



System x3400
Types 7973, 7974,
7975, and 7976

Installation Guide

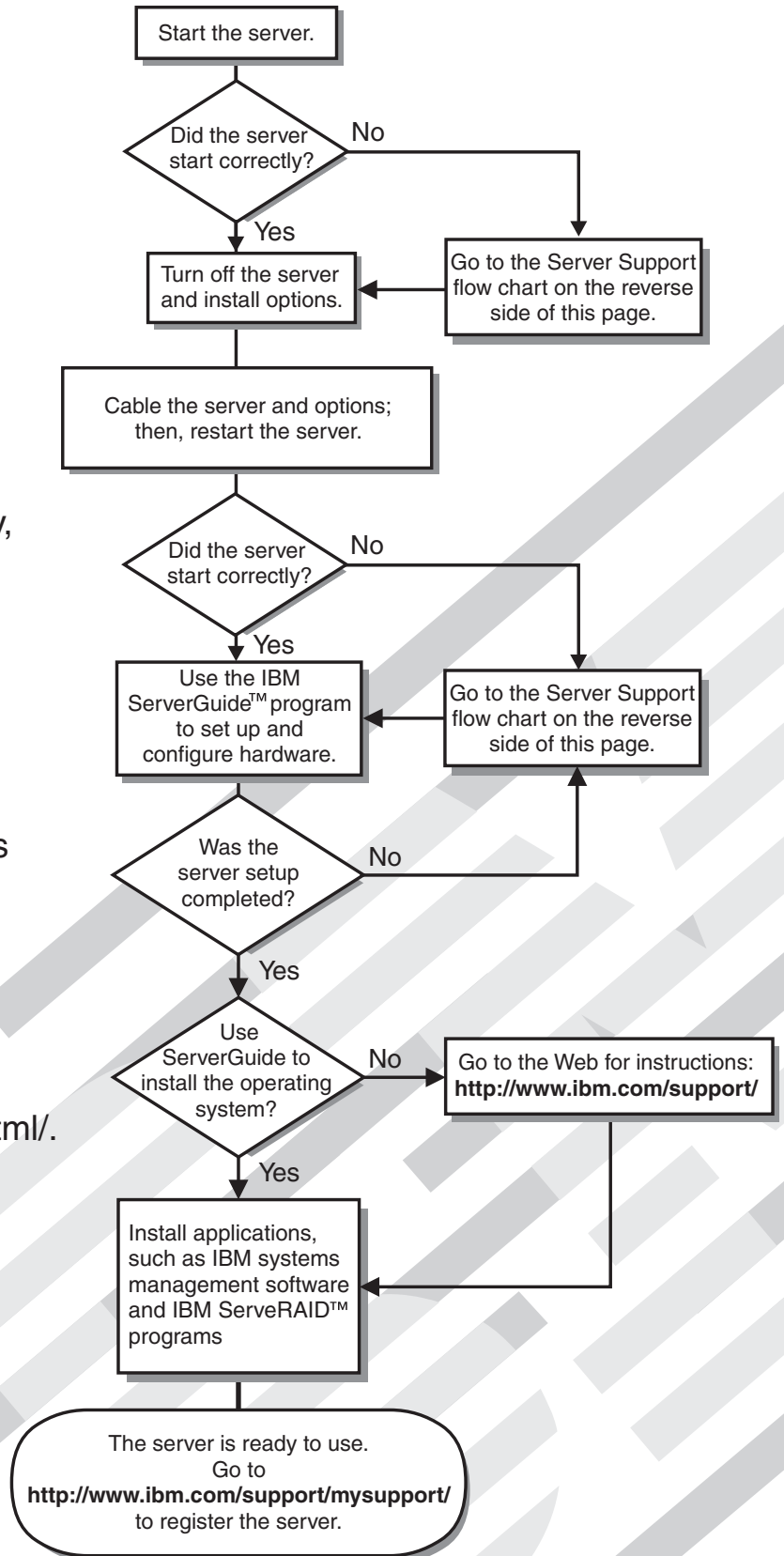
Welcome.

Thank you for buying an IBM server. Your server is based on the X-Architecture technology, and it features superior performance, availability, and affordability.

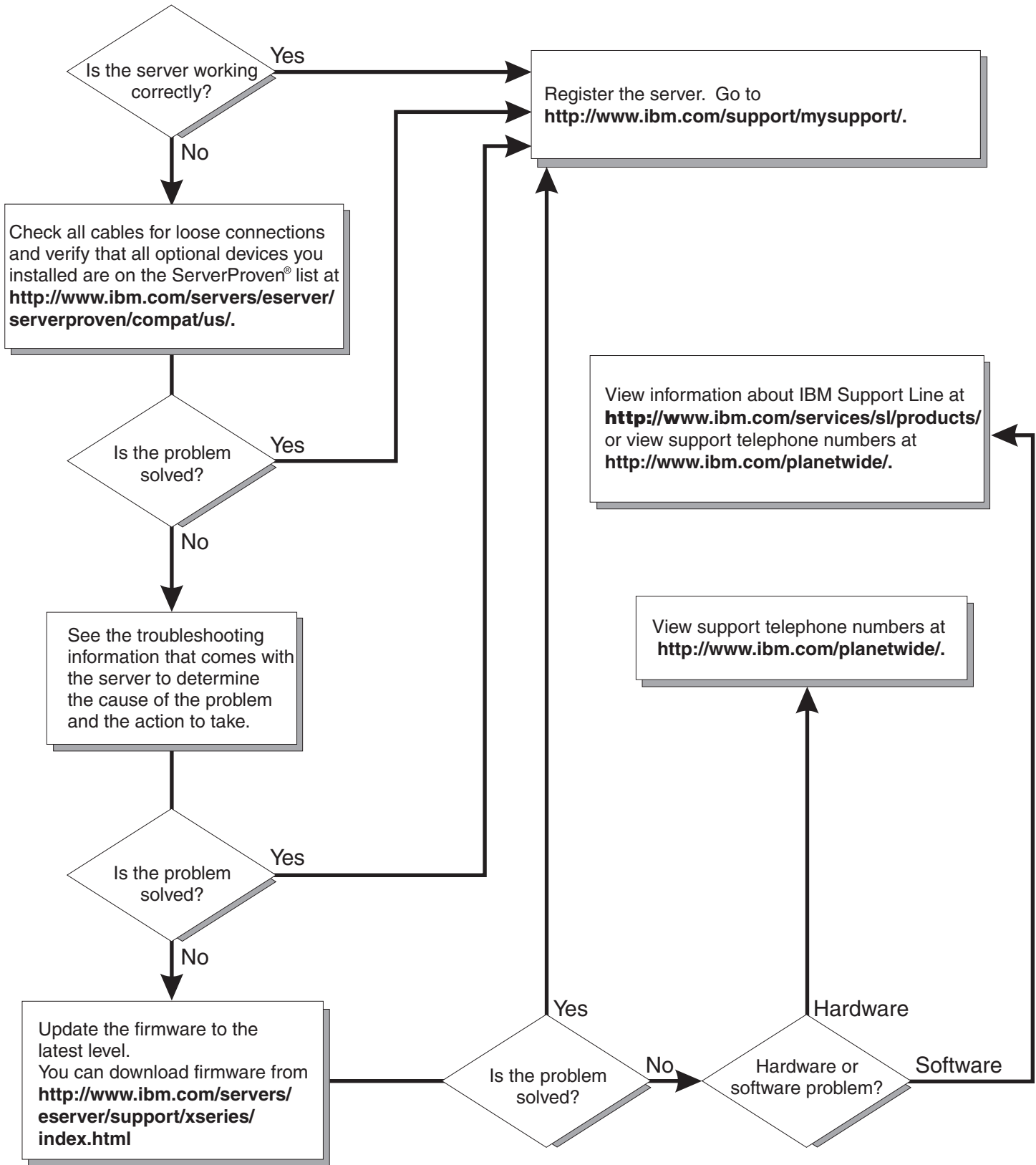
This server *Installation Guide* contains information for setting up and configuring your server.

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/servers/eserver/support/xseries/index.html/>.



Server Support





System x3400 Types 7973, 7974, 7975, and 7976
Installation Guide

Note:

Before using this information and the product it supports, read the general information in Appendix B, "Notices," on page 91, and the *Warranty and Support Information* document on the IBM *Documentation* CD.

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Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الأمنية

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 ασφαλείας (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 pečítajte 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 blade 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:

1. Turn everything OFF.
2. First, attach all cables to devices.
3. Attach signal cables to connectors.
4. Attach power cords to outlet.
5. Turn device ON.

To Disconnect:

1. Turn everything OFF.
2. First, remove power cords from outlet.
3. Remove signal cables from connectors.
4. Remove all cables from devices.

Statement 2:



CAUTION:

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

Do not:

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

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

Statement 3:



CAUTION:

When laser products (such as CD-ROMs, DVD drives, fiber optic devices, or transmitters) are installed, note the following:

- Do not remove the covers. Removing the covers of the laser product could result in exposure to hazardous laser radiation. There are no serviceable parts inside the device.
- Use of controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.



DANGER

Some laser products contain an embedded Class 3A or Class 3B laser diode. Note the following.

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



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

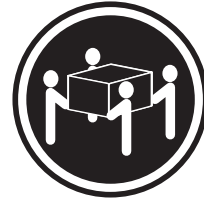
Statement 4:



≥ 18 kg (39.7 lb)



≥ 32 kg (70.5 lb)



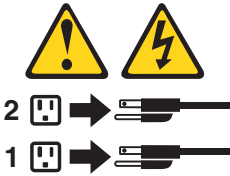
≥ 55 kg (121.2 lb)

CAUTION:
Use safe practices when lifting.

Statement 5:



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



Statement 8:



CAUTION:

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



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

Statement 11:



CAUTION:

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



Statement 12:



CAUTION:

The following label indicates a hot surface nearby.



Statement 13:



DANGER

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

Statement 15:



CAUTION:

Make sure that the rack is secured properly to avoid tipping when the server unit is extended.

Statement 17:



CAUTION:

The following label indicates moving parts nearby.



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.***

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.

Chapter 1. Introduction

This *Installation Guide* contains instructions for setting up the IBM® System x3400 Types 7973, 7974, 7975, and 7976 server and basic instructions for installing some options. More detailed instructions for installing options are in the *User's Guide* on the *IBM System x3400 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 updated, go to <http://www.ibm.com/support/>. For firmware updates, click **Downloads and drivers**. For documentation updates, under **Search technical support**, type 7973, 7974, 7975, or 7976 (depending on your machine type) and click **Search**.

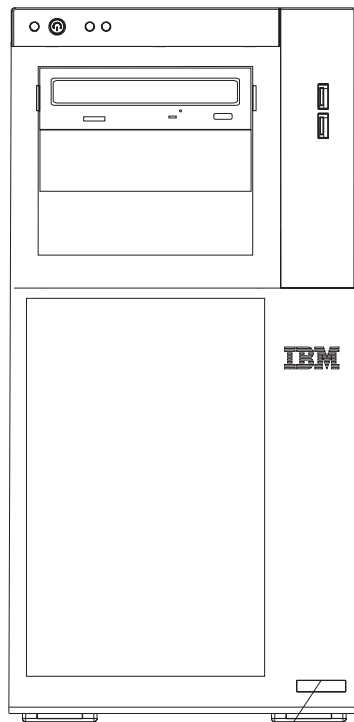
The server comes with an IBM *ServerGuide™ Setup and Installation* CD to help you configure the hardware, install device drivers, and install the operating system.

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 x3400
Machine type	7973, 7974, 7975, or 7976
Model number	_____
Serial number	_____
Key serial number	_____
Key manufacturer	_____
Key phone number	_____

The model number and serial number are on the lower-right side of the bezel, as shown in the following illustration. The illustration might differ slightly from your hardware.



Model type/serial number

The server comes in hot-swap and simple-swap models. For additional information, see the *User's Guide* on the *IBM System x3400 Documentation CD*.

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

The IBM Documentation CD

The IBM *System x3400 Documentation* CD contains documentation for the server in Portable Document Format (PDF) and includes the IBM Documentation Browser to help you find information quickly.

Hardware and software requirements

The IBM *System x3400 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®.
- 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 CD drive and click **Start --> Run**. In the **Open** field, type
`e:\win32.bat`

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

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

```
sh runlinux.sh
```

Select your server from the **Product** menu. The **Available Topics** list displays all the documents for your 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 Ctrl+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 x3400 Documentation* CD. Each statement is numbered for reference to the corresponding statement in the *Safety Information* document.

The following notices and statements are used in this document:

- **Note:** These notices provide important tips, guidance, or advice.
- **Important:** These notices provide information or advice that might help you avoid inconvenient or problem situations.
- **Attention:** These notices indicate potential damage to programs, devices, or data. An attention notice is placed just before the instruction or situation in which damage could occur.
- **Caution:** These statements indicate situations that can be potentially hazardous to you. A caution statement is placed just before the description of a potentially hazardous procedure step or situation.
- **Danger:** These statements indicate situations that can be potentially lethal or extremely hazardous to you. A danger statement is placed just before the description of a potentially lethal or extremely hazardous procedure step or situation.

Machine Types 7973 and 7974 features and specifications

The following information is a summary of the features and specifications for Machine Types 7973 and 7974. Depending on the server model, some features might not be available, or some specifications might not apply. See Chapter 2, “Installing options,” on page 9 for more detail information about the specifications and features and the installation of the components.

Table 1. Features and specifications

<p>Microprocessors:</p> <ul style="list-style-type: none"> • Supports up to two Intel® Xeon® dual-core processors • 4 MB shared Level-2 cache • 667, 1066, or 1333 MHz front-side bus (FSB) <p>Note: Use the Configuration/Setup Utility program to determine the type and speed of the microprocessors.</p> <p>Memory:</p> <ul style="list-style-type: none"> • Minimum: 1 GB • Maximum: 32 GB (16 GB in mirrored mode) • Type: PC2-5300, ECC fully-buffered with double-data-rate 2 (DDR2) SDRAM • Connectors: eight dual inline memory module (DIMM) connectors, two-way interleaved <p>Drives (depending on the model):</p> <ul style="list-style-type: none"> • Diskette (optional): External USB diskette drive • Hard disk drive: SATA • One of the following IDE drives: <ul style="list-style-type: none"> – CD-ROM – CD-RW (optional) – DVD-ROM (optional) – DVD-ROM/CD-RW (optional) <p>Expansion bays (depending on the model):</p> <ul style="list-style-type: none"> • Three half-high 5.25-in. bays (one CD or DVD drive installed) or one half-high CD or DVD drive and one full-high tape drive • Four 3.5-in. simple-swap bays <p>PCI expansion slots (depending on the model):</p> <ul style="list-style-type: none"> • Six PCI expansion slots <ul style="list-style-type: none"> – Three PCI Express x8 slots (two x8 links and one x4 link) – One PCI 32-bit/33 MHz slot – Two PCI-X 64-bit/133 MHz slots 	<p>Fans:</p> <p>Three speed-controlled hot-swap fans</p> <p>Power supply:</p> <p>670 watt (90-240 V ac)</p> <p>Size:</p> <ul style="list-style-type: none"> • Height: 440 mm (17.3 in.) • Depth: 747 mm (29.4 in.) • Width: 218 mm (8.6 in.) • Weight: 20 kg (42 lb) to 34 kg (75 lb) depending upon configuration <p>Integrated functions:</p> <ul style="list-style-type: none"> • Baseboard management controller (BMC) or onboard service processor • Broadcom 5721 10/100/1000 Ethernet controller on the system board with RJ-45 Ethernet port • Remote Supervisor Adapter II SlimLine • Six-port, Serial ATA controller • Integrated RAID capability (HostRAID) • Two serial ports • One parallel port • Four Universal Serial Bus (USB) v2.0 ports (two on front and two on rear) • Keyboard port • Mouse port • ATA-100 single-channel IDE controller (bus mastering) • ATI ES1000 video controller <ul style="list-style-type: none"> – Compatible with SVGA and VGA – 16 MB SDRAM video memory <p>Diagnostic LEDs:</p> <ul style="list-style-type: none"> • Fans • Memory • Power supply <p>Acoustical noise emissions:</p> <ul style="list-style-type: none"> • Sound power, idling: 5.6 bel • Sound power, operating: 6.0 bel 	<p>Environment:</p> <ul style="list-style-type: none"> • Air temperature: <ul style="list-style-type: none"> – Server on: 10° to 35°C (50° to 95°F) – Altitude: 0 to 914 m (2998.0 ft) – Server off: -40° to 60°C (-40° to 140°F) – Altitude: 0 to 2133 m (7000.0 ft) • Humidity (operating and storage): 8% to 80% <p>Heat output:</p> <p>Approximate heat output in British thermal units (Btu) per hour:</p> <ul style="list-style-type: none"> • Minimum configuration: 693 Btu per hour (203 watts) • Maximum configuration: 1631 Btu per hour (478 watts) <p>Electrical input:</p> <ul style="list-style-type: none"> • Sine-wave input (50 or 60 Hz) required • Input voltage and frequency ranges automatically selected • Input voltage low range: <ul style="list-style-type: none"> – Minimum: 100 V ac – Maximum: 127 V ac • Input voltage high range: <ul style="list-style-type: none"> – Minimum: 200 V ac – Maximum: 240 V ac • Input kilovolt-amperes (kVA) approximately: <ul style="list-style-type: none"> – Minimum: 0.21 kVA (all models) – Maximum: 0.49 kVA <p>Notes:</p> <ol style="list-style-type: none"> 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.
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Machine Types 7975 and 7976 features and specifications

The following information is a summary of the features and specifications for Machine Type 7975 and 7976. Depending on the server model, some features might not be available, or some specifications might not apply. See Chapter 2, “Installing options,” on page 9 for more detail information about the specifications and features and the installation of the components.

Table 2. Features and specifications

<p>Microprocessors:</p> <ul style="list-style-type: none"> • Supports up to two Intel Xeon dual-core processors • 4 MB shared Level-2 cache • 667, 1066, or 1333 MHz front-side bus (FSB) <p>Note: Use the Configuration/Setup Utility program to determine the type and speed of the microprocessors.</p> <p>Memory:</p> <ul style="list-style-type: none"> • Minimum: 1 GB • Maximum: 32 GB (16 GB in mirrored mode) • Type: PC2-5300, ECC fully-buffered with double-data-rate 2 (DDR2) SDRAM • Connectors: eight dual inline memory module (DIMM) connectors, two-way interleaved <p>Drives (depending on the model):</p> <ul style="list-style-type: none"> • Diskette (optional): External USB FDD drive • Hard disk drive: SATA or SAS • One of the following IDE drives: <ul style="list-style-type: none"> – CD-ROM – CD-RW (optional) – DVD-ROM (optional) – DVD-ROM/CD-RW (optional) <p>Expansion bays (depending on the model):</p> <ul style="list-style-type: none"> • Three half-high 5.25-in. bays (one CD drive installed) or one half-high CD or DVD drive and one full-high tape drive • Eight 3.5-in. hot-swap hard disk drive bays <p>Note: You can install up to eight hot-swap drives when you order the 4-pack drive backplane option.</p> <p>PCI expansion slots (depending on the model):</p> <ul style="list-style-type: none"> • Six PCI expansion slots <ul style="list-style-type: none"> – Three PCI Express 8x slots (two x8 links and one x4 link) – One PCI 32-bit/33 MHz slot – Two PCI-X 64-bit/133 MHz slots <p>Acoustical noise emissions (depending on your model):</p> <ul style="list-style-type: none"> • Sound power, idling: 5.6 bel or 6.0 bel • Sound power, operating: 6.0 bel or 6.1 bel 	<p>Fans: Three speed-controlled hot-swap fans (standard)</p> <p>Note: Six fans are required to provide redundancy in hot-swap models; therefore, you must install an additional redundant power and cooling option kit (the option kit comes with a hot-swap power supply and three hot-swap fans) to upgrade to redundant mode.</p> <p>Power supply:</p> <p>One of the following power supplies:</p> <ul style="list-style-type: none"> • One nonredundant 670 watt (90-240 V ac) • One 835 watt (90-240 V ac). <p>Note: Two 835-watt power supplies provide redundancy in hot-swap models; therefore, you must install an additional redundant power and cooling option kit (the option kit comes with an 835-watt hot-swap power supply and three hot-swap fans) to upgrade to redundant mode.</p> <p>Size:</p> <ul style="list-style-type: none"> • Height: 440 mm (17.3 in.) • Depth: 747 mm (29.4 in.) • Width: 218 mm (8.6 in.) • Weight: 20 kg (42 lb) to 34 kg (75 lb) depending upon configuration <p>Integrated functions:</p> <ul style="list-style-type: none"> • Baseboard management controller (BMC) or onboard server processor • Broadcom 5721 10/100/1000 Ethernet controller on the system board with RJ-45 Ethernet port • Dual-channel (four ports per channel) onboard SAS/SATA controller with integrated RAID support • Remote Supervisor Adapter II SlimLine • Six-port, Serial ATA controller • Integrated RAID capability (HostRAID) • Two serial ports • One parallel port • Four Universal Serial Bus (USB) v2.0 ports (two on front and two on rear) • Keyboard port • Mouse port • ATA-100 single-channel IDE controller (bus mastering) • ATI ES1000 video controller <ul style="list-style-type: none"> – Compatible with SVGA and VGA – 16 MB SDRAM video memory 	<p>Diagnostic LEDs:</p> <ul style="list-style-type: none"> • Fans • Memory • Hard disk drives (redundant models) • Power supply <p>Environment:</p> <ul style="list-style-type: none"> • Air temperature: <ul style="list-style-type: none"> – Server on: 10° to 35°C (50° to 95°F) – Altitude: 0 to 914 m (2998.0 ft) – Server off: -40° to 60°C (-40° to 140°F) – Altitude: 0 to 2133 m (7000.0 ft) • Humidity (operating and storage): 8% to 80% <p>Heat output:</p> <p>Approximate heat output in British thermal units (Btu) per hour:</p> <ul style="list-style-type: none"> • Minimum configuration: 781 Btu per hour (229 watts) • Maximum configuration: 1910 Btu per hour (560 watts) <p>Electrical input:</p> <ul style="list-style-type: none"> • Sine-wave input (50 or 60 Hz) required • Input voltage and frequency ranges automatically selected • Input voltage low range: <ul style="list-style-type: none"> – Minimum: 100 V ac – Maximum: 127 V ac • Input voltage high range: <ul style="list-style-type: none"> – Minimum: 200 V ac – Maximum: 240 V ac • Input kilovolt-amperes (kVA) approximately: <ul style="list-style-type: none"> – Minimum: 0.23 kVA (all models) – Maximum: 0.57 kVA <p>Notes:</p> <ol style="list-style-type: none"> 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.
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Major components of the server

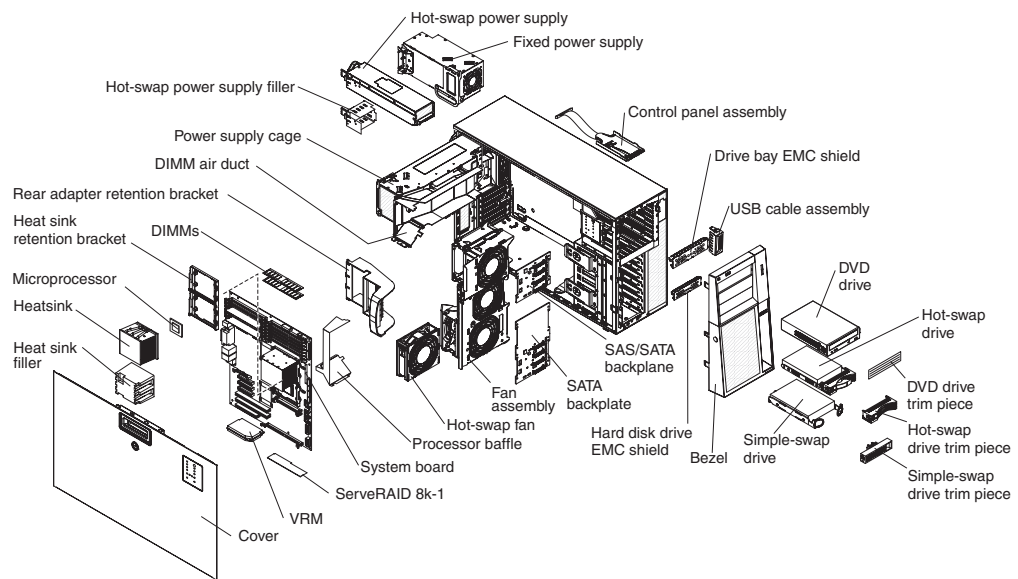
Note: The major components of the server vary, depending on the machine type and model.

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.

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



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 x3400 Documentation* CD.

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.

Installation guidelines

Before you install options, read the following information:

- Read the safety information that begins on page v, the guidelines in “Working inside the server with the power on” on page 10, and “Handling static-sensitive devices” on page 11. This information will help you work safely.
- When you install your new server, take the opportunity to download and apply the most recent firmware updates. This step will help to ensure that any known issues are addressed and that your server is ready to function at maximum levels of performance. To download firmware updates for your server, go to <http://www.ibm.com/support/> and click **Downloads and drivers**. For additional information about tools for updating, managing, and deploying firmware, see the xSeries Tools Center at <http://publib.boulder.ibm.com/infocenter/toolsctr/v1r0/index.jsp>.
- Before you install optional hardware, make sure that the server is working correctly. Start the server, and make sure that the operating system starts, if 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.
- 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 fans, or hot-plug Universal Serial Bus (USB) devices. However, you must turn off the server before performing any steps that involve removing or installing adapter cables.
- Blue on a component indicates touch points, where you can grip the component to remove it from or install it in the server, open or close a latch, and so on.
- Orange on a component or an orange label on or near a component indicates that the component can be hot-swapped, which means that if the server and operating system support hot-swap capability, you can remove or install the component while the server is running. (Orange can also indicate touch points on hot-swap components.) See the instructions for removing and 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.
- When you are finished working on the server, reinstall all safety shields, guards, labels, and ground wires.
- For a list of supported options for the server, see <http://www.ibm.com/servers/eserver/serverproven/compat/us/>.

System reliability guidelines

To help ensure proper system cooling and system reliability, make sure that the following requirements are met:

- Each of the drive bays has a drive or a filler panel and electromagnetic compatibility (EMC) shield installed in it.
- There is adequate space around the server to allow the server cooling system to work properly. Leave approximately 50 mm (2.0 in.) of open space around the front and rear of the server. Do not place objects in front of the fans. For proper cooling and airflow, replace the server cover before turning on the server. Operating the server for extended periods of time (more than 30 minutes) with the server cover removed might damage server components.

When installing the server in a rack, make sure that space is available around the server to enable the server cooling system to work properly. See the documentation that comes with the rack for additional information.

- You have followed the cabling instructions that come with optional adapters.
- You have replaced a failed fan within 48 hours.
- You have replaced a hot-swap drive within 2 minutes of removal.
- You do not operate the server without the DIMM air baffle installed. Operating the server without the air baffle might cause the DIMMs to overheat.

Working inside the server with the power on

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

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

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

Handling static-sensitive devices

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

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

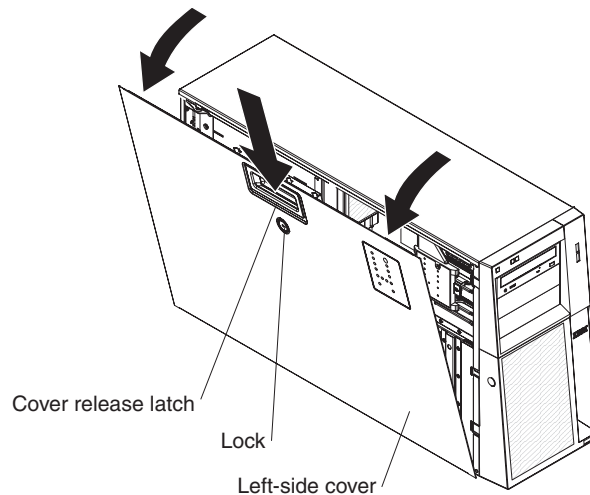
- Limit your movement. Movement can cause static electricity to build up around you.
- The use of a grounding system is recommended. For example, wear an electrostatic-discharge wrist strap, if one is available. Always use an electrostatic-discharge wrist strap or other grounding system when working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

Removing the side cover

Important: Before you install optional hardware, make sure that the server is working correctly. Start the server, and make sure that the operating system starts, if 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.

To remove the server side cover, complete the following steps:

1. Read the safety information that begins on page v and “Installation guidelines” on page 9.
2. Turn off the server and all attached devices (see “Turning off the server” on page 38); then, disconnect all power cords and external cables.
3. Lay the server on its side.
4. Unlock the side cover.
5. Press the cover-release latch down (as indicated by the arrow) and rotate the cover away from the server.



6. Lift the side cover off the server and set it aside.

To replace the side cover, see “Replacing the side cover” on page 30.

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.

Removing the bezel

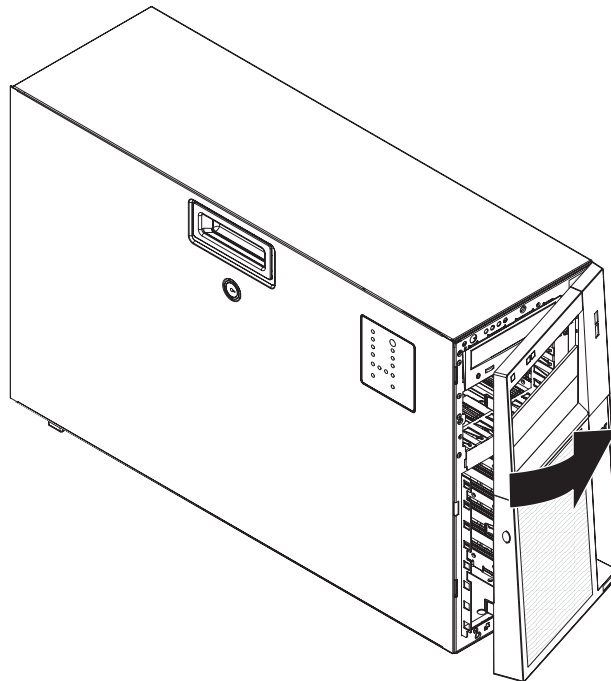
Important: Before you install optional hardware, make sure that the server is working correctly. Start the server, and make sure that the operating system starts, if an operating system is installed, or that a 19990305 error code is displayed, indicating that an operating system was not found but the server is otherwise working correctly. If the server is not working correctly, see the *Problem Determination and Service Guide* for diagnostic information.

To remove the bezel, complete the following steps:

1. Read the safety information that begins on page v and “Installation guidelines” on page 9.
2. Unlock the side cover.

Note: You must unlock the side cover to remove the bezel.

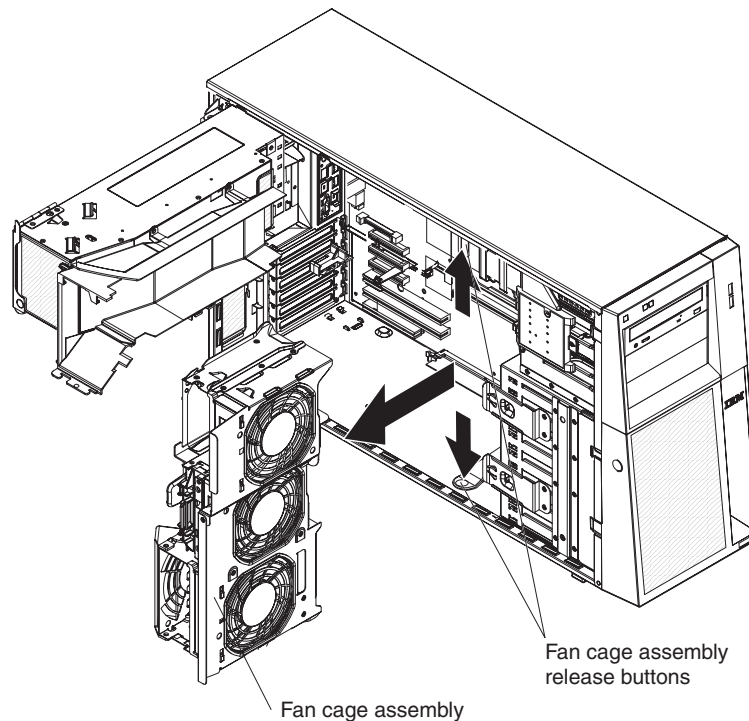
3. Position your finger on the depressed area on the left side of the bezel and rotate the bezel away from the server. After rotating the bezel beyond 90°, pull the bezel off the server and set it aside.



Removing the front fan cage assembly

To remove the front fan cage assembly, complete the following steps:

1. Read the safety information that begins on page v and “Installation guidelines” on page 9.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.
3. Remove the side cover (see “Removing the side cover” on page 12).
4. Rotate the power-supply cage assembly out of the chassis:
 - Hot-swap models:
 - a. Remove the hot-swap power-supply. Press down on the orange release lever and pull the power supply out of the bay, using the handle.
 - b. Lift up the power-supply cage handle and pull the power-supply cage assembly all the way up until the retainer latch locks the cage in place on the chassis.
 - Non-hot-swap models, lift up the power-supply cage handle and pull the power-supply cage assembly all the way up until the retainer latch locks the cage in place on the chassis.
5. Press in on both the fan cage assembly release buttons on the sides of the chassis to release the fan cage assembly from the connector on the chassis. Pull the fan cage assembly up and out of the chassis and set it aside.



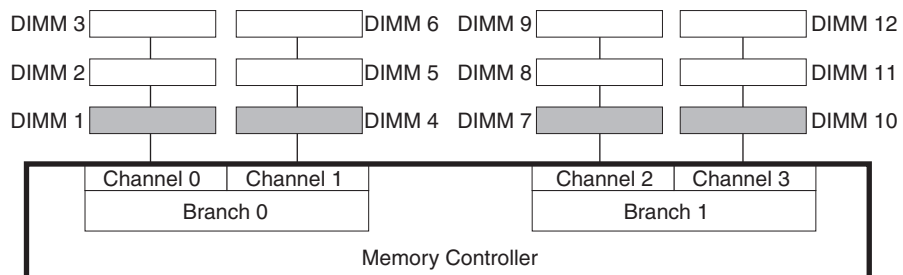
Installing a memory module

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 industry-standard, 1.8 V, 240-pin, 667 MHz, PC2-5300 double-data-rate 2 (DDR2), dynamic random-access memory (DRAM) with error correcting code (ECC) fully buffered dual inline memory modules (DIMMs). These DIMMs must be compatible with the latest DDR2 667 MHz DRAM fully buffered DIMM specification. For a list of supported options for the server, see <http://www.ibm.com/servers/eserver/serverproven/compat/us/>; then, select your country and navigate to the list of options for the server.
- The DIMM options that are supported for the server are 512 MB, 1 GB, and 2 GB in x4 or x8 technology, single-rank or double-rank. The server supports a minimum of 1 GB and a maximum of 32 GB (reduced to 16 GB in mirrored mode) of system memory. The server comes with two 512 MB DIMMs installed.
- The system board provides eight functional DIMM connectors and supports two-way memory interleaving when DIMMs are installed in pairs.

Note: DIMM connectors 3, 6, 9, and 12 are not functional. Do not install DIMMs in these four connectors and do not remove the DIMM thermal baffles installed in these connectors unless you need to replace the system board.

- The memory controller has four fully buffered DIMM channels that are organized into two branches. Each branch has two channels and each channel controls two DIMMs. 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 connector above or below each other within the channels of a branch do not have to be identical (for example, the DIMMs in DIMM connector 1 and DIMM connector 2 do not have to be identical). The following illustration shows how the memory controller is organized into branches and channels with a pair of DIMMs installed in each branch.



- The server can operate in two major modes: mirroring and non-mirroring (normal). The server can also operate in a single-channel mode when one DIMM is installed.
- 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 on the Configuration/Setup Utility program, see the *User's Guide*. 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 3 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 3. DIMM upgrade configuration sequence in mirroring mode

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

- 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-spare 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. For more information on the Configuration/Setup Utility program, see the *User's Guide*. 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-mirroring mode (normal mode).

Table 4. DIMM upgrade configuration sequence in non-mirroring mode (normal)

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

- The amount of usable memory will be reduced depending on the system configuration. A certain amount of memory must be reserved for system resources. To view the total amount of installed memory and the amount of configured memory, run the Configuration/Setup Utility program and select **System Summary** from the menu. For additional information, see the *User's Guide*.
- The following tables show examples of maximum memory capacity when the server operates in mirroring and non-mirroring modes, using identical single-rank, x8 technology or double-rank, x4 technology DIMMs. The memory capacity is dependent on the size and technology of the DIMMs you install.

Table 5. Example of the memory capacity when using identical x8 technology single-rank DIMMs

DIMMs installed	x8 Single-rank technology	Memory available in mirroring mode	Memory available in non-mirroring mode
8	512 Mb	2 GB	4 GB
8	1 Gb	4 GB	8 GB
8	2 Gb	8 GB	16 GB

Table 6. Example of the memory capacity when using identical x4 technology double-rank DIMMs

DIMMs installed	x4 Double-rank technology	Memory available in mirroring mode	Memory available in non-mirroring mode
8	512 Mb	8 GB	16 GB
8	1 Gb	16 GB	32 GB

- When you restart the server after adding or removing a DIMM, the server displays a message that the memory configuration has changed.

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

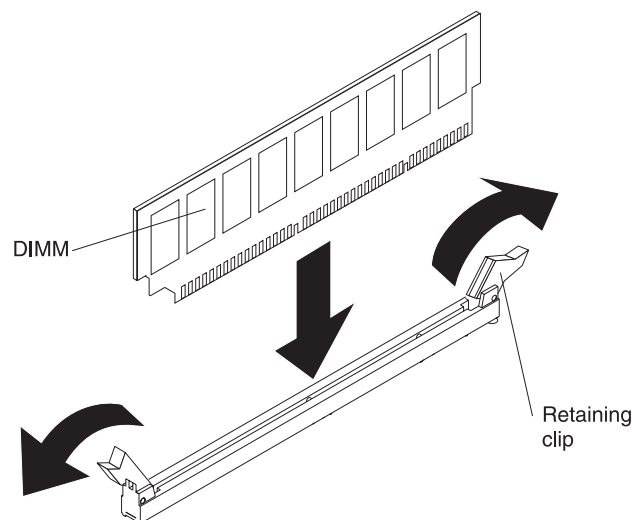
To install a DIMM, complete the following steps:

1. Read the safety information that begins on page v and “Installation guidelines” on page 9.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.
3. Remove the side cover (see “Removing the side cover” on page 12).
4. Rotate the power-supply cage assembly out of the chassis:
 - Hot-swap models:
 - a. Remove the hot-swap power-supply. Press down on the orange release lever and pull the power supply out of the bay, using the handle.
 - b. Lift up the power-supply cage handle and pull the power-supply cage assembly all the way up until the retainer latch locks the cage in place on the chassis.
 - Non-hot-swap models, lift up the power-supply cage handle and pull the power-supply cage assembly all the way up until the retainer latch locks the cage in place on the chassis.
5. Locate the DIMM connectors on the system board. Determine the connector in which you will install the DIMMs. Install the DIMMs in the sequence indicated in Table 3 on page 16 and Table 4 on page 17

Note: DIMM connectors 3, 6, 9, and 12 are not functional in this server. Do not install DIMMs in these connectors.

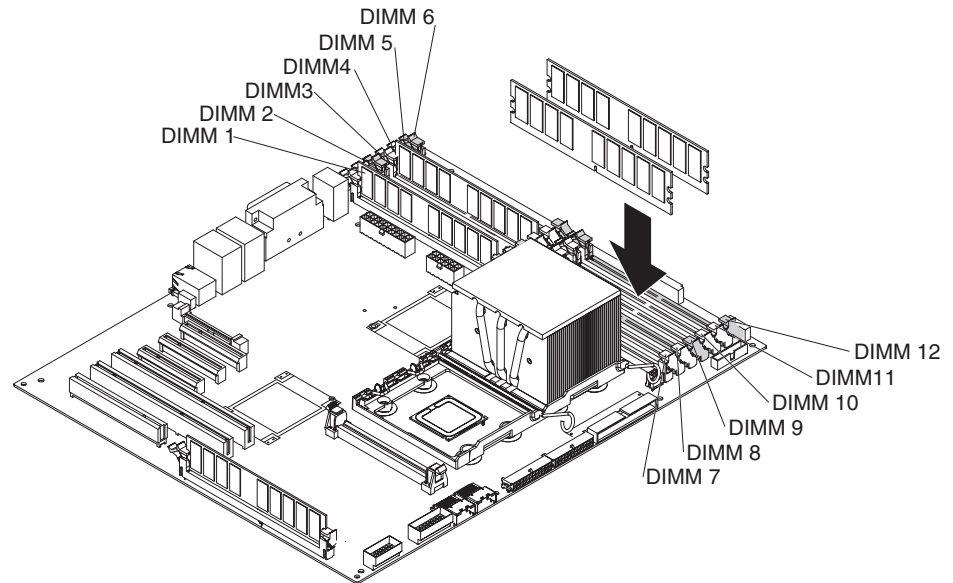
Attention: To avoid breaking the retaining clips or damaging the DIMM connectors, open and close the clips gently.

6. Open the retaining clips and, if necessary, remove any existing DIMM.

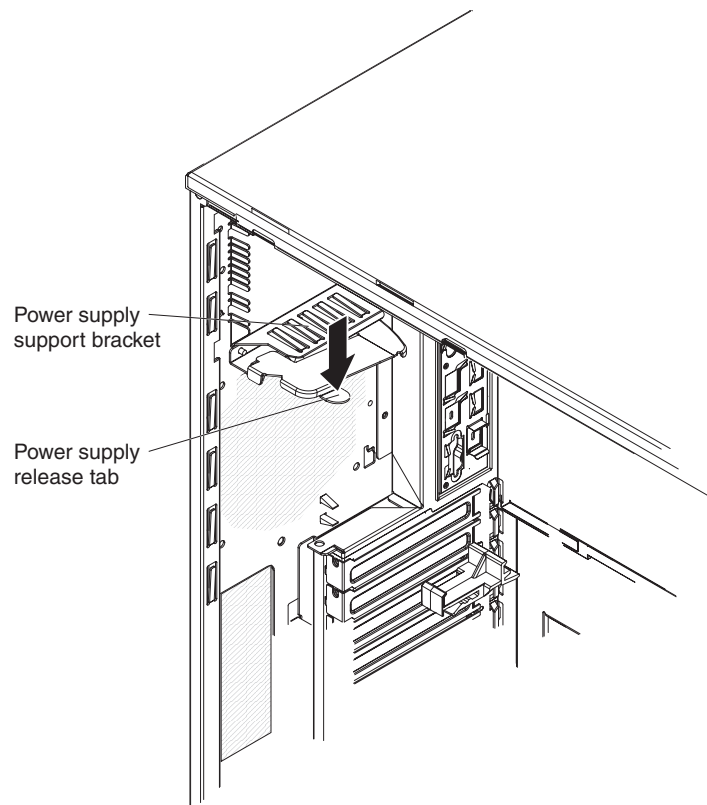


7. Touch the static-protective package that contains the DIMM to any unpainted metal surface on the server. Then, remove the new DIMM from the package.
8. Turn the DIMM so that the DIMM keys align correctly with the slot.

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



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



11. If you have a hot-swap model, reinstall the hot-swap power-supplies.

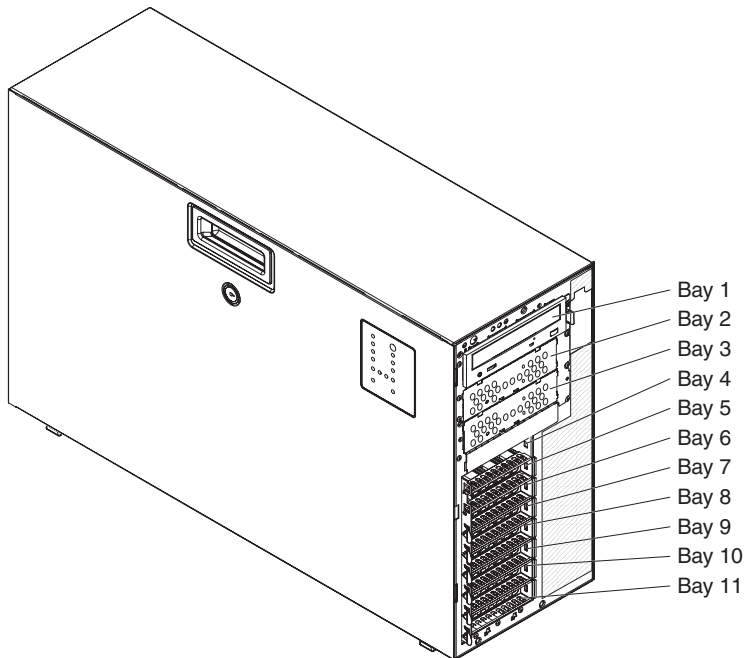
If you have other options to install or remove, do so now; otherwise, go to “Completing the installation” on page 29.

Installing a drive

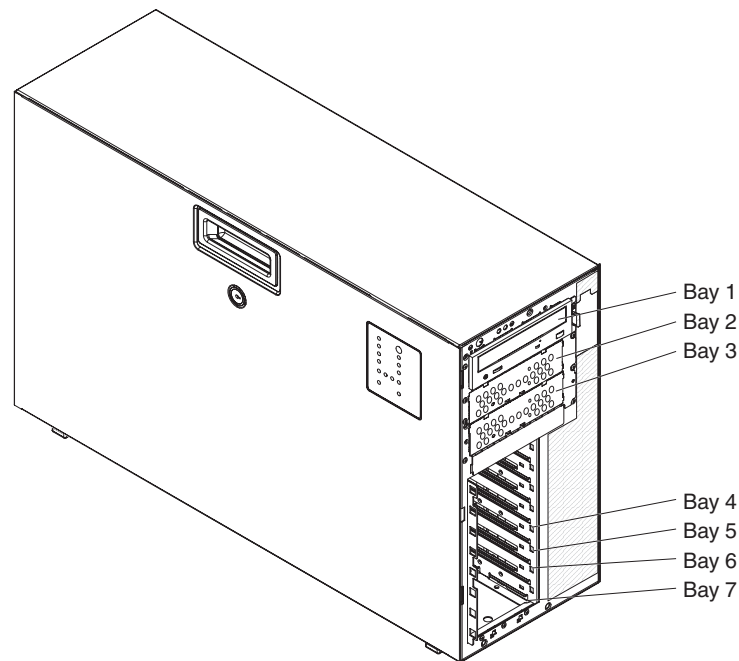
Depending on the server model, the server might come with an integrated drive electronics (IDE) CD-ROM, CD-RW, or DVD/CD-RW combo drive in bay 1.

The following are illustrations of the server and the location of the drive bays. Your hardware might differ, depending on the model.

The following is an illustration of hot-swap server models.



The following is an illustration of the simple-swap server models.



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

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

Installing a hot-swap hard disk drive

Some server models come with hot-swap SAS or hot-swap SATA hard disk drives. Before you install a hot-swap hard disk drive, read the following information:

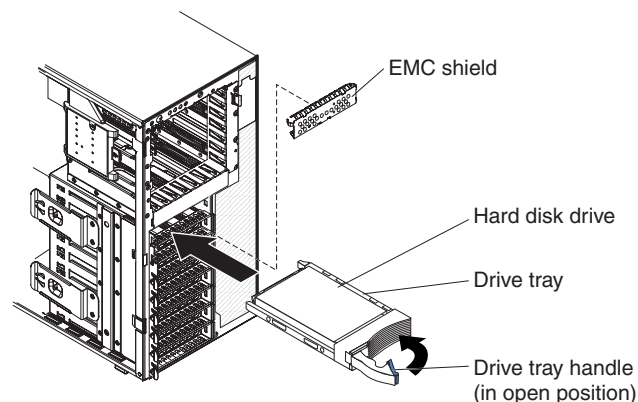
- The hot-swap drives must be either all SAS hard disk drives or all SATA hard disk drives; do not mix SAS and SATA drives.
- The sequence for installing the hard disk drives is to install the drives starting from the top bay (bay 4) and go down to the bottom bay (bay 11).
- Inspect the drive tray for signs of damage.
- Make sure that the drive is correctly installed in the tray.

- All hot-swap drives must have the same throughput speed rating; mixing speed ratings might cause all drives to operate at the lower throughput speed.
- The drive ID for each hot-swap hard disk drive is printed on the bezel.
- You do not have to turn off the server to install hot-swap drives in the hot-swap drive bays.
- To maintain proper system cooling, do not operate the server for more than 10 minutes without either a drive or a filler panel installed in each drive bay.
- See the documentation for the ServeRAID 8k-I SAS Controller for instructions for installing a hard disk drive.
- If you want to install the maximum number (eight) of hot-swap drives, you must order the 4-drive backplane option kit.

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

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

1. Read the safety information that begins on page v and “Installation guidelines” on page 9.
2. Unlock the side cover (the bezel door will not open if the cover is locked).
3. Place your finger on the depression area on the left side of the bezel and rotate it away from the server. After you rotate the bezel beyond 90°, pull the bezel off the server.
4. Remove the EMC shield from the bay in which you want to install the drive.
5. Touch the static-protective package that contains the drive to any unpainted metal surface on the server; then, remove the drive from the package and place it on a static-protective surface.
6. Install the hard disk drive in the hot-swap bay:
 - a. Make sure that the drive tray handle is open.
 - b. Align the drive assembly with the guide rails in the bay.



- c. Gently slide the drive assembly into the drive bay until the drive stops.
- d. Push the drive tray handle to the closed (locked) position.
- e. Check the hard disk drive status indicator to make sure that the hard disk drive is operating correctly. (You might have to restart the server before the drive is recognized.) If the amber hard disk drive status LED for a drive is lit continuously, it indicates that the drive is faulty and must be replaced. If the

amber hard disk drive status LED for a drive is flashing slowly, this indicates that the drive is being rebuilt. If the amber hard disk drive status LED for a drive is flashing rapidly, this indicates that the controller is identifying the drive. If the green hard disk drive activity LED is flashing, this indicates that the drive is being accessed.

Note: If the server is configured for RAID operation using a ServeRAID™ adapter, you might have to reconfigure your disk arrays after installing hard disk drives. See the ServeRAID documentation on the *IBM ServeRAID Support CD* for additional information about RAID operation and complete instructions for using ServeRAID Manager.

7. If you are installing additional hot-swap hard disk drives, do so now.

If you have other options to install or remove, do so now; otherwise go to “Completing the installation” on page 29.

IDs for hot-swap hard disk drives

Hot-swap server models have drive bays that are connected to a SAS/SATA backplane. This backplane, also known as the hot-swap-drive backplane, is the printed circuit board behind these bays.

The hot-swap-drive backplane controls the IDs for the internal hot-swap drive bays. The following table lists the IDs for the hard disk drives and backplane that are connected to hot-swap models.

Device	ID
Drive bay 4	0
Drive bay 5	1
Drive bay 6	2
Drive bay 7	3
Drive bay 8	4
Drive bay 9	5
Drive bay 10	6
Drive bay 11	7

Installing a simple-swap SATA hard disk drive

Some server models come with simple-swap SATA hard disk drives that are accessible from the front of the server. Before you install a simple-swap SATA hard disk drive, read the following information:

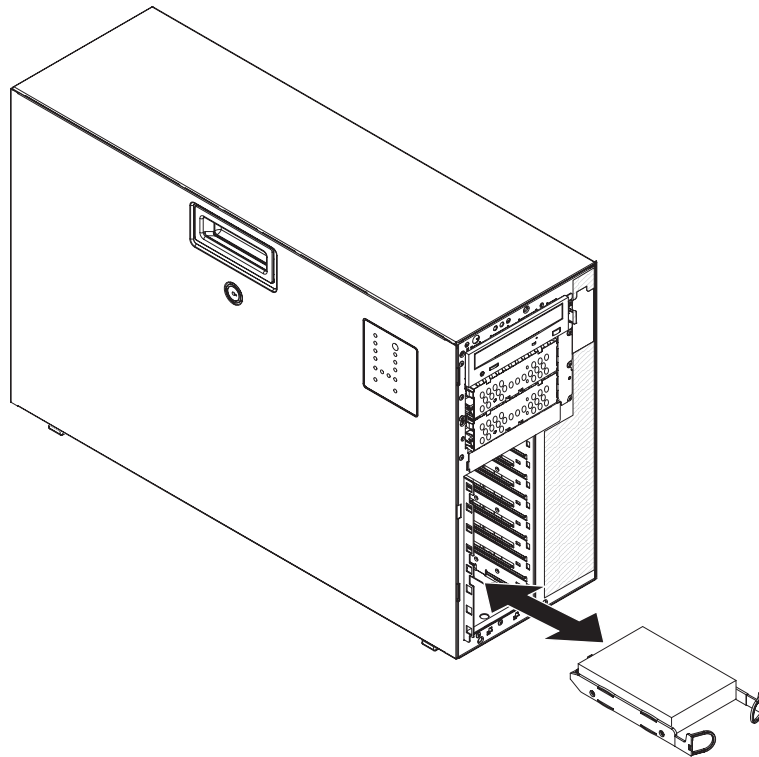
- You must turn off the server before installing simple-swap drives in the server.
- You can install only four simple-swap SATA hard disk drives in the server.
- The sequence for installing the hard disk drives is to install the drives starting from the bottom bay (bay 7) and go up to the top bay (bay 4).

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

1. Read the safety information that begins on page v and “Installation guidelines” on page 9.
2. Turn off the server and peripheral devices and disconnect all external cables and power cords.

3. Unlock the side cover (you cannot open or remove the bezel without unlocking the side cover).
4. Remove the bezel (see “Removing the bezel” on page 13).
5. Touch the static-protective package that contains the drive to any unpainted metal surface on the server; then, remove the drive from the package and place it on a static-protective surface.
6. Align the drive assembly with the guide rails in the bay (the connector end of the drive goes in first).
7. Press the drive assembly loops toward each other; then, carefully slide the drive assembly into the drive bay until it stops and release the loops.

Note: Do not release the loops on the drive assembly until it is completely seated.



If you have other options to install or remove, do so now; otherwise, go to “Completing the installation” on page 29.

The simple-swap-drive backplate controls the IDs for the internal simple-swap drive bays. The following table lists the IDs for the hard disk drives and backplate that are connected to simple-swap models.

Device	ID
Drive bay 4	3
Drive bay 5	2
Drive bay 6	1
Drive bay 7	0

Power and signal cables for internal drives

The server uses cables to connect parallel IDE, simple-swap SATA, hot-swap SATA and hot-swap SAS devices to the power supply and to the system board. (See the *User's Guide* for the location of system-board connectors.) Review the following information before connecting power and signal cables to internal drives:

- The drives that are preinstalled in the server come with power and signal cables attached. If you replace any drives, remember which cable is attached to which drive.
- If you have only one IDE device on a cable, it must be set as a master device.
- If two IDE devices are used on a single cable, one must be designated as the master device and the other as the subordinate device; otherwise, the server might not recognize some of the IDE devices. The master and subordinate designation is determined by switch or jumper settings on each IDE device.
- When you route a cable, make sure that it does not block the airflow to the rear of the drives or over the microprocessor or DIMMs.

The following cables are provided:

- **IDE:** The wider IDE signal cable has three connectors. One of these connectors is attached to the drive, one is a spare, and the third is attached to the IDE connector on the system board. The spare connector can be used to connect an additional IDE optical drive or tape drive to the server.

The CD or DVD drive is attached to an ATA 100 signal cable. The blue connector is attached to the system board. The connector on the other end is attached to the master IDE device. The middle connector attaches to an optional optical device or tape drive.

- **Simple-swap SATA:** The combination signal/power cable connects to the system board and simple-swap backplate to provide signal and power to the simple-swap SATA drives.

Simple-swap SATA models come with one of the combination signal/power cable connected to the system board and the simple-swap SATA backplate.

Note: You can install the optional ServeRAID-8k Controller in the simple-swap SATA models to get RAID level-5 support. If you install the ServeRAID-8k Controller, you will need to switch the signal cable to a different connector on the system board and connect the RAID level-5 enabler plug (that comes with the system) to the system board. See the *User's Guide* for detailed information on how to install and cable ServeRAID-8k Controller in simple-swap SATA models for RAID level-5 support in simple-swap SATA models.

- **Hot-swap SAS or hot-swap SATA:** Hot-swap SAS and hot-swap SATA models come with a single signal cable and a single power cable that connects to the system board and the hot-swap SAS/SATA backplane to provide signal and power to the SAS or SATA drives. If you order the 4-drive backplane option kit to upgrade to eight drives, the option kit comes with an additional signal cable and power cable.

Hot-swap SAS and hot-swap SATA models come with the signal cable and power cable connected to the system board and the hot-swap SAS/SATA backplane.

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

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

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. Adapters the server supports might vary, depending on your server model.

- Locate the documentation that comes with the adapter and follow those instructions in addition to the instructions in this section. If you must change the switch setting or jumper settings on the adapter, follow the instructions that come with the adapter.
- Read the documentation that comes with your operating system.
- The server comes with the following adapter connectors, or slots:
 - Slot 1, PCI Express x8 (x4)

Important: The *x8 (x4)* designation for slot 1 identifies an x8 slot that is designed to support x4 adapters and x8 adapters that can downshift to operate at the x4 bandwidth. If you install an x8 adapter in slot 1 that can downshift to the x4 bandwidth, it will run at the x4 bandwidth. The x8 connector can be used for x4 and x8 adapters. Check the information provided with your adapter for compatibility information.
 - Slot 2, PCI Express x8 (x8)
 - Slot 3, PCI Express x8 (x8)
 - Slot 4, PCI-X 64-bit/133 MHz
 - Slot 5, PCI-X 64-bit/133 MHz
 - Slot 6, PCI 32-bit/33 MHz
- You can install full-length adapters that are included in the ServerProven® list in slots 2, 3, 4 and 5. You can only install half-length adapters in slots 1 and 6.
- The 32-bit slot 6 supports 5.0 V keyed PCI adapters; it does not support 3.3 V keyed adapters. Universal adapters are supported in slots 4 and 5 if they are universally keyed.
- The server scans the onboard SAS/SATA controller, PCI Express slot 1, PCI-X slots 4 and 5, PCI-Express slots 2 and 3, onboard Ethernet controllers, and PCI slot 6 to assign system resources. Then, the server starts the devices in the following order, if you have not changed the default startup sequence: PCI Express slot 1, PCI-X slots 4 and 5, PCI Express slot 2, PCI slot 6, and PCI Express slot 3.

Note: You can change the sequence in which the server start (boot) the devices using the **Start Options** menu choice from the Configuration/Setup Utility program main menu. See the User's Guide for detailed information about using the Configuration/Setup Utility program.
- For a list of supported options for the server, see <http://www.ibm.com/servers/eserver/serverproven/compat/us/>.

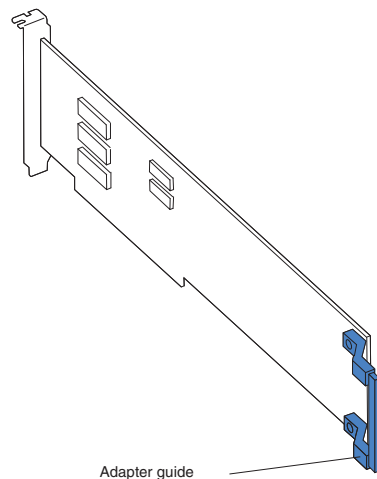
To install an adapter, complete the following steps:

1. Read the safety information that begins on page v and “Installation guidelines” on page 9.
2. Turn off the server and peripheral devices and disconnect all external cables and power cords; then, remove the side cover. See “Removing the side cover” on page 12.
3. Follow the cabling instructions that come with the adapter to set jumpers or switches, if there are any. Route the adapter cables before you install the adapter.

4. Rotate the front and rear adapter-retention brackets to the open (unlocked) position.
5. Remove the screw that secures the expansion-slot cover to the chassis. Store the expansion-slot cover and screw in a safe place for future use.

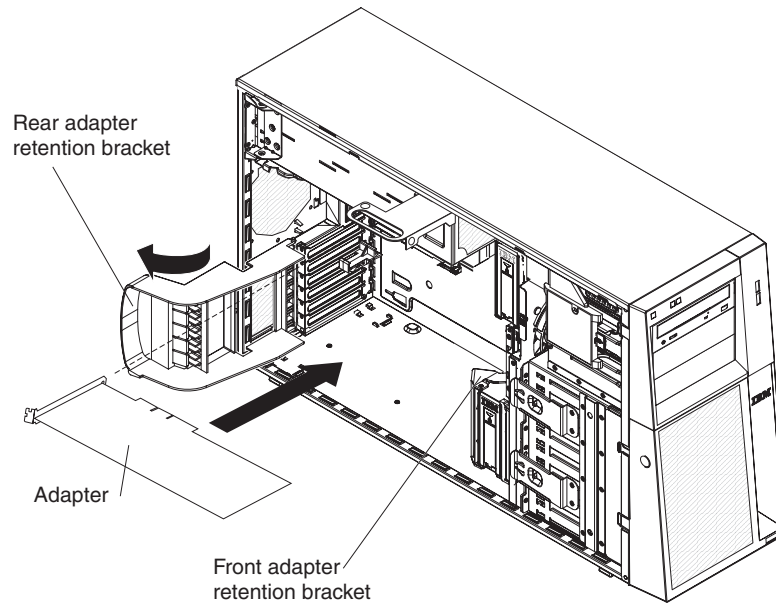
Note: Expansion-slot covers must be installed on all vacant slots. This maintains the electronic emissions standards of the server and ensures proper ventilation of server components.

6. Touch the static-protective package that contains the adapter to any unpainted metal surface on the server. Then, remove the adapter from the static-protective package. Avoid touching the components and gold-edge connectors on the adapter.
7. 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.



8. Carefully grasp the adapter by the top edge or upper corners, and align it with the expansion slot guides; then, press the adapter *firmly* into the expansion slot. Move the adapter directly from the static-protective package to the expansion slot.

Note: If any adapters in the server are large or have heavy cables attached to them, you can remove the rear adapter-retention bracket and secure all of the adapters with expansion-slot screws (the expansion-slot screws are located on the side of the optical drive cage).



9. Connect required cables to the adapter. Route cables so that they do not block the flow of air from the fans.
10. Rotate the front and rear adapter-retention brackets to the closed (locked) position.

If you have other options to install or remove, do so now; otherwise, go to “Completing the installation” on page 29.

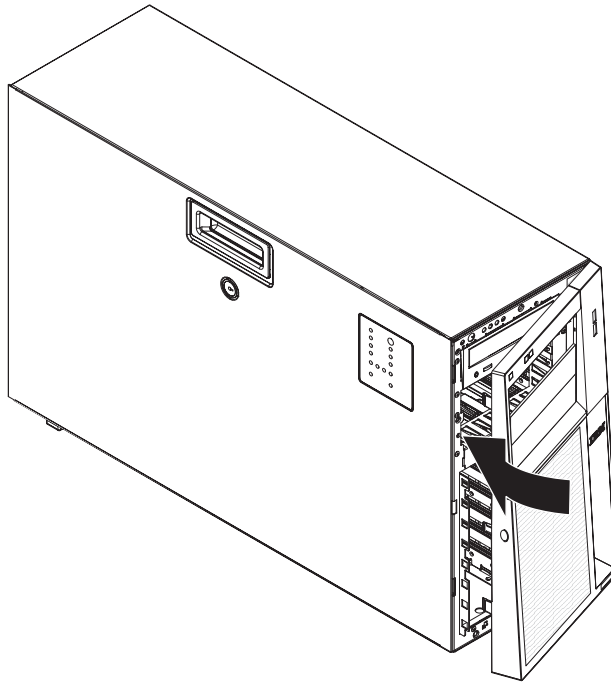
Completing the installation

To complete the installation, you must replace the bezel, reinstall the side cover, and connect all the cables and, for certain options, run the Configuration/Setup Utility program. Follow the instructions in this section.

Replacing the bezel

To replace the bezel, complete the following steps:

1. Insert the tabs on the bezel into the slots on the server chassis.



2. Rotate the bezel toward the server until it snaps in place.

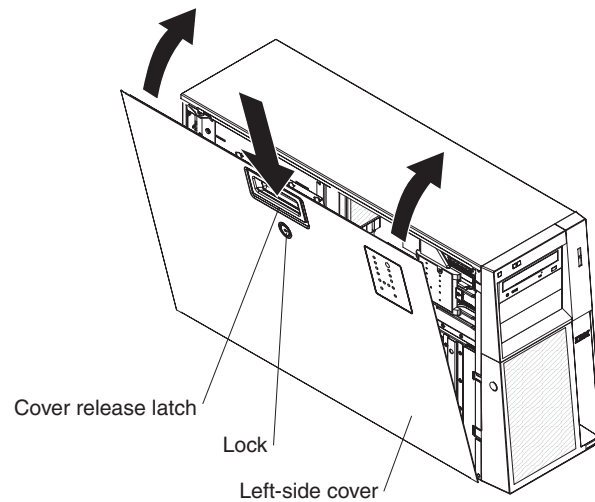
Replacing the side cover

If you removed the side cover, reinstall it.

Note: You might find it easier to lay the server on its side to replace the side cover.

To reinstall the side cover, complete the following steps:

1. Make sure that all cables, adapters, and other components are installed and seated correctly and that you have not left loose tools or parts inside the server. Also, make sure that all internal cables are correctly routed.
2. Insert the bottom edge of the cover into the bottom edge of the chassis and rotate the cover toward the server.



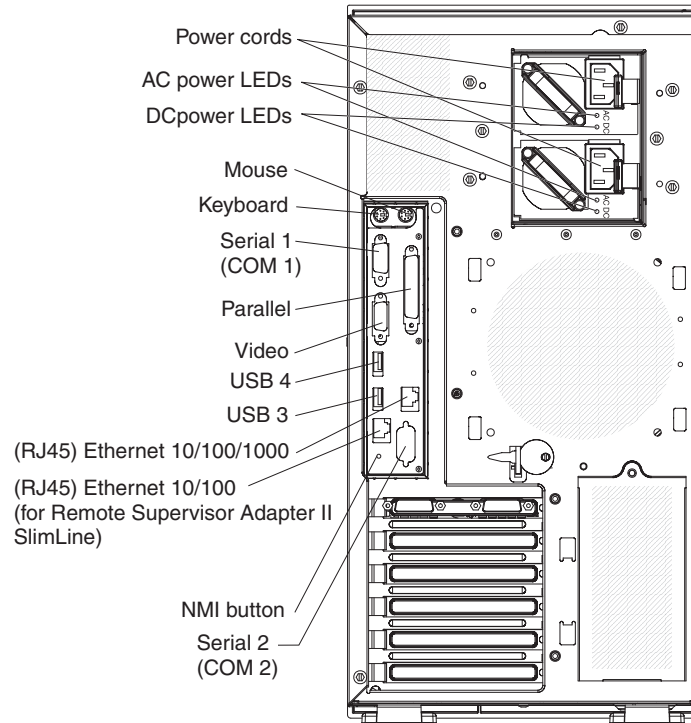
3. Press down on the cover-release latch and close the side cover to secure it in place.
4. Lock the side cover.

Connecting the cables

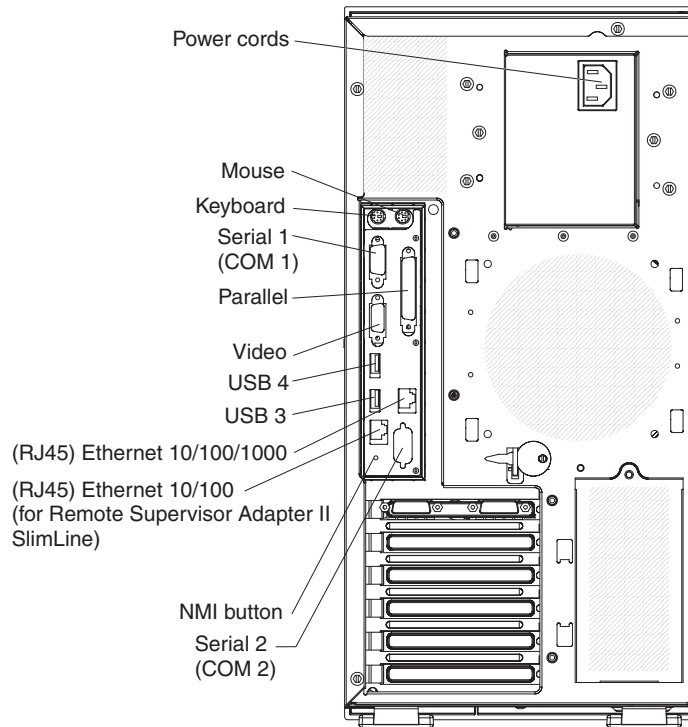
Attention: To prevent damage to equipment, connect the power cords last.

If the server cables and connector panel have color-coded connections, match the color of the cable end with the color of the connector. For example, match a blue cable end with a blue panel connector, a red cable end with a red connector, and so on.

The following illustration shows the input/output (I/O) connectors on the rear of the hot-swap power supply models with optional redundant power.



The following illustration shows the input/output (I/O) connectors on the rear of the non-hot-swap power supply models.



Updating the server configuration

When you start the server for the first time after you add or remove an internal option or an 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 additional information, see “Using the Configuration/Setup Utility program” on page 42.

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

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

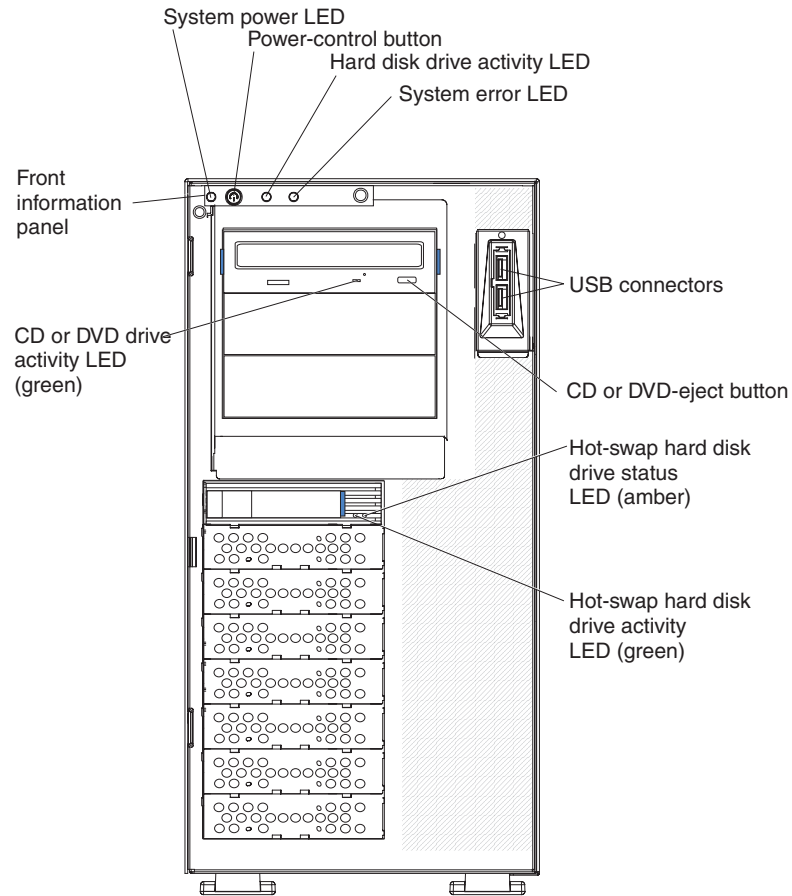
If you have installed an optional Remote Supervisor Adapter II SlimLine to manage the server remotely, see the Remote Supervisor Adapter II SlimLine documentation that comes with the adapter for information about setting up, configuring, and using the adapter.

Chapter 3. Server controls, LEDs, and power

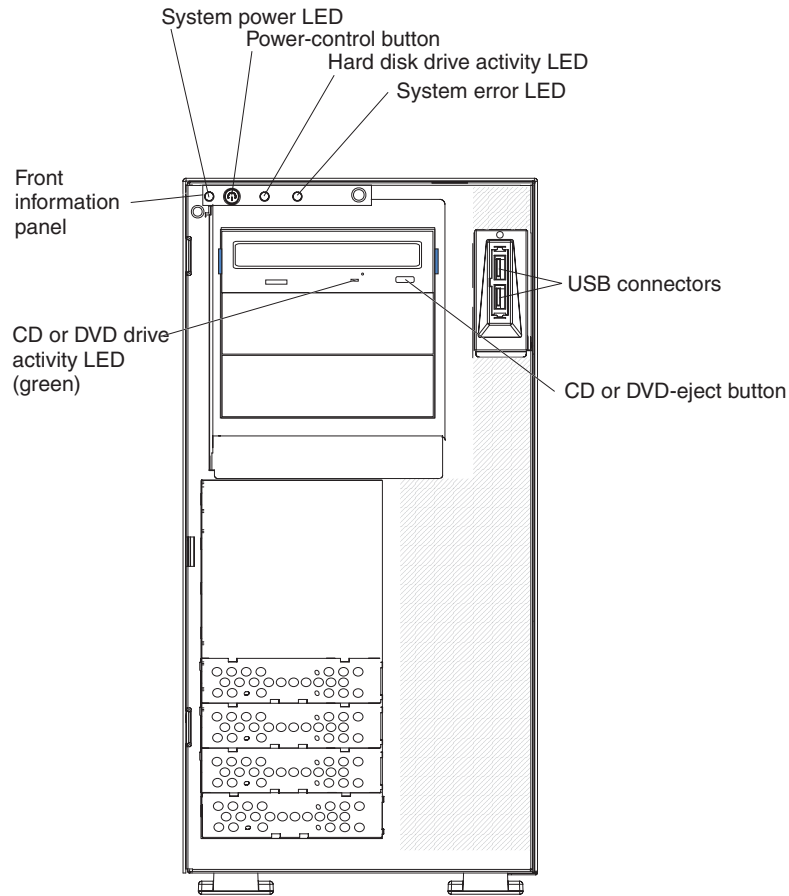
This chapter describes the controls and light-emitting diodes (LEDs) and how to turn the server on and off.

Front view

The following illustration shows the controls, LEDs, and connectors on the front of the hot-swap server models.



The following illustration shows the controls, LEDs, and connectors on the front of the simple-swap server models.



Power-on LED

When this LED is lit, it indicates that the server is turned on. When this LED is off, it indicates that ac power is not present, or the power supply or the LED itself has failed.

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

Power-control button

Press this button to turn the server on and off manually.

Hard disk drive activity LED

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

System-error LED

When this amber LED is lit, it indicates that a system error has occurred. An LED on the system board might also be lit to help isolate the error. See Chapter 5, "Solving problems," on page 63 for additional information. Detailed troubleshooting information is in the *Problem Determination and Service Guide* on the IBM *Documentation CD*.

USB connectors

Connect USB devices to these connectors.

CD or DVD eject button

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

CD or DVD drive activity LED

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

Hot-swap hard disk drive activity LED (some models)

On some models, each hot-swap drive has a hard disk drive activity LED. When this green LED is flashing, it indicates that the associated hard disk drive is in use.

When the drive is removed, this LED also is visible on the SAS/SATA backplane, next to the drive connector. The backplane is the printed circuit board behind drive bays 4 through 11.

Hot-swap hard disk drive status LED (some models)

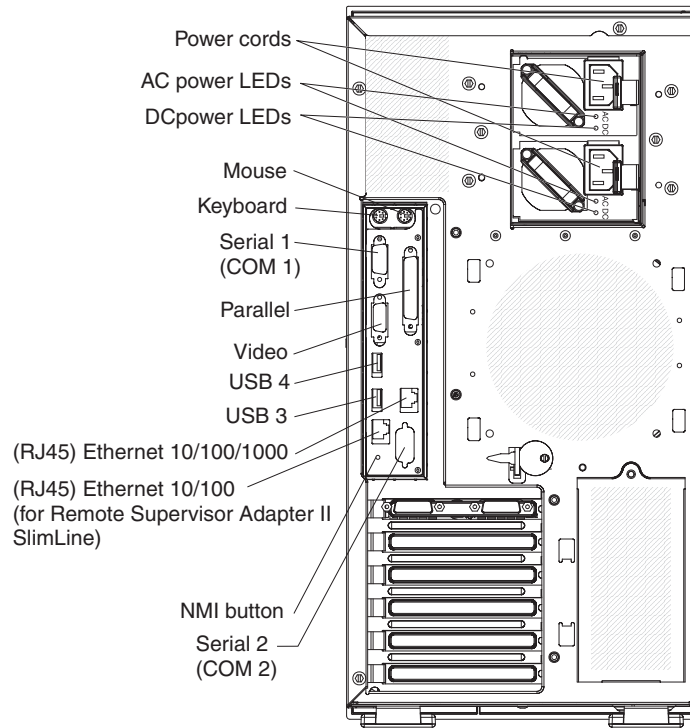
On some models, each hot-swap hard disk drive has an amber status LED. If this amber status LED for a drive is lit, it indicates that the associated hard disk drive has failed.

If an optional ServeRAID adapter is installed in the server and the LED flashes slowly (one flash per second), the drive is being rebuilt. If the LED flashes rapidly (three flashes per second), the adapter is identifying the drive.

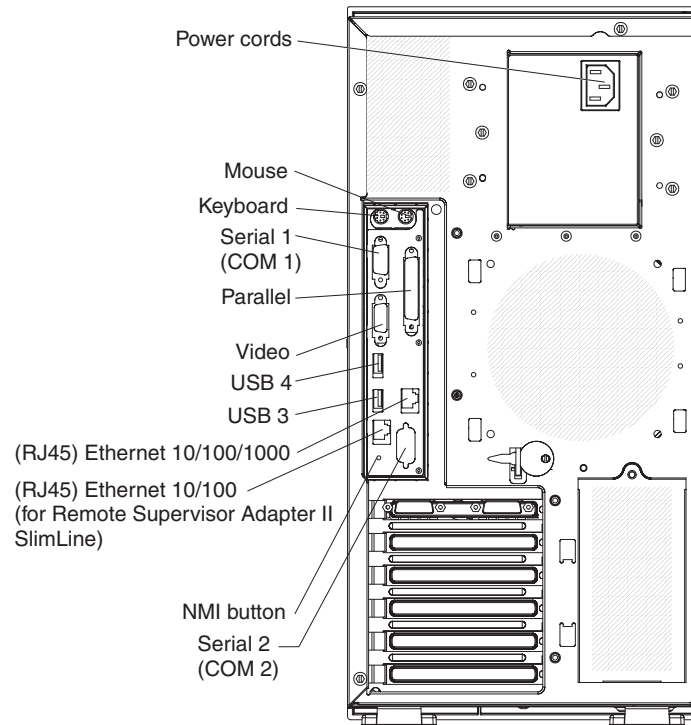
When the drive is removed, this LED also is visible on the SAS/SATA backplane, below the hot-swap hard disk drive activity LED.

Rear view

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



The following illustration shows the connectors on the rear of the non-hot-swap server models.



Power-cord connector

Connect the power cord to this connector.

AC power LED

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

DC power LED

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

Mouse connector

Connect a mouse device to this connector.

Keyboard connector

Connect a PS/2 keyboard to this connector.

Serial 1 connector

Connect a 9-pin serial device to this connector.

Parallel connector

Connect a parallel device to this connector.

Video connector

Connect a monitor to this connector.

USB connectors

Connect USB devices to these connectors.

Ethernet connectors

Use these connectors to connect the server to a network.

Ethernet transmit/receive activity LED

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

Ethernet link status LED

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

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 is shut down; however, the server can respond to remote requests to turn on the server.

Turning on the server

Approximately 20 seconds after the server is connected to ac power, the power-control button becomes active, 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 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.
- If an optional Remote Supervisor Adapter II SlimLine is installed in the server, the server can be turned on from the Remote Supervisor Adapter II SlimLine user interface.

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, PCI-X, or PCI Express 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 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 server can turn itself off as an automatic response to a critical system failure.

Chapter 4. Configuring the server

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

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

- Configuration/Setup Utility program
- RAID configuration programs
 - IBM ServeRAID Configuration Utility program for the following server models:
 - Hot-swap SAS
 - Hot-swap SATA
 - Simple-swap SATA models when the optional ServeRAID-8k Controller is installed
 - Adaptec® RAID (HostRAID™) Configuration Utility program (for simple-swap SATA models with no RAID adapter installed)
 - ServeRAID Manager
- Baseboard Management Controller (BMC)
- Boot Menu program
- Broadcom Gigabit Ethernet Utility program
- Ethernet controller configuration
- IBM Director

For more information about these programs, see “Configuring the server” in the *User's Guide* on the *IBM System x3400 Documentation CD*.

Using the ServerGuide Setup and Installation CD

The *ServerGuide™ Setup and Installation* CD provides state-of-the-art programs to detect the server model and hardware options, 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 75.
2. Follow the instructions that appear on the screen to:
 - a. Select your language.
 - b. Select your keyboard layout and country.
 - c. View the overview to learn about ServerGuide features.
 - d. View the readme file to review installation tips about the operating system and adapter.
 - e. Start the setup and hardware configuration programs.

- f. Start the operating system installation. You will need your copy of the operating-system CD.

Using the Configuration/Setup Utility program

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

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

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

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

See the *User's Guide* on the IBM System x3400 Documentation CD for more detailed information about the Configuration/Setup Utility program.

Using the RAID configuration programs

Note: RAID options and HostRAID are not supported on the SCO 6.0 and UnixWare 7.14 operating systems.

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

The ServeRAID 8k-I SAS Controller that comes installed in some models (hot-swap SAS and hot-swap SATA models) enables you to configure multiple physical SAS or SATA hard disk drives to operate as logical drives in a disk array. The server comes with a CD containing the ServeRAID Manager program, which you can use to configure the ServeRAID 8k-I SAS Controller. If your server comes with an operating system installed, such as Microsoft Windows 2000 Datacenter Server, see the software documentation that comes with the server for configuration information.

Use these programs to perform the following tasks:

- Perform a low-level format on a hard disk drive
- View or change IDs for attached devices
- Set protocol parameters on hard disk drives
- Monitor operation of the RAID controller
- Configure a redundant array of independent disks (RAID) array
- View or change the RAID configuration and associated devices

Consider the following information when using the RAID configuration programs to configure and manage arrays:

- The integrated SATA controller (simple-swap SATA models) with integrated SATA RAID (also known as HostRAID) supports RAID level-0 and level-1 when two drives are installed. When the maximum four drives are installed, RAID level-10 is also supported.

Note: In addition, when the maximum four drives and the optional ServeRAID-8k SAS Controller are installed in the simple-swap SATA models, the server can also support RAID level-5. See the *User's Guide* for details about installing and cabling the ServeRAID-8k Controller to enable RAID level-5 support on simple-swap SATA models.

- The onboard SAS/SATA controller (hot-swap SAS and hot-swap SATA models) supports RAID level-0 and level-1 when two drives and the ServeRAID 8k-l controller are installed. When four drives are installed, RAID level-10 is also supported. When you upgrade to the maximum eight drives and the optional ServeRAID-8k controller is installed, RAID levels 1e, 5, and 6 also are supported.
- Hard disk drive capacities affect how you create arrays. The drives in an array can have different capacities, but the RAID controller treats them as if they all have the capacity of the smallest hard disk drive.
- To help ensure signal quality, do not mix drives with different speeds and data rates.
- To update the firmware and BIOS code for an optional ServeRAID controller, you must use the IBM *ServeRAID Support* CD that comes with the ServeRAID option.
- If you install a different type of RAID controller in the server, use the method that is described in the instructions that come with the controller to view or change settings for attached devices.

Configuring hot-swap SAS, hot-swap SATA, or simple-swap SATA (some models) RAID

Note: RAID options are not supported on the SCO 6.0 and UnixWare 7.14 operating systems.

Use the IBM ServeRAID Configuration Utility program to configure and manage redundant array of independent disks (RAID) on the following server models:

- Hot-swap SAS
- Hot-swap SATA
- Simple-swap SATA models with the optional ServeRAID-8k Controller installed

This utility is part of the BIOS code. The IBM ServeRAID Configuration Utility program adds RAID functionality to the onboard SAS/SATA controller. The onboard SAS/SATA controller comes enabled by default.

Using the IBM ServeRAID Configuration Utility program

Use the IBM ServeRAID Configuration Utility to perform the following tasks:

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

For additional information about how to use the IBM ServeRAID Configuration Utility, see the documentation on the IBM *ServeRAID Support* CD.

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

- **Array Configuration Utility**
Select this choice to create, manage, or delete arrays, add or delete a hot-spare drive, or initialize drives.
- **SerialSelect Utility**
Select this choice to configure the controller interface definitions or to configure the physical transfer and SAS or SATA address of the selected drive.
- **Disk Utilities**
Select this choice to format a disk or verify the disk media. Select a device from the list and read the instructions on the screen carefully before making a selection.

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

1. Turn on the server.
2. When the message Press <CTRL><A> for IBM ServeRAID Configuration Utility appears, press Ctrl+A. If you have set an administrative password, you are prompted to type the password.
3. To select a choice from the menu, use the arrow keys to highlight it and press Enter.

Creating a RAID array

To use the IBM ServeRAID Configuration Utility to configure a RAID level-1 array, complete the following steps:

1. From the IBM ServeRAID Configuration Utility program menu, select **Array Configuration Utility**.
2. Select **Create Array**.
3. From the list of ready drives, select the two drives that you want to group into the array.
4. When you are prompted to select the RAID type, select **RAID 0** or **RAID-1**.
5. (Optional) Type an identifier for the array.
6. When you are prompted for the array build method, select **Quick Init**.
7. Follow the instructions on the screen to complete the configuration; then, select **Done** to exit.
8. Restart the server.

Viewing the array configuration

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

1. Start the IBM ServeRAID Configuration Utility program.
2. From the IBM ServeRAID Configuration Utility window, select **Manage Arrays**.
3. Select an array and press Enter.
4. To exit from the program, press Esc.

For additional information about using the IBM ServeRAID Configuration Utility program to create, configure, and manage arrays, see the documentation on the IBM *ServeRAID Support CD*.

Configuring simple-swap SATA RAID

Use the Adaptec RAID Configuration Utility program to configure and manage simple-swap SATA redundant array of independent disks (RAID) on simple-swap SATA models with no ServeRAID adapter installed.

This utility is part of the BIOS code. The Adaptec RAID Configuration Utility program adds RAID functionality to the integrated SATA controller. The integrated Serial ATA (SATA) controller comes disabled by default. You must enable it and install the device drivers before you can use it. The device drivers, documentation, and other information are available on the IBM *ServeRAID-8e (Adaptec HostRAID) Support CD*.

Enabling the Serial ATA (SATA) controller

To enable the SATA RAID controller, complete the following steps:

1. Turn on the server.
2. When the prompt Press F1 for Configuration/Setup appears, press F1. If you have set an administrator password, you are prompted to type the password.
3. Select **Devices and I/O Ports --> Advanced Chipset Control**.
4. Select **SATA Controller Mode Option**. Change the value to **Enhanced**.
5. Scroll down and select **SATA RAID Enable**.
6. Select **Enabled**.
7. Press Esc; then, select **Yes** to save the changes.

Using the Adaptec RAID Configuration Utility program

Note: Adaptec RAID (also known as HostRAID) is not supported on the SCO 6.0 and UnixWare 7.14 operating systems.

Use the Adaptec RAID Configuration Utility program to perform the following tasks:

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

For additional information about using the Adaptec RAID Configuration Utility program, see the documentation on the IBM *ServeRAID-8e (Adaptec HostRAID) Support CD* that comes with the server.

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

- **Array Configuration Utility**
Select this choice to create, manage, or delete arrays, add or delete a hot-spare drive, or initialize drives.
- **SerialSelect Utility**
Select this choice to configure the controller interface definitions or to configure the physical transfer and SATA address of the selected drive.
- **Disk Utilities**
Select this choice to format a disk or verify the disk media. Select a device from the list and read the instructions on the screen carefully before making a selection.

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

1. Turn on the server.

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

Creating a RAID array

To use the Adaptec RAID Configuration Utility program to configure a RAID level-1 array, complete the following steps:

1. Start the Adaptec RAID Configuration Utility program.
2. Select **Array Configuration Utility**.
3. Select **Create Array**.
4. From the list of ready drives, select the two drives that you want to group into the array.
5. When you are prompted to select the RAID level, select **RAID 0** or **RAID-1**.
6. (Optional) Type an identifier for the array.
7. When you are prompted for the array build method, select **Quick Init**.
8. Follow the instructions on the screen to complete the configuration, and select **Done** to exit.
9. Restart the server.

Viewing the array configuration

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

1. Start the Adaptec RAID Configuration Utility program.
2. Start the Array Configuration Utility.
3. From the Array Configuration Utility window, select **Manage Arrays**.
4. Select an array and press Enter.
5. Press Esc to exit from the program.

For additional information about using the Adaptec RAID Configuration Utility program to create, configure, and manage arrays, see the documentation on the *IBM ServeRAID-8e (Adaptec HostRAID) Support CD*.

Using ServeRAID Manager

Important: RAID options and HostRAID are not supported on the SCO 6.0 and UnixWare 7.14 operating systems.

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

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

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

section. If you install a different type of RAID adapter in the server, use the method that is described in the instructions that come with the adapter to view or change settings for attached devices.

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

Configuring the controller

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

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

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

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

1. In the ServeRAID Manager tree, click the controller.
2. From the toolbar, click **Create**.
3. Click **Express configuration**.
4. Click **Next**.
5. In the “Configuration summary” window, review the information. To change the configuration, click **Modify arrays** or **Modify logical drives**.

Note: Some operating systems have size limitations for logical drives. Before you save the configuration, make sure that the size of the logical drive is appropriate for your operating system.

6. 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.
7. Exit from ServeRAID Manager and remove the CD from the CD or DVD drive.
8. Restart the server.

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

1. In the ServeRAID Manager tree, click the controller.
2. Click **Custom configuration**.
3. Click **Next**.
4. In the “Create arrays” window, from the list of ready drives, select the two drives that you want to 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 icon to add the drive.
7. Click **Next**.
8. In the “Configuration summary” window, review the information. To change the configuration, click **Back**.
9. Click **Apply**; when you are asked whether you want to apply the new configuration, click **Yes**. The configuration is saved in the controller and in the physical drives.
10. Exit from ServeRAID Manager, and remove the CD from the CD or DVD drive.
11. Restart the server.

Viewing the configuration

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

Using the baseboard management controller

The baseboard management controller (BMC) 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 COM Port**: COM 2
 - **Remote Console Baud Rate**: 19200 or higher
 - **Remote Console Connection Type**: VT100
 - **Remote Console Connect**: Direct
 - **Remote Console Flow Control**: Hardware
 - **Remote Console Active After Boot**: Enabled
 - 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

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

Modified /boot/grub/grub.conf contents

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

You must restart the Linux operating system after 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
<pre>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 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</pre>	<p>1</p> <p>1</p>
<p>Note 1: The kernel line is shown with a line break. In your file, the entire entry must all be on one line.</p>	

Modified /boot/grub/menu.lst contents	Notes
<pre>#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</pre>	<p>1</p>

Modified /boot/grub/menu.lst contents	Notes
<pre> 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 </pre>	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

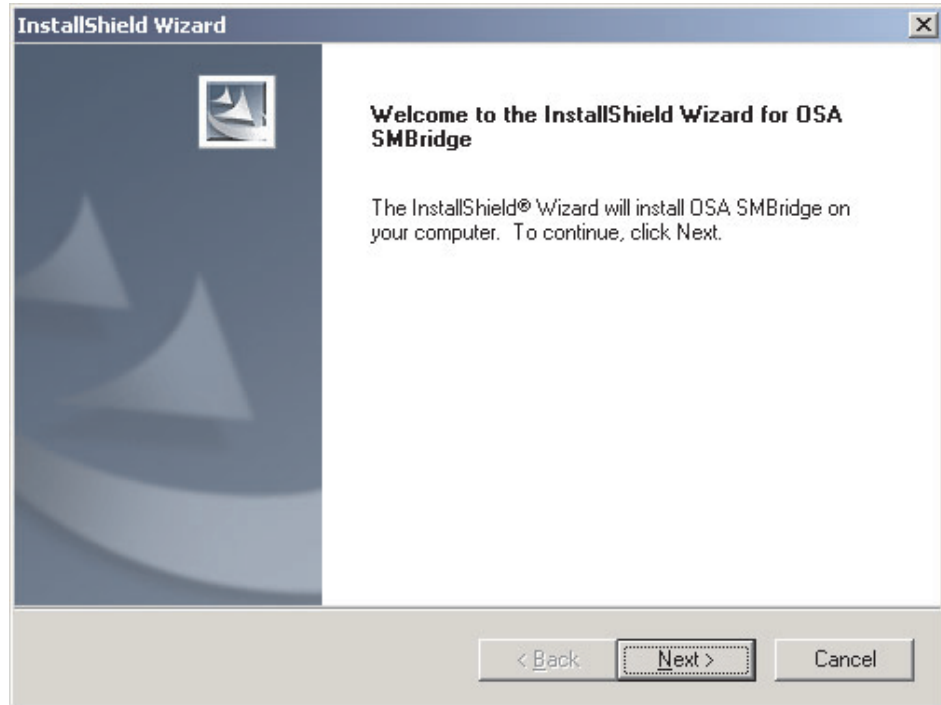
```
Boot Loader Settings
-----
timeout: 30
default: multi(0)disk(0)rdisk(0)partition(1)\WINDOWS
redirect: COM1
redirectbaudrate: 19200
Boot Entries
-----
Boot entry ID: 1
OS Friendly Name: Windows Server 2003, Standard
Path: multi(0)disk(0)rdisk(0)partition(1)\WINDOWS
OS Load Options: /fastdetect /redirect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

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/smbrided`
 - `/var/log/smbridge/License.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 Boot Menu program

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

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

1. Turn off the server.
2. Restart the server.
3. Press F12.
4. Select the startup device.

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

Enabling the Broadcom Gigabit Ethernet Utility program

The Broadcom Gigabit Ethernet Utility program is part of the BIOS. 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. Enable and disable the Broadcom Gigabit Ethernet Utility program from the Configuration/Setup Utility program.

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

1. Turn on the server.
2. When the prompt Press F1 for Configuration/Setup appears during startup, press F1.
3. From the Configuration/Setup Utility main menu, select **Devices and I/O Ports** and press Enter.
4. Select **Planar Ethernet** and use the Right Arrow (→) key to set it to **Enabled**.
5. 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 ports in the server support auto-negotiation, the controller detects the data-transfer rate (10BASE-T, 100BASE-TX, or 1000BASE-T) and duplex mode (full-duplex or half-duplex) of the network and automatically operates at that rate and mode.

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

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

1. Go to <http://www.ibm.com/support/>.
2. Under **Search technical support**, type 7973, 7974, 7975, or 7976 (depending on the machine type for your server model), and click **Search**.
3. In the **Additional search terms** field, type ethernet, and click **Go**.

Updating IBM Director

If you plan to use IBM Director to manage the server, you must check for the latest applicable IBM Director updates and interim fixes.

To install the IBM Director updates and any other applicable updates and interim fixes, 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. Check for the latest version of IBM Director:
 - a. Go to http://www.ibm.com/servers/eserver/xseries/systems_management/xseries_sm/dwnl.html.
 - b. If the drop-down list shows a newer version of IBM Director than what comes with the server, follow the instructions on the Web page to download the latest version.
2. Install the IBM Director program.
3. Download and install any applicable updates or interim fixes for the server:
 - a. Go to <http://www.ibm.com/support/>.
 - b. Click **Downloads and drivers**.

- c. From the **Category** list, select **xSeries (Intel and AMD processor-based)**.
- d. From the **Sub-category** list, select **System x3400** and click **Continue**.
- e. In the **Search within results** field, type director and click **Search**.
- f. Select any applicable update or interim fix that you want to download.
- g. Click the link for the executable (.exe) file to download the file, and follow the instructions in the readme file to install the update or interim fix.
- h. Repeat steps 3f and 3g for any additional updates or interim fixes that you want to install.

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 89, the *Problem Determination and Service Guide* on the IBM System x3400 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 codes” and the *Problem Determination and Service Guide* on the IBM System x3400 Documentation CD for more information.

- **ServerGuide problems**

This chart lists problem symptoms and steps to correct problems that occur when you are using the *ServerGuide Setup and Installation CD*. For more information, see “ServerGuide problems” on page 75.

- **Troubleshooting tables**

These tables list problem symptoms and steps to correct the problems. See “Troubleshooting tables” on page 75 for more information.

- **Diagnostic programs and error messages**

The diagnostic programs are the primary method of testing the major components of the server. These programs are on the IBM *Enhanced Diagnostics* CD that comes with the server. See the *Problem Determination and Service Guide* on the IBM System x3400 Documentation CD for more information.

- **System-board error LEDs**

An LED on the system board might be lit to help isolate an error that is indicated by the system-error LED on the front of the server. For more information, see “System-board LEDs” on page 87.

POST beep codes

POST emits one beep to signal a 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 x3400 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 x3400 Documentation CD for information about other beep codes.

POST error codes

The following table provides an abbreviated list of the error codes that might appear during POST. See the *Problem Determination and Service Guide* on the IBM System x3400 Documentation CD for more information about the POST error codes. To check for updated technical information, go to <http://www.ibm.com/support/>, and type 7973, 7974, 7975, or 7976 (depending on the machine type for your server) under **Search technical support**.

Table 7. Abbreviated list of POST error codes

Error code	Description	Action
062	Three consecutive boot failures using the default configuration.	<ol style="list-style-type: none">1. Update the system firmware to the latest level (see the <i>Problem Determination and Service Guide</i> on the IBM System x3400 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.	<ol style="list-style-type: none">1. Reseat the battery.2. Replace the following components one at a time, in the order shown, restarting the server each time:<ol style="list-style-type: none">a. Batteryb. (Trained service technician only) System board
161	Real-time clock battery failure.	<ol style="list-style-type: none">1. Reseat the battery.2. Replace the following components one at a time, in the order shown, restarting the server each time:<ol style="list-style-type: none">a. Batteryb. (Trained service technician only) System board

Table 7. Abbreviated list of POST error codes (continued)

Error code	Description	Action
162	Invalid configuration information or CMOS random-access memory (RAM) checksum failure.	<ol style="list-style-type: none"> 1. Run the Configuration/Setup Utility program, select Load Default Settings, and save the settings. 2. Reseat the following components: <ol style="list-style-type: none"> a. Battery b. Failing device (If the device is a FRU, it must be reseated by a trained service technician only.) 3. Replace the following components one at a time, in the order shown, restarting the server each time: <ol style="list-style-type: none"> a. Battery b. Failing device (If the device is a FRU, it must be replaced by a trained service technician only.) c. (Trained service technician only) System board
163	The time of day has not set.	<ol style="list-style-type: none"> 1. Run the Configuration/Setup Utility program, select Load Default Settings, make sure that the date and time are correct, and save the settings. 2. Reseat the battery. 3. Replace the following components one at a time, in the order shown, restarting the server each time: <ol style="list-style-type: none"> a. Battery b. (Trained service technician only) System board
175	Service processor flash code damaged or not loaded. Note: In this case, the service processor is the optional Remote Supervisor Adapter II SlimLine.	<ol style="list-style-type: none"> 1. Update the Remote Supervisor Adapter II SlimLine firmware (see the <i>Problem Determination and Service Guide</i> on the IBM System x3400 Documentation CD). 2. Replace the Remote Supervisor Adapter II SlimLine. 3. (Trained service technician only) Replace the system board.

Table 7. Abbreviated list of POST error codes (continued)

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See the parts listing in the <i>Problem Determination and Service Guide</i> to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 		
Error code	Description	Action
178	System VPD not available.	<ol style="list-style-type: none"> 1. Restart the server. 2. Update the BMC firmware (see the <i>Problem Determination and Service Guide</i> on the IBM System x3400 Documentation CD. 3. (Trained service technician only) Reseat the microprocessor. 4. (Trained service technician only) Replace the microprocessor.
184	Power-on password damaged.	<ol style="list-style-type: none"> 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: <ol style="list-style-type: none"> a. Battery b. (Trained service technician only) System board
187	VPD serial number not set.	<ol style="list-style-type: none"> 1. Set the serial number by updating the BIOS code level (see the <i>Problem Determination and Service Guide</i> on the IBM System x3400 Documentation CD. 2. Reseat the optional Remote Supervisor Adapter II Slimline 3. (Trained service technician only) Replace the system board.
188	Bad EEPROM CRC #2.	<ol style="list-style-type: none"> 1. Restart the server. 2. Update the BMC firmware (see the <i>Problem Determination and Service Guide</i> on the IBM System x3400 Documentation CD. 3. 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 same L2 or L3 cache size.
198	Microprocessors are not the same speed	Install microprocessors of the same speed.

Table 7. Abbreviated list of POST error codes (continued)

Error code	Description	Action
		<ul style="list-style-type: none"> Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. See the parts listing in the <i>Problem Determination and Service Guide</i> to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.
289	A DIMM has been disabled by the user or by the system.	<ol style="list-style-type: none"> If the DIMM was disabled by the user, run the Configuration/Setup Utility program and enable the DIMM. Make sure that the DIMM is installed correctly (see “Installing a memory module” on page 15). Replace the DIMM. (Trained service technician only) Replace the system board.
301	Keyboard or keyboard controller error.	<ol style="list-style-type: none"> If you have installed a USB keyboard, run the Configuration/Setup Utility program and enable keyboardless operation to prevent the POST error message 301 from being displayed during startup. Reseat the keyboard cable. Replace the following components one at a time, in the order shown, restarting the server each time: <ol style="list-style-type: none"> Keyboard (Trained service technician only) System board
303	Keyboard controller failure.	<ol style="list-style-type: none"> Reseat the keyboard. Replace the keyboard. (Trained service technician only) Replace the system board.
1600	The service processor is not functioning. Note: Depending on which device is installed, the service processor is the optional Remote Supervisor Adapter II SlimLine or the BMC.	<ol style="list-style-type: none"> If an optional Remote Supervisor Adapter II SlimLine is installed: <ol style="list-style-type: none"> Update the Remote Supervisor Adapter II SlimLine firmware (see the <i>Problem Determination and Service Guide</i> on the IBM System x3400 Documentation CD). Replace the Remote Supervisor Adapter II SlimLine. Update the BMC firmware (see the <i>Problem Determination and Service Guide</i> on the IBM System x3400 Documentation CD). (Trained service technician only) Replace the system board.
1604	Machine Type mismatch detected.	Make sure that the vital product data (VPD), installed hardware, and BMC code level is correct for the server Machine Type.

Table 7. Abbreviated list of POST error codes (continued)

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See the parts listing in the <i>Problem Determination and Service Guide</i> to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 		
Error code	Description	Action
1762	Fixed disk configuration error.	<ol style="list-style-type: none"> 1. Run the Configuration/Setup Utility program and load the default settings. 2. Reseat the following components: <ol style="list-style-type: none"> a. SATA or SAS cable b. Reseat the hard disk drive c. (Trained service technician only) Reseat the system board. d. Replace the components listed in step 2 one at a time, in the order shown, restarting the server each time.

Table 7. Abbreviated list of POST error codes (continued)

Error code	Description	Action
178x	Fixed disk error. Note: x is the drive that has the error.	<ol style="list-style-type: none"> 1. Run the hard disk drive diagnostic tests on drive x (see "Running the diagnostic programs" in the <i>Problem Determination and Service Guide</i> on the IBM System x3400 Documentation CD). 2. Reseat the following components, depending on the server model: <ul style="list-style-type: none"> • Hot-swap and non-hot-swap models: <ol style="list-style-type: none"> a. Hard disk drive x b. Hard disk drive x cable c. Optional adapter cable d. SAS/SATA backplane • Simple-swap models: <ol style="list-style-type: none"> a. Hard disk drive x b. Hard disk drive x cable c. Optional adapter cable d. SATA backplate 3. Replace the following components one at a time, depending on the server model, in the order shown, restarting the server each time: <ul style="list-style-type: none"> • Hot-swap and non-hot-swap models: <ol style="list-style-type: none"> a. Hard disk drive x b. Hard disk drive cable c. Optional adapter cable d. SAS/SATA backplane • Simple-swap models: <ol style="list-style-type: none"> a. Hard disk drive x b. Hard disk drive x cable c. SATA backplate 4. (Trained service technician only) Replace the system board.
1800	Unavailable PCI hardware interrupt.	<ol style="list-style-type: none"> 1. Run the Configuration/Setup Utility program and adjust the adapter settings. 2. Remove each adapter one at a time, restarting the server each time, until the problem is isolated.

Table 7. Abbreviated list of POST error codes (continued)

Error code	Description	Action
1801	A PCI adapter has requested memory resources that are not available.	<ol style="list-style-type: none"> 1. Make sure that no devices have been disabled in the Configuration/Setup Utility program. 2. Change the order of the adapters in the PCI, PCI-X, and PCI Express slots. Make sure that the startup (boot) device is positioned early in the scanning order. (For information about the scanning order, see the <i>User's Guide</i> on the IBM System x3400 Documentation CD). 3. Make sure that the settings for the adapter and all other adapters in the Configuration/Setup Utility program are correct. If the memory resource settings are not correct, change them. 4. If all memory resources are being used, remove an adapter to make memory available to the adapter. Disabling the BIOS on the adapter should correct the error. See the documentation that comes with the adapter.
1810	PCI error.	<ol style="list-style-type: none"> 1. Make sure that no devices have been disabled in the Configuration/Setup Utility program. 2. Reseat the failing adapter. Note: If an error LED is lit on an adapter, reseat that adapter first; if no LEDs are lit, reseat each adapter one at a time, restarting the server each time, to isolate the failing adapter. 3. Replace the following components one at a time, in the order shown, restarting the server each time: <ol style="list-style-type: none"> a. Failing adapter b. (Trained service technician only) System board

Table 7. Abbreviated list of POST error codes (continued)

Error code	Description	Action
1962	A drive does not contain a valid boot sector.	<ol style="list-style-type: none"> 1. Make sure that a bootable operating system is installed. 2. Run the hard disk drive diagnostic tests (see “Running the diagnostic programs” in the <i>Problem Determination and Service Guide</i> on the IBM System x3400 Documentation CD). 3. Reseat the following components, depending on the server model: <ul style="list-style-type: none"> • Hot-swap and non-hot-swap models: <ol style="list-style-type: none"> a. Hard disk drive b. Hard disk drive cable c. Optional adapter cable • Simple-swap models: <ol style="list-style-type: none"> a. Hard disk drive b. Hard disk drive cable c. Optional adapter cable 4. Replace the following components one at a time, depending on the server model, in the order shown, restarting the server each time: <ul style="list-style-type: none"> • Hot-swap and non-hot-swap models: <ol style="list-style-type: none"> a. Hard disk drive b. Hard disk drive cable c. Optional adapter cable d. SAS/SATA backplane • Simple-swap and non-hot-swap models: <ol style="list-style-type: none"> a. Hard disk drive b. Hard disk drive cable c. SATA backplate 5. (Trained service technician only) Replace the system board.
8603	Pointing-device error.	<ol style="list-style-type: none"> 1. Reseat the pointing device. 2. Replace the following components one at a time, in the order shown, restarting the server each time: <ol style="list-style-type: none"> a. Pointing device b. (Trained service technician only) System board

Table 7. Abbreviated list of POST error codes (continued)

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See the parts listing in the <i>Problem Determination and Service Guide</i> to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 		
Error code	Description	Action
00012000	Processor machine check error.	<ol style="list-style-type: none"> 1. (Trained service technician only) Reseat the microprocessor. 2. Replace the following components one at a time, in the order shown, restarting the server each time: <ol style="list-style-type: none"> a. (Trained service technician only) Microprocessor b. (Trained service technician only) System board
01298001	No update data for microprocessor.	<ol style="list-style-type: none"> 1. Update the BIOS code again (see the <i>Problem Determination and Service Guide</i> on the IBM System x3400 Documentation CD). 2. (Trained service technician only) Reseat the microprocessor. 3. (Trained service technician only) Replace the microprocessor.
01298101	Bad update data for processor 1.	<ol style="list-style-type: none"> 1. Update the BIOS code again (see the <i>Problem Determination and Service Guide</i> on the IBM System x3400 Documentation CD). 2. (Trained service technician only) Reseat the microprocessor. 3. (Trained service technician only) Replace the microprocessor.

Table 7. Abbreviated list of POST error codes (continued)

Error code	Description	Action
I9990301	Hard disk drive boot sector error.	<ol style="list-style-type: none"> 1. Reseat the following components, depending on the server model: <ul style="list-style-type: none"> • Hot-swap and non-hot-swap models: <ol style="list-style-type: none"> a. Hard disk drive b. Hard disk drive cable c. Optional adapter cable • Simple-swap models: <ol style="list-style-type: none"> a. Hard disk drive b. Hard disk drive cable c. Optional adapter cable 2. Replace the following components one at a time, depending on the server model, in the order shown, restarting the server each time: <ul style="list-style-type: none"> • Hot-swap and non-hot-swap models: <ol style="list-style-type: none"> a. Hard disk drive b. Hard disk drive cable c. Optional adapter cable d. SAS/SATA backplane • Simple-swap models: <ol style="list-style-type: none"> a. Hard disk drive b. Hard disk drive cable c. SATA backplate 3. (Trained service technician only) Replace the system board.

Table 7. Abbreviated list of POST error codes (continued)

Error code	Description	Action
I9990305	An operating system was not found.	<ol style="list-style-type: none"> 1. Make sure that a bootable operating system is installed. To determine whether an operating system is one of the devices in the startup sequence, run the Configuration/Setup Utility program (see the <i>User's Guide</i> on the IBM System x3400 Documentation CD). 2. Run the hard disk drive diagnostic tests (see "Running the diagnostic programs" in the <i>Problem Determination and Service Guide</i> on the IBM System x3400 Documentation CD). 3. Reseat the following components, depending on the server model: <ul style="list-style-type: none"> • Hot-swap and non-hot-swap models: <ol style="list-style-type: none"> a. Hard disk drive b. Hard disk drive cable c. Optional adapter cable • Simple-swap models: <ol style="list-style-type: none"> a. Hard disk drive b. Hard disk drive cable c. Optional adapter cable 4. Replace the following components one at a time, depending on the server model, in the order shown, restarting the server each time: <ul style="list-style-type: none"> • Hot-swap and non-hot-swap models: <ol style="list-style-type: none"> a. Hard disk drive b. Hard disk drive cable c. Optional adapter cable d. SAS/SATA backplane • Simple-swap models: <ol style="list-style-type: none"> a. Hard disk drive b. Hard disk drive cable 5. (Trained service technician only) Replace the system board.
I9990650	AC power has been restored.	<ol style="list-style-type: none"> 1. Reseat the power cords. 2. Check for interruption of the external power. 3. Replace the power cords.

ServerGuide problems

The following table lists problem symptoms and suggested solutions.

Table 8. ServerGuide Setup and Installation CD

Symptom	Action
The <i>ServerGuide Setup and Installation</i> CD will not start.	<ul style="list-style-type: none">• Make sure that the server supports the ServerGuide program and has a startable (bootable) CD or DVD drive.• If the startup (boot) sequence settings have been changed, make sure that the CD or DVD drive is first in the startup sequence.• If more than one CD or DVD drive is installed, make sure that only one drive is set as the primary drive. Start the CD from the primary drive.
ServeRAID program cannot view all installed drives or the operating system cannot be installed.	<ul style="list-style-type: none">• Make sure that there are no duplicate IRQ assignments.• Make sure that the hard disk drive is connected correctly.
The operating-system installation program continuously loops.	Make more space available on the hard disk.
The ServerGuide program will not start the operating-system CD.	Make sure that the operating-system CD is supported by the ServerGuide program. See the <i>ServerGuide Setup and Installation</i> CD label for a list of supported operating-system versions.
The operating system cannot be installed; the option is not available.	Make sure that the operating-system is supported on the server. If the operating system is supported, no logical drive is defined (RAID servers). Run the ServerGuide program and make sure that setup is complete.

Troubleshooting tables

Use the following tables to find solutions to problems that have identifiable symptoms. See the *Problem Determination and Service Guide* on the IBM System x3400 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 system-board LEDs or the LEDs on the front control panel (see “System-board LEDs” on page 87).
2. Remove the software or device that you added.
3. Run the diagnostic tests to determine whether the server is running correctly.
4. Reinstall the new software or new device.

CD or DVD drive problems

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See the parts listing in the <i>Problem Determination and Service Guide</i> to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 	
Symptom	Action
The CD or DVD drive is not recognized.	<ol style="list-style-type: none"> 1. Make sure that: <ul style="list-style-type: none"> • The IDE channel to which the CD or DVD drive is attached (primary or secondary) is enabled in the Configuration/Setup Utility program. • All cables and jumpers are installed correctly. • The correct device driver is installed for the CD or DVD drive. 2. Run the CD or DVD drive diagnostic programs. 3. Reseat the CD or DVD drive cable. 4. Replace the following components one at a time, in the order shown, restarting the server each time: <ol style="list-style-type: none"> a. CD or DVD drive cable b. CD or DVD drive c. (Trained service technician only) System board
A CD or DVD is not working correctly.	<ol style="list-style-type: none"> 1. Clean the CD or DVD. 2. Run the CD or DVD drive diagnostic programs. 3. Reseat the CD or DVD drive cable. 4. Replace the following components one at a time, in the order shown, restarting the server each time: <ol style="list-style-type: none"> a. CD or DVD drive cable b. CD or DVD drive
The CD or DVD drive tray is not working.	<ol style="list-style-type: none"> 1. Make sure that the server is turned on. 2. Insert the end of a straightened paper clip into the manual tray-release opening. 3. Reseat the CD or DVD drive cable. 4. Replace the following components one at a time, in the order shown, restarting the server each time: <ol style="list-style-type: none"> a. CD or DVD drive cable b. CD or DVD drive

Diskette drive problems

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See the parts listing in the <i>Problem Determination and Service Guide</i> to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 	
Symptom	Action
The optional diskette drive activity LED stays lit, or the server bypasses the diskette drive.	<ul style="list-style-type: none"> • If there is a diskette in the drive, make sure that: <ul style="list-style-type: none"> – The diskette drive cables are correctly and securely connected. – The diskette drive is enabled in the Configuration/Setup Utility program. – The diskette is good and not damaged. (Try another diskette if you have one.) – The diskette is inserted correctly in the drive. – The diskette contains the necessary files to start the server. – Your software program is working properly. • To prevent diskette drive read/write errors, make sure that the distance between monitors and diskette drives is at least 76 mm (3 in.). <p>If the problem remains, replace the internal diskette drive (see the <i>Problem Determination and Service Guide</i> on the IBM System x3400 Documentation CD).</p>

General problems

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See the parts listing in the <i>Problem Determination and Service Guide</i> to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 	
Symptom	Action
A cover lock is broken, an LED is not working, or a similar problem has occurred.	If the part is a CRU, replace it. If the part is a FRU, the part must be replaced by a trained service technician.

Hard disk drive problems

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See the parts listing in the <i>Problem Determination and Service Guide</i> to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 	
Symptom	Action
Not all drives are recognized by the hard disk drive diagnostic test (the Fixed Disk Test).	Remove the drive that is indicated by the diagnostic tests; then, run the hard disk drive diagnostic test again. If the remaining drives are recognized, replace the drive that you removed with a new one.
The server stops responding during the hard disk drive diagnostic test.	Remove the hard disk drive that was being tested when the server stopped responding, and run the diagnostic test again. If the hard disk drive diagnostic test runs successfully, replace the drive that you removed with a new one.

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See the parts listing in the <i>Problem Determination and Service Guide</i> to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 	
Symptom	Action
A hard disk drive was not detected while the operating system was being started.	Reseat all hard disk drives and cables; then, run the hard disk drive diagnostic tests again.
A hard disk drive passes the diagnostic Fixed Disk Test but the problem remains.	Run the diagnostic SCSI Attached Disk Test (see “Running the diagnostic programs” in the <i>Problem Determination and Service Guide</i> on the IBM System x3400 Documentation CD). Note: This test is available on servers that have RAID arrays that uses the onboard SAS/SATA controller or servers that have SATA hard disk drives that are connected to the onboard SAS/SATA controller.

Intermittent problems

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See the parts listing in the <i>Problem Determination and Service Guide</i> to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 	
Symptom	Action
A problem occurs only occasionally and is difficult to diagnose.	<ol style="list-style-type: none"> 1. Make sure that: <ul style="list-style-type: none"> • All cables and cords are connected securely to the rear of the server and attached devices. • When the server is turned on, air is flowing from the fan grille. If there is no airflow, the fan is not working. This can cause the server to overheat and shut down. 2. Check the system/event error log (see “Error logs” in the <i>Problem Determination and Service Guide</i> on the IBM System x3400 Documentation CD).

Keyboard, mouse, or pointing-device problems

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See the parts listing in the <i>Problem Determination and Service Guide</i> to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 	
Symptom	Action
All or some keys on the keyboard do not work.	<ol style="list-style-type: none"> 1. Make sure that: <ul style="list-style-type: none"> • The keyboard cable is securely connected. • If you are using a PS/2 keyboard, the keyboard and mouse cables are not reversed. • The server and the monitor are turned on. 2. If you have installed a USB keyboard, run the Configuration/Setup Utility program and enable keyboardless operation to prevent the POST error message 301 from being displayed during startup. 3. If you are using a USB hub, disconnect the USB device from the hub and connect it directly to the server. 4. Replace the following components one at a time, in the order shown, restarting the server each time: <ol style="list-style-type: none"> a. Keyboard b. (Trained service technician only) System board
The mouse or pointing device does not work.	<ol style="list-style-type: none"> 1. Make sure that: <ul style="list-style-type: none"> • The mouse or pointing-device cable is securely connected to the server. • If you are using a PS/2 device, the keyboard and mouse or pointing-device cables are not reversed. • The mouse or pointing-device drivers are installed correctly. • The server and the monitor are turned on. • The keyboardless operation and mouse options are enabled in the Configuration/Setup Utility program. 2. If you are using a USB hub, disconnect the USB device from the hub and connect it directly to the server. 3. Replace the following components one at a time, in the order shown, restarting the server each time: <ol style="list-style-type: none"> a. Mouse or pointing device b. (Trained service technician only) System board

Memory problems

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See the parts listing in the <i>Problem Determination and Service Guide</i> to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 	
Symptom	Action
The amount of system memory that is displayed is less than the amount of installed physical memory.	<ol style="list-style-type: none"> 1. Make sure that: <ul style="list-style-type: none"> • No error LEDs are lit on the control-panel assembly or on the system board. • Memory mirroring does not account for the discrepancy. • The memory modules are seated correctly. • You have installed the correct type of memory. • All DIMMs are enabled. The server might have automatically disabled a DIMM when it detected a problem. 2. Check the POST error log for error message 289. If a DIMM was disabled by a system-management interrupt (SMI), replace the DIMM. 3. Run memory diagnostics (see “Running the diagnostic programs” in the <i>Problem Determination and Service Guide</i> on the IBM System x3400 Documentation CD). 4. Make sure that there is no memory mismatch when the server is over the minimum memory configuration (one 512 MB DIMM) and that you have installed the correct number of DIMMs (see the <i>User's Guide</i> on the IBM System x3400 Documentation CD for information about installing memory modules). 5. Reseat the DIMMs. 6. Replace the following components one at a time, in the order shown, restarting the server each time: <ol style="list-style-type: none"> a. DIMMs b. (Trained service technician only) System board

Microprocessor problems

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See the parts listing in the <i>Problem Determination and Service Guide</i> to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 	
Symptom	Action
A microprocessor LED is lit during POST, indicating that the startup (boot) microprocessor is not working correctly.	<ol style="list-style-type: none"> 1. Make sure that the server supports the microprocessor. 2. (Trained service technician only) Reseat the microprocessor. 3. Replace the following components one at a time, in the order shown, restarting the server each time: <ol style="list-style-type: none"> a. (Trained service technician only) Microprocessor b. (Trained service technician only) System board

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.

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See the parts listing in the <i>Problem Determination and Service Guide</i> to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 	
Symptom	Action
Testing the monitor	<ol style="list-style-type: none"> 1. Make sure that the monitor cables are firmly connected. 2. Try using a different monitor on the server, or try using the monitor that is being tested on a different server. 3. Run the diagnostic programs. If the monitor passes the diagnostic programs, the problem might be a video device driver. 4. Reseat the Remote Supervisor Adapter II SlimLine (if one is present). 5. Replace the following components one at a time, in the order shown, restarting the server each time: <ol style="list-style-type: none"> a. Remote Supervisor Adapter II SlimLine (if one is present) b. (Trained service technician only) System board
The screen is blank.	<ol style="list-style-type: none"> 1. Make sure that: <ul style="list-style-type: none"> • The server is turned on. If there is no power to the server, see “Power problems” on page 84. • The monitor cables are connected correctly. • The monitor is turned on and the brightness and contrast controls are adjusted correctly. • No beep codes sound when the server is turned on. <p>Important: In some memory configurations, the 3-3-3 beep code might sound during POST, followed by a blank monitor screen. If this occurs and the Boot Fail Count option in the Start Options of the Configuration/Setup Utility program is enabled, you must restart the server three times to reset the configuration settings to the default configuration (the memory connector or bank of connectors enabled).</p> 2. Make sure that the correct server is controlling the monitor, if applicable. 3. Make sure that damaged BIOS code is not affecting the video; see “Recovering from a BIOS update failure” in the <i>Problem Determination and Service Guide</i> on the IBM System x3400 Documentation CD. 4. See “Solving undetermined problems” in the <i>Problem Determination and Service Guide</i>.
The monitor works when you turn on the server, but the screen goes blank when you start some application programs.	<ol style="list-style-type: none"> 1. Make sure that: <ul style="list-style-type: none"> • The application program is not setting a display mode that is higher than the capability of the monitor. • You installed the necessary device drivers for the application. 2. Run video diagnostics (see “Running the diagnostic programs” in the <i>Problem Determination and Service Guide</i> on the IBM System x3400 Documentation CD). <ul style="list-style-type: none"> • If the server passes the video diagnostics, the video is good; see “Solving undetermined problems” in the <i>Problem Determination and Service Guide</i>. • (Trained service technician only) If the server fails the video diagnostics, replace the system board.

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

Symptom	Action
The monitor has screen jitter, or the screen image is wavy, unreadable, rolling, or distorted.	<ol style="list-style-type: none"> 1. If the monitor self-tests show that the monitor is working correctly, consider the location of the monitor. Magnetic fields around other devices (such as transformers, appliances, fluorescent lights, and other monitors) can cause screen jitter or wavy, unreadable, rolling, or distorted screen images. If this happens, turn off the monitor. Attention: Moving a color monitor while it is turned on might cause screen discoloration. Move the device and the monitor at least 305 mm (12 in.) apart, and turn on the monitor. Notes: <ol style="list-style-type: none"> a. To prevent diskette drive read/write errors, make sure that the distance between the monitor and any external diskette drive is at least 76 mm (3 in.). b. Non-IBM monitor cables might cause unpredictable problems. 2. Reseat the following components: <ol style="list-style-type: none"> a. Monitor cable b. Remote Supervisor Adapter II SlimLine (if one is present) 3. Replace the following components one at a time, in the order shown, restarting the server each time: <ol style="list-style-type: none"> a. Monitor b. Remote Supervisor Adapter II SlimLine (if one is present) c. (Trained service technician only) System board
Wrong characters appear on the screen.	<ol style="list-style-type: none"> 1. If the wrong language is displayed, update the BIOS code with the correct language (see “Updating the firmware” in the <i>Problem Determination and Service Guide</i> on the IBM System x3400 Documentation CD). 2. Reseat the monitor cable. 3. Replace the following components one at a time, in the order shown, restarting the server each time: <ol style="list-style-type: none"> a. Monitor b. (Trained service technician only) System board

Optional-device problems

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See the parts listing in the <i>Problem Determination and Service Guide</i> to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 	
Symptom	Action
An IBM optional device that was just installed does not work.	<ol style="list-style-type: none"> 1. Make sure that: <ul style="list-style-type: none"> • The device is designed for the server (see http://www.ibm.com/servers/eserver/serverproven/compat/us/). • You followed the installation instructions that came with the device and the device is installed correctly. • You have not loosened any other installed devices or cables. • You updated the configuration information in the Configuration/Setup Utility program. Whenever memory or any other device is changed, you must update the configuration. 2. Reseat the device that you just installed. 3. Replace the device that you just installed.
An IBM optional device that used to work does not work now.	<ol style="list-style-type: none"> 1. Make sure that all of the hardware and cable connections for the device are secure. 2. If the device comes with test instructions, use those instructions to test the device. 3. Reseat the failing device. 4. Replace the failing device.

Power problems

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

Symptom	Action
<p>The power-control button does not work (the server does not start).</p> <p>Note: The power-control button will not function until 20 seconds after the server has been connected to ac power.</p>	<ol style="list-style-type: none"> 1. Make sure that the control-panel assembly power-control button is working correctly: <ol style="list-style-type: none"> a. Disconnect the server power cords. b. Reconnect the power cords. c. Press the power-control button. If the server do not start, check the power-control button for damage. 2. Make sure that: <ul style="list-style-type: none"> • The power cords are correctly connected to the server and to a working electrical outlet. • The power LEDs (AC, DC) are lit correctly. • The server contains the correct type of DIMMs. • The DIMMs are correctly seated. • A POST beep code did not sound, indicating a memory initialization error. • The LEDs on the power supply do not indicate a problem. • The microprocessor is correctly installed. 3. Reseat the following components: <ol style="list-style-type: none"> a. DIMMs b. Power supply cables to all internal components c. Power supplies (hot-swap models) 4. Replace the following components one at a time, in the order shown, restarting the server each time: <ol style="list-style-type: none"> a. DIMMs b. Power supplies (hot-swap models) c. (Trained service technician only) Power supply (non-hot swap models) 5. If you just installed an optional device, remove it, and restart the server. If the server now starts, you might have installed more devices than the power supply supports. 6. See “Solving undetermined problems” in the <i>Problem Determination and Service Guide</i> on the IBM <i>System x3400 Documentation CD</i>.
<p>The server does not turn off.</p>	<ol style="list-style-type: none"> 1. Determine whether you are using an Advanced Configuration and Power Management (ACPI) or a non-ACPI operating system. If you are using a non-ACPI operating system, complete the following steps: <ol style="list-style-type: none"> a. Press Ctrl+Alt+Delete. b. Turn off the server by holding the power-control button for 5 seconds. c. Restart the server. d. If the server fails POST and the power-control button does not work, disconnect the ac power cord for 20 seconds; then, reconnect the ac power cord and restart the server. 2. (Trained service technician only) If the problem remains or if you are using an ACPI-aware operating system, suspect the system board.

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See the parts listing in the <i>Problem Determination and Service Guide</i> to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 	
Symptom	Action
The server unexpectedly shuts down, and the LEDs on the control-panel assembly are not lit.	See “Solving undetermined problems” in the <i>Problem Determination and Service Guide</i> on the IBM System x3400 Documentation CD.

Serial port problems

For more information about the serial port, see the *User’s Guide* on the IBM System x3400 Documentation CD.

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See the parts listing in the <i>Problem Determination and Service Guide</i> to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 	
Symptom	Action
The number of serial ports that are identified by the operating system is less than the number of installed serial ports.	<ol style="list-style-type: none"> 1. Make sure that: <ul style="list-style-type: none"> • Each port is assigned a unique address in the Configuration/Setup Utility program and none of the serial ports is disabled. • The serial port adapter (if one is present) is seated correctly. 2. Reseat the serial port adapter. 3. Replace the serial port adapter.
A serial device does not work.	<ol style="list-style-type: none"> 1. Make sure that: <ul style="list-style-type: none"> • The device is compatible with the server. • The serial port is enabled and is assigned a unique address. • The device is connected to the correct connector. (For connector locations, see the <i>User’s Guide</i> on the IBM System x3400 Documentation CD.) 2. Reseat the following components: <ol style="list-style-type: none"> a. Failing serial device b. Serial cable c. Remote Supervisor Adapter II SlimLine (if one is present) 3. Replace the following components one at a time, in the order shown, restarting the server each time: <ol style="list-style-type: none"> a. Failing serial device b. Serial cable c. Remote Supervisor Adapter II SlimLine (if one is present) d. (Trained service technician only) System board

Software problems

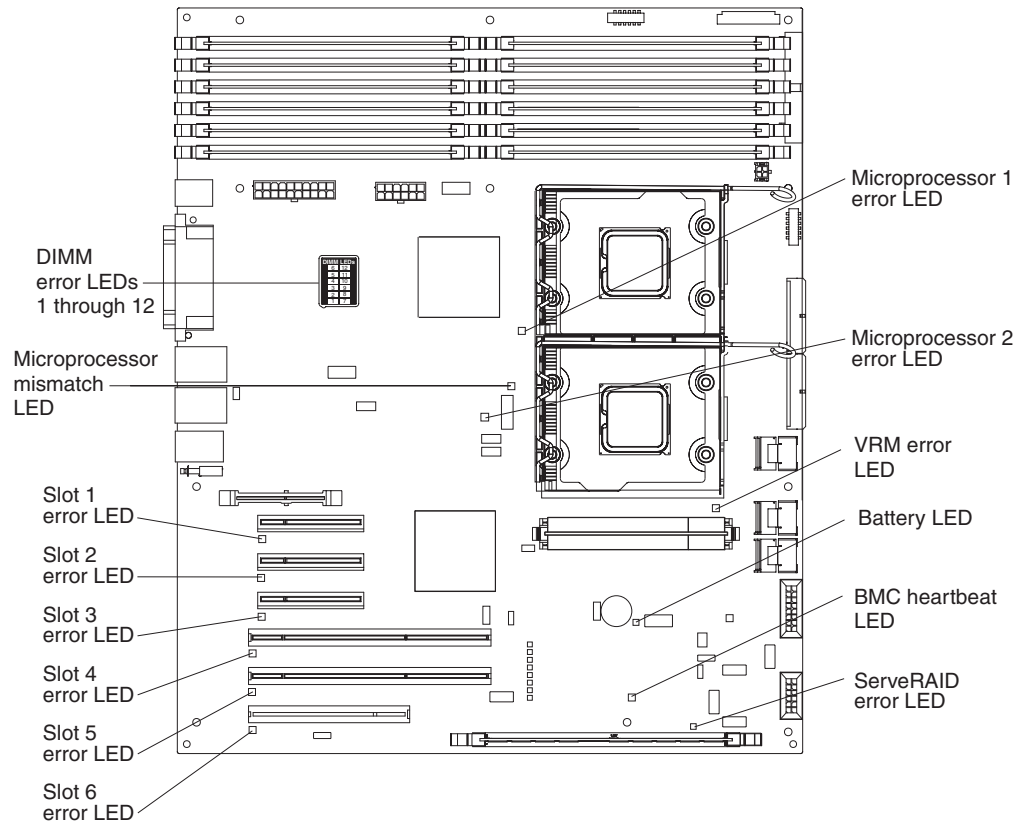
<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See the parts listing in the <i>Problem Determination and Service Guide</i> to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 	
Symptom	Action
You suspect a software problem.	<ol style="list-style-type: none"> 1. To determine whether the problem is caused by the software, make sure that: <ul style="list-style-type: none"> • The server has the minimum memory that is needed to use the software. For memory requirements, see the information that comes with the software. If you have just installed an adapter or memory, the server might have a memory-address conflict. • The software is designed to operate on the server. • Other software works on the server. • The software works on another server. 2. If you received any error messages when using the software, see the information that comes with the software for a description of the messages and suggested solutions to the problem. 3. Contact your place of purchase of the software.

Universal Serial Bus device problems

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See the parts listing in the <i>Problem Determination and Service Guide</i> to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 	
Symptom	Action
A USB device does not work.	<ol style="list-style-type: none"> 1. Run USB diagnostics (see “Running the diagnostic programs” in the <i>Problem Determination and Service Guide</i> on the IBM System x3400 Documentation CD). 2. Make sure that: <ul style="list-style-type: none"> • The correct USB device driver is installed. • The operating system supports USB devices. • A standard PS/2 keyboard or mouse is not connected to the server. If it is, a USB keyboard or mouse will not work during POST. 3. Make sure that the USB configuration options are set correctly in the Configuration/Setup Utility program. (For more information, see the <i>User’s Guide</i> on the IBM System x3400 Documentation CD.) 4. If you are using a USB hub, disconnect the USB device from the hub and connect it directly to the server.

System-board LEDs

The following illustration shows the LEDs on the system board. You might have to refer to this illustration when solving problems with the server.



Use the system-board LEDs to diagnose system errors. An error LED is lit to indicate a problem with a specific component. After a problem is corrected, the LED will not be lit the next time that the server is restarted; if the problem remains, the LED will be lit again. For additional information, see the *Problem Determination and Service Guide* on the IBM System x3400 Documentation CD.

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 *Problem Determination and Service Guide* on the *IBM System x3400 Documentation CD* that comes with your system and 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 the 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 Ordering System 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

Important: When you call for service, you will be asked to provide the four-digit machine type of your system, which is 7973, 7974, 7975, or 7976.

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

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

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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.

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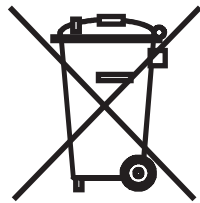
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For Taiwan: Please recycle batteries.



Electronic emission notices

IBM System x3400 Types 7973, 7974, 7975, and 7976

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

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Industry Canada Class A emission compliance statement

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Avis de conformité à la réglementation d'Industrie Canada

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

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

United Kingdom telecommunications safety requirement

Notice to Customers

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

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Taiwanese Class A warning statement

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Chinese Class A warning statement

聲 明
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