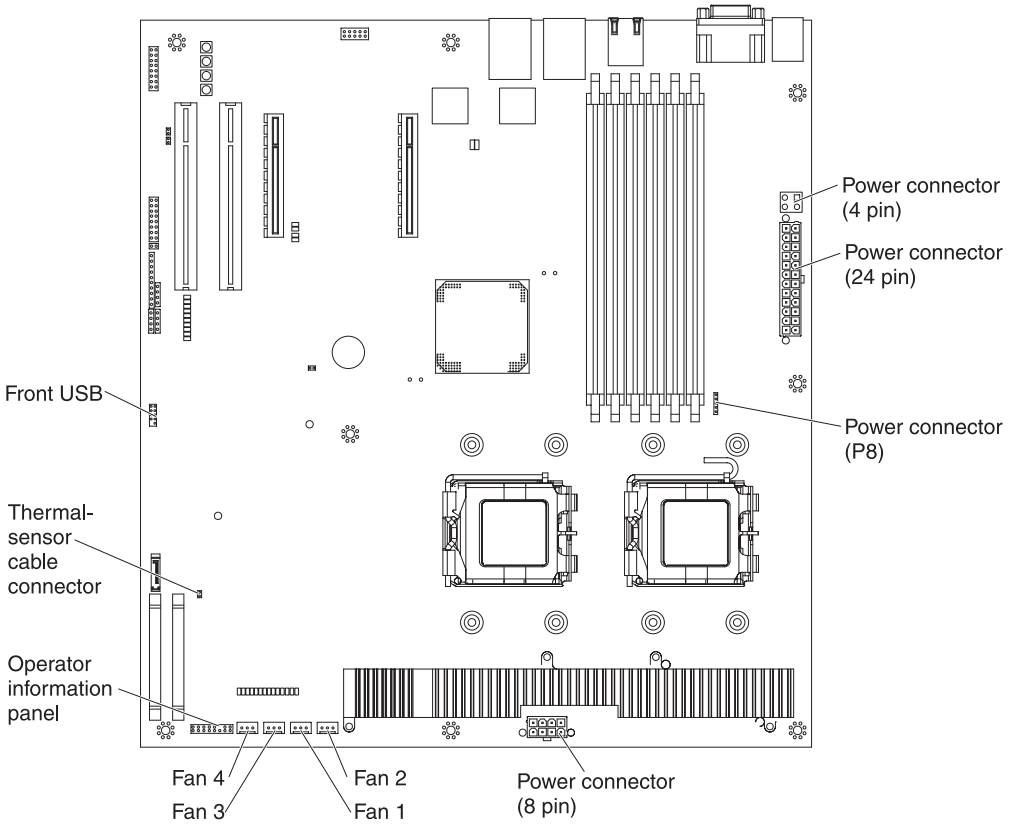
System-board optional-device connectors

The following illustration shows the connectors on the system board for user-installable optional devices.



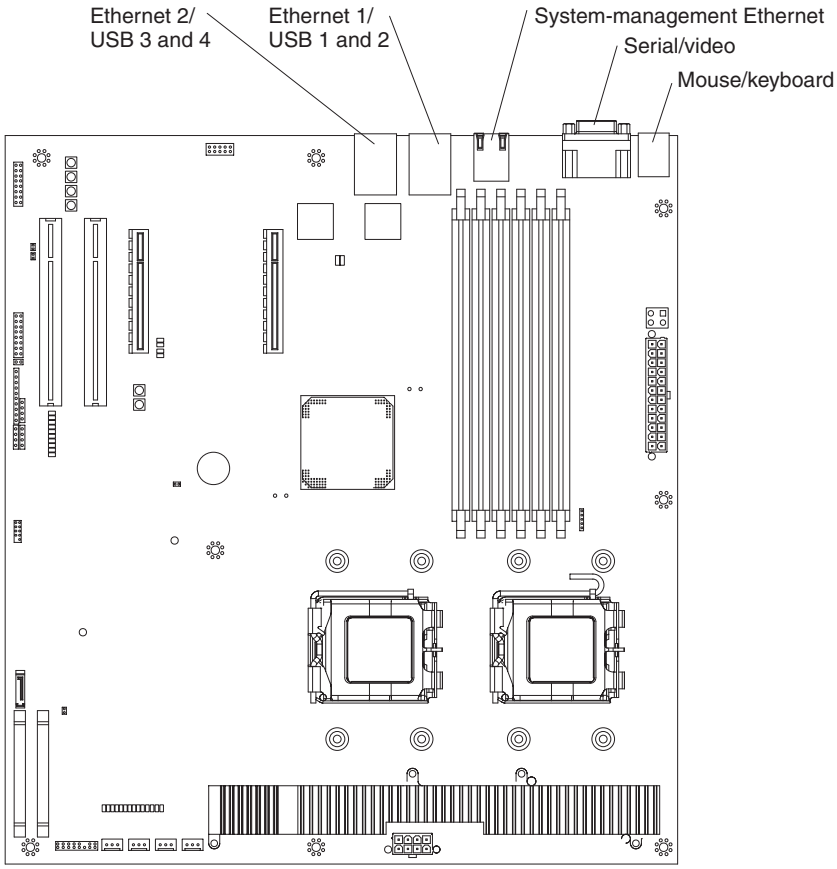
System-board internal cable connectors

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



System-board external connectors

The following illustration shows the external input/output connectors on the system board.



System-board switches

The following illustration shows the switches (buttons) on the system board.

Any switches or jumpers on the system board that are not shown in the illustration are reserved.

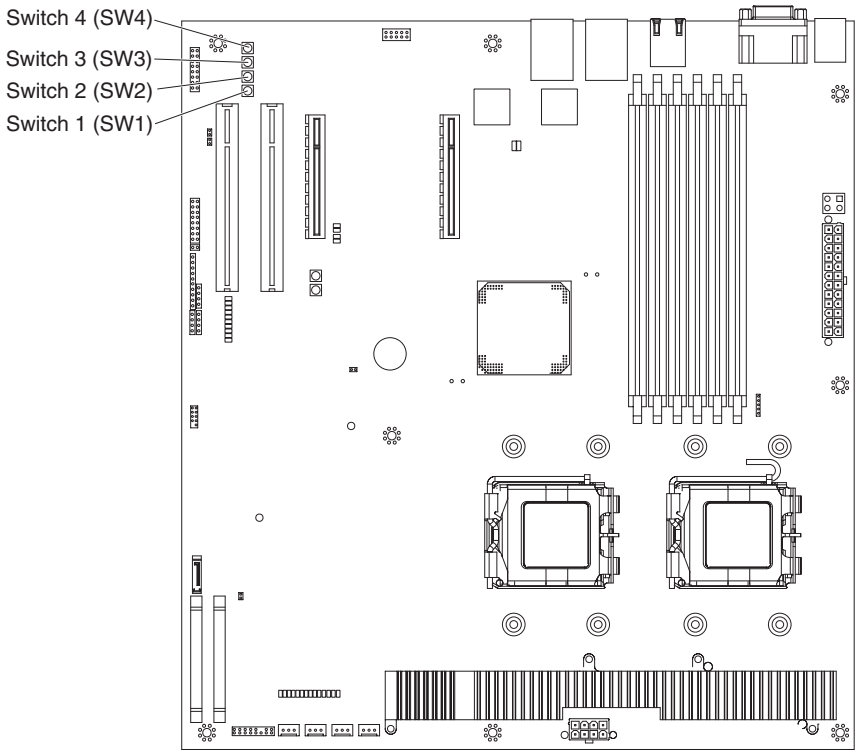


Table 2 describes the function of each switch on the system board.

Table 2. System-board switches

Switch number	Switch (button) description
4	**Reset**. When this button is pressed, it causes the server to reset the system board configuration and restart. This button is effective only when power is connected to the server and the server is running. **Note:** Do not press this button unless explicitly directed to do so by IBM Service.
3	**Power-on**. When this button is pressed, it functions the same as the power-control button on the front of the server. Depending on the state of the server, press this button once to turn the server on or off, or press the button for 4 seconds to force power off. This button is functional only when power is connected to the server.
2	**Clear CMOS**. When this button is pressed, it clears the CMOS data, which clears the user password. This button is effective only when the server is connected to power but turned off.
1	**NMI**. When this button is pressed, it issues a nonmaskable interrupt (NMI) to the server. This button is effective only when power is connected to the server and the server is running.

Important:

1. Before pressing any button on the system board, follow the precautions in “Working inside the server with the power on” on page 45.
2. Any system-board switch or jumper blocks that are not shown in the illustrations in this document are reserved.

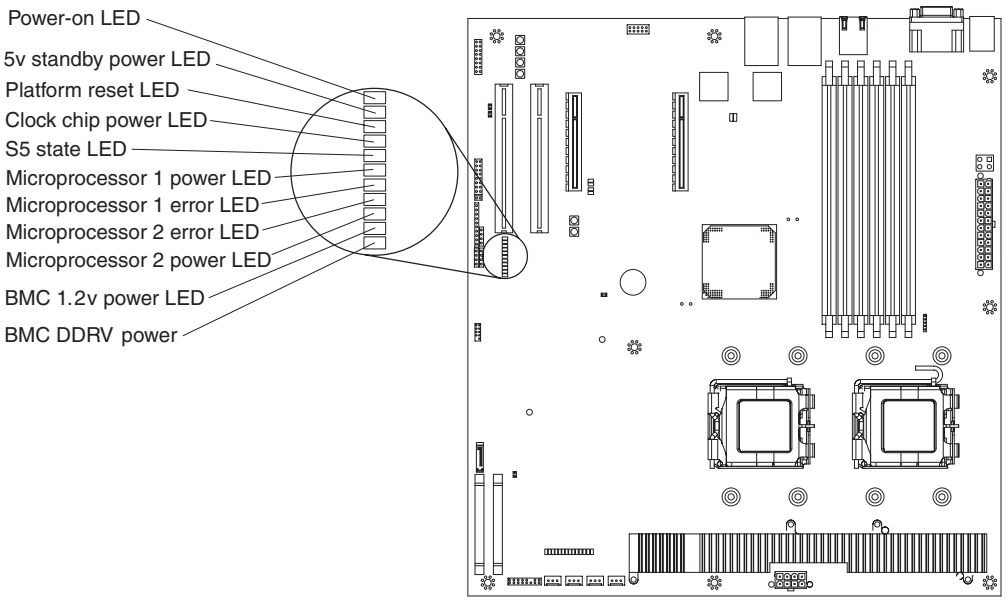
System-board LEDs

Attention: Be careful when sliding the server out of the rack to look at the system-board LEDs. If the cables on the rear of the server are too short (do not have enough slack in them), they might be pulled out of the server or broken. To view the LEDs when the cables are too short, you must turn off the server and peripherals, remove the cables from the server, remove the server from the rack, place it on a flat, static-protective surface, reconnect the cables and turn on the server; then, try to recreate the error.

Statement 27:

CAUTION:
Hazardous moving parts are nearby.

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



Note: A system-board error LED (amber) indicates a problem with the associated component. An LED that is off when it should be on can indicate a problem with the associated component.

Table 3. System-board LEDs

LED	Description
Power-on LED	The system board is receiving power (the power supply is on and 3.3 volts is active; the system power-on sequence has started or completed).

Table 3. System-board LEDs (continued)

LED	Description
5v standby power LED	Standby power for 5v circuits and devices is present (the 5v standby power rail is active).
Platform reset LED	System board reset is active.
Clock chip power LED	Power good is asserted to the clock chip (the real-time clock has power).
S5 state LED	The server is in the S5 state (ac power is present but the server is not turned on).
Microprocessor 1 power LED	The socket for microprocessor 1 is receiving power.
Microprocessor 1 error LED	An internal error has occurred on microprocessor 1 (CPU0).
Microprocessor 2 error LED	An internal error has occurred on microprocessor 2 (CPU1).
Microprocessor 2 power LED	The socket for microprocessor 2 is receiving power.
BMC power 1.2 v LED	The baseboard management controller (BMC) is receiving 1.2 v power. (The 1.2 v standby power rail is good; a stable 1.2 v rail is available.)
BMC power DDRV LED	The BMC is receiving DDR power. (The 2.5 v standby power rail is good; a stable 2.5 v rail is available.)

Hard disk drive backplane LEDs

The following illustration shows the light-emitting diodes (LEDs) on the hard disk drive backplane.

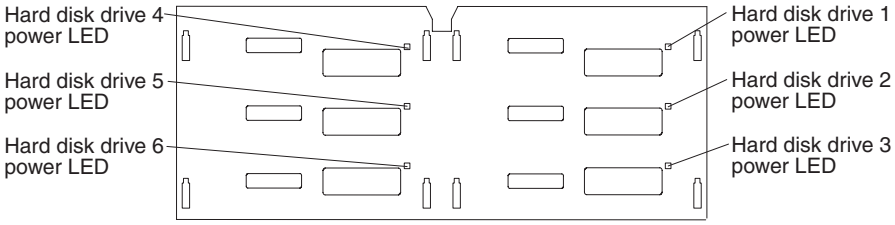


Table 4. Hard disk drive backplane LEDs

Power LEDs	Description
Flashing amber	The hard disk drive in the associated bay is powering up or is being built as part of a RAID configuration.
Flashing green	The hard disk drive is active (reading or writing data)
Off	The drive is not receiving power, the drive is not functioning, or a drive is not installed in the bay.

Chapter 2. 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, vital product data (VPD) code, device drivers, and service processor firmware.

When you replace a device in the server, you might have to either update the server with the latest version of the firmware that is stored in memory on the device or restore the pre-existing firmware from a diskette or CD image.

- BIOS code is stored in ROM on the system board.
- BMC firmware is stored in ROM on the baseboard management controller on the system board.
- Ethernet firmware is stored in ROM on the Ethernet controller.
- SAS firmware is stored in ROM on the integrated RAID controller on the system board.
- Major components contain vital product data (VPD) code. You can select to update the VPD code during the BIOS code update procedure.

Configuring the server

The following configuration programs and capabilities come with the server:

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

  The ServerGuide™ program provides software-setup tools and installation tools that are designed for the server. Use this CD during the installation of the server to configure basic hardware features and to simplify the installation of your operating system. For information about using this CD, see “Using the ServerGuide Setup and Installation CD” on page 19.

  Note: If the *ServerGuide Setup and Installation* CD did not come with your server, you can download the necessary device drivers from the IBM Web site. See the instructions on page 43.

- **BIOS Setup Utility program**

  The BIOS Setup Utility program is part of the basic input/output system (BIOS). Use it to configure hardware such as serial port assignments, change interrupt request (IRQ) settings, change the startup-device sequence, set the date and time, configure the LAN connections for IPMI, view and clear error logs, and set passwords. For information about using this program, see “Using the BIOS Setup Utility program” on page 16.

- **RAID configuration programs**
  - **LSI Configuration Utility program**

    Use the LSI Configuration Utility program to configure and manage redundant array of independent disks (RAID) arrays. For information about using this program, see “Using the LSI Logic Configuration Utility program” on page 22.

  - **LSI Logic MegaRAID Storage Manager**

    Use LSI Logic MegaRAID Storage Manager program to monitor and manage the disk-array subsystem after you install the operating system. For information about using this program, see “Using the LSI Logic MegaRAID Storage Manager program” on page 22.

- **Ethernet controller configuration**

  For information about configuring the Ethernet controllers, see “Configuring the Gigabit Ethernet controllers” on page 34.

- **Baseboard management controller utility programs**

  Use these programs to configure the baseboard management controller, to update the firmware and sensor data record/field replaceable unit (SDR/FRU) data, and to remotely manage a network. For information about using these programs, see “Using the baseboard management controller” on page 22.

Using the BIOS Setup Utility program

Use the BIOS 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 and change passwords
- Set and change the startup characteristics of the server and the order of startup devices (startup-drive sequence)
- Set and change settings for advanced hardware features
- View and clear the error and event logs
- Resolve configuration conflicts

Starting the BIOS Setup Utility program

To start the BIOS Setup Utility program, complete the following steps:

1. Turn on the server.
2. When the prompt `Press F1 for BIOS Setup` appears, press F1. If you have set both a user password and a supervisor password, you must type the supervisor password to access the full BIOS Setup Utility menu. If you do not type the supervisor password, a limited BIOS Setup Utility menu is available.
3. Select the settings to view or change.

BIOS Setup Utility menu choices

The following choices are on the BIOS Setup Utility main window taskbar. Depending on the version of the BIOS code, some taskbar choices might differ slightly from these descriptions.

- **Main**

  Select this choice to view system information, such as the machine type and model, serial number, UIID, system board identifier, asset tag number; information about the BIOS, microprocessors, system memory size; and to view or change the system date and time. This is the default page that is displayed when you start the BIOS Setup Utility program.

- **Advanced**

  Select this choice to view or configure advanced features for the server hardware and software.

  - **CPU configuration**

    Configure advanced features for the microprocessors.

- **SATA configuration**

  View each recognized SATA device, and configure SATA as disabled, enhanced or compatible.
- **Super I/O configuration**

  Select the base address for the serial port used by the Super I/O chipset.
- **USB configuration**

  View the USB configuration and enable or disable USB functions and legacy USB support.
- **ACPI configuration**

  View and change the settings in the Advanced Configuration And Power Interface (ACPI), such as whether to enable support for the advanced programmable interrupt controller (APCI).
- **APM configuration**

  View and change the settings in the advanced power management (APM) configuration, such as whether the server should automatically restart when ac power is restored.
- **Event log configuration**

  View the event log, clear the event log, or enable or disable PCI Express advanced error logging.
- **IPMI configuration**

  View and change the settings in the intelligent platform management interface (IPMI) configuration: view the version of IPMI and the version of BMC firmware; view and change the addresses and subnet mask for the LAN configuration; view or clear the BMC system event log; specify whether the BMC resets the server or powers down the server in the event the operating system crashes or fails to respond (enable or disable the BMC watchdog timer action).
- **Remote Access configuration**

  Configure the type of remote access and the parameters for remote access, such as the serial port and mode used.
- **Memory settings**

  View recognized DIMMs and enable a DIMM after it replaces a failed DIMM.
- **NMI auto reboot**

  Configure whether the server automatically restarts when it receives a non-maskable interrupt.

- **PCIPnP**

  Select this choice to view or change advanced settings for the PCI bus and plug and play (PnP) interface. You can change the master latency timer value, clear non-volatile RAM, specify whether BIOS or the operating system should configure all the devices in the server, and enable or disable the integrated SAS controller.
- **Boot**

  Select this choice to specify the server startup options, including the boot device sequence, type, and priority.
- **Security**

  Select this choice to specify the supervisor password and user (power-on) password.

- **Chipset**

  Select this choice to specify the advanced options for the memory controller chipset.
- **Exit**

  Select this choice to save your changes and exit the BIOS Setup Utility program, discard your changes and exit, discard your changes without exiting the program, or to load the default values for all the setup options.

Passwords

From the **Security** choice, you can set, change, and delete a user (power-on) password and a supervisor password.

If you set only a user password, you must type the user password to complete the system startup.

A supervisor password is intended to be used by a system administrator; it limits access to the configuration choices. If you set only a supervisor password, you do not have to type a password to complete the system startup, but you must type the supervisor password to access all the BIOS Setup Utility program configuration choices.

If you set a user password for a user and a supervisor password for a system administrator, you can type either password to complete the system startup. A system administrator who types the supervisor password has access to the full BIOS Setup Utility program configuration choices; the system administrator can give the user authority to set, change, and delete the user password. A user who types the user password has access to only the limited BIOS Setup Utility program configuration choices; the user can set, change, and delete the user password, if the system administrator has given the user that authority.

User password: If a user password is set, when you turn on the server, the system startup will not be completed until you type the user 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 user password, you can regain access to the server in any of the following ways:

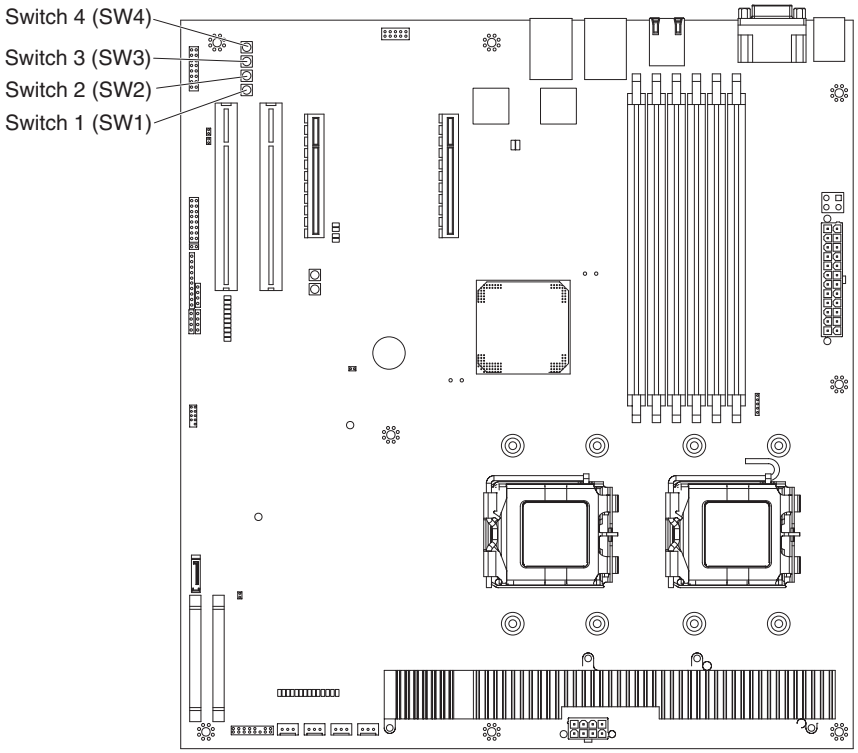
- If a supervisor password is set, type the supervisor password at the password prompt (see “Supervisor password”). Start the BIOS Setup Utility program and reset the user password.
- Remove the battery from the server and then reinstall it. For instructions for removing the battery, see the *Problem Determination and Service Guide* on the IBM *System x Documentation* CD.
- While the server is connected to power but is not turned on, press the clear CMOS button on the system board to bypass the user password check. See “Resetting passwords” for additional information.

Supervisor password: If a supervisor password is set, you must type the supervisor password for access to the full BIOS Setup Utility settings. You can use any combination of up to seven characters (A–Z, a–z, and 0–9) for the password.

If you forget the supervisor password, you can reset it after you press the clear CMOS button. See “Resetting passwords” for additional information.

Resetting passwords: If you forget the user or supervisor password, you can press the clear-CMOS switch (button) on the system board, to clear CMOS memory

and bypass the user or supervisor password check. The clear-CMOS switch is switch 2 (SW2) on the system board. The switch location is shown in the following illustration.



To clear CMOS and reset the passwords, complete the following steps:

1. Read the safety information that begins on page vii and the guidelines in “Installation guidelines” on page 43.
2. Turn off the server and peripheral devices and disconnect all power cords and external cables.
3. Remove the server from the rack and place it on a flat, static-protective surface.
4. Connect the external cables and power cords.
5. Remove the cover. See “Removing the cover” on page 46 for instructions.
6. Press the clear-CMOS button (SW2) once.
7. Install the cover.
8. Turn on the server. You can now start the BIOS Setup Utility program and either delete the old password or set a new user or supervisor password.
9. Save the configuration and turn off the server; then, disconnect all power cords and external cables again.
10. Replace the server in the rack and connect the external cables and power cords; then, turn on the server.

Using the ServerGuide Setup and Installation CD

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

Note: If the *ServerGuide Setup and Installation* CD did not come with your server, you can download the necessary device drivers from the IBM Web site. See the instructions on page 43.

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

The ServerGuide program has the following features:

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

ServerGuide features

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

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

The ServerGuide program performs the following tasks:

- Sets system date and time
- Detects the RAID adapter or controller and runs the SAS RAID configuration program
- Checks the microcode (firmware) levels of a ServeRAID adapter and determines whether a later level is available from the CD
- Detects installed optional hardware devices and provides updated device drivers for most adapters and devices
- Provides diskette-free installation for supported Windows® operating systems
- Includes an online readme file with links to tips for hardware and operating-system installation

Setup and configuration overview

When you use the *ServerGuide Setup and Installation* CD, you do not need setup diskettes. You can use the CD to configure any supported IBM server model. The setup program provides a list of tasks that are required to set up your server model. On a server with a ServeRAID™ adapter or SAS/SATA controller with RAID capabilities, you can run the SAS RAID configuration program to create logical drives.

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

When you start the *ServerGuide Setup and Installation* CD, the program prompts you to complete the following tasks:

- Select your language.
- Select your keyboard layout and country.
- View the overview to learn about ServerGuide features.
- View the readme file to review installation tips for your operating system and adapter.
- Start the operating-system installation. You will need your operating-system CD.

Typical operating-system installation

The ServerGuide program can reduce the time it takes to install an operating system. It provides the device drivers that are required for your hardware and for the operating system that you are installing. This section describes a typical ServerGuide operating-system installation.

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

1. After you have completed the setup process, the operating-system installation program starts. (You will need your operating-system CD to complete the installation.)
2. The ServerGuide program stores information about the server model, service processor, hard disk drive controllers, and network adapters. Then, the program checks the CD for newer device drivers. This information is stored and then passed to the operating-system installation program.
3. The ServerGuide program presents operating-system partition options that are based on your operating-system selection and the installed hard disk drives.
4. The ServerGuide program prompts you to insert your operating-system CD and restart the server. At this point, the installation program for the operating system takes control to complete the installation.

Installing your operating system without ServerGuide

If you have already configured the server hardware and you are not using the ServerGuide program to install your operating system, complete the following steps to download the latest operating-system installation instructions from the IBM Web site.

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 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 x3610**.
6. From the **Operating system** menu, select your operating system, and then click **Search** to display the available installation documents

Using the RAID configuration programs

Use the LSI Logic Configuration Utility program and the LSI Logic MegaRAID Storage Manager program to configure and manage redundant array of independent disks (RAID) arrays. The following notes describe information that you must consider:

- The SATA connectors on the system board support RAID level-0, level-1, and level-1E.

- An optional ServeRAID controller can provide additional RAID support to the hot-swap drives.
- Hard disk drive capacities affect how you create arrays. Drives in an array can have different capacities, but the RAID controller treats them as if they all have the capacity of the smallest hard disk drive.
- To help ensure signal quality, do not mix drives with different speeds and data rates.
- To update the firmware and BIOS code for an optional ServeRAID SAS controller, you must use the IBM *ServeRAID Support* CD that comes with the ServeRAID optional device.

Using the LSI Logic Configuration Utility program

Use the LSI Logic Configuration Utility programs to perform the following tasks:

- Configure a redundant array of independent disks (RAID) array
- View or change the RAID configuration and associated devices

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

1. Turn on the server.
2. When the prompt `Press CTRL-C to start LSI Logic Configuration Utility...` appears, press Ctrl+C. If you have set an supervisor password, you are prompted to type the password.
3. Use the arrow keys to select the controller for which you want to change settings. Use the Help function to see instructions and available actions for this screen.
4. To change the settings of the selected items, follow the instructions on the screen.
5. When you have finished changing settings, press Esc to exit the program; select Save to save the settings that you have changed.

Using the LSI Logic MegaRAID Storage Manager program

Use the LSI Logic MegaRAID Storage Manager program to monitor and manage the disk-array subsystem connected to the integrated SAS controller with RAID capabilities and the optional ServeRAID controller device. The LSI Logic MegaRAID Storage Manager program, device drivers, and information come with the server.

Using the baseboard management controller

Note: You can update the baseboard management controller (BMC) firmware to the latest version by logging into the BMC and applying the IPMI code image file from the Web server. See “Updating the baseboard management controller firmware” on page 23 for the instructions to update the BMC firmware.

The baseboard management controller provides basic service-processor environmental monitoring functions for the server. 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 and also records the error in the BMC system event log.

The baseboard management controller also provides the following remote server management capabilities through the OSA SMBridge management utility program:

- **Command-line interface (IPMI Shell)**

  The command-line interface provides direct access to server management functions through the IPMI protocol. Use the command-line interface to issue

commands to control the server power, view system information, and identify the server. You can also save one or more commands as a text file and run the file as a script.

- **Serial over LAN**

  Establish a Serial over LAN (SOL) connection to manage servers from a remote location. You can remotely view and change the BIOS settings, restart the server, identify the server, and perform other management functions. Any standard Telnet client application can access the SOL connection.

Updating the baseboard management controller firmware

Complete the following steps to log in to the BMC and update the firmware:

1. Get the IP address of the BMC from the BIOS Setup Utility program (select **Advanced → IPMI Configuration → LAN Configuration → IP Address**).
2. Enter the IP address of the BMC in your Web browser **Address** field. The resulting BMC Firmware Update dialog displays the current version of the BMC firmware.
3. In the BMC Firmware Update dialog, enter your user name and password.
4. For **Image Type**, make sure that **IPMI** is selected.
5. For **Update Type**, select **Update**.
6. For **Firmware Image**, browse to the IPMI code image file for Web updating, and select the file; then, click **Apply**. A `Firmware Updating...` message is displayed while the files are being updated.
7. When the `Firmware Update Successful...` message is displayed, click **Reboot**.
8. After the BMC has rebooted with the updated firmware, log in to the BMC again to see the version number of the updated BMC firmware.

Enabling and configuring SOL using the OSA SMBridge management utility program

To enable and configure the server for SOL by using the OSA SMBridge management utility program, you must update and configure the BIOS code; update and configure the baseboard management controller (BMC) firmware; update and configure the Ethernet controller firmware; and enable the operating system for an SOL connection.

BIOS update and configuration: To update and configure the BIOS code to enable SOL, complete the following steps:

1. Update the BIOS code:
   a. Download the latest version of the BIOS code from http://www.ibm.com/systems/support/.
   b. Update the BIOS code, following the instructions that come with the update file that you downloaded.
2. Update the BMC firmware:
   a. Download the latest version of the BMC firmware from http://www.ibm.com/systems/support/.
   b. Update the BMC firmware, following the instructions that come with the update file that you downloaded.
3. Configure the BIOS settings:
   a. When you are prompted to start the BIOS Setup Utility program, restart the server and press F1.
   b. In the BIOS Setup Utility program, make sure that the following remote access items have the following values:

- Remote access: Enabled
- Serial port number: COM1
- Base address, IRQ: 3F8h, 4
- Serial port mode: 19200 8,n,1
- Flow control: None
- Redirection after BIOS POST: Always
- Terminal type: ANSI
- VT-UTF8 combo key support: Enabled
- Sredir memory display delay: No delay

Linux configuration: For SOL operation on the server, you must configure the Linux® operating system to expose the Linux initialization (booting) process. This enables users to log in to the Linux console through an SOL session and directs Linux output to the serial console. See the documentation for your specific Linux operating-system type for information and instructions.

Use one of the following procedures to enable SOL sessions for your Linux operating system. You must be logged in as a root user to perform these procedures.

Red Hat Enterprise Linux ES 4 configuration:

Note: This procedure is based on a default installation of Red Hat Enterprise Linux ES 4. The file names, structures, and commands might be different for other versions of Red Hat Linux.

To configure the general Linux parameters for SOL operation when you are using the Red Hat Enterprise Linux ES 4 operating system, complete the following steps.

Note: Hardware flow control prevents character loss during communication over a serial connection. You must enable it when you are using a Linux operating system.

1. Add the following line to the end of the `# Run gettys in standard runlevels` section of the /etc/inittab file. This enables hardware flow control and enables users to log in through the SOL console.

   ```
   7:2345:respawn:/sbin/agetty -h ttyS0 19200 vt102
   ```

2. Add the following line at the bottom of the /etc/securetty file to enable a user to log in as the root user through the SOL console:

   ```
   ttyS0
   ```

LILO configuration: If you are using LILO, complete the following steps:

1. Modify the /etc/lilo.conf file:
   a. Add the following text to the end of the first `default=linux` line

      ```
      -Monitor
      ```

   b. Comment out the `map=/boot/map` line by adding a `#` at the beginning of this line.
   c. Comment out the `message=/boot/message` line by adding a `#` at the beginning of this line.
   d. Add the following line before the first `image=` line:

      ```
      # This will allow you to only Monitor the OS boot via SOL
      ```

   e. Add the following text to the end of the first `label=linux` line:

      ```
      -Monitor
      ```

f. Add the following line to the first `image=` section. This enables SOL.

```
append="console=ttyS0,19200n8 console=tty1"
```

g. Add the following lines between the two `image=` sections:

```
# This will allow you to Interact with the OS boot via SOL
image=/boot/vmlinuz-2.4.9-e.12smp
    label=linux-Interact
    initrd=/boot/initrd-2.4.9-e.12smp.img
    read-only
    root=/dev/hda6
    append="console=tty1 console=ttyS0,19200n8 "
```

The following examples show the original content of the /etc/lilo.conf file and the content of this file after modification.

Original /etc/lilo.conf contents

```
prompt
timeout=50
default=linux
boot=/dev/hda
map=/boot/map
install=/boot/boot.b
message=/boot/message
linear
image=/boot/vmlinuz-2.4.9-e.12smp
    label=linux
    initrd=/boot/initrd-2.4.9-e.12smp.img
    read-only
    root=/dev/hda6
image=/boot/vmlinuz-2.4.9-e.12
    label=linux-up
    initrd=/boot/initrd-2.4.9-e.12.img
    read-only
    root=/dev/hda6
```

Modified /etc/lilo.conf contents

```
prompt
timeout=50
default=linux-Monitor
boot=/dev/hda
#map=/boot/map
install=/boot/boot.b
#message=/boot/message
linear
# This will allow you to only Monitor the OS boot via SOL
image=/boot/vmlinuz-2.4.9-e.12smp
    label=linux-Monitor
    initrd=/boot/initrd-2.4.9-e.12smp.img
    read-only
    root=/dev/hda6
    append="console=ttyS0,19200n8 console=tty1"
# This will allow you to Interact with the OS boot via SOL
image=/boot/vmlinuz-2.4.9-e.12smp
    label=linux-Interact
    initrd=/boot/initrd-2.4.9-e.12smp.img
    read-only
    root=/dev/hda6
    append="console=tty1 console=ttyS0,19200n8 "
image=/boot/vmlinuz-2.4.9-e.12
    label=linux-up
    initrd=/boot/initrd-2.4.9-e.12.img
    read-only
    root=/dev/hda6
```

2. Run the **lilo** command to store and activate the LILO configuration.

When the Linux operating system starts, a `LILO boot:` prompt is displayed instead of the graphical user interface. Press Tab at this prompt to install all of the boot options that are listed. To load the operating system in interactive mode, type `linux-Interact` and then press Enter.

GRUB configuration: If you are using GRUB, modify the /boot/grub/grub.conf file:

1. Comment out the `splashimage=` line by adding a `#` at the beginning of this line.
2. Add the following line before the first `title=` line:
   ```
   # This will allow you to only Monitor the OS boot via SOL
   ```
3. Append the following text to the first `title=` line:
   ```
   SOL Monitor
   ```
4. Append the following text to the `kernel/` line of the first `title=` section:
   ```
   console=ttyS0,19200 console=tty1
   ```
5. Add the following five lines between the two `title=` sections:
   ```
   # This will allow you to Interact with the OS boot via SOL
   title Red Hat Linux (2.4.9-e.12smp) SOL Interactive
       root (hd0,0)
   kernel /vmlinuz-2.4.9-e.12smp ro root=/dev/hda6 console=tty1
   ```

```
console=ttyS0,19200
initrd /initrd-2.4.9-e.12smp.img
```

Note: The entry that begins with `kernel /vmlinuz` is shown with a line break after `console=tty1`. In your file, the entire entry must all be on one line.

The following examples show the original content of the /boot/grub/grub.conf file and the content of this file after modification.

Original /boot/grub/grub.conf contents

```
#grub.conf generated by anaconda
#
# Note that you do not have to rerun grub after making changes to this file
# NOTICE:  You have a /boot partition.  This means that
#          all kernel and initrd paths are relative to /boot/, eg.
#          root (hd0,0)
#           kernel /vmlinuz-version ro root=/dev/hda6
#           initrd /initrd-version.img
#boot=/dev/hda
default=0
timeout=10
splashimage=(hd0,0)/grub/splash.xpm.gz
title Red Hat Enterprise Linux ES (2.4.9-e.12smp)
    root (hd0,0)
    kernel /vmlinuz-2.4.9-e.12smp ro root=/dev/hda6
    initrd /initrd-2.4.9-e.12smp.img
title Red Hat Enterprise Linux ES-up (2.4.9-e.12)
    root (hd0,0)
    kernel /vmlinuz-2.4.9-e.12 ro root=/dev/hda6
    initrd /initrd-2.4.9-e.12.img
```

Modified /boot/grub/grub.conf contents

```
#grub.conf generated by anaconda
#
# Note that you do not have to rerun grub after making changes to this file
# NOTICE:  You have a /boot partition.  This means that
#          all kernel and initrd paths are relative to /boot/, eg.
#          root (hd0,0)
#          kernel /vmlinuz-version ro root=/dev/hda6
#          initrd /initrd-version.img
#boot=/dev/hda
default=0
timeout=10
# splashimage=(hd0,0)/grub/splash.xpm.gz
# This will allow you to only Monitor the OS boot via SOL
title Red Hat Enterprise Linux ES (2.4.9-e.12smp) SOL Monitor
    root (hd0,0)
    kernel /vmlinuz-2.4.9-e.12smp ro root=/dev/hda6 console=ttyS0,19200 console=tty1
    initrd /initrd-2.4.9-e.12smp.img
# This will allow you to Interact with the OS boot via SOL
title Red Hat Linux (2.4.9-e.12smp) SOL Interactive
    root (hd0,0)
    kernel /vmlinuz-2.4.9-e.12smp ro root=/dev/hda6 console=tty1 console=ttyS0,19200
    initrd /initrd-2.4.9-e.12smp.img
title Red Hat Enterprise Linux ES-up (2.4.9-e.12)
    root (hd0,0)
    kernel /vmlinuz-2.4.9-e.12 ro root=/dev/hda6
    initrd /initrd-2.4.9-e.12.img
```

You must restart the Linux operating system after you complete these procedures for the changes to take effect and to enable SOL.

SUSE SLES 9.0 configuration:

Note: This procedure is based on a default installation of SUSE Linux Enterprise Server (SLES) 9.0. The file names, structures, and commands might be different for other versions of SUSE Linux.

Configure the general Linux parameters for SOL operation when using the SLES 9.0 operating system.

Note: Hardware flow control prevents character loss during communication over a serial connection. You must enable it when using a Linux operating system.

1. Add the following line to the end of the `# getty-programs for the normal runlevels` section of the /etc/inittab file. This enables hardware flow control and enables users to log in through the SOL console.

   ```
   7:2345:respawn:/sbin/agetty -h ttyS0 19200 vt102
   ```

2. Add the following line after the `tty6` line at the bottom of the /etc/securetty file to enable a user to log in as the root user through the SOL console:

   ```
   ttyS0
   ```

3. Modify the /boot/grub/menu.lst file:
   a. Comment out the `gfxmenu` line by adding a `#` in front of the word `gfxmenu`.
   b. Add the following line before the first `title` line:
      ```
      # This will allow you to only Monitor the OS boot via SOL
      ```
   c. Append the following text to the first `title` line:
      ```
      SOL Monitor
      ```
   d. Append the following text to the `kernel` line of the first `title` section:
      ```
      console=ttyS1,19200 console=tty0
      ```
   e. Add the following four lines between the first two `title` sections:
      ```
      # This will allow you to Interact with the OS boot via SOL
      title linux SOL Interactive
         kernel (hd0,1)/boot/vmlinuz root=/dev/hda2 acpi=oldboot vga=791
         console=tty1 console=ttyS0,19200
         initrd (hd0,1)/boot/initrd
      ```
      The following examples show the original content of the /boot/grub/menu.lst file and the content of this file after modification.

Original /boot/grub/menu.lst contents	**Notes**

`gfxmanu (hd0,1)/boot/message`
`color white/blue black/light-gray`
`default 0`
`timeout 8`
 	
`title linux`
`  kernel (hd0,1)/boot/vmlinuz root=/dev/hda2 acpi=oldboot vga=791`
`  initrd (hd0,1)/boot/initrd`
`title floppy`
`  root`
`  chainloader +1`
`title failsafe`
`  kernal (hd0,1)/boot/vmlinuz.shipped root=/dev/hda2 ide=nodma apm=off vga=normal nosmp`
`disableapic maxcpus=0 3`
`  initrd (hd0,1)/boot/initrd.shipped`
	1
	
	1

Note 1: The kernel line is shown with a line break. In your file, the entire entry must all be on one line.	

Modified /boot/grub/menu.lst contents	**Notes**

`#gfxmanu (hd0,1)/boot/message`
`color white/blue black/light-gray`
`default 0`
`timeout 8`
 	
`# This will allow you to only Monitor the OS boot via SOL`
`title linux SOL Monitor`
`  kernel (hd0,1)/boot/vmlinuz root=/dev/hda2 acpi=oldboot vga=791 console=ttyS1,19200`
`console=tty1`
`  initrd (hd0,1)/boot/initrd`
`# This will allow you to Interact with the OS boot via SOL`
`title linux SOL Interactive`
` kernel (hd0,1)/boot/vmlinuz root=/dev/hda2 acpi=oldboot vga=791 console=tty1 console=ttyS0,19200`
` initrd (hd0,1)/boot/initrd`
	1

Modified /boot/grub/menu.lst contents	Notes

title floppy
  root
  chainloader +1
title failsafe
  kernel (hd0,1)/boot/vmlinuz.shipped root=/dev/hda2 ide=nodma apm=off vga=normal nosmp
disableapic maxcpus=0 3
  initrd (hd0,1)/boot/initrd.shipped
	1

Note 1: The kernel line is shown with a line break. In your file, the entire entry must all be on one line.	

You must restart the Linux operating system after you complete these procedures for the changes to take effect and to enable SOL.

Microsoft Windows 2003 Standard Edition configuration:

Note: This procedure is based on a default installation of the Microsoft® Windows 2003 operating system.

To configure the Windows 2003 operating system for SOL operation, complete the following steps. You must be logged in as a user with administrator access to perform this procedure.

1. Determine which boot entry ID to modify:
   a. Type `bootcfg` at a Windows command prompt; then, press Enter to display the current boot options for your server.
   b. In the `Boot Entries` section, locate the boot entry ID for the section with an OS friendly name of Windows Server 2003, Standard. Write down the boot entry ID for use in the next step.
2. To enable the Microsoft Windows Emergency Management System (EMS), at a Windows command prompt, type

   `bootcfg /EMS ON /PORT COM1 /BAUD 19200 /ID` *`boot_id`*

   where *boot_id* is the boot entry ID from step 1b; then, press Enter.
3. Verify that the EMS console is redirected to the COM1 serial port:
   a. Type `bootcfg` at a Windows command prompt; then, press Enter to display the current boot options for your server.
   b. Verify the following changes to the bootcfg settings:
      - In the `Boot Loader Settings` section, make sure that `redirect` is set to `COM1` and that `redirectbaudrate` is set to `19200`.
      - In the `Boot Entries` section, make sure that the `OS Load Options:` line has `/redirect` appended to the end of it.

   The following examples show the original bootcfg program output and the output after modification.

Original bootcfg program output

```
Boot Loader Settings
----------------------------
timeout: 30
default: multi(0)disk(0)rdisk(0)partition(1)\WINDOWS
Boot Entries
----------------
Boot entry ID: 1
OS Friendly Name: Windows Server 2003, Standard
Path: multi(0)disk(0)rdisk(0)partition(1)\WINDOWS
OS Load Options: /fastdetect
```

Modified bootcfg program output

```
Boot Loader Settings
----------------------------
timeout: 30
default: multi(0)disk(0)rdisk(0)partition(1)\WINDOWS
redirect: COM1
redirectbaudrate: 19200
Boot Entries
----------------
Boot entry ID: 1
OS Friendly Name: Windows Server 2003, Standard
Path: multi(0)disk(0)rdisk(0)partition(1)\WINDOWS
OS Load Options: /fastdetect /redirect
```

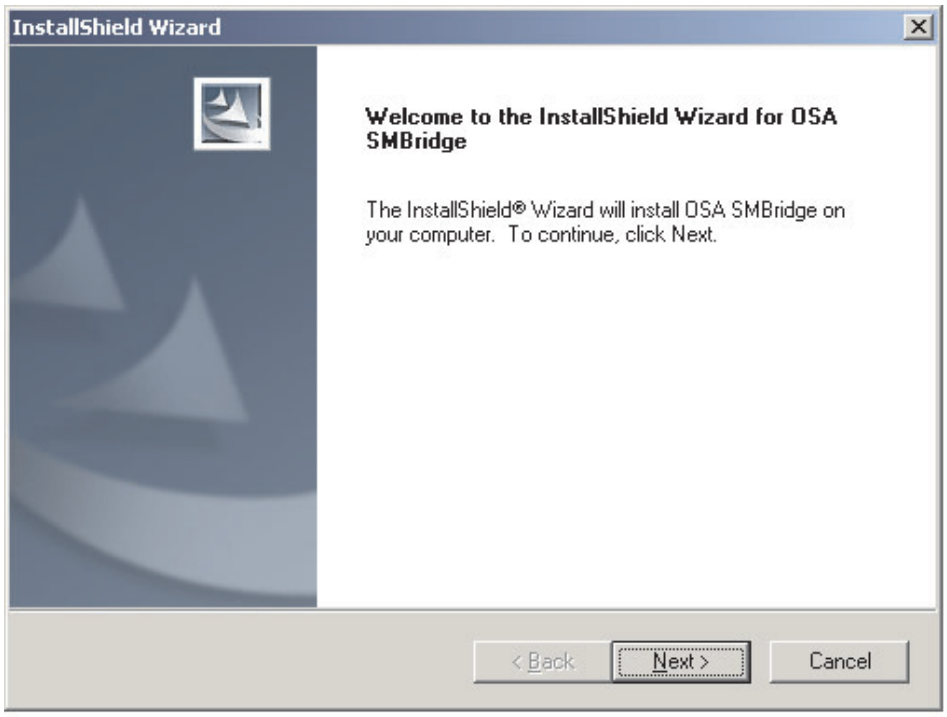
You must restart the Windows 2003 operating system after you complete this procedure for the changes to take effect and to enable SOL.

Installing the OSA SMBridge management utility program

Important: To obtain maximum benefit from the OSA SMBridge management utility program, install and load the program *before* problems occur.

To install the OSA SMBridge management utility program on a server running a Windows operating system, complete the following steps:

1. Go to http://www.ibm.com/systems/support/ and download the utility program and create the OSA BMC Management Utility CD.
2. Insert the OSA BMC Management Utility CD into the drive. The InstallShield wizard starts, and a window similar to that shown in the following illustration opens.



3. Follow the prompts to complete the installation.

   The installation program prompts you for a TCP/IP port number and an IP address. Specify an IP address, if you want to limit the connection requests that will be accepted by the utility program. To accept connections from any server, type `INADDR_ANY` as the IP address. Also specify the port number that the utility program will use. These values will be recorded in the smbridge.cfg file for the automatic startup of the utility program.

To install the OSA SMBridge management utility program on a server running a Linux operating system, complete the following steps. You must be logged in as a root user to perform these procedures.

1. Go to http://www.ibm.com/systems/support/. Download the utility program and create the OSA BMC Management Utility CD.
2. Insert the OSA BMC Management Utility CD into the drive.
3. Type `mount/mnt/cdrom`.
4. Locate the directory where the installation RPM package is located and type `cd/mnt/cdrom`.
5. Type the following command to run the RPM package and start the installation:

   ```
   rpm -I've smbridge-2.0-xx.rpm
   ```

   where *xx* is the release level being installed.
6. Follow the prompts to complete the installation. When the installation is complete, the utility copies files to the following directories:

   /etc/init.d/SMBridge
   /etc/smbridge.cfg
   /usr/sbin/smbridged
   /var/log/smbridge/Liscense.txt
   /var/log/smbridge/Readme.txt

The utility starts automatically when the server is started. You can also locate the /ect/init.d directory to start the utility and use the following commands to manage the utility:

```
smbridge status
smbridge start
smbridge stop
smbridge restart
```

Using the baseboard management controller utility programs

Use the baseboard management controller utility programs to configure the baseboard management controller, download firmware updates and sensor data record/field replaceable unit (SDR/FRU) updates, and remotely manage a network.

Using the baseboard management controller configuration utility program: Use the baseboard management controller configuration utility program to view or change the baseboard management controller configuration settings. You can also use the utility program to save the configuration to a file for use on multiple servers.

Note: You must attach an optional USB diskette drive to the server to run this program.

To start the baseboard management controller configuration utility program, complete the following steps:

1. Insert the configuration utility diskette into the diskette drive and restart the server.
2. From a command-line prompt, type `bmc_cfg` and press Enter.
3. Follow the instructions on the screen.

Using the baseboard management controller firmware update utility program: Use the baseboard management controller firmware update utility program to download and apply a baseboard management controller firmware update and SDR/FRU data update. The firmware update utility program updates the baseboard management controller firmware and SDR/FRU data only and does not affect any device drivers.

Note: To ensure proper server operation, be sure to update the server baseboard management controller firmware before you update the BIOS code.

To update the firmware, if the Linux or Windows operating-system update package is available from the World Wide Web and you have obtained the applicable update package, follow the instructions that come with the update package.

Using the OSA SMBridge management utility program: Use the OSA SMBridge management utility program to remotely manage and configure a network. The utility program provides the following remote management capabilities:

- **CLI (command-line interface) mode**

  Use CLI mode to remotely perform power-management and system identification control functions over a LAN or serial port interface from a command-line interface. Use CLI mode also to remotely view the BMC system event log.

Use the following commands in CLI mode:

– **power**

  Turn the server on and off remotely.

– **sel**

  Perform operations with the BMC system event log.

– **sysinfo**

  Display general system information that is related to the server and the baseboard management controller.

- **Serial over LAN**

  Use the Serial over LAN capability to remotely perform control and management functions over a Serial over LAN (SOL) network. You can also use SOL to remotely view and change the server BIOS settings.

  At a command prompt, type `telnet localhost 623` to access the SOL network. Type `help` at the `smbridge>` prompt for more information.

  Use the following commands in an SOL session:

  – **connect**

    Connect to the LAN. Type `connect -ip` *`ip_address`* `-u` *`username`* `-p` *`password`*.

  – **power**

    Turn the server on and off remotely.

  – **reboot**

    Force the server to restart.

  – **sel get**

    Display the BMC system event log.

  – **sol**

    Configure the SOL function.

  – **sysinfo**

    Display system information that is related to the server and the globally unique identifier (GUID).

Configuring the Gigabit Ethernet controllers

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

You do not have to set any jumpers or configure the controllers. However, you must install a device driver to enable the operating system to address the controllers. To download device drivers from the IBM Web site, see the instructions on page 43. To find updated information about configuring the controllers, 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 **Publications lookup**.
4. From the **Product family** menu, select **System x3610** and click **Continue**.

Chapter 3. Parts listing, Type 7942 server

The following replaceable components are available for the Series x3610 Type 7942 server. To check for an updated parts listing on the Web, 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 **Parts documents lookup**.
4. From the **Product family** menu, select **System x3610** and click **Continue**.

Replaceable server components

Replaceable components are of three types:

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

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

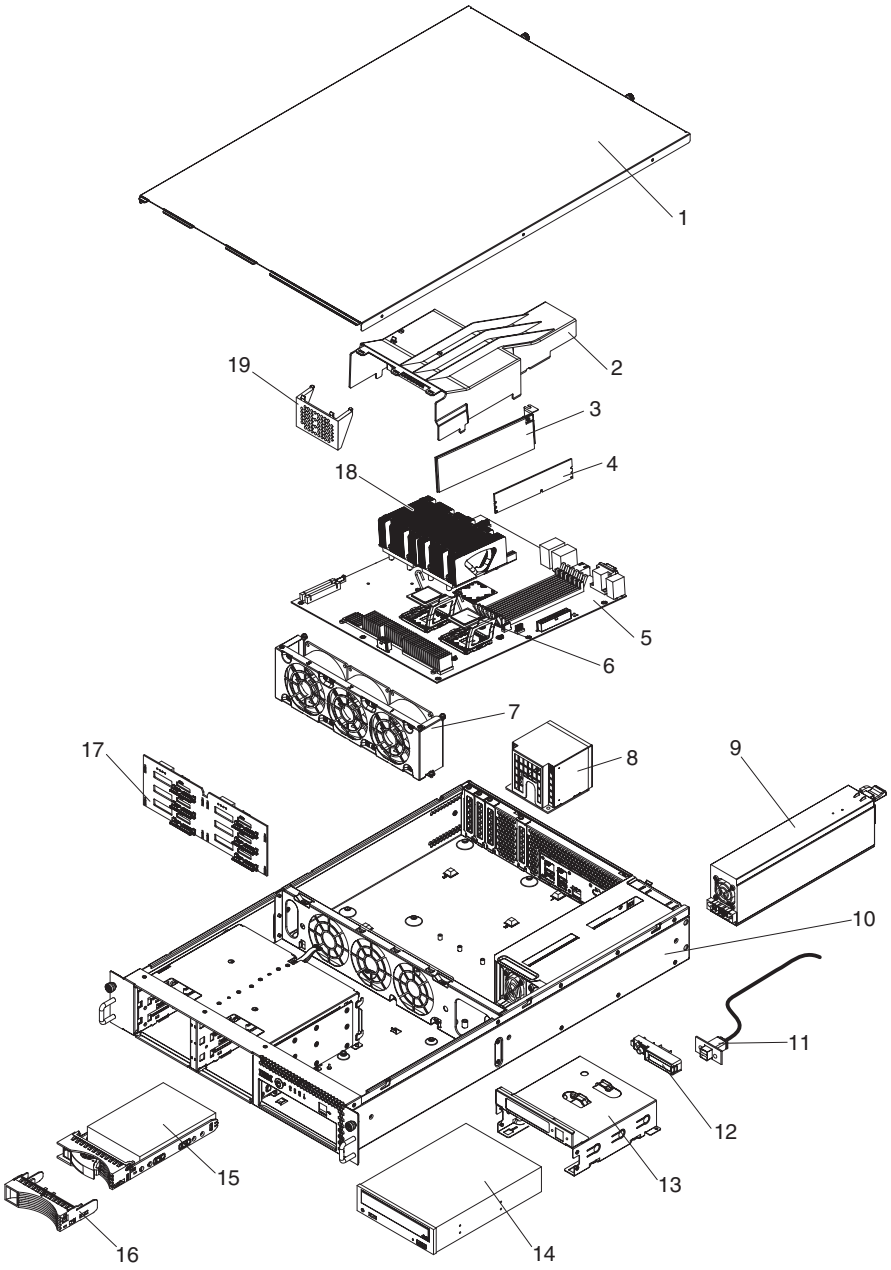


Table 5. Parts listing, Type 7942

Index	Description	CRU part number (Tier 1)	CRU part number (Tier 2)	FRU part number
1	Cover	44X1870		
2	Air duct	44X1816		
3	Adapter, low-profile	varies		
4	Memory, registered DDR2 DIMM, 512 GB	varies		
4	Memory, registered DDR2 DIMM, 1 GB	41Y2761		
4	Memory, registered DDR2 DIMM, 2 GB	varies		
4	Memory, registered DDR2 DIMM, 4 GB	varies		
5	System board			44X1798

Table 5. Parts listing, Type 7942 (continued)

Index	Description	CRU part number (Tier 1)	CRU part number (Tier 2)	FRU part number
6	Microprocessor, 1.60 GHz/1066, dual core, 4MB L2, (model 22x)			44X1832
6	Microprocessor, 1.86 GHz/1066, dual core, 6MB L2 65W (model 24x)			44E5145
6	Microprocessor, 2.00 GHz/1333, quad core, 12MB L2, 80W (models 42x, 62x)			44R5644
7	Fan bracket assembly			44X1819
8	Power backplane			44X1800
9	Power supply, 600 W	44X1802		
10	Chassis			44X1792
11	Front USB connectors assembly		44X1813	
12	Operator information panel assembly (front I/O cable assembly)		44X1814	
13	CD/DVD drive enclosure			46C7690
14	CD/DVD drive, SATA			43W4595
14	CD/DVD drive, SATA			43W4597
15	Hot-swap hard disk drive, SAS or SATA	varies		
16	Filler panel, hot-swap hard disk drive bay	39M4375		
17	SAS hot-swap backplane			44X1799
18	Heat sink			44X1794
19	Air-baffle insert	part of 44X1816		
	Cable assembly, front USB		44X1813	
	Cable, SAS hard disk drive, 275mm, 32P-7PX2		44X1811	
	Cable, SAS hard disk drive, 375mm, 32P-7PX4		44X1812	
	Cable, SATA optical (CD/DVD) drive, 630 mm		44X1810	
	Cable, thermal sensor		46C7743	
	Rack rail assembly	44X1822		
	System service label	44X1864		

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

Table 6. Consumable parts, Type 7942

Description	Part number
Battery, 3.0 volt	33F8354

To order a consumable part, complete the following steps:

1. Go to http://www.ibm.com.
2. From the **Products** menu, select **Upgrades, accessories & parts**.

3. Click **Obtain maintenance parts**; then, follow the instructions to order the part from the retail store.

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): 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

IBM power cord part number	Used in these countries and regions
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, Colombia, Costa Rica, 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, Caicos Islands, Canada, Cayman Islands, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Guam, Guatemala, Haiti, Honduras, Jamaica, Mexico, Micronesia (Federal States of), Netherlands Antilles, Nicaragua, Panama, Peru, Philippines, Saudi Arabia, Thailand, Taiwan, United States of America, Venezuela
39M5219	Korea (Democratic People's Republic of), Korea (Republic of)
39M5199	Japan

IBM power cord part number	Used in these countries and regions
39M5068	Argentina, Paraguay, Uruguay
39M5226	India
39M5233	Brazil

Chapter 4. Removing and replacing server components

Replaceable components are of three types:

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

See Chapter 3, “Parts listing, Type 7942 server,” on page 37 to determine whether a component is a Tier 1 CRU, Tier 2 CRU, or FRU.

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

Installation guidelines

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

- Read the safety information that begins on page vii, and the guidelines in “Handling static-sensitive devices” on page 45. This information will help you work safely.
- 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:
  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 x3610** to display the matrix of downloadable files for the server.

  For additional information about tools for updating, managing, and deploying firmware, see the System x and xSeries Tools Center at http://publib.boulder.ibm.com/infocenter/toolsctr/v1r0/index.jsp.
- Before you install optional hardware, make sure that the server is working correctly. Start the server, and make sure that the operating system starts. If the server is not working correctly, see Chapter 5, “Diagnostics,” on page 83 for diagnostic information.
- 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 tools or 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 can stand safely without slipping.
  – Distribute the weight of the object equally between your feet.

  - Use a slow lifting force. Never move suddenly or twist when you lift a heavy object.
  - To avoid straining the muscles in your back, lift by standing or by pushing up with your leg muscles.
- Make sure that you have an adequate number of properly grounded electrical outlets for the server, monitor, and other devices.
- Back up all important data before you make changes to disk drives.
- Have a small flat-blade screwdriver available.
- You do not have to turn off the server to install or replace redundant hot-swap ac power supplies or hot-plug Universal Serial Bus (USB) devices. However, you must turn off the server before performing any steps that involve removing or installing adapter cables or non-hot-swap optional devices or components.
- Blue on a component indicates touch points, where you can grip the component to remove it from or install it in the server, open or close a latch, and so on.
- Orange on a component or an orange label on or near a component indicates that the component can be hot-swapped, which means that if the server and operating system support hot-swap capability, you can remove or install the component while the server is running. (Orange can also indicate touch points on hot-swap components.) See the instructions for removing or installing a specific hot-swap component for any additional procedures that you might have to perform before you remove or install the component.
- When you are finished working on the server, reinstall all safety shields, guards, labels, and ground wires.
- For a list of supported 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 (2.0 in.) of open space around the front and rear of the server. Do not place objects in front of the fans. For proper cooling and airflow, replace the server cover before turning on the server. Operating the server for extended periods of time (more than 30 minutes) with the server cover removed might damage server components.
- You have followed the cabling instructions that come with optional adapters.
- You have replaced a failed fan (fan-bracket assembly) within 48 hours.
- You have replaced a hot-swap drive within 2 minutes of removal.
- You do not operate the server without the air duct installed. Operating the server without the air duct might cause the microprocessors to overheat.
- The air duct always contains the air-baffle insert over microprocessor socket 2, or microprocessor socket 2 always contains a microprocessor and heat sink.

Working inside the server with the power on

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

You might be instructed to turn on the server while the cover is off, to look at system-board or backplane LEDs, or to press a button on the system board. Follow these guidelines when you work inside a server that is turned on:

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

Handling static-sensitive devices

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

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

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

Returning a device or component

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

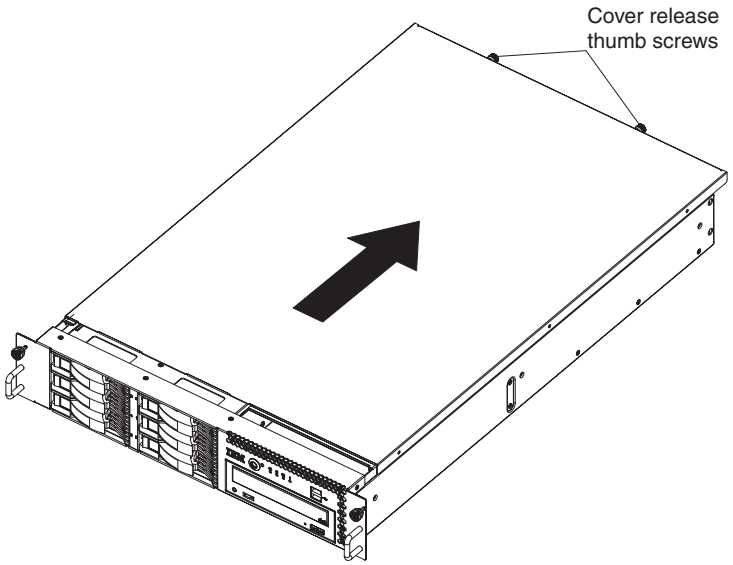
Removing and replacing Tier 1 CRUs

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

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

Removing the cover

To remove the cover, complete the following steps.



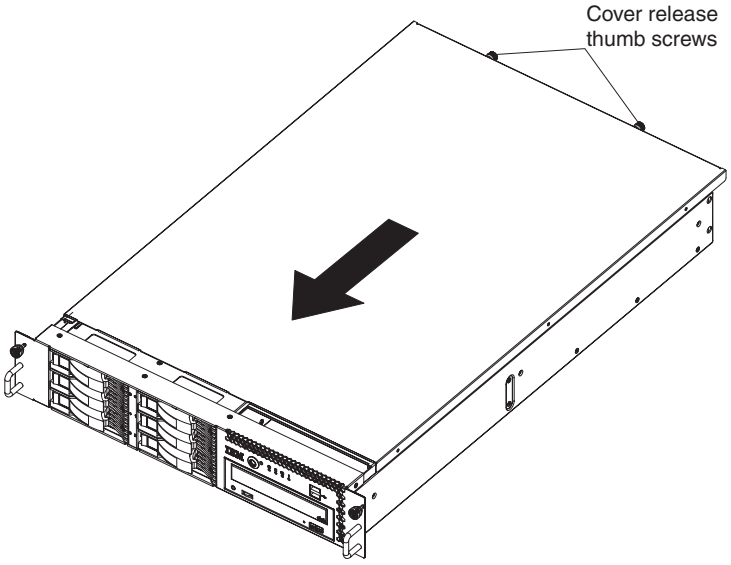
1. Read the safety information that begins on page vii and “Installation guidelines” on page 43.
2. If you are planning to install or remove a microprocessor, memory module, PCI adapter, fan-bracket assembly, battery, or other non-hot-swap optional device, turn off the server and all attached devices and disconnect all external cables and power cords (see “Turning off the server” on page 6).
3. Loosen the rack-release thumbscrews at the front of the server; then, pull the server out of the rack enclosure until both slide rails lock.

   Note: You can reach the cables on the back of the server when the server is in the locked position.
4. Loosen the cover-release thumbscrews at the rear of the server. Lift the cover off the server and set the cover aside.

   Attention: For proper cooling and airflow, replace the cover before turning on the server. Operating the server for extended periods of time (over 30 minutes) with the cover removed might damage server components.
5. If you are instructed to return the cover, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

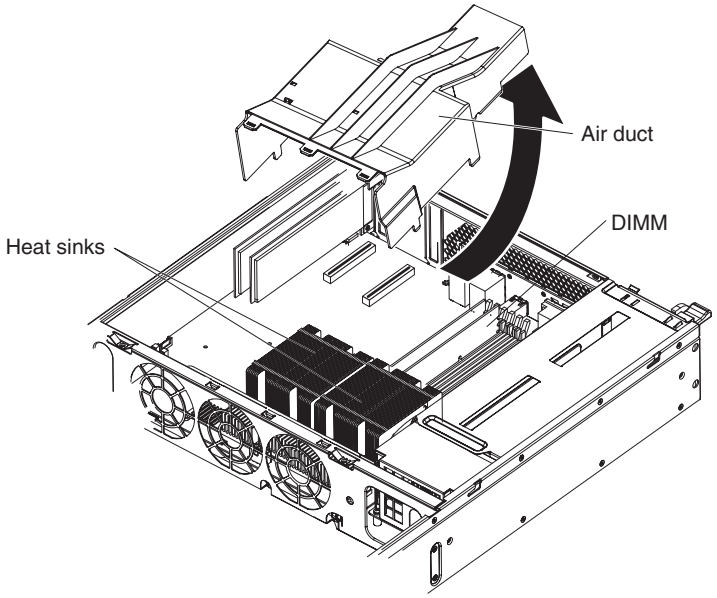
Installing the cover

To install the cover, place it into position and slide it forward; then, tighten the cover-release thumbscrews.



Removing the air duct

When you work with some optional devices, you must first remove the air duct to access certain components or connectors on the system board. The following illustration shows how to remove the air duct.



To remove the air duct, complete the following steps:

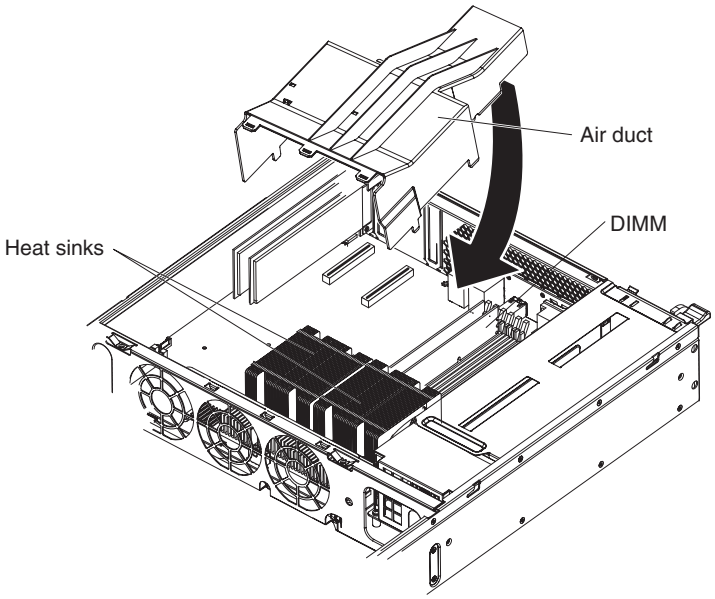
1. Read the safety information that begins on page vii and “Installation guidelines” on page 43.
2. Turn off the server and peripheral devices and disconnect all power cords and external cables.
3. Remove the cover (see “Removing the cover” on page 46).
4. Lift the rear of the air duct slightly and pull it toward the rear of the server to release the air-duct tabs from the slots on the fan-bracket assembly.
5. Lift the air duct out of the server.

Attention: For proper cooling and airflow, replace the air duct before you turn on the server. Operating the server with the air duct removed might damage server components.

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

Installing the air duct

To install the air duct, complete the following steps.



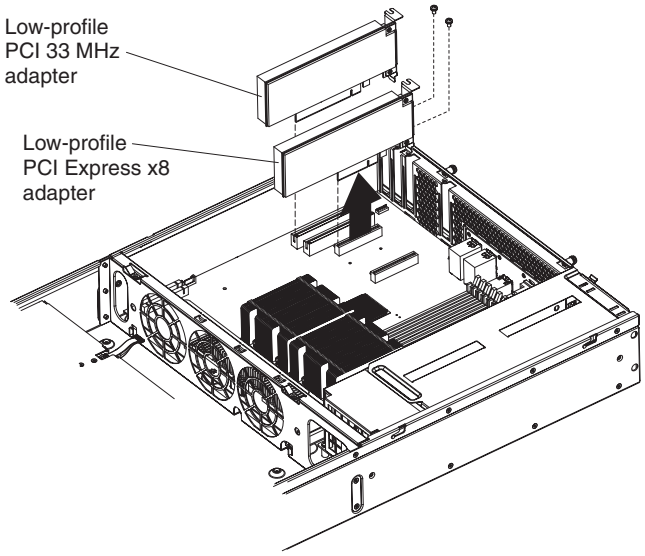
1. Tilt the front of the air duct down and align the tabs on the air duct with the slots in the fan-bracket assembly.
2. Lower the rear of the air duct into the server.

   Attention: For proper cooling and airflow, replace the air duct before you turn on the server. Operating the server with an air duct removed might damage server components.
3. Install the cover (see “Installing the cover” on page 46).
4. Slide the server into the rack and tighten the rack release thumbscrews.
5. Reconnect the external cables; then, reconnect the power cords and turn on the peripheral devices and the server.

Removing an adapter

This topic describes removing an adapter from a PCI slot.

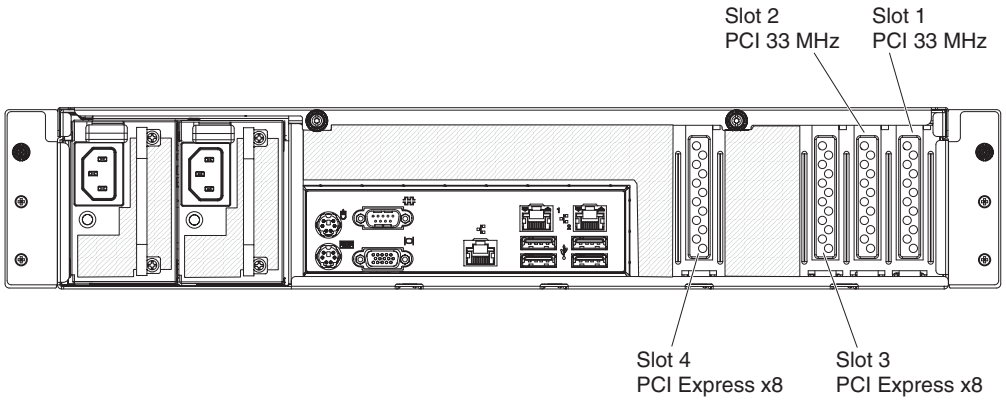
To remove an adapter from a PCI slot, complete the following steps.



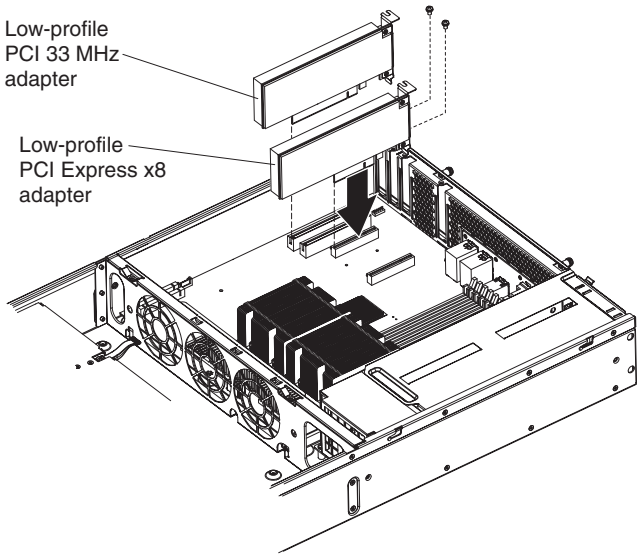
1. Read the safety information that begins on page vii and “Installation guidelines” on page 43.
2. Turn off the server and peripheral devices and disconnect all power cords and external cables.
3. Pull the server out of the rack; then, remove the cover (see “Removing the cover” on page 46).
4. Disconnect any cables from the adapter.
5. Remove the screw that holds the adapter in the slot.
6. Carefully grasp the adapter by its top edge or upper corners, and pull the adapter from the PCI slot.
7. If you are instructed to return the adapter, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing an adapter

This topic describes installing an adapter in a PCI slot.



To install an adapter, complete the following steps.



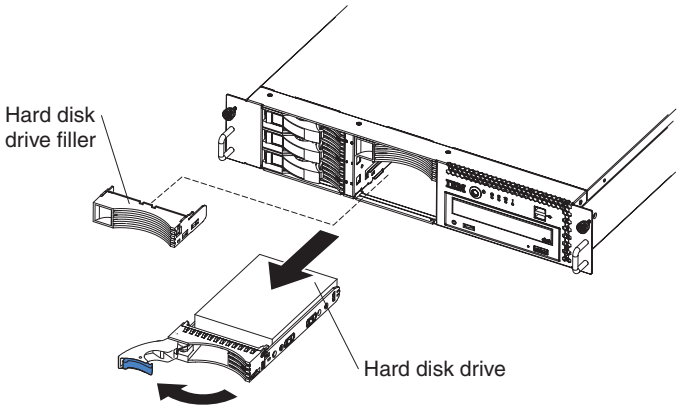
1. Install the adapter in the expansion slot.
2. Install the screw that holds the adapter in the expansion slot.
3. Connect any required cables to the adapter.

   Attention:

   - When you route cables, do not block any connectors or the ventilated space around any of the fans.
   - Make sure that cables are not routed on top of components.
   - Make sure that cables are not pinched by the server components.
4. Perform any configuration tasks that are required for the adapter.
5. Install the cover (see “Installing the cover” on page 46).
6. Slide the server into the rack and tighten the rack release thumbscrews.
7. Reconnect the external cables; then, reconnect the power cords and turn on the peripheral devices and the server.

Removing a hard disk drive

To remove a hard disk drive from a hot-swap bay, complete the following steps.



1. Read the safety information that begins on page vii and “Installation guidelines” on page 43.
2. Move the handle on the drive to the open position (perpendicular to the drive).
3. Pull the hot-swap drive assembly from the bay.

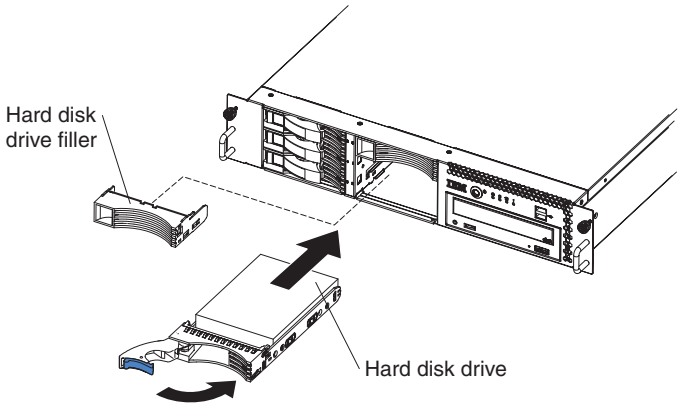
4. If you are instructed to return the hot-swap drive, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing a hard disk drive

Locate the documentation that comes with the hard disk drive and follow those instructions in addition to the instructions in this section.

For information about the type of hard disk drive that the server supports and other information that you must consider when installing a hard disk drive, see the *User's Guide* on the IBM *System x Documentation* CD.

Important: Do not install a SCSI hard disk drive in this server; install only SAS or SATA hard disk drives.



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

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

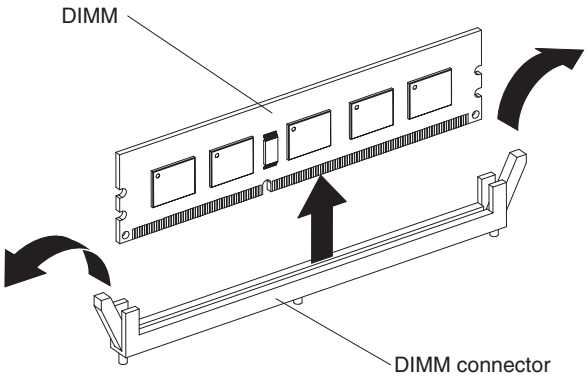
1. Make sure that the tray handle is open (that is, perpendicular to the drive).
2. Align the drive assembly with the guide rails in the bay.
3. Gently push the drive assembly into the bay until the drive stops.
4. Push the tray handle to the closed (locked) position.
5. Check the hard disk drive status LED to verify that the hard disk drive is operating correctly.

   If the amber hard disk drive status LED for a drive is lit continuously, that drive is faulty and must be replaced. If the green hard disk drive activity LED is flashing, the drive is being accessed.

Note: You might have to reconfigure the disk arrays after you install hard disk drives. See "Using the RAID configuration programs" on page 21.

Removing a memory module (DIMM)

To remove a DIMM, complete the following steps.



1. Read the safety information that begins on page vii and “Installation guidelines” on page 43.
2. Turn off the server and peripheral devices and disconnect all power cords and external cables.
3. Remove the cover (see “Removing the cover” on page 46).
4. Remove the air duct (see “Removing the air duct” on page 47).

   Attention: To avoid breaking the retaining clips or damaging the DIMM connectors, open and close the clips gently.
5. Open the retaining clip on each end of the DIMM connector and lift the DIMM from the connector.
6. Replace the DIMM or remove the second DIMM of the pair.
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

For information about the types of dual inline memory modules (DIMMs) that the server supports and other information that you must consider when installing DIMMs, see the *User's Guide* on the IBM *System x Documentation* CD.

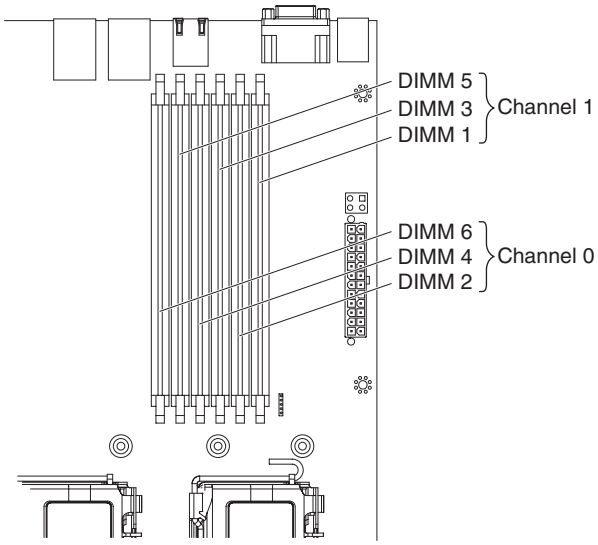
- The server comes with a minimum of two 512 MB DIMMs, installed in connectors 1 and 2 or one 1 GB DIMM, installed in connector 1. When you install additional DIMMs, you must install the DIMMs in the order shown in the following tables, to maintain performance.

Table 7. DIMM installation sequence, non-interleaved

DIMM	DIMM connectors
1st	1
2nd	3
3rd	5

Table 8. DIMM installation sequence, interleaved

DIMM pair	DIMM connectors
1st	1 and 2
2nd	3 and 4
3rd	5 and 6



- Each DIMM in a pair must be the same size, speed, type, and technology to ensure that the server will operate correctly.

DIMM Population Rule

Notes:

1. Single rank 4 GB memory is not supported.
2. A rank is defined as an area or block of 64 bits that is created by using some or all of the chips on a DIMM. For an ECC DIMM, a memory rank is a block of 72 data bits (64 bits plus 8 ECC bits).

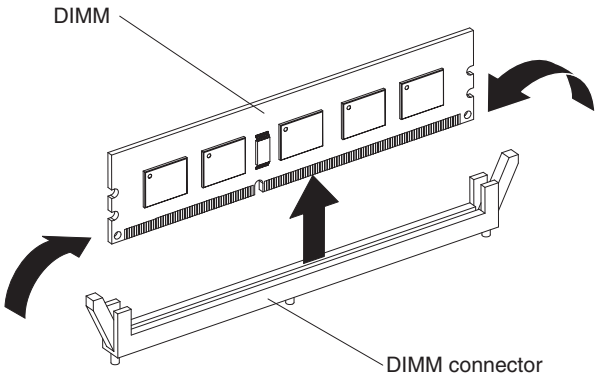
Table 9. DIMM Configurations

Configuration	Channel 0 DIMM 6	Channel 1 DIMM 5	Channel 0 DIMM 4	Channel 1 DIMM 3	Channel 0 DIMM 2	Channel 1 DIMM 1
1	X	X	Dual rank	Dual rank	Dual rank	Dual rank
2	Single rank	Single rank	Single rank	Single rank	Dual rank	Dual rank
3	Single rank	Single rank	Single rank	Single rank	Single rank	Single rank

DIMM installation priority:

1. Channel 0 DIMM 2 or channel 1 DIMM 1
2. Channel 0 DIMM 4 or channel 1 DIMM 3
3. Channel 0 DIMM 6 or channel 1 DIMM 5

To install a DIMM, complete the following steps.

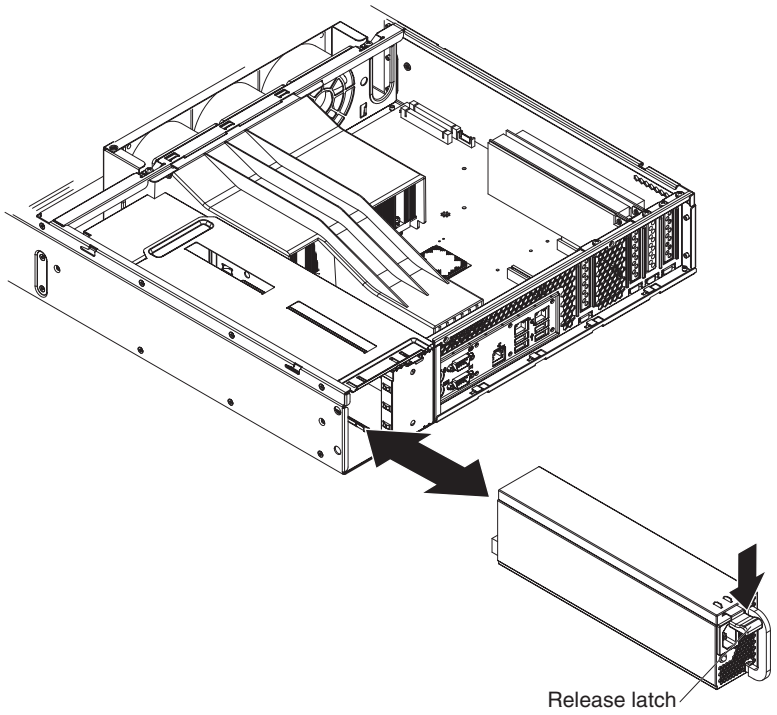


1. Open the retaining clip on each end of the DIMM connector.
2. Touch the static-protective package that contains the DIMM to any unpainted metal surface on the server. Then, remove the DIMM from the package.
3. Turn the DIMM so that the DIMM keys align correctly with the connector.
4. Insert the DIMM into the connector by aligning the edges of the DIMM with the slots at the ends of the DIMM connector. Firmly press the DIMM straight down into the connector by applying pressure on both ends of the DIMM simultaneously. The retaining clips snap into the locked position when the DIMM is firmly seated in the connector. If there is a gap between the DIMM and the retaining clips, the DIMM has not been correctly inserted; open the retaining clips, remove the DIMM, and then reinsert it.
5. Repeat steps 1 through 4 until all the new or replacement DIMMs are installed.
6. Replace the air duct (see “Installing the air duct” on page 48).
7. Install the cover (see “Installing the cover” on page 46).
8. Slide the server into the rack and tighten the rack release thumbscrews.
9. Reconnect the external cables; then, reconnect the power cords and turn on the peripheral devices and the server.
10. Check the system-error LED on the operator information panel. If the system-error LED is off, you have completed this procedure. If the system-error LED is on, look at the other LEDs on the operator information panel and the LEDs on the system board; an error LED (amber) that is lit on the system board or an LED on the hard disk drive backplane or system board that is off when it should be on can help isolate the error.

Removing a power supply

Important: If the server has two power supplies and you remove either of them, the server will not have redundant power; if the server power load then exceeds 600 W, the server might not start or might not function correctly.

To remove a power supply, complete the following steps.



1. Read the safety information that begins on page vii and “Installation guidelines” on page 43.
2. Turn off the server and peripheral devices.
3. Disconnect the power cord from the power supply that you are removing.
4. Grasp the power-supply handle.
5. Press the orange release latch down and hold it down.
6. Pull the power supply part of the way out of the bay.
7. Release the release latch; then, support the power supply and pull it the rest of the way out of the bay.
8. If you do not intend to install another power supply in the bay, install a power-supply filler in the bay.
9. If you are instructed to return the power supply, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

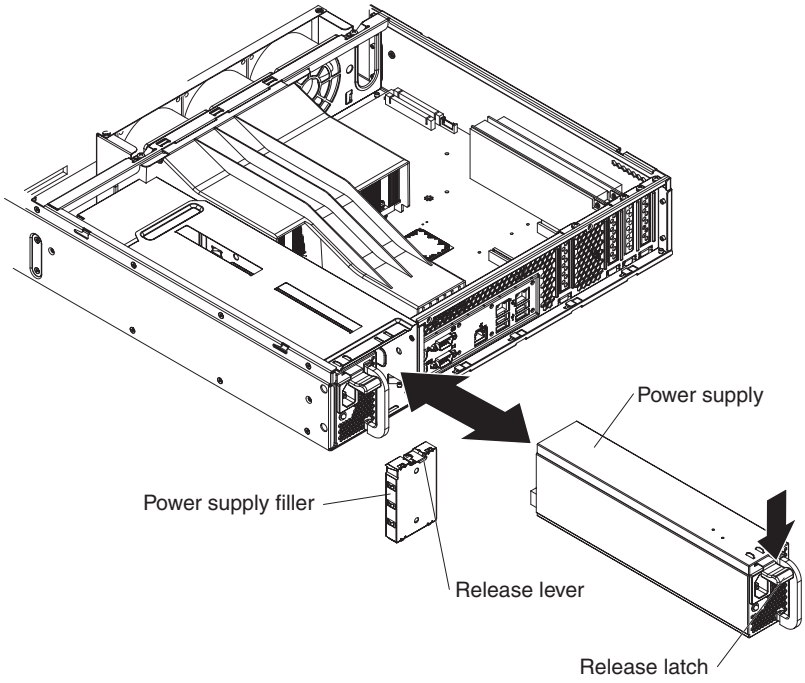
Installing a power supply

The server supports a maximum of two power supplies.

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.

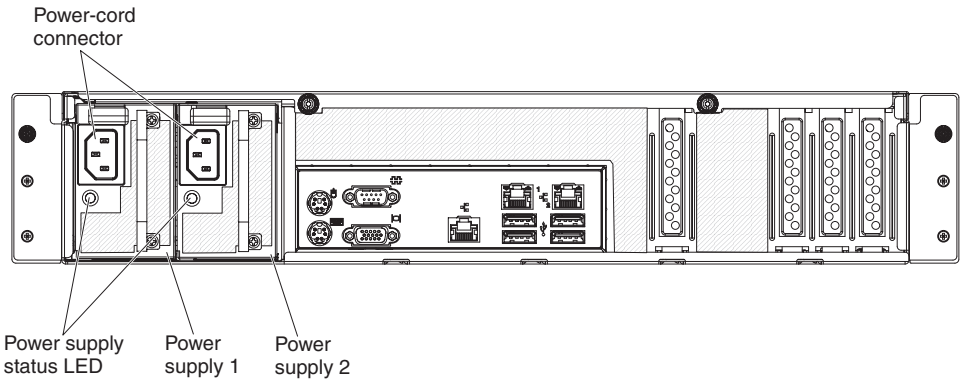


Attention: During normal operation, each power-supply bay must have either a power supply or power-supply blank installed for proper cooling.

To install a power supply, complete the following steps:

1. Slide the power supply into the bay until the retention latch clicks into place.
2. Connect the power cord for the new power supply to the power-cord connector on the power supply.

   The following illustration shows the power-supply connectors on the back of the server.



3. Route the power cord through the power-supply handle and through any cable clamps on the rear of the server, to prevent the power cord from being accidentally pulled out when you slide the server in and out of the rack.
4. Connect the power cord to a properly grounded electrical outlet.
5. Make sure that the power supply status LED on the power supply is lit and is green, indicating that the power supply is operating correctly.

Removing the battery

The following notes describe information that you must consider when replacing 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.

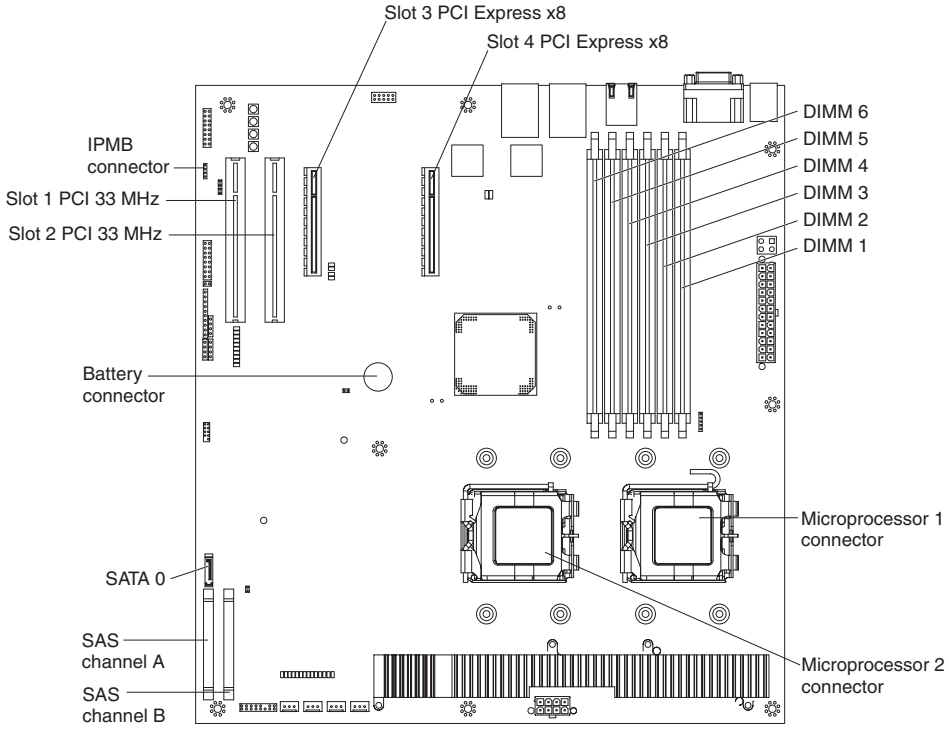
Do not:

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

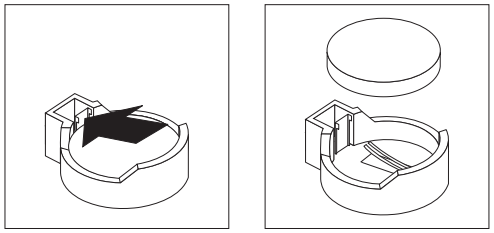
Dispose of the battery as required by local ordinances or regulations.

To remove the battery, complete the following steps:

1. Read the safety information that begins on page vii and “Installation guidelines” on page 43.
2. Follow any special handling and installation instructions that come with the battery.
3. Turn off the server and peripheral devices, and disconnect the power cord and all external cables.
4. Pull the server out of the rack.
5. Remove the cover (see “Removing the cover” on page 46).
6. Disconnect any internal cables, as necessary.
7. Remove any adapters as necessary.
8. Locate the battery on the system board.



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



10. Dispose of the battery as required by local ordinances or regulations. See “Battery return program” on page 118 for more information.

Installing the battery

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

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

Statement 2:

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

Do not:

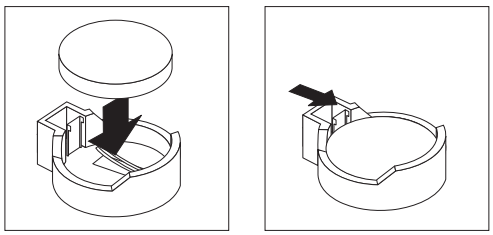
- **Throw or immerse into water**
- **Heat to more than 100°C (212°F)**
- **Repair or disassemble**

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

See “Battery return program” on page 118 for more information.

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:
   a. Orient the battery so that the positive side faces up.
   b. Tilt the battery so that you can insert it into the socket on the side opposite the battery clip.
   c. Press the battery down into the socket until it clicks into place. Make sure that the battery clip holds the battery securely.



3. Reinstall any adapters that you removed.
4. Reconnect the internal cables that you disconnected.
5. Install the cover (see “Installing the cover” on page 46).
6. Slide the server into the rack and tighten the rack release thumbscrews.

7. Reconnect the external cables; then, reconnect the power cords and turn on the peripheral devices and the server.

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

   See “Using the BIOS Setup Utility program” on page 16 for details.

Removing and replacing Tier 2 CRUs

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

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

Removing a fan

Attention: To ensure proper server operation, if a fan fails, replace it as soon as possible.

To replace a fan, replace the fan-bracket assembly. See “Removing the fan-bracket assembly” on page 67.

Installing a fan

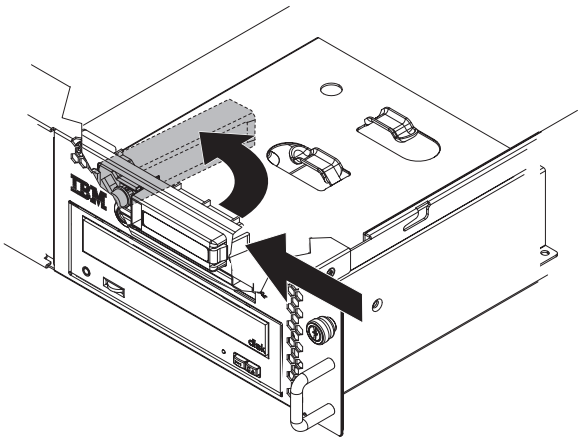
For proper cooling, the server requires that all three fans are functioning.

Attention: To ensure proper server operation, if a fan fails, replace it as soon as possible.

To replace a fan, replace the fan-bracket assembly. See “Removing the fan-bracket assembly” on page 67 and “Installing the fan-bracket assembly” on page 68.

Removing the operator information panel assembly

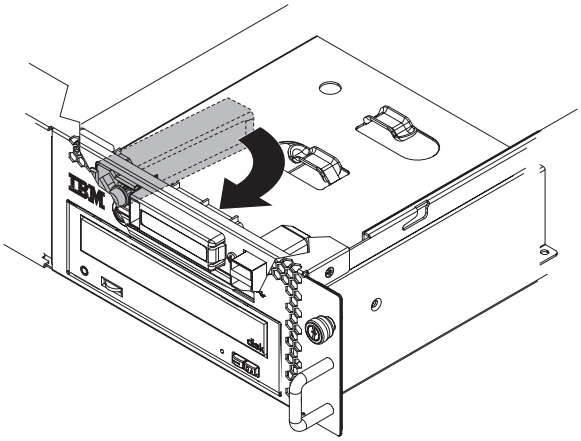
The operator information panel is on top of the DVD enclosure. To remove the operator information panel assembly, complete the following steps.



1. Read the safety information that begins on page vii and “Installation guidelines” on page 43.
2. Turn off the server and peripheral devices, and disconnect the power cord and all external cables.
3. Remove the cover (see “Removing the cover” on page 46).
4. Disconnect the operator-information panel cables from the system board and remove them from the clips that are on top of the DVD drive cage assembly.
5. From inside the server, press the release-latch on the operator information panel assembly toward the left side of the server and rotate the assembly toward the inside of the server.
6. Pull the assembly away from the front of the server and lift it out of the server.
7. If you are instructed to return the operator information panel assembly, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the operator information panel assembly

To install the replacement operator information panel assembly, complete the following steps.



1. From the inside of the server, insert the tab on the left end of the operator panel assembly into the left side of the opening in the inside front of the server.

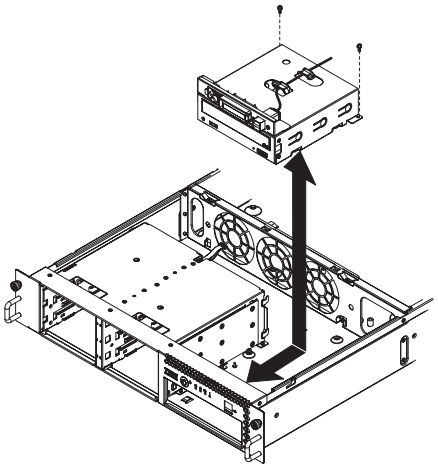
2. Rotate the operator panel assembly into the opening in the front of the server until it clicks into place.
3. Place the cables through the clips that are on top of the DVD drive cage assembly, then route them in front of the fans and connect them to the system board. See “System-board internal cable connectors” on page 9 for the connector location.
4. Install the cover (see “Installing the cover” on page 46).
5. Slide the server into the rack and tighten the rack release thumbscrews.
6. Reconnect the external cables; then, reconnect the power cords and turn on the peripheral devices and the server.

Removing the front USB connectors

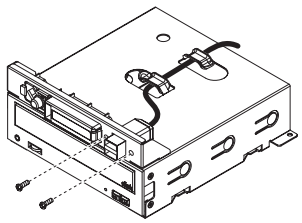
The front USB connectors are on top of the DVD drive cage assembly.

To remove the front USB connectors, complete the following steps:

1. Read the safety information that begins on page vii and “Installation guidelines” on page 43.
2. Turn off the server and peripheral devices, and disconnect the power cord and all external cables.
3. Remove the cover (see “Removing the cover” on page 46).
4. Remove the fan-bracket assembly (see “Removing the fan-bracket assembly” on page 67).
5. Remove the DVD drive cage assembly.



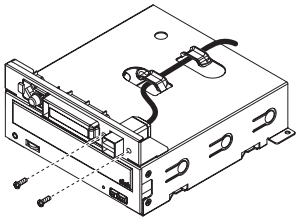
   a. Disconnect the cables from the rear of the drive.
   b. Remove the screws that secure the drive enclosure to the chassis.
   c. Slide the drive enclosure toward the rear of the server slightly; then, lift the drive enclosure out of the server.



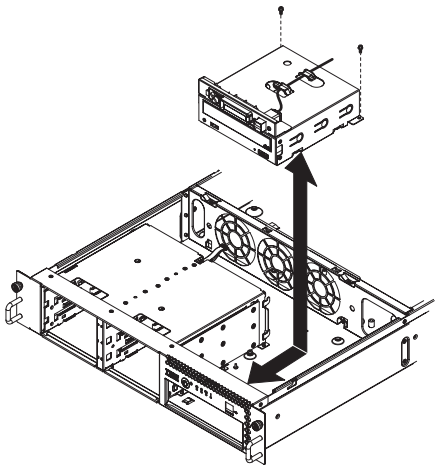
6. Remove the screws that secure the front USB connectors to the DVD drive cage assembly.
7. Disconnect the USB cables from the system board and remove them from the clips that are on top of the DVD drive cage assembly.
8. Lift the USB connectors off the CD/DVD drive cage assembly.
9. If you are instructed to return the USB connector assembly, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the front USB connectors

To install the replacement front USB connectors, complete the following steps.



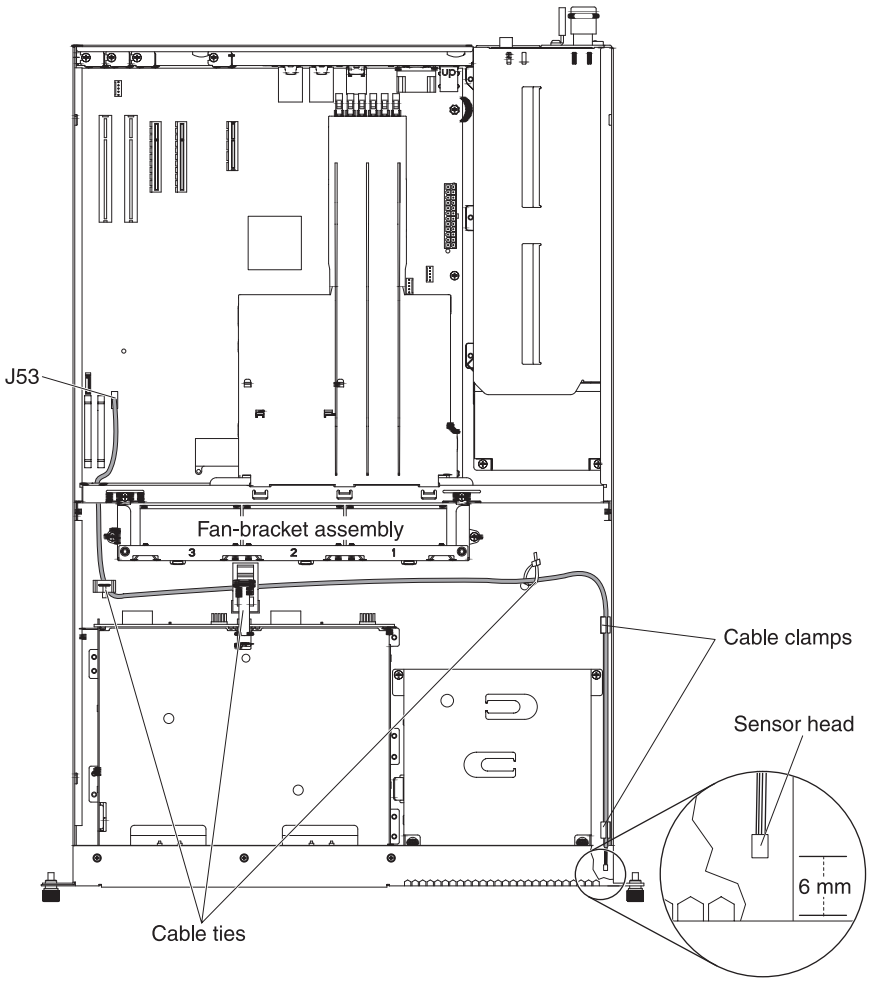
1. Align the front USB connectors with the opening in the flange on top of the DVD drive cage assembly.
2. Attach the screws that secure the front USB connectors to the DVD drive cage assembly.
3. Place the cables through the clips that are on top of the DVD drive cage assembly
4. Install the DVD drive cage assembly into the server.



   a. Lower the drive-cage enclosure into the server; then, slide the enclosure toward the front of the server until it is flush with the front of the chassis.
   b. Replace the screws that secure the drive-cage enclosure to the chassis.
5. Install the fan-bracket assembly (see “Installing the fan-bracket assembly” on page 68).
6. Route the USB cables in front of the fans and connect them to the system board. See “System-board internal cable connectors” on page 9 for the connector location.
7. Install the cover (see “Installing the cover” on page 46).
8. Slide the server into the rack and tighten the rack release thumbscrews.

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

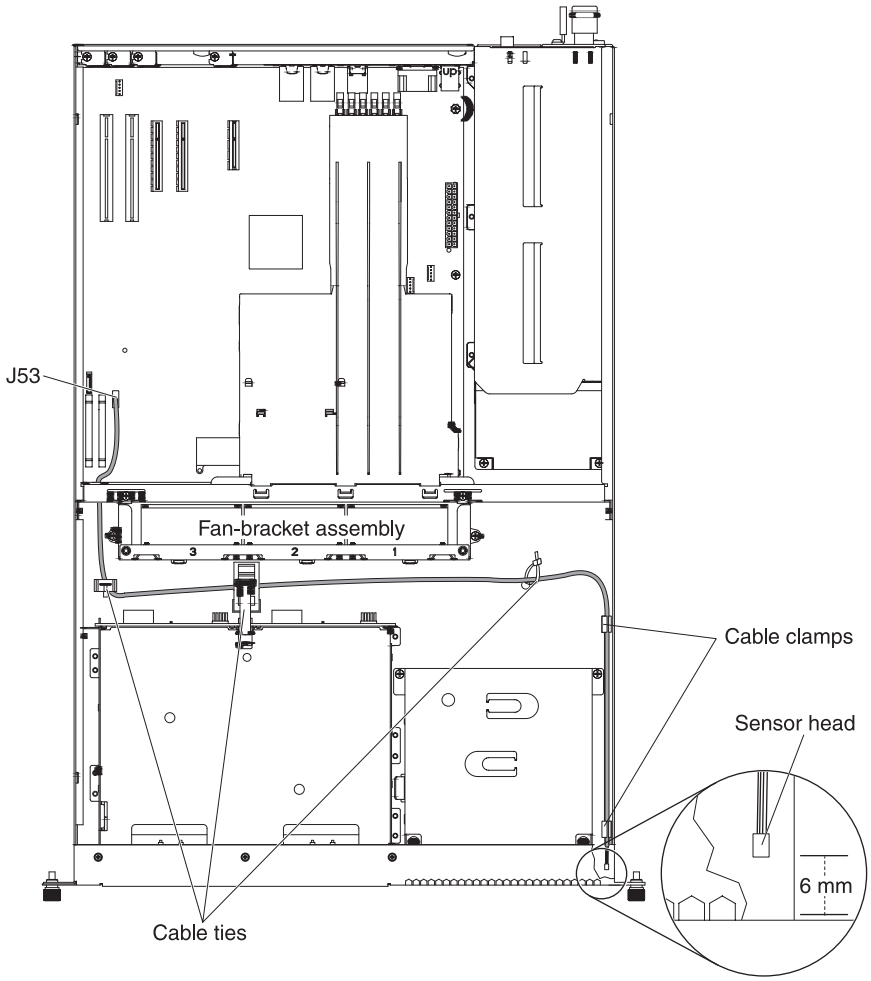
Removing the thermal-sensor cable



To remove the thermal-sensor cable, complete the following steps:

1. Read the safety information that begins on page vii and “Installation guidelines” on page 43.
2. Turn off the server and peripheral devices, and disconnect the power cord and all external cables.
3. Remove the cover (see “Removing the cover” on page 46).
4. Disconnect the thermal-sensor cable from the connector on the system board. See “System-board internal cable connectors” on page 9 for the connector location.
5. Gently pull the cable toward the front of the server, through the opening in the fan wall.
6. Release the cable from the cable ties and cable clips (in front of the fan-bracket assembly, and on the right side of the server); then, lift the cable out of the server.

Installing the thermal-sensor cable



To install the thermal-sensor cable, complete the following steps:

1. Orient the cable so that the sensor head is toward the front of the server.
2. Route the cable as shown in the illustration.

   Important:

   a. Thread the cable toward the front of the chassis, sensor head first, through the two cable clips on the right side of the server chassis.

   b. Make sure that the sensor head of the cable stops approximately 6 mm (0.25 inches) from the front of the chassis and *does not touch the front of the chassis*.

   c. Use the cable ties in front of the fan-bracket assembly to secure the thermal cable.

   d. Thread the connector end of the cable through the opening in the fan wall.
3. Connect the cable to the thermal-cable connector (J53, near the SAS channel B connector) on the system board. See “System-board internal cable connectors” on page 9 for the connector location.
4. Install the cover (see “Installing the cover” on page 46).
5. Slide the server into the rack and tighten the rack release thumbscrews.
6. Reconnect the external cables; then, reconnect the power cords and turn on the peripheral devices and the server.

Removing and replacing FRUs

FRUs must be installed only by trained service technicians.

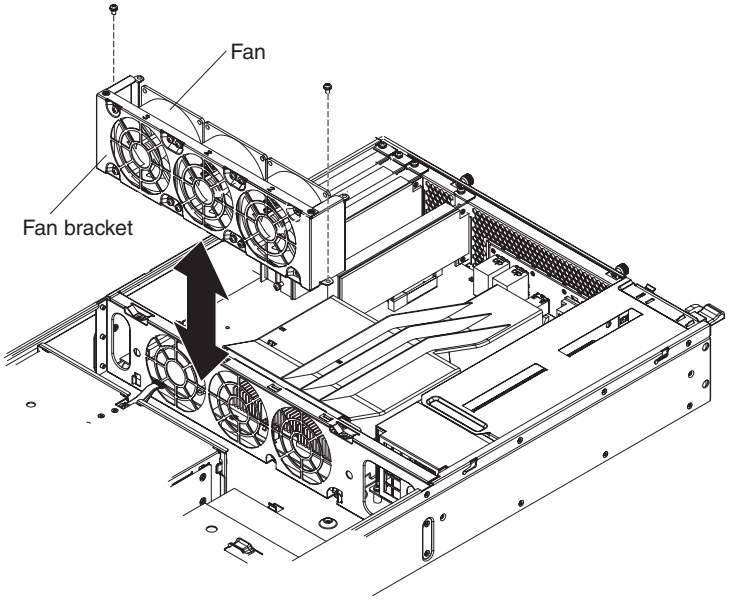
The illustrations in this document might differ slightly from the hardware.

Removing the fan-bracket assembly

To replace some components, such as the DVD drive, you must remove the fan-bracket assembly; to route some cables, you might have to remove the fan-bracket assembly.

Note: To remove or install a fan, remove the fan-bracket assembly. To install a replacement fan, install a replacement fan-bracket assembly. See “Removing a fan” on page 61 and “Installing a fan” on page 61.

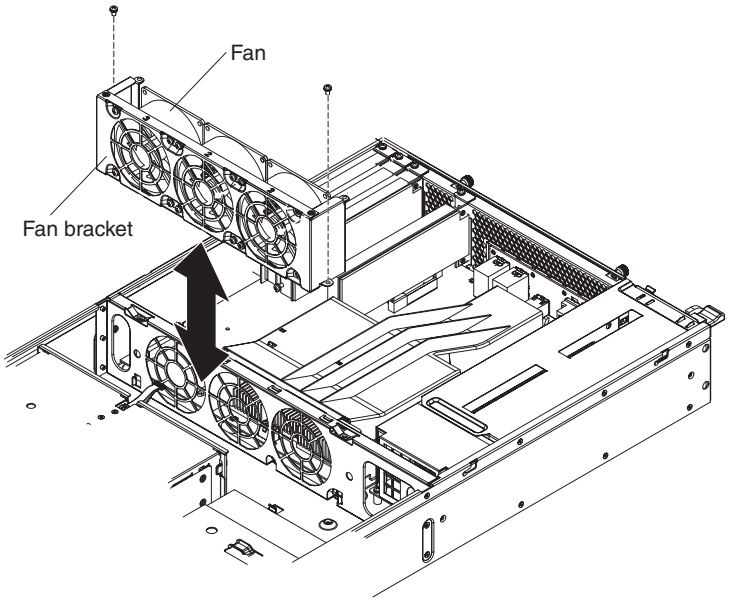
To remove the fan-bracket assembly, complete the following steps.



1. Read the safety information that begins on page vii and “Installation guidelines” on page 43.
2. Turn off the server and peripheral devices and disconnect all power cords and external cables.
3. Remove the cover (see “Removing the cover” on page 46).
4. Remove the screws that secure the fan-bracket assembly to the chassis.
5. Lift the fan-bracket assembly out of the chassis.
6. If you are instructed to return the fan-bracket assembly, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the fan-bracket assembly

To install the fan-bracket assembly, complete the following steps.



1. Align the fan-bracket assembly with the assembly location on the chassis.
2. Lower the fan-bracket assembly into the chassis.
3. Replace the screws that secure the fan-bracket assembly to the chassis.
4. Install the cover (see “Installing the cover” on page 46).
5. Slide the server into the rack and tighten the rack release thumbscrews.
6. Reconnect the external cables; then, reconnect the power cords and turn on the peripheral devices and the server.
7. Check the system-error LED and the fan error LED on the operator information panel.

Table 10.

Fan error LED	System-error LED	Meaning
On	Any condition	1. The replacement fan-bracket assembly might be faulty; install a different one. 2. (Trained service technician only) replace the system board.
Off	On	Check the LEDs on the system board (see “System-board LEDs” on page 12). An error LED (amber) that is lit on the system board or an LED on the hard disk drive backplane or system board that is off when it should be on can help isolate the error. See Chapter 5, “Diagnostics,” on page 83.

Table 10. (continued)

Fan error LED	System-error LED	Meaning
Off	Off	You have completed this procedure. If you have no other components to replace, complete the following steps: 1. Replace the air duct (see “Installing the air duct” on page 48). 2. Install the cover (see “Installing the cover” on page 46). 3. Slide the server into the rack and tighten the rack release thumbscrews. 4. Reconnect the external cables; then, reconnect the power cords and turn on the peripheral devices and the server.

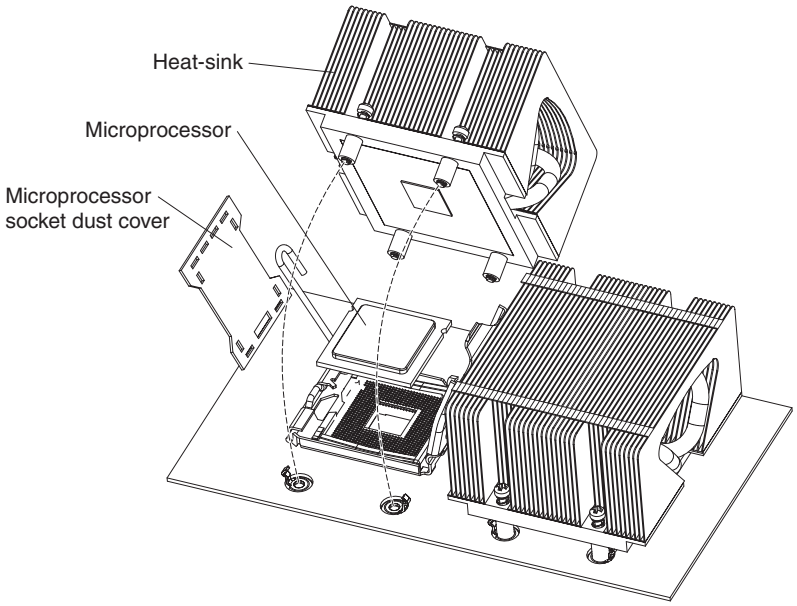
Removing a microprocessor

Attention:

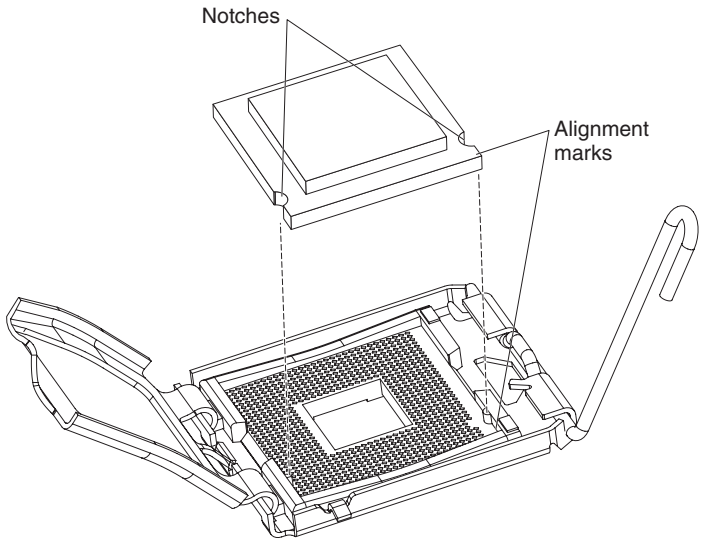
- Do not allow the thermal grease on the microprocessor and heat sink to come in contact with anything. Contact with any surface can compromise the thermal grease and the microprocessor socket.
- Dropping the microprocessor during installation or removal can damage the contacts.
- Do not touch the microprocessor contacts; handle the microprocessor by the edges only. Contaminants on the microprocessor contacts, such as oil from your skin, can cause connection failures between the contacts and the socket.

To remove a microprocessor, complete the following steps:

1. Read the safety information that begins on page vii and “Installation guidelines” on page 43.
2. Turn off the server and peripheral devices, and disconnect the power cord and all external cables.
3. Remove the cover (see “Removing the cover” on page 46).
4. Remove the air duct (see “Removing the air duct” on page 47).



5. Unscrew the screws that secure the heat sink to the planar.
6. Lift the heat sink out of the server.



7. Open the microprocessor release latch to the fully-open position.
8. Open the microprocessor bracket frame.
9. Carefully remove the microprocessor.
10. If you are instructed to return the microprocessor, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing a microprocessor

For information about the type of microprocessor that the server supports and other information that you must consider when installing a microprocessor, see the *User's Guide* on the IBM *System x Documentation* CD.

Important: Dual-core and quad-core microprocessors are not interchangeable and cannot be used in the same server. For example, if the server has a dual-core microprocessor, you cannot install a quad-core microprocessor as the second microprocessor. Use the BIOS Setup Utility program to determine the type and speed of the microprocessor that is currently installed in the server.

At the time of this publication, the following IBM System x3610 server models come with quad-core microprocessors:

- 7942 - 42x
- 7942 - 62x

Read the documentation that comes with the microprocessor to determine whether you must update the basic input/output system (BIOS) code. To download the most current level of BIOS code, complete the following steps:

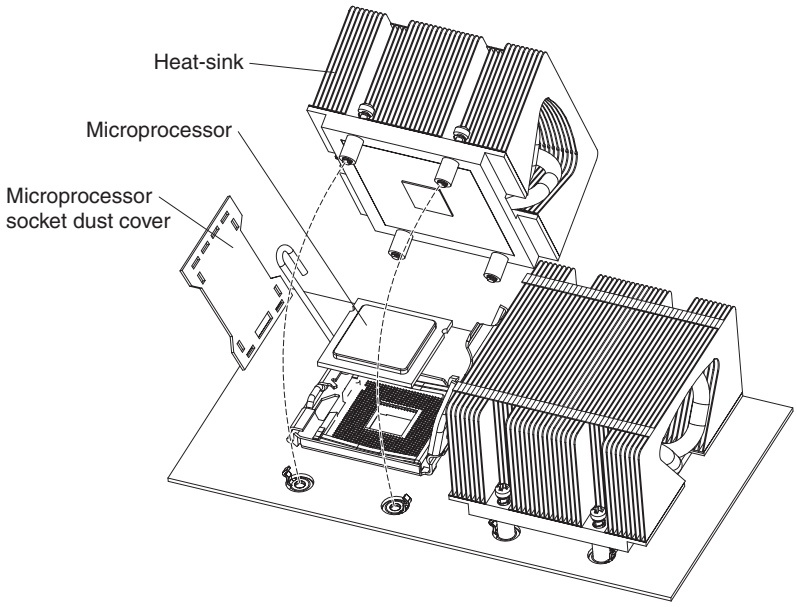
1. Go to http://www.ibm.com/systems/support/.
2. Under **Product support**, click **System x**.
3. Under **Popular links**, click **Software and device drivers**.
4. Click **System x3610** to display the matrix of downloadable files for the server.

Attention:

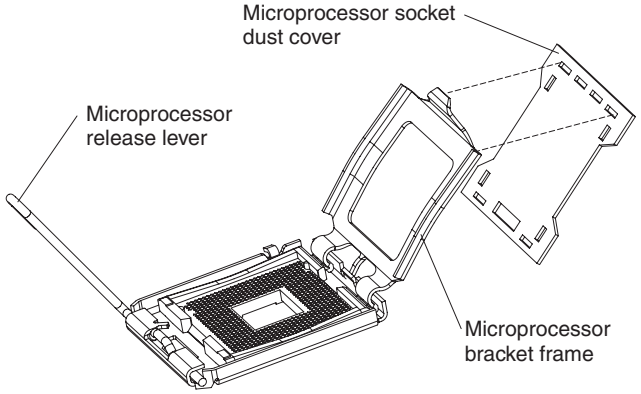
- A startup (boot) microprocessor must always be installed in microprocessor connector 1 on the system board.
- To ensure correct server operation, use microprocessors that have the same cache size and type, front-side bus frequency, and clock speed. Microprocessor internal and external clock frequencies must be identical.
- If you are installing a microprocessor that has been removed, make sure that it is paired with its original heat sink or a new replacement heat sink. Do not reuse a heat sink from another microprocessor; the thermal grease distribution might be different and might affect conductivity.

To install a new or replacement microprocessor, complete the following steps. The following illustration shows how to install microprocessor 2 on the system board.

Note: For simplicity, certain components are not shown in this illustration.



1. Touch the static-protective package containing the microprocessor to any unpainted metal surface on the server. Then, remove the microprocessor from the package.

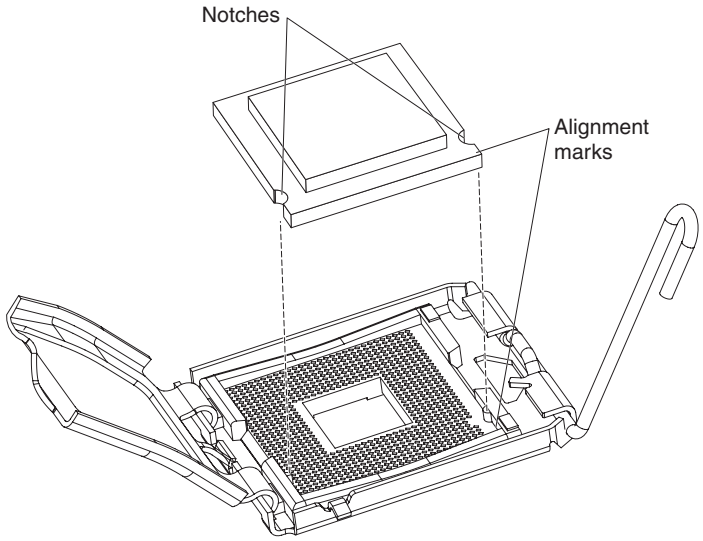


2. Remove the protective dust cover, tape, or label from the surface of the microprocessor socket, if present.

3. Rotate the microprocessor release lever on the socket from its closed and locked position until it stops in the fully open position.
4. Lift the microprocessor bracket frame to the open position.

   Attention:

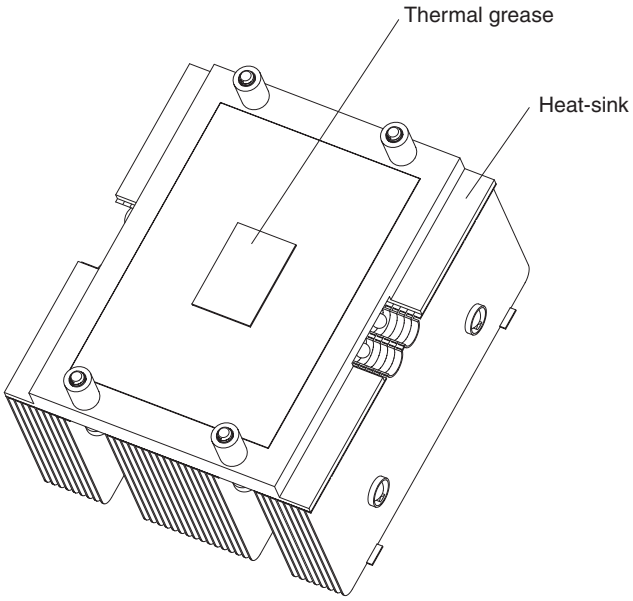
   - Handle the microprocessor carefully. Dropping the microprocessor during installation or removal can damage the contacts. Also, contaminants on the microprocessor contacts, such as oil from your skin, can cause connection failures between the contacts and the socket.
   - Do not use excessive force when you press the microprocessor into the socket.
   - Make sure that the microprocessor is oriented and aligned and positioned in the socket before you try to close the lever.



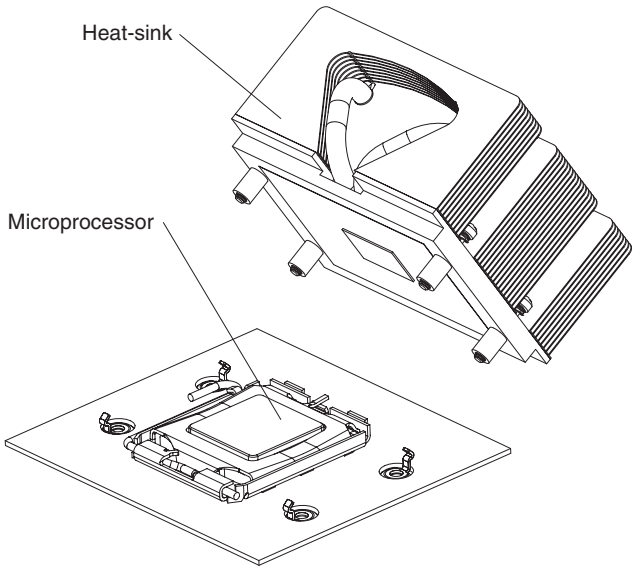
5. Align the microprocessor with the socket (note the alignment mark and the position of the notches); then, carefully place the microprocessor on the socket. Close the microprocessor bracket frame.

   Note: The microprocessor fits only one way on the socket.
6. Carefully close the microprocessor release lever to secure the microprocessor in the socket.
7. Install a heat sink on the microprocessor.

Attention: Do not touch the thermal grease on the bottom of the heat sink or set down the heat sink after you remove the plastic cover. Touching the thermal grease will contaminate it.



a. Remove the plastic protective cover from the bottom of the heat sink.
b. Align the heat sink above the microprocessor with the thermal grease side down.

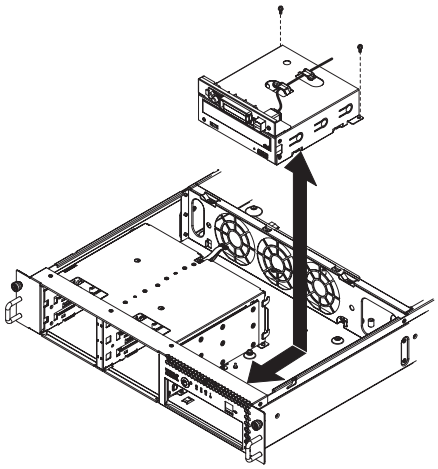


c. Press down firmly on the heat sink until it is seated securely.
d. Tighten the screws that secure the heat sink to the system board.

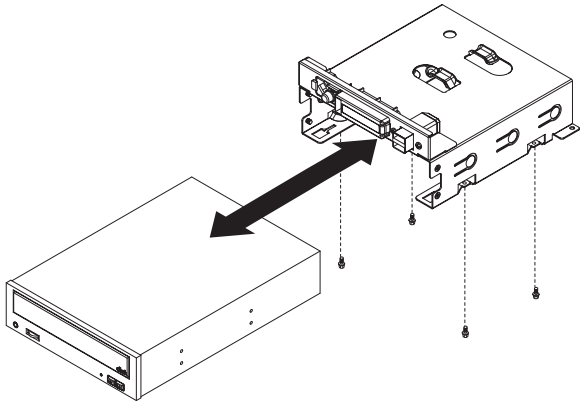
8. Replace the air duct (see “Installing the air duct” on page 48).
9. Install the cover (see “Installing the cover” on page 46).
10. Slide the server into the rack and tighten the rack release thumbscrews.
11. Reconnect the external cables; then, reconnect the power cords and turn on the peripheral devices and the server.

Removing a DVD drive

To remove the DVD drive, complete the following steps.



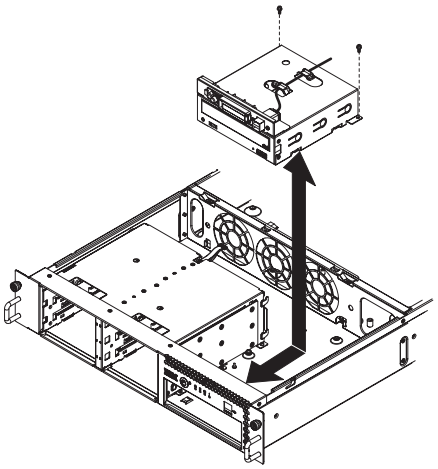
1. Read the safety information that begins on page vii and “Installation guidelines” on page 43.
2. Turn off the server and peripheral devices and disconnect all power cords and external cables.
3. Pull the server out of the rack; then, remove the cover (see “Removing the cover” on page 46).
4. Disconnect the cables from the rear of the drive. You might also want to disconnect the cables for the operator information panel and front Ethernet connectors from the system board.
5. Remove the two screws that secure the drive enclosure to the chassis.
6. Slide the drive enclosure toward the rear of the server slightly; then, lift the drive enclosure out of the server.



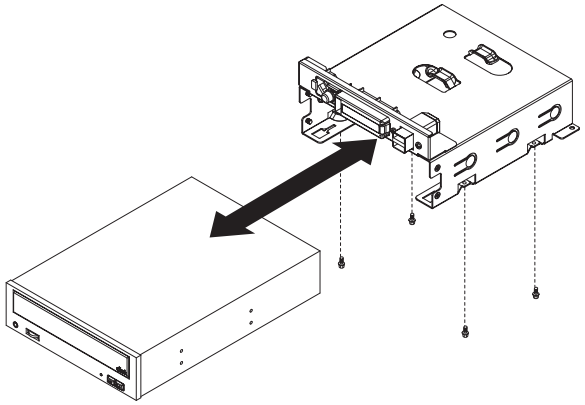
7. Remove the four screws that secure the drive to the enclosure; then, remove the drive from the enclosure.
8. If you are instructed to return the DVD drive, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing a DVD drive

To install the replacement DVD drive, complete the following steps.



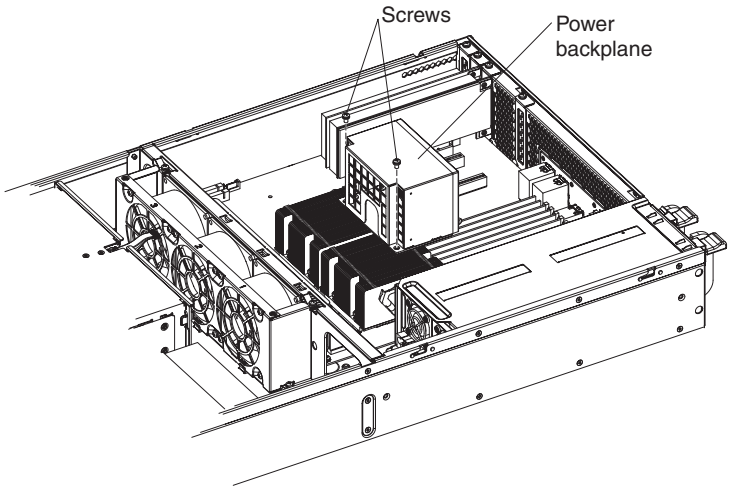
1. Follow the instructions that come with the drive to set any jumpers or switches.



2. Place the drive in the drive-cage enclosure. Replace the four screws that hold the drive in place.
3. Lower the drive-cage enclosure into the server; then, slide the enclosure toward the front of the server until it is flush with the front of the chassis.
4. Replace the two screws that secure the drive-cage enclosure to the chassis.
5. Reconnect the cables that you disconnected in “Removing a DVD drive” on page 74. Be sure to connect the SATA cable to the SATA 4 connector on the system board (see “System-board optional-device connectors” on page 8 for the location of the SATA connectors).
6. Install the cover (see “Installing the cover” on page 46).
7. Slide the server into the rack and tighten the rack release thumbscrews.
8. Reconnect the external cables; then, reconnect the power cords and turn on the peripheral devices and the server.

Removing the power backplane

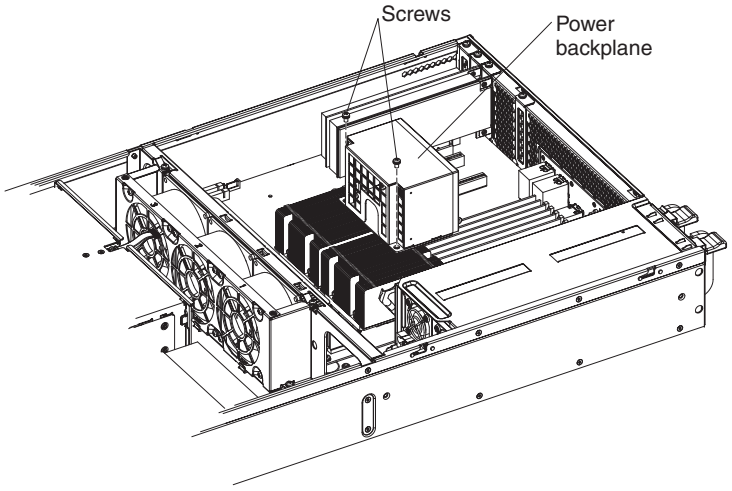
To remove the power backplane, complete the following steps.



1. Read the safety information that begins on page vii and “Installation guidelines” on page 43.
2. Turn off the server and peripheral devices, and disconnect the power cord and all external cables.
3. Remove the cover (see “Removing the cover” on page 46).
4. Remove the power supplies from the power-supply bays (see “Removing a power supply” on page 54).
5. Make note of the routing for all power backplane cables; then, disconnect all power backplane cables from the system board and other components.
6. Remove the system board (see “Removing the system board” on page 80).
7. Remove the screws that secure the power backplane to the chassis; then, grasp the power backplane and slide it toward the left side of the server.
8. Lift the power backplane out of the server.
9. If you are instructed to return the backplane, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the power backplane

To install the power backplane, complete the following steps.



1. Place the power backplane behind the fan assembly; then, slide the power backplane toward the right side of the server until the power backplane aligns with the power-supply enclosure.
2. Align the screw holes in the power backplane with the holes in the bottom of the chassis; then, replace the screws that secure the power backplane to the bottom of the chassis.
3. Install the system-board (see “Installing the system board” on page 81).
4. Connect the cables from the power backplane to the following locations:

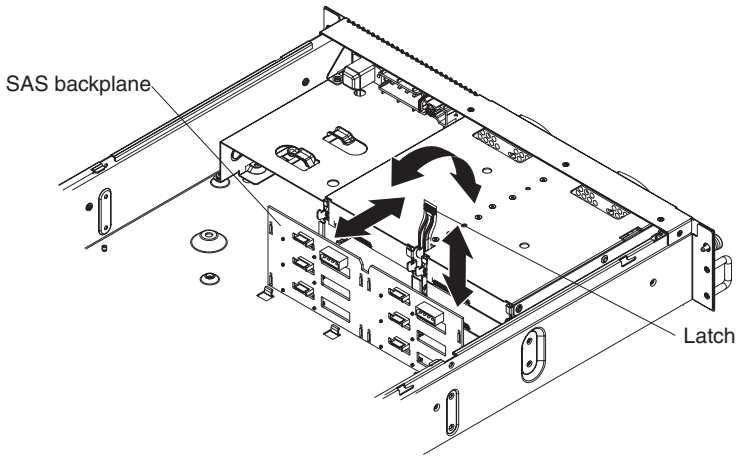
Table 11. Power backplane cable connections

Location	Cable to connector
System board	P1 to J31
	P2 to J39
	P3 to J14
	P8 to J50
Hard disk drive backplane	P4 to J18 (power for the left side of the hard disk drive backplane)
	P5 to J19 (power for the right side of the hard disk drive backplane)
Optical drive (CD/DVD drive)	P7 to rear of CD/DVD drive

   Be sure to route and secure the cables using the cable ties and bridges located along each cable route.
5. Install the cover (see “Installing the cover” on page 46).
6. Install the power supplies into the power-supply bays (see “Installing a power supply” on page 55).
7. Slide the server into the rack and tighten the rack release thumbscrews.
8. Reconnect the external cables; then, reconnect the power cords and turn on the peripheral devices and the server.

Removing the hot-swap hard disk drive backplane

To remove the hot-swap hard disk drive backplane, complete the following steps.

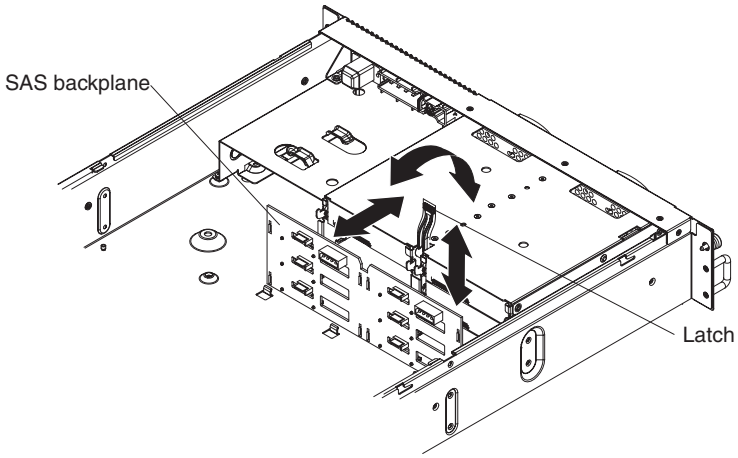


1. Read the safety information that begins on page vii and “Installation guidelines” on page 43.

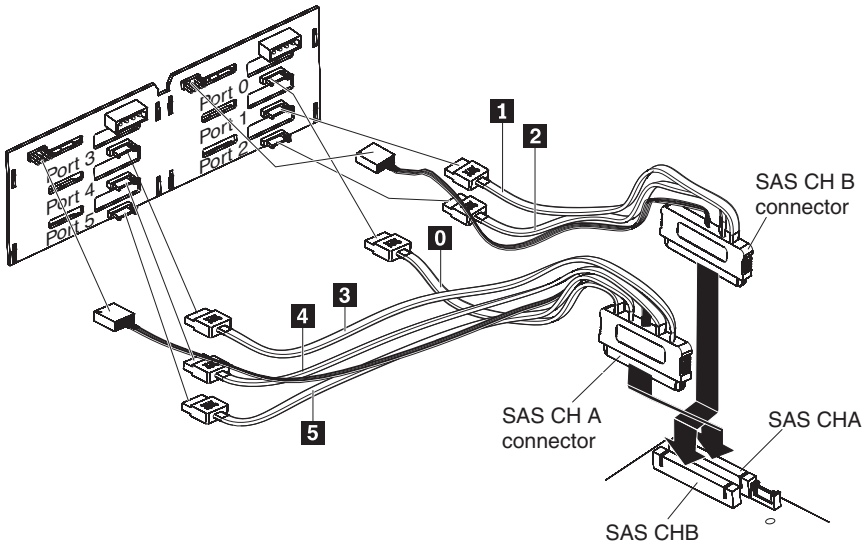
2. Turn off the server and peripheral devices, and disconnect the power cord and all external cables.
3. Pull the hard disk drives out of the server slightly to disengage them from the backplane.
4. Remove the cover (see “Removing the cover” on page 46).
5. Remove the fan-bracket assembly (see “Removing the fan-bracket assembly” on page 67).
6. Disconnect the backplane cables.
7. Lift the blue backplane retention latch.
8. Pull the backplane toward the rear of the server slightly, to disengage the tabs on the drive cage from the slots on the backplane.
9. Lift the backplane out of the server.
10. If you are instructed to return the backplane, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the hot-swap hard disk drive backplane

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



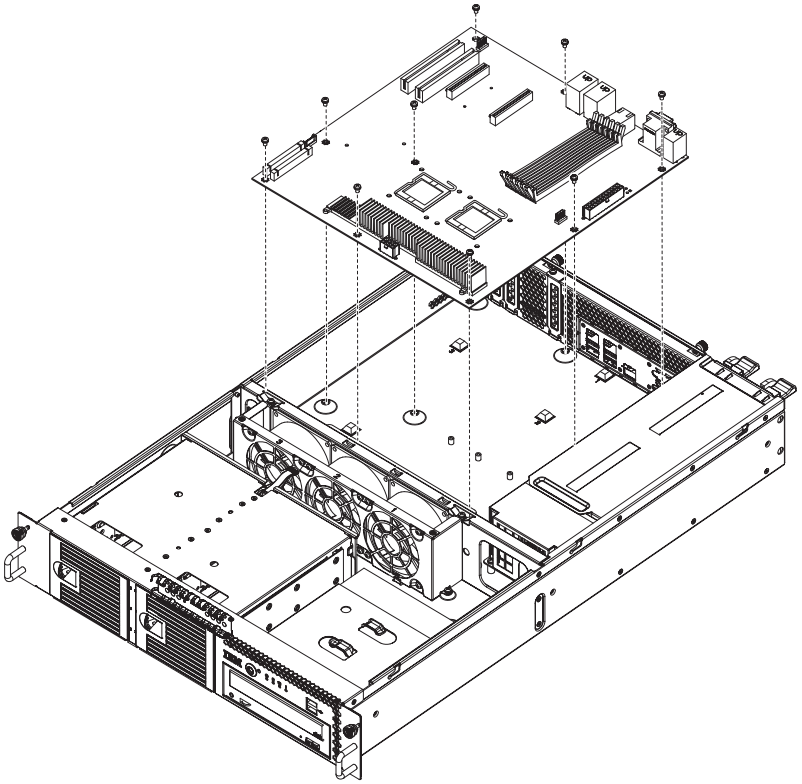
1. Orient the replacement hard disk drive backplane so that the connectors for the hard disk drives face the front of the server.
2. Engage the slots on the backplane with the tabs on rear of the drive cage; then, gently press the backplane against the drive cage until the backplane is flush against the drive cage.
3. Rotate the blue backplane retention latch until it secures the backplane in place.



4. Connect the SAS power and signal cables to the backplane as shown in the illustration. Each signal cable has a numbered label on it. Be sure to connect the cable that is labeled “0” to port 0 on the backplane, cable “1” to port 1, and so on.
5. Route the other end of the cables along the front of the fans to the left side of the server and through the opening in the fan bracket assembly to the SAS connectors on the system board. See “System-board optional-device connectors” on page 8 for the locations of the SAS channel A and SAS channel B connectors on the system board.
6. Connect the SAS CH A cable connector to the SAS CHA connector on the system board. Connect the SAS CH B cable connector to the SAS CHB connector on the system board. Note that you must cross the cables to connect them to the correct system-board connectors.
7. Replace the fan bracket assembly (see “Installing the fan-bracket assembly” on page 68).
8. Install the cover (see “Installing the cover” on page 46).
9. Slide the server into the rack and tighten the rack release thumbscrews.
10. Insert the hard disk drives into the bays.
11. Reconnect the external cables; then, reconnect the power cords and turn on the peripheral devices and the server.

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 43.
2. Turn off the server, and disconnect all power cords and external cables.
3. Remove the server cover (see “Removing the cover” on page 46).

   Note: When you replace the system board, you must either update the server with the latest firmware or restore the pre-existing firmware that the customer provides on a diskette or CD image. Make sure that you have the latest firmware or a copy of the pre-existing firmware before you proceed.
4. Remove the air duct (see “Removing the air duct” on page 47).
5. Remove all adapters and place them on a static-protective surface for reinstallation

   Important: Note which DIMMs are in which connectors, before you remove the DIMMs. You must install them in the same configuration on the replacement system board.
6. Remove all DIMMs, and place them on a static-protective surface for reinstallation (see “Removing a memory module (DIMM)” on page 52).
7. Disconnect all cables from the system board.

   Attention: In the following step, do not allow the thermal grease to come in contact with anything, and keep each heat sink paired with its microprocessor for reinstallation. Contact with any surface can compromise the thermal grease and the microprocessor socket; a mismatch between the microprocessor and its original heat sink can require the installation of a new heat sink instead.

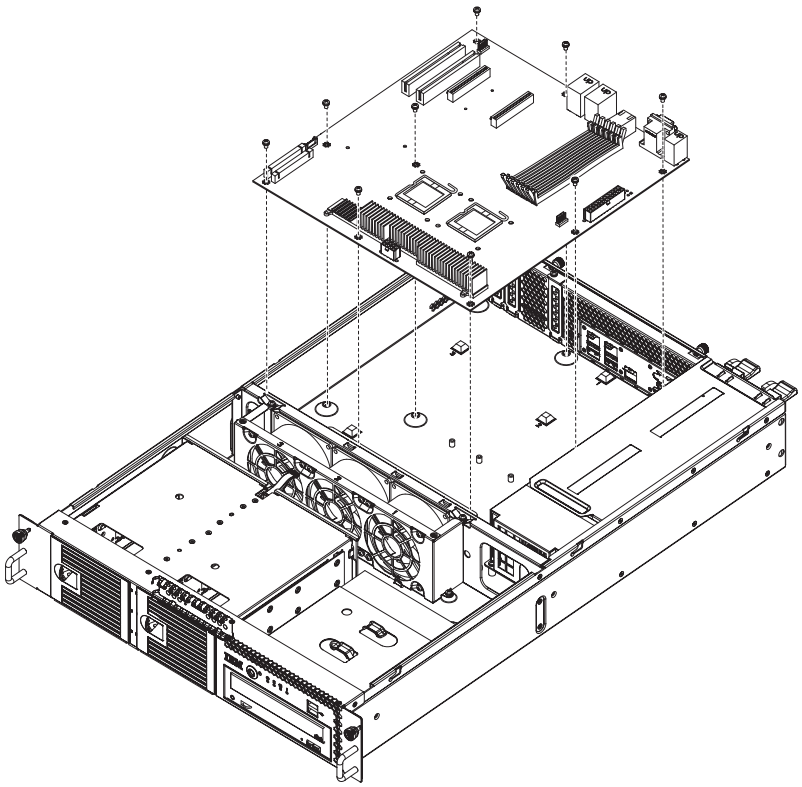
8. Remove each microprocessor heat sink and microprocessor; then, place them on a static-protective surface for reinstallation (see “Removing a microprocessor” on page 69).
9. Remove the remaining 9 screws that secure the system board to the chassis.
10. Lift the system board out of the server.
11. If 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

Notes:

1. When you reassemble the components in the server, be sure to route all cables carefully so that they are not exposed to excessive pressure.
2. When you replace the system board, you must either update the server with the latest firmware or restore the pre-existing firmware that the customer provides on a diskette or CD image.

To reinstall the system board, complete the following steps.



1. Lower the system board into the server; then, align the screw holes in the system board with the holes in the chassis bottom.
2. Replace the 9 screws that secure the system board to the chassis.
3. Install each microprocessor with its matching heat sink (see “Installing a microprocessor” on page 70).
4. Reconnect to the system board the cables that you disconnected in step 7 of “Removing the system board” on page 80.
5. Install the DIMMs (see “Installing a memory module” on page 52).
6. Install the air duct.

7. Install all adapters.
8. Install the fan-bracket assembly.
9. Install the cover (see “Installing the cover” on page 46).
10. Slide the server into the rack and tighten the rack release thumbscrews.
11. Reconnect the external cables; then, reconnect the power cords and turn on the peripheral devices and the server.

Important: Either update the server with the latest SAS firmware or restore the pre-existing firmware from a diskette or CD image.

Chapter 5. Diagnostics

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

If you cannot locate and correct the problem using the information in this chapter, see Appendix A, “Getting help and technical assistance,” on page 113 for more information.

Diagnostic tools

The following tools are available to help you diagnose and solve hardware-related problems:

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

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

  These tables list problem symptoms and actions to correct the problems. See “Troubleshooting tables” on page 93.
- **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 provided on the *System Diagnostics* CD. See “Diagnostic programs and messages” on page 105 for more information.

POST

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

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

If POST is completed without detecting any problems, two beeps sound, and the server startup is completed.

If POST detects a problem, other beeps might sound, or no beeps, or an error message is displayed. See “POST beep codes” and “POST error codes” on page 88 for more information.

POST beep codes

A beep code is a series of short beeps that sounds either during or after POST. A beep code other than two beeps indicates that POST has detected a problem. To determine the meaning of a beep code, see “Beep code descriptions.” If no beep code sounds, see “Solving undetermined problems” on page 110.

Beep code descriptions

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

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

Exception: If there are multiple error codes or LEDs that indicate a microprocessor error, the error might be in the microprocessor or in the microprocessor socket. See "Microprocessor problems" on page 99 for information about diagnosing microprocessor problems.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing, Type 7942 server," on page 37 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 beep	Memory refresh timer failed.	1. Reseat the DIMMs. 2. Replace the following components, one at a time, in the order shown, restarting the server each time: a. DIMMs b. (Trained service technician only) System board (Trained service technician only) Replace the system board.
2 beeps	The server has successfully completed POST.	None
3 beeps	Base memory read/write test error. A memory failure occurred within the first 64K of memory.	1. Reseat the DIMMs. 2. Replace the following components, one at a time, in the order shown, restarting the server each time: a. DIMMs, starting with the lowest-numbered DIMMs first. b. (Trained service technician only) System board
4 beeps	CMOS write/read test failed.	1. Reseat the battery. 2. Clear CMOS memory. See "System-board switches" on page 11 for information about how to clear CMOS memory. 3. Load the default BIOS settings: a. Start the BIOS Setup Utility program and select **Exit**. b. Select **Load Default Setting**. c. Select **Save Changes and Exit**. 4. Replace the following components one at a time, in the order shown, restarting the server each time: a. Battery b. (Trained service technician only) System board

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing, Type 7942 server," on page 37 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
5 beeps	Processor error.	1. Reseat the following components, one at a time, in the order shown, restarting the server each time: • (Trained service technician only) Microprocessor 2 (if installed) • (Trained service technician only) Microprocessor 1 2. Replace the following components, one at a time, in the order shown, restarting the server each time: • (Trained service technician only) Microprocessor 2 (if installed) • (Trained service technician only) Microprocessor 1 • (Trained service technician only) System board
6 beeps	Keyboard controller failed. Controller 8042 Gate A20 test failed.	1. Reseat the PS/2 keyboard cable. 2. Replace the following components, one at a time, in the order shown, restarting the server each time: a. PS/2 keyboard b. (Trained service technician only) System board
10 beeps	ROM checksum error.	1. Recover the BIOS code (see "Recovering the BIOS code" on page 107). 2. (Trained service technician only) Replace the system board.
3 short beeps, repeated endlessly	No valid memory modules were found.	1. Make sure that the memory modules in the server are supported and are installed in the arrangement indicated in "Installing a memory module" on page 52. Go to http://www.ibm.com/systems/support/ for a list of supported memory modules. 2. Reseat the memory modules. 3. Replace the memory modules. 4. (Trained service technician only) Replace the system board.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing, Type 7942 server," on page 37 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 long beep and 3 short beeps, repeated endlessly	Bad memory module or multi-bit ECC was found.	1. Make sure that the memory modules in the server are supported and are installed in the arrangement indicated in "Installing a memory module" on page 52. Go to http://www.ibm.com/systems/support/ for a list of supported memory modules. 2. Reseat the memory modules. 3. Replace the memory modules. 4. Enable the memory module (start the BIOS Setup Utility Program, click **Advanced –> Memory settings**).

Error logs

The event log contains messages that were generated during POST and all system status messages from the service processor. The BMC system event log contains monitored events, such as a threshold that is reached or a device that fails.

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

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



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

                  Sensor Number= 40
                  Event Direction/Type= 01

                  Event Data= 52 00 1A
```

The BMC 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 BMC system event log through the BIOS Setup Utility program (the menu choices are described in the *User's Guide*). When you are troubleshooting an error, be sure to clear the BMC system event log so that you can find current errors more easily.

You can view the contents of the event log and the BMC system event log from the BIOS Setup Utility program.

When you are troubleshooting PCI slots, note that the error logs report the PCI buses numerically. The numerical assignments vary depending on the configuration. You can check the assignments by running the BIOS Setup Utility program (see"Using the BIOS Setup Utility program" on page 16 for more information).

Viewing error logs from the BIOS Setup Utility program

For complete information about using the BIOS Setup Utility program, see "Using the BIOS Setup Utility program" on page 16.

To view the error logs, complete the following steps:

1. Turn on the server.
2. When the prompt `Press F1 for BIOS Setup` appears, press F1. If you have set both a user password and a supervisor password, you must type the supervisor password to access the full BIOS Setup Utility menu. If you do not type the supervisor password, a limited BIOS Setup Utility menu is available.
3. Use one of the following procedures:
   - To view the event log, select **Advanced –> Event Log Configuration –> View Event Log**.

- To view the BMC system event log, select **Advanced –> IPMI configuration –> View BMC System Event Log**.

Clearing the error logs

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

To clear the error logs, complete the following steps:

1. Turn on the server.
2. When the prompt `Press F1 for BIOS Setup` appears, press F1. If you have set both a user password and a supervisor password, you must type the supervisor password to view the error logs.
3. Use one of the following procedures:
   - To clear the event log, select **Advanced –> Event Log Configuration –> Clear Event Log**.
   - To clear the BMC system event log, select **Advanced –> IPMI configuration –> Clear BMC System Event Log**.

POST error codes

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

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing, Type 7942 server," on page 37 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
0005	CMOS checksum error	1. Run the BIOS Setup Utility program, make sure that the date and time are correct, select **Exit → Load Default Settings → Save Changes and Exit**. 2. Reseat the battery. 3. Clear CMOS memory. See "System-board switches" on page 11 for information about how to clear CMOS memory. 4. Replace the following components one at a time, in the order shown, restarting the server each time: a. Battery b. (Trained service technician only) System board

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing, Type 7942 server," on page 37 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
0009	Keyboard not found	1. Reseat the keyboard cable in the keyboard connector. 2. Make sure that the keyboard and mouse cables are not reversed. 3. Replace the following components one at a time, in the order shown, restarting the server each time: a. Keyboard b. (Trained service technician only) System board
004C	Keyboard function error	1. Reseat the keyboard cable in the keyboard connector. 2. Make sure that the keyboard and mouse cables are not reversed. 3. Replace the following components one at a time, in the order shown, restarting the server each time: a. Keyboard b. (Trained service technician only) System board
0048	Password check failed. An attempt was made to access the server with an incorrect password.	Restart the server and enter the supervisor password; then, run the BIOS Setup Utility program and change the user password.
005D	SMART command failed.	1. Run the hard disk drive diagnostics tests on the drive. 2. Reseat the following components: a. Hard disk drive b. Cable from the system board to the backplane or drive 3. Replace the following components one at a time, in the order shown, restarting the server each time: a. Hard disk drive b. Cable from the system board to the backplane or drive c. Hard disk drive backplane, if one is installed d. (Trained service technician only) System board

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing, Type 7942 server," on page 37 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
5105	Processor error.	1. (Trained service technician only) Reseat the microprocessor. 2. Replace the following components one at a time, in the order shown, restarting the server each time: a. (Trained service technician only) Microprocessor b. (Trained service technician only) System board
5120	BIOS checksum error detected.	1. Start the BIOS Setup Utility program, select **Exit**, select **Load Default Setting**, and then select **Save Changes and Exit**. 2. Update the BIOS code: a. Download the latest version of the BIOS code from http://www.ibm.com/systems/support/. b. Update the BIOS code, following the instructions that come with the update file that you downloaded. 3. Replace the following components one at a time, in the order shown, restarting the server each time: a. Battery b. (Trained service technician only) System board.
8601	BMC not responding.	1. Update the firmware on the baseboard management controller. 2. (Trained service technician only) Replace the system board.

Checkout procedure

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

About the checkout procedure

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

- Read the safety information that begins on page vii.
- The diagnostic programs provide the primary methods of testing the major components of the server, such as the system board, Ethernet controller, keyboard, mouse (pointing device), serial ports, and hard disk drives. You can also use them to test some external devices. If you are not sure whether a problem is caused by the hardware or by the software, you can use the diagnostic programs to confirm that the hardware is working correctly.
- When you run the diagnostic programs, a single problem might cause more than one error message. When this happens, correct the cause of the first error message. The other error messages usually will not occur the next time you run the diagnostic programs.

  Exception: If there are multiple error codes or LEDs that indicate a microprocessor error, the error might be in the microprocessor or in the microprocessor socket. See “Microprocessor problems” on page 99 for information about diagnosing microprocessor problems.
- Before running the diagnostic programs, you must determine whether the failing server is part of a shared hard disk drive cluster (two or more servers sharing external storage devices). If it is part of a cluster, you can run all diagnostic programs except the ones that test the storage unit (that is, a hard disk drive in the storage unit) or the storage adapter that is attached to the storage unit. The failing server might be part of a cluster if any of the following conditions is true:
  - You have identified the failing server as part of a cluster (two or more servers sharing external storage devices).
  - One or more external storage units are attached to the failing server and at least one of the attached storage units is also attached to another server or unidentifiable device.
  - One or more servers are located near the failing server.

  Important: If the server is part of a shared hard disk drive cluster, run one test at a time. Do not run any suite of tests, 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 87. If the server is halted and no error message is displayed, see “Troubleshooting tables” on page 93 and “Solving undetermined problems” on page 110.
- For information about power-supply problems, see “Solving power problems” on page 108.
- For intermittent problems, check the error log; see “Error logs” on page 87 and “Diagnostic programs and messages” on page 105.

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. Check the power supply status LED, see “Rear view” on page 5.
   b. Turn off the server and all external devices.
   c. Check all internal and external devices for compatibility at http://www.ibm.com/servers/eserver/serverproven/compat/us/.
   d. Make sure the server is cabled correctly.
   e. Check all cables and power cords.
   f. Set all display controls to the middle positions.
   g. Turn on all external devices.
   h. Turn on the server. If the server does not start, see “Troubleshooting tables” on page 93.
   i. Check the system-error LED and the fan error LED on the operator information panel.
      - If the fan error LED is on, one or more fans have failed. Replace the fan-bracket assembly.
      - If the system-error LED is flashing and the fan error LED is off, check the LEDs on the system board (see “System-board LEDs” on page 12). An error LED (amber) that is lit on the system board or an LED on the hard disk drive backplane or system board that is off when it should be on can help isolate the error.
   j. Check for the following results:
      - Successful completion of POST (see “POST” on page 83 for more information)
      - Successful completion of startup
3. Did one or more beeps sound?

   Note: Two beeps indicates successful completion of POST and is not an error.
   - **No:** Find the failure symptom in “Troubleshooting tables” on page 93; if necessary, run the diagnostic programs (see “Running the diagnostic programs” on page 105). If the diagnostic programs were completed successfully and you still suspect a problem, see “Solving undetermined problems” on page 110.
   - **Yes:** Find the beep code in “POST beep codes” on page 83; if necessary, see “Solving undetermined problems” on page 110.

Troubleshooting tables

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

If you cannot find the problem in these tables, see “Running the diagnostic programs” on page 105 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. Check the system-error LED and the fan error LED on the operator information panel.
   - If the fan error LED is on, one or more fans have failed. Replace the fan-bracket assembly.
   - If the system-error LED is flashing and the fan error LED is off, check the LEDs on the system board (see “System-board LEDs” on page 12). An error LED (amber) that is lit on the system board or an LED on the hard disk drive backplane or system board that is off when it should be on can help isolate the error.
2. Remove the software or device that you just added.
3. Run the diagnostic tests to determine whether the server is running correctly.
4. Reinstall the new software or new device.

CD/DVD drive problems

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, “Parts listing, Type 7942 server,” on page 37 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.**

Symptom	Action
The CD/DVD drive is not recognized.	1. Make sure that: • All cables and jumpers are installed correctly. • The signal cable and connector are not damaged and the connector pins are not bent. • The correct device driver is installed for the CD/DVD drive. 2. Run the CD/DVD drive diagnostic programs. 3. Reseat the following components: a. CD/DVD drive b. CD/DVD cables 4. Replace the components listed in step 3 one at a time, in the order shown, restarting the server each time.
The CD/DVD drive is not working correctly.	1. Clean the CD or DVD. 2. Run the CD/DVD drive diagnostic programs. 3. Check the connector and signal cable for bent pins or damage. 4. Reseat the CD/DVD drive. 5. Replace the CD/DVD drive.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing, Type 7942 server," on page 37 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Symptom	Action
The CD/DVD drive tray is not working.	1. Make sure that the server is turned on. 2. Insert the end of a straightened paper clip into the manual tray-release opening. 3. Reseat the CD/DVD drive. 4. Replace the CD/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 3, "Parts listing, Type 7942 server," on page 37 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

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

Hard disk drive problems

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing, Type 7942 server," on page 37 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 3, "Parts listing, Type 7942 server," on page 37 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Symptom	Action
A problem occurs only occasionally and is difficult to diagnose.	1. Make sure that: • All cables and cords are connected securely to the rear of the server and attached devices. • When the server is turned on, air is flowing from the fan grille. If there is no airflow, the fans are not working. This can cause the server to overheat and shut down. 2. Check the event log or BMC system event log (see "Error logs" on page 87). 3. See "Solving undetermined problems" on page 110.
The server resets (restarts) occasionally.	1. If the reset occurs during POST and the BMC watchdog timer is enabled (click **Advanced --> IPMI Configuration--> BMC Watchdog Timer Action** in the BIOS Setup Utility program to see the BMC watchdog setting), make sure that sufficient time is allowed in the watchdog timeout value. If the server continues to reset during POST, see "POST" on page 83 and "Diagnostic programs and messages" on page 105. 2. If the reset occurs after the operating system starts, disable any automatic server restart (ASR) utilities, such as the IBM Automatic Server Restart IPMI Application for Windows, or ASR devices that may be installed. **Note:** ASR utilities operate as operating-system utilities and are related to the IPMI device driver. If the reset continues to occur after the operating system starts, the operating system might have a problem; see "Software problems" on page 104. 3. If neither condition applies, check the event log or BMC system event log (see "Error logs" on page 87).

Keyboard, mouse, or pointing-device problems (PS/2)

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing, Type 7942 server," on page 37 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. If the server is attached to a KVM switch, bypass the KVM switch to eliminate it as a possible cause of the problem: connect the keyboard cable directly to the correct connector on the rear of the server. 2. Make sure that: • The keyboard cable is securely connected. • The keyboard and mouse cables are not reversed. • The server and the monitor are turned on. 3. Reseat the keyboard cable. 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. If the server is attached to a KVM switch, bypass the KVM switch to eliminate it as a possible cause of the problem: connect the mouse or pointing-device cable directly to the correct connector on the rear of the server. 2. Make sure that: • The mouse or pointing-device cable is securely connected and the keyboard and mouse cables are not reversed. • The mouse device drivers are installed correctly. 3. Reseat the mouse or pointing device cable. 4. 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

Keyboard, mouse, or pointing-device problems (USB)

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing, Type 7942 server," on page 37 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. See http://www.ibm.com/servers/eserver/serverproven/compat/us/ for keyboard compatibility. 2. Make sure that: • The keyboard cable is securely connected. • The server and the monitor are turned on. 3. Move the keyboard cable to a different USB connector. 4. Replace the following components one at a time, in the order shown, restarting the server each time: a. Keyboard b. (Only if the problem occurred with a front USB connector) Internal USB cable c. (Trained service technician only) System board
The USB mouse or USB pointing device does not work.	1. Make sure that: • The mouse is compatible with the server. See http://www.ibm.com/servers/eserver/serverproven/compat/us/. • The mouse or pointing-device USB cable is securely connected to the server, and the device drivers are installed correctly. • The server and the monitor are turned on. 2. If a USB hub is in use, disconnect the USB device from the hub and connect it directly to the server. 3. Move the mouse or pointing device cable to another USB connector. 4. Replace the following components one at a time, in the order shown, restarting the server each time: a. Mouse or pointing device b. (Only if the problem occurred with a front USB connector) Internal USB cable c. (Trained service technician only) System board

Memory problems

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing, Type 7942 server," on page 37 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 operator information panel. • Memory reserved for the operating system does not account for the discrepancy. • The memory modules are seated correctly. • You have installed the correct type of memory (see "Installing a memory module" on page 52). • All DIMMs are enabled. The server might have automatically disabled a DIMM when it detected a problem. Use the BIOS Setup Utility program to view and enable installed DIMMs. 2. Check the POST error log for memory error messages. 3. Run memory diagnostics (see "Running the diagnostic programs" on page 105). 4. Remove the DIMMs; then, add one DIMM or pair of DIMMs at a time, making sure that the DIMMs in each pair are matching. Install the DIMMs in the sequence that is described in "Installing a memory module" on page 52. 5. Reseat the DIMMs. 6. Replace the following components one at a time, in the order shown, restarting the server each time: a. DIMMs (make sure to enable the DIMMs after installation: **Advanced –> Memory settings** in the BIOS Setup Utility) b. (Trained service technician only) System board
Multiple rows of DIMMs in a branch are identified as failing.	1. Reseat the DIMMs; then, restart the server. 2. Replace the lowest-numbered DIMM pair of those that are identified; then, restart the server. Repeat as necessary. 3. Enable all the DIMMs (**Advanced –> Memory settings** in the BIOS Setup Utility). 4. (Trained service technician only) Replace the system board.

Microprocessor problems

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.** • **See Chapter 3, "Parts listing, Type 7942 server," on page 37 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 microprocessor is not working correctly.	1. Correct any errors that are indicated by the LEDs (see "Server controls, LEDs, and power" on page 4 for the LEDs on the front of the server, "System-board LEDs" on page 12), and "Hard disk drive backplane LEDs" on page 13. 2. Make sure that the server supports all the microprocessors and that the microprocessors match in speed and cache size. 3. (Trained service technician only) Reseat the microprocessors, restarting the server after each one. 4. (Trained service technician only) Replace the microprocessors. 5. (Trained service technician only) Replace the system board.

Monitor problems

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

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.** • **See Chapter 3, "Parts listing, Type 7942 server," on page 37 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 testing the monitor on a different server. 3. Run the diagnostic programs (see "Running the diagnostic programs" on page 105). If the monitor passes the diagnostic programs, the problem might be a video device driver. 4. (Trained service technician only) Replace the system board.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing, Type 7942 server," on page 37 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 screen is blank.	1. If the server is attached to a KVM switch, bypass the KVM switch to eliminate it as a possible cause of the problem: connect the monitor cable directly to the correct connector on the rear of the server. 2. Make sure that: • The server is turned on. If there is no power to the server, see "Power problems" on page 102. • 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. 3. Make sure that the correct server is controlling the monitor, if applicable. 4. Make sure that damaged BIOS code is not affecting the video; see "Recovering the BIOS code" on page 107 for information about recovering from a BIOS failure. 5. See "Solving undetermined problems" on page 110 for information about solving undetermined problems.
The monitor works when you turn on the server, but the screen goes blank when you start some application programs.	1. Make sure that: • The application program is not setting a display mode that is higher than the capability of the monitor. • You installed the necessary device drivers for the application. 2. Run video diagnostics (see "Running the diagnostic programs" on page 105). If the server passes the video diagnostics, the video is good; see "Solving undetermined problems" on page 110 for information about solving undetermined problems.
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 monitor cable. 3. Replace the following components one at a time, in the order shown, restarting the server each time: a. Monitor cable b. Monitor c. (Trained service technician only) System board

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing, Type 7942 server," on page 37 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
Wrong characters appear on the screen.	1. If the wrong language is displayed, update the BIOS code with the correct language. 2. Reseat the monitor cable. 3. Replace the following components one at a time, in the order shown, restarting the server each time: a. Monitor b. (Trained service technician only) System board

Optional-device problems

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing, Type 7942 server," on page 37 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 BIOS Setup Utility program. Whenever memory or any other device is changed, you must update the configuration. 2. Reseat the device that you just installed. 3. Replace the device that you just installed.
An IBM optional device that used to work does not work now.	1. Make sure that all of the hardware and cable connections for the device are secure. 2. If the device comes with test instructions, use those instructions to test the device. 3. Reseat the failing device. 4. Follow the instructions for device maintenance, such as keeping the heads clean, and troubleshooting in the documentation that comes with the 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 3, "Parts listing, Type 7942 server," on page 37 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Symptom	Action
The power-control button does not work (the server does not start). **Note:** The power-control button will not function until 20 seconds after the server has been connected to power.	1. Make sure that: • The power cords are correctly connected to the server and to a working electrical outlet. • The LED on the power supply does not indicate a problem. • The type of memory that is installed is correct. • The microprocessors are installed in the correct sequence (make sure that a microprocessor is in socket 1). 2. Make sure that the power-control button is working correctly: a. Disconnect the server power cords. b. Reseat the operator information panel assembly cable. c. Reconnect the power cords. d. Press the power-control button to restart the server. If the button does not work, replace the operator information panel assembly. 3. 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. 4. Reseat the power backplane and power backplane cables; then, restart the server. 5. Replace the power backplane and restart the server. 6. Replace the following components one at a time, in the order shown, restarting the server each time: a. Power supplies b. (Trained service technician only) System board 7. See "Solving power problems" on page 108. 8. See "Solving undetermined problems" on page 110.
The server does not turn off.	1. Turn off the server by pressing the power-control button for 5 seconds. 2. Restart the server. 3. If the server fails POST and the power-control button does not work, disconnect the power cord for 20 seconds; then, reconnect the power cord and restart the server. 4. If the problem remains, suspect the system board.
The server unexpectedly shuts down, and the LEDs on the operator information panel are not lit.	See "Solving undetermined problems" on page 110.

Serial port problems

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing, Type 7942 server," on page 37 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 BIOS 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, if one is present. 3. Replace the serial port adapter, if one is present.
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 "Rear view" on page 5). 2. Reseat the following components: a. Serial cable b. Failing serial device 3. Replace the following components one at a time, in the order shown, restarting the server each time: a. Serial cable b. Failing serial device c. (Trained service technician only) System board

ServerGuide problems

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing, Type 7942 server," on page 37 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Symptom	Action
The *ServerGuide Setup and Installation* CD will not start.	1. Make sure that the server supports the ServerGuide program and has a startable (bootable) CD or DVD drive. 2. If the startup (boot) sequence settings have been changed, make sure that the CD or DVD drive is first in the startup sequence. 3. If more than one CD or DVD drive is installed, make sure that only one drive is set as the primary drive. Start the CD from the primary drive.
The operating-system installation program continuously loops.	Make more space available on the hard disk.
The ServerGuide program will not start the operating-system CD.	Make sure that the operating-system CD is supported by the ServerGuide program. See the *ServerGuide Setup and Installation* CD label for a list of supported operating-system versions.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing, Type 7942 server," on page 37 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 operating system cannot be installed; the option is not available.	Make sure that the server supports the operating system. If it does, no logical drive is defined (RAID servers). Run the ServerGuide program and make sure that setup is complete.

Software problems

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing, Type 7942 server," on page 37 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

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

Universal Serial Bus (USB) port problems

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing, Type 7942 server," on page 37 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 BIOS Setup Utility program menu (see Chapter 2, "Configuration information and instructions," on page 15 for more information). 3. If you are using a USB hub, disconnect the USB device from the hub and connect it directly to the server. 4. Move the device cable to a different USB connector. 5. Replace the following components one at a time, in the order shown, restarting the server each time: a. Failing USB device b. (Trained service technician only) System board

Video problems

See "Monitor problems" on page 99.

Diagnostic programs and messages

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 that a problem has been detected.

Running the diagnostic programs

To run the diagnostic programs, complete the following steps:

1. If the server is running, turn off the server and all attached devices.
2. Turn on all attached devices; then, turn on the server.
3. Use the BIOS Setup Utility program to make sure that the CD/DVD drive is selected as the first startup device (select **Boot → Boot Device Priority → CD/DVD ROM**). See "Using the BIOS Setup Utility program" on page 16.
4. Insert the *System Diagnostics* CD in the CD/DVD drive.
5. Save the settings and exit the BIOS Setup Utility program. The diagnostic programs start.

   Note: If the diagnostics programs do not start, leave the CD in the CD/DVD drive and restart the server.
6. 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.

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 messages or LEDs that indicate a microprocessor error, the error might be in a microprocessor or in a microprocessor socket. See “Microprocessor problems” on page 99 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 is attached to the server, you cannot use the **Next Cat** and **Prev Cat** buttons to select categories. All other mouse-selectable functions are available through function keys.

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 test log when the tests are completed, select **Utility** from the top of the screen and then select **View Test Log**. The test-log data is maintained only while you are running the diagnostic programs. When you exit from the diagnostic programs, the test log is cleared.

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

Notes:

1. To create and use a diskette, you must add an optional external diskette drive to the server 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.

Recovering the BIOS code

If the BIOS code has become damaged, such as from a power failure during an update, you can recover the BIOS code using the Ctrl+Home keys and a recovery medium that contains a BIOS image, such as a hard disk drive or an external USB storage device.

Notes:

1. You can obtain a BIOS recovery image from one of the following sources:
   - Download the BIOS code update from the World Wide Web and use it to make a recovery medium.
   - Contact your IBM service representative.
2. To create and use a USB BIOS recovery medium, you must add an optional external USB drive to the server.

To download the BIOS code update from the World Wide Web, 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 x3610** to display the matrix of downloadable files for the server.
5. Download the latest BIOS code update.
6. Create the BIOS recovery medium, following the instructions that come with the update file that you downloaded. Rename the BIOS file on the recovery medium to `amiboot.rom`.

To recover the BIOS code and restore the server operation to the primary page, complete the following steps:

1. Turn off the server, and disconnect all power cords and external cables.
2. Insert the BIOS recovery medium into the external USB storage drive, if applicable.
3. Restart the server. The power-on self test (POST) starts.
4. Press Ctrl+Home for approximately 2 seconds to begin the recovery process. When the recovery process is finished, the system automatically restarts and sounds a beep code.
5. Remove the BIOS recovery medium from the drive.

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 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 110 for the minimum configuration).
4. Reconnect all 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.

Power supply LEDs

The following minimum configuration is required for the power supply status LED on the power supply to be lit:

- Power supply
- Power backplane
- Power cord

The following minimum configuration is required for the server to start:

- One microprocessor
- One 512 DIMM
- One power supply
- Power backplane
- Power cord

The power supply has one LED. When the minimum configuration is present, the power supply status LED displays either green or amber, and is either lit or flashing.

The following table describes the conditions that are indicated by various actions and colors of the power supply status LED:

Table 12.

Color	Condition	Description	Action
none	OFF	No ac power to the power supply	Make sure that the power supply is receiving ac power from a known good source.
Green	Lit	AC power is present and the power supply is operating correctly.	None
Green	Flashing	AC power is present but the server is turned off. The power supply is producing 5v standby power.	Turn on the server when you need it to run.

Table 12. (continued)

Color	Condition	Description	Action
Amber	Lit	One of the following conditions: • No ac power to the power supply (redundant power supplies) • Power supply has shut down because of one of the following critical events: – Power supply failed – Fuse blown (redundant power supplies) – Under- or over-voltage – Fan failed	1. Make sure that the power supply is receiving ac power from a known good source. 2. Replace the power supply.
Amber	Flashing	Warning of one of the following potential failure conditions. The power supply continues to operate. • High temperature • High power or current • Slow fan	1. Make sure that the power supply is receiving ac power from a known good source. 2. Replace the power supply.

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.
  - You must use Category 5 cabling.
- 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.

  If the Ethernet link/activity LED is off, there might be a defective connector or cable or a problem with the hub. 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 104.

Damaged data in CMOS memory or damaged BIOS code can cause undetermined problems. To reset the CMOS data, use the clear CMOS switch to clear the CMOS memory and override the user password; see “System-board switches” on page 11. If you suspect that the BIOS code is damaged, see “Recovering the BIOS code” on page 107.

Check the LEDs on all the power supplies (see “Power supply LEDs” on page 108). If the LEDs indicate that the power supplies are working correctly, complete the following steps:

1. Turn off the server.
2. Make sure that the server is cabled correctly.
3. Make sure that all internal and external devices are compatible with the server (see http://www.ibm.com/servers/eserver/serverproven/compat/us/).
4. 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, in DIMM connector 1.

   The following minimum configuration is required for the server to start:
   - One microprocessor
   - One 512 DIMM
   - One power supply
   - Power backplane
   - Power cord
5. Turn on the server. If the problem remains, suspect the following components in the following order:
   a. Power backplane
   b. System board

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

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

Problem determination tips

Due to the variety of hardware and software combinations that can be encountered, use the following information to assist you in problem determination. If possible, have this information available when requesting assistance from Service Support and Engineering functions.

- Machine type and model
- Microprocessor or hard disk upgrades
- Failure symptom
  - Do diagnostics fail?
  - What, when, where, single, or multiple systems?
  - Is the failure repeatable?
  - Has this configuration ever worked?
  - If it has been working, what changes were made prior to it failing?
  - Is this the original reported failure?
- Diagnostics version
  - Type and version level
- Hardware configuration
  - Print (print screen) configuration currently in use
  - BIOS level
- Operating system software
  - Type and version level

Note: To eliminate confusion, identical systems are considered identical only if they:

1. Are the exact machine type and models
2. Have the same BIOS level
3. Have the same adapters/attachments in the same locations
4. Have the same address jumpers/terminators/cabling
5. Have the same software versions and levels
6. Have the same diagnostics code (version)
7. Have the same configuration options set in the system
8. Have the same setup for the operation system control files

Comparing the configuration and software setup between “working” and “non-working” systems will often lead to problem resolution.

Calling IBM for service

See Appendix A, “Getting help and technical assistance,” on page 113 for information about calling IBM for service.

When you call for service, have as much of the following information available as possible:

- Machine type and model
- Microprocessor and hard disk drive upgrades
- Failure symptoms
  - Does the server fail the diagnostic programs? If so, what are the error codes?
  - What occurs? When? Where?
  - Is the failure repeatable?
  - Has the current server configuration ever worked?
  - What changes, if any, were made before it failed?
  - Is this the original reported failure, or has this failure been reported before?
- Diagnostic program type and version level

- Hardware configuration (print screen of the system summary)
- BIOS code level
- Operating-system type and version level

You can solve some problems by comparing the configuration and software setups between working and nonworking servers. When you compare servers to each other for diagnostic purposes, consider them identical only if all the following factors are exactly the same in all the servers:

- Machine type and model
- BIOS level
- Memory amount, type, and configuration
- 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

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 *Hardware Maintenance Manual and Troubleshooting Guide* or *Problem Determination and Service Guide* on the IBM *System x Documentation* CD that comes with your system.

  Note: For some IntelliStation models, the *Hardware Maintenance Manual and Troubleshooting Guide* is available only from the IBM support Web site.
- Go to the IBM support Web site at http://www.ibm.com/systems/support/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.

You can solve many problems without outside assistance by following the troubleshooting procedures that IBM provides in the online help or in the documentation that is provided with your IBM product. The documentation that comes with IBM systems also describes the diagnostic tests that you can perform. Most systems, operating systems, and programs come with documentation that contains troubleshooting procedures and explanations of error messages and error codes. If you suspect a software problem, see the documentation for the operating system or program.

Using the documentation

Information about your IBM system and preinstalled software, if any, or optional device is available in the documentation that comes with the product. That documentation can include printed documents, online documents, readme files, and help files. See the troubleshooting information in your system documentation for instructions for using the diagnostic programs. The troubleshooting information or the diagnostic programs might tell you that you need additional or updated device drivers or other software. IBM maintains pages on the World Wide Web where you can get the latest technical information and download device drivers and updates. To access these pages, go to http://www.ibm.com/systems/support/ and follow the instructions. Also, some documents are available through the IBM Publications Center at http://www.ibm.com/shop/publications/order/.

Getting help and information from the World Wide Web

On the World Wide Web, the IBM Web site has up-to-date information about IBM systems, optional devices, services, and support. The address for IBM System x and xSeries information is http://www.ibm.com/systems/x/. The address for IBM BladeCenter information is http://www.ibm.com/systems/bladecenter/. The address for IBM IntelliStation® information is http://www.ibm.com/intellistation/.

You can find service information for IBM systems and optional devices at http://www.ibm.com/systems/support/.

Software service and support

Through IBM Support Line, you can get telephone assistance, for a fee, with usage, configuration, and software problems with System x and xSeries servers, BladeCenter products, IntelliStation workstations, and appliances. For information about which products are supported by Support Line in your country or region, see http://www.ibm.com/services/sl/products/.

For more information about Support Line and other IBM services, see http://www.ibm.com/services/, or see http://www.ibm.com/planetwide/ for support telephone numbers. In the U.S. and Canada, call 1-800-IBM-SERV (1-800-426-7378).

Hardware service and support

You can receive hardware service through IBM Services or through your IBM reseller, if your reseller is authorized by IBM to provide warranty service. See http://www.ibm.com/planetwide/ for support telephone numbers, or 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

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Alert on LAN	Netfinity	Wake on LAN

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Chipkill
e-business logo
@server
FlashCopy
i5/OS
Predictive Failure Analysis
ServeRAID
ServerGuide
ServerProven
System x
XA-32
XA-64
X-Architecture
XpandOnDemand
xSeries

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Important notes

Processor speed indicates the internal clock speed of the microprocessor; other factors also affect application performance.

CD or DVD drive speed is the variable read rate. Actual speeds vary and are often less than the possible maximum.

When referring to processor storage, real and virtual storage, or channel volume, KB stands for 1024 bytes, MB stands for 1 048 576 bytes, and GB stands for 1 073 741 824 bytes.

When referring to hard disk drive capacity or communications volume, MB stands for 1 000 000 bytes, and GB stands for 1 000 000 000 bytes. Total user-accessible capacity can vary depending on operating environments.

Maximum internal hard disk drive capacities assume the replacement of any standard hard disk drives and population of all hard disk drive bays with the largest currently supported drives that are available from IBM.

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

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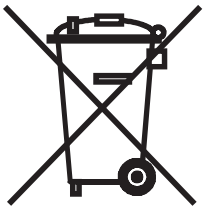
Some software might differ from its retail version (if available) and might not include user manuals or all program functionality.

Product recycling and disposal

This unit must be recycled or discarded according to applicable local and national regulations. IBM encourages owners of information technology (IT) equipment to responsibly recycle their equipment when it is no longer needed. IBM offers a variety of product return programs and services in several countries to assist equipment owners in recycling their IT products. Information on IBM product recycling offerings can be found on IBM's Internet sites at http://www.ibm.com/ibm/recycle/us/index.shtml and http://www.ibm.com/ibm/environment/products/index.shtml.

Esta unidad debe reciclarse o desecharse de acuerdo con lo establecido en la normativa nacional o local aplicable. IBM recomienda a los propietarios de equipos de tecnología de la información (TI) que reciclen responsablemente sus equipos cuando éstos ya no les sean útiles. IBM dispone de una serie de programas y servicios de devolución de productos en varios países, a fin de ayudar a los propietarios de equipos a reciclar sus productos de TI. Se puede encontrar información sobre las ofertas de reciclado de productos de IBM en el sitio web de IBM http://www.ibm.com/ibm/recycle/us/index.shtml y http://www.ibm.com/ibm/environment/products/index.shtml.



Notice: This mark applies only to countries within the European Union (EU) and Norway.

This appliance is labeled in accordance with European Directive 2002/96/EC concerning waste electrical and electronic equipment (WEEE). The Directive determines the framework for the return and recycling of used appliances as applicable throughout the European Union. This label is applied to various products to indicate that the product is not to be thrown away, but rather reclaimed upon end of life per this Directive.

注意: このマークは EU 諸国およびノルウェーにおいてのみ適用されます。

この機器には、EU 諸国に対する廃電気電子機器指令 2002/96/EC(WEEE) のラベルが貼られています。この指令は、EU 諸国に適用する使用済み機器の回収とリサイクルの骨子を定めています。このラベルは、使用済みになった時に指令に従って適正な処理をする必要があることを知らせるために種々の製品に貼られています。

Remarque : Cette marque s'applique uniquement aux pays de l'Union Européenne et à la Norvège.

L'etiquette du système respecte la Directive européenne 2002/96/EC en matière de Déchets des Equipements Electriques et Electroniques (DEEE), qui détermine les dispositions de retour et de recyclage applicables aux systèmes utilisés à travers l'Union européenne. Conformément à la directive, ladite étiquette précise que le produit sur lequel elle est apposée ne doit pas être jeté mais être récupéré en fin de vie.

In accordance with the European WEEE Directive, electrical and electronic equipment (EEE) is to be collected separately and to be reused, recycled, or recovered at end of life. Users of EEE with the WEEE marking per Annex IV of the WEEE Directive, as shown above, must not dispose of end of life EEE as unsorted municipal waste, but use the collection framework available to customers for the return, recycling, and recovery of WEEE. Customer participation is important to minimize any potential effects of EEE on the environment and human health due to the potential presence of hazardous substances in EEE. For proper collection and treatment, contact your local IBM representative.

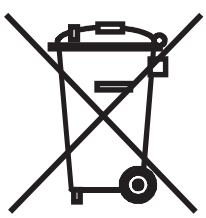
Battery return program

This product may contain a sealed lead acid, nickel cadmium, nickel metal hydride, lithium, or lithium ion battery. Consult your user manual or service manual for specific battery information. The battery must be recycled or disposed of properly. Recycling facilities may not be available in your area. For information on disposal of batteries outside the United States, go to http://www.ibm.com/ibm/environment/products/index.shtml or contact your local waste disposal facility.

In the United States, IBM has established a return process for reuse, recycling, or proper disposal of used IBM sealed lead acid, nickel cadmium, nickel metal hydride, and battery packs from IBM equipment. For information on proper disposal of these batteries, contact IBM at 1-800-426-4333. Have the IBM part number listed on the battery available prior to your call.

For Taiwan: Please recycle batteries.

For the European Union:



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Batteries or packaging for batteries are labeled in accordance with European Directive 2006/66/EC concerning batteries and accumulators and waste batteries and accumulators. The Directive determines the framework for the return and recycling of used batteries and accumulators as applicable throughout the European Union. This label is applied to various batteries to indicate that the battery is not to be thrown away, but rather reclaimed upon end of life per this Directive.

Les batteries ou emballages pour batteries sont étiquetés conformément aux directives européennes 2006/66/EC, norme relative aux batteries et accumulateurs en usage et aux batteries et accumulateurs usés. Les directives déterminent la marche à suivre en vigueur dans l'Union Européenne pour le retour et le recyclage des batteries et accumulateurs usés. Cette étiquette est appliquée sur diverses batteries pour indiquer que la batterie ne doit pas être mise au rebut mais plutôt récupérée en fin de cycle de vie selon cette norme.

バッテリーあるいはバッテリー用のパッケージには、EU 諸国に対する廃電気電子機器指令 2006/66/EC のラベルが貼られています。この指令は、バッテリーと蓄電池、および廃棄バッテリーと蓄電池に関するものです。この指令は、使用済みバッテリーと蓄電池の回収とリサイクルの骨子を定めているもので、EU 諸国にわたって適用されます。このラベルは、使用済みになったときに指令に従って適正な処理をする必要があることを知らせるために種々のバッテリーに貼られています。

In accordance with the European Directive 2006/66/EC, batteries and accumulators are labeled to indicate that they are to be collected separately and recycled at end of life. The label on the battery may also include a chemical symbol for the metal concerned in the battery (Pb for lead, Hg for mercury, and Cd for cadmium). Users of batteries and accumulators must not dispose of batteries and accumulators as unsorted municipal waste, but use the collection framework available to customers for the return, recycling, and treatment of batteries and accumulators. Customer participation is important to minimize any potential effects of batteries and accumulators on the environment and human health due to the potential presence of hazardous substances. For proper collection and treatment, contact your local IBM representative.

This notice is provided in accordance with Royal Decree 106/2008 of Spain: The retail price of batteries, accumulators, and power cells includes the cost of the environmental management of their waste.

For California:

Perchlorate material – special handling may apply. See http://www.dtsc.ca.gov/hazardouswaste/perchlorate/.

The foregoing notice is provided in accordance with California Code of Regulations Title 22, Division 4.5 Chapter 33. Best Management Practices for Perchlorate Materials. This product/part may include a lithium manganese dioxide battery which contains a perchlorate substance.

Chinese Class A warning statement

声　　明

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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。

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