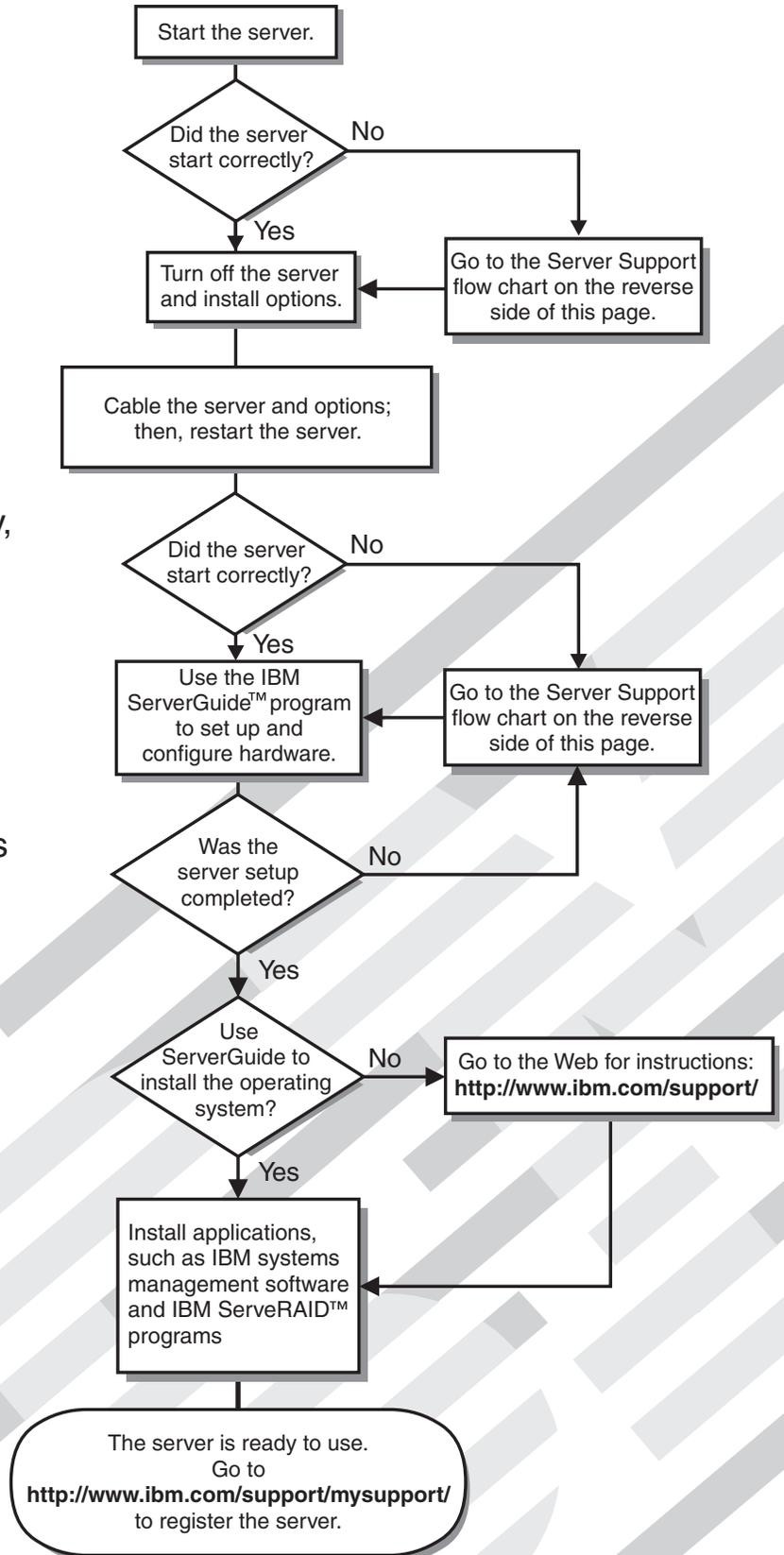# IBM

System x3500
Type 7977

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.
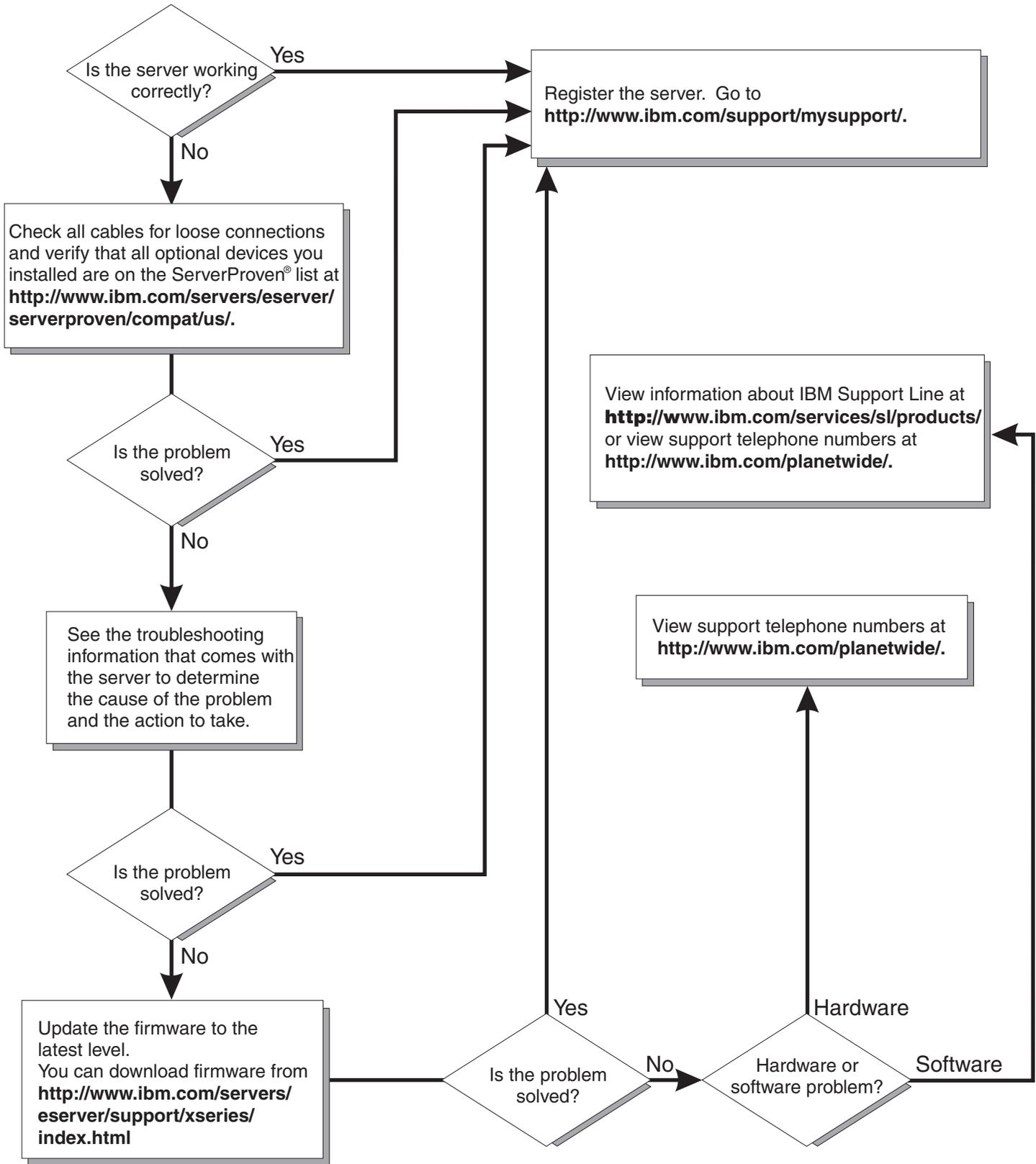
This server *Installation Guide* contains information for setting up and configuring your server.

For detailed information about your server, view the publications on the Documentation CD.

You can also find the most current information about your server at:
http://www.ibm.com/support/servers/eserver/support/xseries/index.html.

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.

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 → Go to the Server Support flow chart on the reverse side of this page.

Yes ↓

Use ServerGuide to install the operating system? — No → Go to the Web for instructions: **http://www.ibm.com/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 → Register the server. 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 → Register the server. 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 → Register the server. 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/servers/ eserver/support/xseries/ index.html**

→ Is the problem solved?

Yes → Register the server. 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 x3500 Type 7977

Installation Guide

Note: Before using this information and the product it supports, read the general information in Appendix B, "Notices," on page 77 and the *Warranty and Support Information* document on the IBM *Documentation* CD.

Second Edition (November 2006)

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:

All caution and danger statements in this documentation begin with a number. This number is used to cross reference an English caution or danger statement with translated versions of the caution or danger statement in the *IBM Safety Information* book.

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

Be sure to read all caution and danger statements in this documentation before performing the instructions. Read any additional safety information that comes with 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:
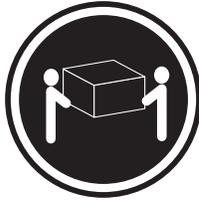
≥ 18 kg (39.7 lb)   ≥ 32 kg (70.5 lb)   ≥ 55 kg (121.2 lb)
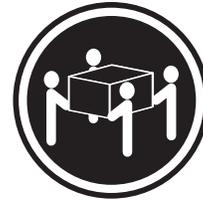
CAUTION:
Use safe practices when lifting.

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 11:

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

Statement 17:

CAUTION:
The following label indicates moving parts nearby.

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

WARNING: Handling the cord on this product or cords associated with accessories sold with this product, will expose you to lead, a chemical known to the State of California to cause cancer, and birth defects or other reproductive harm. *Wash hands after handling.*

ADVERTENCIA: El contacto con el cable de este producto o con cables de accesorios que se venden junto con este producto, pueden exponerle al plomo, un elemento químico que en el estado de California de los Estados Unidos está considerado como un causante de cancer y de defectos congénitos, además de otros riesgos reproductivos. *Lávese las manos después de usar el producto.*

Chapter 1. Introduction

This *Installation Guide* contains instructions for setting up your IBM® System x3500 Type 7977 server and basic instructions for installing some options. More detailed instructions for installing options 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 options
- Solving problems

If firmware and documentation updates are available, you can download them from http://www.ibm.com/support/. 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, go to http://www.ibm.com/support/. For firmware updates, click **Downloads and drivers**. For documentation updates, under **Search technical support**, type **IBM System x3500** and click **Search**.

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.

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.

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/eserver/xseries/.

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 x3500
Machine type	7977
Model number	_____
Serial number	_____
Key serial number	_____
Key manufacturer	_____
Key phone number	_____

The model number and serial number are on labels on the bottom of the server and on the front, visible through the bezel, as shown in the following illustration.

Model type/serial
number
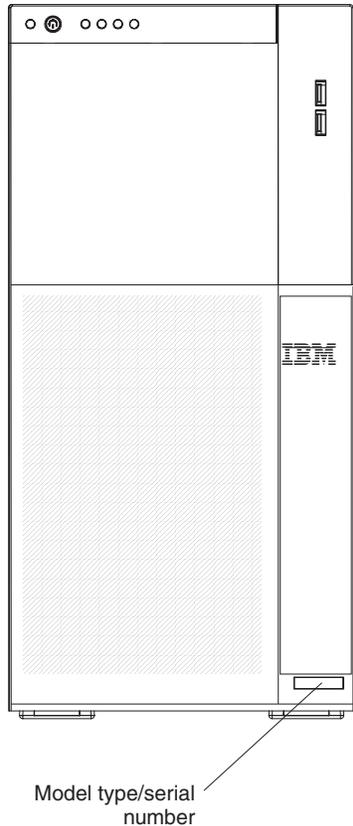
Important: The server keys cannot be duplicated by a locksmith. If you lose them, order replacement keys from the key manufacturer. The key serial number and the telephone number of the manufacturer are on a tag that is attached to the keys.

If you plan to install the server in a rack, you must purchase a Tower-to-Rack Kit. For a list of supported options for the server, see the ServerProven® list at http://www.ibm.com/servers/eserver/serverproven/compat/us/.

The IBM Documentation CD

The IBM *System x Documentation* CD contains documentation for the server in Portable Document Format (PDF) and includes the IBM System x 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 NT® 4.0 (with Service Pack 3 or later), Windows® 2000, or Red Hat Linux.

  Note: Microsoft NT is not supported on the IBM System x3500.
- 100 MHz microprocessor.
- 32 MB of RAM.
- Adobe Acrobat Reader 3.0 (or later) or xpdf, which comes with Linux operating systems. Acrobat Reader software is included on the CD, and you can install it when you run the Documentation Browser.

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 use 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 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 drive and click **Start --> Run**. In the **Open** field, type

    `e:\win32.bat`

    where *e* is the drive letter of the drive, and click **OK**.
  - If you are using Red Hat Linux, insert the CD into the 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 appears 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 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.

*Table 1. Features and specifications*

Microprocessor:
- Intel® Xeon™ dual-core or two Clovertown quad-core with 4096 KB (minimum) Level-2 cache
  Important: Do not mix dual-core and quad-core processors in the same system.
- Support for up to two microprocessors
- Support for Intel Extended Memory 64 Technology (EM64T)

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

Memory:
- Minimum: 1 GB depending on server model, expandable to 48 GB
- Type: 667 MHz, PC2-5300, ECC Fully Buffered DIMMs (FBD) with double data rate (DDR) II, SDRAM
- Connectors: Twelve 240-pin dual inline memory module (DIMM) connectors

Drives:
- IDE:
  - DVD (standard)
  - CD, CD-RW, DVD/CD-RW (optional)
  - Maximum of two devices can be installed
- Diskette (optional): External USB 1.44 MB
- Supported hard disk drives:
  - Serial Attached SCSI (SAS)
  - Serial Advanced Technology Attachment (SATA)

Expansion bays:
- Eight hot-swap SAS, 3.5-inch bays
- Three half-high 5.25-inch bays (DVD drive installed)
  Note: Full-high devices such as an optional tape drive will occupy two half-high 5.25-inch bays.

PCI and PCI-X expansion slots:
- Six PCI expansion slots
  - Three PCI Express x8 (two x8 links and one x4 link
  - One PCI 33 MHz/32-bit
  - Two PCI-X 2.0 133 MHz/64-bit slots

Upgradeable microcode:
System BIOS, service processor, BMC, and SAS microcode

Power supply:
Note: To upgrade to two 835-watt hot-swap power supplies, install the redundant power and cooling option kit. Kit includes one 835-watt power-supply and three hot-swap fans.
- Standard: One 835-watt 110 V or 240 V ac input dual-rated power supply
- Upgradeable to two 835-watt hot-swap power supplies

Hot-swap fans:
- Three (standard)
- Upgradeable to six fans (for redundant cooling)

Note: To upgrade to redundant cooling. Install the redundant power and cooling option kit. Kit includes one 835-watt hot-swap power-supply and three hot-swap fans.

Size:
- Tower
  - Height: 440 mm (17.3 in.)
  - Depth: 747 mm (29.4 in.)
  - Width: 218 mm (8.6 in.)
  - Weight: approximately 38 kg (84 lb) when fully configured or 20 kg (42 lb) minimum
- Rack
  - 5 U
  - Height: 218 mm (8.6 in.)
  - Depth: 696 mm (27.4 in.)
  - Width: 424 mm (16.7 in.)
  - Weight: approximately 34 kg (75 lb) when fully configured or 20 kg (42 lb) minimum

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 4.45 cm (1.75 inches) tall.

Integrated functions:
- Baseboard management controller (Intelligent Platform Management Interface (IPMI) 2.0 compliant)
- Service processor support for Remote Supervisor Adapter II SlimLine
- Light path diagnostics
- ServeRAID-8k SAS Controller, 512 MB with battery backup, that supports RAID levels 0, 1, 1E, 5, 6, and 10
- Four Universal Serial Bus (USB) ports (2.0)
  - Two on rear of server
  - Two on front of server
- Broadcom 5721 and 5721KFB3 10/100/1000 Gigabit Ethernet controllers
- ATI PCI ES1000 video
  - 16 MB video memory
  - VGA and SVGA compatible
- ATA-100 single-channel IDE controller (bus mastering)
- Vitesse VSC7250 SAS/SATA RAID controller
- Mouse connector
- Keyboard connector
- Serial connector

Acoustical noise emissions:
- Sound power, idle: 5.5 bel declared
- Sound power, operating: 6.0 bel declared

Environment:
- Air temperature:
  - Server on: 10° to 35°C (50.0° to 95.0°F); altitude: 0 to 2134 m (7000 ft)
  - Server off: -40° to 60°C (-40.0° to 140.4°F); maximum altitude: 2134 m (7000 ft)
- Humidity:
  - Server on: 8% to 80%
  - Server off: 8% to 80%

Heat output:

Approximate heat output in British thermal units (Btu) per hour:
- Minimum configuration: 2013 Btu (590 watts per hour)
- Maximum configuration: 2951 Btu (865 watts per hour)

Electrical input:
- Sine-wave input (50-60 Hz) required
- Input voltage low range:
  - Minimum: 100 V ac
  - Maximum: 127 V ac
- Input voltage high range:
  - Minimum: 200 V ac
  - Maximum: 240 V ac
- Approximate input kilovolt-amperes (kVA):
  - Minimum: 0.60 kVA
  - Maximum: 0.88 kVA

Notes:

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

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

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 illustration shows the major components in the server.
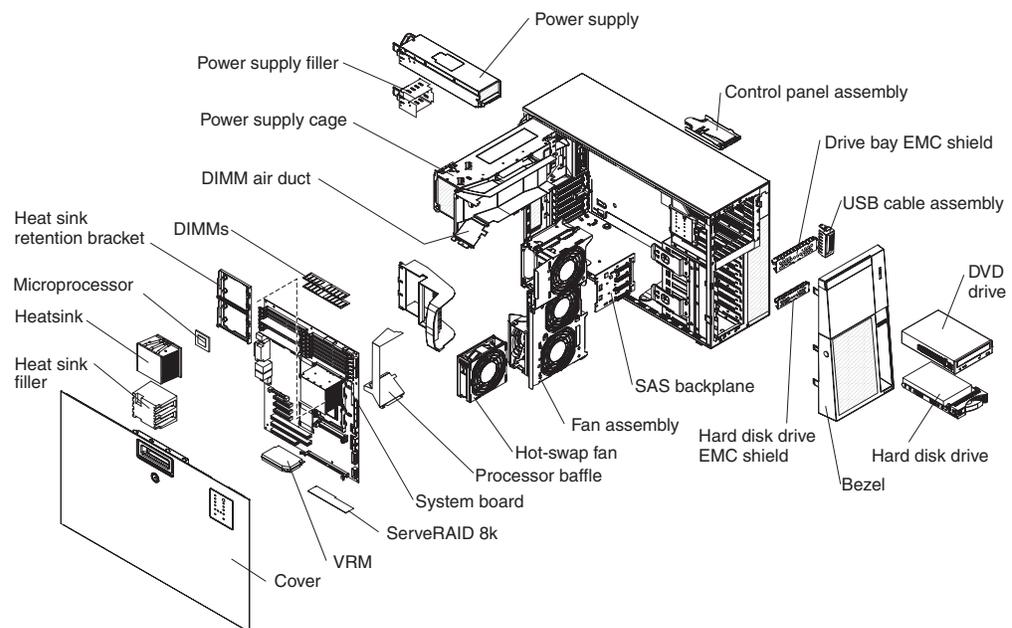
Chapter 2. Installing options

This chapter provides basic instructions for installing hardware options 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.

Installation guidelines

Before you install options, read the following information:

- Read the safety information that begins on page vii and the guidelines in "Handling static-sensitive devices" on page 8. 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, go to http://www.ibm.com/support/ and click **Downloads and drivers**.

- 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 an operating system is installed, or that a 19990305 error code is displayed, indicating that an operating system was not found but the server is otherwise working correctly. If the server is not working correctly, see Chapter 5, "Solving problems," on page 63 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-swap power supplies, hot-swap hard disk drives, hot-swap fans, or hot-plug Universal Serial Bus (USB) devices.

- 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 have to access the inside of the server, you might find it easier to lay the server on its side.
- You can install a maximum of two IDE devices in the server.
- For a list of supported options for the server, go to http://www.ibm.com/servers/ eserver/serverproven/compat/us/.

System reliability guidelines

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

- Each of the drive bays has a drive or an 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 left-side cover before turning on the server. Operating the server for extended periods of time (more than 30 minutes) with the left-side 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 remove the air ducts or air baffles while the server is running. Operating the server without the air ducts or air baffles might cause the microprocessor to overheat.
- Microprocessor socket 2 always contains either a microprocessor baffle or a microprocessor and heat sink.

Working inside the server with the power on

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

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

Handling static-sensitive devices

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

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

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

Removing the bezel

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 an operating system is installed, or that a 19990305 error code is displayed, indicating that an operating system was not found but the server is otherwise working correctly. If the server is not working correctly, see the *Problem Determination and Service Guide* for diagnostic information.

The following illustration shows how to remove the bezel from the server.

Notes:

1. You do not have to remove the left-side cover to remove the bezel from the server.

2. You must unlock the left-side cover lock to open or remove the bezel.
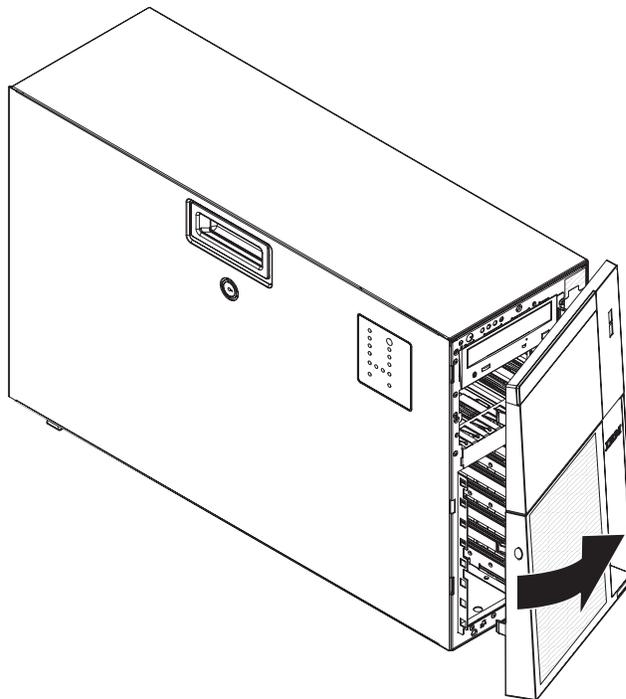
To remove the bezel, complete the following steps:

1. Read the safety information that begins on page vii and "Installation guidelines" on page 7.

2. Using the supplied key, unlock the left-side cover and bezel.

3. Press on the edge of the bezel and rotate the left side of the bezel away from the server. Rotate the left edge of the bezel out beyond 90°; then, pull the bezel away from the server.

Removing the left-side cover

The following illustration shows how to remove the left-side cover from the server.

Cover release latch

Lock

Left-side cover

To remove the server left-side cover, complete the following steps:
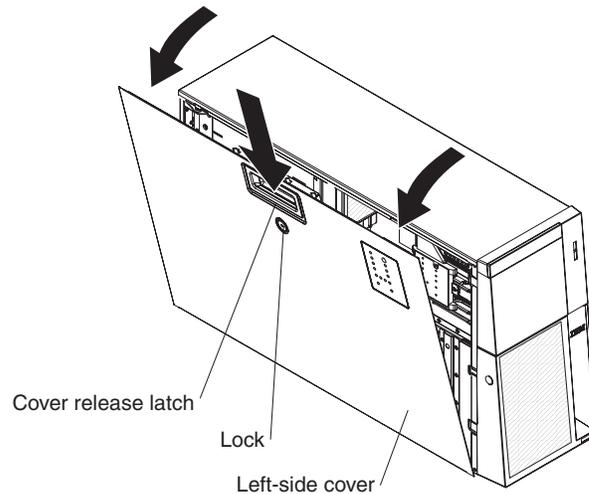
1. Read the safety information that begins on page vii and the guidelines in "Handling static-sensitive devices" on page 8.
2. Using the supplied key, unlock the left-side cover.
3. Pull the cover-release latch down and rotate the top edge of the cover away from the server.

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

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 667 MHz, 1.8 V, 240-pin, PC2-5300 single-stacked and double-staked double-data-rate (DDR) II, fully buffered synchronous dynamic random-access memory (SDRAM) with error correcting code (ECC) DIMMs. These DIMMs must be compatible with the latest 5300 SDRAM Fully Buffered DIMM (FBD) specification. For a list of supported options for the server, go to http://www.ibm.com/servers/eserver/serverproven/compat/us/.
- When you install additional DIMMs, be sure to install them in pairs. The DIMMs in each pair must be the same size and type. You can mix compatible DIMMs from various manufacturers.
- The second pair does not have to contain DIMMs of the same size, speed, type, and technology as the first pair when the server is operating in a non-mirrored mode.

Branch 0   Branch 1

Channel 2

Channel 1

Channel 4

Channel 3
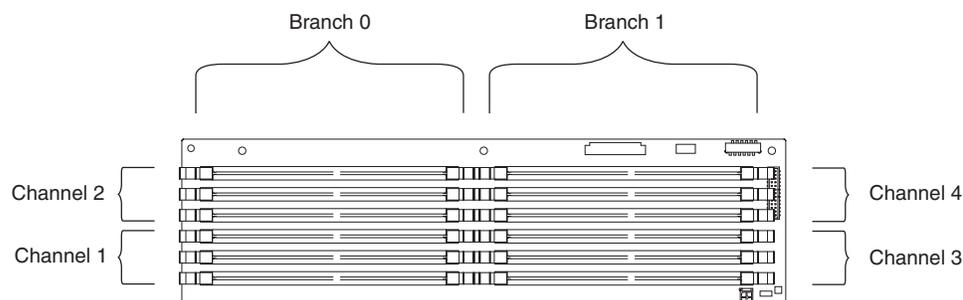
- Installing additional DIMMs in both memory branches will improve system performance.
- The server supports memory mirroring (mirroring mode) and online-spare memory.
  – Memory mirroring replicates and stores data on DIMMs within two branches simultaneously. You must enable memory mirroring through the Configuration/Setup Utility program (for more information, see the section about configuring the server in the *User's Guide* on the IBM *System x Documentation* CD). To enable memory mirroring in the Configuration/Setup Utility program, select **Devices and I/O Ports → Advanced Chipset Control → Memory Branch Mode**. Use the arrow keys to change the Memory Branch Mode setting to Mirror; then, save your changes. When you use memory mirroring, consider the following information:
    - The maximum available memory is reduced to 16 GB, instead of the 32 GB available in non-mirroring mode.
    - The minimum memory configuration is four identical DIMMs. You must install identical pairs of fully buffered, dual-inline memory modules (DIMMs) in all four DIMM connectors (same size, type, speed, and technology). These DIMMs must span across both branches and all four channels. For example, when you install the first four DIMMs, you must install two DIMMs in branch 0 (one in channel 0 and one in channel 1) and two DIMMs in branch 1 (one in channel 2 and one in channel 3). See Table 2 for the DIMM installation sequence.
    - When you upgrade the server to eight DIMMs, the DIMMs that are next to each other (for example, DIMM connector 1 and DIMM connector 4) within the channels of a branch must be identical in size, type, speed, and technology. However, the DIMMs in the connectors above or below each other within the channels of a branch do not have to be identical to each other (for example, the DIMMs in DIMM connector 1 and DIMM connector 2).
    - Both branches operate in dual-channel mode.
    The following table shows the DIMM configuration upgrade sequence for operating in mirroring mode.

Table 2. DIMM upgrade configuration sequence in mirroring mode

Number of DIMMs	DIMM connectors
4	1, 4, 7, 10
8	1, 4, 7, 10, 2, 5, 8, 11
12	1, 4, 7, 10, 2, 5, 8, 11, 3, 6, 9, 12

  – Online-spare memory disables a failed rank pair of DIMMs from the system configuration and activates an online-spare rank pair of DIMMs to replace the failed rank pair of DIMMs. For an online-space pair of DIMMs to be activated,

you must enable this feature and have installed an additional rank pair of DIMMs of the same speed, type, size (or larger), and technology as the failed pair of DIMMs. You must enable the feature through the Configuration/Setup Utility program. To enable online-spare memory in the Configuration/Setup Utility program, select Devices and I/O Ports → Advanced Chipset Control → Memory Branch Mode. Use the arrow keys to change the setting for Branch 0 Rank Sparing or Branch 1 Rank Sparing to Enabled ; then, save your changes. For more information, see the section about configuring the server in the *User's Guide* on the IBM *System x Documentation* CD. When you use online-spare memory, you must consider the following information:

- You cannot enable online-spare memory while the server is operating in mirroring mode.

- The minimum memory configuration is two single-rank DIMMs installed in branch 0, DIMM connector 1 (in channel 0) and connector 4 (in channel 1); however, online-sparing is not supported with this configuration.

- To support online-sparing in branch 0, you must add a second pair of DIMMs. The spare pair of DIMMs can be single-rank or double-rank and must be the same speed, type, size (or larger), and technology as the failed pair of DIMMs. The spare pair must be installed in branch 0, DIMM connector 2 (in channel 0) and connector 5 (in channel 1). However, if the DIMMs are double-rank and you install the spare pair of DIMMs in branch 1, DIMM connector 7 (channel 2) and connector 10 (channel 3) rather than branch 0, then branch 1 will support online-sparing and branch 0 will not. - Branch 0 and branch 1 operate independently.

- The following notes apply when the server operates in non-mirroring mode (normal mode):

  – DIMMs must be installed in matched pairs. If you install a second pair of DIMMs in DIMM connector 7 and DIMM connector 10, they do not have to be the same size, speed, type, and technology as the DIMMs in DIMM connector 1 and DIMM connector 4. However, the size, speed, type, and technology of the DIMMs that you install in DIMM connector 7 and DIMM connector 10 must match each other.

  – The following table shows the DIMM upgrade configuration sequence for operating in non-mirrored mode (normal mode).

Table 3. 5. DIMM upgrade configuration sequence in non-mirroring mode

Number of DIMMs	DIMM connectors
2	1, 4
4	1, 4, 7, 10
6	1, 4, 7, 10, 2, 5
8	1, 4, 7, 10, 2, 5, 8, 11
10	1, 4, 7, 10, 2, 5, 8, 11, 3, 6
12	1, 4, 7, 10, 2, 5, 8, 11, 3, 6, 9, 12

- You do not have to save new configuration information when you install or remove DIMMs.

- See the *User's Guide* on the IBM *System x Documentation* CD for more information about memory mirroring and the online spare feature.

The following illustration shows how to install DIMMs on the system board.
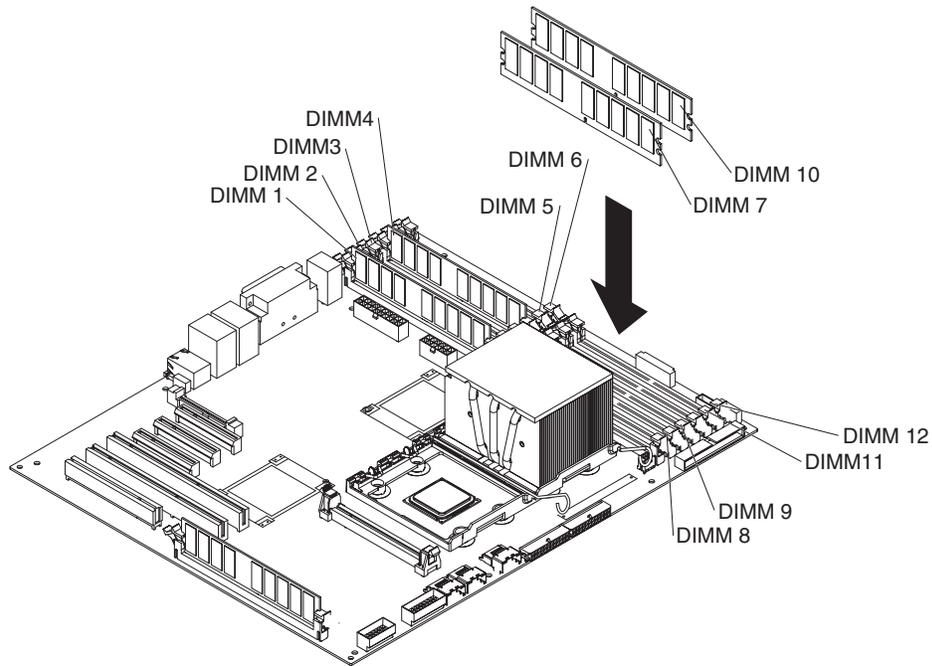
- Install the DIMMs in the order shown in the following table.

Table 4. DIMM installation sequence

Memory in Non-mirrored mode		Memory in mirrored mode	
Number of DIMMs	DIMM connectors	Number of DIMMs	DIMM connectors
1	1	4	1, 4, 7, 10
2	1, 4	8	1, 4, 7, 10, 2, 5, 8, 11
4	1, 4, 7, 10	12	1, 4, 7, 10, 2, 5, 8, 11, 3, 6, 9, 12
6	1, 4, 7, 10, 2, 5		
8	1, 4, 7, 10, 2, 5, 8, 11		
10	1, 4, 7, 10, 2, 5, 8, 11, 3, 6		
12	1, 4, 7, 10, 2, 5, 8, 11, 3, 6, 9, 12		

To install DIMMs in the server, complete the following steps:

1. Read the safety information that begins on page vii and "Installation guidelines" on page 7.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.
3. Remove the left-side 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 8.

Power supply

Release latch

Statement 11:

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

Statement 17:

CAUTION:
The following label indicates moving parts nearby.

4. Remove the power-supply and power-supply filler from the server by pressing down on the release latch while pulling out on the plastic handle.

   Note: The power-supply, power-supply filler or power supplies must be removed before attempting to rotate the power-supply cage out of the way.

Power-supply cage assembly

Power-supply cage handle
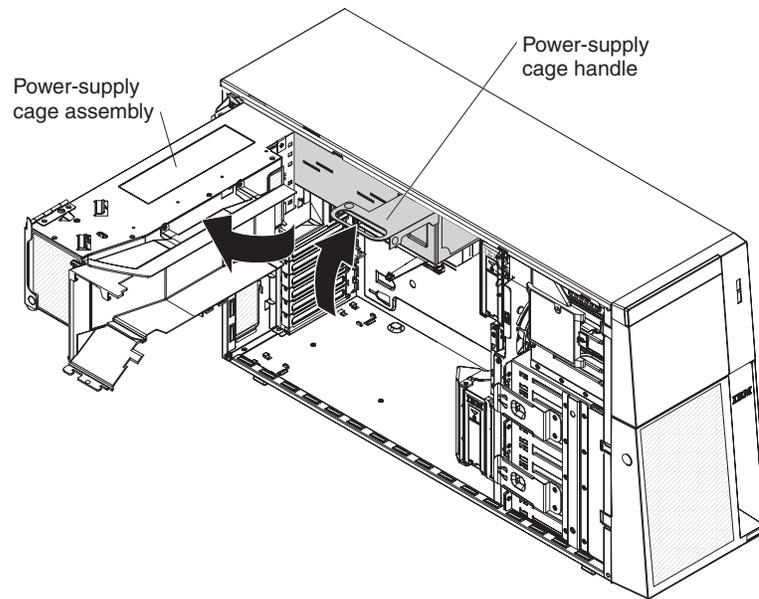
5. Lift the power-supply cage handle on the rear of the power supply cage, and rotate the power-supply cage out of the way until it latches in place. Let the power-supply cage rest on the rear power-supply structure support bracket.

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

6. Install the DIMMs into DIMM sockets:
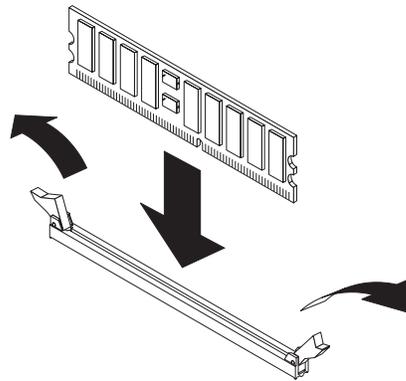
   a. Open the retaining clip on each end of the DIMM connector.
   b. Touch the static-protective package containing the DIMM to any unpainted metal surface on the server. Then, remove the DIMM from the package.
   c. Turn the DIMM so that the DIMM keys align correctly with the slot.
   d. Insert the DIMM into the connector.

Power supply
support bracket

Power supply
release tab
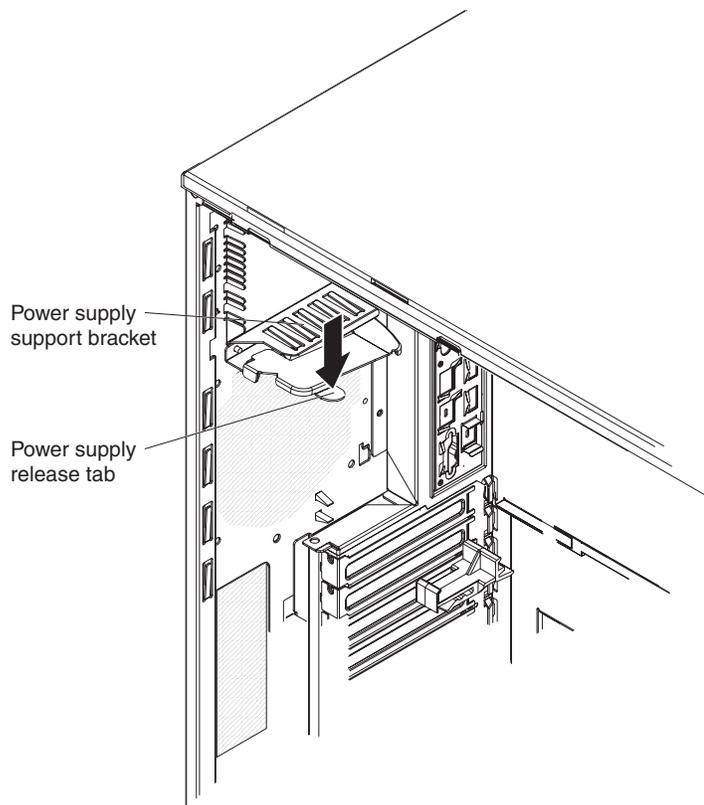
7. Raise the power-supply cage slightly and press and hold the release tab on the rear power-supply support bracket; then, lower the power-supply structure into position. The power-supply cage is not shown in the illustration for clarity.

8. Install the power supply or power supplies in the power-supply cage.

If you have other options to install or remove, do so now. Otherwise, go to "Completing the installation" on page 31.

Installing redundant power and cooling

You can install a second 835-watt hot-swap power-supply. This upgrade option includes a hot-swap power supply, two hot-swap fans, a fan structure with an air duct and a single hot-swap fan installed, and a fan power cable. You must also purchase a second power cord to connect the power-supply to the power source.

To install the redundant power and cooling option, complete the following steps:

1. Read the safety information that begins on page vii and the guidelines in "Handling static-sensitive devices" on page 8.

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

2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables. Remove the left-side cover.

3. Remove all adapters.

Fan cage assembly
release buttons
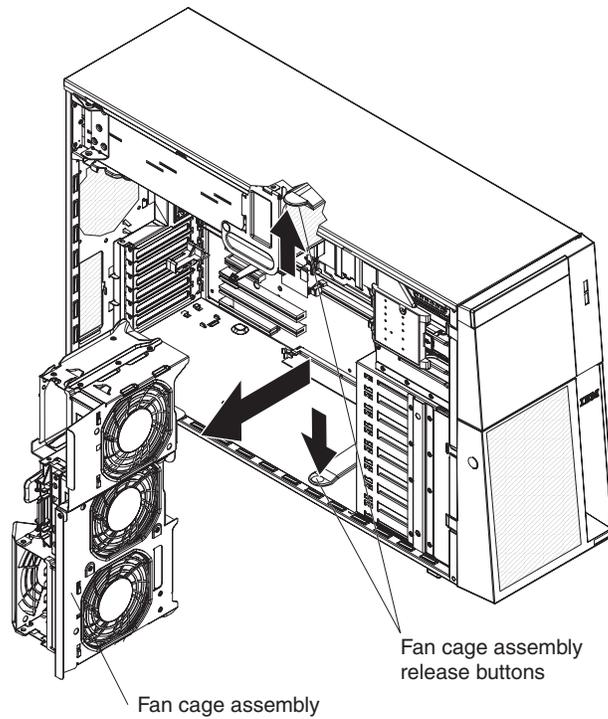
Fan cage assembly

4. Remove the fan cage from the server:

   a. Press the fan cage assembly release button on each side of the server. The fan cage assembly rises up slightly when the buttons have been fully pressed and the fan cage is released.

   b. Lift the fan cage assembly out of the server.

5. Install the fan power cable.

   Note: The following illustration shows the underside of the fan cage. Fans 3 and 5 are shown at the top of the illustration.

12-pin connector
(installed from reverse side)

Fan 5 connector
(installed from
this side)

Cable clamp

Cable routing
channel

Cable clamps

Fan 4 connector
(installed from
this side)

3

5

2

1

4
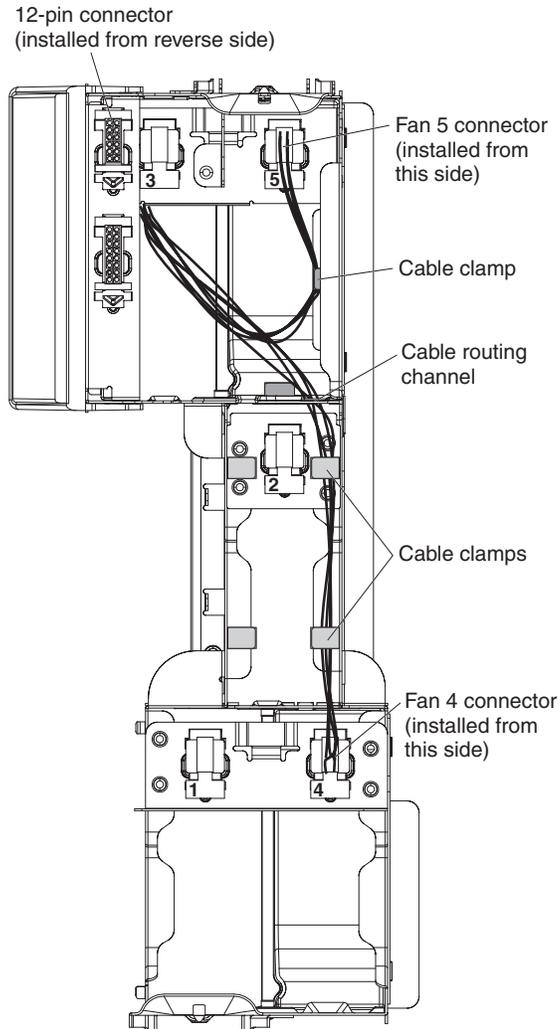
a. Turn the fan cage assembly over and place it on a flat surface. Position the fan cage as shown in the illustration.

b. Press the 12-pin power connector on the supplied fan power cable into the empty hole in the fan cage next to the fan 3 connector. When this connector is installed, the connector pins should be facing you.

c. Route the shorter of the two lengths of cables to the nearest hole under fan 3 and install the connector in the hole; then, secure the cable in the cable clamp on the fan cage.

d. Route the longer length of cables through the cable routing channel and the two cable clamps in the cable routing channel.

e. Install the connector in the hole in the fan cage assembly for fan 4.

6. Turn the fan cage assembly over and install the assembly in the server.

Fan air baffle
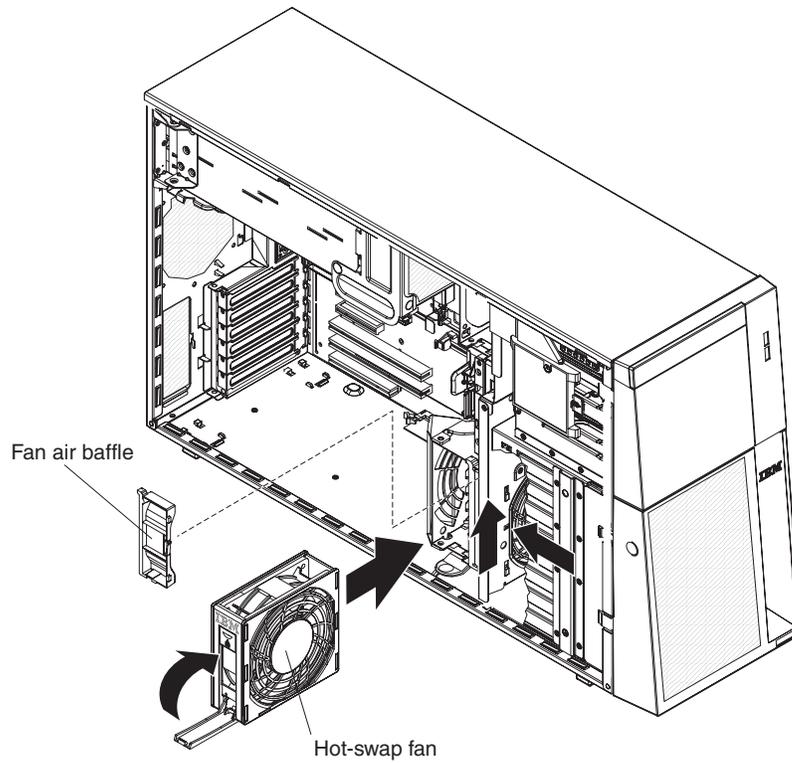
Hot-swap fan

7. Remove the fan air baffle from the fan cage assembly by pushing in on the tab on the back of the air baffle; then, push the baffle to the left and lift it out of the fan cage assembly.

8. Install two hot-swap fans in the empty bays of the fan cage assembly.

Power supply
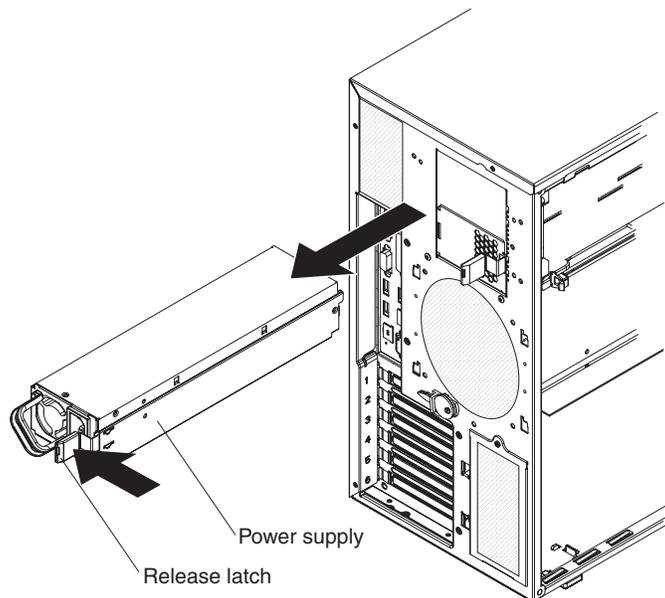
Release latch

9. Remove the power-supply and power supply filler from the server by pressing down on the release latch while you pull out.

Power-supply cage assembly

Power-supply cage handle
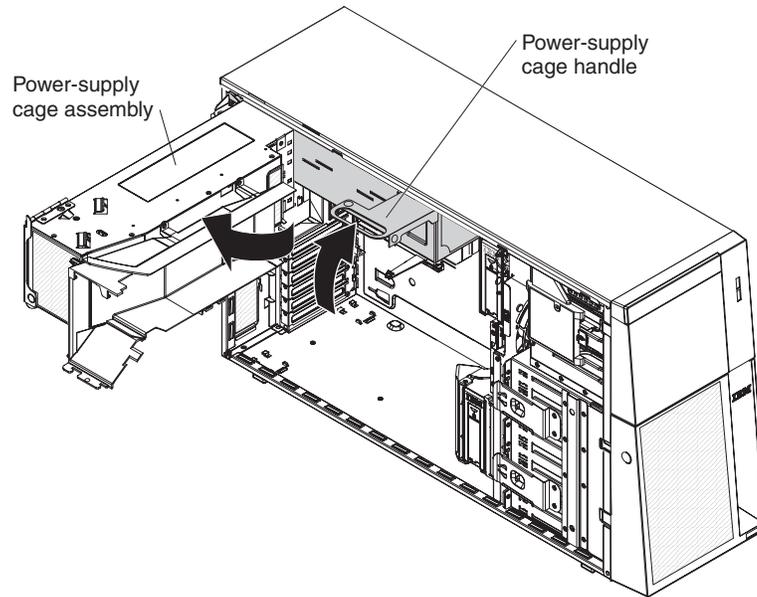
10. Lift the power-supply cage handle on the rear of the power-supply cage, and rotate the power-supply cage out of the way until it latches in place. Let the power-supply cage rest on the rear power-supply structure support bracket.

11. Install the transition duct on the edge of the DIMM air baffle.

DIMM air baffle

Transition duct
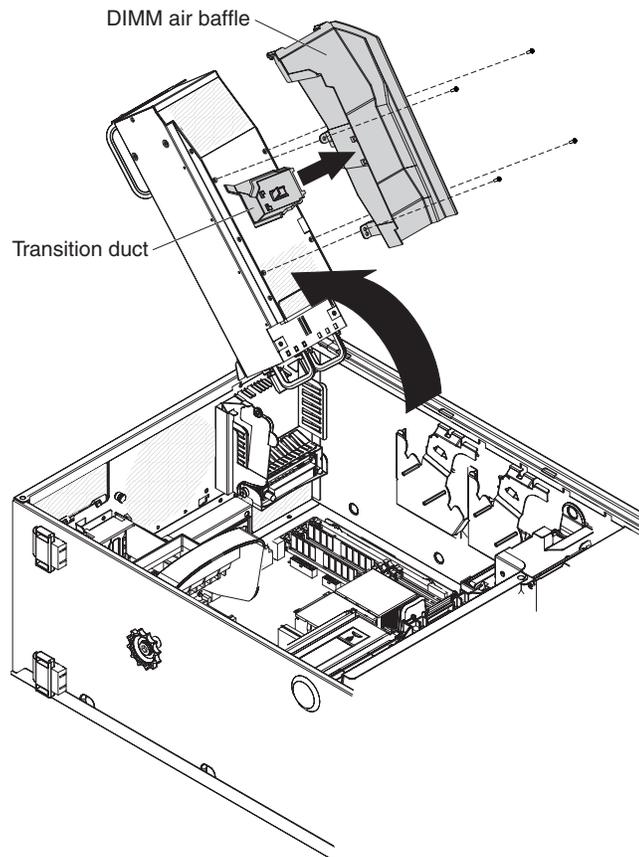
a. Remove the four screws that secure the DIMM air baffle to the power-supply cage.

b. Push the DIMM air baffle toward the rear of the server until the positioning pins on the DIMM air baffle are clear of the holes in the power-supply cage.

c. Position the transition duct so that the two tabs are directly over the slots on the side of the DIMM air baffle.

d. Slide the transition duct into the slots until it clicks into place.

12. Reinstall the DIMM air baffle onto the power-supply cage.
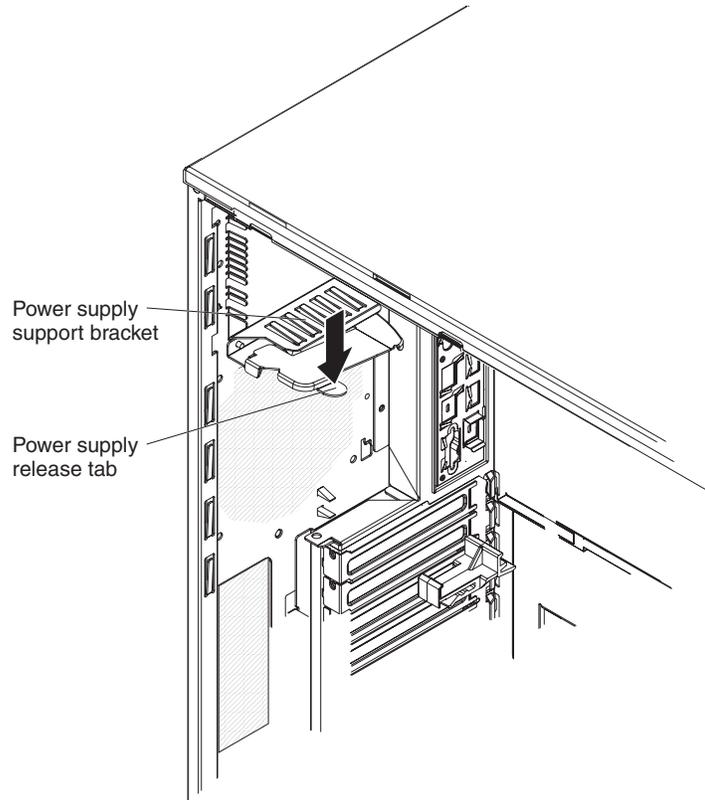
Power supply support bracket

Power supply release tab

13. Raise the power-supply cage slightly and press and hold the release tab on the rear power-supply support bracket; then, lower the power-supply structure into position. The power-supply cage is not shown in the illustration for clarity.

Rear fan assembly with baffle
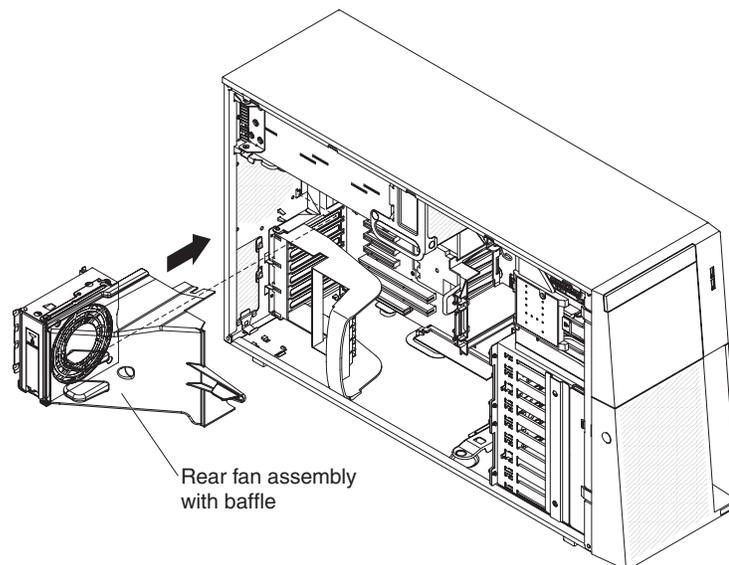
14. Install the rear fan and fan structure on the chassis.
    a. Align the clips on the rear fan assembly with the holes in the chassis.
    b. Slide the assembly toward the power-supply cage until it stops.

Rear Fan
Connector
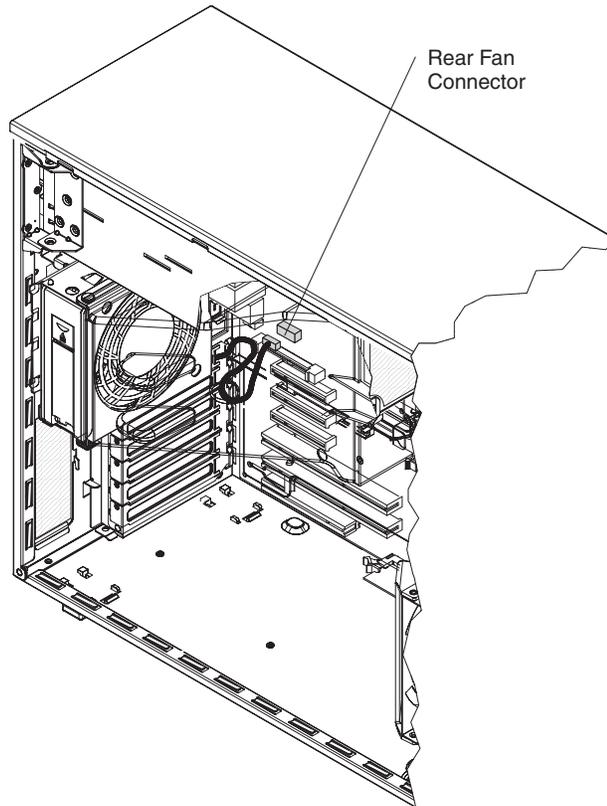
    c. Connect the fan power cable to the connector on the system board.
15. Install the adapters.
16. Install the left-side cover.
17. Install the power supplies into the server. Push each power supply until it stops and clicks into place.
18. Connect one end of each power cord into the connector on the back of each power supply, and connect the other end of each power cords to a properly grounded electrical outlet.
19. Make sure that the ac power LED on the top of each power supply is lit, indicating that the power supply is operating correctly. If the server is turned on, make sure that the dc power LED on the top of the power supply is lit also.
20. Reconnect the external cables.

If you have other options to install or remove, do so now. Otherwise, go to "Completing the installation" on page 31.

Installing a hot-swap hard disk drive

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

- The server supports up to eight 1-inch (26 mm) slim-high, 3.5-inch, SAS/SATA hot-swap hard disk drives in the standard hot-swap bays.
- The hot-swap bays are arranged vertically in the standard hard disk drive cage; the bay numbers are 0 through 7 (from top to bottom).

- For a list of supported options for the server, see http://www.ibm.com/servers/eserver/serverproven/compat/us/.
- Inspect the drive tray for signs of damage.
- Make sure that the drive is correctly installed in the tray.
- See the documentation for the ServeRAID-8k SAS Controller for instructions for installing a hard disk drive.
- All hot-swap drives in the server must have the same throughput speed rating; mixing speed ratings might cause all drives to operate at the lower throughput speed.
- To minimize the possibility of damage to the hard disk drives when you are installing them in a rack configuration, install the server in the rack before installing the hard disk drives.
- You do not have to turn off the server to install hot-swap drives in the hot-swap drive bays. However, you must turn off the server when performing any steps that involve installing or removing cables.
- Do not mix SAS and SATA drives in the same array.
- The drive ID for each hot-swap hard disk drive is printed on the bezel.

The following illustration shows how to install a hot-swap hard disk drive.
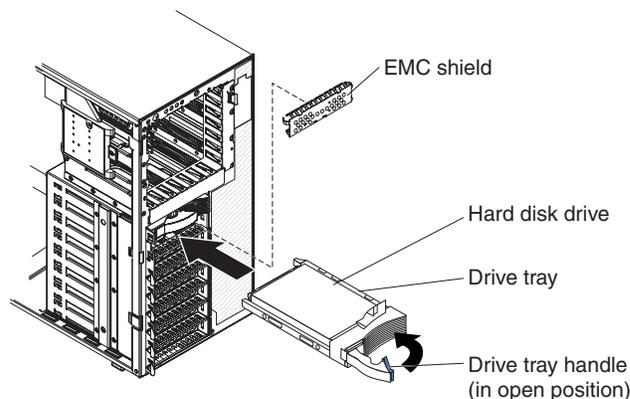
To install a hot-swap hard disk drive, complete the following steps:
1. Read the safety information that begins on page vii and "Installation guidelines" on page 7.
2. Remove the bezel from the server.
3. Remove the EMC shield from one of the empty hot-swap bays.
4. Make sure that the tray handle is open; then, install the hard disk drive into the hot-swap bay.

Notes:
1. When you turn on the server, check the hard disk drive status LEDs 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.
2. If the server will be configured for RAID operation through the ServeRAID-8k SAS Controller controller, you must configure the disk arrays before installing the operating system. See the ServeRAID™ documentation on the *IBM ServeRAID Support* CD for additional information about RAID operation and complete instructions for using ServeRAID Manager.

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:

- For a list of supported options for the server, go to http://www.ibm.com/servers/eserver/serverproven/compat/us/.
- See the System x3500 Type 7977 *User's Guide* on the IBM *System x Documentation* CD for details about how to install a microprocessor.
- The server supports Intel Xeon dual core or quad core 1.6 GHz or higher microprocessors in each socket. If you are installing two microprocessors, they must be the same cache size and type, and the same clock speed.
- Some models support dual-core processors and quad-core processors. Do not mix dual-core processors and quad-core processors in the same system. Install all dual-core or all quad-core processors in the server.
- Read the documentation that comes with the microprocessor to determine whether you must update the basic input/output system (BIOS) code in the server. To download the most current level of BIOS code for the server, go to http://www.ibm.com/support/.
- Obtain an SMP-capable operating system. For a list of supported operating systems, see http://www.ibm.com/servers/eserver/serverproven/compat/us/.
- You can use the Configuration/Setup Utility program to determine the specific type of microprocessor in the server.

To install a microprocessor, complete the following steps:

1. Read the safety information that begins on page vii and "Installation guidelines" on page 7.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.
3. Lay the server on its side; then, remove the left-side 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 8.
4. Remove the microprocessor air duct from the fan structure. Squeeze the two tabs on the top of the air duct together and lift the air duct out of the server.
5. Remove the microprocessor baffle and the protective film from the second microprocessor socket.

Heatsink 2

Microprocessor release lever

Microprocessor 2

Microprocessor 2 VRM
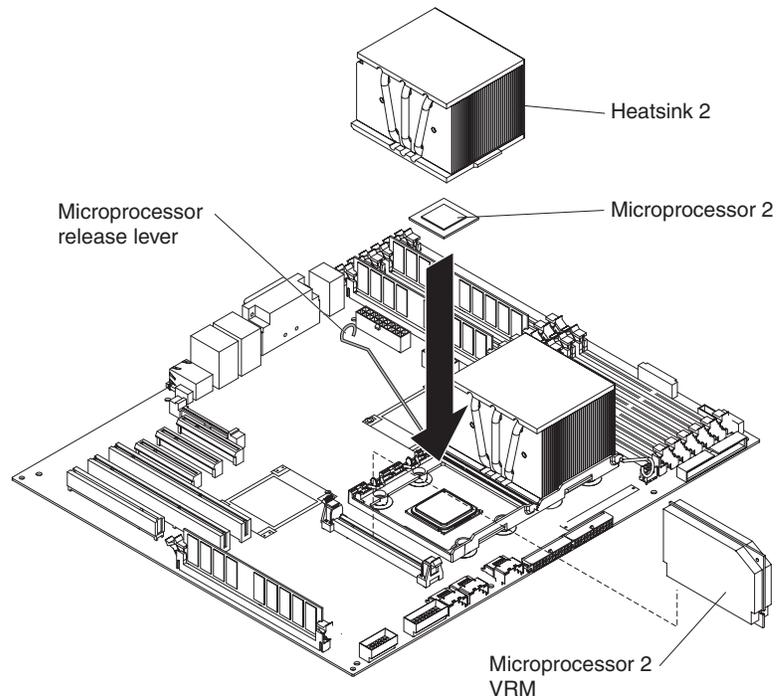
6. Install the VRM.

7. Install the microprocessor:

   a. Touch the static-protective package that contains the new microprocessor to any unpainted metal surface on the server; then, remove the microprocessor from the package.

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

Microprocessor release lever (fully open)

Microprocessor bracket frame
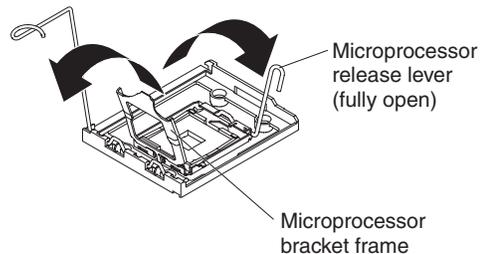
   c. Open the microprocessor bracket frame by lifting up the tab on the top edge.

   Attention: Use the vacuum tool that comes with the replacement part to install or remove the microprocessor. Dropping the microprocessor 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.

   d. Install the microprocessor by using the vacuum tool and completing the following steps.

Vacuum tool

Microprocessor
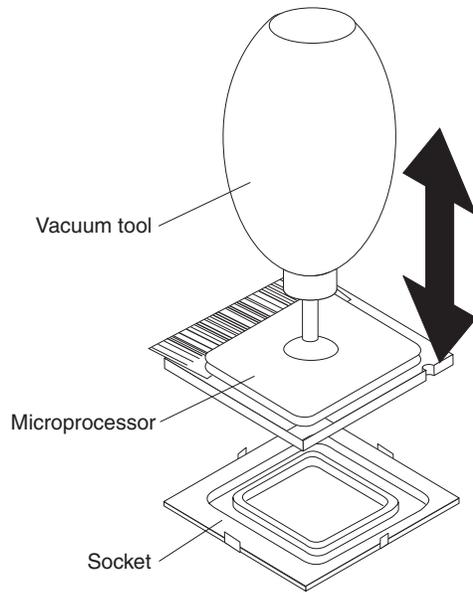
Socket

1) Squeeze and hold the bladder of the tool; then, place the suction cup on the microprocessor and release the bladder.

   Note: To maintain proper orientation between the microprocessor and the microprocessor socket during installation, observe the following information:

   • The microprocessor has two notches that are keyed to two tabs on the sides of the socket.

   • A triangle-shaped indicator on one corner of the microprocessor points to a 45-degree angle on one corner of the socket.

2) Using the tool, carefully place the microprocessor into the socket.

3) Squeeze the bladder of the tool to release the microprocessor from the suction cup.

e. Close the microprocessor bracket frame; then, close the microprocessor retention latch and lock it securely in place.

Microprocessor retention latch

Microprocessor bracket frame
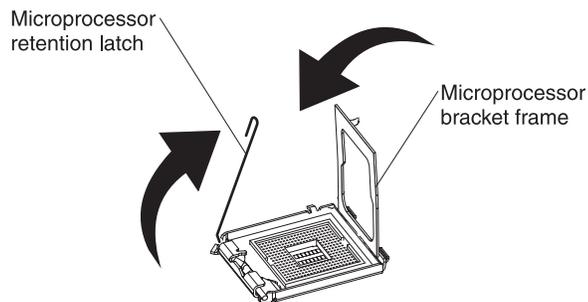
f. Close the microprocessor-release lever to secure the microprocessor.

8. Open the heat-sink release lever and install a heat sink on the microprocessor with the thermal grease side down; then, close the release lever.

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

9. Reinstall the microprocessor air duct on the fan cage.

If you have other options to install or remove, do so now. Otherwise, go to "Completing the installation" on page 31.

Installing an adapter

The following notes describe the types of adapters that the server supports and other information that you must consider when installing an adapter:

- Locate the documentation that comes with the adapter and follow those instructions in addition to the instructions in this section. If you must change the switch or jumper settings on the adapter, follow the instructions that come with the adapter.
- Avoid touching the components and gold-edge connectors on the adapter.
- PCI slot 6 supports half-length 5.0 V PCI adapters only.
- PCI slot 1 supports half-length 3.3V PCI adapters only.
- PCI slots 2 through 5 support full-length 3.3 V signaling adapters only.
- The PCI configuration:
  - Slot 1 is a PCI-Express x8 slot with x4 links, PCI Express 1.0a compliant.
  - Slot 2 and 3 are PCI-Express x8 slots with x8 links, PCI Express 1.0a compliant.
  - Slots 4 and 5 are PCI-X 133/64 slots, PCI-X 2.0 compliant.
  - Slot 6 is a PCI 33/32 slot, PCI 2.2 compliant.

  Note: The ServeRAID-8k SAS Controller overrides the standard functionality of the integrated SAS/SATA controller with RAID capabilities.
- The system scans PCI slots 1 through 6 to assign system resources. The system then starts (boots) the system devices in the following order, if you have not changed the default boot precedence: integrated Ethernet controller, ServeRAID-8k SAS Controller, and then PCI, PCI-X, and PCI-Express slots.

  Note: To change the boot precedence for PCI and PCI-X devices, start the Configuration/Setup Utility program and select **Start Options** from the main menu. See the *User's Guide* on the IBM *System x Documentation* CD for details about using the Configuration/Setup Utility program.
- The server uses a rotational interrupt technique to configure PCI adapters so that you can install PCI adapters that do not support sharing of PCI interrupts.

To install an adapter, complete the following steps:

1. Read the safety information that begins on page vii and "Installation guidelines" on page 7.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables. Remove the left-side cover.
3. See the documentation that comes with the adapter for any cabling instructions and information about jumper or switch settings. (It might be easier for you to route cables before you install the adapter.)

Rear adapter
retention bracket

Adapter

Front adapter
retention bracket
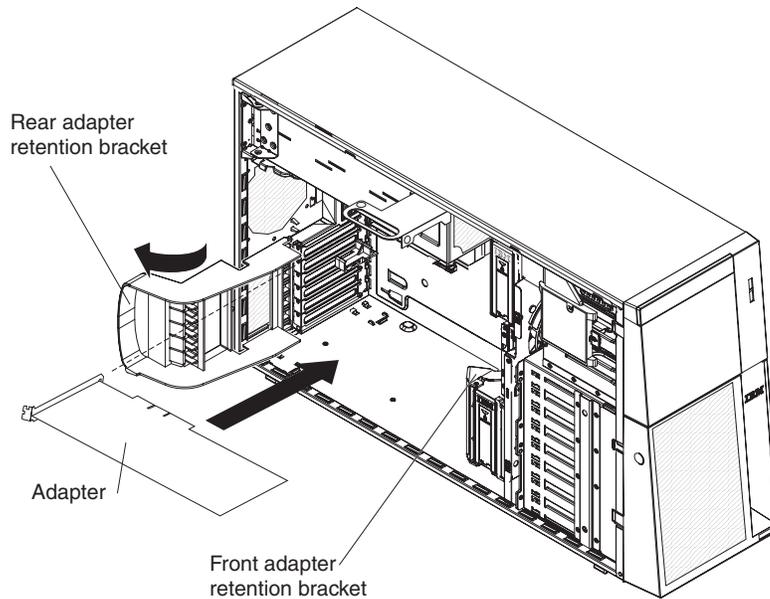
4. Open the front and rear adapter retention brackets.

5. Remove the expansion-slot cover.

6. If you are installing a full-length adapter, remove the blue adapter guide (if any) from the end of the adapter; then, lift the adapter-retention clip on the adapter-support bracket. Otherwise, continue with the next step.

Adapter guide
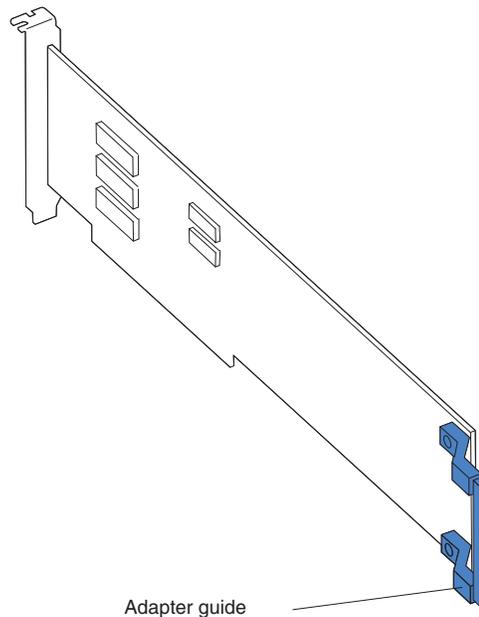
7. Press the adapter *firmly* into the expansion slot, lower the adapter retention brackets, and make sure that the brackets are closed. To release the rear adapter retention bracket press up on the retention clip while rotating the bracket forward.

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

8. Connect any needed cables to the adapter.

If you have other options to install or remove, do so now. Otherwise, go to "Completing the installation" on page 31.

Installing an IBM Remote Supervisor Adapter II SlimLine

An optional IBM Remote Supervisor Adapter II SlimLine can be installed only in its dedicated connector on the system board. See the illustration on page 22 for the location of the connector on the system board. The Remote Supervisor Adapter II SlimLine is not cabled to the system board.

To install a Remote Supervisor Adapter II SlimLine, complete the following steps:

1. Read the safety information that begins on page vii and "Installation guidelines" on page 7.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.
3. Remove the left-side cover.
4. Carefully lay the server on its right side and remove the left side cover.

Adapter retention bracket

Remote Supervisor Adapter II SlimLine retention tab

Remote Supervisor Adapter II SlimLine
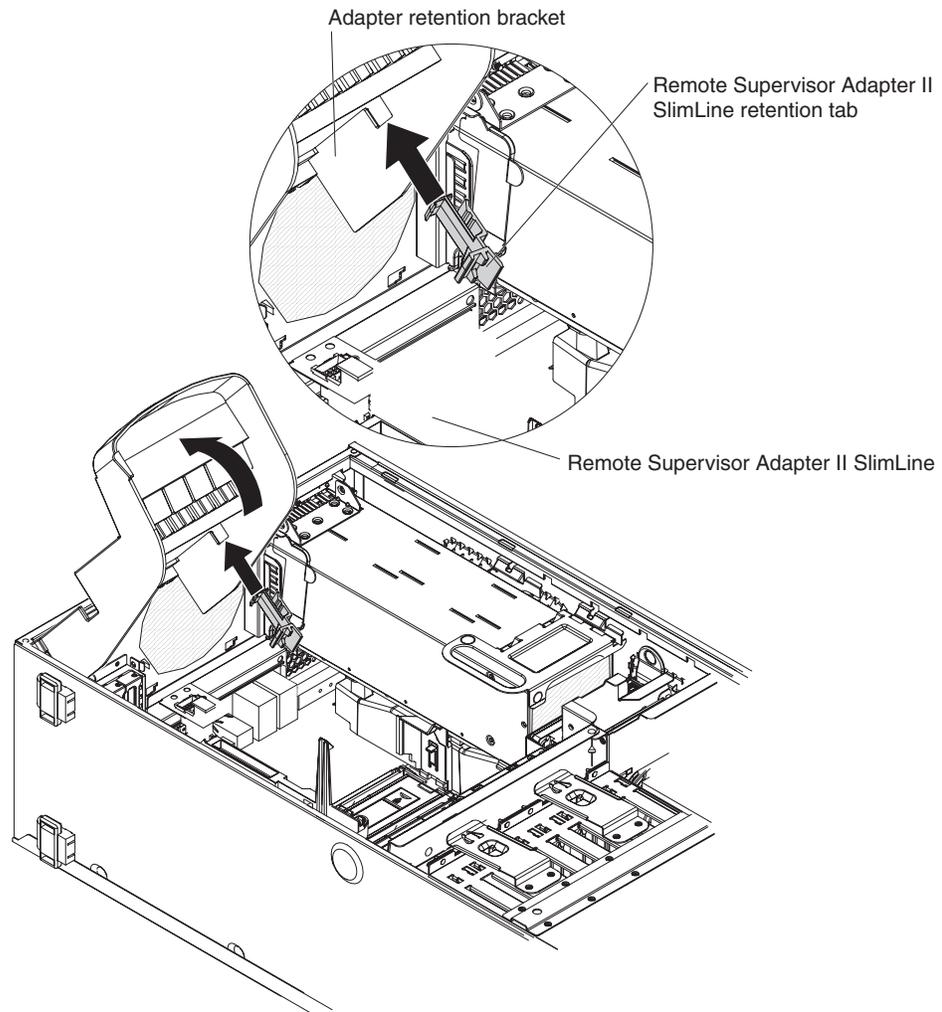
5. Open the rear adapter retention bracket and install the Remote Supervisor Adapter II SlimLine retention tab that comes with the adapter on the bracket by clipping it onto the adapter retention bracket.

Remote Supervisor II
SlimLine adapter

Remote Supervisor II
SlimLine adapter retainer clip

Remote Supervisor II
SlimLine adapter support bracket
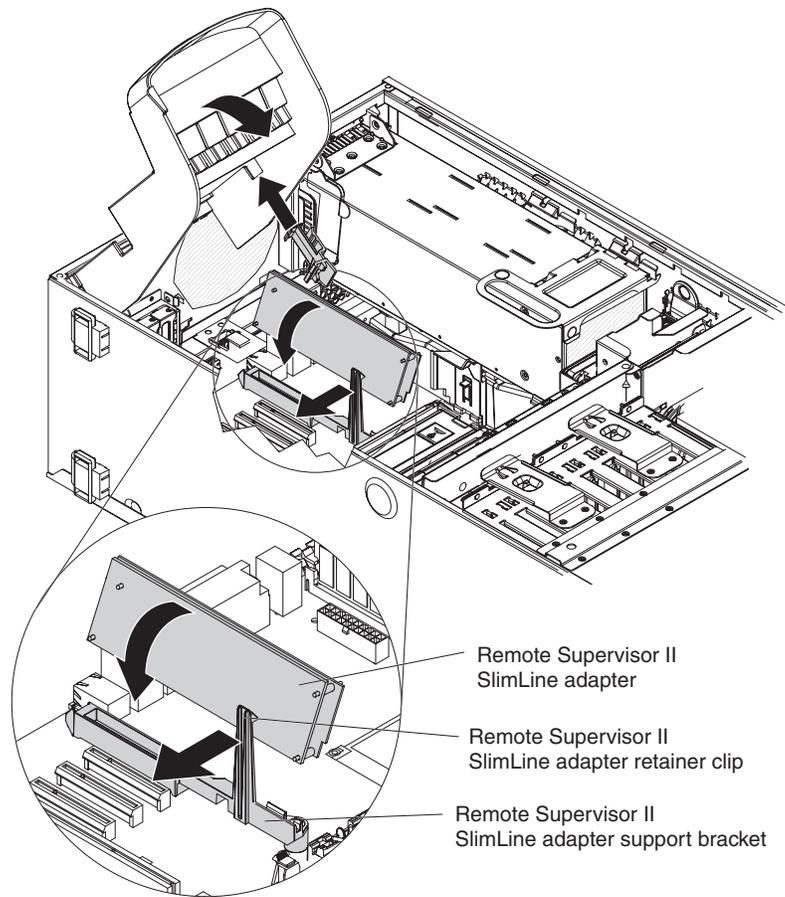
6. Carefully grasp the Remote Supervisor Adapter II SlimLine by its top edge or upper corners, and align it with the Remote Supervisor Adapter II SlimLine guide and the connector on the system board.

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

7. Press the Remote Supervisor Adapter II SlimLine *firmly* into the connector and under the retention clip on the Remote Supervisor Adapter II SlimLine support bracket.

8. Close the rear adapter retention bracket.

If you have other options 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 bezel:

   a. Align the tabs on the left-side of the bezel with the slots on the server chassis.

   b. Insert the tabs into the slots and close the bezel.

2. Install the left-side cover.

Cover release latch

Lock
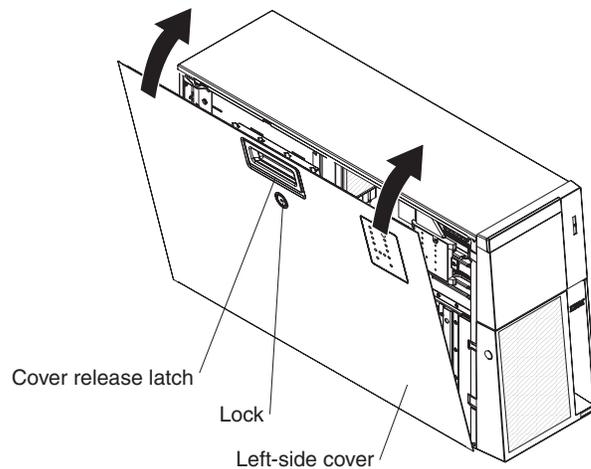
Left-side cover

   a. Position the left-side cover so that the handle is at the top.

   b. Place the bottom edge of the cover onto the bottom edge of the server.

   c. Rotate the top edge of left-side cover toward the server; then, press down on the cover until it clicks into place.

   d. Using the supplied key, lock the left-side cover and bezel.

3. Connect the cables and power cords. See "Connecting the cables" for more information.

Connecting the cables

Notes:

1. Turn off the server before connecting any cables to or disconnecting any cables from the server or hot-plug adapter.

2. For additional cabling instructions, see the *User's Guide* on the IBM *System x Documentation* CD and the documentation that comes with the optional devices. It might be easier for you to route any cables before you install certain optional devices.

3. 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.

The following illustration shows the location of the input and output connectors on the rear of the server.

Note: There are two USB connectors located on the front of the server. (See "Front view" on page 35 for the location of these two USB connectors.)

Power cord

Mouse

Keyboard

Serial 1
(COM 1)

Parallel

Video

USB 4

Ethernet 10/100/1000

USB 3

Ethernet 10/100/1000

RJ-45

Serial 2
(COM 2)
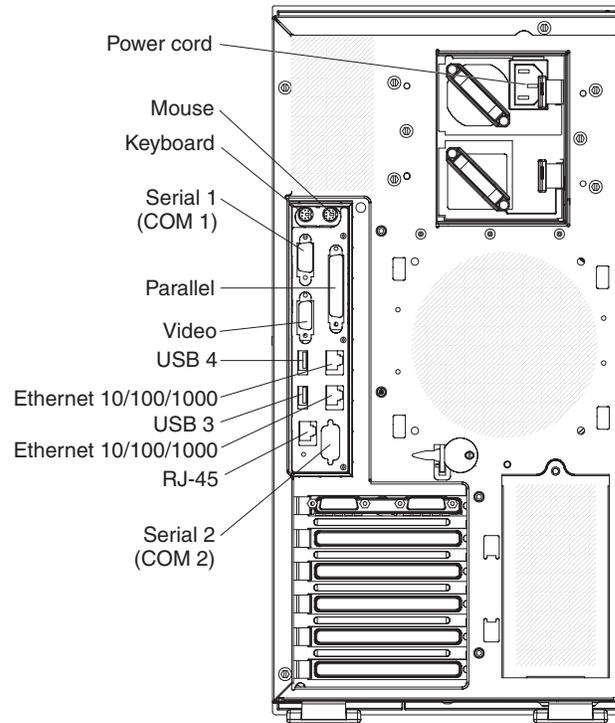
Updating the server configuration

When you start the server for the first time after you add or remove an internal option or external device, you might receive a message that the configuration has changed. The Configuration/Setup Utility program starts automatically so that you can save the new configuration settings. For more information, see the section about configuring the server in the *User's Guide* on the IBM *System x Documentation* CD.

Some options have device drivers that you must install. See the documentation that comes with each option 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 the section about using the *ServerGuide Setup and Installation* CD in the *User's Guide* and the operating-system documentation.

If the server has an optional RAID adapter and you have installed or removed a hard disk drive, see the documentation that comes with the RAID adapter for information about reconfiguring the disk arrays.

If you have installed a Remote Supervisor Adapter II SlimLine to manage the server remotely, see the *Remote Supervisor Adapter II SlimLine User's Guide*, which comes with the option, for information about setting up, configuring, and using the option.

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

Chapter 3. Server controls, connectors, LEDs, and power

This chapter 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 and LEDs on the front of the server.

Note: The front bezel door is not shown so that the drive bays are visible.
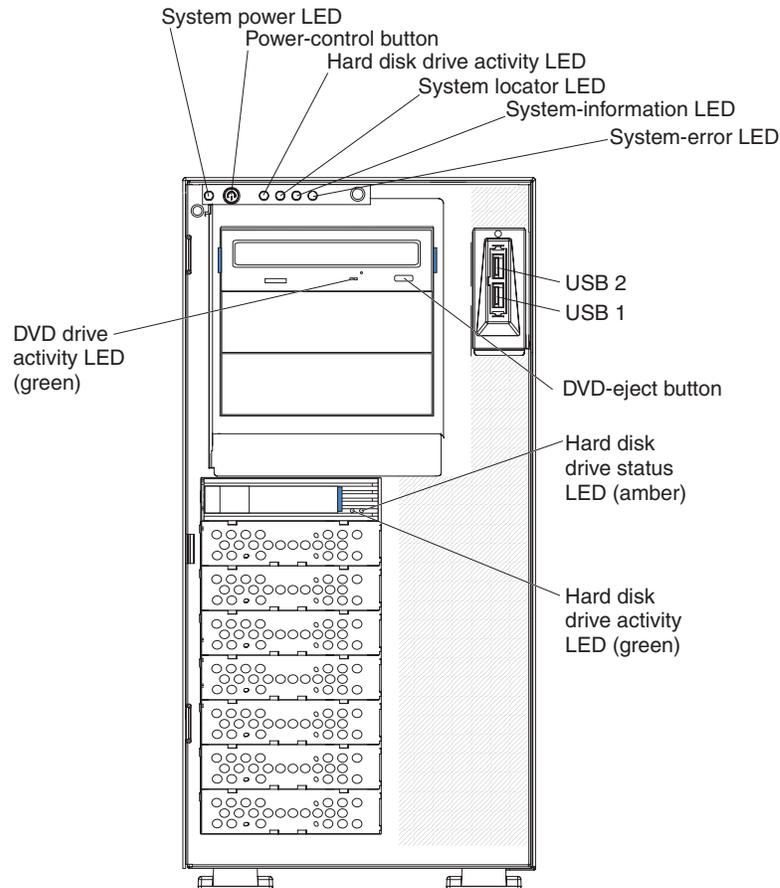
System Power LED: When this LED is lit and not flashing, it indicates that the server is turned on. When this LED is flashing, it indicates that the server is turned off and is still connected to an ac power source. When this LED is off, it indicates that ac power is not present, or the power supply or the LED itself has failed. A power LED is also on the rear of the server.

Power-control button: Press this button to turn the server on and off manually. A power-control-button shield comes with the server. You can install this disk-shaped shield to prevent the server from being turned off accidentally.

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

System locator LED: Use this LED to visually locate the server among other servers. You can use IBM Director to light this LED remotely.

System-information LED: When this amber LED is on, the server power supplies are nonredundant, or some other noncritical event has occurred. The event is recorded in the error log. Check the light path diagnostic panel for more information (see the *Problem Determination and Service Guide* on the IBM *System x Documentation* CD).

System-error LED: When this amber LED is lit, it indicates that a system error has occurred. Use the diagnostic LED panel and the system service label on the inside of the left-side cover to further isolate the error. See the *Problem Determination and Service Guide* on the IBM *System x Documentation* CD for additional information.

USB 2 connector: Connect a USB device to this connector.

USB 1 connector: Connect a USB device to this connector.

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

Hard disk drive status LED: When this LED is lit, it indicates that the associated hard disk drive has failed. If an optional RAID adapter is installed in the server and the LED flashes slowly (one flash per second), the drive is being rebuilt. If the LED flashes rapidly (three flashes per second), the controller is identifying the drive.

Hard disk drive activity LED: When this LED is flashing, it indicates that the drive is in use.

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

Rear view

The following illustration shows the connectors and LEDs on the rear of the server.
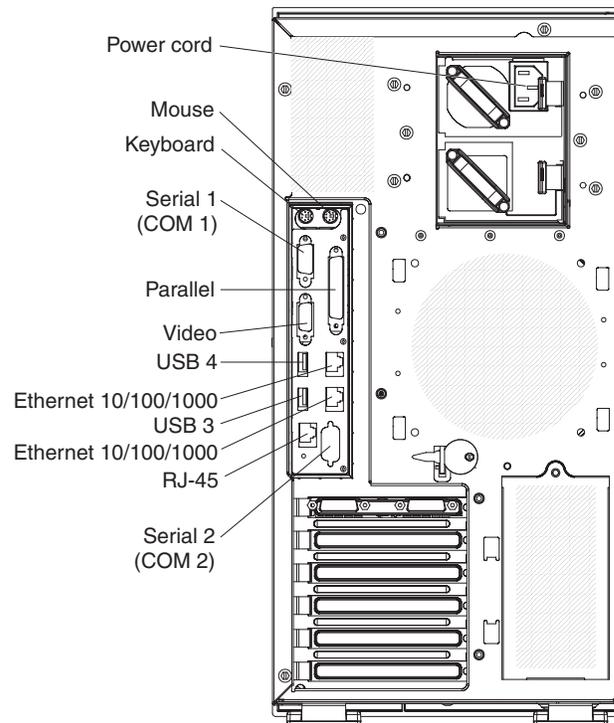
Power-cord connector: Connect the power cord to this connector.

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

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

Serial 1(COM 1) connector: Connect a 9-pin serial device to this connector.

Parallel connector: Connect a parallel device to this connector.

Video connector: Connect a monitor to this connector.

USB 4 connector: Connect a USB device to this connector.

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

USB 3 connector: Connect a USB device to this connector.

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

RJ-45 connector: Use this connector to connect the optional Remote Supervisor Adapter II SlimLine to a network.

Serial 2 (COM 2) connector: Connect a 9-pin serial device to this connector or using the Configuration/Setup Utility program you can configure this port for use by the system management.

Note: When this connector is configured for use with the system management, do not connect any other 9-pin serial devices to this connector.

Server power features

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

Turning on the server

Approximately 20 seconds after the server is connected to ac power, the power-control button becomes active, one or more fans might start running, and 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 the server is connected to an Advanced System Management interconnect network that contains at least one server with an optional Remote Supervisor Adapter II SlimLine installed, the server can be turned on from the Remote Supervisor Adapter user interface.
- If your operating system supports the systems-management software for an optional Remote Supervisor Adapter II SlimLine, the systems-management software can turn on the server.
- 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 ac 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 ac 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.
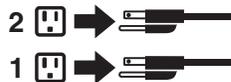
The server can be turned off in any of the following ways:

- 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.
- If the server is connected to an Advanced System Management interconnect network that contains at least one server with an optional Remote Supervisor Adapter II SlimLine installed, the server can be turned off from the Remote Supervisor Adapter II SlimLine user interface.
- If an optional Remote Supervisor Adapter II SlimLine is installed in the server, the server can be turned off from the Remote Supervisor Adapter II SlimLine user interface.
- The integrated system management 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:

- Configuration/Setup Utility program
- Integrated System Management Firmware Update Utility program
- Baseboard management controller utility programs
- RAID configuration programs
  - Use the IBM ServeRAID Configuration Utility program or ServeRAID Manager to configure an array of hot-swap SAS or hot-swap SATA hard disk drives. For information about using these programs, see "Configuring hot-swap SAS or hot-swap SATA RAID" on page 54.
  - Adaptec RAID Configuration Utility program
  - ServeRAID Manager
- Boot Menu program
- Broadcom Gigabit Ethernet Utility program

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

Using the ServerGuide Setup and Installation CD

The *ServerGuide Setup and Installation* CD provides state-of-the-art programs to detect the server model and installed hardware options, configure the server hardware, provide device drivers, and help you install the operating system. For information about the supported operating-system versions, see the label on the CD. If the *ServerGuide Setup and Installation* CD did not come with the server, you can download the latest version from http://www.ibm.com/pc/qtechinfo/MIGR-4ZKPPT.html.

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

1. Insert the CD, and restart the server. If the CD does not start, see "ServerGuide problems" on page 66.
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 Configuration/Setup Utility program

The Configuration/Setup Utility program is part of the BIOS. You can use it to:

- Change interrupt request (IRQ) settings
- Change the startup drive sequence
- Configure serial-port assignments
- Enable USB keyboard and mouse support
- Resolve configuration conflicts
- Set the date and time
- Set passwords and security settings

To start the Configuration/Setup Utility program, complete the following steps:

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

Using the Integrated System Management Firmware Update Utility program

To update the firmware for the integrated system management processor (ISMP), go to http://www.ibm.com/support/, click **Downloads and drivers**, and download the Integrated System Management Firmware Update Utility program for your server. Run the utility program to create a diskette that you can use to update the firmware. The utility program updates the integrated system management firmware only and does not affect any device drivers.

To update the firmware, complete the following steps:

1. Turn off the server.
2. Insert the diskette into the diskette drive.
3. Turn on the server. If the server does not start from the diskette, use the Configuration/Setup Utility program to configure the diskette drive as a startup device. (For more information, see the information about Configuration/Setup Utility start options in the *User's Guide*.) Then, start again at step 1 of this procedure.
4. From the main menu, select **Update System Management Firmware** and press Enter.
5. Follow the instructions on the screen to complete the update.

If there is an error in updating the firmware, try installing the firmware again.

Using the baseboard management controller

The baseboard management controller provides environmental monitoring for the server. If environmental conditions exceed thresholds or if system components fail, the baseboard management controller lights LEDs to help you diagnose the problem and also records the error in the System Event/Error 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.

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

Complete the following steps to update and configure the BIOS code to enable SOL:

1. Update the BIOS code:

    a. Download the latest version of the BIOS code from http://www.ibm.com/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/support/.

    b. Update the BMC firmware, following the instructions that come with the update file that you downloaded.

3. Configure the BIOS settings:

    a. Restart the server and press F1 when prompted to start the Configuration/Setup Utility program.

    b. Select **Devices and I/O Ports**; then, make sure that the values are set as follows:

      - **Serial Port A**: Auto-configure
      - **Serial Port B**: Auto-configure

    c. Select **Remote Console Redirection**; then, make sure that the values are set as follows:

      - **Remote Console Active**: Enabled
      - **Remote Console COM Port**: COM 2
      - **Remote Console Baud Rate**: 19200 or higher
      - **Remote Console Data Bits**: 8
      - **Remote Console Parity**: None
      - **Remote Console Stop Bits**: 1
      - **Remote Console Text Emulation**: ANSI

- Remote Console Keyboard Emulation: ANSI
- Remote Console Active After Boot: Enabled
- Remote Console Flow Control: Hardware

d. Press Esc twice to exit the **Remote Console Redirection** and **Devices and I/O Ports** sections of the Configuration/Setup Utility program.

e. Select **Advanced Setup**; then, select **Baseboard Management Controller (BMC) Settings**.

f. Set **BMC Serial Port Access Mode** to **Dedicated**.

g. Press Esc twice to exit the **Baseboard Management Controller (BMC) Settings** and **Advanced Setup** sections of the Configuration/Setup Utility program.

h. Select **Save Settings**; then, press Enter.

i. Press Enter to confirm.

j. Select **Exit Setup**; then, press Enter.

k. Make sure that **Yes, exit the Setup Utility** is selected; then, press Enter.

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 2.1 configuration:

Note: This procedure is based on a default installation of Red Hat Enterprise Linux ES 2.1. The file names, structures, and commands might be different for other versions of Red Hat Linux.

Complete the following steps to configure the general Linux parameters for SOL operation when using the Red Hat Enterprise Linux ES 2.1 operating system.

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

1. Add the following line to the end of the `# 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. Complete the following steps to 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

<pre>#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</pre>

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 completing these procedures for the changes to take effect and to enable SOL.

SUSE SLES 8.0 configuration:

Note: This procedure is based on a default installation of SUSE Linux Enterprise Server (SLES) 8.0. The file names, structures, and commands might be different for other versions of SUSE LINUX.

Complete the following steps to configure the general Linux parameters for SOL operation when using the SLES 8.0 operating system.

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

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

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

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

   `ttyS0`

3. 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=ttyS0,19200 console=tty1`

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 completing 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.

Complete the following steps to configure the Windows 2003 operating system for SOL operation. You must be logged in as a user with administrator 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 COM2 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 `COM2` 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
```
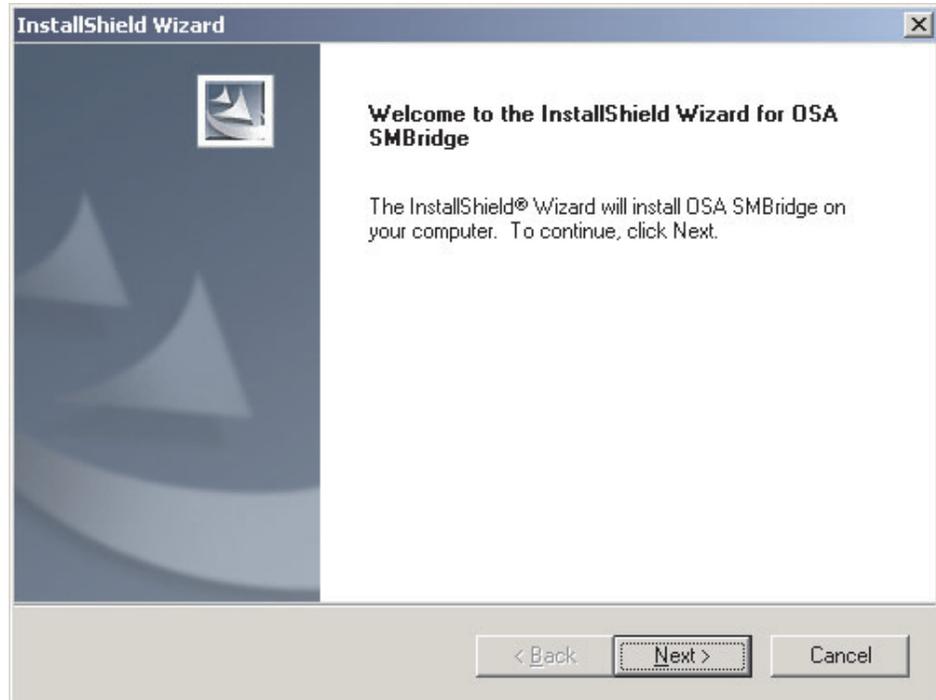
Modified bootcfg program output

```
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 completing this procedure for the changes to take effect and to enable SOL.

Installing the OSA SMBridge management utility program

Complete the following steps to install the OSA SMBridge management utility program on a server running a Windows operating system:

1. Go to http://www.ibm.com/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.

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

1. Go to http://www.ibm.com/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.

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`

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/smbriged
   /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.

Complete the following steps to start the baseboard management controller configuration utility program:

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 disk to update the baseboard management controller firmware and SDR/FRU data. The firmware update utility 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 updating 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 System Event/Error log.

  Use the following commands in CLI mode:

  - **identify**

    Control the system-locator LED on the front of the server.
  - **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*.

  – **identify**

  Control the system-locator LED on the front of the server.

  – **power**

  Turn the server on and off remotely.

  – **reboot**

  Force the server to restart.

  – **sel get**

  Display the System Event/Error log.

  – **sol**

  Configure the SOL function.

  – **sysinfo**

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

Using the ServeRAID configuration programs

The ServeRAID-8k SAS Controller enables you to configure multiple physical SAS hard disk drives to operate as logical drives in a disk array. The server comes with a CD containing the ServeRAID Manager program, which you can use to configure the ServeRAID-8k SAS Controller. For information about these programs, see the *User's Guide* on the IBM System x *Documentation* CD. If your server comes with an operating system installed, such as Microsoft Windows 2000 Datacenter Server, see the software documentation that comes with the server for configuration information.

Configuring hot-swap SAS or hot-swap SATA RAID

Use the IBM ServeRAID Configuration Utility program or ServeRAID Manager to configure and manage hot-swap SAS or hot-swap SATA redundant array of independent disks (RAID). Be sure to use these programs as described in this document.

- Use the IBM ServeRAID Configuration Utility program to:
  - Perform a low-level format on a hard disk drive
  - View or change IDs for some attached devices
  - Set protocol parameters on hard disk drives
- Use ServeRAID Manager to:
  - Configure arrays

– View the RAID configuration and associated devices
   – Monitor operation of the RAID controller

Consider the following information when using the IBM ServeRAID Configuration Utility program or ServeRAID Manager to configure and manage arrays:

- The ServeRAID-8k-l SAS controller that comes with the server supports only RAID level-0 and RAID level-1. Servers that come with eight 3.5-inch hot-swap SAS drives also support RAID level-10. You can replace the ServeRAID-8k-l SAS controller with a ServeRAID-8k SAS controller that supports additional RAID levels.
- 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.
- Do not include SAS and SATA drives in the same array.
- To update the firmware and BIOS code for an optional ServeRAID controller, you must use the IBM *ServeRAID Support* CD that comes with the ServeRAID option.

Using the IBM ServeRAID Configuration Utility program

Use the IBM ServeRAID 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 IBM ServeRAID Configuration Utility program

To start the IBM ServeRAID Configuration Utility program, complete the following steps:

1. Turn on the server.
2. When the prompt `<<< Press <CTRL><A> for IBM ServeRAID Configuration Utility! >>>` appears, press Ctrl+A.
3. To select a choice from the menu, use the arrow keys.
4. Use the arrow keys to select the channel for which you want to change settings.
5. To change the settings of the selected items, follow the instructions on the screen. Be sure to press Enter to save your changes.

IBM ServeRAID Configuration Utility menu choices

The following choices are on the IBM ServeRAID Configuration Utility menu:

- **Array Configuration Utility**

  Select this choice to create, manage, or delete arrays, or to initialize drives.

- **SerialSelect Utility**

  Select this choice to configure the controller interface definitions or to configure the physical transfer and SAS address of the selected drive.

- **Disk Utilities**

  Select this choice to format a disk or verify the disk media. Select a device from the list and read the instructions on the screen carefully before making a selection.

Using ServeRAID Manager

Use ServeRAID Manager, which is on the *IBM ServeRAID Manager Application* CD, to perform the following tasks:

- Configure a redundant array of independent disks (RAID) array
- Erase all data from a hard disk drive and return the disk to the factory-default settings
- View the RAID configuration and associated devices
- Monitor the operation of the RAID controller

To perform some tasks, you can run ServeRAID Manager as an installed program. However, to configure the RAID controller and perform an initial RAID configuration on the server, you must run ServeRAID Manager in Startable CD mode, as described in the instructions in this section.

See the ServeRAID documentation on the *IBM ServeRAID Support* CD for additional information about RAID technology and instructions for using ServeRAID Manager to configure the RAID controller. Additional information about ServeRAID Manager is also available from the **Help** menu. For information about a specific object in the ServeRAID Manager tree, select the object and click **Actions --> Hints and tips**.

Configuring the RAID controller

By running ServeRAID Manager in Startable CD mode, you can configure the RAID controller before you install the operating system. The information in this section assumes that you are running ServeRAID Manager in Startable CD mode.

To run ServeRAID Manager in Startable CD mode, turn on the server; then, insert the CD into the CD-RW/DVD drive. If ServeRAID Manager detects an unconfigured controller and ready drives, the Configuration wizard starts.

In the Configuration wizard, you can select express configuration or custom configuration. Express configuration automatically configures the controller by grouping the first two physical drives in the ServeRAID Manager tree into an array and creating a RAID level-1 logical drive. If you select custom configuration, you can select the physical drives that you want to group into an array and create a hot-spare drive.

Using express configuration: To use express configuration, complete the following steps:

1. In the ServeRAID Manager tree, click the controller.
2. Click **Express configuration**.
3. Click Next.
4. In the "Configuration summary" window, review the information. To change the configuration, click **Modify arrays**.
5. Click **Apply**; when you are asked whether you want to apply the new configuration, click **Yes**. The configuration is saved in the controller and in the physical drives.
6. Exit from ServeRAID Manager and remove the CD from the CD-RW/DVD drive.
7. Restart the server.

Using custom configuration: To use custom configuration, complete the following steps:

1. In the ServeRAID Manager tree, click the controller.

2. Click **Custom configuration**.

3. Click **Next**.

4. In the "Create arrays" window, from the list of ready drives, select the drives that you want to group into the array.

5. Click the (Add selected drives) icon to add the drives to the array.

6. If you want to configure a hot-spare drive, complete the following steps:

   a. Click the **Spares** tab.

   b. Select the physical drive that you want to designate as the hot-spare drive, and click the (Add selected drives) icon.

7. Click **Next**.

8. Review the information in the "Configuration summary" window. To change the configuration, click **Back**.

9. Click **Apply**; when you are asked whether you want to apply the new configuration, click **Yes**. The configuration is saved in the controller and in the physical drives.

10. Exit from ServeRAID Manager and remove the CD from the CD-RW/DVD drive.

11. Restart the server.

Viewing the configuration

You can use ServeRAID Manager to view information about RAID controllers and the RAID subsystem (such as arrays, logical drives, hot-spare drives, and physical drives). When you click an object in the ServeRAID Manager tree, information about that object appears in the right pane. To display a list of available actions for an object, click the object and click **Actions**.

Using the RAID configuration programs

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

- Use the Adaptec RAID Configuration Utility program to:
  - Perform a low-level format on a SAS/SATA hard disk drive
  - View or change IDs for attached devices
  - Set protocol parameters on SAS/SATA hard disk drives
- Use ServeRAID Manager to:
  - Configure arrays
  - View the RAID configuration and associated devices
  - Monitor operation of the RAID controllers

Consider the following information when using the Adaptec RAID Configuration Utility program and ServeRAID Manager to configure and manage arrays:

- The ServeRAID-8k SAS Controller that comes with the server supports RAID levels 0, 1, 1e, 5, 6, and 10.
- 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 use drives with different speeds and data rates in the array.

- You can set up a mirror after the operating system is installed on the primary drive. You must make sure that the primary drive has the lower ID (for example, 0).
- To update the firmware and BIOS code for the ServeRAID-8k SAS Controller, you must use the IBM *ServeRAID Support* CD that comes with the server.
- If you install a different type of RAID controller, see the documentation that comes with the controller for information about viewing and changing SAS settings for attached devices.

Starting the Adaptec RAID Configuration Utility program

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

1. Turn on the server.
2. When the prompt `<<< Press <CTRL><A> for Adaptec RAID Configuration Utility! >>>` appears, press Ctrl+A.
3. To select a choice from the menu, use the arrow keys to highlight it and press Enter.

Adaptec RAID Configuration Utility menu choices

The following choices are on the Adaptec RAID Configuration Utility menu:

- **Array Configuration Utility**

  Select this choice to create, manage, or delete arrays, or to initialize drives.

- **SerialSelect Utility**

  Select this choice to configure the controller interface definitions or to configure the physical transfer and SAS address of the selected drive.

- **Disk Utilities**

  Select this choice to format a disk or verify the disk media. Select a device from the list and read the instructions on the screen carefully before making a selection.

Creating a RAID array

To create a RAID array, complete the following steps:

1. Start the Adaptec RAID Configuration Utility program.
2. Select **Array Configuration Utility**.
3. From the Main menu, select **Create Array**.

   Note: Hard disk drives in an array can have different capacities, but the ServeRAID-8k SAS Controller treats them as if they all have the capacity of the smallest hard disk drive.

4. From the list of available drives, select the drives that you want to include in the array and press Enter.
5. From the list of RAID levels available, select the one you want to use.
6. Follow the instructions on the screen to complete the configuration; then, select **Done** to exit.
7. Restart the server.

Viewing the array configuration

To view information about the RAID array, complete the following steps:

1. Start the Adaptec RAID Configuration Utility program.

2. Select **Array Configuration Utility**.
3. From the Main menu, select **Manage Arrays**.
4. Select an array and press Enter.
5. To exit from the program, press Esc.

Using ServeRAID Manager

Use ServeRAID Manager, which is on the *IBM ServeRAID Support* CD, to:

- Configure a redundant array of independent disks (RAID) array
- Restore a SAS hard disk drive to the factory-default settings, erasing all data from the disk
- View the RAID configuration and associated devices
- Monitor the operation of the RAID controllers

To perform some tasks, you can run ServeRAID Manager as an installed program. However, to configure the installed ServeRAID controller and perform an initial RAID configuration on the server, you must run ServeRAID Manager in Startable CD mode, as described in the instructions in this section. If you install a different type of RAID adapter in the server, use the configuration method described in the instructions that come with that adapter to view or change SAS settings for attached devices.

See the ServeRAID documentation on the *IBM ServeRAID Support* CD for additional information about RAID technology and instructions for using ServeRAID Manager to configure the installed ServeRAID controller. Additional information about ServeRAID Manager is also available from the **Help** menu. For information about a specific object in the ServeRAID Manager tree, select the object and click **Actions --> Hints and tips**.

Configuring the controller

By running ServeRAID Manager in Startable CD mode, you can configure the installed controller before you install the operating system. The information in this section assumes that you are running ServeRAID Manager in Startable CD mode.

To run ServeRAID Manager in Startable CD mode, turn on the server; then, insert the CD into the CD drive. If ServeRAID Manager detects an unconfigured controller and ready drives, the Configuration wizard starts.

In the Configuration wizard, you can select express configuration or custom configuration. Express configuration automatically configures the controller by grouping the first two physical drives in the ServeRAID Manager tree into an array and creating a RAID level-1 logical drive. If you select custom configuration, you can select the two physical drives that you want to group into an array and create a hot-spare drive.

Using express configuration: To use express configuration, complete the following steps:

1. In the ServeRAID Manager tree, click the controller.
2. Click **Express configuration**.
3. Click Next. The "Configuration summary" window opens.
4. Review the information in the "Configuration summary" window. To change the configuration, click **Modify arrays**.

5. Click **Apply**; then, click **Yes** when asked if you want to apply the new configuration. The configuration is saved in the controller and in the physical drives.

6. Exit from ServeRAID Manager and remove the CD from the CD drive.

7. Restart the server.

Using custom configuration: To use custom configuration, complete the following steps:

1. In the ServeRAID Manager tree, click the controller.

2. Click **Custom configuration**.

3. Click **Next**. The "Create arrays" window opens.

4. From the list of ready drives, select the two drives that you want to group into the array.

5. Click the (Add selected drives) icon to add the drives to the array.

6. If you want to configure a hot-spare drive, complete the following steps:

   a. Click the **Spares** tab.

   b. Select the physical drive that you want to designate as the hot-spare drive, and click the (Add selected drives) icon.

7. Click **Next**. The "Configuration summary" window opens.

8. Review the information in the "Configuration summary" window. To change the configuration, click **Back**.

9. Click **Apply**; then, click **Yes** when asked if you want to apply the new configuration. The configuration is saved in the controller and in the physical drives.

10. Exit from ServeRAID Manager and remove the CD from the CD drive.

11. Restart the server.

Viewing the configuration

You can use ServeRAID Manager to view information about RAID controllers and the RAID subsystem (such as arrays, logical drives, hot-spare drives, and physical drives). When you click an object in the ServeRAID Manager tree, information about that object appears in the right pane. To display a list of available actions for an object, click the object and click **Actions**.

Using the Boot Menu program

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

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

1. Turn off the server.

2. Restart the server.

3. Press F12.

4. Select the startup device.

The next time that the server is started, it returns to the startup sequence that is set in the Configuration/Setup Utility program.

Enabling the Broadcom Gigabit Ethernet Utility program

The Broadcom Gigabit Ethernet Utility is part of the BIOS code. You can use it to configure the network as a startable device, and you can customize where the network startup option appears in the startup sequence.

To enable the Broadcom Gigabit Ethernet Utility program, complete the following steps:

1. From the Configuration/Setup Utility main menu, select **Devices and I/O Ports** and press Enter.
2. Select **Planar Ethernet** and use the Right Arrow (→) key to set it to **Enabled**.
3. Select **Save Settings** and press Enter.

Configuring the Broadcom Gigabit Ethernet controller

The Ethernet controller is integrated on the system board. It provides an interface for connecting to a 10-Mbps, 100-Mbps, or 1-Gbps network and provides full duplex (FDX) capability, which enables simultaneous transmission and reception of data on the network. If the Ethernet port in the server supports auto-negotiation, the controller detects the data-transfer rate (10BASE-T, 100BASE-TX, or 1000BASE-T) and duplex mode (full-duplex or half-duplex) of the network and automatically operates at that rate and mode.

You do not have to set any jumpers or configure the controller. However, you must install a device driver to enable the operating system to address the controller. To find updated information about configuring the controller, complete the following steps.

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

1. Go to http://www.ibm.com/support/.
2. Under **Search technical support**, type 7977, and click **Search**.
3. In the **Additional search terms** field, type ethernet, and click **Go**.

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 75, 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.
  - One beep indicates successful completion of POST, with no errors.
  - More than one beep indicates that POST detected a problem. Error messages also appear during startup if POST detects a hardware-configuration problem.

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

- **Troubleshooting charts**

  These charts list problem symptoms and steps to correct the problems. See "Troubleshooting charts" on page 67 for more information.

- **Diagnostic programs and error messages**

  The system diagnostic programs are provided on the IBM *Enhanced Diagnostics* CD. These diagnostic programs are used to troubleshoot problems in the server. See the *Problem Determination and Service Guide* on the IBM *System x Documentation* CD for more information about the diagnostic programs and error messages.

- **Light path diagnostics**

  Use light path diagnostics to diagnose system errors quickly. See "Light path diagnostics" on page 72 for more information.

POST beep code descriptions

POST emits one beep 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.

One beep
> POST was completed successfully without finding any errors.

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 messages

The following table provides an abbreviated list of the error messages 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 messages. To check updated technical information go to http://www.ibm.com/support/, type **IBM System x3500** under **Search for technical support**.

Table 5. Abbreviated list of POST error messages

POST message	Failing device or problem found	Suggested action
062	Three consecutive boot failures using the default configuration.	1. Flash the system firmware to the latest level (see the *Problem Determination and Service Guide* on the IBM *System x Documentation* CD). 2. (Trained service technician only) Replace the system board.
101	Tick timer internal interrupt failure.	(Trained service technician only) Replace the system board.
102	Internal timer channel 2 test failure.	(Trained service technician only) Replace the system board.

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

161	The real-time clock battery has failed.	Replace the battery or call for service.
162	A device configuration has changed.	• Run the Configuration/Setup Utility program; then, exit, saving the configuration settings. • Make sure that optional devices are turned on and installed correctly.
163	The time of day has not been set.	Set the date and time.
175	Service processor flash code damaged or not loaded. **Note:** In this case, the service processor is the optional Remote Supervisor Adapter II.	1. Update the Remote Supervisor Adapter II firmware (see the *Problem Determination and Service Guide o*n the IBM *System x Documentation* CD). 2. Replace the Remote Supervisor Adapter II.

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

187	VPD serial number not set.	1. Set the serial number by updating the BIOS code level (see the *Problem Determination and Service Guide* on the IBM *System x Documentation* CD). 2. (Trained service technician only) Replace the system board

Table 5. Abbreviated list of POST error messages (continued)

POST message	Failing device or problem found	Suggested action
188	Remote Supervisor Adapter II SlimLine EEPROM error	Replace the Remote Supervisor Adapter II SlimLine
189	Three attempts were made to access the server with an incorrect password.	Restart the server and enter the administrator password; then, run the Configuration/Setup Utility program and change the power-on password.
196	Microprocessors do not have the same L2 or L3 cache size.	Install microprocessors with the same L2 or L3 cache size.
198	Microprocessors are not the same speed	Install microprocessor of the same speed.
289	A failing DIMM was disabled.	Make sure that the DIMMs are supported by the server and that they are installed correctly.
301, 303	Keyboard and keyboard controller	Make sure that the keyboard cable is connected and that nothing is resting on the keyboard keys.
1604	Machine Type mismatch detected	Make sure the vital product data (VPD), installed hardware, and BMC code level is correct for the servers machine type.
00019*xxx*	Microprocessor *x* is not functioning or failed the built-in self-test.	Make sure that microprocessor *x* is installed correctly. If the problem remains, replace microprocessor *x*.
012980*xx* 012981*xx*	Data for microprocessor *x*	Download and install the latest level of BIOS code.
I9990650	AC power has been restored.	1. Reseat the power cord or cords 2. Check for interruption of the external power. 3. Replace the power cord or cords

ServerGuide problems

The following table lists problem symptoms and suggested solutions.

Table 6. ServerGuide Setup and Installation CD

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

Troubleshooting charts

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. Check the light path diagnostics LEDs on the operator information panel (see "Light path diagnostics" on page 72).
2. Remove the software or device that you just added.
3. Run the diagnostic tests to determine whether the server is running correctly.
4. Reinstall the new software or new device.

DVD drive problems

Symptom	Suggested action
The DVD drive is not recognized.	Make sure that: • The IDE channel to which the DVD drive is attached (primary or secondary) is enabled in the Configuration/Setup Utility program. If the server has a single IDE channel, only the primary channel can be used. • All cables and jumpers are installed correctly. • The correct device driver is installed for the CD-ROM drive. If the problem remains, call for service.
A DVD is not working correctly.	Clean the DVD. If the problem remains, call for service.
The DVD drive tray is not working.	The server must be turned on for the DVD drive tray to work. If the problem remains, call for service.

Diskette drive problems

Symptom	Suggested action
The diskette drive activity LED stays lit, or the server bypasses the diskette drive.	If there is a diskette in the drive, make sure that: • The diskette drive cables are correctly and securely connected. • The diskette is good and not damaged. (Try another diskette if you have one.) • The diskette contains the necessary files to start the server. • Your software program is working correctly. If the problem remains, call for service.

General problems

Symptom	Suggested action
A cover lock is broken, an LED is not working, or a similar problem has occurred.	Call for service.

Hard disk drive problems

Symptom	Suggested action
Not all drives are recognized by the hard disk drive diagnostic test (the Fixed Disk test).	1. Remove the first drive that is not recognized and try the hard disk drive diagnostic test again. 2. 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.	1. Remove the hard disk drive that was being tested when the server stopped responding and try the diagnostic test again. 2. If the hard disk drive diagnostic test runs successfully, replace the drive that you removed with a new one.

Intermittent problems

Symptom	Suggested action
A problem occurs only occasionally and is difficult to diagnose.	Make sure that: • All cables and cords are connected securely to the rear of the server and attached devices. • When the server is turned on, air is flowing from the rear of the server at the fan grille. If there is no airflow, the fan is not working. This can cause the server to overheat and shut down. If the problem remains, call for service.

Keyboard, mouse, or pointing-device problems

Symptom	Suggested action
All or some keys on the keyboard do not work.	• Make sure that the keyboard cable is securely connected to the server and that the keyboard and mouse cables are not reversed. • Make sure that the server and the monitor are turned on. • Try using another keyboard. If the problem remains, call for service.
The mouse or pointing device does not work.	• Make sure that the mouse or pointing-device cable is securely connected to the server and that the keyboard and mouse cables are not reversed. • Make sure that the mouse device drivers are installed correctly. • Make sure that the server and the monitor are turned on. • Try using another mouse or pointing device. If the problem remains, call for service.

Memory problems

Symptom	Suggested action
The amount of system memory that is displayed is less than the amount of installed physical memory.	Make sure that: • The DIMMs are seated correctly. • You have installed the correct type of memory. • All banks of memory are enabled. The server might have automatically disabled a memory bank when it detected a problem. Check the POST error log for error message 289: • If the DIMM was disabled by a system-management interrupt (SMI), replace the DIMM. • If the DIMM was disabled by POST, replace the disabled DIMM. If the problem remains, call for service.

Microprocessor problems

Symptom	Suggested action
The server emits a continuous tone during POST.	The startup (boot) microprocessor is not working correctly. Make sure that the startup microprocessor is seated correctly. If it is, replace the startup microprocessor. If the problem remains, call for service.

Monitor problems

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

Symptom	Suggested action
The screen is blank.	Make sure that: • The server power cord is connected to the server and a working electrical outlet. • The monitor cables are connected correctly. • The monitor is turned on and the brightness and contrast controls are adjusted correctly. **Important:** In some memory configurations, the 3-3-3 beep code might sound during POST, followed by a blank monitor screen. If this occurs and the **Boot Fail Count** feature in the **Start Options** of the Configuration/Setup Utility program is enabled (its default setting), you must restart the server three times to force the BIOS to reset the configuration settings to the default configuration (the memory connector or bank of connectors enabled). If the problem remains, call for service.
Only the cursor appears.	Call for service.
The monitor works when you turn on the server, but the screen goes blank when you start some application programs.	Make sure that: • The monitor cable is connected. • You have installed the necessary device drivers for the application programs. If the problem remains, call for service.

Symptom	Suggested action
The monitor has screen jitter, or the screen image is wavy, unreadable, rolling, or distorted.	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 300 mm (12 in.) apart, and turn on the monitor. **Notes:** 1. To prevent diskette drive read/write errors, make sure that the distance between the monitor and diskette drives is at least 75 mm (3 in.). 2. Non-IBM monitor cables might cause unpredictable problems. 3. An enhanced monitor cable with additional shielding is available for the 9521 and 9527 monitors. For information about the enhanced monitor cable, contact your IBM marketing representative or authorized reseller. If the problem remains, call for service.
Wrong characters appear on the screen.	If the wrong language is displayed, update the BIOS code with the correct language. If the problem remains, call for service.

Option problems

Symptom	Suggested action
An IBM option that was just installed does not work.	Make sure that: • The option is designed for the server. See the "Server Support" flowchart for information about obtaining ServerProven compatibility information from the World Wide Web. • You followed the installation instructions that come with the option. • The option is installed correctly. • You have not loosened any other installed options or cables. • You have updated the configuration information in the Configuration/Setup Utility program. Whenever memory or an option is changed, you must update the configuration. If the problem remains, call for service.
An IBM option that used to work does not work now.	• Make sure that all of the option hardware and cable connections are secure. • If the option comes with test instructions, use those instructions to test the option. If the problem remains, call for service.

Power problems

Symptom	Suggested action
The server does not turn on.	• Make sure that the server power cord is connected to the server and a working electrical outlet. • Make sure that the type of memory that is installed is supported by the server. • If you just installed an option, remove it, and restart the server. If the server now turns on, you might have installed more options than the power supply supports. If the problem remains, call for service.

Symptom	Suggested action
The server does not turn off.	Determine whether you are using an ACPI or non-ACPI operating system. If you are using a non-ACPI operating system, complete the following steps: 1. Press Ctrl+Alt+Delete. 2. Turn off the server by using the power-control button. You might have to press and hold the power-control button for 5 seconds to force the server to turn off. If the problem remains or if you are using an ACPI operating system, call for service.

Serial connector problems

For more information about the serial connector, see the *User's Guide* on the IBM *System x Documentation* CD.

Symptom	Suggested action
The number of serial connectors that are identified by the operating system is less than the number of installed serial connectors.	Make sure that: • Each connector is assigned a unique address in the Configuration/Setup Utility program and none of the serial connectors is disabled. • The serial connector adapter, if you installed one, is seated correctly. If the problem remains, call for service.
A serial device does not work.	Make sure that: • The device is compatible with the server. • The serial connector is enabled and is assigned a unique address. • The device is connected to the serial connector. If the problem remains, call for service.

Software problems

Symptom	Suggested action
You suspect a software problem.	To determine whether the problem is caused by the software, make sure that: • The server has the minimum memory 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. 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. If the problem remains, contact your place of purchase of the software.

Universal Serial Bus device problems

Symptom	Suggested action
A USB device does not work.	Make sure that: • You are not trying to use a USB device during POST if a standard (non-USB) keyboard is connected to the keyboard connector. If a standard (non-USB) keyboard is connected to the keyboard connector, the USB is disabled, and no USB device will work during POST. • The correct USB device driver is installed. • The operating system supports USB devices. If the problem remains, call for service.

Light path diagnostics

The following illustration shows the remind button and the LEDs on the light path diagnostics panel. The light path diagnostics panel is inside the server under the left-side cover, and the error LEDs are also visible through the left-side cover.

Press the remind button on the light path diagnostics panel to acknowledge an error has occurred but indicates that you will not take immediate action. When you press the remind button, the system-error LED flashes every 2 seconds until the error is corrected. If another error occurs, the system-error LED stops flashing and is lit again.

For more information about light path diagnostics, see the *Problem Determination and Service Guide* on the IBM *System x Documentation* CD.

Diagnosing problems using the light path diagnostics

LEDs in three locations on the server are available to help you diagnose problems that might occur during installation. Use them in the following order:

1. **LEDs on the front of the server** - Look at the front of the server. If a system error has occurred, the system-error LED on the front of the server is lit.
2. **LEDs on the left-side cover** - There are 13 LEDs and a system service label on the left-side cover. Note the lit LEDs and follow the instructions on the system service label.
3. **LEDs on the system board** - To identify the component that is causing the error, note the lit LED next to the component.

Light path diagnostics LEDs

The following table lists the LEDs on the light path diagnostics panel, the problems that they indicate, and actions to solve the problems.

LED	Problem	Action
POWER SUPPLY 1	Lit LED: Power supply 1 has failed.	1. Remove ac power from the server. 2. Replace the power supply; then, reconnect the server to ac power and restart the server.
	Flashing LED: Power supply 1 was removed in a redundant power-supply configuration.	Install a new power supply in the PS1 location.
POWER SUPPLY 2	Lit LED: Power supply 2 has failed.	1. Remove ac power from the server. 2. Replace the power supply; then, reconnect the server to ac power and restart the server.
	Flashing LED: Power supply 2 was removed in a redundant power supply configuration.	Install a new power supply in the PS2 location.
CONFIG	Microprocessor configuration error.	• Mismatched microprocessors, remove and install two microprocessor of the same cache size, type, and clock speed. • Check the system error log for information indicating incompatible components.
TEMP	The system temperature has exceeded a threshold level.	• Determine whether a fan has failed. If it has, replace it. • Make sure that the room temperature is not too high. See "Features and specifications" on page 5 for temperature information. • Make sure that the air vents are not blocked.
CPU	A microprocessor has failed.	If a lit LED on the system board indicates a problem with a microprocessor, make sure that the microprocessor is installed correctly. See the *User's Guide* on the IBM *System x Documentation* CD for information about installing a microprocessor.
S_ERR	Reserved	
VRM	The VRM or integrated VRD has failed.	• Remove ac power from the server, and then restart the server. • If the LED next to the VRM is lit, replace the pluggable VRM. • If the LED next to the integrated VRD is lit, call for service.
SERVICE PROCESSOR BUS	The service processor has failed.	• Reseat the Remote Supervisor Adapter II SlimLine. • Update the system and Remote Supervisor Adapter II SlimLine firmware. • Remove ac power from the server, and then restart the server.
MEMORY	A memory error has occurred.	Replace the failing DIMM, which is indicated by the lit LED on the system board.
DASD/RAID	A hard disk drive, integrated SAS controller, or integrated RAID error has occurred.This LED is also lit when a hard disk drive is removed from the server.	• Check the LEDs on the hard disk drives and replace the indicated drive. • Check the LEDs on the system board and replace the indicated component. • If a hard disk drive LED remains lit after being replaced, call for service.

LED	Problem	Action
FAN	A fan has failed or is operating too slowly. A failing fan can also cause the TEMP LED to be lit.	Replace the failing fan, indicated by the lit LED.
PCI BUS	An error has occurred on a PCI bus.	• Check the system error log for information about the error. • If you cannot isolate the failing adapter through the information in the system error log, remove one adapter at a time from the failing PCI bus, and restart the server after each adapter is removed. If the problem remains, call for service.
NMI	A machine check error has occurred.	Check the error log to diagnose the condition.

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 appendix 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 or optional device, 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 *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/servers/eserver/support/ xseries/index.html 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/servers/eserver/support/xseries/ index.html 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 IntelliStation information is http://www.ibm.com/intellistation/.

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

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.

Appendix B. Notices

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e-business logo	Tivoli
@server	Tivoli Enterprise
FlashCopy	Update Connector
IBM	Wake on LAN
IBM (logo)	XA-32
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Important notes

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

CD-ROM drive speeds list the variable read rate. Actual speeds vary and are often less than the maximum possible.

When referring to processor storage, real and virtual storage, or channel volume, KB stands for approximately 1000 bytes, MB stands for approximately 1 000 000 bytes, and GB stands for approximately 1 000 000 000 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 may 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 available from IBM.

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

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

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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/batteryrecycle.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.

In the Netherlands, the following applies.

For Taiwan: Please recycle batteries.

Electronic emission notices

Federal Communications Commission (FCC) statement

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

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

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

Industry Canada Class A emission compliance statement

This Class A digital apparatus complies with Canadian ICES-003.

Avis de conformité à la réglementation d'Industrie Canada

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

Australia and New Zealand Class A statement

Attention: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

United Kingdom telecommunications safety requirement

Notice to Customers

This apparatus is approved under approval number NS/G/1234/J/100003 for indirect connection to public telecommunication systems in the United Kingdom.

European Union EMC Directive conformance statement

This product is in conformity with the protection requirements of EU Council Directive 89/336/EEC on the approximation of the laws of the Member States relating to electromagnetic compatibility. IBM cannot accept responsibility for any failure to satisfy the protection requirements resulting from a nonrecommended modification of the product, including the fitting of non-IBM option cards.

This product has been tested and found to comply with the limits for Class A Information Technology Equipment according to CISPR 22/European Standard EN

55022. The limits for Class A equipment were derived for commercial and industrial environments to provide reasonable protection against interference with licensed communication equipment.

Attention: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Taiwanese Class A warning statement

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

Chinese Class A warning statement

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

Japanese Voluntary Control Council for Interference (VCCI) statement

この装置は、情報処理装置等電波障害自主規制協議会（ＶＣＣＩ）の基準に
基づくクラスＡ情報技術装置です。この装置を家庭環境で使用すると電波妨害を
引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求
されることがあります。

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