IBM

System x3610
Type 7942
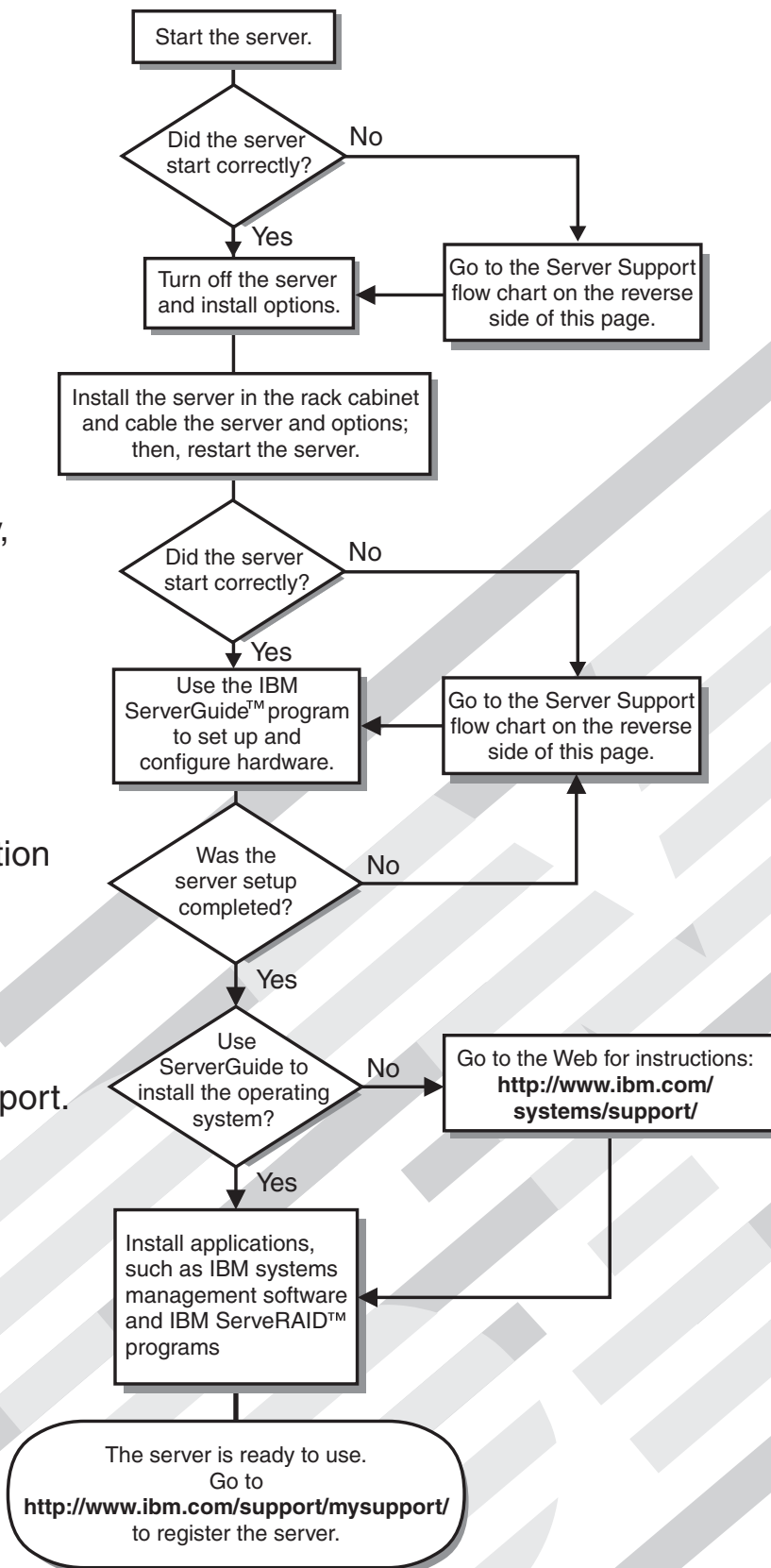
Installation Guide

Welcome.

Thank you for buying an IBM server. Your server is based on the X-Architecture technology, and it features superior performance, availability, and affordability.
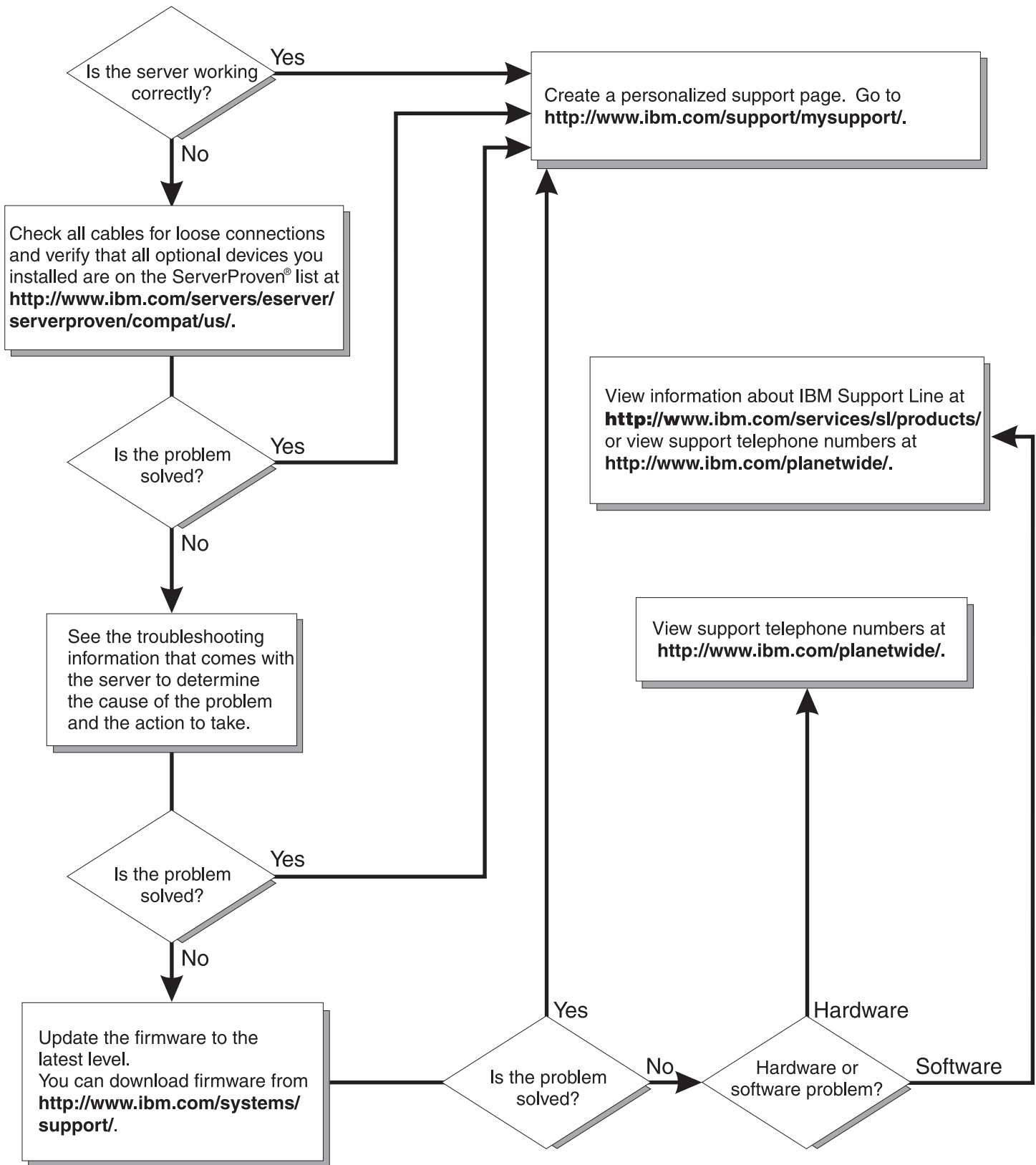
This server *Installation Guide* contains information for setting up and configuring your server.

For detailed information about your server, view the documentation on the IBM *Documentation* CD.

You can also find the most current information about your server at http://www.ibm.com/systems/support.

Start the server.

Did the server start correctly? — No → Go to the Server Support flow chart on the reverse side of this page.

Yes ↓

Turn off the server and install options.

Install the server in the rack cabinet and cable the server and options; then, restart the server.

Did the server start correctly? — No → Go to the Server Support flow chart on the reverse side of this page.

Yes ↓

Use the IBM ServerGuide™ program to set up and configure hardware.

Was the server setup completed? — No →

Yes ↓

Use ServerGuide to install the operating system? — No → Go to the Web for instructions: **http://www.ibm.com/systems/support/**

Yes ↓

Install applications, such as IBM systems management software and IBM ServeRAID™ programs

The server is ready to use. Go to **http://www.ibm.com/support/mysupport/** to register the server.

Server Support

Is the server working correctly? — Yes → Create a personalized support page. Go to **http://www.ibm.com/support/mysupport/.**

No ↓

Check all cables for loose connections and verify that all optional devices you installed are on the ServerProven® list at **http://www.ibm.com/servers/eserver/ serverproven/compat/us/.**

↓

Is the problem solved? — Yes → Create a personalized support page. Go to **http://www.ibm.com/support/mysupport/.**

No ↓

See the troubleshooting information that comes with the server to determine the cause of the problem and the action to take.

↓

Is the problem solved? — Yes → Create a personalized support page. Go to **http://www.ibm.com/support/mysupport/.**

No ↓

Update the firmware to the latest level.
You can download firmware from **http://www.ibm.com/systems/ support/.**

→ **Is the problem solved?**

Yes ↑ → Create a personalized support page. Go to **http://www.ibm.com/support/mysupport/.**

No → **Hardware or software problem?**

Hardware ↑ → View support telephone numbers at **http://www.ibm.com/planetwide/.**

Software → View information about IBM Support Line at **http://www.ibm.com/services/sl/products/** or view support telephone numbers at **http://www.ibm.com/planetwide/.**

IBM System x3610 Type 7942

Installation Guide

Note: Before using this information and the product it supports, read the general information in Appendix B, "Notices," on page 67 and the *Warranty and Support Information* document on the IBM *System x Documentation* CD.

Contents

Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الآمنية

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

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

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

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

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

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

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

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

A termék telepítése előtt olvassa el a Biztonsági előírásokat!

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

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

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

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

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

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

Перед установкой продукта прочтите инструкции по
технике безопасности.

Pred inštaláciou tohto zariadenia si pečítaje Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

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

Läs säkerhetsinformationen innan du installerar den här produkten.

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
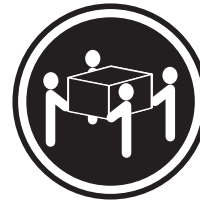Appareil À Laser de Classe 1

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.**

2

1

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 *Installation Guide* contains instructions for setting up your IBM® System x3610 Type 7942 server and basic instructions for installing some optional devices. More detailed instructions for installing optional devices are in the *User's Guide* on the IBM *System x Documentation* CD, which comes with the server. This document contains information about:

- Setting up and cabling the server
- Starting and configuring the server
- Installing some optional devices
- Solving problems

If firmware and documentation updates are available, you can download them from the IBM Web site. The server might have features that are not described in the documentation that comes with the server, and 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. To check for updates, complete the following steps:

Note: Changes are made periodically to the IBM Web site. Procedures for locating firmware and documentation might vary slightly from what is described in this document.

1. Go to http://www.ibm.com/systems/support/.
2. Under **Product support**, click **System x**.
3. Under **Popular links**, click **Software and device drivers** for firmware updates, or click **Publications lookup** for documentation updates.

The server comes with an IBM *ServerGuide™ Setup and Installation* CD to help you configure the hardware, install device drivers, and install the operating system.

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.

The server comes with a limited warranty. You can obtain up-to-date information about the server and other IBM server products at http:/www.ibm.com/systems/x/.

Record information about the server in the following table. You will need this information when you register the server with IBM.

Product name	IBM System x3610 server
Machine type	7942
Model number	
Serial number	

The model number and serial number are on the ID label on the bezel, as shown in the following illustration.
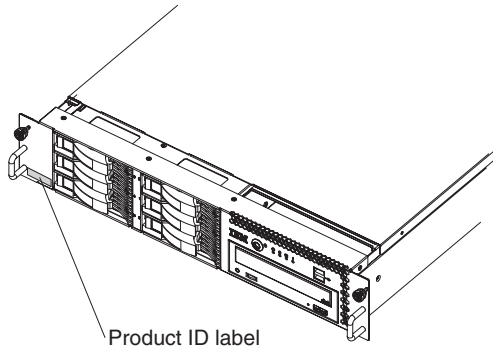
Product ID label

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

See the *Rack Installation Instructions* document for complete rack installation and
removal instructions.

The IBM System x Documentation CD

The IBM *System x® Documentation* CD contains documentation for your server in
Portable Document Format (PDF) and includes the IBM Documentation Browser to
help you find information quickly.

Hardware and software requirements

The IBM *System x Documentation* CD requires the following minimum hardware
and software:

- Microsoft Windows XP, Windows 2000, or Red Hat Linux
- 100 MHz microprocessor
- 32 MB of RAM
- Adobe Acrobat Reader 3.0 (or later) or xpdf, which comes with Linux operating
  systems

Using the Documentation Browser

Use the Documentation Browser to browse the contents of the CD, read brief
descriptions of the documents, and view documents, using Adobe Acrobat Reader
or xpdf. The Documentation Browser automatically detects the regional settings in
your server and displays the documents in the language for that region (if
available). If a document is not available in the language for that region, the
English-language version is displayed.

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

- If Autostart is enabled, insert the CD into the CD or DVD drive. The
  Documentation Browser starts automatically.
- If Autostart is disabled or is not enabled for all users, use one of the following
  procedures:
  - If you are using a Windows operating system, insert the CD into the CD or
    DVD drive and click **Start --> Run**. In the **Open** field, type

    `e:\win32.bat`

    where *e* is the drive letter of the CD or DVD drive, and click **OK**.

– If you are using Red Hat Linux, insert the CD into the CD or DVD drive; then, run the following command from the /mnt/cdrom directory:

```
sh runlinux.sh
```

Select the server from the **Product** menu. The **Available Topics** list displays all the documents for the server. Some documents might be in folders. A plus sign (+) indicates each folder or document that has additional documents under it. Click the plus sign to display the additional documents.

When you select a document, a description of the document is displayed under **Topic Description**. To select more than one document, press and hold the Ctrl key while you select the documents. Click **View Book** to view the selected document or documents in Acrobat Reader or xpdf. If you selected more than one document, all the selected documents are opened in Acrobat Reader or xpdf.

To search all the documents, type a word or word string in the **Search** field and click **Search**. The documents in which the word or word string appears are listed in order of the most occurrences. Click a document to view it, and press Crtl+F to use the Acrobat search function, or press Alt+F to use the xpdf search function within the document.

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

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
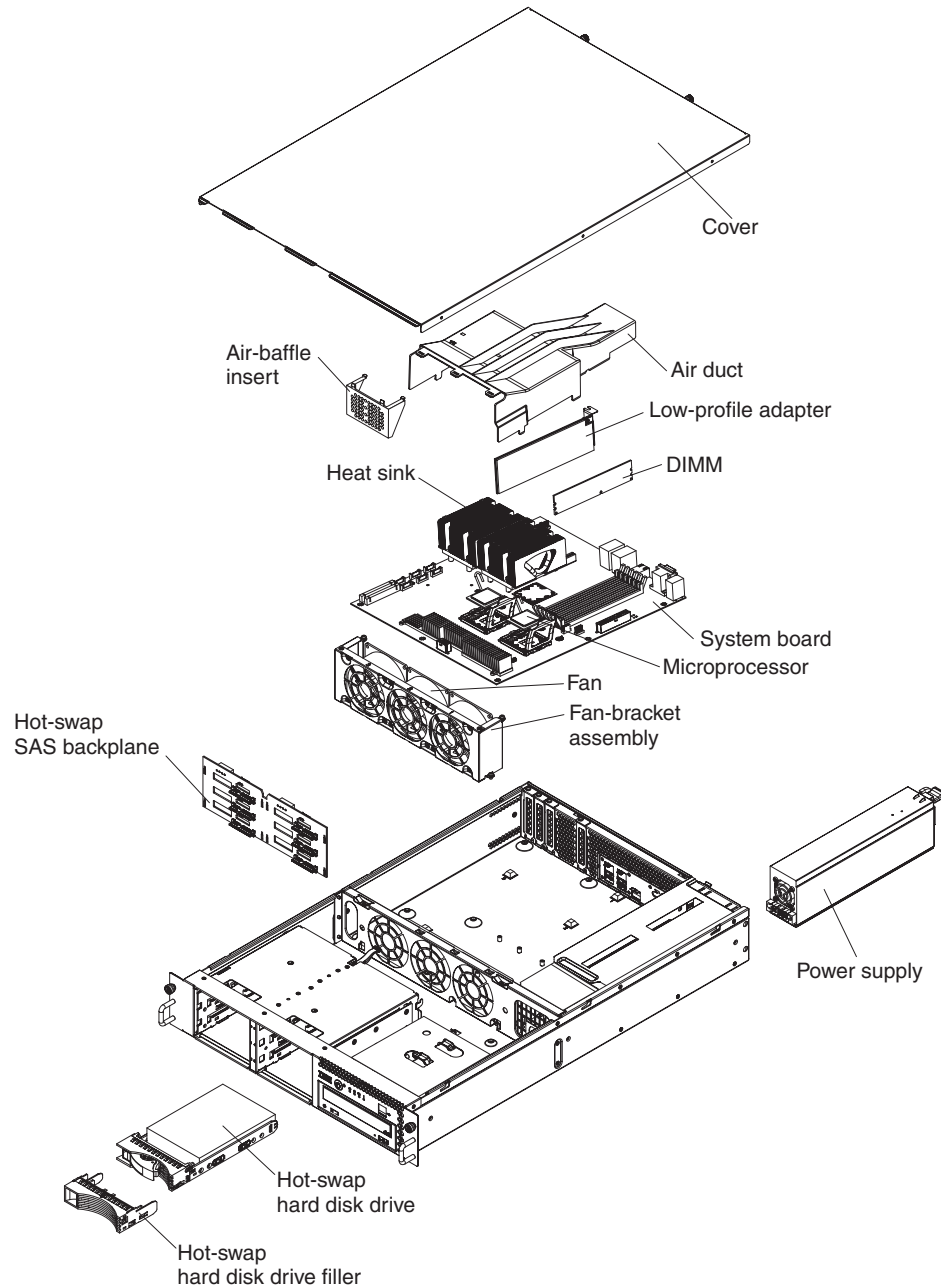
Major components of the server

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.

The following illustrations show the major components in the server.

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

Cover

Air-baffle insert

Air duct

Low-profile adapter

Heat sink

DIMM

System board

Microprocessor

Fan

Fan-bracket assembly

Hot-swap SAS backplane

Power supply

Hot-swap hard disk drive

Hot-swap hard disk drive filler

System-board optional-device connectors

The following illustration shows the connectors on the system board for user-installable optional devices.
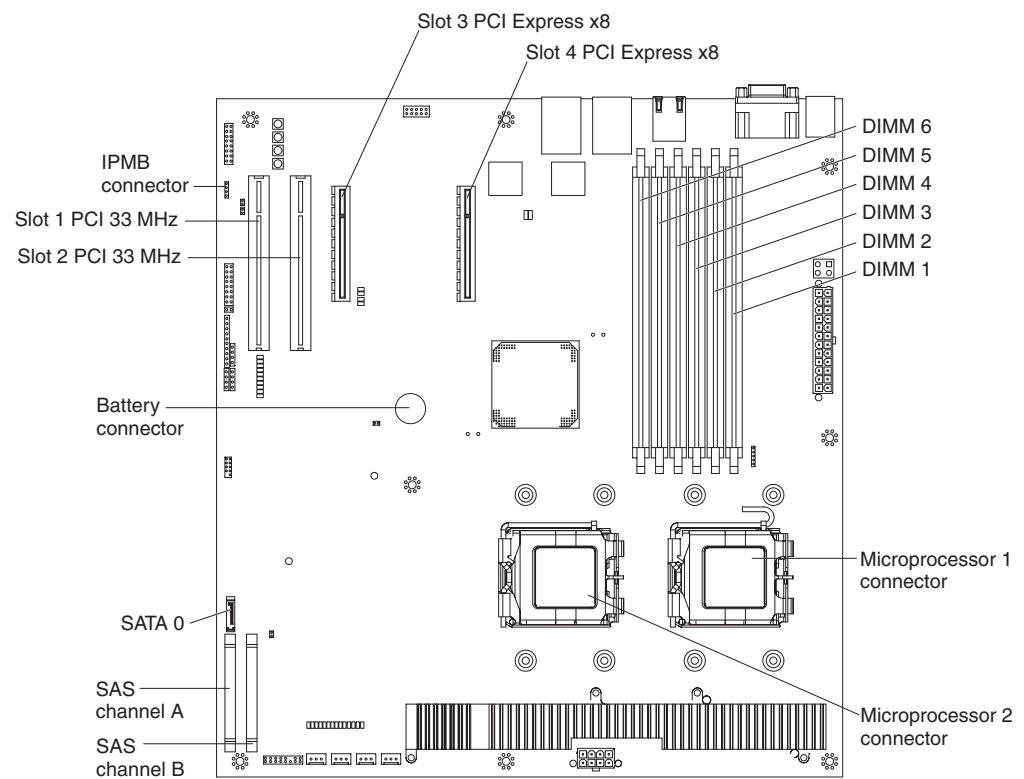
Chapter 2. Installing optional devices

This chapter provides basic instructions for installing optional hardware devices in the server. These instructions are intended for users who are experienced with setting up IBM server hardware. If you need more detailed instructions, see the *User's Guide* on the IBM *System x Documentation* CD.

Statement 27:

CAUTION:
Hazardous moving parts are nearby.

Installation guidelines

Before you install optional devices, read the following information:

- Read the safety information that begins on page v and the guidelines in "Handling static-sensitive devices" on page 11. 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:

  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.

  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, "Solving problems," on page 47 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 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 the following requirements are met:
- 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 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

Statement 27:

CAUTION:
Hazardous moving parts are nearby.

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.

Removing the cover

Important: 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 the *Problem Determination and Service Guide* for diagnostic information.

To remove the cover, complete the following steps:

1. Read the safety information that begins on page v and "Installation guidelines" on page 9.

2. If you are planning to install or remove a microprocessor, memory module, PCI adapter, fan, 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 29).

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.

Cover release thumb screws
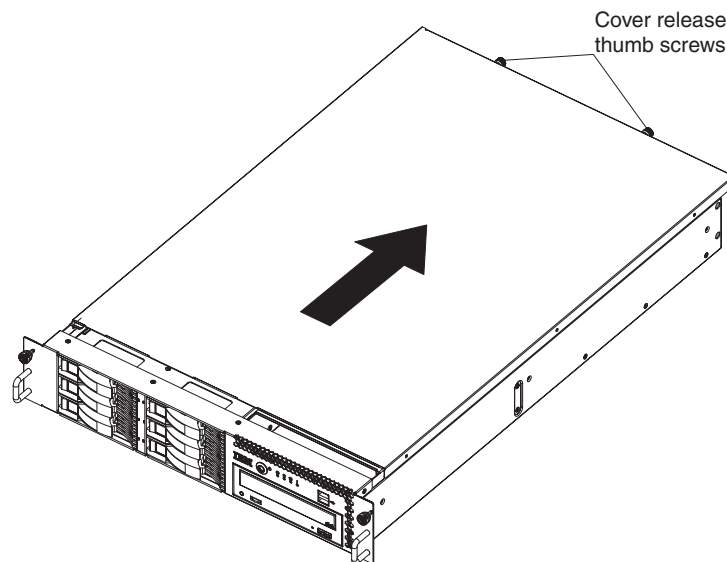
4. Loosen the cover-release thumbscrews at the rear of the server.

5. Slide the cover back approximately 1.27 cm (0.5 inches); then, lift it off the server and set the cover aside.

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

Installing a memory module

The following notes describe the types of dual inline memory modules (DIMMs) that the server supports and other information that you must consider when installing DIMMs:

- The server supports up to 6 registered 512 MB, 1 GB, 2 GB, and 4 GB DDR2 DIMMs, for a maximum of 16 GB of system memory. See http://www.ibm.com/servers/eserver/serverproven/compat/us/ for a list of memory modules that you can use with the server.

  Note: Because some memory is reserved for system operation, the actual usable memory size that is reported by the operating system is less than the total installed size.

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

Table 2. DIMM installation sequence, non-interleaved

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

Table 3. DIMM installation sequence, interleaved

DIMM pair	DIMM connectors
1st	1 and 2
2nd	3 and 4
3rd	5 and 6
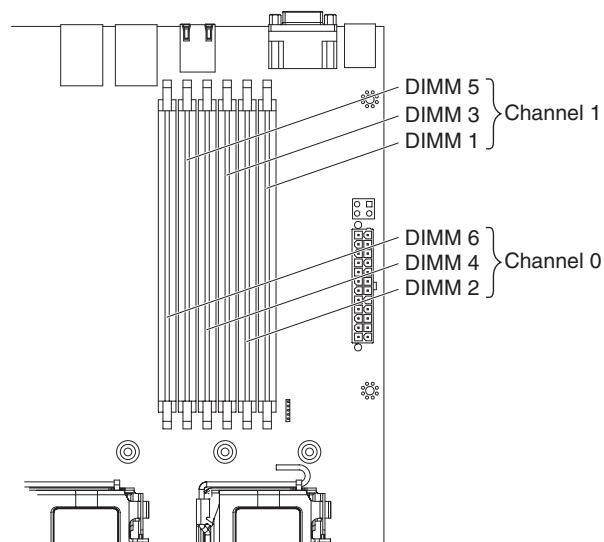
- Each DIMM in a pair must be the same size, speed, type, and technology to ensure that the server will operate correctly.
- When you install or remove DIMMs, the server configuration information changes. When you restart the server, the system displays a message that indicates that the memory configuration has changed.

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 4. 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:
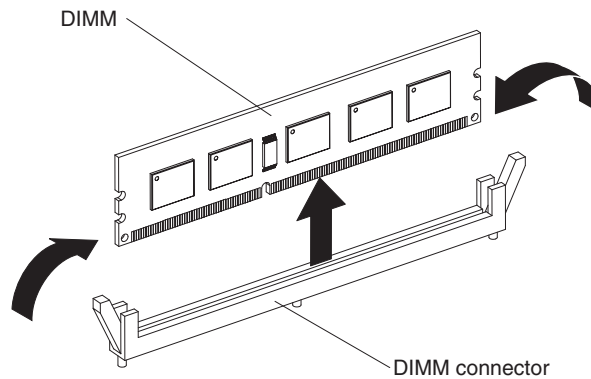
1. Read the safety information that begins on page v and "Installation guidelines" on page 9.
2. Turn off the server and peripheral devices, and disconnect the power cord and all external cables.
3. Remove the cover.

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

Air duct

DIMM

Heat sinks
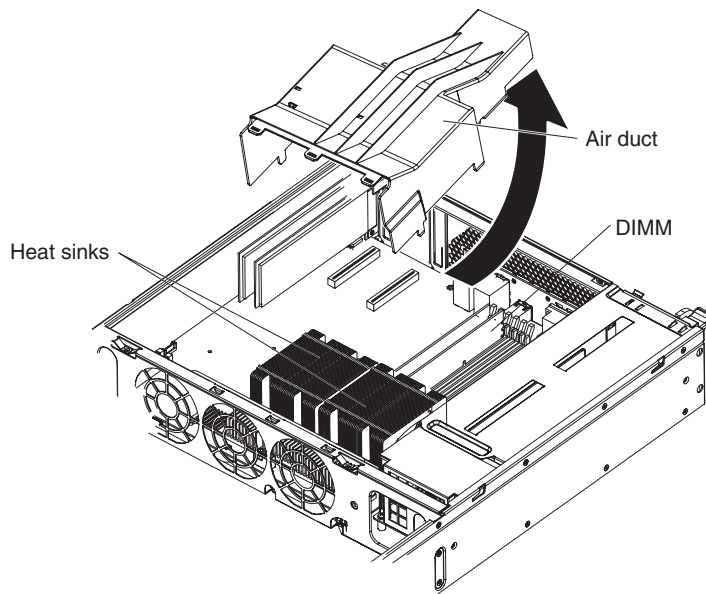
4. Remove the air duct.

5. Open the retaining clip on each end of the DIMM connector.

6. Touch the static-protective package that contains the DIMM to any unpainted metal surface on the outside of the server. Then, remove the DIMM from the package.

7. Turn the DIMM so that the keys align correctly with the connector.

8. Insert the DIMM into the connector. Firmly press the DIMM straight down into the connector. The retaining clips snap into the locked position when the DIMM is firmly seated in the connector.

   Note: If there is a gap between the DIMM and the retaining clips, the DIMM has not been correctly inserted; open the retaining clips, remove the DIMM, and then reinsert it.

9. Replace the air duct.

If you have other optional devices to install, do so now. Otherwise, go to "Completing the installation" on page 24.

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 chapter.

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

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

• The server supports six slim 3.5-inch hard disk drives. For a list of supported 3.5-inch hard disk drives, see http://www.ibm.com/servers/eserver/serverproven/compat/us/.

• All hard disk drives in the server should have the same throughput speed rating. Mixing hard disk drives with different speed ratings will cause all drives to operate at the lower throughput speed.

- The ID that is assigned to each bay is printed on the front of the server.

The following illustration shows how to install a hard disk drive.
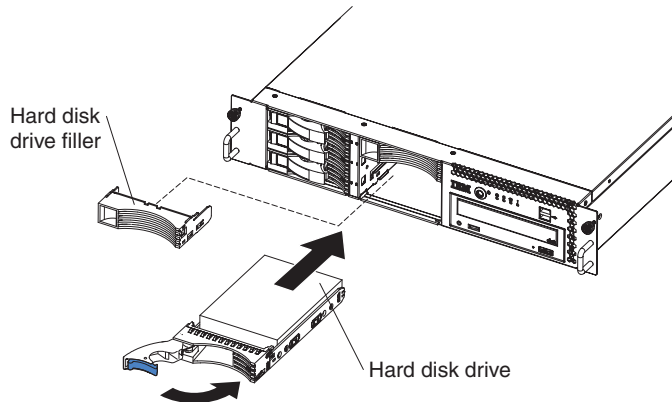
To install a drive in a hard disk drive bay, complete the following steps.

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. Read the safety information that begins on page v, and "Installation guidelines" on page 9.
2. Remove the filler panel from one of the empty hard disk drive bays.
3. Install the hard disk drive in the hard disk drive bay:
   a. Make sure that the tray handle is open (that is, perpendicular to the drive).
   b. Align the drive assembly with the guide rails in the bay.
   c. Gently push the drive assembly into the bay until the drive stops.
   d. Push the tray handle to the closed (locked) position.
   e. 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 32.

If you have other optional devices to install or remove, do so now. Otherwise, go to "Completing the installation" on page 24.

Installing an additional microprocessor

The following notes describe the type of microprocessor that the server supports and other information that you must consider when installing a microprocessor:

- The server supports certain Intel® Xeon® dual-core or quad-core flip-chip land grid array 771 (FC-LGA 771) microprocessors, which are designed for the LGA771 socket. See http://www.ibm.com/servers/eserver/serverproven/compat/us/ for a list of supported microprocessors.

  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.

- The server supports up to two microprocessors. If the server comes with one microprocessor, you can install a second microprocessor.
- Both microprocessors must have the same cache size and type, front-side bus frequency, and the same clock speed. Microprocessor internal and external clock frequencies must be identical.
- Read the documentation that comes with the microprocessor to determine whether you must update the basic input/output system (BIOS) code for the server. To download the most current level of BIOS code and many other code updates for your server, go to http://www.ibm.com/systems/support/, select **System x3610** from the **Hardware** list, and click the **Download** tab.
- (Optional) Obtain an SMP-capable operating system. For a list of supported operating systems and optional devices, go to http://www.ibm.com/servers/eserver/serverproven/compat/us/.
- To order additional microprocessors, contact your IBM marketing representative or authorized reseller.
- The microprocessor speeds are automatically set for this server; therefore, you do not have to set any microprocessor frequency-selection jumpers or switches.
- If you have to replace a microprocessor, call for service.
- If the thermal-grease protective cover (for example, a plastic cap or tape liner) is removed from the heat sink, do not touch the thermal grease on the bottom of the heat sink or set down the heat sink.
- Do not remove the first microprocessor from the system board to install the second microprocessor.

The following illustration shows the microprocessor connector locations on the system board.

Microprocessor 1 connector (CPU0)

Microprocessor 2 connector (CPU1)
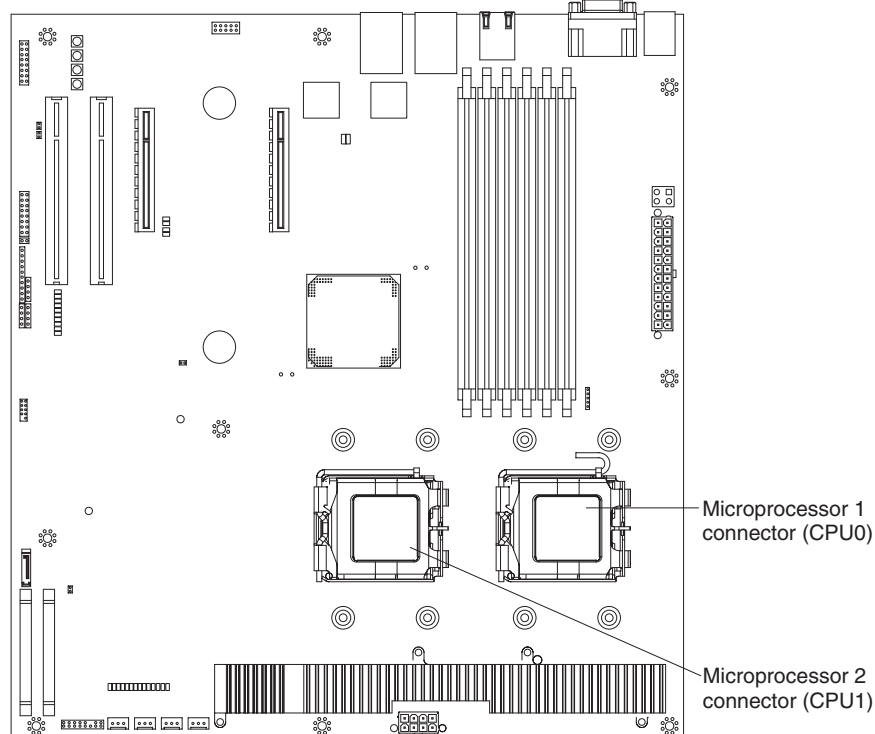
The following illustration shows how to install the second microprocessor on the system board.

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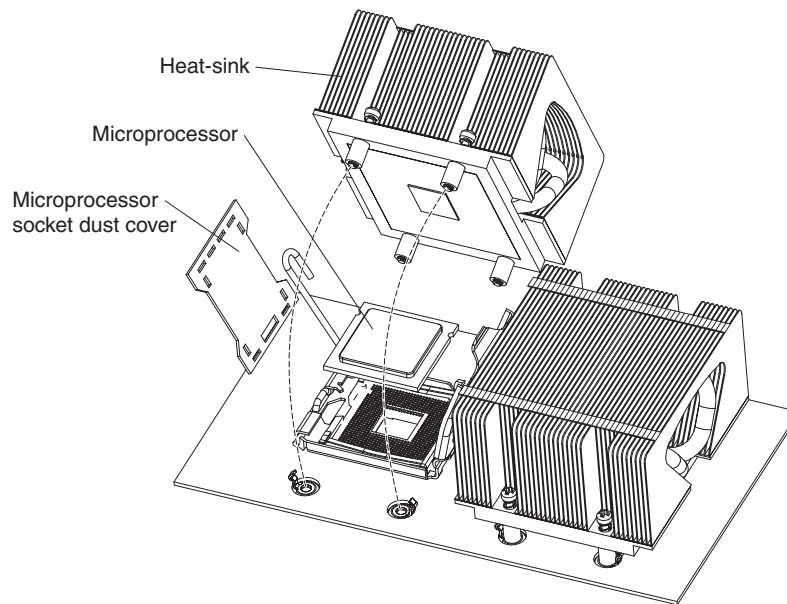

Attention:

- A startup (boot) processor must always be installed in microprocessor connector 1 on the system board.
- To ensure correct server operation when you install an additional microprocessor, use microprocessors that have the same cache size and type, and the same clock speed. Microprocessor internal and external clock frequencies must be identical.

To install an additional microprocessor, complete the following steps:

1. Read the safety information that begins on page v and "Installation guidelines" on page 9.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.
3. Remove the server cover.

   Attention: When you handle static-sensitive devices, take precautions to avoid damage from static electricity. For details about handling these devices, see "Handling static-sensitive devices" on page 11.
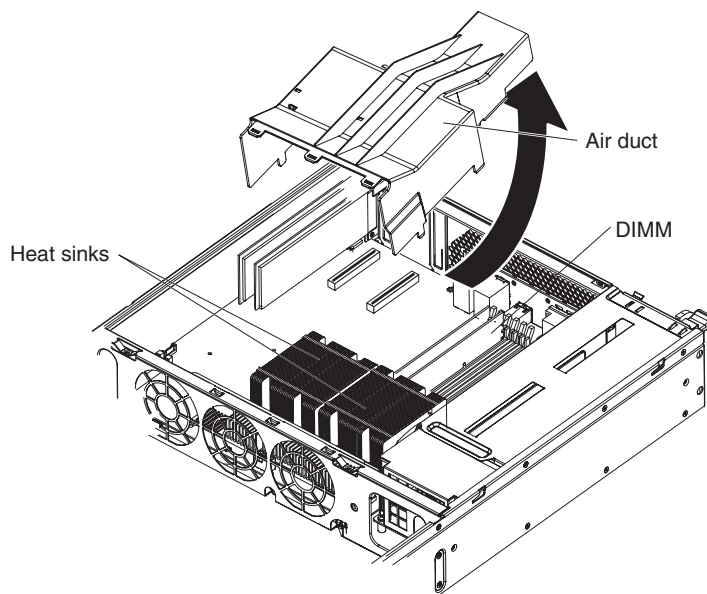
4. Remove the air duct.
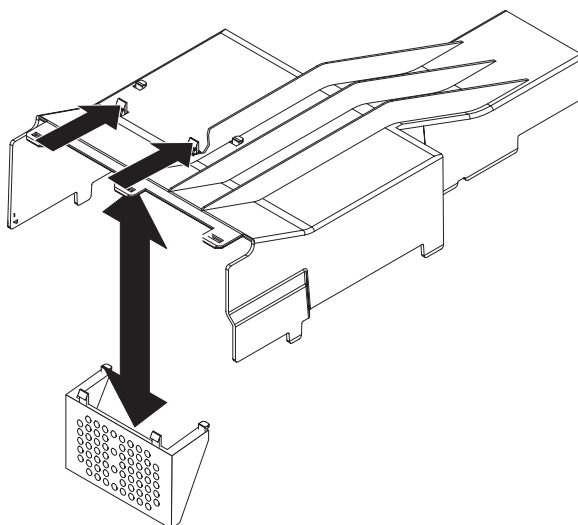
5. Remove the air-baffle insert from the air duct:
   a. From the top of the air duct, push the tabs of the air-baffle insert toward the rear of the air duct until they are free from the slots in the air duct.
   b. Push the air-baffle insert down and out of the air duct.
6. Install the microprocessor:
   a. Touch the static-protective package that contains the microprocessor to any unpainted metal surface on the server. Then, remove the microprocessor from the package.

Microprocessor socket dust cover

Microprocessor release lever

Microprocessor bracket frame
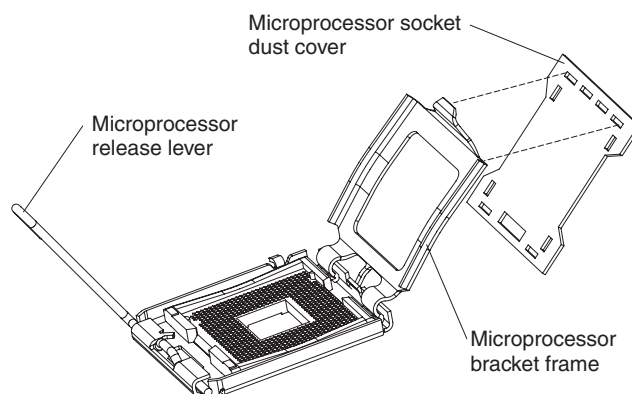
b. Remove the protective dust cover, tape, or label from the surface of the microprocessor socket, if one is present.

c. Rotate the microprocessor release lever on the socket from its closed and locked position until it stops in the fully open position.

d. Lift the microprocessor bracket frame to the open position.

Attention:

- Handle the microprocessor carefully, by the edges only. 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 correctly aligned and positioned in the socket before you try to close the lever.


Notches
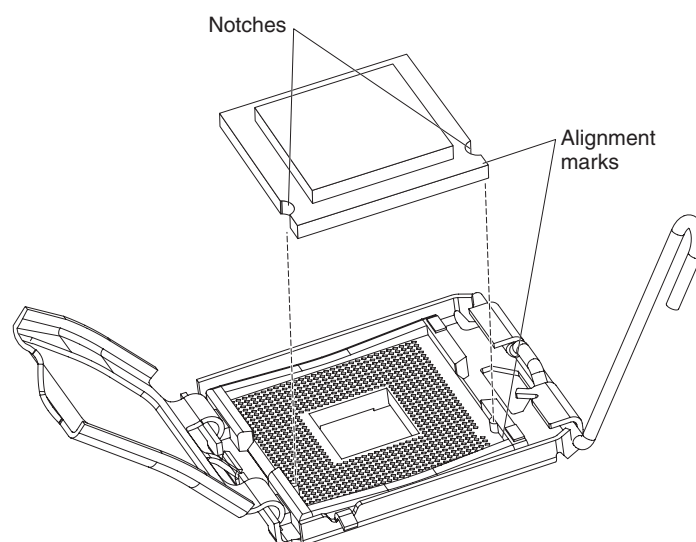
Alignment marks

e. 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.

f. 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.
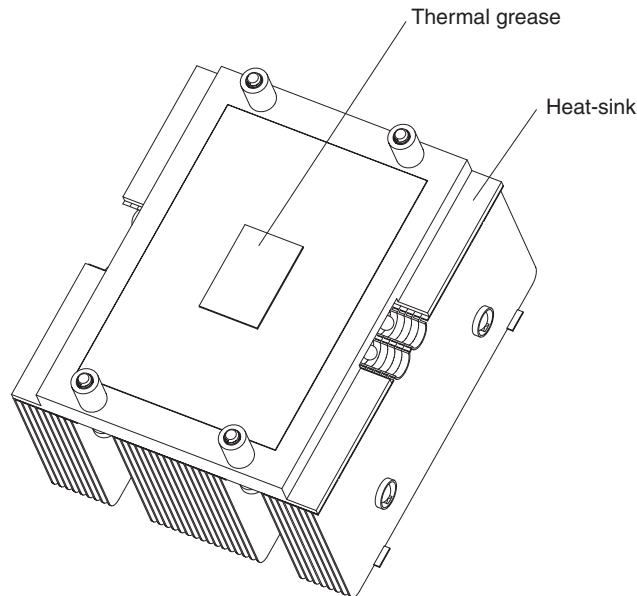
a. Remove the plastic protective cover from the bottom of the heat sink.
b. Align the heat sink above the microprocessor with the thermal grease side down.
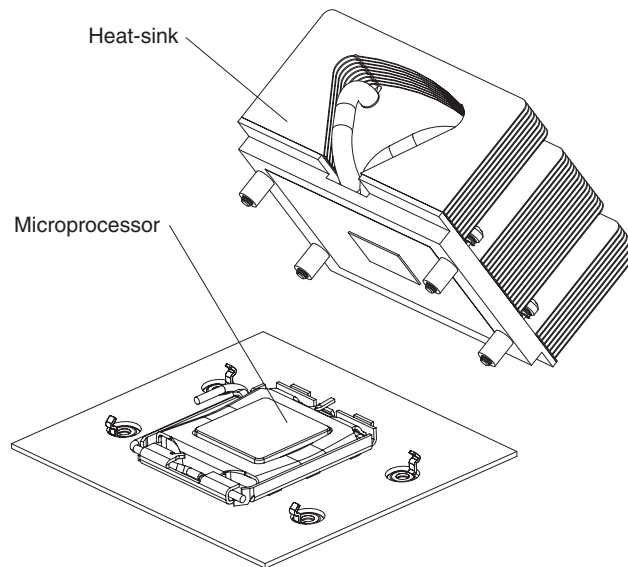
c. Press down firmly on the heat sink until it is seated securely.
d. Tighten the four screws that secure the heat sink to the system board.
8. Install the air duct.

If you have other optional devices to install or remove, do so now. Otherwise, go to "Completing the installation" on page 24.

Installing an adapter
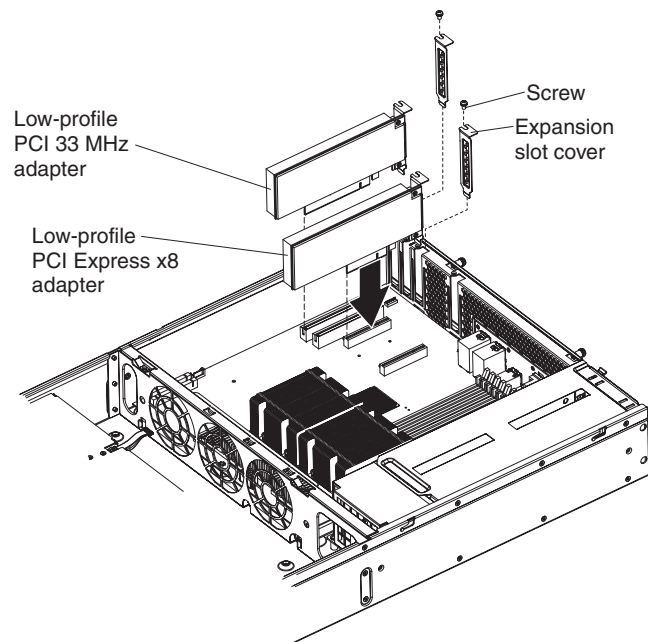
The following illustration shows the locations of the adapter expansion slots.
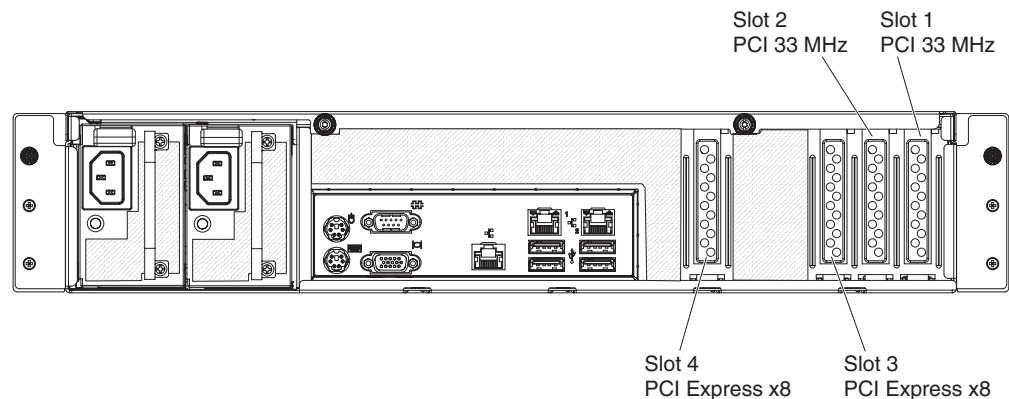
The following notes describe the types of adapters that the server supports and other information that you must consider when installing an adapter:

- You can install only low-profile adapters in the adapter slots on the system board.
- The PCI bus configuration is as follows (see "System-board optional-device connectors" on page 7 for a system-board view of the slots):
  - Non-hot-plug, low-profile PCI Express x8, slot 4
  - Non-hot-plug, low-profile PCI Express x8, slot 3
  - Non-hot-plug, low-profile, half-length, 33 MHz, 3.3 V / 5V PCI, slot 2
  - Non-hot-plug, low-profile, half-length, 33 MHz, 3.3 V / 5V PCI, slot 1
- The system scans devices in the following order, if you have not changed the default boot precedence: PCI slot 3 (PCI Express), PCI slot 4 (PCI Express), integrated Ethernet 1, integrated Ethernet 2, PCI slot 1, PCI slot 2, integrated SAS controller.

To install an adapter, complete the following steps:

1. Read the safety information that begins on page v and "Installation guidelines" on page 9.

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

3. Remove the cover.

4. Determine which expansion slot you will use for the adapter.

5. Remove the screw that holds the expansion-slot cover and slide the cover out of the expansion slot.

6. Install the adapter.

7. Install the screw that holds the adapter in the expansion slot.

8. 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.

9. Perform any configuration tasks that are required for the adapter.

If you have other optional devices to install, do so now. Otherwise, go to "Completing the installation" on page 24.

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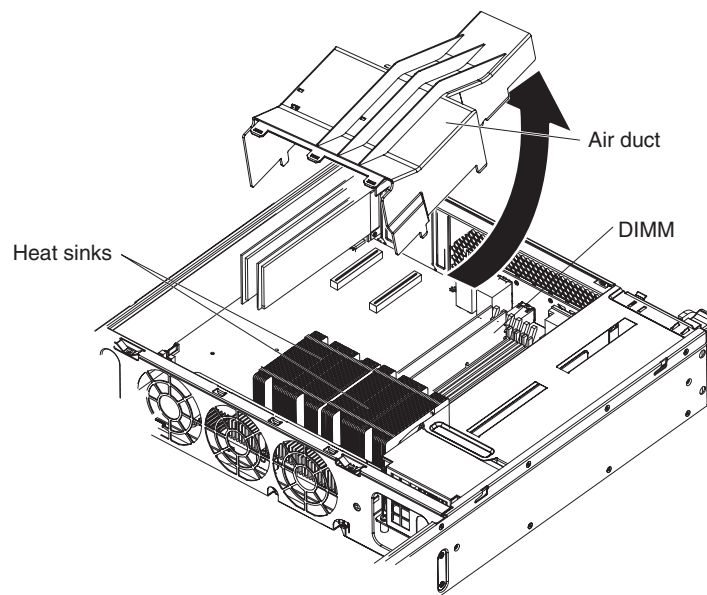
To remove the air duct, complete the following steps:

1. Read the safety information that begins on page v and "Installation guidelines" on page 9.

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

3. Remove the cover.

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.

   If you have other optional devices to install or remove, do so now. Otherwise, go to "Completing the installation."

Completing the installation

To complete the installation, complete the following steps:

1. Install the cover. See "Installing the cover" for more information.
2. Install the server in the rack cabinet. See the *Rack Installation Instructions* that come with the server for detailed information about how to install the server in a rack cabinet.

   Attention:
   - Install the server only in a rack cabinet that has perforated doors.
   - Do not leave open space above or below an installed server in your rack cabinet. To help prevent damage to server components, always install a filler panel to cover the open space and to help ensure proper air circulation. See the documentation that comes with the rack cabinet for more information.
3. Connect the cables and power cords. See "Connecting the cables" on page 24 for more information.
4. Update the server configuration. See "Updating the server configuration" on page 25 for more information.
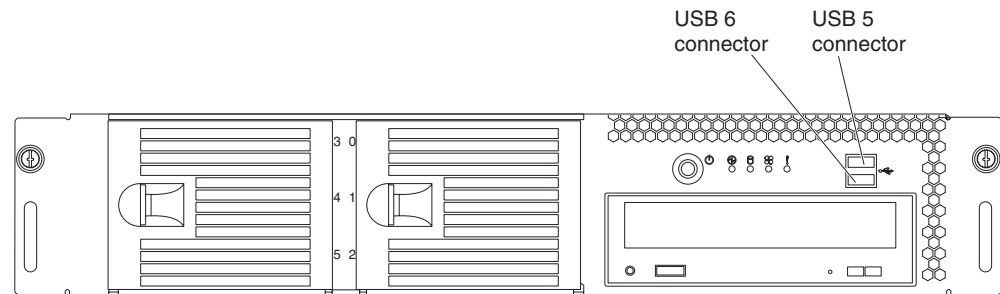
Installing the cover

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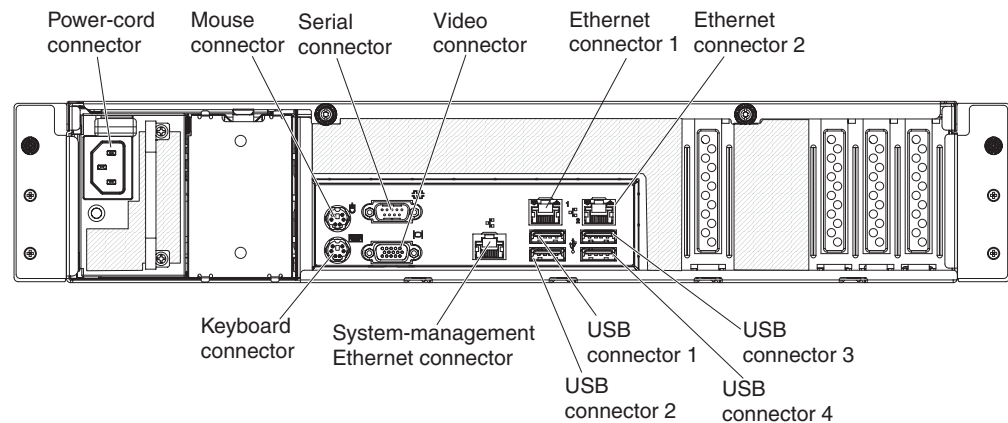

Cover release thumb screws
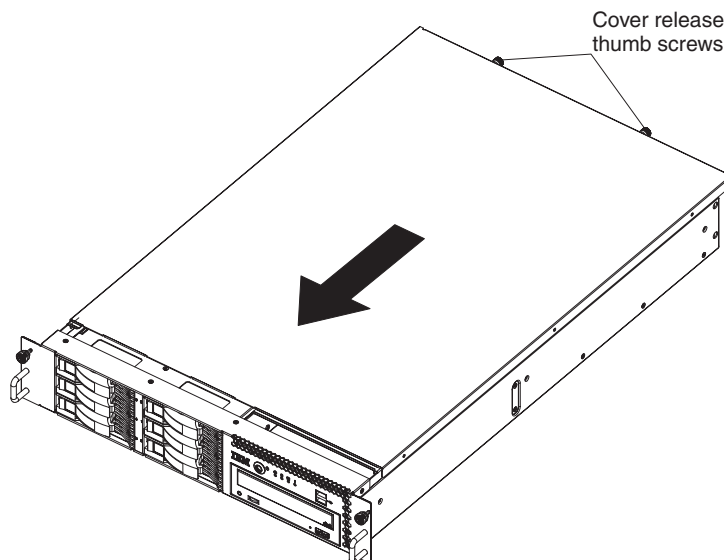
Connecting the cables

The following illustrations show the locations of the input and output connectors on the front and rear of the server.

Front view

USB 6 connector   USB 5 connector

Rear view

Power-cord connector   Mouse connector   Serial connector   Video connector   Ethernet connector 1   Ethernet connector 2

Keyboard connector   System-management Ethernet connector   USB connector 1   USB connector 3

USB connector 2   USB connector 4

You must turn off the server before you connect or disconnect cables from the server.

See the documentation that comes with any external devices for additional cabling instructions. It might be easier for you to route cables before you connect the devices to the server.

Cable identifiers are printed on the cables that come with the server and optional devices. Use these identifiers to connect the cables to the correct connectors.

Updating the server configuration

Some optional devices have device drivers that you must install. See the documentation that comes with each optional device for information about installing device drivers.

The server comes with at least one microprocessor. If more than one microprocessor is installed, the server can operate as a symmetric multiprocessing (SMP) server. You might have to upgrade the operating system to support SMP. For more information, see "Using the ServerGuide Setup and Installation CD" on page 31 and the operating-system documentation.

If you have installed or removed a hard disk drive, see "Using the RAID configuration programs" on page 32 for information about reconfiguring the disk arrays.

For information about configuring the integrated Gigabit Ethernet controllers, see the *User's Guide*.

Chapter 3. 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.
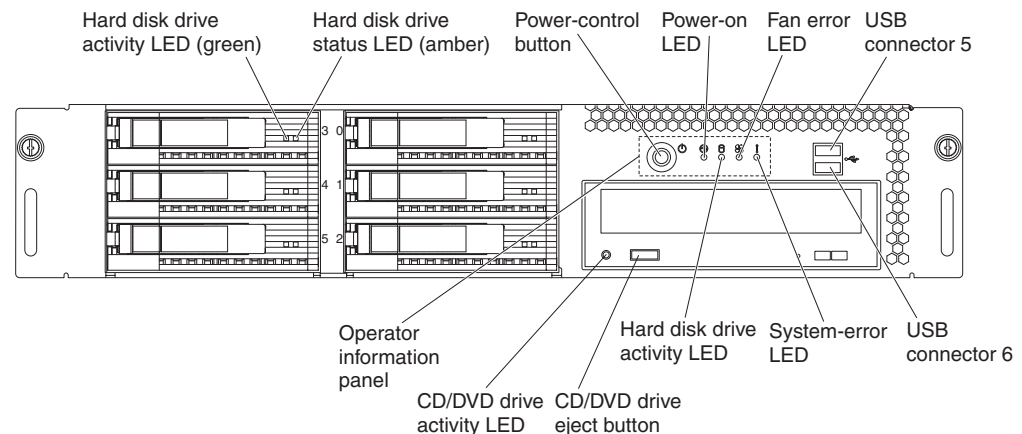
Hard disk drive activity LED: Each hot-swap hard disk drive has an activity LED. When this LED is flashing, it indicates that the drive is in use.

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, LEDs, and connectors 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-RW/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.
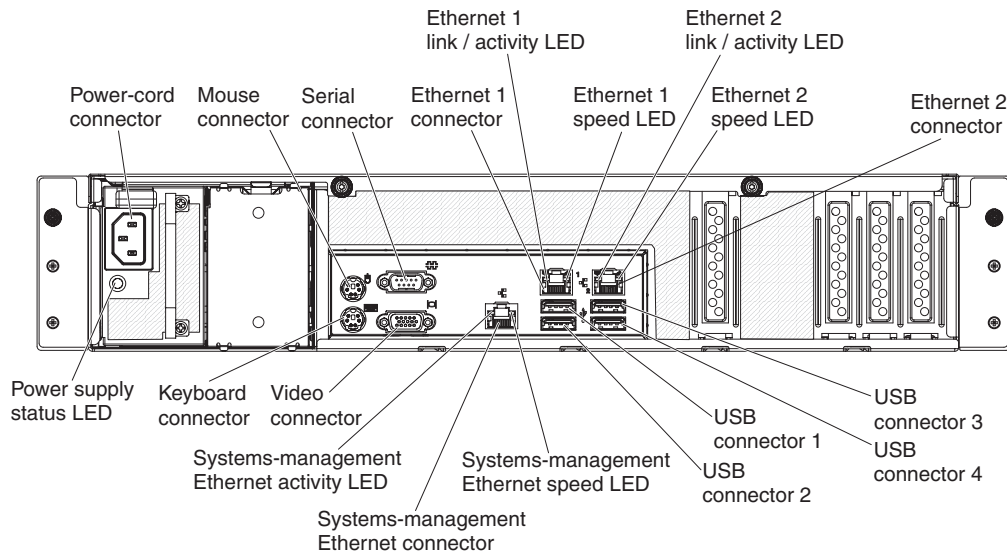
Power-cord connector: Connect the power cord to this connector.

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 the "Diagnostics" section of the *Problem Determination and Service Guide*.

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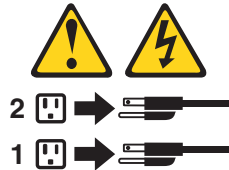
Some operating systems require an orderly shutdown before you turn off the server. See your operating-system documentation for information about shutting down the operating system.

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.

Chapter 4. Configuring the server

The *ServerGuide Setup and Installation* CD provides software setup tools and installation tools that are specifically designed for your IBM server. Use this CD during the initial installation of the server to configure basic hardware features and to simplify the operating-system installation. (See "Using the ServerGuide Setup and Installation CD" for more information.)

In addition to the *ServerGuide Setup and Installation* CD, you can use the following configuration programs to customize the server hardware:

- BIOS Setup Utility program
- Baseboard management controller utility programs
- RAID configuration programs
    - LSI Logic Configuration Utility program
    - LSI Logic MegaRAID Storage Manager program

For more information about these programs, see "Configuring the server" in the *User's Guide* on the IBM *System x Documentation* CD.

Using the ServerGuide Setup and Installation CD

The *ServerGuide Setup and Installation* CD provides programs to detect the server model and installed optional hardware devices, configure the server hardware, provide device drivers, and help you install the operating system. For information about the supported operating-system versions, see the label on the CD. If the *ServerGuide Setup and Installation* CD did not come with the server, you can download the latest version from http://www.ibm.com/pc/qtechinfo/ MIGR-4ZKPPT.html, or download the necessary device drivers from http://www.ibm.com/systems/support/ (see the instructions on page 1).

To start the *ServerGuide Setup and Installation* CD, complete the following steps:

1. Insert the CD, and restart the server. If the CD does not start, see "ServerGuide problems" on page 51.
2. Follow the instructions on the screen to:
    a. Select your language.
    b. Select your keyboard layout and country.
    c. View the overview to learn about ServerGuide features.
    d. View the readme file to review installation tips about your operating system and adapter.
    e. Start the setup and hardware configuration programs.
    f. Start the operating-system installation. You will need your operating-system CD.

Using the BIOS Setup Utility program

The BIOS Setup Utility program is part of the BIOS. You can use it 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 log

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

1. Turn on the server.
2. When the message `Press F1 for Configuration/Setup` appears, press F1. If a supervisor password has been set, you must type the supervisor password to access the full BIOS Setup Utility menu.
3. Follow the instructions on the screen.

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. Be sure to use these programs as described in this document.

- Use the LSI Logic Configuration Utility program to:
  - Perform a low-level format on a hard disk drive
  - View or change IDs for attached devices
  - Set protocol parameters on hard disk drives
- 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.

Consider the following information when using the LSI Logic Configuration Utility program and LSI Logic MegaRAID Storage Manager program to configure and manage arrays:

- The SATA connectors on the system board support RAID level-0, level-1, and level-1E.
- An optional ServeRAID controller provides additional RAID level support to the hot-swap drives (see http://www.ibm.com/servers/eserver/serverproven/compat/ us/ for a list of supported ServeRAID controllers).
- Hard disk drive capacities affect how you create arrays. The drives in an array can have different capacities, but the ServeRAID 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 RAID Configuration Utility program

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

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

Starting the LSI Logic RAID Configuration Utility program

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

1. Turn on the server.
2. When the prompt `<<< Press <CTRL><C> for LSI Logic RAID Configuration Utility! >>>` appears, press Ctrl+C.
3. To select a choice from the menu, follow the instructions on the screen.

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 the instructions in the *User's Guide* on the IBM *System x Documentation* CD 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.

Important: The server Ethernet ports are set to DHCP by default. In order to find your BMC on an existing network, you will need to identify the server by the default hostname. The default hostname for each server is the last 8 characters of the BMC MAC address. The BMC MAC address can be found in the setup utility, on a label on the system board, and on a tag hanging from the front of the server. Once you have deployed your server, make sure that you remove the BMC MAC address tag from the front of the server so that it does not impede airflow through the front of the server.

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, complete the following steps to 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.

To configure the general Linux parameters for SOL operation when using the SLES 9.0 operating system, complete the following steps.

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. Complete the following steps to 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`
`title floppy`
	1

Modified /boot/grub/menu.lst contents	Notes

``
  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 supervisor access to perform this procedure.

1. Complete the following steps to 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. Complete the following steps to 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
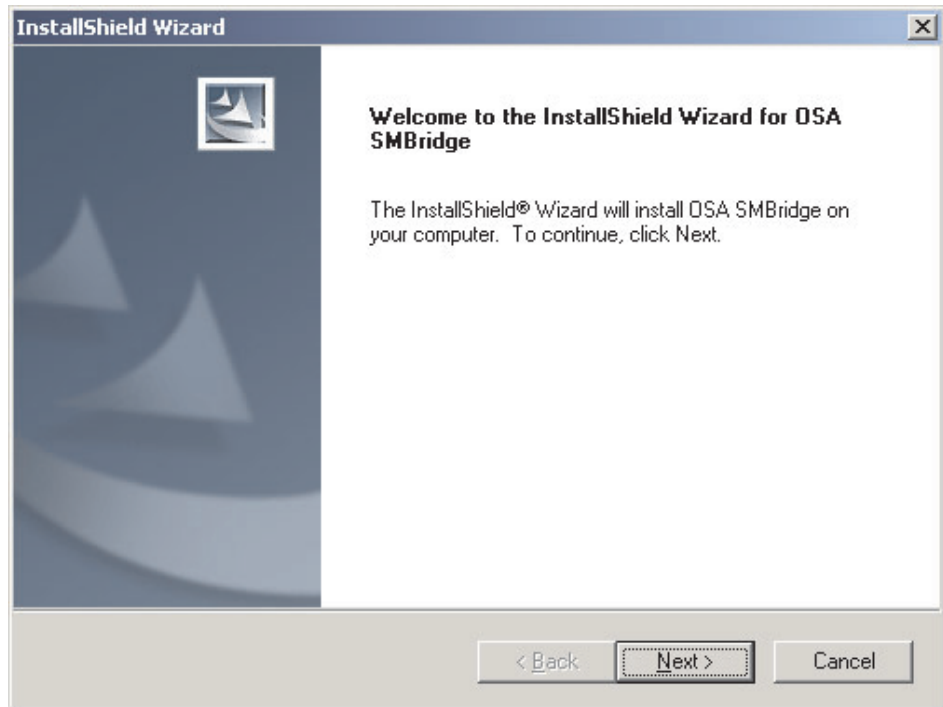Path: multi(0)disk(0)rdisk(0)partition(1)\WINDOWS
OS Load Options: /fastdetect
```

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 -ivh 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 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).

Chapter 5. Solving problems

This chapter provides basic troubleshooting information to help you solve some common problems that might occur while you are setting up 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 65, the *Problem Determination and Service Guide* on the IBM *System x Documentation* CD, and the "Server Support" flowchart in the front of this document.

Diagnostic tools overview

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

- **POST beep codes**

  The power-on self-test beep codes indicate the detection of a problem.

  - Two beeps indicates successful completion of POST, with no errors.
  - Any other sequence of beep codes, including no beep code, indicates that POST detected a problem. Error messages also appear during startup if POST detects a hardware-configuration problem.

    See "POST beep codes" and the *Problem Determination and Service Guide* on the IBM *System x Documentation* CD for more information.

- **Troubleshooting tables**

  These tables list problem symptoms and steps to correct the problems. See "Troubleshooting tables" on page 52 for more information.

- **Diagnostic programs and error messages**

  The system diagnostic programs are provided in ROM. These programs test the major components of the server. See the *Problem Determination and Service Guide* on the IBM *System x Documentation* CD for more information.

POST beep codes

POST emits two beeps to signal successful completion. If POST detects a problem during startup, other beep codes might occur. Use the following beep code descriptions to help diagnose and solve problems that are detected during startup.

Note: See the *Problem Determination and Service Guide* on the IBM *System x Documentation* CD for more information about the POST beep codes.

Two beeps
> POST was completed successfully without finding any errors.

No beeps
> See the *Problem Determination and Service Guide* on the IBM *System x Documentation* CD for information about absence of beep codes.

Other beep codes
> See the *Problem Determination and Service Guide* on the IBM *System x Documentation* CD for information about other beep codes.

POST error codes

The following table provides an abbreviated list of the error codes that might appear during POST. See the *Problem Determination and Service Guide* on the IBM *System x Documentation* CD for more information about the POST error codes. To check for updated technical information, go to http://www.ibm.com/systems/support/, select **System x3610**, click the **Install and use** tab, and click **Product documentation**.

- Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
- See "Parts listing" in the *Problem Determination and Service Guide* 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 the *Problem Determination and Service Guide* 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

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

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See "Parts listing" in the** *Problem Determination and Service Guide* **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
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

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.

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**	
• **See "Parts listing" in the** *Problem Determination and Service Guide* **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
8601	BMC not responding.	1. Update the firmware on the baseboard management controller. 2. (Trained service technician only) Replace the system board.

ServerGuide problems

The following table lists problem symptoms and suggested solutions.

Table 5. ServerGuide Setup and Installation CD

Symptom	Suggested 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
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.

Troubleshooting tables

Use the troubleshooting tables to find solutions to problems that have identifiable symptoms. See the *Problem Determination and Service Guide* on the IBM *System x Documentation* CD for more detailed troubleshooting information. If you cannot find the problem in these tables, run the diagnostic programs (see "Running the diagnostic programs" in the *Problem Determination and Service Guide*).

If you have just added new software or a new optional device and the server is not working, complete the following steps before using the troubleshooting tables:

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

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 the parts listing in the *Problem Determination and Service Guide* 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.
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 the parts listing in the *Problem Determination and Service Guide* 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 the parts listing in the *Problem Determination and Service Guide* 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 the parts listing in the *Problem Determination and Service Guide* 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" in the *Problem Determination and Service Guide*). 3. See "Solving undetermined problems" in the *Problem Determination and Service Guide*.
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 watchdog setting), make sure that sufficient time is allowed in the watchdog timeout value (**BMC POST Watchdog Timeout**). See the *User's Guide* for information about the settings in the BIOS Setup Utility program. If the server continues to reset during POST, see the "POST" and "Diagnostic programs" sections in the *Problem Determination and Service Guide*. 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 63. 3. If neither condition applies, check the event and error logs (see "Error Logs" in the *Problem Determination and Service Guide*).

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 the parts listing in the *Problem Determination and Service Guide* 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 the parts listing in the *Problem Determination and Service Guide* 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 the parts listing in the *Problem Determination and Service Guide* 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 13).
	  • 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" in the *Problem Determination and Service Guide*).
	4. 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 13.
	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 the parts listing in the *Problem Determination and Service Guide* 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 the *Problem Determination and Service Guide*). 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 the parts listing in the *Problem Determination and Service Guide* 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 the *Problem Determination and Service Guide*). If the monitor passes the diagnostic programs, the problem might be a video device driver. 4. (Trained service technician only) Replace the system board
The screen is blank.	1. 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 62. • 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 the *Problem Determination and Service Guide* for information about recovering from a BIOS failure. 5. See the *Problem Determination and Service Guide* 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 the *Problem Determination and Service Guide* for information about running the diagnostic programs). If the server passes the video diagnostics, the video is good; see the *Problem Determination and Service Guide* for information about solving undetermined problems.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the parts listing in the *Problem Determination and Service Guide* to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Symptom	Action
The monitor has screen jitter, or the screen image is wavy, unreadable, rolling, or distorted.	1. If the monitor self-tests show that the monitor is working correctly, consider the location of the monitor. Magnetic fields around other devices (such as transformers, appliances, fluorescent lights, and other monitors) can cause screen jitter or wavy, unreadable, rolling, or distorted screen images. If this happens, turn off the monitor. **Attention:** Moving a color monitor while it is turned on might cause screen discoloration. Move the device and the monitor at least 305 mm (12 in.) apart, and turn on the monitor. **Notes:** a. To prevent diskette drive read/write errors, make sure that the distance between the monitor and any external diskette drive is at least 76 mm (3 in.). b. Non-IBM monitor cables might cause unpredictable problems. 2. Reseat the 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
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 the parts listing in the *Problem Determination and Service Guide* 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 the parts listing in the *Problem Determination and Service Guide* 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" and "Solving undetermined problems" in the *Problem Determination and Service Guide*.

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" in the *Problem Determination and Service Guide*.

Serial port problems

Symptom	Action
• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See the parts listing in the *Problem Determination and Service Guide* 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 28).
	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

Software problems

Symptom	Action
• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See the parts listing in the *Problem Determination and Service Guide* 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 the parts listing in the _Problem Determination and Service Guide_ 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 the _User's Guide_ 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 59.

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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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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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.

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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:

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

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

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该产品可能会造成无线电干扰。
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