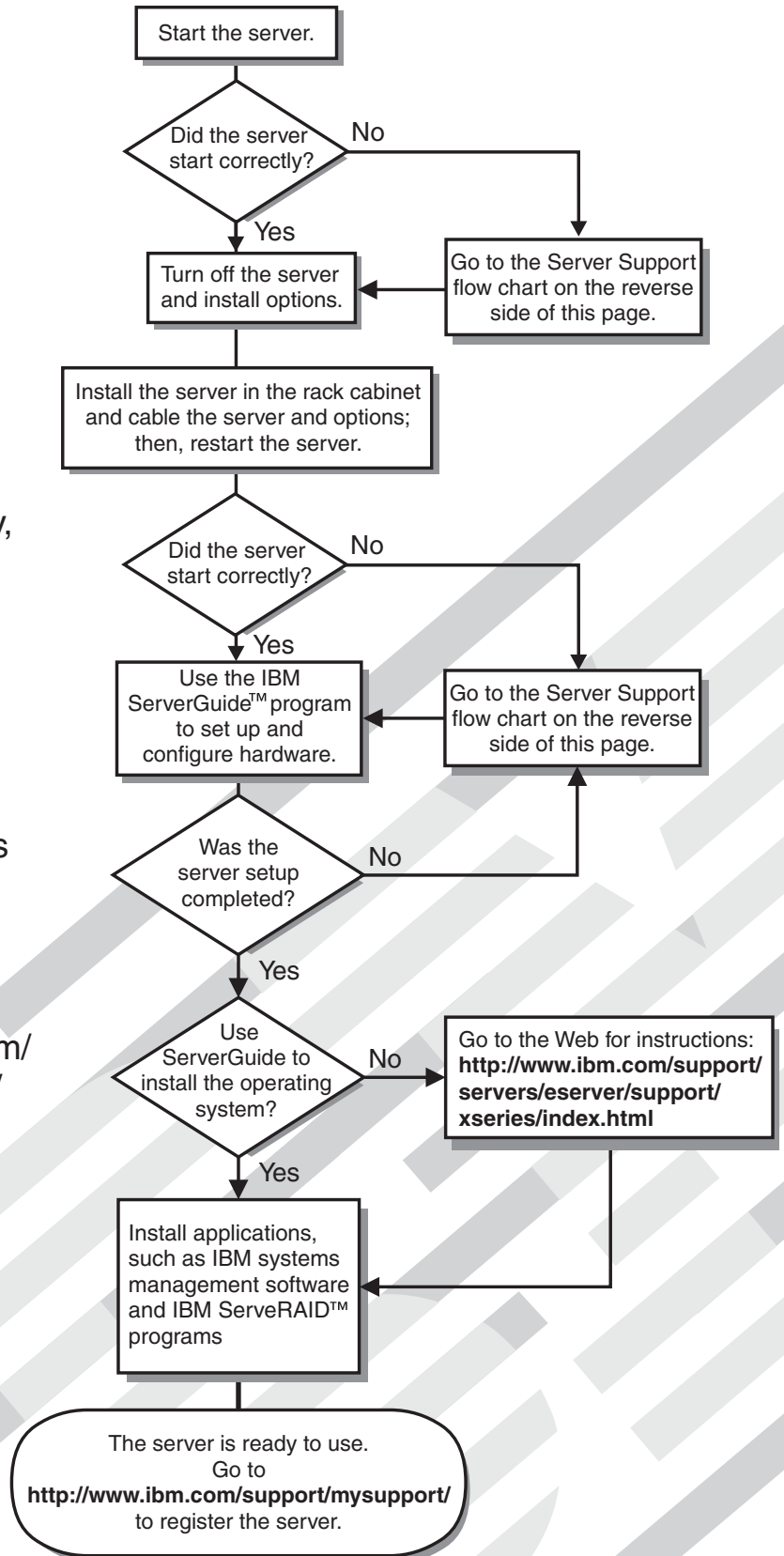# IBM

System x3755
Type 8877

Installation Guide

Welcome.

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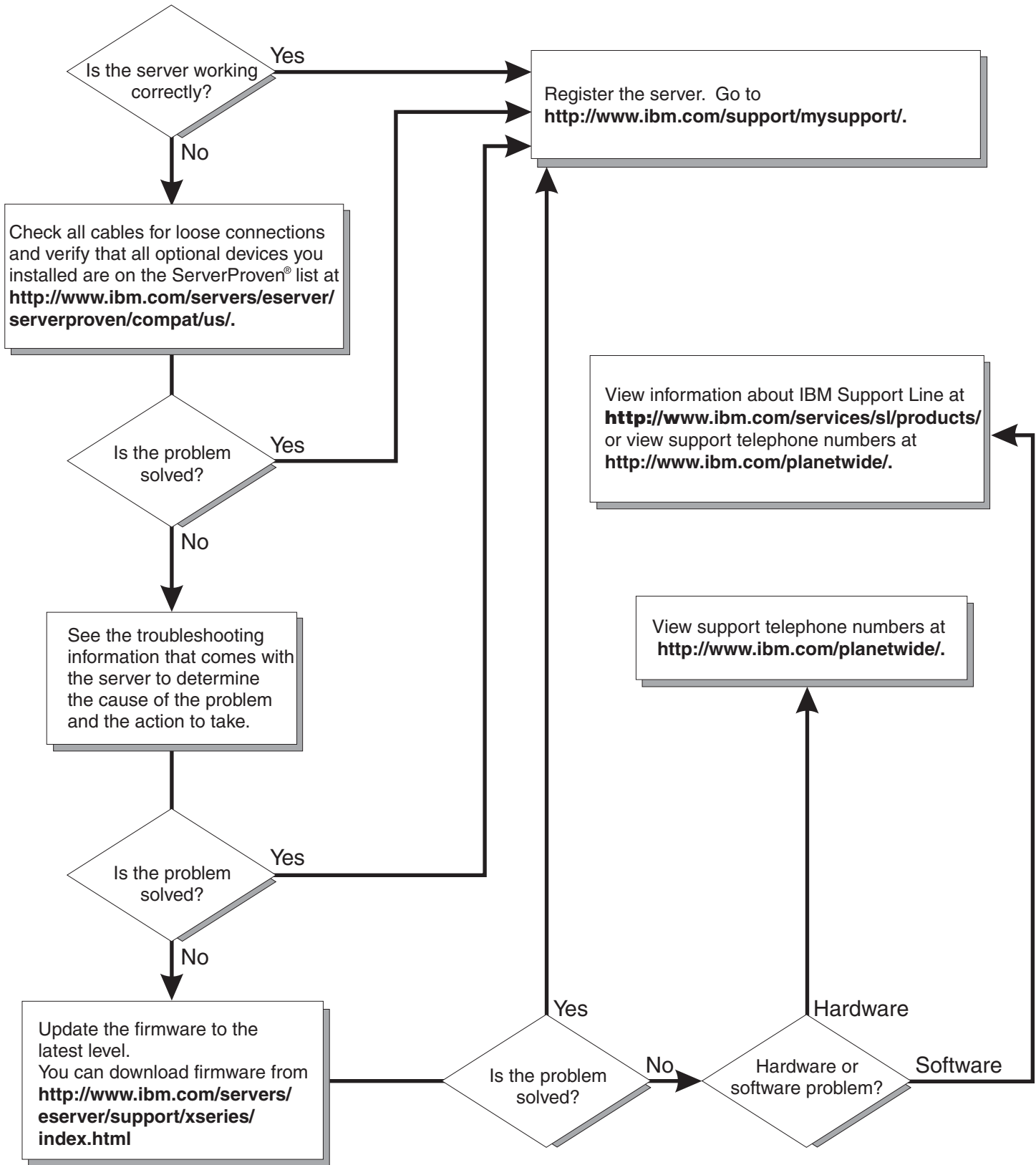
This server *Installation Guide* contains information for setting up and configuring your server.

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

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

Start the server.

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

Yes ↓

Turn off the server and install options.

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

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

Yes ↓

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

Was the server setup completed? — No →

Yes ↓

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

Yes ↓

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

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

Server Support

Is the server working correctly?

Yes → Register the server. Go to **http://www.ibm.com/support/mysupport/.**

No ↓

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

↓

Is the problem solved?

Yes → Register the server. Go to **http://www.ibm.com/support/mysupport/.**

No ↓

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

↓

Is the problem solved?

Yes → Register the server. Go to **http://www.ibm.com/support/mysupport/.**

No ↓

Update the firmware to the latest level.
You can download firmware from **http://www.ibm.com/servers/ eserver/support/xseries/ index.html**

→ **Is the problem solved?**

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

No → **Hardware or software problem?**

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

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

IBM System x3755 Type 8877

Installation Guide

Note: Before using this information and the product it supports, read the general information in "Notices" on page 61, and the *Warranty and Support Information* document on the IBM *System x Documentation* CD.

Contents

Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الآمنية

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

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

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

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

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

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

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

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

A termék telepítése előtt olvassa el a Biztonsági előírásokat!

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

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

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

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

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

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

Перед установкой продукта прочтите инструкции по
технике безопасности.

Pred inštaláciou tohto zariadenia si pečítaje Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

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

Läs säkerhetsinformationen innan du installerar den här produkten.

Important:

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

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

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

Statement 1:

DANGER

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

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

To Connect:	To Disconnect:
1. Turn everything OFF.	1. Turn everything OFF.
2. First, attach all cables to devices.	2. First, remove power cords from outlet.
3. Attach signal cables to connectors.	3. Remove signal cables from connectors.
4. Attach power cords to outlet.	4. Remove all cables from devices.
5. Turn device ON.	

Statement 2:

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

Do not:

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

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

Statement 3:

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

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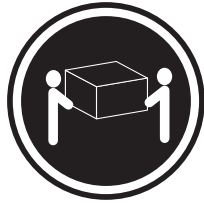

DANGER

> **Some laser products contain an embedded Class 3A or Class 3B laser diode. Note the following.**
>
> **Laser radiation when open. Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam.**

Statement 4:

| ≥ 18 kg (39.7 lb) | ≥ 32 kg (70.5 lb) | ≥ 55 kg (121.2 lb) |
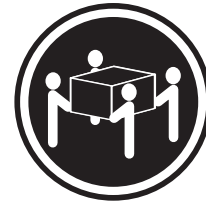
CAUTION:
Use safe practices when lifting.

Statement 5:

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

Statement 8:

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

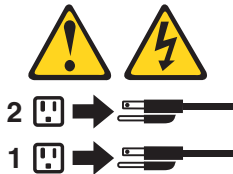**Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.**

Statement 26:

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

Statement 27:

CAUTION:
Hazardous moving parts are nearby.

Chapter 1. Introduction

This *Installation Guide* contains instructions for setting up your IBM® System x3755 Type 8877 server and basic instructions for installing some optional devices. More detailed instructions for installing optional devices are in the *User's Guide* on the IBM *System x™ Documentation* CD, which comes with the server. This document contains information about:

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

If firmware and documentation updates are available, you can download them from the IBM Web site. The server might have features that are not described in the documentation that comes with the server, and the documentation might be updated occasionally to include information about those features, or technical updates might be available to provide additional information that is not included in the server documentation. To check for updates, go to http://www.ibm.com/servers/eserver/support/xseries/index.html, select **System x3755** from the **Hardware** list, and click **Go**. For firmware updates, click the **Download** tab. For documentation updates, click the **Install and use** tab, and click **Product documentation**.

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

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

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

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

Product name	IBM System x3755
Machine type	8877
Model number	_____
Serial number	_____

The model number and serial number are on the ID labels, one on the front of the bezel and the other on the right side, as shown in the following illustration.
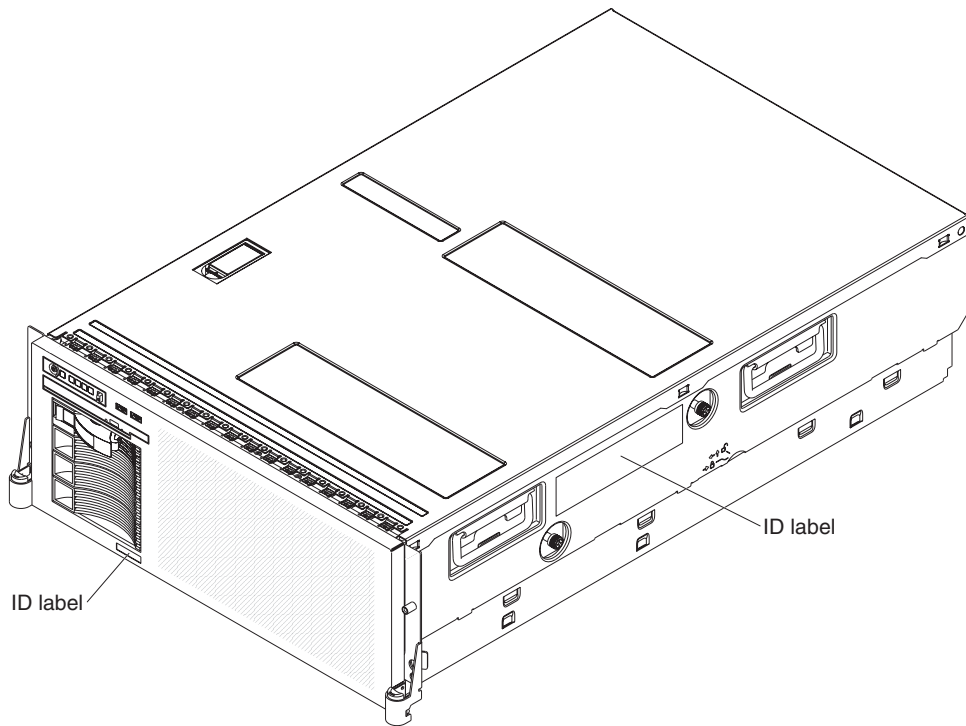
ID label

ID label

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

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 NT® 4.0 (with Service Pack 3 or later), Windows® 2000, or Red Hat Linux.
- 100 MHz microprocessor.
- 32 MB of RAM.
- Adobe Acrobat Reader 3.0 (or later) or xpdf, which comes with Linux operating systems. Acrobat Reader software is included on the CD, and you can install it when you run the Documentation Browser.

Using the Documentation Browser

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

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

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

    ```
    e:\win32.bat
    ```

    where *e* is the drive letter of the drive, and click **OK**.
  - If you are using Red Hat Linux, insert the CD into the drive; then, run the following command from the /mnt/cdrom directory:

    ```
    sh runlinux.sh
    ```

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

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

To search all the documents, type a word or word string in the **Search** field and click **Search**. The documents in which the word or word string appears are listed in order of the most occurrences. Click a document to view it, and press Crtl+F to use the Acrobat search function or 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 could occur.
- **Caution:** These statements indicate situations that can be potentially hazardous to you. A caution statement is placed just before the description of a potentially hazardous procedure step or situation.
- **Danger:** These statements indicate situations that can be potentially lethal or extremely hazardous to you. A danger statement is placed just before the description of a potentially lethal or extremely hazardous procedure step or situation.

Features and specifications

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

Table 1. Features and specifications

Microprocessor:
- AMD Opteron™
- 1 MB Level-2 cache
- Support for up to four dual-core microprocessors

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

Memory:
- Minimum: 1 GB depending on server model, expandable to 128 GB
- Type: 667 MHz, registered, ECC, PC2-5300 double data rate (DDR) II, SDRAM
- Sizes: 512 MB, 1 GB, 2 GB, or 4 GB in pairs
- Connectors: Two-way interleaved, eight dual inline memory module (DIMM) connectors per microprocessor/memory card
- Maximum: Four microprocessor/memory cards, each card containing four pairs of PC2-5300 DDRII DIMMs

Drives:
- Slim CD-RW/DVD: IDE
- Serial Attached SCSI (SAS) hard disk drives

Expansion bays:
- Four SAS, 3.5-inch bays
- One 5.25-inch bay (CD-RW/DVD drive installed)

Expansion slots:
- One PCI Express x16 (full-length)
- Two PCI Express x8 (full-length)
- One PCI Express x4 (full-length)
- Two 100 MHz/64-bit PCI-X (full-length)
- One HTX (half-length)

Upgradeable microcode:

System BIOS, diagnostics, service processor, BMC, CPLD, and SAS microcode

Power supply:
- Standard: One dual-rated power supply
  - 1500 watts at 220 V ac input
  - 750 watts at 110 V ac input
- Upgradeable to two power supplies (redundant at 220 V ac only)

Size:
- 4 U
- Height: 178 mm (7 in.)
- Depth: 711 mm (28 in.)
- Width: 483 mm (19 in.)
- Weight: approximately 43.2 kg (95.25 lb) when fully configured or 29.5 kg (65 lb) minimum

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

Integrated functions:
- Support for ServeRAID-8k-l or ServeRAID-8k SAS controller
- Baseboard management controller (BMC)
- Service processor support for Remote Supervisor Adapter II SlimLine
- Light path diagnostics
- Three Universal Serial Bus (USB) ports (2.0)
  - Two on front of server
  - One on rear of server
- Two Broadcom 5708 10/100/1000 Ethernet controllers (with Wake on LAN support)
- ATI ES1000 video controller
- Mouse connector
- Keyboard connector
- Serial connector

Acoustical noise emissions:
- Sound power, idle: 6.6 bel declared
- Sound power, operating: 6.6 bel declared

Environment:
- Air temperature:
  - Server on: 10° to 35°C (50.0° to 95.0°F); altitude: 0 to 2133 m (6998.0 ft)
  - Server off: 10° to 43°C (50.0° to 109.4°F); maximum altitude: 2133 m (6998.0 ft)
- Humidity:
  - Server on: 8% to 80%
  - Server off: 8% to 80%

Heat output:

Approximate heat output in British thermal units (Btu) per hour:
- Minimum configuration: 683 Btu per hour (200 watts)
- Maximum configuration: 6598 Btu per hour (1932 watts)

Electrical input:
- Sine-wave input (50-60 Hz) required
- Input voltage low range:
  - Minimum: 100 V ac
  - Maximum: 127 V ac
- Input voltage high range:
  - Minimum: 200 V ac
  - Maximum: 240 V ac
- Approximate input kilovolt-amperes (kVA):
  - Minimum: 0.20 kVA
  - Maximum: 1.93 kVA

Notes:

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

2. These levels were measured in controlled acoustical environments according to the procedures that are specified by the American National Standards Institute (ANSI) S12.10 and ISO 7779 and are reported in accordance with ISO 9296. Actual sound-pressure levels in a given location might exceed the average 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.

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.

Top cover

Hot-swap power supply

Hot-swap fan

DIMM

Microprocessor/ memory card

I/O board

Passthru card

Power supply filler

DVD drive

Operator information panel

Hot-swap hard disk drive

Hard disk drive filler panel
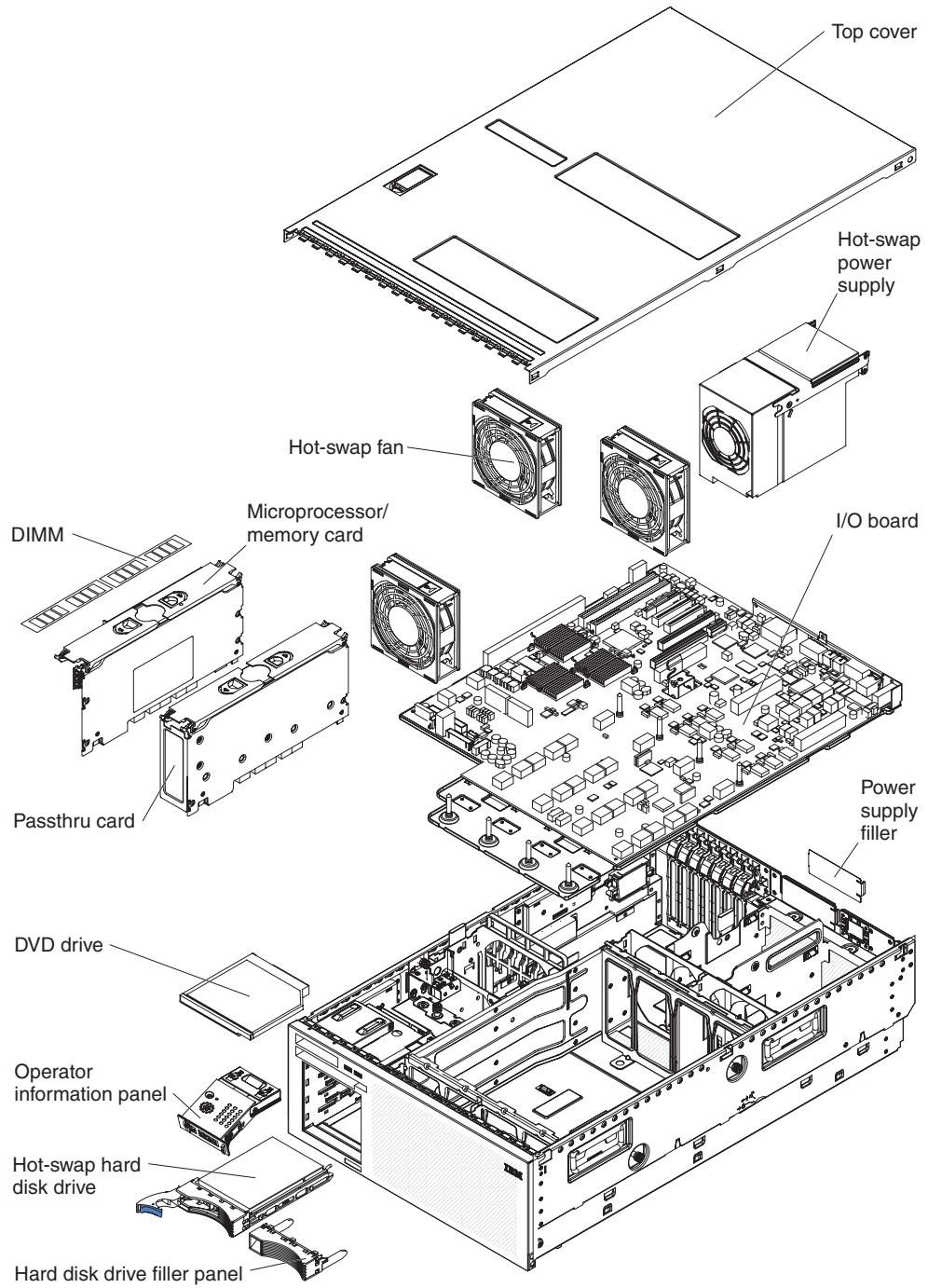
Chapter 2. Installing options

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, "Working inside the server with the power on" on page 8, and the guidelines in "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, go to http://www.ibm.com/servers/eserver/support/xseries/index.html, select **System x3755** from the **Hardware** list, and click the **Download** tab. 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, if an operating system is installed, or that a 19990305 error code is displayed, indicating that an operating system was not found but the server is otherwise working correctly. If the server is not working correctly, see Chapter 6, "Solving problems," on page 37 for diagnostic information.

- Observe good housekeeping in the area where you are working. Place removed covers and other parts in a safe place.

- If you must start the server while the cover is removed, make sure that no one is near the server and that no 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 stand safely without slipping.
  - Distribute the weight of the object equally between your feet.
  - Use a slow lifting force. Never move suddenly or twist when you lift a heavy object.
  - To avoid straining the muscles in your back, lift by standing or by pushing up with your leg muscles.

- Make sure that you have an adequate number of properly grounded electrical outlets for the server, monitor, and other devices.

- Back up all important data before you make changes to disk drives.

- Have a small flat-blade screwdriver available.

- You do not have to turn off the server to install or replace hot-swap power supplies, hot-swap fans, or hot-plug Universal Serial Bus (USB) devices. However, you must turn off the server before you perform any steps that involve installing or removing adapter cables.

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

- Orange on a component or an orange label on or near a component indicates that the component can be hot-swapped, which means that if the server and operating system support hot-swap capability, you can remove or install the component while the server is running. (Orange can also indicate touch points on hot-swap components.) See the instructions for removing or installing a specific hot-swap component for any additional procedures that you might have to perform before you remove or install the component.
- When you are finished working on the server, reinstall all safety shields, guards, labels, and ground wires.
- For a list of supported optional devices for the server, see http://www.ibm.com/servers/eserver/serverproven/compat/us/.

System reliability guidelines

To help ensure proper cooling and system reliability, make sure that the following requirements are met:
- Each of the drive bays has a drive or a filler panel installed in it.
- If the server has redundant power, each of the power-supply bays has a power supply installed.
- There is adequate space around the server to allow the server cooling system to work properly. Leave approximately 50 mm (2 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. Operating the server for extended periods of time (more than 30 minutes) with the server cover removed might damage server components.
- You have followed the cabling instructions that come with optional adapters.
- You have replaced a failed fan within 48 hours.
- You have replaced a hot-swap drive within 2 minutes of removal.
- You do not operate the server without the air baffles installed. Operating the server without the air baffles might cause some components 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 you work inside the server with the power on.

The server supports hot-swap devices and is designed to operate safely while it is turned on and the cover is removed. Follow these guidelines when you work inside a server that is turned on:
- Avoid wearing loose-fitting clothing on your forearms. Button long-sleeved shirts before 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 might 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 part 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.

Installing a hot-swap hard disk drive

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, if an operating system is installed, or that a 19990305 error code is displayed, indicating that an operating system was not found but the server is otherwise working correctly. If the server is not working correctly, see Chapter 6, "Solving problems," on page 37 for diagnostic information.

The following illustration shows how to install a hot-swap hard disk drive.

Filler panel

Drive tray assembly

Drive handle
(in open position)
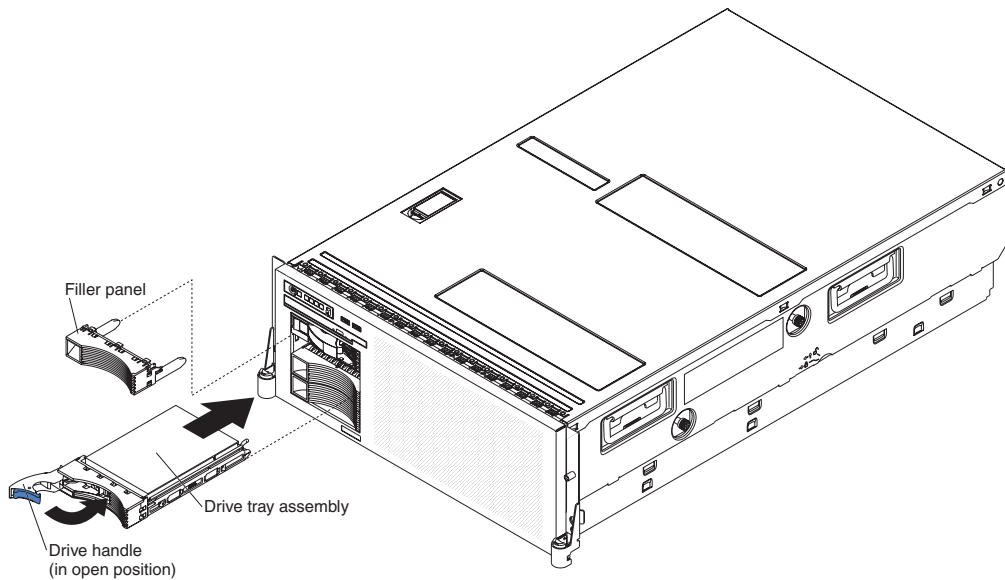
To install a hot-swap hard disk drive, complete the following steps:

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

2. Remove the filler panel from one of the empty hot-swap bays.

3. Make sure that the tray handle is open; then, install the hard disk drive into the hot-swap bay.

Notes:

1. When you turn on the server, check the hard disk drive status LEDs to make sure that the hard disk drive is operating correctly.

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

2. If the server will be configured for RAID operation using a ServeRAID™ controller, you must configure the disk arrays before you install the operating system. See the ServeRAID documentation on the *IBM ServeRAID Support* CD for additional information about RAID operation and complete instructions for using ServeRAID Manager.

Installing a memory module

The following illustration shows how to install a dual inline memory module (DIMM) on a microprocessor/memory card.
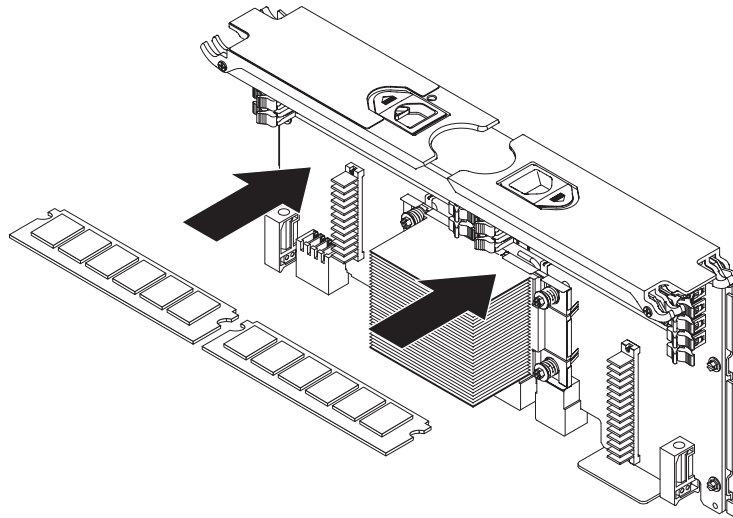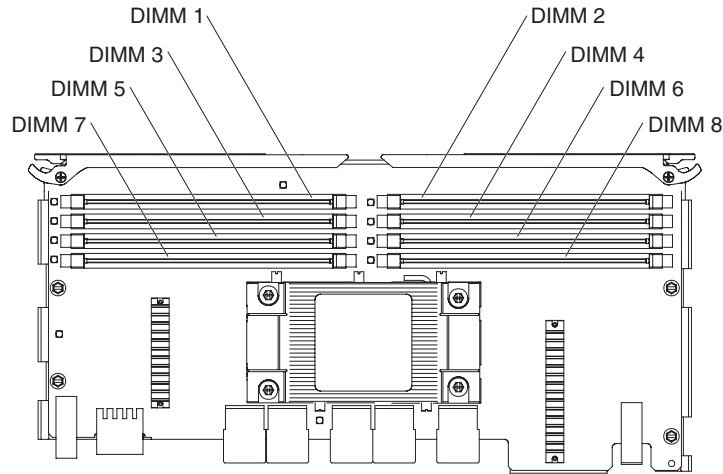
The following notes describe information that you must consider when you install DIMMs:

- You can configure your server to use online-spare memory, Chipkill memory, and memory scrubbing. For detailed information about configuring your server and using these features, see the *User's Guide* on the IBM *System x Documentation* CD.
- The server supports up to four microprocessor/memory cards. Each microprocessor/memory card holds up to eight DIMMs.
- When you install additional DIMMs on a microprocessor/memory card, be sure to install them in pairs. Each pair of DIMMs must be the same speed, type, and size. However, each microprocessor/memory card can have different speed, type, and size DIMMs.
- See Table 2 for the order in which to install DIMMs on each microprocessor/memory card.

Table 2. DIMM pair installation sequence

Installation order	DIMM connectors
First pair	1 and 2
Second pair	3 and 4
Third pair	5 and 6
Fourth pair	7 and 8

The following illustration shows the DIMM connectors on the microprocessor/memory card.

```
    DIMM 1                              DIMM 2
         DIMM 3                    DIMM 4
         DIMM 5               DIMM 6
      DIMM 7             DIMM 8
```

To install additional DIMMs, 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 necessary to replace the device.

   Attention: When you handle static-sensitive devices, take precautions to avoid damage from static electricity. For details about handling these devices, see "Handling static-sensitive devices" on page 9.

3. Remove the top cover.

4. If necessary, remove the microprocessor/memory card on which you are installing the DIMM.

   Attention: When you move the microprocessor/memory card, do not allow it to touch any components or structures inside the server.

   a. Slide the retention tabs to the open position and lift the microprocessor/memory card retention levers on the top of the microprocessor/memory card.

   b. While you hold the retention levers open, lift the microprocessor/memory card out of the server.

5. Place the microprocessor/memory card on a flat, static-protective surface with the DIMM connectors facing up.

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

6. Lift open the microprocessor/memory card air baffle.

Air baffle
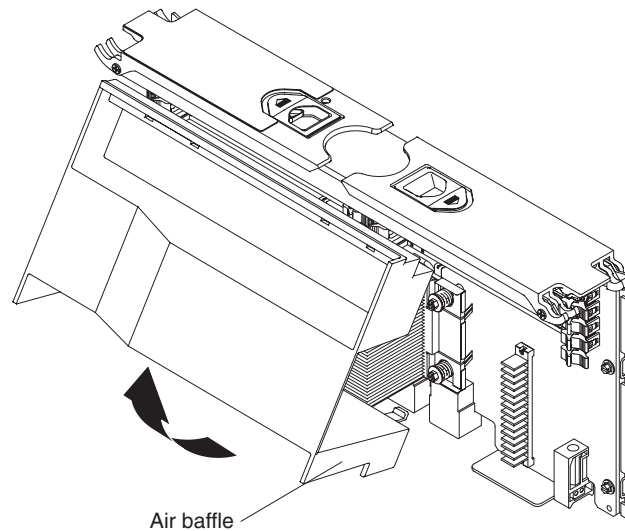
7. Open the retaining clip on each end of the DIMM connector.

8. 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.

9. Turn the DIMM so that the DIMM keys align correctly with the slot.

DIMM
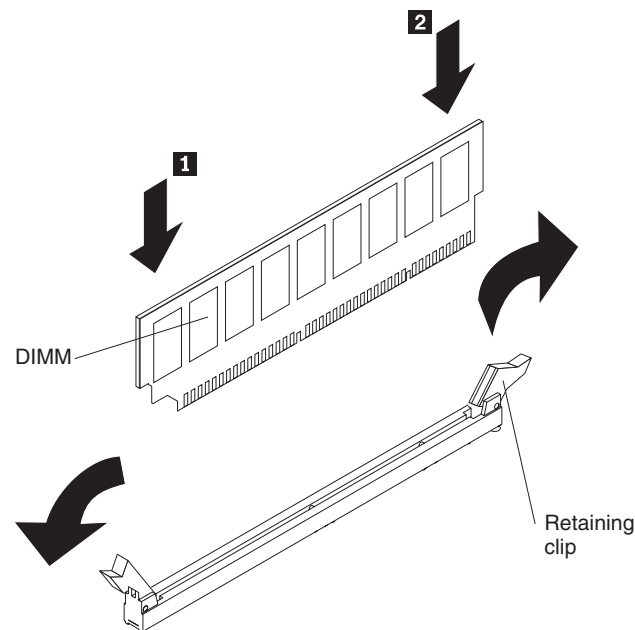
Retaining clip

10. Insert the DIMM into the connector by aligning the edges of the DIMM with the slots at the ends of the DIMM connector.

11. Firmly press one end of the DIMM into the connector; then, press the other end into the connector. The retaining clips snap into the locked position when the DIMM is seated in the connector. If there is a gap between the DIMM and the retaining clips, the DIMM has not been correctly inserted; open the retaining clips, remove the DIMM, and then reinsert it.

12. Repeat steps 7 through 11 to install the second DIMM in the pair and for each additional pair that you install.

13. Close the microprocessor/memory card air baffle.

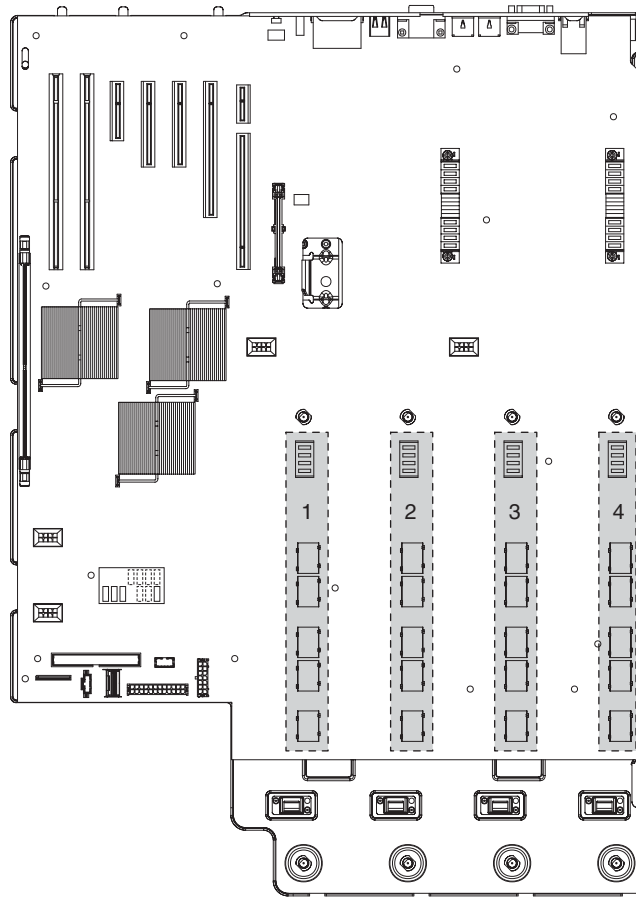14. Install the microprocessor/memory card:

a. Grasp the microprocessor/memory card by the retention levers and turn the microprocessor/memory card so that the connectors align with the connectors on the I/O board.

b. Align the microprocessor/memory card with the guides.

c. Press the microprocessor/memory card into the connectors and close the retention levers. Slide the retention tabs to lock the card in place.

If you have other devices to install or remove, do so now; otherwise, go to "Completing the installation" on page 20.

Installing a microprocessor/memory card

The following notes describe information that you must consider when you install a microprocessor/memory card:

- Each microprocessor/memory card comes with one AMD Opteron microprocessor installed and has eight DIMM connectors.
- The server supports up to four microprocessor/memory cards with four microprocessors. If you are installing two or more microprocessors, all must be the same cache size and type.
- At least three microprocessor/memory cards must be installed to support a HyperTransport adapter.
- The server operates at the clock speed of the lowest speed microprocessor in the server.
- When you install additional microprocessor/memory cards, populate the microprocessor/memory card connectors in numeric order on the I/O board, starting with connector 2. Install the microprocessor/memory cards in the order shown in the following illustration.

- You must install a passthru card in a microprocessor/memory card slot to support some microprocessor/memory card configurations. See Table 3 for the passthru card installation requirements.

Table 3. Passthru card installation requirements

Slots populated with microprocessor/ memory cards	Passthru card requirement
Slot 1	Slot 2
Slot 1 and slot 2	None
Slot 1, slot 2, and slot 3	Slot 4
Slot 1, slot 2, slot 3, and slot 4	None

- All 6 fans must be installed to support some microprocessor/memory card configurations. See Table 4 for the fan requirements.

Table 4. Fan requirements

Slots populated with microprocessor/ memory cards	Fan requirement
Slot 1	Fans in locations 1, 2, and 5
Slot 1 and slot 2	Fans in locations 1, 2, and 5
Slot 1, slot 2, and slot 3	All 6 fans
Slot 1, slot 2, slot 3, and slot 4	All 6 fans

To install an additional microprocessor/memory card, 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 necessary to replace the device.
3. Remove the top cover.

    Attention: When you handle static-sensitive devices, take precautions to avoid damage from static electricity. For details about handling these devices, see "Handling static-sensitive devices" on page 9.

4. Prepare the microprocessor/memory card:

    a. Touch the static-protective package that contains the microprocessor/ memory card to any unpainted surface on the outside of the server; then, remove the microprocessor/memory card from the package.

    b. If you are installing DIMMs on the microprocessor/memory card, install the DIMMs (see "Installing a memory module" on page 11).

    c. If necessary, close the microprocessor/memory card air baffle.

Air baffle
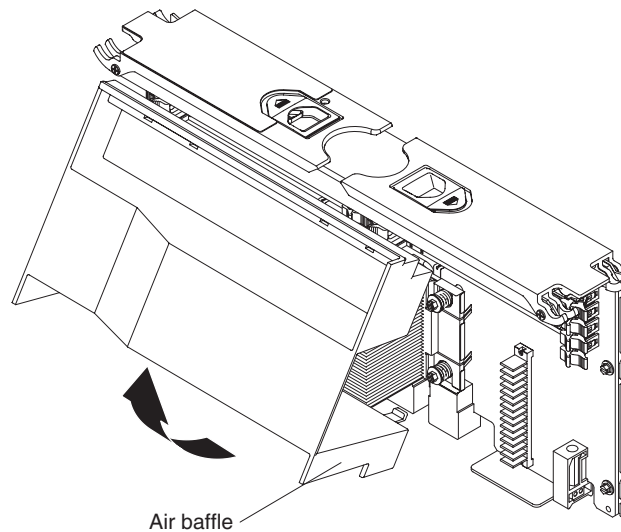
5. Install the microprocessor/memory card.

    Attention: When you move the microprocessor/memory card, do not allow it to touch any components or structures inside the server.

    a. Grasp the microprocessor/memory card by the retention levers and turn the microprocessor/memory card so that the connectors align with the connectors on the I/O board.

    b. Align the microprocessor/memory card with the guides.

    c. Press the microprocessor/memory card into the connectors and close the retention levers. Slide the retention tabs to lock the card in place.

If you have other devices to install or remove, do so now; otherwise, go to "Completing the installation" on page 20.

Installing an adapter

The following sections describe how to install adapters in the server.

Installing the Remote Supervisor Adapter II SlimLine

An optional IBM Remote Supervisor Adapter II SlimLine can be installed only in its dedicated connector on the I/O board.
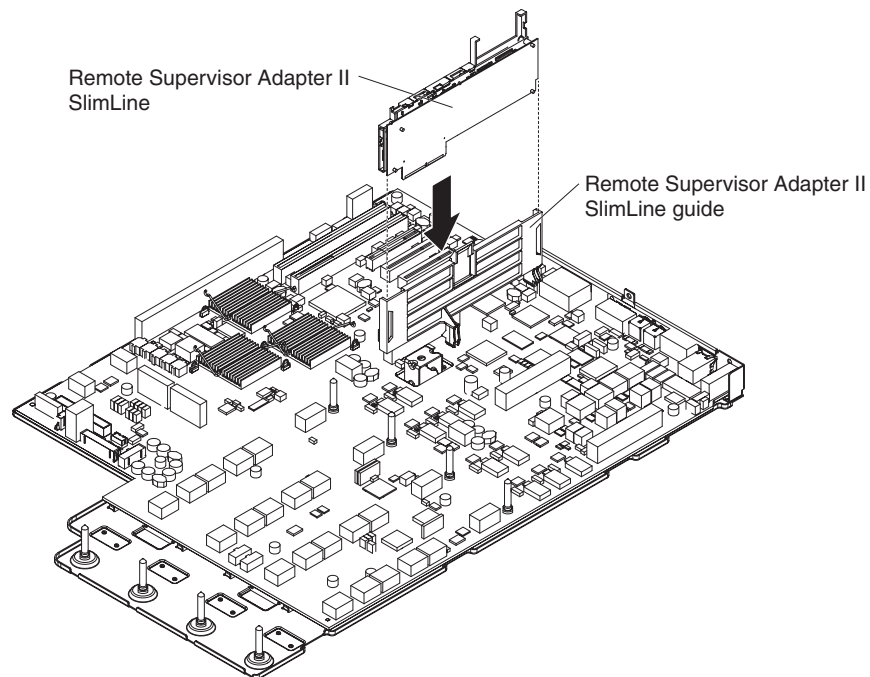
Note: If a Remote Supervisor Adapter II SlimLine is installed in the server, when you turn on the server for the first time, the server might appear to be unresponsive for an unusual length of time (one minute to several minutes). This is normal operation while the Remote Supervisor Adapter II SlimLine gathers information about the server.

To install a Remote Supervisor Adapter II SlimLine, 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 necessary to install the device.

   Attention: When you handle static-sensitive devices, take precautions to avoid damage from static electricity. For details about handling these devices, see "Handling static-sensitive devices" on page 9.
3. Remove the top cover.

Remote Supervisor Adapter II SlimLine

Remote Supervisor Adapter II SlimLine guide

4. Carefully grasp the Remote Supervisor Adapter II SlimLine assembly by its top edge or upper corners, and align it with the guide and the connector on the I/O board.

   Attention: Incomplete insertion might cause damage to the I/O board or the adapter.
5. Press the assembly firmly into the connector and under the retention latch on the guide.
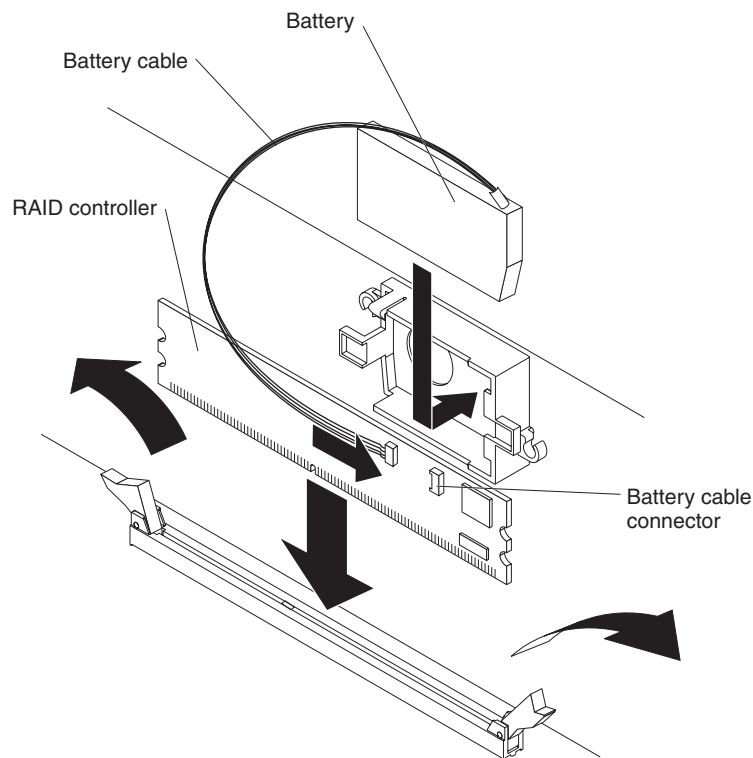
If you have other devices to install or remove, do so now; otherwise, go to "Completing the installation" on page 20.

Installing a ServeRAID-8k SAS controller

To replace the ServeRAID-8k-l SAS controller with a ServeRAID-8k SAS controller, review the following information:

- A ServeRAID-8k SAS controller can be installed only in the dedicated slot on the I/O board.
- The ServeRAID-8k SAS controller is not cabled to the server, and no rerouting of the SAS cables is required.

The following illustration shows how to install a ServeRAID-8k SAS controller.

For more detailed instructions or information, see the *User's Guide* on the IBM *System x Documentation* CD.

If you have other devices to install or remove, do so now; otherwise, go to "Completing the installation" on page 20.

Installing an adapter

The PCI bus configuration is as follows:
- Non-hot-plug, full-length PCI Express x16 (x16 lanes) slot 1.
- Non-hot-plug, full-length PCI Express x8 (x8 lanes) slot 2 and slot 3.
- Non-hot-plug, full-length PCI Express x4 (x4 lanes) slot 4.
- Non-hot-plug, full-length 64-bit/100 MHz or 133 MHz slot 5 and slot 6. See Table 5 for slot speed assignments for slot 5 and slot 6.

Table 5. Slot 5 and slot 6 bus speed assignments

Slot 5	Slot 6	Bus speed
PCI-X 133 MHz adapter	Unpopulated	100 MHz
Unpopulated	PCI-X 133 MHz adapter	133 MHz
PCI-X 133 MHz adapter	PCI-X 133 MHz adapter	100 MHz

- Non-hot-plug, half-length HyperTransport (HTX) slot.

  Note: At least three microprocessor/memory cards must be installed to support a HyperTransport adapter.

To install an adapter, 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 necessary to install the device.

   Attention: When you handle static-sensitive devices, take precautions to avoid damage from static electricity. For details about handling these devices, see "Handling static-sensitive devices" on page 9.
3. Remove the top cover.
4. Determine which PCI expansion slot you will use for the adapter.
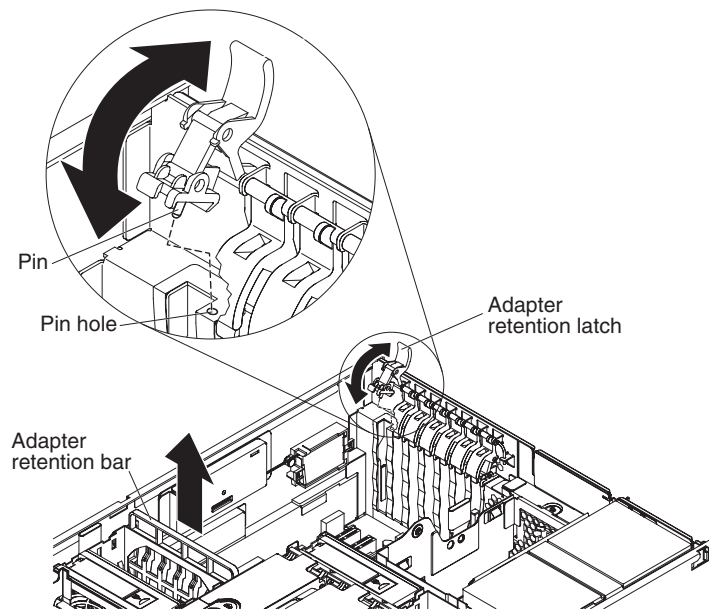
5. See the documentation that comes with the adapter for instructions for setting jumpers or switches and for cabling.

   Note: Route adapter cables before you install the adapter.
6. Install the adapter:
   a. Open the adapter retention latch by lifting the front edge.
   b. Remove the expansion-slot cover.
   c. Lift up on the adapter retention bar.
   d. Carefully grasp the adapter by its top edge or upper corners, and align it with the connector on the I/O board.
   e. If necessary, remove the adapter guide before you install a full-length adapter.
   f. Press the adapter *firmly* into the adapter connector.
   g. Replace the adapter retention bar to stabilize the adapter.
   h. Close the adapter retention latch. Be sure to align the pin on the latch with the matching hole in the chassis.
7. Connect any required cables to the adapter.

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

Completing the installation

To complete the installation, complete the following steps:

1. Install the top cover.
2. Install the server in a rack. See the *Rack Installation Instructions* that come with the server for complete rack installation and removal instructions.
3. Connect the cables and power cords. See "Connecting the cables" for more information.

Connecting the cables

You must turn off the server (see "Turning off the server" on page 26) before you connect any cables to or disconnect any cables from the server.

See the documentation that comes with optional devices for additional cabling instructions. It might be easier for you to route cables before you install certain devices.

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.

For details about the locations and functions of the input and output connectors, see Chapter 3, "Server controls, connectors, LEDs, and power," on page 23.

The following illustration shows the location of the input and output connectors on the rear of the server. Detailed cabling instructions are in the *Rack Installation Instructions* that come with the server.
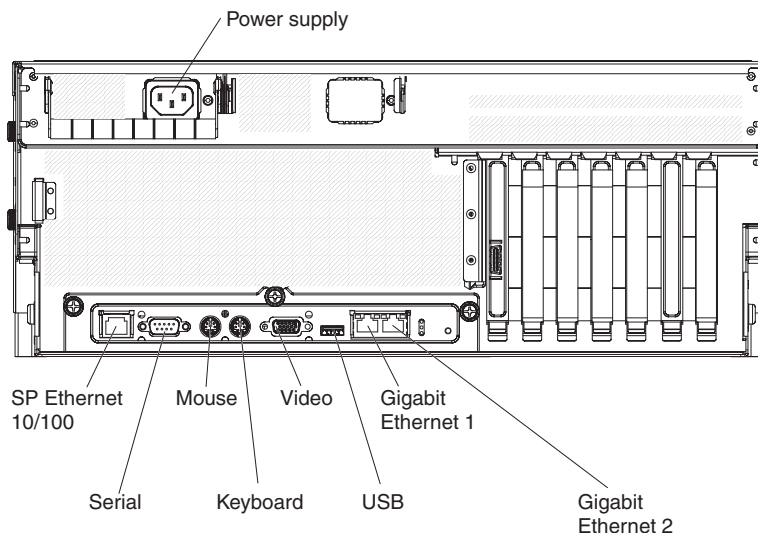
Updating the server configuration

When you start the server for the first time after you add or remove an internal optional device or external SAS or SCSI 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 more than one microprocessor is installed, the server can operate as a symmetric multiprocessing (SMP) server. You might have to upgrade the operating system to support SMP. For more information, see the section about using the *ServerGuide Setup and Installation* CD in the *User's Guide* on the IBM *System x Documentation* CD and the operating-system documentation.

If the server is configured for RAID operation and you have installed or removed a hard disk drive, see the documentation that comes with the RAID controller for information about reconfiguring the disk arrays.
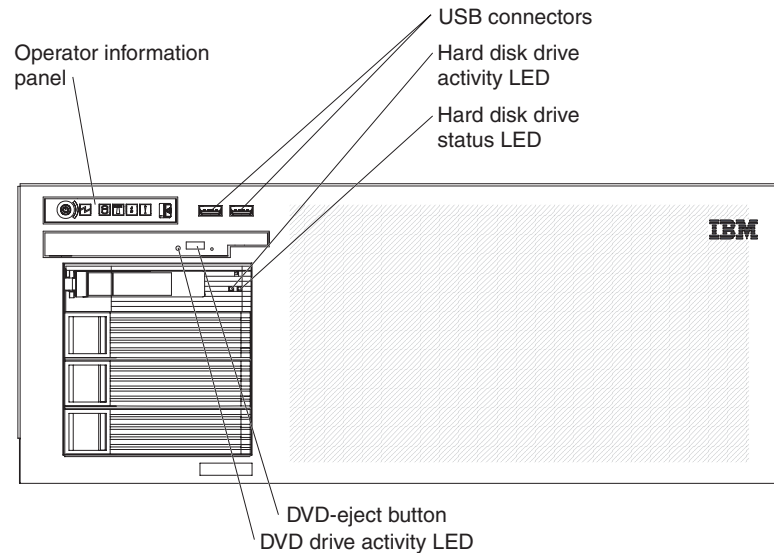
For information about configuring the integrated Gigabit Ethernet controllers, see the *User's Guide* on the IBM *System x Documentation* CD.

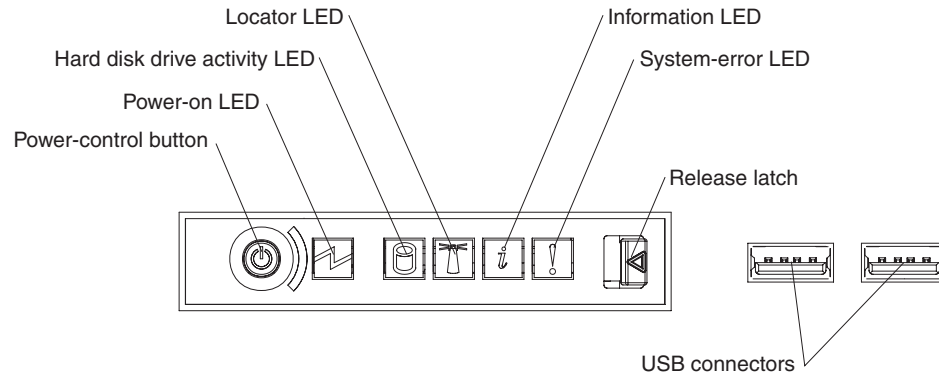# Chapter 3. Server controls, connectors, LEDs, and power

This chapter describes the controls, connectors, 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 server.

Operator information panel

USB connectors

Hard disk drive activity LED

Hard disk drive status LED

IBM

DVD-eject button

DVD drive activity LED

Operator information panel: The following illustration shows the controls and LEDs on the operator information panel.

Locator LED

Information LED

Hard disk drive activity LED

System-error LED

Power-on LED

Power-control button

Release latch

USB connectors

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

Power-control button: Press this button to turn the server on and off manually. A power-control-button shield comes with the server.

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.

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

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

Locator LED: When this LED is lit, it has been lit remotely by the system administrator to aid in visually locating the server.

Information LED: When this LED is lit, it indicates that a noncritical event has occurred. An LED on the light path diagnostics panel is also lit to help isolate the error.

System-error LED: When this LED is lit, it indicates that there is a fault or condition in the server and that light path diagnostics might light an additional LED to help isolate the condition.

Release latch: Slide this latch to the left to access the light path diagnostics panel.

USB connectors: Connect USB devices to these connectors.

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

Hard disk drive status LED: If the server is configured for RAID operation, when this LED is lit, it indicates that the associated hard disk drive has failed. If the LED flashes slowly (one flash per second), the drive is being rebuilt. If the LED flashes rapidly (three flashes per second), the controller is identifying the drive.

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

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

Rear view

The following illustration shows the connectors and LEDs on the rear of the server.
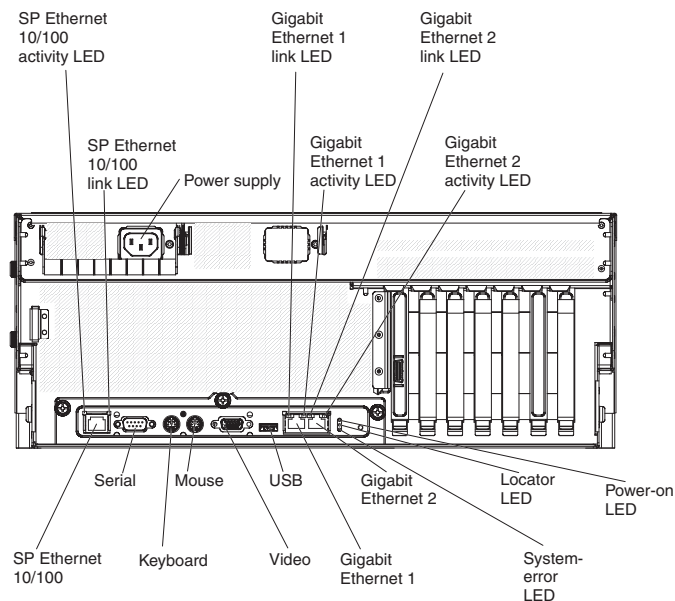
SP Ethernet 10/100 activity LED: This LED is on the SP Ethernet 10/100 connector. When this LED is lit, it indicates that there is activity between the server and the network.

SP Ethernet 10/100 link LED: This LED is on the SP Ethernet 10/100 connector. When this LED is lit, it indicates that there is an active connection on the Ethernet port.

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

Gigabit Ethernet 1 link LED: This LED is on the Gigabit Ethernet 1 connector. When this LED is lit, it indicates that there is an active connection on the Ethernet port.

Gigabit Ethernet 1 activity LED: This LED is on the Gigabit Ethernet 1 connector. When this LED flashes, it indicates that there is activity between the server and the network.

Gigabit Ethernet 2 link LED: This LED is on the Gigabit Ethernet 2 connector. When this LED is lit, it indicates that there is an active connection on the Ethernet port.

Gigabit Ethernet 2 activity LED: This LED is on the Gigabit Ethernet 2 connector. When this LED flashes, it indicates that there is activity between the server and the network.

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.

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

Locator LED: When this LED is lit, it has been lit remotely by the system administrator to aid in visually locating the server.

System-error LED: When this LED is lit, it indicates that there is a fault or condition in the server and that light path diagnostics might light an additional LED to help isolate the condition.

Gigabit Ethernet 2 connector: Use this connector to connect the server to a network.

Gigabit Ethernet 1 connector: Use this connector to connect the server to a network.

USB connector: Connect a USB device to this connector.

Video connector: Connect a monitor to this connector.

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

Keyboard connector: Connect a keyboard to this connector.

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).

SP Ethernet 10/100 connector: Use this connector to connect the service processor to a network.

Server power features

When the server is connected to an ac power source but is not turned on, the operating system does not run, and all core logic except for the service processor is shut down; however, the server can respond to requests from the service processor, 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 your operating system supports the systems-management software for an optional Remote Supervisor Adapter II SlimLine, the systems-management software can turn on the server.
- If your operating system supports the Wake on LAN® feature, the Wake on LAN feature can turn on the server.

Turning off the server

When you turn off the server and leave it connected to ac power, the server can respond to requests from the service processor, such as a remote request to turn on the server. While the server remains connected to ac power, one or more fans might continue to run. To remove all power from the server, you must disconnect it from the power source.
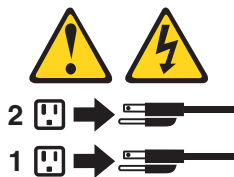
Some operating systems require an orderly shutdown before you turn off the server. See your operating-system documentation for information about shutting down the operating system.

Statement 5:

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

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

- You can turn off the server from the operating system, if your operating system supports this feature. After an orderly shutdown of the operating system, the server will be turned off automatically.
- You can press the power-control button to start an orderly shutdown of the operating system and turn off the server, if your operating system supports this feature.
- If the operating system stops functioning, you can press and hold the power-control button for more than 4 seconds to turn off the server.
- If an optional Remote Supervisor Adapter II SlimLine is installed in the server, the server can be turned off from the Remote Supervisor Adapter II SlimLine user interface.
- You can turn off the server through a request from the service processor.

Chapter 4. Configuring the server

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

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
- Baseboard management controller utility programs
- RAID configuration programs
    - IBM ServeRAID Configuration Utility program
    - ServeRAID Manager
- Remote Supervisor Adapter II Web interface

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

Using the ServerGuide Setup and Installation CD

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

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

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

Using the Configuration/Setup Utility program

Use the Configuration/Setup Utility program to perform the following tasks:

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

- Set the date and time
- Set the power-on password and security settings
- Set the trusted platform module (TPM) settings
- Set the baseboard management controller (BMC) settings
- Set the Remote Supervisor Adapter II SlimLine settings
- View the POST error log and system event/error log

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

1. Turn on the server.
2. When the message `Press F1 for Configuration/Setup` 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.

Installing and using the baseboard management controller utility programs

The baseboard management controller provides basic service-processor environmental monitoring functions. If an environmental condition exceeds a threshold or if a system component fails, the baseboard management controller lights LEDs to help you diagnose the problem and also records the error in the BMC system event log.

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

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

  The command-line interface provides direct access to server management functions through the IPMI 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. For more information about IPMI 2.0, see the *Intelligent Platform Management Interface Specification (IPMI Specification)*, version 2.0, which is available at http://www.intel.com.

- **Serial over LAN**

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

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

Use the baseboard management controller utility programs to configure the baseboard management controller, download firmware updates, and remotely manage a network.

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

To download the program, go to http://www.ibm.com/servers/eserver/support/ xseries/index.html; then, copy the bmc_cfg.exe file to a configuration utility diskette on a USB-connected diskette drive.

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

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

See the *User's Guide* on the IBM *System x Documentation* CD for details.

Using the RAID configuration programs

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

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

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

- The ServeRAID-8k-l SAS controller that comes with the server supports only RAID level-0, level-1, and level-10. You can replace it with a ServeRAID-8k SAS controller that supports additional RAID levels.
- Hard disk drive capacities affect how you create arrays. The drives in an array can have different capacities, but the ServeRAID controller treats them as if they all have the capacity of the smallest hard disk drive.
- To help ensure signal quality, do not mix drives with different speeds and data rates.
- To update the firmware and BIOS code for an optional ServeRAID controller, you must use the IBM *ServeRAID Support* CD that comes with the ServeRAID option.

Using the IBM ServeRAID Configuration Utility program

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

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

Starting the IBM ServeRAID Configuration Utility program

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

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

IBM ServeRAID Configuration Utility menu choices

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

- **Array Configuration Utility**

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

- **SerialSelect Utility**

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

- **Disk Utilities**

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

Using ServeRAID Manager

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

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

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

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

Configuring the RAID controller

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

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

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

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

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

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

1. In the ServeRAID Manager tree, click the controller.
2. Click **Custom configuration**.
3. Click **Next**.
4. In the "Create arrays" window, from the list of ready drives, select the drives that you want to group into the array.
5. Click the (Add selected drives) icon to add the drives to the array.
6. If you want to configure a hot-spare drive, complete the following steps:
   a. Click the **Spares** tab.
   b. Select the physical drive that you want to designate as the hot-spare drive, and click the (Add selected drives) icon.
7. Click **Next**.
8. Review the information in the "Configuration summary" window. To change the configuration, click **Back**.
9. Click **Apply**; when you are asked whether you want to apply the new configuration, click **Yes**. The configuration is saved in the controller and in the physical drives.
10. Exit from ServeRAID Manager and remove the CD from the CD-RW/DVD drive.
11. Restart the server.

Viewing the configuration

You can use ServeRAID Manager to view information about RAID controllers and the RAID subsystem (such as arrays, logical drives, hot-spare drives, and physical

drives). When you click an object in the ServeRAID Manager tree, information about that object appears in the right pane. To display a list of available actions for an object, click the object and click **Actions**.

Using the Remote Supervisor Adapter II Web interface

The Remote Supervisor Adapter II Web interface is a graphical user interface that you can use to perform many of the tasks that were previously only available through the Configuration/Setup Utility program. The Remote Supervisor Adapter II Web interface is in the Remote Supervisor Adapter II integrated service processor and is accessed using a Web browser on the administrator console or another computer that is connected to the server through the serial connector on the rear of the server.

Before you use the Remote Supervisor Adapter II Web interface, read the following information:

- A Remote Supervisor Adapter II SlimLine must be installed in the server.
- You must have a Web browser to access the Web interface.
- You must know the IP address or the host name of the Remote Supervisor Adapter II SlimLine that you are connecting to.
- You can find the IP address and the host name in the Configuration/Setup Utility program or from your network administrator.
- You can connect directly to the server or use an Ethernet network to access the service processor and the Remote Supervisor Adapter II Web interface.
- You must connect one of the following cables:
  - Crossover cable from the serial connector to a computer.
  - An Ethernet cable that is connected to an Ethernet network.

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

Chapter 5. 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:

1. Check for the latest version of IBM Director:
   a. Go to http://www.ibm.com/servers/eserver/xseries/systems_management /xseries_sm/dwnl.html.
   b. If a newer version of IBM Director than what comes with the server is shown in the drop-down list, follow the instructions on the Web page to download the latest version.
2. Install the IBM Director program.
3. Download and install any applicable updates or interim fixes for the server:
   a. Go to http://www.ibm.com/servers/eserver/support/xseries/index.html.
   b. From the **Hardware** list, select **System x3755**.
   c. From the **Software** list, select the operating environment of the server and click **Go**.
   d. Under **Fixes and drivers**, select the choice for your operating system.
   e. Select any applicable update or interim fix that you want to download.
   f. Click the file link for the executable file to download the file, and follow the instructions in the readme file to install the update or interim fix.
   g. Repeat steps 3e and 3f for any additional updates or interim fixes that you want to install.

Chapter 6. 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 "Getting help and technical assistance," on page 59, the *Problem Determination and Service Guide* on the IBM *System x Documentation* CD, and the "Server Support" flowchart in the front of this document.

Diagnostic tools overview

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

- **POST beep codes**

  The power-on self-test beep codes indicate the detection of a problem.
  - One beep indicates successful completion of POST, with no errors.
  - More than one beep indicates that POST detected a problem. Error messages also appear during startup if POST detects a hardware-configuration problem.

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

- **Troubleshooting tables**

  These tables list problem symptoms and actions to correct the problems. See "Troubleshooting tables" on page 40 for more information.

- **Diagnostic programs and error messages**

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

- **Light path diagnostics**

  Use light path diagnostics to diagnose system errors quickly. See "Light path diagnostics" on page 52 for more information.

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.

Two short beeps
> The server configuration has changed.

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

POST error codes

The following table provides an abbreviated list of the error codes and messages that might be displayed during POST. See the *Problem Determination and Service Guide* on the IBM *System x Documentation* CD for more information about the POST error codes and messages. For updated technical information, go to http://www.ibm.com/servers/eserver/support/xseries/index.html, select **System x3755**, click the **Install and use** tab, and click **Product documentation**.

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

Error code	Description	Action

162	Device configuration error.	1. Run the Configuration/Setup Utility program, select **Load Default Settings**, and save the settings.
		2. Reseat the following components:
		  a. Battery
		  b. Failing device
		3. Replace the following components one at a time, in the order shown, restarting the server each time.
		  a. Battery
		  b. Failing device
		  c. (Trained service technician only) I/O board

163	Real-time clock error.	1. Run the Configuration/Setup Utility program, select **Load Default Settings**, make sure the date and time are correct, and save the settings.
		2. Reseat the battery.
		3. Replace the following components one at a time, in the order shown, restarting the server each time.
		  a. Battery
		  b. (Trained service technician only) I/O board

289	A DIMM has been disabled by the user or by the system.	1. If the DIMM was disabled by the user, run the Configuration/Setup Utility program and enable the DIMM.
		2. Reseat the disabled DIMM.
		3. Reseat the microprocessor/memory cards.
		4. Replace the following components one at a time, in the order shown, restarting the server each time.
		  a. Disabled DIMM
		  b. Microprocessor/memory card containing the disabled DIMM
		  c. (Trained service technician only) I/O board

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

Error code	Description	Action

301	Keyboard or keyboard controller error.	1. If you have installed a USB keyboard, run the Configuration/Setup Utility program and enable keyboardless operation to prevent the POST error message 301 from being displayed during startup.
		2. Reseat the keyboard.
		3. Replace the following components one at a time, in the order shown, restarting the server each time.
		  a. Keyboard
		  b. (Trained service technician only) I/O board

303	Keyboard controller error.	(Trained service technician only) Replace the I/O board.

00019*xxx*	Microprocessor *x* is not functioning or failed the built-in self-test.	1. Reseat the microprocessor/memory card containing microprocessor *x*.
		2. Replace the following components one at a time, in the order shown, restarting the server each time.
		  a. Microprocessor/memory card containing microprocessor x
		  b. (Trained service technician only) I/O board

00180*xxx*	A PCI adapter requested resources that are not available.	1. See http://www.ibm.com/servers/eserver/support/xseries/ index.html and search for MIGR-61663 for additional information on the error code.
		2. Make sure that the BIOS code is at the latest level.
		3. Run the Configuration/Setup Utility program to verify that the interrupt resource settings are correct.
		4. Reseat the failing adapter (if installed).
		5. Replace the following components one at a time, in the order shown, restarting the server each time.
		  a. Failing adapter
		  b. (Trained service technician only) I/O board

012980*xx* 012981*xx*	No update data for microprocessor *x*.	1. Update the BIOS code. 2. Reseat the microprocessor/memory card containing microprocessor xx. 3. Replace the microprocessor/memory card containing microprocessor xx.

I9990305	An operating system was not found.	1. Make sure that a bootable operating system is installed.
		2. Run the hard disk drive diagnostic test.
		3. Reseat the hard disk drive.
		4. Replace the following components one at a time, in the order shown, restarting the server each time.
		  a. Hard disk drive
		  b. (Trained service technician only) I/O board

Troubleshooting tables

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

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

1. Check the light path diagnostics LEDs on the operator information panel (see "Light path diagnostics" on page 52).
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

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

Symptom	Action
The CD or DVD drive is not recognized.	1. Make sure that: • The IDE channel to which the CD or DVD drive is attached (primary or secondary) is enabled in the Configuration/Setup Utility program. • All cables and jumpers are installed correctly. • The correct device driver is installed for the CD or DVD drive. 2. Run the CD or DVD drive diagnostic programs. 3. Reseat the following components: a. CD or DVD drive b. CD or DVD drive cable 4. Replace the components listed in step 3 one at a time, in the order shown, restarting the server each time.
A CD or DVD is not working correctly.	1. Clean the CD or DVD. 2. Run the CD or DVD drive diagnostic programs. 3. Reseat the CD or DVD drive. 4. Replace the CD or DVD drive.
The CD or DVD drive tray is not working.	1. Make sure that the server is turned on. 2. Insert the end of a straightened paper clip into the manual tray-release opening. 3. Reseat the CD or DVD drive. 4. Replace the CD or DVD drive.

General problems

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

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

Hard disk drive problems

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

Symptom	Action
Not all drives are recognized by the hard disk drive diagnostic test.	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. Verify that the hard disk drives have the minimum firmware levels.
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.
A hard disk drive passes the diagnostic SCSI Attached Disk Test, but the problem remains.	Run the diagnostic SCSI Attached Disk Test. **Note:** This test is not available on servers using controllers other than the integrated SAS controller or servers with IDE or SATA hard disk drives.

Intermittent problems

<table>
<tr><td colspan="2">

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

</td></tr>
<tr><th>Symptom</th><th>Action</th></tr>
<tr>
<td>A problem occurs only occasionally and is difficult to diagnose.</td>
<td>
1. Make sure that:
   - All cables and cords are connected securely to the rear of the server and attached devices.
   - When the server is turned on, air is flowing from the fan grille. If there is no airflow, the fan is not working. This can cause the server to overheat and shut down.
2. Check the system-error log or BMC log.
</td>
</tr>
</table>

Keyboard, mouse, or pointing-device problems

<table>
<tr><td colspan="2">

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

</td></tr>
<tr><th>Symptom</th><th>Action</th></tr>
<tr>
<td>All or some keys on the keyboard do not work.</td>
<td>
1. If the server is attached to a KVM switch, bypass the KVM switch to eliminate it as a possible cause of the problem: connect the keyboard cable directly to the correct connector on the rear of the server.
2. Make sure that:
   - The keyboard cable is securely connected.
   - If you are using a PS/2 keyboard, the keyboard and mouse cables are not reversed.
   - The server and the monitor are turned on.
3. If you are using a USB keyboard, run the Configuration/Setup Utility program and enable keyboardless operation to prevent the 301 POST error message from being displayed during startup.
4. 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.
5. Replace the following components one at a time, in the order shown, restarting the server each time:
   a. Keyboard
   b. (Trained service technician only) I/O board
</td>
</tr>
</table>

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

Symptom	Action
The mouse or pointing device does not work.	1. If the server is attached to a KVM switch, bypass the KVM switch to eliminate it as a possible cause of the problem: connect the mouse cable directly to the correct connector on the rear of the server. 2. Make sure that: 　• The mouse or pointing-device cable is securely connected to the server. 　• If you are using a PS/2 mouse or pointing device, the keyboard and mouse or pointing-device cables are not reversed. 　• The mouse or pointing-device device drivers are installed correctly. 　• The server and the monitor are turned on. 　• The mouse option is enabled in the Configuration/Setup Utility program. 3. 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. 4. Replace the following components one at a time, in the order shown, restarting the server each time: 　a. Mouse or pointing device 　b. (Trained service technician only) I/O board

Memory problems

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

Symptom	Action

The amount of system memory that is displayed is less than the amount of installed physical memory.	1. Make sure that:
	   • No error LEDs are lit on the operator information panel or on the microprocessor/memory cards.
	   • The memory modules are seated correctly.
	   • You have installed the correct type of memory.
	   • If you changed the memory, you updated the memory configuration in the Configuration/Setup Utility program.
	   • All banks of memory are enabled. The server might have automatically disabled a memory bank when it detected a problem, or a memory bank might have been manually disabled.
	2. Check the POST error log for error message 289:
	   • If a DIMM was disabled by a system-management interrupt (SMI), replace the DIMM.
	   • If a DIMM was disabled by the user or by POST, run the Configuration/Setup Utility program and enable the DIMM.
	3. Run memory diagnostics.
	4. Make sure that there is no memory mismatch when the server is at the minimum memory configuration (two 512 MB DIMMs on each microprocessor/memory card).
	5. Add one pair of DIMMs at a time, making sure that the DIMMs in each pair match.
	6. Add one microprocessor/memory card at a time, making sure that the DIMMs on each card match.
	7. Reseat the following components:
	   a. DIMMs
	   b. Microprocessor/memory cards
	8. Replace the components listed in step 7 one at a time, in the order shown, restarting the server each time.

Microprocessor problems

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

Symptom	Action

The server emits a continuous beep during POST, indicating that the startup (boot) microprocessor is not working correctly.	1. Correct any errors that are indicated by the light path diagnostics LEDs (see "Light path diagnostics" on page 52).
	2. Make sure that the server supports all the microprocessors and that the microprocessors match in cache size and speed.
	3. Reseat the microprocessor/memory cards.
	4. If there is no indication of which microprocessor has failed, isolate the error by testing with one microprocessor/memory card at a time.
	5. Replace the microprocessor/memory cards one at a time, restarting the server each time.
	6. If there are multiple error codes or light path diagnostics LEDs that indicate a microprocessor error, reverse the location of two microprocessor/memory cards to determine whether the error is associated with a microprocessor or with a microprocessor/memory card connector.
	   • If the error is associated with a microprocessor, replace the microprocessor/memory card.
	   • (Trained service technician only) If the error is associated with a microprocessor/memory card connector, replace the I/O board.

Monitor problems

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

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

Symptom	Action

Testing the monitor.	1. Make sure that the monitor cables are firmly connected.
	2. Try using a different monitor on the server, or try using the monitor that is being tested on a different server.
	3. Run the diagnostic programs. If the monitor passes the diagnostic programs, the problem might be a video device driver.
	4. Reseat the Remote Supervisor Adapter II SlimLine (if one is present).
	5. Replace the following components one at a time, in the order shown, restarting the server each time:
	   a. Remote Supervisor Adapter II SlimLine (if one is present)
	   b. (Trained service technician only) I/O board

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

Symptom	Action
The screen is blank.	1. If the server is attached to a KVM switch, bypass the KVM switch to eliminate it as a possible cause of the problem: connect the monitor cable directly to the correct connector on the rear of the server. 2. Make sure that: • The server is turned on. If there is no power to the server, see "Power problems" on page 49. • The monitor cables are connected correctly. • The monitor is turned on and the brightness and contrast controls are adjusted correctly. • No beep codes sound when the server is turned on. **Important:** In some memory configurations, the 3-3-3 beep code might sound during POST, followed by a blank monitor screen. If this occurs and the **Boot Fail Count** option in the **Start Options** of the Configuration/Setup Utility program is enabled, you must restart the server three times to reset the configuration settings to the default configuration (the memory connector or bank of connectors enabled). 3. Make sure that the correct server is controlling the monitor, if applicable. 4. Make sure that damaged BIOS code is not affecting the video. 5. Observe the checkpoint LEDs on the I/O board.
The monitor works when you turn on the server, but the screen goes blank when you start some application programs.	1. Make sure that: • The application program is not setting a display mode that is higher than the capability of the monitor. • You installed the necessary device drivers for the application. 2. Run video diagnostics. • If the server passes the video diagnostics, the video is good. • (Trained service technician only) If the problem remains, replace the I/O board.

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

Symptom	Action
The monitor has screen jitter, or the screen image is wavy, unreadable, rolling, or distorted.	1. If the monitor self-tests show that the monitor is working correctly, consider the location of the monitor. Magnetic fields around other devices (such as transformers, appliances, fluorescent lights, and other monitors) can cause screen jitter or wavy, unreadable, rolling, or distorted screen images. If this happens, turn off the monitor. **Attention:** Moving a color monitor while it is turned on might cause screen discoloration. Move the device and the monitor at least 305 mm (12 in.) apart, and turn on the monitor. **Notes:** a. To prevent diskette drive read/write errors, make sure that the distance between the monitor and any external diskette drive is at least 76 mm (3 in.). b. Non-IBM monitor cables might cause unpredictable problems. 2. Reseat the following components: a. Monitor b. Remote Supervisor Adapter II SlimLine (if one is present) 3. Replace the following components one at a time, in the order shown, restarting the server each time: a. Monitor b. Remote Supervisor Adapter II SlimLine (if one is present) c. (Trained service technician only) I/O board
Wrong characters appear on the screen.	1. If the wrong language is displayed, update the BIOS code with the correct language. 2. Reseat the monitor. 3. Replace the following components one at a time, in the order shown, restarting the server each time: a. Monitor b. (Trained service technician only) I/O board

Optional-device problems

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

Symptom	Action

An IBM optional device that was just installed does not work.	1. Make sure that:
	  • The device is designed for the server (see http://www.ibm.com/servers/eserver/serverproven/compat/us/).
	  • You followed the installation instructions that came with the device and the device is installed correctly.
	  • You have not loosened any other installed devices or cables.
	  • You updated the configuration information in the Configuration/Setup Utility program. Whenever memory or any other device is changed, you must update the configuration.
	2. Reseat the device that you just installed.
	3. Replace the device that you just installed.

An IBM optional device that used to work does not work now.	1. Make sure that all of the hardware and cable connections for the device are secure.
	2. If the device comes with test instructions, use those instructions to test the device.
	3. If the failing device is a SCSI device, make sure that:
	  • The cables for all external SCSI devices are connected correctly.
	  • The last device in each SCSI chain, or the end of the SCSI cable, is terminated correctly.
	  • Any external SCSI device is turned on. You must turn on an external SCSI device before turning on the server.
	4. Reseat the failing device.
	5. Replace the failing device.

Power problems

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

Symptom	Action

The server does not start. **Note:** The power-control button will not function until 10 seconds after the server has been connected to ac power.	1. Make sure that:
	 • The power cords are correctly connected to the server and to a working electrical outlet.
	 • The type of memory that is installed is correct.
	 • The microprocessor/memory cards are fully seated.
	 • The LEDs on the power supply do not indicate a problem.
	 • The microprocessor/memory cards are installed in the correct sequence.
	
	2. If the power-on LED does not flash:
	  a. Disconnect the server power cords.
	  b. Reconnect the power cords.
	  c. Reseat the operator information panel cables, and then repeat steps 2a and 2b.
	     • If the server starts, reseat the operator information panel. If the problem remains, replace the operator information panel.
	     • If the server does not start, bypass the operator information panel power-control button by using the force power-on jumper; if the server starts, reseat the operator information panel. If the problem remains, replace the operator information panel.
	
	3. Reseat the following components:
	  a. Microprocessor/memory cards
	  b. Power switch connector
	
	4. Replace the following components one at a time, in the order shown, restarting the server each time:
	  a. Microprocessor/memory cards
	  b. Power switch connector
	  c. (Trained service technician only) I/O board
	
	5. If you just installed an optional device, remove it, and restart the server. If the server now starts, you might have installed more devices than the power supply supports.

The server does not turn off.	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:
	  a. Press Ctrl+Alt+Delete.
	  b. Turn off the server by pressing the power-control button for 5 seconds.
	  c. Restart the server.
	  d. If the server fails POST and the power-control button does not work, disconnect the power cord for 20 seconds; then, reconnect the power cord and restart the server.
	
	2. If the problem remains or if you are using an ACPI-aware operating system, suspect the I/O board.

Symptom	Action
• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**	
• **See the parts listing in the *Problem Determination and Service Guide* to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**	
• **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**	
Symptom	**Action**
The server unexpectedly shuts down, and the LEDs on the operator information panel are not lit.	See the *Problem Determination and Service Guide* on the IBM *System x Documentation* CD for more information.

Serial port problems

Symptom	Action
• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**	
• **See the parts listing in the *Problem Determination and Service Guide* to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**	
• **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**	
Symptom	**Action**
The number of serial ports that are identified by the operating system is less than the number of installed serial ports.	Make sure that each port is assigned a unique address in the Configuration/Setup Utility program and that none of the serial ports is disabled.

A serial device does not work.	1. Make sure that:
	   • The device is compatible with the server.
	   • The serial port is enabled and is assigned a unique address.
	   • The device is connected to the correct connector (see Chapter 3, "Server controls, connectors, LEDs, and power," on page 23).
	2. Reseat the following components:
	   a. Failing serial device
	   b. Serial cable
	   c. Remote Supervisor Adapter II SlimLine (if one is present)
	3. Replace the following components one at a time, in the order shown, restarting the server each time:
	   a. Failing serial device
	   b. Serial cable
	   c. Remote Supervisor Adapter II SlimLine (if one is present)
	   d. (Trained service technician only) I/O board

ServerGuide problems

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

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

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

Symptom	Action

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

Universal Serial Bus (USB) port problems

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

Symptom	Action
A USB device does not work.	1. Make sure that: • The correct USB device driver is installed. • The operating system supports USB devices. • A standard PS/2 keyboard or mouse is not connected to the server. If it is, a USB keyboard or mouse will not work during POST. 2. Make sure that the USB configuration options are set correctly in the Configuration/Setup Utility program menu (see the *User's Guide* for more information). 3. If you are using a USB hub, disconnect the USB device from the hub and connect it directly to the server.

Video problems

See "Monitor problems" on page 45.

Light path diagnostics

Use light path diagnostics to diagnose system errors. By viewing the LEDs in order, you can often identify the source of the error.

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

Any memory or microprocessor LED can be lit while the microprocessor/memory card is removed from the server so that you can isolate a problem. After ac power has been removed from the server, power remains available to these LEDs for up to 24 hours.

To view the memory or microprocessor LEDs, press and hold the light path diagnostics button on the microprocessor/memory card to light the error LEDs. The LEDs that were lit while the server was turned on will be lit again while the button is pressed.

Diagnosing problems using light path diagnostics

Before you work inside the server to view light path diagnostics LEDs, read the safety information that begins on page v and "Installation guidelines" on page 7.

If an error occurs, view the light path diagnostics LEDs in the following order:

1. **Operator information panel:** Look at this panel first and note the lit LEDs.

    • If the information LED is lit, it indicates that a noncritical event has occurred. An LED on the light path diagnostics panel is also lit to help isolate the error.

- If the system-error LED is lit, it indicates that there is a fault or condition in the server and that light path diagnostics might light an additional LED to help diagnose the problem.

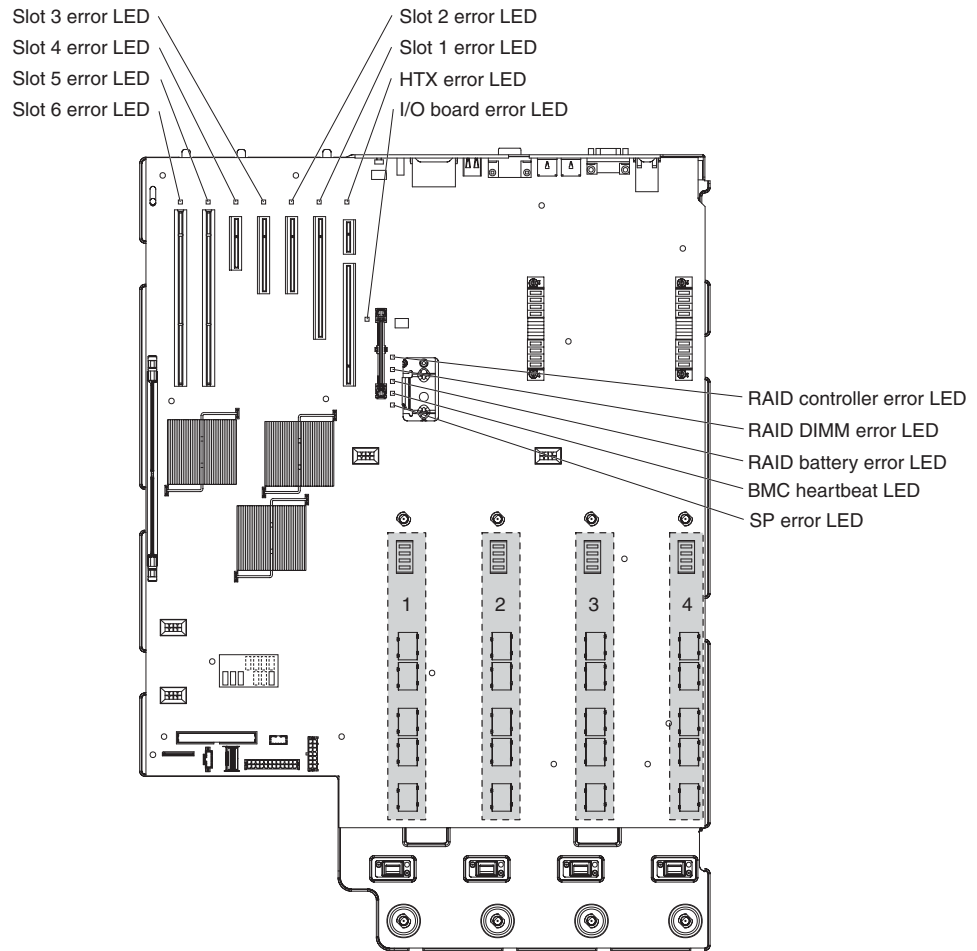The following illustration shows the operator information panel.
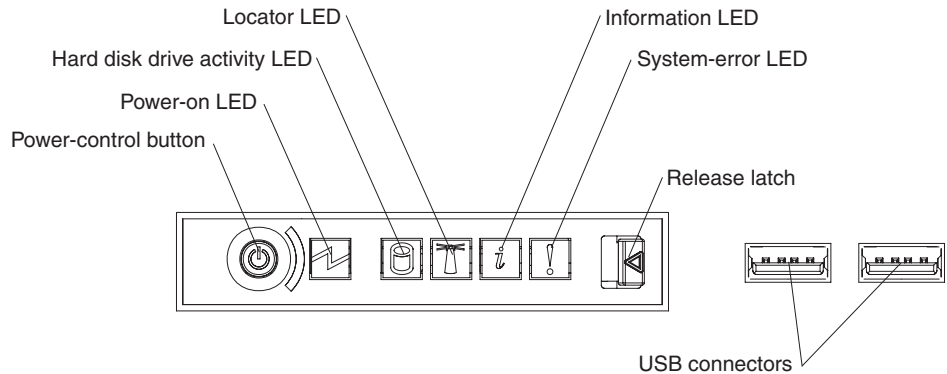
2. **Light path diagnostics panel:** To access the light path diagnostics panel, press the release latch on the front of the operator information drawer to the left; then, slide it forward. Note any LEDs that are lit, and then close the drawer.
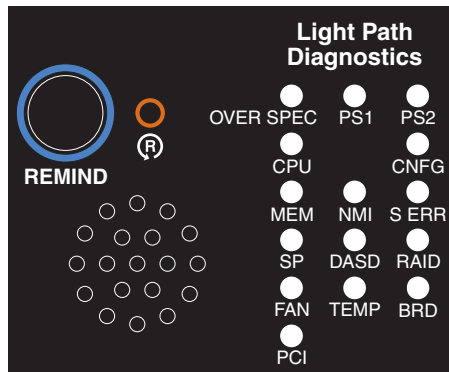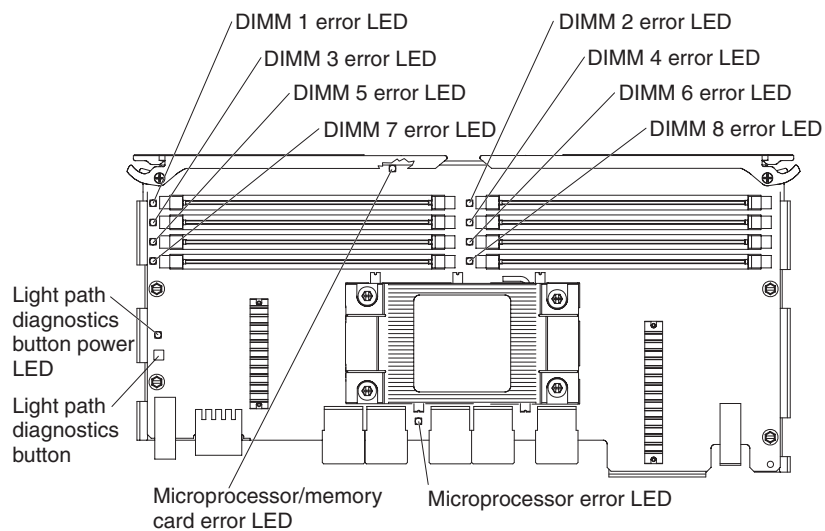

3. **LEDs on server components:** Remove the top cover to look inside the server for lit LEDs. To identify the component that is causing the error, note the lit LED on or next to the component. For example, a microprocessor/memory card error will light the LED on top of the microprocessor/memory card.

The following illustration shows the LEDs on the I/O board.

Slot 3 error LED

Slot 4 error LED

Slot 5 error LED

Slot 6 error LED

Slot 2 error LED

Slot 1 error LED

HTX error LED

I/O board error LED

RAID controller error LED

RAID DIMM error LED

RAID battery error LED

BMC heartbeat LED

SP error LED

1   2   3   4

The following illustration shows the LEDs on the microprocessor/memory card.

DIMM 1 error LED

DIMM 3 error LED

DIMM 5 error LED

DIMM 7 error LED

DIMM 2 error LED

DIMM 4 error LED

DIMM 6 error LED

DIMM 8 error LED

Light path
diagnostics
button power
LED

Light path
diagnostics
button

Microprocessor/memory
card error LED

Microprocessor error LED

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.

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

Lit light path diagnostics LED with the system-error LED also lit	Description	Action
All LEDs off (the power LED is lit).		No action necessary.
OVERSPEC	There is insufficient power to power the system.	1. Check that ac power is available to all power supplies. 2. Reseat any failed power supplies. 3. Replace any failed power supplies. 4. Add an optional power supply if only one power supply is installed. 5. Remove optional devices. 6. Use 220 V ac instead of 110 V ac.
PS 1	Power supply 1 has failed or has been removed. **Note:** In a redundant power configuration, the dc power LED on one power supply might be off.	1. Reinstall the removed power supply. 2. Reseat the failed power supply. 3. Replace the failed power supply. 4. Remove ac power before restoring dc power.
PS 2	Power supply 2 has failed or has been removed. **Note:** In a redundant power configuration, the dc power LED on one power supply might be off.	1. Reinstall the removed power supply. 2. Reseat the failed power supply. 3. Replace the failed power supply. 4. Remove ac power before restoring dc power.
CPU	A microprocessor/memory card has failed, or a component on the card has failed. **Note:** Make sure that the microprocessor/memory card is installed in the correct sequence; see "Installing a microprocessor/memory card" on page 14.	1. See the BMC log or the system-error log for the source of the fault. 2. Find the failing, missing, or mismatched microprocessor/memory card by checking the LEDs on top of the card. 3. Remove the microprocessor/memory card with the lit error LED on the top of the card; then, press the light path diagnostics button on the microprocessor/memory card to identify the failed component. 4. Reseat the microprocessor/memory card. 5. Replace the microprocessor/memory card.
CNFG	A microprocessor/memory card configuration error has occurred.	1. See the BMC log or the system-error log for the source of the fault. 2. Make sure that the microprocessor/memory cards are installed in the correct sequence and that a passthru card is correctly installed, if required. See "Installing a microprocessor/memory card" on page 14.

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

Lit light path diagnostics LED with the system-error LED also lit	Description	Action

MEM	Memory failure.	1. Remove the microprocessor/memory card with the lit error LED on the top of the card; then, press the light path diagnostics button on the microprocessor/memory card to identify the failed DIMM.
		2. Reseat the DIMM.
		3. Replace the following components one at a time, in the order shown, restarting the server each time:
		  a. DIMM
		  b. Microprocessor/memory card

NMI	A hardware error has been reported to the operating system. **Note:** The PCI or MEM LED might also be lit.	1. See the BMC log or the system-error log for the source of the fault. 2. If the PCI LED is lit, follow the instructions for that LED. 3. If the MEM LED is lit, follow the instructions for that LED. 4. Restart the server.
S ERR	A PCI serr error has occurred.	1. See the BMC log or the system-error log. 2. Replace the failing adapter. 3. (Trained service technician only) Replace the I/O board.
SP	There is a fault in the Remote Supervisor Adapter II SlimLine.	1. Reseat the Remote Supervisor Adapter II SlimLine. 2. Update the firmware for the Remote Supervisor Adapter II SlimLine. 3. Replace the Remote Supervisor Adapter II SlimLine.

DASD	A hard disk drive has failed or has been removed.
	Note: The error LED on the failing hard disk drive might also be lit.
		1. Reinstall the removed drive.
		2. Reseat the following components:
		  a. Failing hard disk drive
		  b. SAS hard disk drive backplane cables
		3. Replace the following components one at a time, in the order shown, restarting the server each time:
		  a. Failing hard disk drive
		  b. SAS hard disk drive backplane cables
		  c. SAS backplane
		  d. (Trained service technician only) I/O board

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

Lit light path diagnostics LED with the system-error LED also lit	Description	Action

RAID	A RAID controller error has occurred.	1. See the BMC log or the system-error log for the source of the fault.
		2. If an optional RAID controller is installed, see the documentation that comes with the RAID controller.
		3. Reseat the following components:
		  a. Optional RAID controller
		  b. Hard disk drives
		4. Replace the components in step 3 one at a time, in the order shown, restarting the server each time.

FAN	A fan has failed or has been removed. **Note:** A failing fan can also cause the TEMP LED to be lit.	1. Reinstall the removed fan. 2. If an individual fan LED is lit, replace the fan.
TEMP	A system temperature or component has exceeded specifications. **Note:** A fan LED might also be lit.	1. See the BMC log or the system-error log for the source of the fault. 2. Make sure that the airflow in the server is not blocked. 3. If a fan LED is lit, reseat the fan. 4. Replace the fan for which the LED is lit. 5. Make sure that the room is neither too hot nor too cold (see "Environment" in "Features and specifications" on page 4). 6. If one of the microprocessors indicates "hot," remove ac power before restoring dc power.
BRD	An error has occurred on the I/O board.	1. See the BMC log or the system-error log for the source of the fault. 2. Check the LEDs on the I/O board to identify the component that is causing the error. 3. (Trained service technician only) Replace the I/O board.
PCI	A PCI adapter has failed. **Note:** The error LED next to one or more adapters might also be lit.	1. See the BMC log or the system-error log for the source of the fault. **Note:** The BMC log or system-error log might point to more than one adapter as the source of the fault. 2. Reseat the failing adapter. 3. Replace the failing adapter. 4. Repeat step 2 and step 3 for each failing adapter.

Appendix. Getting help and technical assistance

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

Before you call

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

- Check all cables to make sure that they are connected.
- Check the power switches to make sure that the system and any optional devices are turned on.
- Use the troubleshooting information in your system documentation, and use the diagnostic tools that come with your system. Information about diagnostic tools is in the *Hardware Maintenance Manual and Troubleshooting Guide* or *Problem Determination and Service Guide* on the IBM *System x Documentation* CD that comes with your system.

  Note: For some IntelliStation models, the *Hardware Maintenance Manual and Troubleshooting Guide* is available only from the IBM support Web site.

- Go to the IBM support Web site at http://www.ibm.com/servers/eserver/support/ xseries/index.html to check for technical information, hints, tips, and new device drivers or to submit a request for information.

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

Using the documentation

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

Getting help and information from the World Wide Web

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

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

Software service and support

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

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

Hardware service and support

Important: When you call for service, you will be asked to provide the four-digit machine type of your system, which is 8877.

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

In the U.S. and Canada, hardware service and support is available 24 hours a day, 7 days a week. In the U.K., these services are available Monday through Friday, from 9 a.m. to 6 p.m.

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Alert on LAN	Netfinity	Wake on LAN

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Important notes

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

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

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

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

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

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

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

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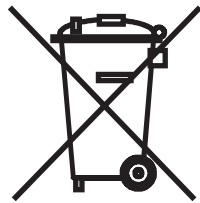
Notice: This mark applies only to countries within the European Union (EU) and Norway.

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

注意: このマークは EU 諸国およびノルウェーにおいてのみ適用されます。

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

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

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

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

Battery return program

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

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

In the Netherlands, the following applies.

For Taiwan: Please recycle batteries.

Electronic emission notices

Federal Communications Commission (FCC) statement

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio

communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

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

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

Industry Canada Class A emission compliance statement

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

Avis de conformité à la réglementation d'Industrie Canada

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

Australia and New Zealand Class A statement

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

United Kingdom telecommunications safety requirement

Notice to Customers

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

European Union EMC Directive conformance statement

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

This product has been tested and found to comply with the limits for Class A Information Technology Equipment according to CISPR 22/European Standard EN 55022. The limits for Class A equipment were derived for commercial and industrial environments to provide reasonable protection against interference with licensed communication equipment.

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

Taiwanese Class A warning statement

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

Chinese Class A warning statement

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

Japanese Voluntary Control Council for Interference (VCCI) statement

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

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