



# System x3350

Types 4192 and 4193

## Installation Guide

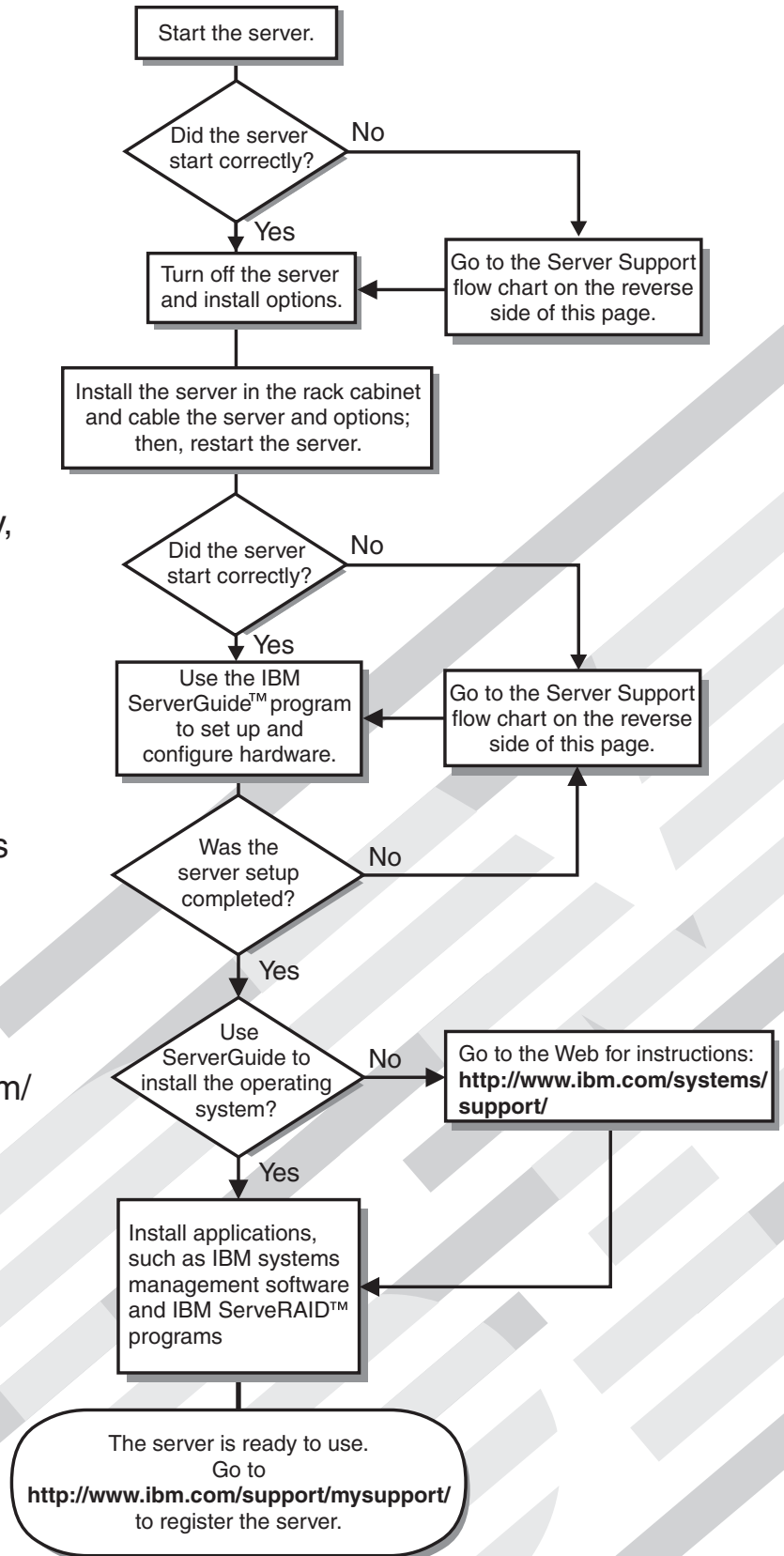
### Welcome.

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

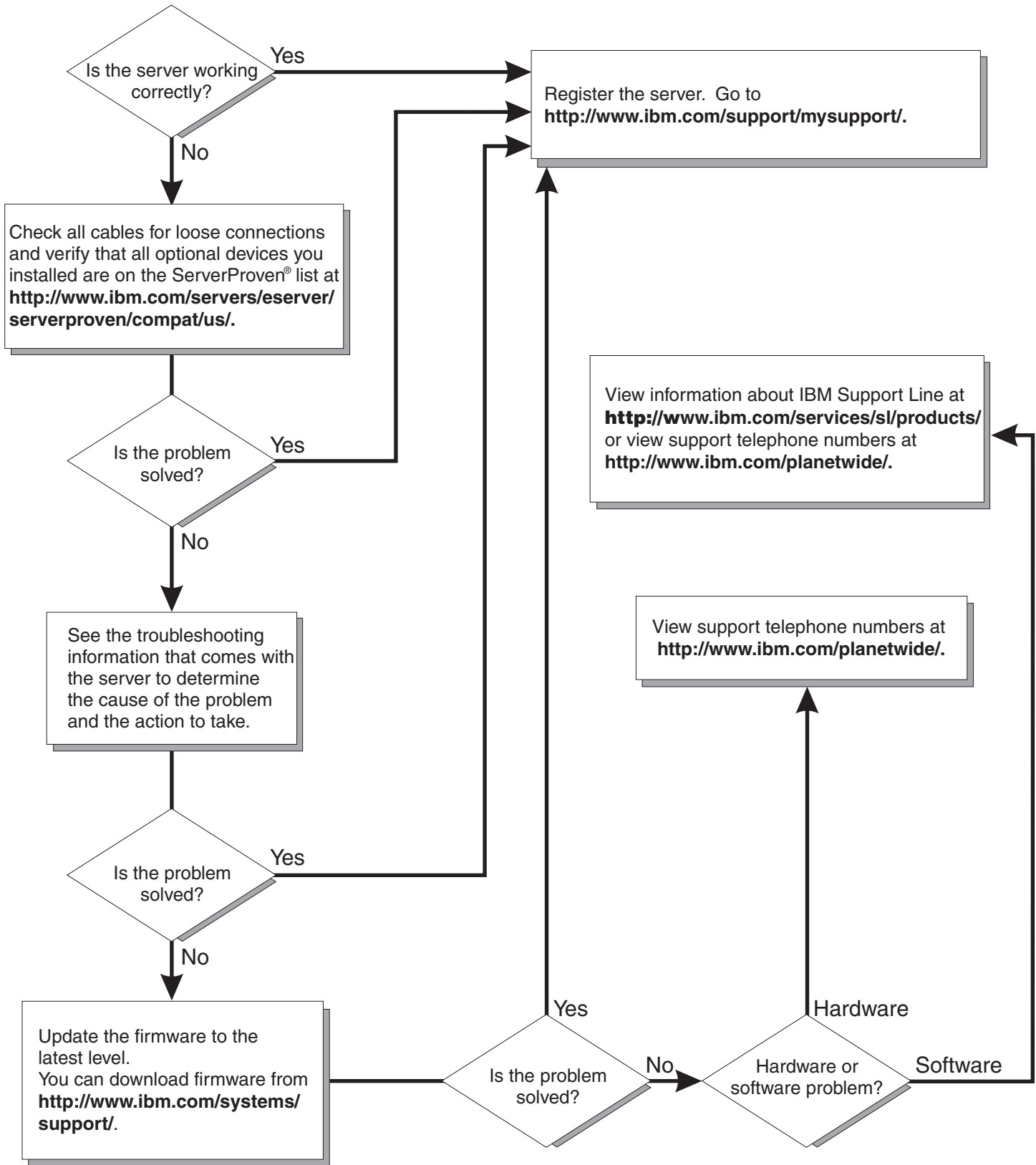
This server *Installation Guide* contains information for setting up and configuring your server.

For detailed information about your server, view the publications on the *IBM System x Documentation CD*.

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



# Server Support



IBM System x3350 Types 4192 and 4193



# Installation Guide

**Note:** Before using this information and the product it supports, read the general information in Appendix B, "Notices," on page 57 and the *Warranty and Support Information* document on the IBM *System x 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.

在安裝本產品之前，請仔細閱讀 **Safety Information** (安全信息)。

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

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

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

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

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

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

A termék telepítése előtt olvassa el a Biztonsági előírásokat!

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

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

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

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

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

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

Перед установкой продукта прочтите инструкции по технике безопасности.

Pred inštaláciou tohto zariadenia si 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:**

Each caution and danger statement in this document is labeled with a number. This number is used to cross reference an English-language caution or danger statement with translated versions of the caution or danger statement in the *Safety Information* document.

For example, if a caution statement is labeled "Statement 1", translations for that caution statement are in the *Safety Information* document under "Statement 1."

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



**Statement 1:**



**DANGER**

**Electrical current from power, telephone, and communication cables is hazardous.**

**To avoid a shock hazard:**

- **Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.**
- **Connect all power cords to a properly wired and grounded electrical outlet.**
- **Connect to properly wired outlets any equipment that will be attached to this product.**
- **When possible, use one hand only to connect or disconnect signal cables.**
- **Never turn on any equipment when there is evidence of fire, water, or structural damage.**
- **Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.**
- **Connect and disconnect cables as described in the following table when installing, moving, or opening covers on this product or attached devices.**

**To Connect:**

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**

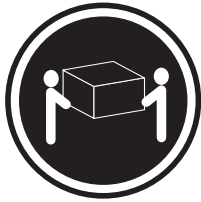
Some laser products contain an embedded Class 3A or Class 3B laser diode. Note the following.

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

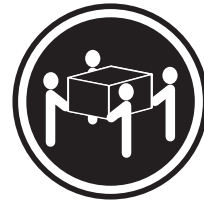
**Statement 4:**



≥ 18 kg (39.7 lb.)



≥ 32 kg (70.5 lb.)



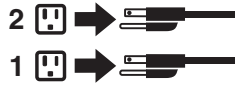
≥ 55 kg (121.2 lb.)

**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 6:**



**CAUTION:**

Do not place any objects on top of a rack-mounted device unless that rack-mounted device is intended for use as a shelf.

**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 12:**



**CAUTION:**

The following label indicates a hot surface nearby.



**Statement 26:**



**CAUTION:**

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



# Chapter 1. Introduction

This *Installation Guide* contains instructions for setting up your IBM® System x3350 Type 4192 or 4193 server and basic instructions for installing some optional devices. More detailed instructions for installing optional devices are in the *User's Guide* on the IBM System x™ Documentation CD, which comes with the server. This document contains information about:

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

If firmware and documentation updates are available, you can download them from the IBM Web site. The server might have features that are not described in the documentation that comes with the server, and the documentation might be updated occasionally to include information about those features, or technical updates might be available to provide additional information that is not included in the server documentation. To check for updates, complete the following steps:

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

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

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.

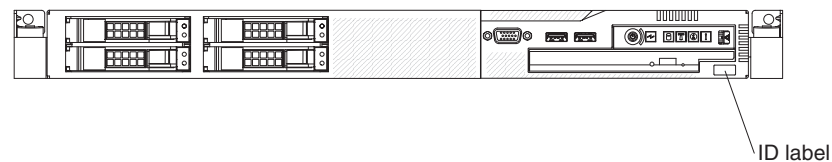
The server comes with a limited warranty. You can obtain up-to-date information about the server and other IBM server products at <http://www.ibm.com/systems/x/>.

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

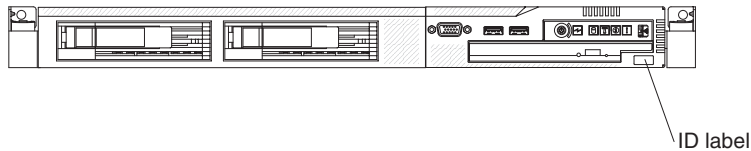
<b>Product name</b>	IBM System x3350 server
<b>Machine type</b>	4192 or 4193
<b>Model number</b>	_____
<b>Serial number</b>	_____

The model number and serial number are on the ID label on the front of the server, as shown in the following illustration.

The following illustration shows a 2.5-inch hard disk drive server model.



The following illustration shows a hot-swap or simple-swap 3.5-inch hard disk drive server model.



Throughout this documentation, the terms *2.5-inch models* and *3.5-inch models* are used to distinguish between the server models.

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

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

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## The IBM System x Documentation CD

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

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

### 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 or DVD drive. The Documentation Browser starts automatically.
- If Autostart is disabled or is not enabled for all users, use one of the following procedures:
  - If you are using a Windows operating system, insert the CD into the CD or DVD drive and click **Start --> Run**. In the **Open** field, type  
`e:\win32.bat`

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



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

```
sh runlinux.sh
```

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

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

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

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

---

## Notices and statements in this document

The caution and danger statements in this document are also in the multilingual *Safety Information* document, which is on the IBM *System x Documentation* CD. Each statement is numbered for reference to the corresponding statement in the *Safety Information* document.

The following notices and statements are used in this document:

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

---

## Features and specifications

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

Table 1. Features and specifications

<p><b>Microprocessor:</b></p> <ul style="list-style-type: none"> <li>• Supports one Intel® Xeon™ dual-core or quad-core microprocessor</li> <li>• 4 MB or 8 MB Level-2 cache</li> <li>• 1066 or 1333 MHz front-side bus (FSB)</li> </ul> <p><b>Note:</b> Use the Configuration/Setup Utility Program to determine the type and speed of the microprocessor.</p> <p><b>Memory:</b></p> <ul style="list-style-type: none"> <li>• Minimum: 1 GB</li> <li>• Maximum: 8 GB</li> <li>• Type: PC2-5300, dual-data-rate 2 (DDR2), unbuffered, error correcting code (ECC) DIMMs with a minimum data transfer rate of 667 MHz</li> <li>• Slots: Four dual inline</li> <li>• Supports 512 MB, 1 GB, and 2 GB DIMMs</li> </ul> <p><b>Drives:</b></p> <ul style="list-style-type: none"> <li>• CD-RW/DVD combo: IDE</li> <li>• Multi-burner Ultrabay Enhanced (optional)</li> </ul> <p><b>Expansion bays (depending on model):</b></p> <ul style="list-style-type: none"> <li>• Hot-swap hard disk drive bays: One of the following configurations: <ul style="list-style-type: none"> <li>– Two 3.5-inch drive bays (SAS or SATA)</li> <li>– Four 2.5-inch drive bays (SAS)</li> </ul> </li> <li>• Simple-swap disk drive bays: Two 3.5-inch drive bays (SATA)</li> </ul> <p><b>PCI Expansion slots:</b></p> <p>Two PCI Express x8 (full height, half length) slots. Each slot requires a PCI riser card.</p> <p><b>Power supply:</b></p> <p>Maximum of two redundant 450-watt (100 - 240V ac auto-sensing) hot-swap power supplies</p>	<p><b>Hot-swap fans:</b></p> <p>Standard: four</p> <p><b>Size:</b></p> <ul style="list-style-type: none"> <li>• Height: 43 mm (1.69 inches, 1 U)</li> <li>• Depth: 711 mm (28 inches)</li> <li>• Width: 440 mm (17.3 inches)</li> <li>• Maximum weight: 15.6 kg (34 lb) when fully configured</li> </ul> <p><b>Integrated functions:</b></p> <ul style="list-style-type: none"> <li>• Two Broadcom 5722 multi-speed, single-port GB Ethernet controller with Wake on LAN® support</li> <li>• Four Universal Serial Bus (USB) 2.0 ports (two front and two rear)</li> <li>• One Advanced System Management RJ-45 port (active only when a Remote Supervisor Adapter II SlimLine is installed)</li> <li>• One serial port</li> <li>• Serial ATA (SATA) controller without RAID (simple-swap SATA models)</li> <li>• Serial-attached SCSI (SAS) controller with integrated RAID (hot-swap SAS/SATA models)</li> </ul> <p><b>Acoustical noise emissions:</b></p> <ul style="list-style-type: none"> <li>• Sound power, idling: 6.5 bels maximum</li> <li>• Sound power, operating: 6.5 bels maximum</li> </ul> <p><b>Environment:</b></p> <ul style="list-style-type: none"> <li>• Air temperature: <ul style="list-style-type: none"> <li>– Server on: 10° to 35°C (50.0° to 95°F); altitude: 0 to 914.4 m (7000 ft)</li> <li>– Server on: 10° to 32°C (50.0° to 89.6°F); maximum altitude: 2133.6 m (7000 ft)</li> <li>– Server off: 10° to 43°C (50.0° to 109.4°F); maximum altitude: 2133.6 m (7000 ft)</li> <li>– Shipping -40° to 60°C (-40° to 140°F); maximum altitude: 2133.6 m (7000 ft)</li> </ul> </li> <li>• Humidity: <ul style="list-style-type: none"> <li>– Server on: 8% to 80%</li> <li>– Server off: 8% to 80%</li> </ul> </li> </ul>	<p><b>Heat output:</b></p> <p>Approximate heat output in British thermal units (Btu) per hour:</p> <ul style="list-style-type: none"> <li>• Minimum configuration: 396 Btu per hour (116 watts)</li> <li>• Maximum configuration: 1365 Btu per hour (400 watts)</li> </ul> <p><b>Electrical input:</b></p> <ul style="list-style-type: none"> <li>• Sine-wave input (50 - 60 Hz) required</li> <li>• Input voltage low range: <ul style="list-style-type: none"> <li>– Minimum: 100 V ac</li> <li>– Maximum: 127 V ac</li> </ul> </li> <li>• Input voltage high range: <ul style="list-style-type: none"> <li>– Minimum: 200 V ac</li> <li>– Maximum: 240 V ac</li> </ul> </li> <li>• Input kilovolt-amperes (kVA), approximately: <ul style="list-style-type: none"> <li>– Minimum: 0.116 kVA</li> <li>– Maximum: 0.400 kVA</li> </ul> </li> </ul> <p><b>Video controller (integrated):</b></p> <ul style="list-style-type: none"> <li>• ATI Radeon ATI ES 1000 (dual ports - front and rear)</li> <li>• Flexible memory support <ul style="list-style-type: none"> <li>– 16 MB video memory</li> <li>– DDR2 SDRAM</li> </ul> </li> </ul> <p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. Power consumption and heat output vary depending on the number and type of optional features that are installed and the power-management optional features in use.</li> <li>2. These levels were measured in controlled acoustical environments according to the procedures that are specified by C-S 1-1710-008 (8803) "Acoustical Noise Measurement on IBM Products - sound power and pressure level" and are reported in accordance with C-S-1710-024 (8803). Actual sound-pressure levels in a given location might exceed the average stated values 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.</li> </ol>
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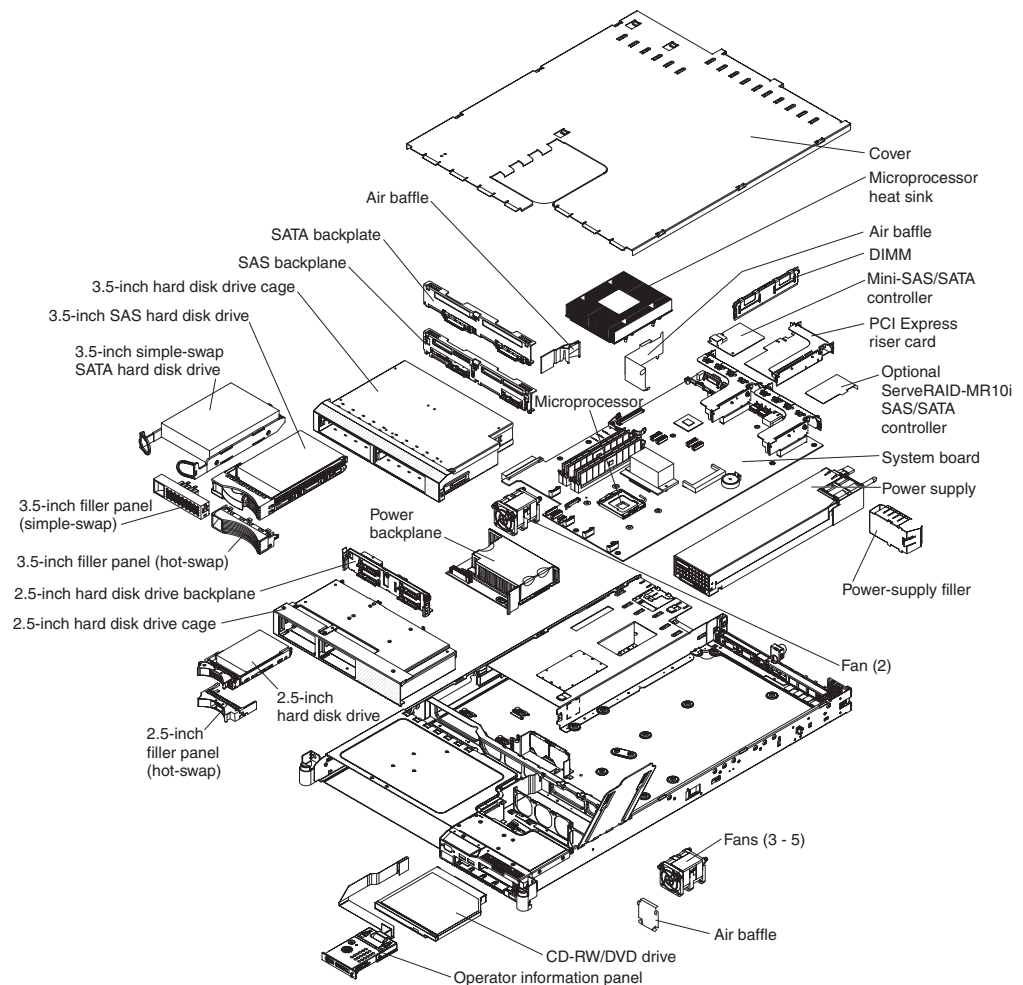
## Major components of the server

Blue on a component indicates touch points, where you can grip the component to remove it from or install it in the server, open or close a latch, and so on.

Orange on a component or an orange label on or near a component indicates that the component can be hot-swapped, which means that if the server and operating system support hot-swap capability, you can remove or install the component while the server is running. (Orange can also indicate touch points on hot-swap components.) See the instructions for removing or installing a specific hot-swap component for any additional procedures that you might have to perform before you remove or install the component.

The following illustration shows the major components in the server.

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



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



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## Chapter 2. Installing optional devices

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

---

### Installation guidelines

Before you install optional devices, 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 8, and “Handling static-sensitive devices” on page 9. This information will help you work safely.
- When you install your new server, take the opportunity to download and apply the most recent firmware updates. This step will help to ensure that any known issues are addressed and that your server is ready to function at maximum levels of performance. To download firmware updates for your server, complete the following steps.

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

1. Go to <http://www.ibm.com/systems/support/>.
2. Under **Product support**, click **System x**.
3. Under **Popular links**, click **Software and device drivers**.
4. Click **System x3350** to display the matrix of downloadable files for the server.

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

- Before you install optional hardware devices, make sure that the server is working correctly. Start the server, and make sure that the operating system starts, or if an operating system is installed. If the server is not working correctly, see Chapter 5, “Solving problems,” on page 33 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 server 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 and a small Phillips screwdriver available.

- You do not have to turn off the server to install or replace hot-swap power supplies, hot-swap fans, hot-swap drives, or hot-plug Universal Serial Bus (USB) devices. However, you must turn off the server before you perform any steps that involve removing or installing adapter cables or non-hot-swap optional devices or components.
- Blue on a component indicates touch points, where you can grip the component to remove it from or install it in the server, open or close a latch, and so on.
- Orange on a component or an orange label on or near a component indicates that the component can be hot-swapped, which means that if the server and operating system support hot-swap capability, you can remove or install the component while the server is running. (Orange can also indicate touch points on hot-swap components.) See the instructions for removing or installing a specific hot-swap component for any additional procedures that you might have to perform before you remove or install the component.
- When you are finished working on the server, reinstall all safety shields, guards, labels, and ground wires.
- For a list of supported optional devices for the server, see <http://www.ibm.com/servers/eserver/serverproven/compat/us/>.

## System reliability guidelines

To help ensure proper 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.
- If the server has redundant power, each of the power-supply bays has a power supply installed in it.
- There is adequate space around the server to allow the server cooling system to work properly. Leave approximately 50 mm (2.0 in.) of open space around the front and rear of the server. Do not place objects in front of the fans. For proper cooling and airflow, replace the server cover before you turn on the server.
- You have followed the cabling instructions that come with optional adapters.
- You have replaced a failed fan within 48 hours.
- You have replaced a hot-swap drive within 2 minutes of removal.
- You do not operate the server without the air baffles installed. Operating the server without the air baffles might cause the microprocessor to overheat.
- For redundant operation, the power supplies are connected to 200 - 240 V ac.

## 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 might 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 supports hot-plug, hot-add, and hot-swap devices and is designed to operate safely while it is turned on and the server 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 you work inside the server; do not wear cuff links while you are working inside the server.
- Do not allow your necktie or scarf to hang inside the server.

- Remove jewelry, such as bracelets, necklaces, rings, and loose-fitting wrist watches.
- Remove items from your shirt pocket, such as pens and pencils, that could fall into the server as you lean over it.
- Avoid dropping any metallic objects, such as paper clips, hairpins, and screws, into the server.

## Handling static-sensitive devices

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

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

- Limit your movement. Movement can cause static electricity to build up around you.
- The use of a grounding system is recommended. For example, wear an electrostatic-discharge wrist strap, if one is available. Always use an electrostatic-discharge wrist strap or other grounding system when you work 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 you handle devices during cold weather. Heating reduces indoor humidity and increases static electricity.

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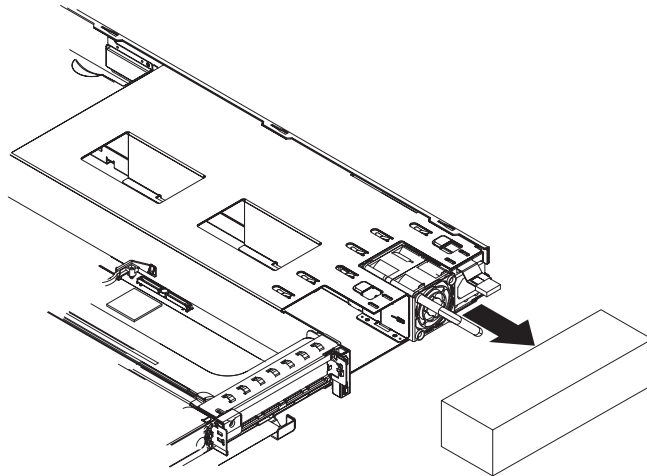
## Removing the server cover

**Important:** Before you install optional hardware devices, make sure that the server is working correctly. Start the server, and make sure that the operating system starts, or if an operating system is installed. If the server is not working correctly, see Chapter 5, “Solving problems,” on page 33 for diagnostic information.

To remove the server cover, complete the following steps:

1. Read the safety information that begins on page v and “Installation guidelines” on page 7.
2. Remove the protective power-supply cover from the back of the server.

**Note:** The server comes with this protective cover over both power-supply openings.

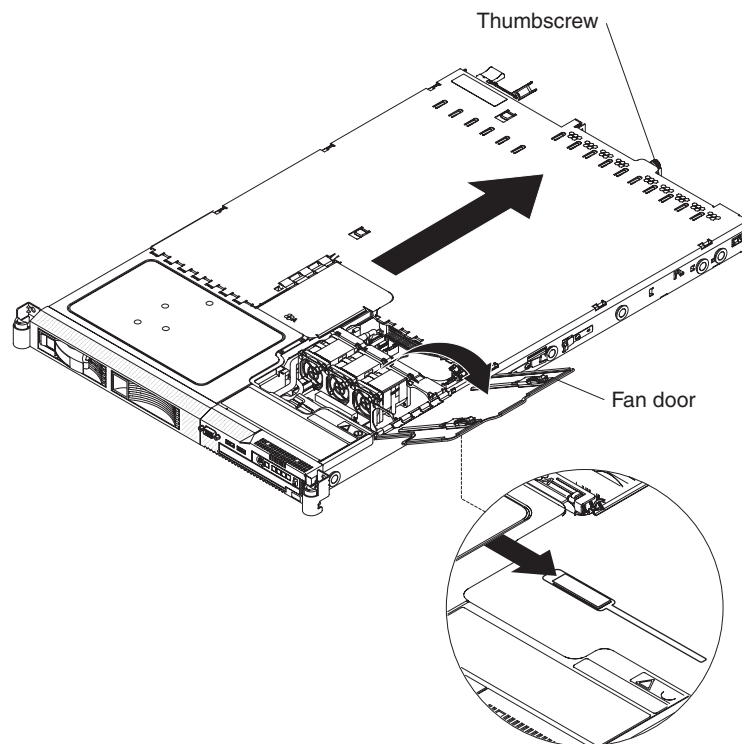


Pull the cover straight back and off the power supplies; then, remove it and store it in a safe place.

3. If you are planning to install or remove a memory module, PCI adapter, battery, or other non-hot-swap optional device, turn off the server and all attached devices and disconnect all external cables and power cords (see “Turning off the server” on page 24).
4. Press down on the left and right side latches and pull the server out of the rack enclosure until both slide rails lock.

**Note:** You can reach the cables on the back of the server when the server is in the locked position.

5. Loosen the thumbscrew at the back of the server.



6. Slide the two cover-release latches on the fan door on the right side of the top of the server back; then, open the fan door cover.



7. Slide the server cover back until the locking tabs release.
8. Lift the server cover off the server and set the cover aside.

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

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## Installing a hard disk drive

The following notes describe the type of hard disk drives that the server supports and other information that you must consider when you install a hard disk drive. For a list of supported hard disk drives, see <http://www.ibm.com/servers/eserver/serverproven/compat/us/>.

**Attention:** To avoid damage to the hard disk drive connectors, make sure that the cover is in place and fully closed whenever you install or remove a hard disk drive.

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

The server supports one of the following hard disk drive configurations:

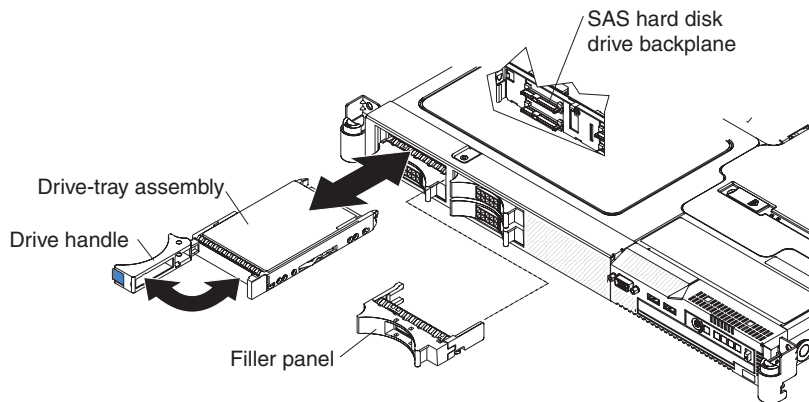
- Do not use both SAS and SATA drives in the same array.
- The 2.5-inch server models support four hot-swap SAS hard disk drives. You can install only 2.5-inch hot-swap SAS drives in these servers.
- The 3.5-inch server models support two hot-swap SAS or hot-swap SATA hard disk drives. You can install only 3.5-inch hot-swap SAS or hot-swap SATA drives in these servers.
- The simple-swap server models support two 3.5-inch simple-swap SATA hard disk drives. You can install only 3.5-inch simple-swap SATA drives in these servers.
- All hot-swap drives in the server should have the same throughput speed rating. Using hard disk drives with different speed rating will cause all drives to operate at the throughput speed of the slowest drive.

## Installing a hot-swap hard disk drive

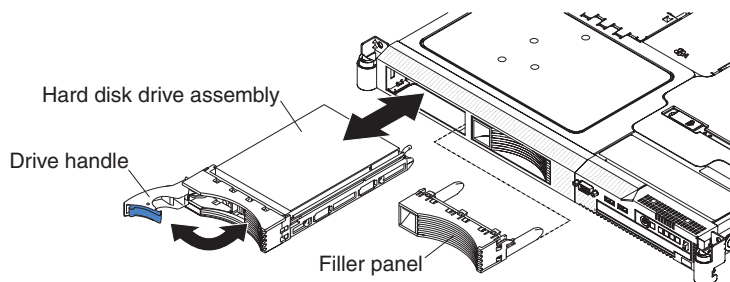
To install a 2.5-inch or 3.5-inch hard disk drive, complete the following steps.

**Note:** If you have only one hard disk drive, you must install it in the left or upper-left bay.

The following illustration shows the 2.5-inch hard disk drive server model.



The following illustration shows the 3.5-inch hard disk drive server model.



1. Read the safety information that begins on page v and “Installation guidelines” on page 7.
2. Remove the filler panel from the empty drive bay.
3. Install the hard disk drive in the drive bay:
  - a. Make sure that the tray handle is open (that is, horizontal to the drive).
  - b. Align the drive assembly with the guide rails in the bay.
  - c. Gently push the drive assembly into the bay until the drive stops.
  - d. Push the tray handle to the closed (locked) position.
  - e. Check the hard disk drive status LED to verify that the hard disk drive is operating correctly. If the amber hard disk drive status LED for a drive is lit continuously, that drive is faulty and must be replaced. If the green hard disk drive activity LED is flashing, the drive is being accessed.

If the server has a RAID controller or adapter, you might have to reconfigure the disk array after you install hard disk drives. See your RAID controller documentation.

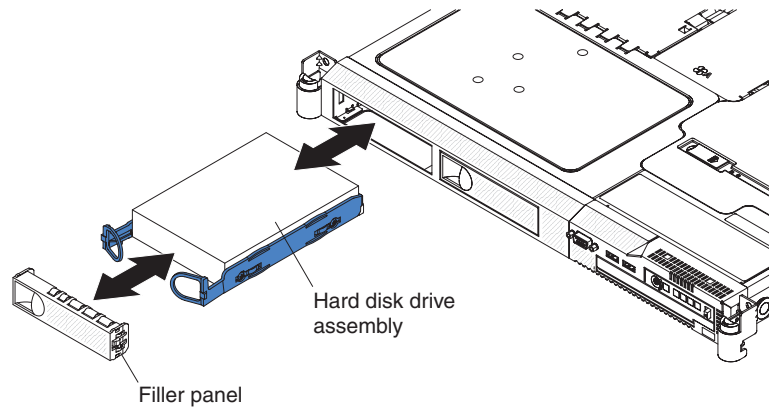
If you have other devices to install, do so now. Otherwise, go to “Completing the installation” on page 17.

## Installing a simple-swap hard disk drive

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

To install a 3.5-inch SATA simple-swap hard disk drive, complete the following steps.

**Note:** If you have only one hard disk drive, you must install it in the left drive bay.



1. Read the safety information that begins on page v and “Installation guidelines” on page 7.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.
3. Remove the filler panel from the empty drive bay.
4. Pull the loops of the tray toward each other and slide the drive into the server until the drive connects to the backplate.
5. Release the loops of the drive tray.
6. Install the filler panel into the drive bay to cover the drive.

If the server has a RAID controller or adapter, you might have to reconfigure the disk array after you install hard disk drives. See your RAID controller documentation.

If you have other devices to install, do so now. Otherwise, go to “Completing the installation” on page 17.

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## Installing an adapter

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

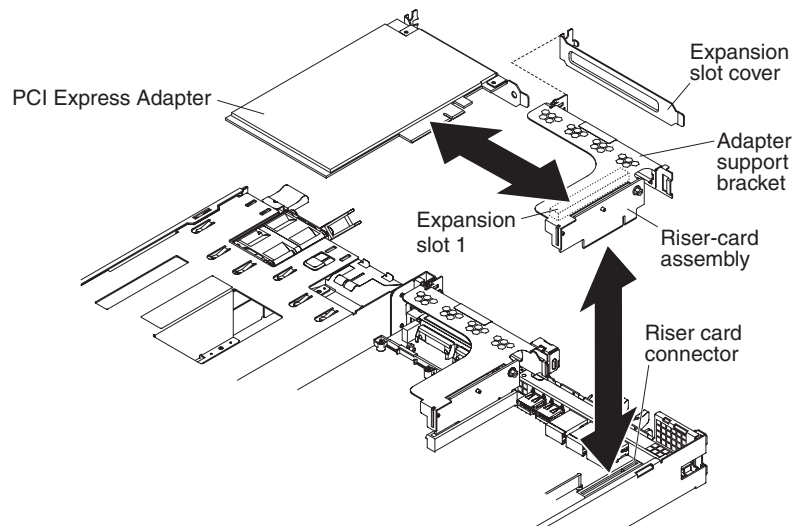
- Locate the documentation that comes with the adapter and follow those instructions in addition to the instructions in this section. If you must change the switch settings or jumper settings on the adapter, follow the instructions that come with the adapter.
- The adapter slots are on the riser-card assemblies. You must first remove the riser-card assemblies to access the adapter slots.
- The server provides two PCI Express slots on the riser-card assemblies and supports half-length, full-height, PCI Express x8 1.0a adapters in each expansion slot.
- The server scans the onboard SAS/SATA controller, PCI express slots 1 and 2, and onboard Ethernet controllers 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, then PCI Express slot 2.

**Note:** You can change the sequence in which the server starts (boots) the devices by 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 optional devices 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 the “Installation guidelines” on page 7.
2. Turn off the server and peripheral devices and disconnect the power cords and all external cables. Remove the cover (see “Removing the server cover” on page 9).



3. Grasp the riser-card assembly at the rear edge and lift to remove it from the server. Place the riser-card assembly on a flat, static-protective surface.
4. Remove the expansion-slot cover from the slot that you intend to use.  
**Attention:** PCI expansion-slot covers must be installed on all vacant slots. This maintains the electronic emissions characteristics of the server and ensures proper cooling of server components.
5. Route the adapter cables, if any, before you install the adapter. Route the cables so that they are not on top of components or blocking the airflow from the fans
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. Set any jumpers or switches on the adapter as directed by the adapter manufacturer.
8. Insert the adapter into the riser-card assembly, aligning the connector on the adapter with the connector on the riser-card assembly. Press the adapter connector *firmly* into the riser-card connector. Make sure that the adapter snaps securely into the riser-card assembly.
9. Insert the riser-card assembly into the riser-card connector on the system board. Then, press down on the assembly. Make sure that the riser-card assembly is fully seated in the riser-card connector on the system board.
10. Connect the cables to the adapter.
11. Perform any configuration tasks that are required for the adapter.

If you have other devices to install, do so now. Otherwise, go to “Completing the installation” on page 17.

## Installing a memory module (DIMM)

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

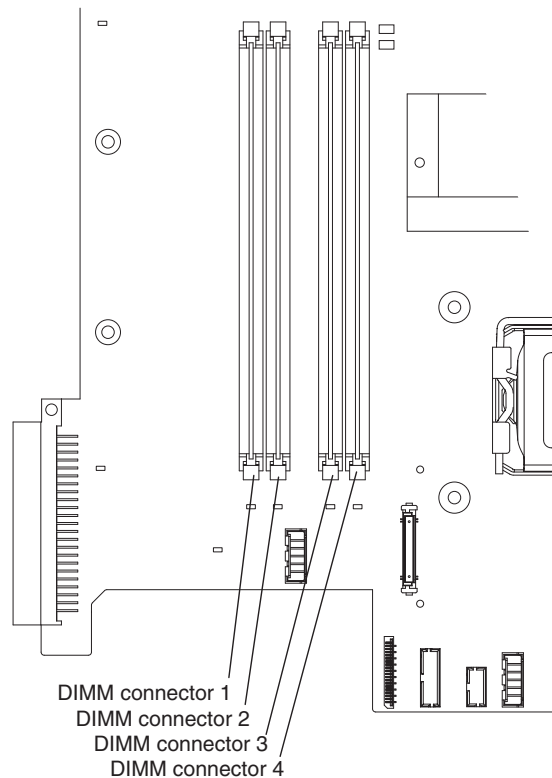
- The server supports up to four unbuffered, PC2-5300, 512 MB, 1 GB, and 2 GB DIMMs, for a maximum of 8 GB of system memory. See <http://www.ibm.com/servers/eserver/serverproven/compat/us/> for a list of memory modules that you can use with the server.

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

- The server comes with a minimum of two 512 MB DIMMs or two 1 GB DIMMs, installed in connectors 1 and 3 or connectors 2 and 4. When you install additional DIMMs, you must install two identical DIMMs at a time, in the order shown in the following table, to maintain performance.

Table 2. DIMM installation sequence

DIMMS	DIMM connectors
2 DIMMs	1 and 3
4 DIMMs	1, 3, 2, and 4



- Each DIMM in a pair must be the same size, speed, type, and technology to ensure that the server will operate correctly.
- If you install a second pair of DIMMs in the DIMM 2 and DIMM 4 connectors, they do not have to be the same size, speed, type, and technology as the

DIMMs in the DIMM 1 and DIMM 3 connectors. However, the size, speed, type, and technology of the DIMMs that you install in the DIMM 2 and DIMM 4 connectors must match each other.

- The server can operate in single channel mode or dual channel mode.
- DIMM population is based on single-rank, double-rank, or mix single-rank and double-rank DIMMs. DIMMs must be installed in order, starting with the DIMM connector that is farthest from the memory controller hub. Double-rank DIMMs must be installed in the DIMM connector that is farthest from the memory controller hub when you install a combination of single-rank and double-rank DIMMs. The following tables show examples of populating the server with different combinations of single-rank and double-rank DIMMs.

*Table 3. Interleave Mode DIMM slot population*

First pair		Second pair		Remarks
DIMM 1	DIMM 3	DIMM 2	DIMM 4	
Single-rank	Single-rank	Single-rank	Single-rank	
Single-rank	Single-rank	Double-rank	Double-rank	Recommend this configuration as the first choice.
Double-rank	Double-rank	Single-rank	Single-rank	Recommend this configuration as the second choice.
Double-rank	Double-rank	Double-rank	Double-rank	

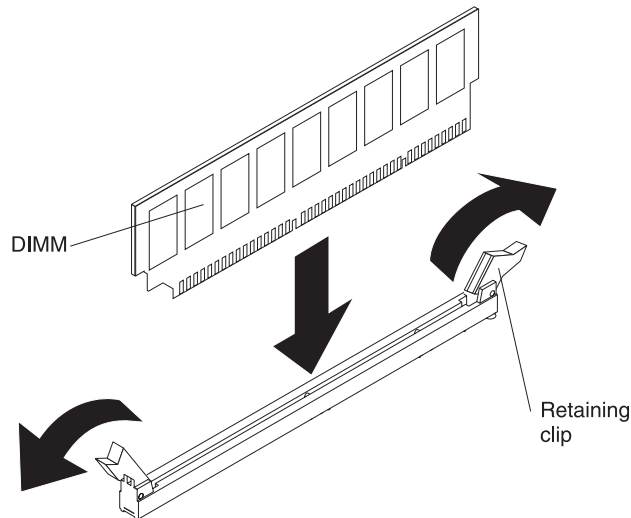
- When you install or remove DIMMs, the server configuration information changes. When you restart the server, the system displays a message that indicates that the memory configuration has changed.

To install a DIMM, complete the following steps:

1. Read the safety information that begins on page v and “Installation guidelines” on page 7.
2. Turn off the server and peripheral devices and disconnect the power cords and all external cables. Remove the cover (see “Removing the server cover” on page 9).

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

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



4. Touch the static-protective package that contains the DIMM to any unpainted metal surface on the outside of the server. Then, remove the DIMM from the package.
5. Turn the DIMM so that the DIMM keys align correctly with the connector.
6. Insert the DIMM into the connector by aligning the edges of the DIMM with the slots at the ends of the DIMM connector.
7. Firmly press the DIMM straight down into the connector by applying pressure on both ends of the DIMM simultaneously. The retaining clips snap into the locked position when the DIMM is firmly seated in the connector.

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

If you have other devices to install, do so now. Otherwise, go to “Completing the installation”

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## Completing the installation

To complete the installation, complete the following steps:

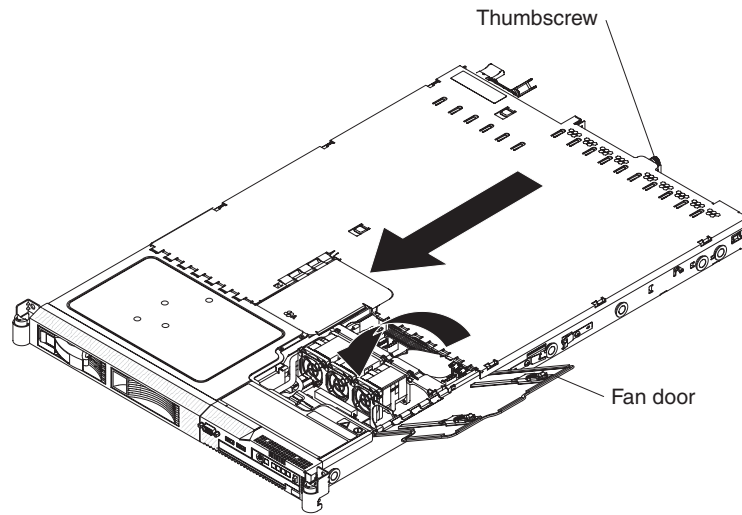
1. If you removed the server cover, replace it and close the fan doors. For more information, see “Replacing the server cover.”
2. Slide the server back into the rack. If you removed the server from the rack, see the *Rack Installation Instructions* that come with the server for complete rack installation instructions.
3. Connect the cables and power cords. For more information, see “Connecting the cables” on page 18.
4. Update the server configuration. See “Updating the server configuration” on page 19 for more information.

## Replacing the server cover

To replace the server cover, complete the following steps:

1. Slide the cover forward, making sure that all the tabs on the front, rear, and side of the cover engage the chassis correctly.
2. Close the fan door and slide the cover release latches back to lock the cover in place.

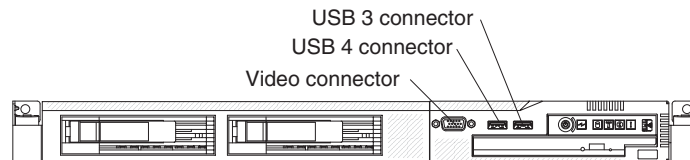
3. Tighten the thumbscrew at the back of the server.



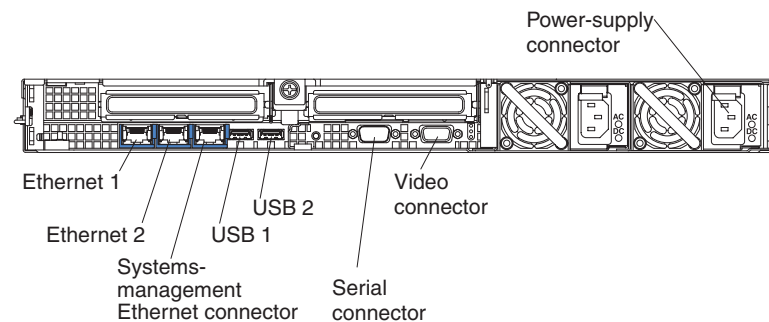
## Connecting the cables

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

### Front View



### Rear View

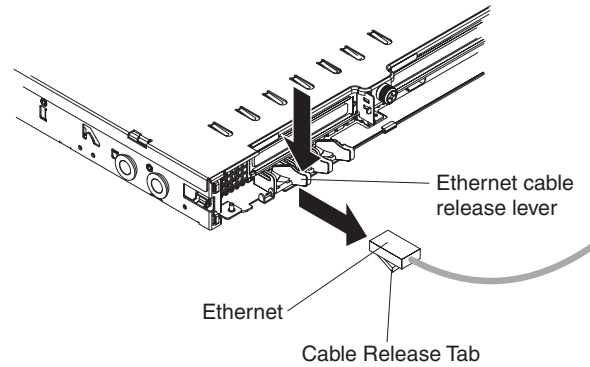


**Attention:** You must turn off the server before you connect or disconnect cables.

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

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





**Note:** There are release levers on the Ethernet and systems management connectors. To disconnect a cable from one of these connectors, pull up on the lever to release the cable.

## Updating the server configuration

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

Some optional devices have device drivers that you must install. For information about installing device drivers, see the documentation that comes with each device.

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

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

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

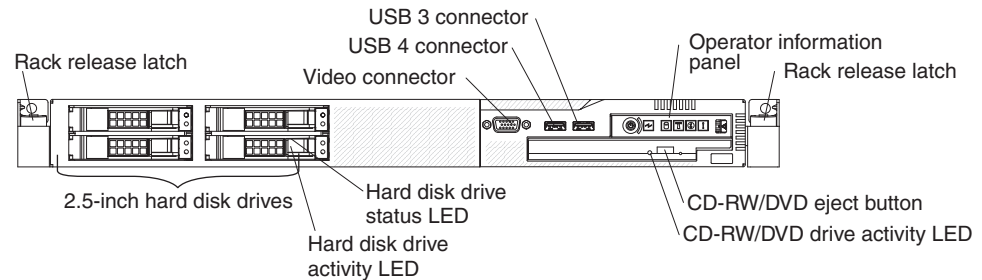


## Chapter 3. Server controls, LEDs, connectors, and power

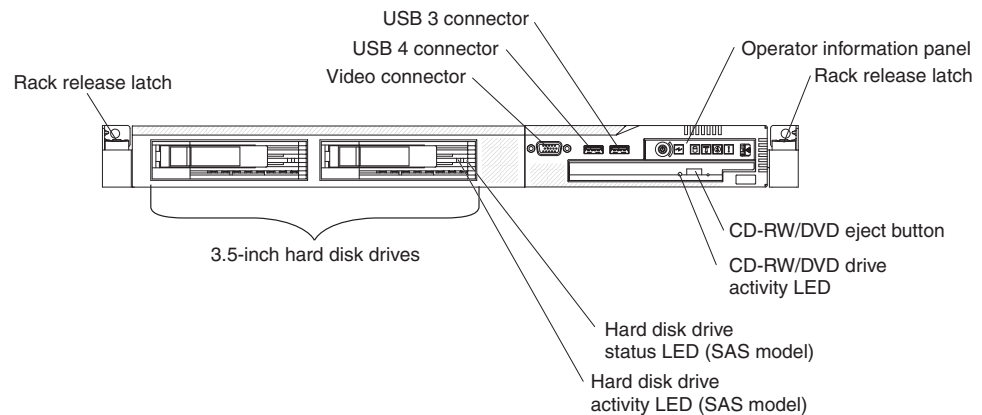
This section describes the controls and light-emitting diodes (LEDs) and how to turn the server on and off.

### Front view

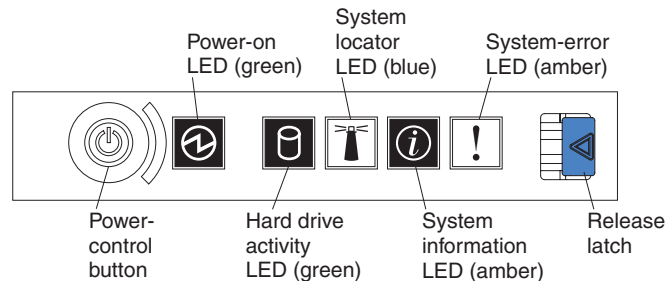
The following illustration shows the controls, LEDs, and connectors on the front of the 2.5-inch server model.



The following illustration shows the controls, LEDs, and connectors on the front of the 3.5-inch server model.



- The following illustration shows the operator information panel. This panel contains controls and LEDs that indicate the status of the server.



- **Power-control button:** Press this button to turn the server on and off manually.

**Note:** The server can also be turned on or off by a command to the BMC. For more information about using this feature of the BMC, see the *User's Guide* on the IBM System x Documentation CD.

- **Power-on LED:** When this green LED is lit and not flashing, it indicates that the server is turned on. When this LED is flashing, it indicates that the server is turned off and is still connected to an ac power source. When this LED is off, it indicates that ac power is not present, or the power supply or the LED itself has failed. A power LED is also on the rear of the server.

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

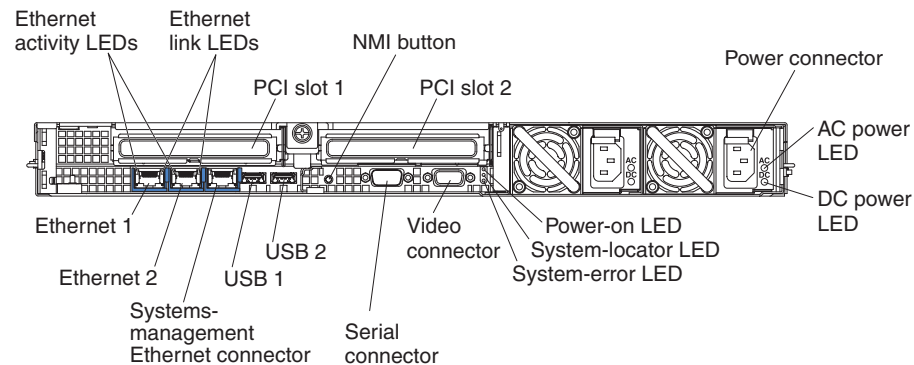
- **System locator LED:** Use this blue LED to visually locate the server if it is in a location with other servers. You can use IBM Director to light this LED remotely. This LED is controlled by the BMC.
- **System-error LED:** When this amber LED is lit, it indicates that a system error has occurred. A system-error LED is also on the rear of the server. An LED on the light path diagnostics panel on the system board is also lit to help isolate the error. This LED is controlled by the BMC.
- **Release Latch:** Press the release latch to the left to slide out the operator information panel and view the light path diagnostics panel. See the *Problem Determination and Service Guide* for more information about the light path diagnostics panel.
- **System information LED:** When this amber LED is lit, it indicates that a non-critical event has occurred. Check the error log for additional information. See the information about light path diagnostics in the *Problem Determination and Service Guide* for more information about error logs.
- **Hard drive activity LED:** When this green LED is lit, it indicates that one of the hard disk drives is in use.

**Notes:**

1. Hard disk drive activity LEDs for the SAS drives are in two places: on the hard disk drive and on the operator information panel.
  2. There is no hard disk drive activity LED on a SATA drive. The only hard disk drive activity LED is on the operator information panel.
- **Rack release latches:** Press the latches on each front side of the server to remove the server from the rack.
  - **Video connector:** Connect a monitor to this connector. The video connectors on the front and rear of the server can be used simultaneously.
  - **USB connectors:** Connect a USB device, such as a USB mouse, keyboard, or other device to any of these connectors.
  - **CD-RW/DVD eject button:** Press this button to release a DVD or CD from the CD/DVD drive.
  - **CD-RW/DVD drive activity LED:** When this LED is lit, it indicates that the CD-RW/DVD drive is in use.
  - **Hard disk drive status LED:** This LED is used on SAS hard disk drives. When this LED is lit, it indicates that the drive has failed.
  - **Hard disk drive activity LED:** This LED is used on SAS hard disk drives. Each hot-swap hard disk drive has an activity LED, and when this LED is flashing, it indicates that the drive is in use.

## Rear view

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



- **PCI slots 1 and 2:** Connect the PCI Express adapters to these connectors.
- **NMI button:** (For service only) This button can be used to generate a non-maskable interrupt (NMI) to the server.
- **Power connector:** Connect the power cord to this connector.
- **AC power LED:** Each hot-swap power supply has an ac power LED and a dc power LED. When the ac power LED is lit, it indicates that sufficient power is coming into the power supply through the power cord. 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 x Documentation CD.
- **DC power LED:** Each hot-swap power supply has a dc power LED and an ac power LED. When the dc power LED is lit, it indicates that the power supply is supplying adequate dc power to the system. 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 x Documentation CD.
- **System-error LED:** When this LED is lit, it indicates that a system error has occurred. An LED on the light path diagnostics panel is also lit to help isolate the error.
- **Power-on LED:** When this LED is lit and not flashing, it indicates that the server is turned on. When this LED is flashing, it indicates that the server is turned off and still connected to an ac power source. When this LED is off, it indicates that ac power is not present, or the power supply or the LED itself has failed.
- **System-locator LED:** Use this LED to visually locate the server among other servers. You can use IBM Director to light this LED remotely.
- **Video connector:** Connect a monitor to this connector. The video connectors on the front and rear of the server can be used simultaneously.
- **Serial connector:** Connect a 9-pin serial device to this connector. The serial port is shared with the baseboard management controller (BMC). The BMC can take control of the shared serial port to perform text console redirection and to redirect serial traffic, using Serial over LAN (SOL).
- **USB connectors:** Connect a USB device, such as a USB mouse, keyboard, or other device to any of these connectors.
- **Systems-management Ethernet connector:** Use this connector to connect the server to a network for systems-management information control. This connector is active only if you have installed a Remote Supervisor Adapter II SlimLine, and it is used only by the Remote Supervisor Adapter II SlimLine.

- **Ethernet activity LEDs:** When these LEDs are lit, they indicate that the server is transmitting to or receiving signals from the Ethernet LAN that is connected to the Ethernet port.
- **Ethernet link LEDs:** When these LEDs are lit, they indicate that there is an active link connection on the 10BASE-T, 100BASE-TX, or 1000BASE-TX interface for the Ethernet port.
- **Ethernet connectors:** Use either of these connectors to connect the server to a network.

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## Server power features

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

### Turning on the server

Approximately 20 seconds after the server is connected to ac power, the power-control button becomes active, and one or more fans might start running to provide cooling while the server is connected to power. You can turn on the server and start the operating system by pressing the power-control button.

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

- If a power failure occurs while the server is turned on, the server will restart automatically when power is restored.
- If you installed an optional Remote Supervisor Adapter II SlimLine, the server can be turned on from the Remote Supervisor Adapter II SlimLine user interface.
- If your operating system supports the Wake on LAN feature, the Wake on LAN feature can turn on the server.

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

### Turning off the server

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

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

**Statement 5:**



**CAUTION:**

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



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

- You can turn off the server from the operating system, if your operating system supports this feature. After an orderly shutdown of the operating system, the server will turn 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, the server can be turned off from the Remote Supervisor Adapter II SlimLine user interface.
- The baseboard management controller can turn off the server as an automatic response to a critical system failure.





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## Chapter 4. Configuring the server

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

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

- Configuration/Setup utility program
- LSI Logic Configuration Utility program
- Baseboard management controller utility programs
- 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 x Documentation* CD.

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### Using the ServerGuide Setup and Installation CD

The *ServerGuide Setup and Installation* CD provides programs to detect the server model and installed optional hardware devices, configure the server hardware, provide device drivers, and help you install the operating system. For information about the supported operating-system versions, see the label on the CD. If the *ServerGuide Setup and Installation* CD did not come with the server, to download the latest version, go to <http://www.ibm.com/systems/management/serverguide/sub.html> and click **IBM Service and Support Site**.

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

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 48.
2. Follow the instructions on the screen to:
  - a. Select your language.
  - b. Select your keyboard layout and country.
  - c. View the overview to learn about ServerGuide features.
  - d. View the readme file to review installation tips about your operating system and adapter.
  - e. Start the setup and hardware configuration programs.
  - f. Start the operating-system installation. You will need your copy of the operating-system CD.

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## Using the Configuration/Setup Utility program

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

- View configuration information
- View and change assignments for devices and I/O ports
- Set the date and time
- Set and change passwords
- Set and change the startup characteristics of the server and the order of startup devices (startup-drive sequence)
- Set and change settings for advanced hardware features
- View and clear the error log
- Change interrupt request (IRQ) settings
- Resolve configuration conflicts

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 is displayed, 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 x Documentation CD for more information about using the Configuration/Setup Utility program.

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## Using the LSI Logic Configuration Utility program

Use the LSI Logic Configuration Utility program to configure and manage redundant array of independent disks (RAID) arrays of hot-swap disk drives.

**Important:** If the server is a simple-swap SATA model and you have installed an optional SATA RAID Kit, you can use the LSI Logic Configuration Utility program to configure the simple-swap SATA hard disk drives.

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

1. Turn on the server.
2. When the prompt Press Ctrl-C to start LSI Logic Configuration Utility is displayed, press Ctrl+C. If you have set an administrator password, you are prompted to type the password.
3. Use the arrow keys to select a controller (channel) from the list of adapters; then, press Enter.
4. To change the settings of the selected items, follow the instructions on the screen. If you select **Raid Properties**, **SAS Topology**, or **Advanced Adapter Properties** additional screens are displayed.

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

See the *User's Guide* on the IBM System x Documentation CD for more information about the LSI Logic Configuration Utility program.

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## Using the baseboard management controller

The baseboard management controller (BMC) provides environmental monitoring functions for the server. If an environmental condition exceeds 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 (CLI) provides direct access to server management functions through the IPMI 2.0 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.

See the *User's Guide* that is on the *IBM System x Documentation CD* for more information about the baseboard management controller.

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## Using the Boot Menu program

The Boot Menu program is a built-in, menu-driven configuration utility program that you can use to temporarily redefine the first startup device without changing settings in the 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. If a bootable USB mass storage device is installed, a submenu item **USB Key/Disk** is displayed.
4. Select a device from the **Select Boot Device** menu.
5. Select an option, and then select **Exit and continue booting**.

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

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## 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

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## Configuring the Broadcom Gigabit Ethernet controller

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

You do not have to set any jumpers or configure the controllers. However, you must install a device driver to enable the operating system to address the controllers. For device drivers and information about configuring the Ethernet controllers, see the *Broadcom NetXtreme II Gigabit Ethernet Software CD* that comes with the server. 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/systems/support/>
2. Under **Product support**, click **System x**.
3. Under **Popular links**, click **Software and device drivers**.
4. Click **IBM System x3350** to display the matrix of downloadable device driver files for the server.

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## 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/systems/management/downloads.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 IBM Director.
3. Download and install any applicable updates or interim fixes for the server:
  - a. Go to <http://www.ibm.com/systems/support/>.
  - b. Under **Product Support**, click **System x**.
  - c. Under **Popular links**, click **Software and device drivers**.
  - d. Click **IBM System x3350** to display the matrix of downloadable files for the server.

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## Setting up a Remote Supervisor Adapter II SlimLine

You use an optional Remote Supervisor Adapter II SlimLine to obtain enhanced system management capabilities, beyond those of the integrated BMC. The Remote Supervisor Adapter II SlimLine has a dedicated Ethernet connection at the rear of the server.

See the *User's Guide* that is on the *IBM System x Documentation CD* for more information about the Remote Supervisor Adapter II SlimLine.



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## 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 diagnose and correct a problem by using the information in this chapter, see Appendix A, “Getting help and technical assistance,” on page 55, the *IBM Problem Determination and Service Guide* on the *IBM System x Documentation CD*, and the “Server Support” flowchart in the front of this document.

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### 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 (POST) 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 are also displayed if POST detects a hardware-configuration problem.

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

- **Troubleshooting tables**

These tables list problem symptoms and actions to correct the problems. See “Troubleshooting tables” on page 37 for more information.

- **Light path diagnostics**

Use light path diagnostics to diagnose system errors quickly. See “Light path diagnostics” on page 50 for more information.

- **Diagnostic programs and error messages**

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

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### POST beep codes

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

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

**One beep**

POST was completed successfully without detecting any errors.

**One long beep and two short beeps**

A video error has occurred, and the BIOS cannot initialize the monitor screen to display additional information.

**Other beep codes**

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

## POST error codes

The following table provides an abbreviated list of the error codes that might appear during POST. See the *Problem Determination and Service Guide* on the IBM *System x Documentation* CD for more information about the POST error codes. To check for updated technical information, complete the following steps:

1. Go to <http://www.ibm.com/systems/support>
2. Under **Product Support**, click **System x**.
3. Under **Popular links**, click **Publications lookup**.
4. From the **Product family** menu, select **System x3350** and click **Continue**.

Table 4. Abbreviated list of error codes

Error code	Description	Action
062	Three consecutive boot failures using the default configuration.	<ol style="list-style-type: none"><li>1. Run the Configuration/Setup Utility program, save the configuration, and restart the server.</li><li>2. Update the system firmware to the latest level (see "Updating the firmware" in the <i>Problem Determination and Service Guide</i>).</li><li>3. Reseat the following components, one at a time, in the order shown, restarting the server each time:<ol style="list-style-type: none"><li>a. System-board battery</li><li>b. (Trained service technician only) Microprocessor</li></ol></li><li>4. Replace the components listed in step 3, one at a time, in the order shown, restarting the server each time.</li></ol>



Table 4. Abbreviated list of error codes (continued)

<ul style="list-style-type: none"> <li>• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.</li> <li>• See the parts listing in the <i>Problem Determination and Service Guide</i> on the IBM System x Documentation CD to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).</li> <li>• If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.</li> </ul>		
162	Device configuration error	<ol style="list-style-type: none"> <li>1. Run the Configuration/Setup Utility program, select <b>Load Default Settings</b>, and save the settings.</li> <li>2. Reseat the following components, one at a time, in the order shown, restarting the server each time:             <ol style="list-style-type: none"> <li>a. System-board battery</li> <li>b. Failing device (if the device is a FRU, the device must be resealed by a trained service technician only)</li> </ol> </li> <li>3. Replace the following components one at a time, in the order shown, restarting the server each time:             <ol style="list-style-type: none"> <li>a. System-board battery</li> <li>b. Failing device (if the device is a FRU, the device must be replaced by a trained service technician only)</li> <li>c. (Trained service technician only) System board</li> </ol> </li> </ol>
163	Real-time clock error (time of day not set)	<ol style="list-style-type: none"> <li>1. Run the Configuration/Setup Utility program, select <b>Load Default Settings</b>, make sure that the date and time are correct, and save the settings.</li> <li>2. Clear CMOS. See "Resetting Passwords in the <i>User's Guide</i> for information about how to clear CMOS.</li> <li>3. Reseat the battery.</li> <li>4. Replace the following components one at a time, in the order shown, restarting the server each time:             <ol style="list-style-type: none"> <li>a. System-board battery</li> <li>b. (Trained service technician only) System board</li> </ol> </li> </ol>
289	A DIMM has been disabled by the system	<ol style="list-style-type: none"> <li>1. Make sure that the DIMM is installed correctly (see “Installing a memory module (DIMM)” on page 15).</li> <li>2. Replace the DIMM.</li> <li>3. (Trained service technician only) Replace the system board.</li> </ol>
1162	Serial port configuration error.	<ol style="list-style-type: none"> <li>1. Run the Configuration/Setup Utility program, select <b>Load Default Settings</b>, and save the settings.</li> <li>2. (Trained service technician only) Replace the system board.</li> </ol>

Table 4. Abbreviated list of error codes (continued)

<ul style="list-style-type: none"> <li>• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.</li> <li>• See the parts listing in the <i>Problem Determination and Service Guide</i> on the <i>IBM System x Documentation CD</i> to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).</li> <li>• If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.</li> </ul>		
18xx	PCI device error	<ol style="list-style-type: none"> <li>1. Make sure that the PCI adapters and riser cards are installed correctly.</li> <li>2. Run the Configuration/Setup Utility program, select <b>Load Default Settings</b>, and save the settings.</li> <li>3. Remove the PCI adapters and riser cards, one at a time, until the problem is isolated.</li> </ol>
00019xxx	The microprocessor is not functioning or failed the built-in self-test.	<ol style="list-style-type: none"> <li>1. Make sure that the microprocessor is installed correctly.</li> <li>2. (Trained service technician only) Replace the microprocessor.</li> </ol>
01298xxx	Data for microprocessor	Download and install the latest level of BIOS code.

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## Troubleshooting tables

Use the troubleshooting tables to find solutions to problems that have identifiable symptoms. See the *Problem Determination and Service Guide* on the IBM System x Documentation CD for more detailed troubleshooting information. If you cannot find a 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 you use the troubleshooting tables:

1. Check the light path diagnostics LEDs (see “Light path diagnostics” on page 50).
2. Remove the software or device that you just added.
3. Run the diagnostic tests to determine whether the server is running correctly.
4. Reinstall the new software or new device.

## CD or DVD drive problems

<ul style="list-style-type: none"><li>• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.</li><li>• See the parts listing in the <i>Problem Determination and Service Guide</i> on the IBM System x Documentation CD to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).</li><li>• If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.</li></ul>	
Symptom	Action
The CD or DVD drive is not recognized.	<ol style="list-style-type: none"><li>1. Make sure that:<ul style="list-style-type: none"><li>• All cables and jumpers are installed correctly.</li><li>• The correct device driver is installed for the CD or DVD drive.</li><li>• The signal cable and connector are not damaged and the connector pins are not bent.</li><li>• All damaged parts are repaired or replaced.</li><li>• The correct device driver is installed for the CD or DVD drive.</li></ul></li><li>2. Run the CD or DVD drive diagnostic programs.</li><li>3. Reseat the following components:<ol style="list-style-type: none"><li>a. CD or DVD drive</li><li>b. CD or DVD drive cable</li></ol></li><li>4. Replace the following components one at a time, in the order shown, restarting the server each time:<ol style="list-style-type: none"><li>a. CD or DVD drive</li><li>b. CD or DVD drive cable</li><li>c. (Trained service technician only) System board</li></ol></li></ol>
A CD or DVD is not working correctly.	<ol style="list-style-type: none"><li>1. Clean the CD or DVD drive.</li><li>2. Run the CD or DVD drive diagnostic programs.</li><li>3. Reseat the CD or DVD drive.</li><li>4. Replace the CD or DVD drive.</li></ol>

<ul style="list-style-type: none"> <li>• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.</li> <li>• See the parts listing in the <i>Problem Determination and Service Guide</i> on the IBM System x Documentation CD to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).</li> <li>• If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.</li> </ul>	
Symptom	Action
The CD or DVD drive tray is not working.	<ol style="list-style-type: none"> <li>1. Make sure that the server is turned on.</li> <li>2. Insert the end of a straightened paper clip into the manual tray-release opening.</li> <li>3. Reseat the CD or DVD drive.</li> <li>4. Replace the CD or DVD drive.</li> </ol>

## General problems

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

<ul style="list-style-type: none"> <li>• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.</li> <li>• See the parts listing in the <i>Problem Determination and Service Guide</i> on the IBM System x Documentation CD to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).</li> <li>• If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.</li> </ul>	
Symptom	Action
A hard disk drive passes the diagnostic Fixed Disk Test, but the problem remains.	<p>Run the diagnostic SCSI Fixed Disk Test (See "Running the Diagnostics" in the <i>Problem Determination and Service Guide</i>).</p> <p><b>Note:</b> This test is not available on servers that have RAID arrays or servers that have IDE or SATA hard disk drives.</p>

## Intermittent problems

<ul style="list-style-type: none"> <li>• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.</li> <li>• See the parts listing in the <i>Problem Determination and Service Guide</i> on the IBM System x Documentation CD to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).</li> <li>• If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.</li> </ul>	
Symptom	Action
A problem occurs only occasionally and is difficult to diagnose.	<ol style="list-style-type: none"> <li>1. Make sure that: <ul style="list-style-type: none"> <li>• All cables and cords are connected securely to the rear of the server and attached devices.</li> <li>• 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.</li> </ul> </li> <li>2. Check the system event/error log or the BMC system event log (see “Error Logs” in the <i>Problem Determination and Service Guide</i>).</li> </ol>
The server resets (restarts) occasionally	<ol style="list-style-type: none"> <li>1. If the reset occurs during POST and the POST watchdog timer is enabled (click <b>Advanced Setup --&gt; Baseboard Management Controller (BMC) Settings --&gt; BMC Post Watchdog</b> in the Configuration/Setup Utility program to see the POST watchdog setting), make sure that sufficient time is allowed in the watchdog timeout value (<b>BMC POST Watchdog Timeout</b>). See the <i>User's Guide</i> for information about the settings in the Configuration/Setup Utility program. If the server continues to reset during POST, see the “POST” and “Diagnostic programs and messages” sections in the <i>Problem Determination and Service Guide</i>.</li> <li>2. If the reset occurs after the operating system starts, disable any automatic server restart (ASR) utilities, such as the IBM Automatic Server Restart IPMI Application for Windows, or ASR devices that may be installed. <b>Note:</b> ASR utilities operate as operating-system utilities and are related to the IPMI device driver. If the reset continues to occur after the operating system starts, the operating system might have a problem; see “Software problems” on page 49.</li> <li>3. If neither condition applies, check the system event/error log or BMC system event log (see “Error Logs” in the <i>Problem Determination and Service Guide</i>).</li> </ol> <p>If the problem remains, call for service.</p>

## USB keyboard, mouse, or pointing-device problems

- Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
- See the parts listing in the *Problem Determination and Service Guide* on the IBM System x Documentation CD 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"> <li>1. Make sure that: <ul style="list-style-type: none"> <li>• The keyboard cable is securely connected.</li> <li>• The server and the monitor are turned on.</li> </ul> </li> <li>2. If you are using a USB keyboard and it is connected to a USB hub, disconnect the keyboard from the hub and connect it directly to the server.</li> <li>3. Replace the following components one at a time, in the order shown, restarting the server each time: <ol style="list-style-type: none"> <li>a. Keyboard</li> <li>b. (Trained service technician only) System board</li> </ol> </li> </ol>
The mouse or pointing device does not work.	<ol style="list-style-type: none"> <li>1. Make sure that: <ul style="list-style-type: none"> <li>• The mouse or pointing-device cable is securely connected to the server.</li> <li>• The mouse or pointing-device drivers are installed correctly.</li> <li>• The server and the monitor are turned on.</li> <li>• The mouse operation has been enabled in the Configuration/Setup Utility program.</li> </ul> </li> <li>2. If you are using a USB mouse or pointing device and it is connected to a USB hub, disconnect the mouse or pointing device from the hub and connect it directly to the server.</li> <li>3. Replace the following components one at a time, in the order shown, restarting the server each time: <ol style="list-style-type: none"> <li>a. Mouse or pointing device</li> <li>b. (Trained service technician only) System board</li> </ol> </li> </ol>

## Memory problems

- Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
- See the parts listing in the *Problem Determination and Service Guide* on the IBM System x Documentation CD 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 amount of system memory that is displayed is less than the amount of installed physical memory.</p>	<ol style="list-style-type: none"> <li>1. Make sure that:               <ul style="list-style-type: none"> <li>• No error LEDs are lit on the front panel assembly or on the system board.</li> <li>• The memory modules are seated correctly.</li> <li>• You have installed the correct type of memory. See “Installing a memory module (DIMM)” on page 15.</li> <li>• All DIMMs are enabled. The server might have automatically disabled a memory bank when it detected a problem.</li> <li>• If a DIMM was disabled by a systems-management interrupt (SMI), replace the DIMM.</li> </ul> </li> <li>2. Check the POST error log for error message 289. If POST error message 289 is in the error log, perform the actions listed in the POST error codes table (see “POST error codes” on page 34). Otherwise, continue to step 3.</li> <li>3. Run memory diagnostics (see “Running the diagnostic programs” in the <i>Problem Determination and Service Guide</i>).</li> <li>4. Make sure that there is no memory mismatch when the server is at the minimum memory configuration (two 512 MB DIMMs; see the information about the minimum required configuration on page 15).</li> <li>5. Add one pair of DIMMs at a time, making sure that the DIMMs in each pair match. Install the DIMMs in the sequence described in “Installing a memory module (DIMM)” on page 15.</li> <li>6. Reseat the DIMMs. See “Installing a memory module (DIMM)” on page 15.</li> <li>7. Replace the following components one at a time, in the order shown, restarting the server each time:               <ol style="list-style-type: none"> <li>a. DIMMs</li> <li>b. (Trained service technician only) System board</li> </ol> </li> </ol>

## Microprocessor problems

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

Symptom	Action
The server emits a continuous beep during POST, indicating that the microprocessor is not working correctly.	<ol style="list-style-type: none"> <li>1. Correct any errors that are indicated by the light path diagnostics LEDs (see “Light path diagnostics” on page 50).</li> <li>2. Make sure that the server supports the microprocessor.</li> <li>3. (Trained service technician only) Reseat the microprocessor.</li> <li>4. (Trained service technician only) Replace the microprocessor.</li> </ol>

## Monitor problems

Some IBM monitors have their own self-tests. If you suspect a problem with your monitor, see the documentation that comes with the monitor for instructions for testing and adjusting the monitor.

- 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* on the IBM System x Documentation CD 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"> <li>1. Make sure that the monitor cables are firmly connected.</li> <li>2. Try using a different monitor on the server, or try testing the monitor on a different server.</li> <li>3. Run the diagnostic programs (see the <i>Problem Determination and Service Guide</i>). If the monitor passes the diagnostic programs, the problem might be a video device driver.</li> <li>4. Reseat the Remote Supervisor Adapter II SlimLine (if one is installed).</li> <li>5. Replace the following components one at a time, in the order shown, restarting the server each time:             <ol style="list-style-type: none"> <li>a. Remote Supervisor Adapter II SlimLine (if one is installed)</li> <li>b. (Trained service technician only) System board</li> </ol> </li> </ol>



- 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* on the IBM System x Documentation CD to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).
- If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.

Symptom	Action
The screen is blank.	<ol style="list-style-type: none"> <li>1. If the server is attached to a KVM switch, bypass the KVM switch to eliminate it as a possible cause of the problem: connect the monitor cable directly to the correct connector on the rear of the server.</li> <li>2. Make sure that: <ul style="list-style-type: none"> <li>• The server is turned on. If there is no power to the server, see “Power problems” on page 46.</li> <li>• The monitor cables are connected correctly.</li> <li>• The monitor is turned on and the brightness and contrast controls are adjusted correctly.</li> <li>• No beep codes sound when the server is turned on.</li> </ul> <p><b>Important:</b> 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 <b>Boot Fail Count</b> option in the <b>Start Options</b> 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> </li> <li>3. Make sure that the correct server is controlling the monitor, if applicable.</li> <li>4. Make sure that damaged BIOS code is not affecting the video; see "Recovering from a BIOS failure" in the <i>Problem Determination and Service Guide</i>.</li> <li>5. See the <i>Problem Determination and Service Guide</i> for information about solving undetermined problems.</li> </ol>
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"> <li>1. Make sure that: <ul style="list-style-type: none"> <li>• The application program is not setting a display mode that is higher than the capability of the monitor.</li> <li>• You installed the necessary device drivers for the application.</li> </ul> </li> <li>2. Run video diagnostics (see the <i>Problem Determination and Service Guide</i> for information about running the diagnostic programs). <ul style="list-style-type: none"> <li>• If the server passes the video diagnostics, the video is good; see the <i>Problem Determination and Service Guide</i> for information about solving undetermined problems.</li> <li>• (Trained service technician only) If the server fails the video diagnostics, replace the system board.</li> </ul> </li> </ol>

- 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* on the IBM System x Documentation CD 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 monitor has screen jitter, or the screen image is wavy, unreadable, rolling, or distorted.</p>	<ol style="list-style-type: none"> <li>1. If the monitor self-tests show the that 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. <b>Attention:</b> 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. <b>Notes:</b> <ol style="list-style-type: none"> <li>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.).</li> <li>b. Non-IBM monitor cables might cause unpredictable problems.</li> </ol> </li> <li>2. Reseat the following components:           <ol style="list-style-type: none"> <li>a. Monitor</li> <li>b. Remote Supervisor Adapter II SlimLine (if one is installed)</li> </ol> </li> <li>3. Replace the following components one at a time, in the order shown, restarting the server each time:           <ol style="list-style-type: none"> <li>a. Monitor</li> <li>b. Remote Supervisor Adapter II SlimLine (if one is installed)</li> <li>c. (Trained service technician only) System board</li> </ol> </li> </ol>
<p>Wrong characters appear on the screen.</p>	<ol style="list-style-type: none"> <li>1. If the wrong language is displayed, update the BIOS code with the correct language.</li> <li>2. Reseat the monitor cable.</li> <li>3. Replace the following components one at a time, in the order shown, restarting the server each time:           <ol style="list-style-type: none"> <li>a. Monitor</li> <li>b. (Trained service technician only) System board</li> </ol> </li> </ol>

## Optional-device problems

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

## 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* on the IBM System x Documentation CD 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, and the reset button does work (the server does not start).</p> <p><b>Note:</b> 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"> <li>1. Make sure that the power-control button is working correctly:               <ol style="list-style-type: none"> <li>a. Disconnect the server power cords.</li> <li>b. Reconnect the power cords.</li> <li>c. (Trained service technician only) Reseat the operator information panel cables; then, repeat steps 1a and 1b.</li> <li>d. (Trained service technician only) If the server starts, reseat the operator information panel. If the problem remains, replace the operator information panel.</li> </ol> </li> <li>2. Make sure that the reset button is working correctly:               <ol style="list-style-type: none"> <li>a. Disconnect the server power cords.</li> <li>b. Reconnect the power cords.</li> <li>c. (Trained service technician only) Reseat the light path diagnostics panel cable, and then repeat steps 2a and 2b.                   <ul style="list-style-type: none"> <li>• (Trained service technician only) If the server starts, replace the light path diagnostics panel.</li> <li>• If the server does not start, go to 3.</li> </ul> </li> </ol> </li> <li>3. Make sure that:               <ul style="list-style-type: none"> <li>• The power cords are correctly connected to the server and to a working electrical outlet.</li> <li>• The type of memory that is installed is correct.</li> <li>• The DIMMs are fully seated.</li> <li>• The LEDs on the power supply do not indicate a problem.</li> <li>• (Trained service technician only) The microprocessor is correctly installed.</li> </ul> </li> <li>4. 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.</li> <li>5. Reseat the following components:               <ol style="list-style-type: none"> <li>a. DIMMs</li> <li>b. (Trained service technician only) Power backplane</li> </ol> </li> <li>6. Replace the following components one at a time, in the order shown, restarting the server each time:               <ol style="list-style-type: none"> <li>a. DIMMs</li> <li>b. Power supply</li> <li>c. (Trained service technician only) Power backplane</li> <li>d. (Trained service technician only) System board</li> </ol> </li> <li>7. See “Solving undetermined problems” in the <i>Problem Determination and Service Guide</i>.</li> </ol>

<ul style="list-style-type: none"> <li>• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.</li> <li>• See the parts listing in the <i>Problem Determination and Service Guide</i> on the IBM System x Documentation CD to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).</li> <li>• If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.</li> </ul>	
Symptom	Action
The server does not turn off.	<ol style="list-style-type: none"> <li>1. Determine whether you are using an Advanced Configuration and Power Interface (ACPI) or a non-ACPI operating system. If you are using a non-ACPI operating system, complete the following steps: <ol style="list-style-type: none"> <li>a. Press Ctrl+Alt+Delete.</li> <li>b. Turn off the server by pressing the power-control button for 5 seconds.</li> <li>c. Restart the server.</li> <li>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.</li> </ol> </li> <li>2. If the problem remains or if you are using an ACPI-aware operating system, suspect the system board.</li> </ol>
The server unexpectedly shuts down, and the LEDs on the operator information panel are not lit.	See “Solving undetermined problems” in the <i>Problem Determination and Service Guide</i> .

## Serial device problems

<ul style="list-style-type: none"> <li>• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.</li> <li>• See the parts listing in the <i>Problem Determination and Service Guide</i> on the IBM System x Documentation CD to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).</li> <li>• If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.</li> </ul>	
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"> <li>1. Make sure that: <ul style="list-style-type: none"> <li>• The serial port is assigned a unique address in the Configuration/Setup Utility program and is not disabled.</li> <li>• The serial port adapter (if one is present) is seated correctly.</li> </ul> </li> <li>2. Reseat the serial port adapter.</li> <li>3. Replace the serial port adapter.</li> </ol>

- 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* on the IBM System x Documentation CD 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 serial device does not work.	<ol style="list-style-type: none"> <li>1. Make sure that: <ul style="list-style-type: none"> <li>• The device is compatible with the server.</li> <li>• The serial port is enabled and is assigned a unique address.</li> <li>• The device is connected to the correct connector (see “Rear view” on page 23).</li> </ul> </li> <li>2. Reseat the following components: <ol style="list-style-type: none"> <li>a. Failing serial device</li> <li>b. Serial cable</li> <li>c. Remote Supervisor Adapter II SlimLine (if one is installed)</li> </ol> </li> <li>3. Replace the following components one at a time, in the order shown, restarting the server each time: <ol style="list-style-type: none"> <li>a. Failing serial device</li> <li>b. Serial cable</li> <li>c. Remote Supervisor Adapter II SlimLine (if one is installed)</li> <li>d. (Trained service technician only) System board</li> </ol> </li> </ol>

## ServerGuide 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* on the IBM System x Documentation CD 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 <i>ServerGuide Setup and Installation</i> CD will not start.	<ol style="list-style-type: none"> <li>1. Make sure that the server supports the ServerGuide program and has a startable (bootable) CD or DVD drive.</li> <li>2. If the startup (boot) sequence settings have been changed, make sure that the CD or DVD drive is first in the startup sequence.</li> <li>3. If more than one CD or DVD drive is installed, make sure that only one drive is set as the primary drive. Start the CD from the primary drive.</li> </ol>
The ServeRAID Manager program cannot view all installed drives, or the operating system cannot be installed.	<ol style="list-style-type: none"> <li>1. Make sure that the hard disk drive is connected correctly.</li> <li>2. Make sure that the hard disk drive cables are securely connected.</li> </ol>
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.

<ul style="list-style-type: none"> <li>• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.</li> <li>• See the parts listing in the <i>Problem Determination and Service Guide</i> on the IBM System x Documentation CD to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).</li> <li>• If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.</li> </ul>	
Symptom	Action
The operating system cannot be installed; the option is not available.	Make sure that the server supports the operating system. If it does, either no logical drive is defined (SCSI RAID servers), or the ServerGuide System Partition is not present. Run the ServerGuide program and make sure that setup is complete.

## Software problems

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

## Universal Serial Bus (USB) device problems

- Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
- See the parts listing in the *Problem Determination and Service Guide* on the IBM System x Documentation CD 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"><li>1. Make sure that:<ul style="list-style-type: none"><li>• The correct USB device driver is installed.</li><li>• The operating system supports USB devices.</li></ul></li><li>2. Make sure that the USB configuration options are set correctly in the Configuration/Setup Utility program (see the <i>User's Guide</i> for more information).</li><li>3. If you are using an external USB hub, disconnect the USB device from the hub and connect it directly to the server.</li></ol>

## Video problems

See “Monitor problems” on page 42.

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## Light path diagnostics

Light path diagnostics is a system of LEDs on various external and internal components of the server. When an error occurs, LEDs are lit throughout the server. By viewing the LEDs in a particular order, you can often identify the source of the error.

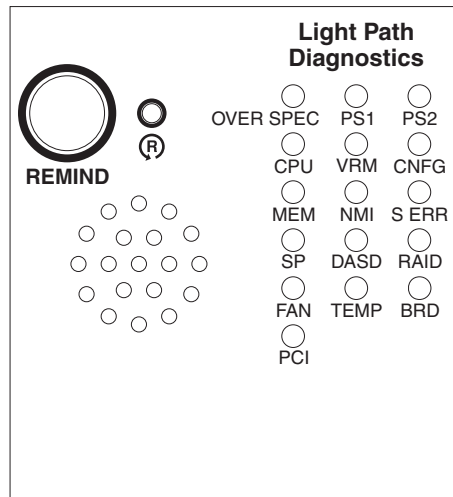
The server is designed so that LEDs remain lit when the server is connected to a power source but is not turned on, provided that the power supply is operating correctly. This feature helps you to isolate the problem when the operating system is shut down.

To acknowledge a system error but not take immediate action, press the remind button to place the server in Remind mode. When the server is in Remind mode, the system-error LED on the front of the server flashes. If a new failure occurs, the system-error LED is lit again.

Press the reset button to reset the server and run the power-on self-test (POST). You might have to use a pen or the end of a straightened paper clip to press the button.

The following illustration shows the LEDs on the light path diagnostics panel.





## Diagnosing problems using light path diagnostics

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

1. **Light path diagnostics panel** - Look at this panel first. If a system error has occurred, the system-error LED on the front of the light path diagnostics drawer is lit. Slide the latch to the left on the front of the light path diagnostics drawer to access the light path diagnostics panel. Note any LEDs that are lit, and then close the drawer.
2. **LEDs on the system board** - To identify the component that is causing the error, note the lit LED on or beside the component.

## Light path diagnostics LEDs

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

Lit light path diagnostics LED with the system-error or information LED also lit	Description	Action
None	An error has occurred and cannot be diagnosed, or the Advanced System Management (ASM) processor on the Remote Supervisor Adapter II SlimLine has failed. The error is not represented by a light path diagnostics LED.	Check the system event/error log for information about the error.
OVER SPEC	The power supplies or power backplane are using more power than their maximum rating allows.	<ol style="list-style-type: none"> <li>1. Remove optional devices from the server.</li> <li>2. Replace the failing power supply.</li> <li>3. If the 12V error LED is lit, reseal the power backplane. If the problem remains, replace the power backplane.</li> </ol>
PS1	The power supply in bay 1 has failed or has been removed.	<ol style="list-style-type: none"> <li>1. Make sure that the power supply is correctly seated.</li> <li>2. Replace the failed power supply.</li> </ol>

Lit light path diagnostics LED with the system-error or information LED also lit	Description	Action
PS2	The power supply in bay 2 has failed or been removed.	<ol style="list-style-type: none"> <li>1. Make sure that the power supply is correctly seated.</li> <li>2. Replace the failed power supply.</li> </ol>
CPU	The microprocessor has failed.	<ol style="list-style-type: none"> <li>1. Make sure that the microprocessor is installed correctly. See the <i>Problem Determination and Service Guide</i> on the IBM System x Documentation CD for information about installing a microprocessor.</li> <li>2. (Trained service technician only) Replace the microprocessor.</li> </ol>
VRM	Reserved.	Reserved.
CNFG	A microprocessor configuration error has occurred.	<ul style="list-style-type: none"> <li>• Check the microprocessor options for compatibility.</li> <li>• Check the system event/error log for information indicating incompatible components.</li> <li>• (Trained service technician only) Replace an incompatible microprocessor.</li> </ul>
MEM	A memory error has occurred.	Replace the failing DIMM, which is indicated by the lit LED on the system board.
NMI	A non-masking error has occurred.	Check the system event/error log for information about the error. (Use the Configuration/Setup Utility program to view the error logs.)
S ERR	Reserved	Reserved
SP	The service processor has failed.	<ol style="list-style-type: none"> <li>1. Remove ac power from the server; then, reconnect the server to ac power and restart the server.</li> <li>2. Update the firmware on the BMC.</li> <li>3. If a Remote Supervisor Adapter II SlimLine is installed update the firmware, if the problem persists, replace the adapter.</li> <li>4. (Trained service technician only) Replace the system board.</li> </ol>
DASD	A hard disk drive error has occurred.	<ol style="list-style-type: none"> <li>1. Check the LEDs on the hard disk drives and replace the indicated drive.</li> <li>2. If the problem remains, replace the hard disk drive backplane or backplate.</li> </ol>
BRD	An error has occurred with the system board voltage over range or a battery fault.	<ul style="list-style-type: none"> <li>• Check the LEDs on the system board to identify the component that is causing the error.</li> <li>• Check the system error log for information about the error. (Use the Configuration/Setup Utility program to view the error logs.)</li> </ul>
FAN	A fan has failed, is operating too slowly, or has been removed. A failing fan can also cause the TEMP LED to be lit.	Replace the failing fan, which is indicated by a lit LED near the fan connector on the system board.

Lit light path diagnostics LED with the system-error or information LED also lit	Description	Action
TEMP	The system temperature has exceeded the maximum threshold level. A failing fan can cause the TEMP LED to be lit	<ul style="list-style-type: none"> <li>• Determine whether a fan has failed. If it has, replace it.</li> <li>• Make sure that the room temperature is not too high. See “Features and specifications” on page 3 for temperature information.</li> <li>• Make sure that the air vents are not blocked.</li> </ul>
RAID	Reserved	Reserved
PCI	An error has occurred on a PCI bus or on the system board. An additional LED will be lit next to a failing PCI slot.	<ol style="list-style-type: none"> <li>1. Check the LEDs at the PCI slots to identify the component that is causing the error.</li> <li>2. Check that the PCI riser assemblies are seated correctly.</li> <li>3. Check the system error log for information about the error.</li> <li>4. If you cannot isolate the failing adapter through the LEDs and the information in the system error log, remove one adapter at a time from the failing PCI bus, and restart the server after each adapter is removed.</li> </ol>



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## Appendix A. Getting help and technical assistance

If you need help, service, or technical assistance or just want more information about IBM products, you will find a wide variety of sources available from IBM to assist you. This section contains information about where to go for additional information about IBM and IBM products, what to do if you experience a problem with your system, and whom to call for service, if it is necessary.

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### Before you call

Before you call, make sure that you have taken these steps to try to solve the problem yourself:

- Check all cables to make sure that they are connected.
- Check the power switches to make sure that the system and any optional devices are turned on.
- Use the troubleshooting information in your system documentation, and use the diagnostic tools that come with your system. Information about diagnostic tools is in the *Problem Determination and Service Guide* on the *IBM Documentation CD* that comes with your system.
- Go to the IBM support Web site at <http://www.ibm.com/systems/support/> to check for technical information, hints, tips, and new device drivers or to submit a request for information.

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

---

### Using the documentation

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

---

### Getting help and information from the World Wide Web

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

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

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## 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).

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## Hardware service and support

You can receive hardware service through IBM Services or through your IBM reseller, if your reseller is authorized by IBM to provide warranty service. See <http://www.ibm.com/planetwide/> for support telephone numbers, or in the U.S. and Canada, call 1-800-IBM-SERV (1-800-426-7378).

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## IBM Taiwan product service

台灣 IBM 產品服務聯絡方式：  
台灣國際商業機器股份有限公司  
台北市松仁路 7 號 3 樓  
電話：0800-016-888

IBM Taiwan product service contact information:

IBM Taiwan Corporation  
3F, No 7, Song Ren Rd.  
Taipei, Taiwan  
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## Important notes

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

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

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

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

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



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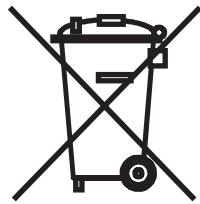
Some software might differ from its retail version (if available) and might not include user manuals or all program functionality.

---

## Product recycling and disposal

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

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

注意: このマークは EU 諸国およびノルウェーにおいてのみ適用されます。

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## Battery return program

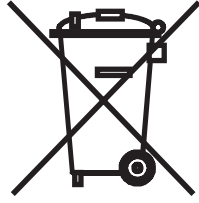
This product may contain a sealed lead acid, nickel cadmium, nickel metal hydride, lithium, or lithium ion battery. Consult your user manual or service manual for specific battery information. The battery must be recycled or disposed of properly. Recycling facilities may not be available in your area.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

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

**For Taiwan:** Please recycle batteries.



**For the European Union:**



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

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

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

---

## German Ordinance for Work gloss statement

The product is not suitable for use with visual display work place devices according to clause 2 of the German Ordinance for Work with Visual Display Units.

Das Produkt ist nicht für den Einsatz an Bildschirmarbeitsplätzen im Sinne § 2 der Bildschirmarbeitsverordnung geeignet.

---

## Electronic emission notices

### Federal Communications Commission (FCC) statement

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

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

### Industry Canada Class A emission compliance statement

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

### Avis de conformité à la réglementation d'Industrie Canada

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

### Australia and New Zealand Class A statement

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

### United Kingdom telecommunications safety requirement

#### Notice to Customers

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

## European Union EMC Directive conformance statement

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

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European Community contact:  
IBM Technical Regulations  
Pascalstr. 100, Stuttgart, Germany 70569  
Telephone: 0049 (0)711 785 1176  
Fax: 0049 (0)711 785 1283  
E-mail: tjahn@de.ibm.com

## Taiwanese Class A warning statement

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

## Chinese Class A warning statement

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

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