

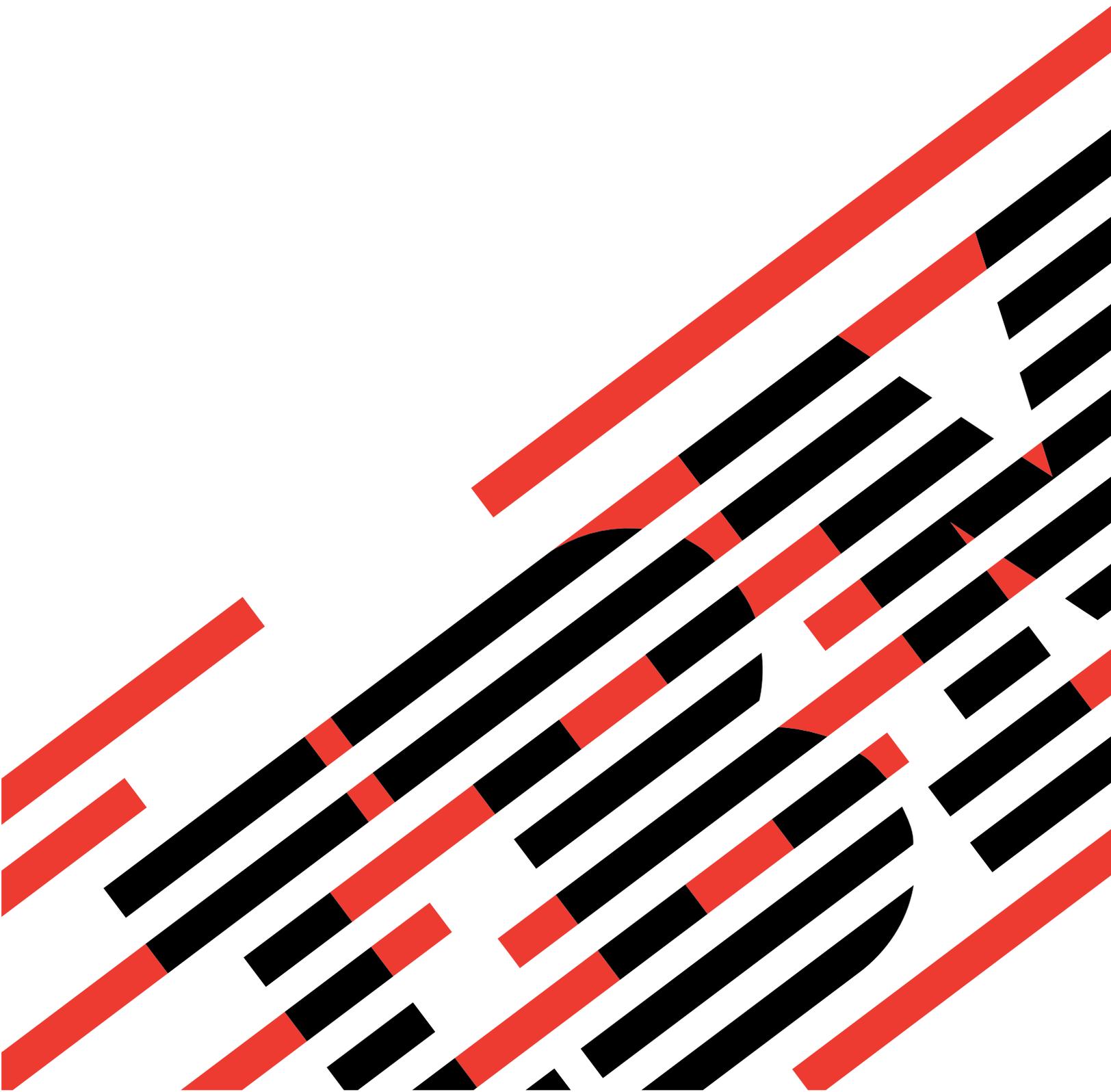


@server

xSeries 100

Type 8486

User's Guide







@server

xSeries 100

Type 8486

User's Guide

**Note:**

Before using this information and the product it supports, read the general information in “Notices,” on page 47, and the *Warranty and Support Information* document on the IBM *xSeries Documentation* CD.

**First Edition (October 2005)**

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# Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الأمنية

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

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

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

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

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

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

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

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

A termék telepítése előtt olvassa el a Biztonsági előírásokat!

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

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

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

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

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

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

Перед установкой продукта прочтите инструкции по технике безопасности.

Pred inštaláciou tohto zariadenia si pečítajte Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

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

Läs säkerhetsinformationen innan du installerar den här produkten.

**Statement 1:**



**DANGER**

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

**To avoid a shock hazard:**

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

**To Connect:**

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

**To Disconnect:**

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

**Statement 2:**



**CAUTION:**

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

*Do not:*

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

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

**Statement 3:**



**CAUTION:**

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

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



**DANGER**

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

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

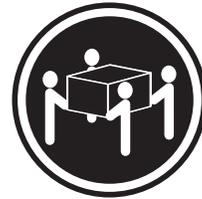
**Statement 4:**



≥ 18 kg (39.7 lb)



≥ 32 kg (70.5 lb)



≥ 55 kg (121.2 lb)

**CAUTION:**

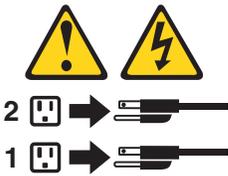
Use safe practices when lifting.

**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 12:**



**CAUTION:**

The following label indicates a hot surface nearby.



**Statement 13:**



**DANGER**

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

**Statement 15:**



**CAUTION:**

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

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

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

**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 your server or optional device before you install the device.

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## Chapter 1. The xSeries 100 Type 8486 server

The IBM® @server® xSeries® 100 Type 8486 server is a high-performance server based on IBM X-Architecture™ technologies. It is ideally suited for networking environments that require superior microprocessor performance, improved systems management as well as flexible memory and data management.

Performance, ease of use, reliability, and expansion capabilities were key considerations in the design of the server. These design features make it possible for you to customize the system hardware to meet your needs today and provide flexible expansion capabilities for the future.

The server comes with a limited warranty. For information about the terms of the warranty and getting service and assistance, see the *Warranty and Support Information* document.

The server contains IBM Enterprise X-Architecture technologies, which help increase performance, reliability, and availability. For more information, see “What your server offers” on page 5 and “Reliability, availability, and serviceability” on page 6.

You can obtain up-to-date information about the server and other IBM server products at <http://www.ibm.com/eserver/xseries/>.

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## Related documentation

This *User's Guide* provides general information about the server, including how to install supported options and how to configure the server. The following documentation comes with the server:

- *Installation Guide*  
This printed document contains instructions for setting up the server and basic instructions for installing some options.
- *Warranty and Support Information*  
This document is in Portable Document Format (PDF) on the IBM *xSeries Documentation* CD. It contains information about the terms of the warranty and getting service and assistance.
- *Safety Information*  
This document is in PDF on the IBM *xSeries Documentation* CD. It contains translated caution and danger statements. Each caution and danger statement that appears in the documentation has a number that you can use to locate the corresponding statement in your language in the *Safety Information* document.
- *Problem Determination and Service Guide*  
This document is in PDF on the IBM *xSeries Documentation* CD. It contains information to help you solve problems yourself, and it contains information for service technicians.

Depending on the server model, additional documentation might be included on the IBM *xSeries Documentation* CD.

The server might have features that are not described in the documentation that you received with the server. 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. These updates are available from the IBM Web site. To check for updated documentation and technical updates, complete the following steps.

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

1. Go to <http://www.ibm.com/support/>.
2. Under **Search technical support**, type **xSeries 100** and click **Search**.

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## Notices and statements in this document

The caution and danger statements that appear in this document are also in the multilingual *Safety Information* document, which is on the IBM *xSeries® 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 hazardous to you. A danger statement is placed just before the description of a potentially lethal or extremely hazardous procedure step or situation.

## Features and specifications

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

Table 1. Features and specifications

<p><b>Microprocessor:</b></p> <ul style="list-style-type: none"> <li>Intel™ Pentium® 4 or Celeron Processor</li> <li>1 MB Level-2 or 256 KB level-2 cache</li> <li>800 MHz front-side bus (FSB) or 533 MHz front-side bus</li> </ul> <p><b>Note:</b> Use the Configuration/Setup Utility program to determine the type and speed of the microprocessor.</p> <p><b>Memory:</b></p> <ul style="list-style-type: none"> <li>Minimum: 256 MB</li> <li>Maximum: 8 GB</li> <li>Types: PC2-4200, double-data-rate 2 (DDR2) with ECC</li> <li>Connectors: four dual inline memory module (DIMM) connectors, two-way interleaved</li> </ul> <p><b>Drives:</b> (depending on your model)</p> <ul style="list-style-type: none"> <li>Diskette: (optional) 1.44 MB (two mode)</li> <li>Hard disk drive: SATA</li> <li>One of the following IDE drives: <ul style="list-style-type: none"> <li>CD-ROM</li> <li>CD-RW (optional)</li> <li>DVD-ROM (optional)</li> <li>DVD/CD-RW combo (optional)</li> </ul> </li> </ul> <p><b>Expansion bays:</b> (depending on your model)</p> <ul style="list-style-type: none"> <li>Two 5.25-in. bays (one CD or DVD drive installed)</li> <li>One 3.5-in. removable-media drive bays (optional)</li> <li>Two 3.5-in. hard disk drive bays (one hard disk drive installed)</li> </ul> <p><b>Expansion slots:</b></p> <ul style="list-style-type: none"> <li>One PCI Express x1</li> <li>One PCI Express x8</li> <li>Two PCI 32-bit/33 MHz</li> </ul> <p><b>Video controller:</b> ATI ES1000 video controller with 16 MB SDRAM video memory on the system board</p> <p><b>Fans:</b> Two speed-controlled fans</p>	<p><b>Power supply:</b> One 310 watt (90-240 V ac)</p> <p><b>Important:</b> Make sure that the ac power supply input voltage is set to the right level (between 110 V ac and 220 V ac) for your geographic location before powering on the system.</p> <p><b>Size:</b></p> <ul style="list-style-type: none"> <li>Height: 438 mm (17.24 in.)</li> <li>Depth: 497 mm (19.57 in.)</li> <li>Width: 205 mm (8.07 in.)</li> <li>Weight: 14 kg (30.86 lb) to 17 kg (37.48 lb) depending upon configuration</li> </ul> <p><b>Integrated functions:</b></p> <ul style="list-style-type: none"> <li>Broadcom 5721 10/100/1000 Ethernet controller on the system board with RJ-45 Ethernet port</li> <li>Two serial ports</li> <li>One parallel port</li> <li>Two-port Serial ATA controller</li> <li>Four Universal Serial Bus (USB) v2.0 ports (two on front and two on rear)</li> <li>Keyboard port</li> <li>Mouse port</li> <li>ATA-100 single-channel IDE controller</li> <li>ATI ES1000 video <ul style="list-style-type: none"> <li>Compatible with SVGA and VGA</li> <li>16 MB video memory</li> </ul> </li> </ul> <p><b>Diagnostic LEDs:</b></p> <ul style="list-style-type: none"> <li>Fans</li> <li>Memory</li> <li>Microprocessor</li> </ul> <p><b>Acoustical noise emissions:</b></p> <ul style="list-style-type: none"> <li>Sound power, idling: 5.0 bel</li> <li>Sound power, operating: 5.5 bel</li> </ul>	<p><b>Environment:</b></p> <ul style="list-style-type: none"> <li>Air temperature: <ul style="list-style-type: none"> <li>Server on: 10° to 35°C (50° to 95°F)</li> <li>Altitude: 0 to 914 m (2998.0 ft)</li> <li>Server off: 0° to 60°C (-32° to 140°F)</li> <li>Altitude: 0 to 2133 m (7000.0 ft)</li> </ul> </li> <li>Humidity (operating and storage): 8% to 80%</li> </ul> <p><b>Heat output:</b></p> <p>Approximate heat output in British thermal units (Btu) per hour</p> <ul style="list-style-type: none"> <li>Minimum configuration: 379 Btu (111 watts) per hour</li> <li>Maximum configuration: 853 Btu (250 watts) per hour</li> </ul> <p><b>Electrical input:</b></p> <ul style="list-style-type: none"> <li>Sine-wave input (50 or 60 Hz) required</li> <li>Input voltage and frequency ranges manually selected</li> <li>Input voltage low range: <ul style="list-style-type: none"> <li>Minimum: 100 V ac</li> <li>Maximum: 127 V ac</li> </ul> </li> <li>Input voltage high range: <ul style="list-style-type: none"> <li>Minimum: 200 V ac</li> <li>Maximum: 240 V ac</li> </ul> </li> <li>Input kilovolt-amperes (kVA) approximately: <ul style="list-style-type: none"> <li>Minimum: 0.15 kVA (all models)</li> <li>Maximum: 0.59 kVA</li> </ul> </li> </ul> <p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>Power consumption and heat output vary depending on the number and type of optional features installed and the power-management optional features in use.</li> <li>These levels were measured in controlled acoustical environments according to the procedures specified by the American National Standards Institute (ANSI) S12.10 and ISO 7779 and are reported in accordance with ISO 9296. Actual sound-pressure levels in a given location might exceed the average values stated because of room reflections and other nearby noise sources. The declared sound-power levels indicate an upper limit, below which a large number of computers will operate.</li> </ol>
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## What your server offers

The server uses the following features and technologies:

- **High-performance graphics controller**

The server comes with an onboard graphics controller on the system board. This high-performance controller supports high resolutions and includes many performance-enhancing features for your operating-system environment.
- **IBM Enhanced Diagnostics CD**

The server comes with an *IBM Enhanced Diagnostics CD*, which you can use to diagnose problems.
- **IBM Director**

IBM Director is a workgroup-hardware-management tool that you can use to centrally manage xSeries servers. For more information, see the IBM Director documentation on the *IBM Director CD*.
- **IBM Enterprise X-Architecture technology**

IBM X-Architecture technology combines proven, innovative IBM designs to make your Intel-processor-based server powerful, scalable, and reliable. For more information, see <http://www.ibm.com/us/eserver/xseries/xarchitecture/enterprise/index.htm>.
- **IBM ServerGuide Setup and Installation CD**

The *ServerGuide™ Setup and Installation CD* that comes with the server provides programs to help you set up the server and install a 32-bit Windows® operating system. The ServerGuide program detects installed hardware options and provides the correct configuration programs and device drivers. For more information about the *ServerGuide Setup and Installation CD*, see “Using the ServerGuide Setup and Installation CD” on page 43.
- **Integrated network support**

The server comes with an integrated Broadcom NetXtreme Gigabit Ethernet controller, which supports connection to a 10-Mbps, 100-Mbps, or 1000-Mbps network. For more information, see “Configuring the Broadcom NetXtreme Gigabit Ethernet controller” on page 45.
- **Large system-memory capacity**

The server supports up to 8 GB of system memory. The memory controller supports error correcting code (ECC) for up to four industry-standard, 1.8 V, 184-pin, double-data-rate 2 (DDR2), PC2-4200 unbuffered, synchronous dynamic random access memory (SDRAM) dual inline memory modules (DIMMs).
- **Redundant connection**

The addition of an optional network interface card (NIC) provides a failover capability to a redundant Ethernet connection. If a problem occurs with the primary Ethernet connection, all Ethernet traffic associated with the primary connection is automatically switched to the redundant NIC. If the applicable device drivers are installed, this switching occurs without data loss and without user intervention.
- **ServeRAID support**

The server supports ServeRAID adapters to create redundant array of independent disks (RAID) configurations.

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## Reliability, availability, and serviceability

Three important server design features are reliability, availability, and serviceability (RAS). The RAS features help to ensure the integrity of the data that is stored in your server, the availability of the server when you need it, and the ease with which you can diagnose and repair problems.

The server has the following RAS features:

- 1-year parts, 1-year labor limited warranty
- Advanced Configuration and Power Interface (ACPI)
- Advanced Desktop Management Interface (DMI) features
- Automatic error retry or recovery
- Automatic memory downsizing on error detection
- Automatic restart on nonmaskable interrupt (NMI)
- Automatic Server Restart (ASR) logic supporting a system restart when the operating system becomes unresponsive
- Automatic server restart after a power failure, based on the BIOS setting
- Availability of microcode level
- Boot-block recovery
- Built-in monitoring for fan, power, temperature, and voltage
- CD-based diagnostic programs
- Cooling fans with speed-sensing capability
- Customer support center that is available 24 hours a day, 7 days a week<sup>1</sup>
- Diagnostic support of ServeRAID adapters
- Error codes and messages
- Error correcting code (ECC) double-data-rate 2 (DDR2) synchronous dynamic random access memory (SDRAM) with serial presence detect (SPD)
- Error logging of POST failures
- Integrated Ethernet controller
- Memory change messages posted to the error log
- Power-on self-test (POST)
- Read-only memory (ROM) checksums
- Redundant Ethernet capabilities (requires an optional Ethernet adapter) with failover support
- Standby voltage for system-management features and monitoring
- System auto-configuring from the configuration menu
- System-error LED on the front bezel and diagnostics LEDs on the system board
- Upgradeable microcode for POST, BIOS, and read-only memory (ROM) resident code, locally or over a LAN
- Wake on LAN<sup>®</sup> capability

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1. Service availability will vary by country. Response time varies; may exclude holidays.

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## IBM Director

With IBM Director, a network administrator can perform the following tasks:

- View the hardware configuration of remote systems, in detail
- Monitor the usage and performance of critical components, such as microprocessors, disks, and memory
- Centrally manage individual or large groups of IBM and non-IBM Intel-processor-based servers, desktop computers, workstations, and mobile computers on a variety of platforms

IBM Director provides a comprehensive entry-level workgroup hardware manager. It includes the following key features:

- Advanced self-management capabilities for maximum system availability.
- Multiple operating-system platform support, including Microsoft® Windows® 2000 Server, Windows XP Professional, Red Hat Linux, SUSE LINUX, and Novell NetWare. For a complete list of operating systems that support IBM Director, see the IBM Director Compatibility Document. This document is in Portable Document Format (PDF) at [http://www.ibm.com/ww/eserver/xseries/systems\\_management/nfdir/agent.html](http://www.ibm.com/ww/eserver/xseries/systems_management/nfdir/agent.html). It is updated every 6 to 8 weeks.
- Support for IBM and non-IBM servers, desktop computers, workstations, and mobile computers.
- Support for systems-management industry standards.
- Integration into leading workgroup and enterprise systems-management environments.
- Ease of use, training, and setup.

IBM Director also provides an extensible platform that supports advanced server tools that are designed to reduce the total cost of managing and supporting networked systems. By deploying IBM Director, you can achieve reductions in ownership costs through the following benefits:

- Reduced downtime
- Increased productivity of IT personnel and users
- Reduced service and support costs

For more information about IBM Director, see the IBM Director documentation on the CD image on the IBM xSeries Systems Management Web page at [http://www-1.ibm.com/servers/eserver/xseries/systems\\_management/xseries\\_sm.html](http://www-1.ibm.com/servers/eserver/xseries/systems_management/xseries_sm.html), which presents an overview of IBM Systems Management and IBM Director.

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## Update *Xpress* program

The Update*Xpress* program is available for most xSeries servers and server options. It detects supported and installed device drivers and firmware in the server and installs available updates. You can download the Update*Xpress* program from the Web at no additional cost, or you can purchase it on a CD. To download the program or purchase the CD, go to <http://www.ibm.com/ww/eserver/xseries/serverguide/xpress.html>.

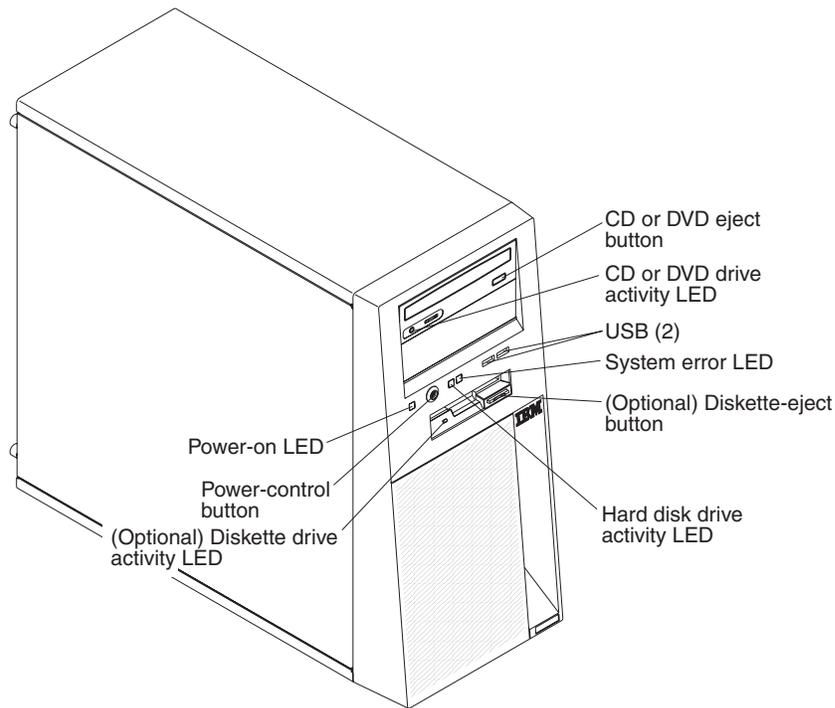
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## Server controls, LEDs, and power

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

### Front view

The following illustration shows the controls and LEDs on the front of the server.



#### **CD or DVD-eject button**

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

#### **CD or DVD drive activity LED**

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

#### **USB connectors**

Connect a USB device to these connectors.

#### **System-error LED**

When this amber LED is lit, it indicates that a system error has occurred. A LED on the system board might also be lit to help isolate the error.

#### **(Optional) Diskette-eject button**

Press this button to release a diskette from the diskette drive.

#### **Hard disk drive activity LED**

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

#### **(Optional) Diskette drive activity LED**

When this LED is lit, it indicates that the diskette drive is in use.

#### **Power-control button**

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

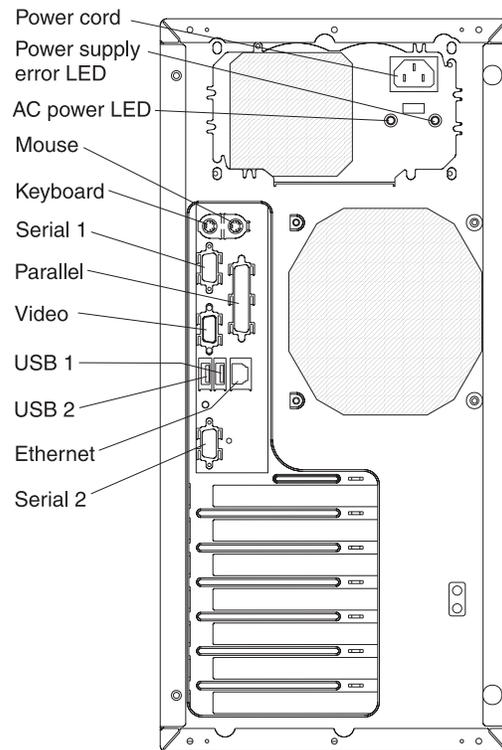
### Power-on LED

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

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

## Rear view

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



### Power-cord connector

Connect the power cord to this connector.

### Power supply error LED

When this amber LED is lit, it indicates that a power supply error has occurred.

### AC power LED

When this green LED is lit, it indicates that the server is connected to an ac power source.

### Mouse connector

Connect a mouse or other PS/2<sup>®</sup> device to this connector.

### Keyboard connector

Connect a PS/2 keyboard to this connector.

### Serial 1 connector

Connect a 9-pin serial device to this connector.

**Parallel connector**

Connect a parallel device to this connector.

**Video connector**

Connect a monitor to this connector.

**USB 1 connector**

Connect a USB device to this connector.

**USB 2 connector**

Connect a USB device to this connector.

**Serial 2 connector**

Connect a 9-pin serial device to this connector.

**Ethernet connector**

Use this connector to connect the server to a network.

**Ethernet link status LED**

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

**Ethernet transmit/receive activity LED**

This LED is on the Ethernet connector. When this LED is lit, it indicates that there is activity between the server and the 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 is shut down; however, the server can respond to remote requests to turn on the server. When the Power-on LED is flashing, it indicates that there is power, but the server 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 Wake on LAN feature, the Wake on LAN feature can turn on the server.

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

## Turning off the server

When you turn off the server and leave it connected to ac power, the server can respond to remote requests to turn on the server. To remove all power from the server, you must disconnect it from the power source.

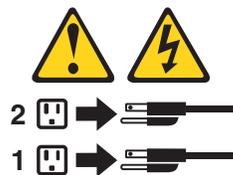
Some operating systems require an orderly shutdown before you turn off the server. See your operating-system documentation for information about shutting down the operating system.

### Statement 5:



### CAUTION:

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



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

- You can turn off the server from the operating system, if your operating system supports this feature. After an orderly shutdown of the operating system, the server will be turned off automatically.
- You can press the power-control button to start an orderly shutdown of the operating system and turn off the server, if your operating system supports this feature.
- If the operating system stops functioning, you can press and hold the power-control button for more than 4 seconds to turn off the server.
- If the Wake on LAN feature turned on the server, the Wake on LAN feature can turn off the server.
- The server can turn itself off as an automatic response to a critical system failure.

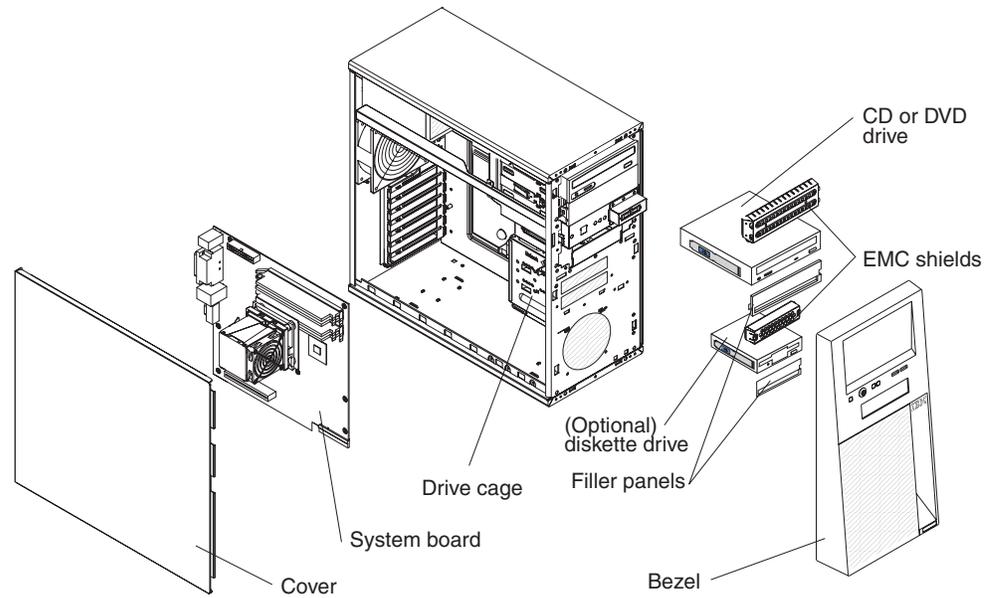


## Chapter 2. Installing options

This chapter provides detailed instructions for installing optional hardware devices in the server.

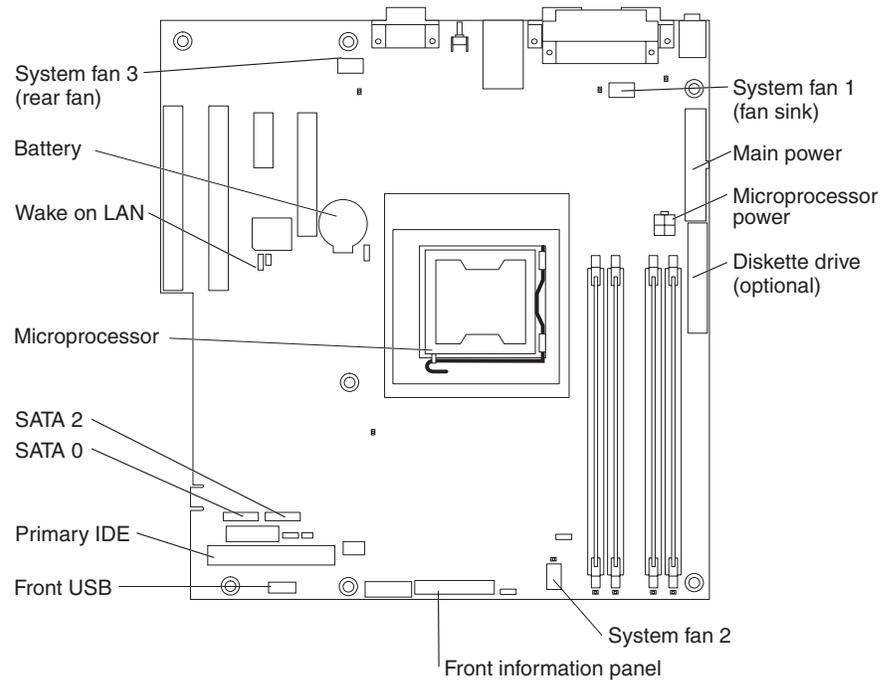
### Server components

The following illustration shows the major components in the server. The illustrations in this document might differ slightly from your hardware.



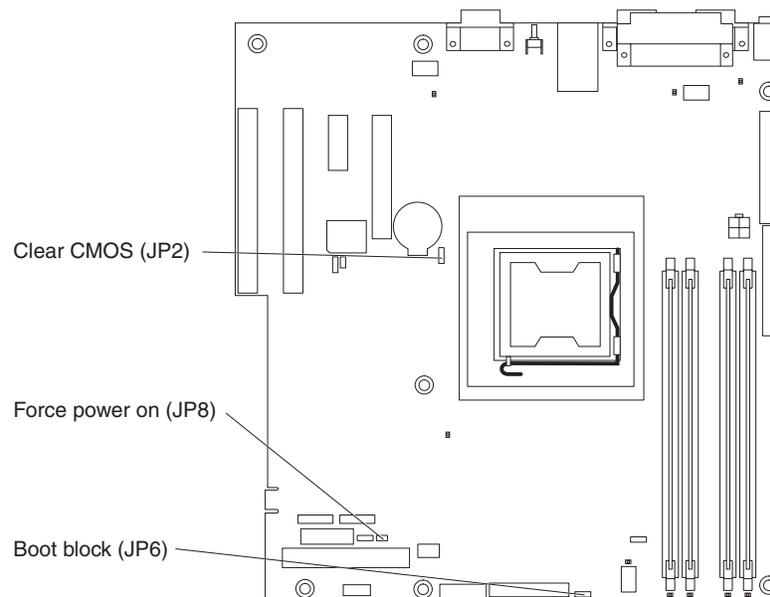
## System-board internal connectors

The following illustration shows the internal connectors on the system board.



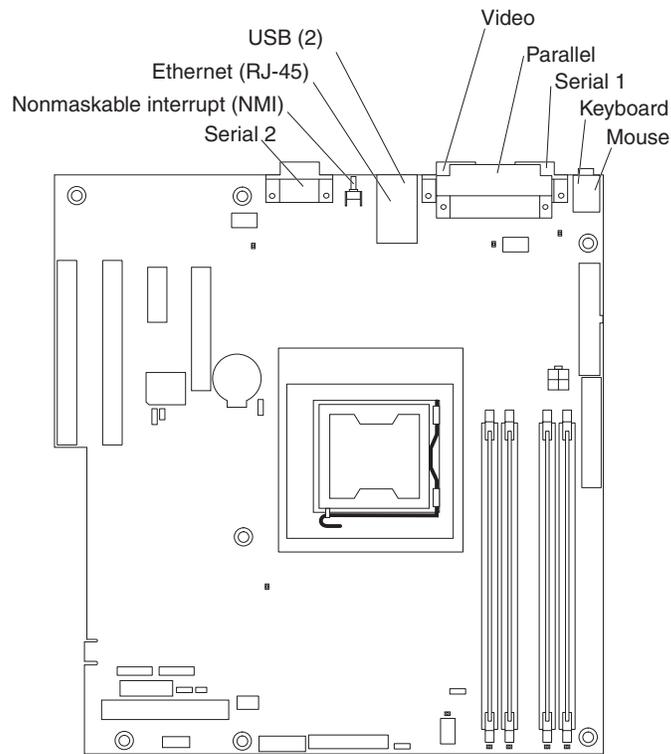
## System-board switches and jumpers

The following illustration shows the switches and jumpers on the system board.



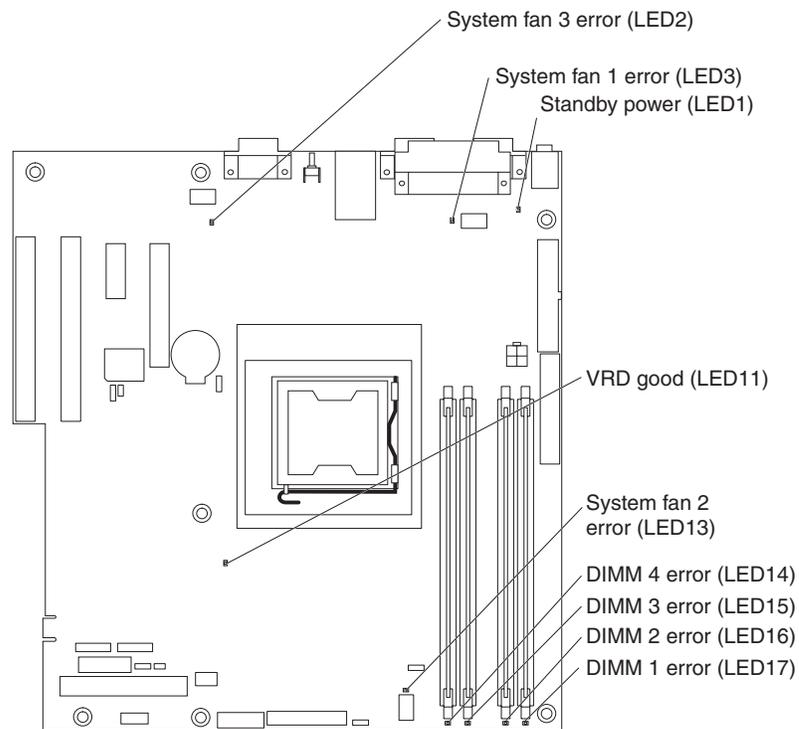
## System-board external connectors

The following illustration shows the external input/output connectors on the system board.



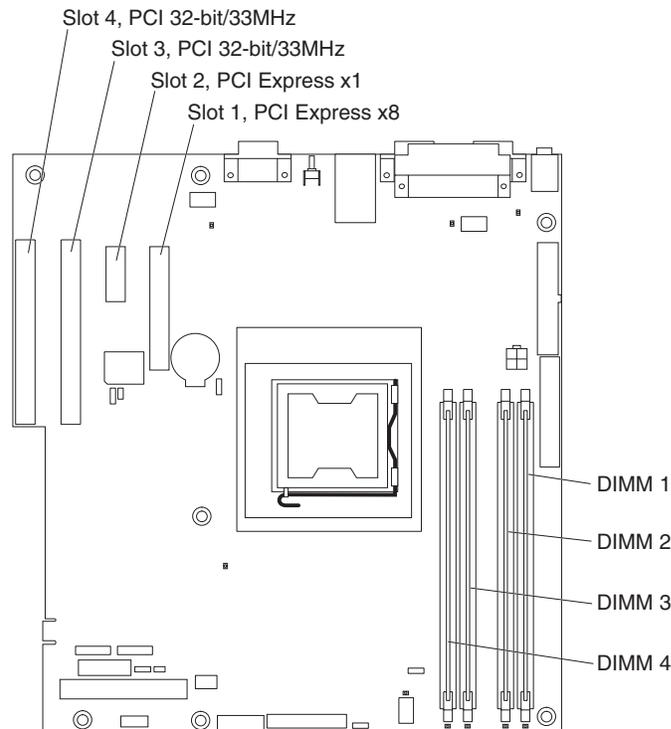
## System-board LEDs

The following illustration shows the LEDs on the system board.



## System-board option connectors

The following illustration shows the system-board connectors for user-installable options.



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## Installation guidelines

Before you install options, read the following information:

- Read the safety information that begins on page v and the guidelines in “Handling static-sensitive devices” on page 17. This information will help you work safely.
- Make sure you have an adequate number of properly grounded electrical outlets for the server, monitor, and other devices.
- Observe good housekeeping in the area where you are working. Place removed covers and other parts in a safe place.
- If you must start the server while the cover is removed, make sure that no one is near the server and that no tools or other objects have been left inside the server.
- Do not attempt to lift an object that you think is too heavy for you. If you have to lift a heavy object, observe the following precautions:
  - Make sure that you 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.
- Back up all important data before you make changes to disk drives.
- Have a small flat-blade screwdriver available.

- 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 orange label on or near a component indicates that the component can be hot-swapped, which means that if the server and operating system support hot-swap capability, you can remove or install the component while the server is running. (Orange can also indicate touch points on hot-swap components.) See the instructions for removing and installing a specific hot-swap component for any additional procedures that you might have to perform before you remove or install the component.
- For a list of supported options for the server, see <http://www.ibm.com/servers/eserver/serverproven/compat/us/>.

## System reliability guidelines

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

- Each of the drive bays has a drive or a filler panel and electromagnetic compatibility (EMC) shield installed in it.
- There is adequate space around the server to allow the server cooling system to work properly. Leave approximately 50 mm (2 in.) of open space around the front and rear of the server. Do not place objects in front of the fans. For proper cooling and airflow, replace the server cover before turning on the server. Operating the server for extended periods of time (more than 30 minutes) with the server cover removed might damage server components.
- You have followed the cabling instructions that come with optional adapters.
- You have replaced a failed fan as soon as possible.

## 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:

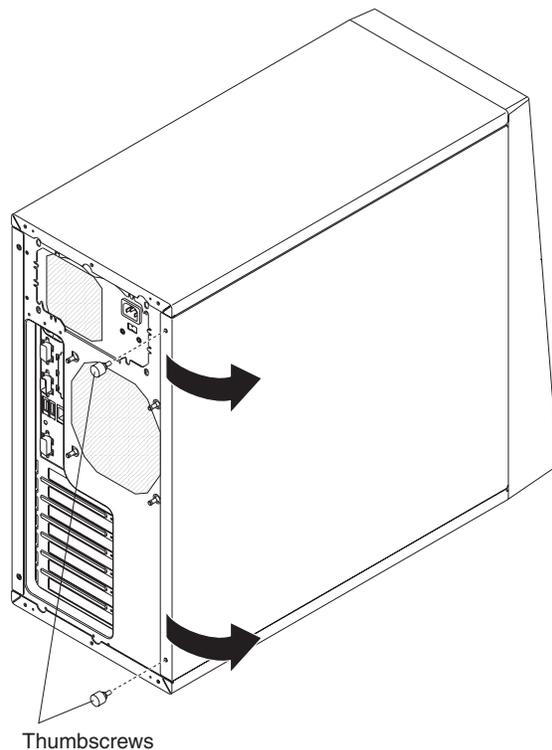
- Limit your movement. Movement can cause static electricity to build up around you.
- The use of a grounding system is recommended. For example, wear an electrostatic-discharge wrist strap, if one is available.
- Handle the device carefully, holding it by its edges or its frame.
- Do not touch solder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

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## Removing the side cover

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

1. Read the safety information that begins on page v and the “Installation guidelines” on page 16.
2. Turn off the server and all attached devices (see “Turning off the server” on page 11); then, disconnect all power cords and external cables.
3. Lay the server on its side.
4. Remove the two thumbscrews from the rear of the server that secure the cover to the chassis. Slide the cover slightly toward the rear of the chassis and lift it off the server and set it aside.



To replace the side cover, see “Installing the side cover” on page 35.

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

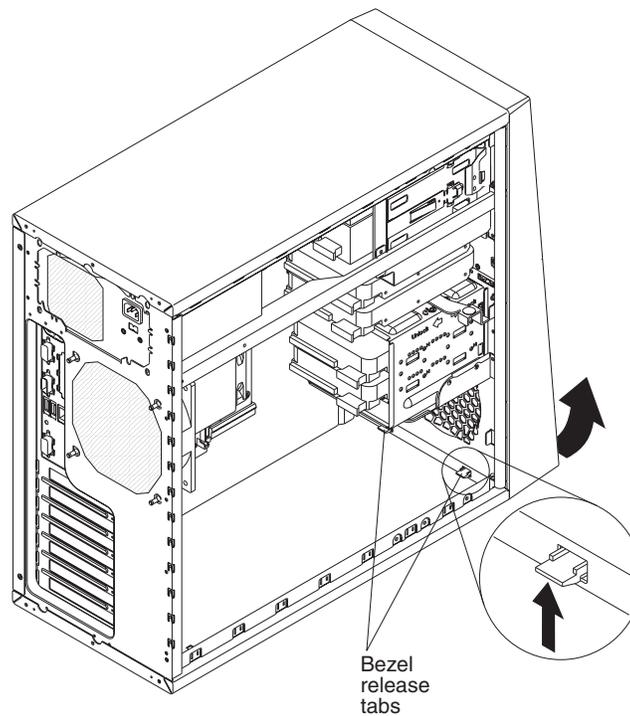
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## Removing the bezel

When working with some devices, such as additional optical drives, you must first remove the bezel to access the device.

To remove the bezel, complete the following steps:

1. Remove the side cover (see “Removing the side cover” on page 18).
2. From inside the server, locate the two bezel release tabs at the bottom of the bezel.



3. Press up slightly on both bezel release tabs while pulling the bottom of the bezel away from the server to disengage the tabs and remove the bezel.
4. Store the bezel in a safe place.

For instructions for replacing the bezel, see “Installing the bezel” on page 34.

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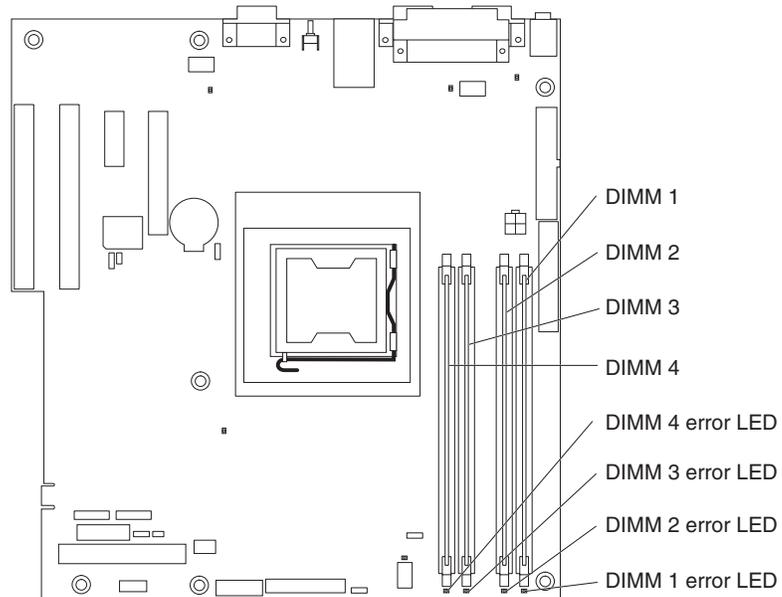
## Installing a memory module

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

- The server supports industry-standard PC2-4200, double-data-rate 2 (DDR2) dual inline memory modules (DIMMs).
- The server supports a maximum of two hard disk drives, four DIMMs, and one 5.25-inch device; or, one hard disk drive, four DIMMs, and two 5.25-inch devices; or, two hard disk drives, two DIMMs, and two 5.25-inch devices.
- The system board contains four DIMM connectors and supports two-way memory interleaving.
- You can install one, two, or four DIMMs in the server, but not three DIMMs. Three DIMMs are not supported.
- The DIMM options that are available for the server are 256 MB, 512 MB, 1 GB, and 2 GB. The server supports a minimum of 256 MB and a maximum of 8 GB of system memory.
- The amount of usable memory will be reduced depending on the system configuration. A certain amount of memory must be reserved for system resources. The BIOS will display the total amount of installed memory and the amount of configured memory.
- The server comes with one 256 MB or 512 MB DIMM installed in the DIMM 1 connector. If the server has one DIMM installed, when you install an additional DIMM, it must be installed in the DIMM 3 connector, and it must be the same size, speed, type, and technology as the DIMM in the DIMM 1 connector. You can mix compatible DIMMs from various manufacturers. When one DIMM is installed, the server runs as a single-channel server. When you add a DIMM in the DIMM 3 connector, the server defaults to a dual-channel server.
- DIMMs must be installed in matched pairs. If you install a second pair of DIMMs in the DIMM 2 and DIMM 4 connectors, they do not have to be the same size, speed, type, and technology as the DIMMs in the DIMM 1 and DIMM 3 connectors. However, the size, speed, type, and technology of the DIMMs you install in the DIMM 2 and DIMM 4 connectors must match each other.
- Install only 1.8 V, 184-pin, double-data-rate 2 (DDR2), PC2-4200, unbuffered synchronous dynamic random-access memory (SDRAM) with error correcting code (ECC) DIMMs. These DIMMs must be compatible with the latest PC2-4200 SDRAM unbuffered DIMM specification. For a list of supported options for your server, go to <http://www.ibm.com/servers/eserver/serverproven/compat/us/>; then, select your country and navigate to the list of options for your computer.
- When you restart the server after adding or removing a DIMM, the server displays a message that the memory configuration has changed.

To install a DIMM, complete the following steps:

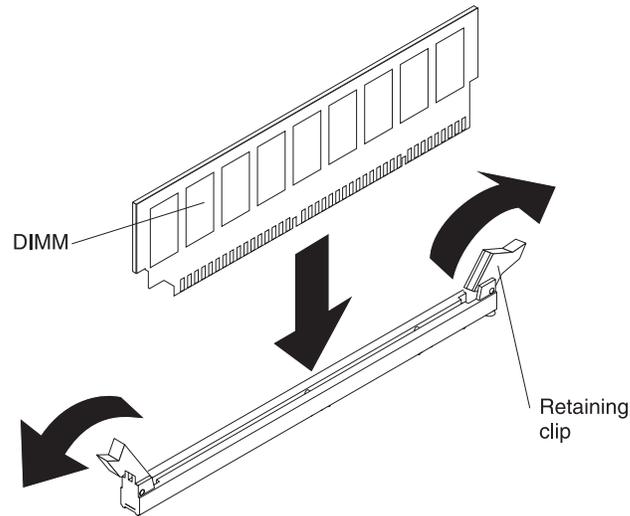
1. Locate the DIMM connectors on the system board. Determine the connectors into which you will install the DIMMs. Install the DIMMs in the sequence shown in the following table.



Memory installation sequence	
DIMMs	Slots
1 DIMM	1
2 DIMMs	1, 3
4 DIMMs	1, 2, 3, 4
<b>Note:</b> You can install one, two, or four DIMMs in the server, but not three DIMMs. Three DIMMs are not supported.	

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

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



3. Touch the static-protective package that contains the DIMM to any unpainted metal surface on the server. Then, remove the new DIMM from the package.
4. Turn the DIMM so that the DIMM keys align correctly with the slot.
5. Insert the DIMM into the connector by aligning the edges of the DIMM with the slots at the ends of the DIMM connector. Firmly press the DIMM straight down into the connector by applying pressure on both ends of the DIMM simultaneously. The retaining clips snap into the locked position when the DIMM is firmly seated in the connector. If there is a gap between the DIMM and the retaining clips, the DIMM has not been correctly installed. Open the retaining clips, remove the DIMM, and then reinsert it.

If you have other options to install or remove, do so now; otherwise, go to “Completing the installation” on page 34.

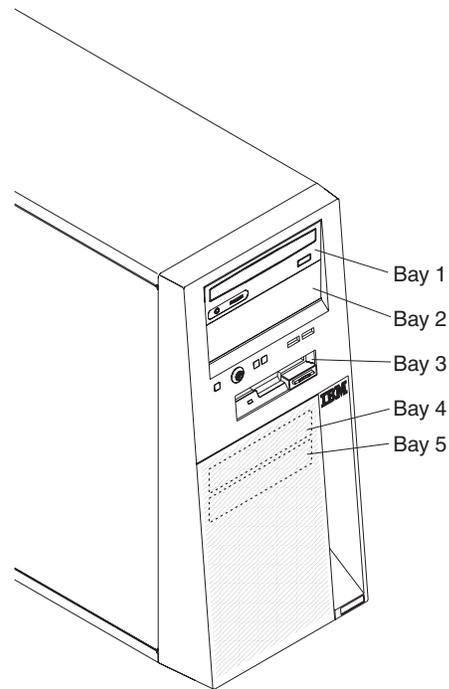
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## Installing a drive

Depending on the server model, one or more of the following drives might be installed in the server:

- Diskette (optional)
- Hard disk drive
- CD-ROM, CD-RW, or DVD/CD-RW combo

The server might come with an IDE CD-ROM drive in bay 1 and a 3.5-in. Serial ATA hard disk drive in bay 4.



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

- Read the documentation that comes with the drive and make sure that you have all the cables and other equipment specified in the documentation that comes with the drive.
- The server supports a maximum of two hard disk drives, four DIMMs, and one 5.25-inch device; or, one hard disk drive, four DIMMs, and two 5.25-inch devices; or, two hard disk drives, two DIMMs, and two 5.25-inch devices.
- Diskette drives, tape drives, CD-ROM, CD-RW/DVD combo drives are examples of removable-media drives. You can install removable-media drives in bays 1, 2, and 3 only.

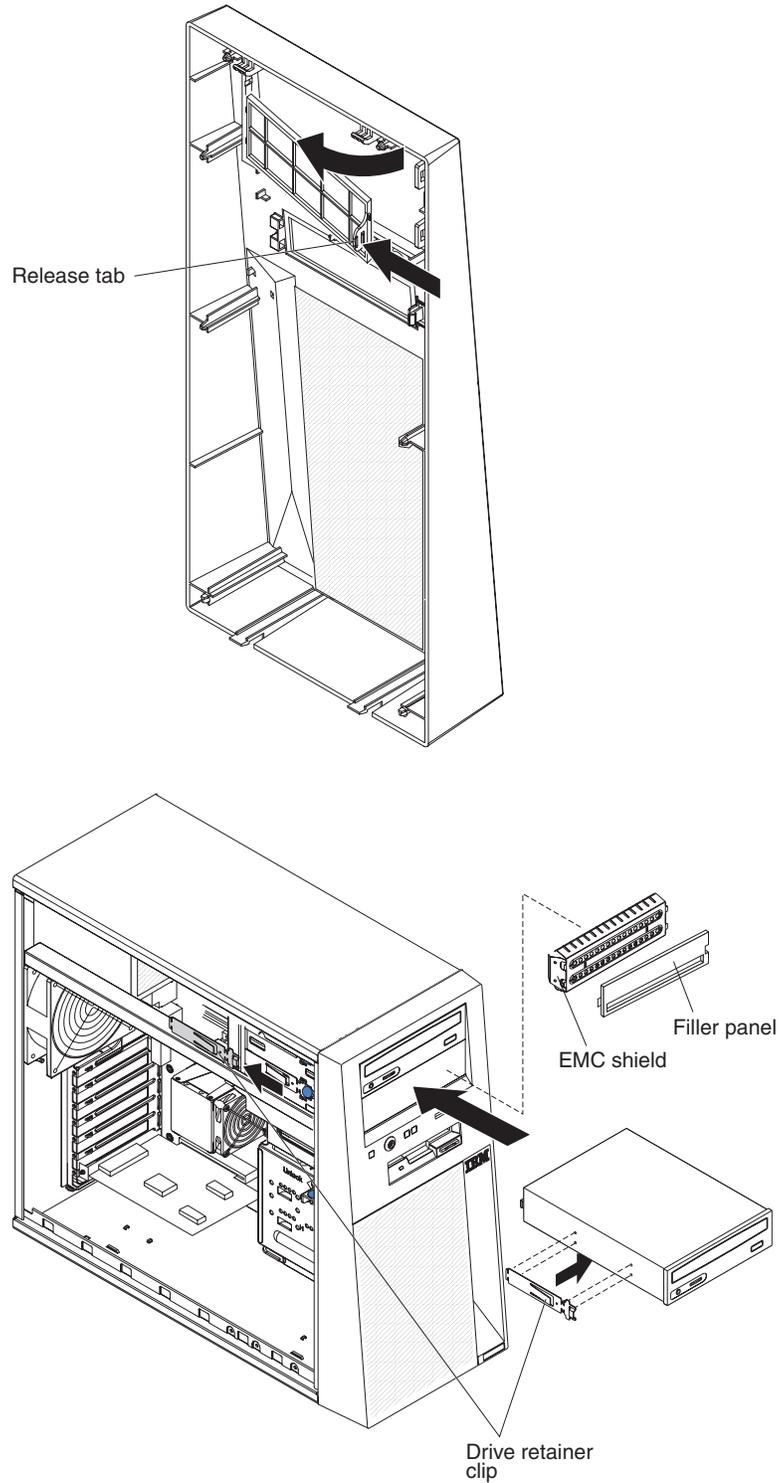
- Only the optional diskette drive can be installed in bay 3. Other drives are not supported in bay 3.
- You can install SATA hard disk drives in bays 4 and 5 only.
- The integrated IDE controller in the server supports the connection of up to two IDE devices.
- The electromagnetic interference (EMI) integrity and cooling of the server are protected by having all bays and PCI or PCI Express slots covered or occupied. When you install a drive or PCI adapter, save the EMC shield and filler panel from the bay, the PCI or PCI Express adapter slot cover in the event you later remove the option.
- For a complete list of supported options for the server, see <http://www.ibm.com/support/>.

## **Installing a removable-media drive in bay 2 or 3**

To install a removable-media drive in bay 2 or 3, complete the following steps:

1. Read the safety information that begins on page v and “Installation guidelines” on page 16.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.
3. Remove the side cover (see “Removing the side cover” on page 18).
4. Remove the bezel (see “Removing the bezel” on page 19).

5. Use your fingers to press the filler panel release tab on the inside of the bezel and remove it from the bezel; then, pry the EMC shield away from the server. Store the filler panel and EMC shield in a safe place.



**Note:** If you are installing a drive that contains a laser, observe the following safety precaution.

### Statement 3



#### CAUTION:

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

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



#### Danger

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

#### Class 1 Laser Product

Laser Klasse 1

Laser Klass 1

Luokan 1 Laserlaite

Appareil À Laser de Classe 1

6. Touch the static-protective package that contains the drive to any unpainted metal surface on the server; then, remove the drive from the package and place it on a static-protective surface.
7. Set any jumpers or switches on the drive according to the documentation that comes with the drive.
8. Remove the drive retainer clip (located on the side of the drive cage) for the bay in which you want to install the drive (see the illustration on page 27). Slide the drive retainer clip to the left to remove it from the drive cage; then, snap the drive retainer clip into the screw holes on the side of the drive (the blue side of the drive clip should be facing outward).
9. Align the drive assembly with the guide rails in the bay. Push the drive into the bay.

**Note:** Only an optional diskette drive can be installed in bay 3.

10. Connect one end of the signal cable into the back of the drive and make sure that the other end of this cable is connected into the IDE connector on the system board.
11. Route the signal cable so that it does not block the airflow to the rear of the drives or over the microprocessor and DIMMs.
12. If you have another drive to install or remove, do so now.
13. Connect the power cable to the back of the drive. The connectors are keyed and can be inserted only one way.

If you have other options to install or remove, do so now; otherwise, replace the bezel (see “Installing the bezel” on page 34), replace the cover (see “Installing the side cover” on page 35), and then go to “Completing the installation” on page 34.

## Installing a SATA hard disk drive in bay 4 or 5

The server comes with a Serial ATA (SATA) hard disk drive. Before you install a SATA hard disk drive, read the following information:

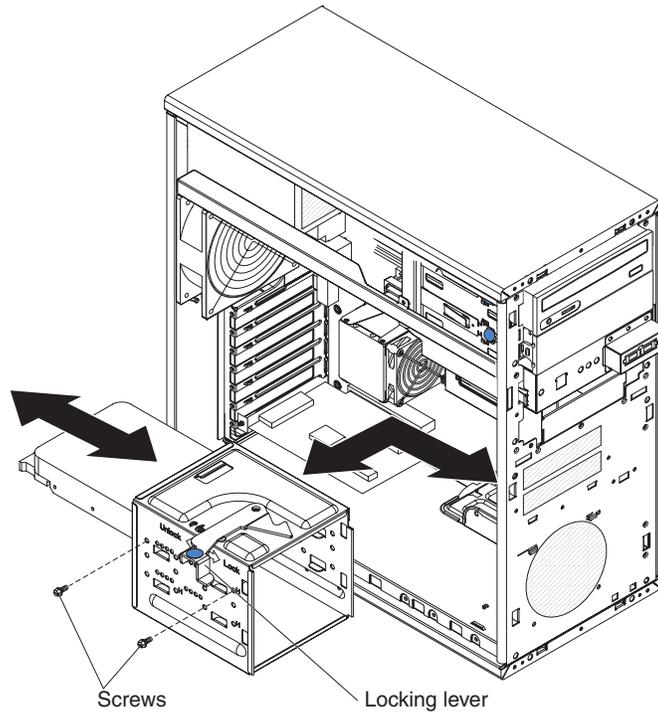
- Read the documentation that comes with the drive for cabling instructions.
- Route the cable before you install the drive. Do not block the airflow from the fans.
- You can install two SATA hard disk drives in the server.

**Note:** Each Serial ATA drive comes with a cable. If you install an additional Serial ATA drive, you will need an additional cable. If you install the optional ServeRAID-7t S-ATA controller, all SATA drives must be connected to the ServeRAID-7t S-ATA controller instead of the system board. The controller comes with two cables. See the optional ServeRAID-7t S-ATA controller documentation for cabling instructions. You can install the optional ServeRAID-7t S-ATA controller in slot 3 or slot 4.

To install a SATA hard disk drive, complete the following steps:

1. Read the safety information that begins on page v and the “Installation guidelines” on page 16.
2. Turn off the server and peripheral devices and disconnect all external cables and power cords.
3. Remove the side cover (see “Removing the side cover” on page 18).

4. Move the drive cage release lever to the unlocked position and gently pull the drive cage out of the drive cage slot on the chassis and set it aside.



5. Touch the static-protective package that contains the drive to any unpainted metal surface on the server; then, remove the drive from the package and place it on a static-protective surface.
- Note:** If the hard disk drive comes attached to a drive tray, remove the drive from the drive tray before you install the drive in the drive bay.
6. Set any jumpers or switches on the drive according to the documentation that comes with the drive.
  7. Align the drive assembly with the guide rails in the bay (with the connector end of the drive facing you).
  8. Gently slide the drive assembly into the drive bay as far as it will go.
  9. Attach the hard disk drive to the drive cage with the four screws.
  10. Connect one end of the signal cable into the back of the drive and make sure that the other end of the cable is connected into the connector on the system board. See “Power and signal cables for internal drives” on page 29 for additional information about cabling drives and “System-board internal connectors” on page 14 for the location of the SATA connectors.
  11. Route the signal cable so that it does not block the airflow to the rear of the drives or over the microprocessor and DIMMs.
  12. Connect the power cable to the back of the drive. The connectors are keyed and can be inserted only one way.

If you have other options to install or remove, do so now. Otherwise, go to “Completing the installation” on page 34.

## Power and signal cables for internal drives

The server uses cables to connect parallel IDE, Serial ATA, and SCSI devices (such as tape devices) to the power supply and to the system board. (See “System-board internal connectors” on page 14 for the location of connectors.) Review the following information before connecting power and signal cables to internal drives:

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

The following cables are provided:

- **Power cables:** Four-wire power cables connect the drives to the power supply. At the end of these cables are plastic connectors that can be attached to different drives; these connectors vary in size. Use either a four-wire power cable or Serial ATA power cable with Serial ATA drives, but do not use both at the same time (use one or the other).
- **Signal cables:** Signal cables are typically flat cables, also called ribbon cables, that connect parallel IDE, Serial ATA, SCSI, and diskette drives to the system board. Two or three types of signal cables come with the server:
  - **IDE:** The wider IDE signal cable has three connectors. One of these connectors is attached to the drive, one is a spare, and the third is attached to the primary or secondary IDE connector on the system board. The spare connector can be used to connect an additional IDE drive to the server.  
The CD or DVD drive is attached to an ATA 100 signal cable. ATA 100 signal cables are color-coded. The blue connector is attached to the system board. The black connector is attached to the master IDE device. The gray middle connector is attached to the subordinate IDE device.
  - **(Optional) Diskette drive:** The narrower signal cable has two connectors. One is attached to the diskette drive, and the other is connected to the connector (FDD1) on the system board.
  - **Serial ATA (SATA):** The narrower, black signal cable has two connectors. One is connected to the Serial ATA drive, and the other is attached to the connector on the system board. Each Serial ATA drive comes with a cable. If you install an additional Serial ATA drive, you will need an additional cable.  
If you install the optional ServeRAID-7t S-ATA controller, all SATA drives must then be connected to the ServeRAID-7t S-ATA controller instead of the system board. The controller comes with two cables. See the optional ServeRAID-7t S-ATA controller documentation for cabling instructions.
  - **SCSI** A SCSI cable connects SCSI devices to an optional SCSI controller. For more information about connecting SCSI devices, see the SCSI documentation.

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## Installing an adapter

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

- Locate the documentation that comes with the adapter and follow those instructions in addition to the instructions in this section. If you need to change the switch setting or jumper settings on the adapter, follow the instructions that come with the adapter.
- Read the documentation that comes with the operating system.
- The server comes with two PCI Express slots and two PCI slots.
- You can install full-length adapters in PCI slots 3 and 4.
- You can install only 32-bit/33 MHz adapters in the 32-bit PCI slots 3 and 4.
- The 32-bit PCI slots 3 and 4 support 5.0 V signaling PCI adapters; they do not support 3.3 V keyed adapters. However, 64-bit adapters are supported if they are universal adapters.
- The PCI Express x1 slot (slot 2) and PCI Express x8 slot (slot 1) supports any PCI Express adapter that is on the ServerProven list.
- The server scans the PCI Express x8 slot (slot 1), PCI Express x1 slot (slot 2), and PCI slots 3 and 4 to assign system resources. Then, the server starts the PCI and PCI Express devices in the following order, if you have not changed the default startup sequence: PCI Express x8 slot, PCI Express x1 slot, system-board integrated drive electronics (IDE) or SCSI devices, and then PCI slots 3 and 4.
- For a list of supported options for the server, see <http://www.ibm.com/support/>.

To install an adapter, complete the following steps:

1. Read the safety information that begins on page v and “Installation guidelines” on page 16.
2. Turn off the server and peripheral devices and disconnect all external cables and power cords; then, remove the side cover. See “Removing the side cover” on page 18.
3. Follow the instructions that come with the adapter for requirements, restrictions, or cabling instructions. It might be easier to route any cables before you install the adapter.
4. Remove the screw from the expansion slot; then, remove the expansion-slot cover. From the rear of the server, press on the slot cover. Grasp it and pull it out of the expansion slot. Store it in a safe place for future use.

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

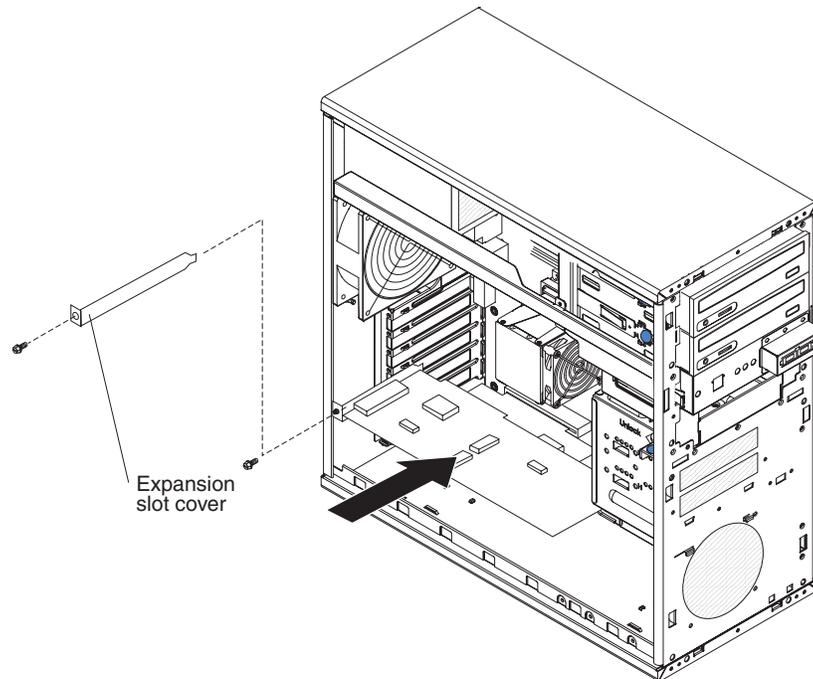
5. Touch the static-protective package that contains the adapter to any unpainted metal surface on the server. Then, remove the adapter from the static-protective package. Avoid touching the components and gold-edge connectors on the adapter.

6. Follow the instructions that come with the adapter to set jumpers or switches, if any.

**Attention:** Avoid touching the components and gold-edge connectors on the adapter.

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

**Attention:** Make sure that the adapter is correctly seated in the expansion slot before you turn on the server. Incomplete installation of an adapter might damage the system board or the adapter.



8. Reinstall the screw that you removed from the expansion slot earlier to secure the adapter to the chassis.
9. Connect required cables to the adapter. Route cables so that they do not block the flow of air from the fans. If you are installing an optional SCSI adapter, see “Cabling an optional SCSI adapter” on page 32 for additional information.
10. If you have other options to install or remove, do so now.

Go to “Completing the installation” on page 34.

---

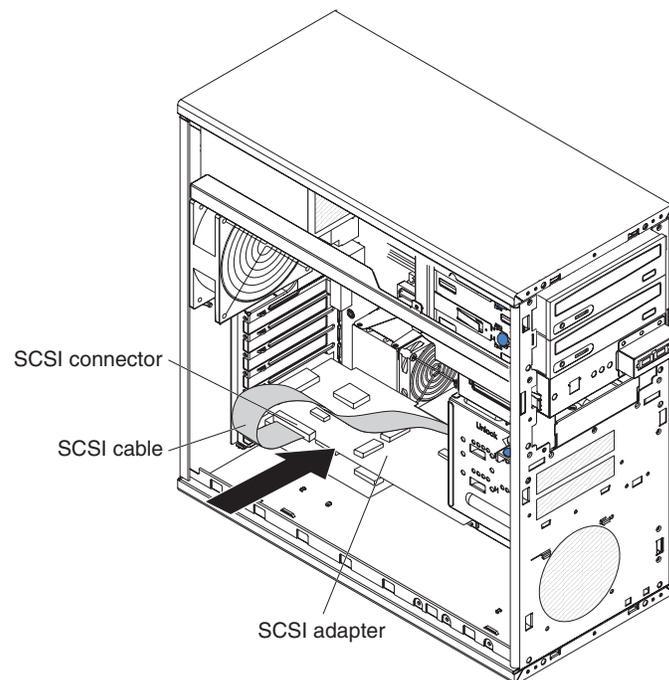
## Cabling an optional SCSI adapter

You can install an optional SCSI adapter in the server to control an internal tape drive. You can also cable a SCSI adapter to external hard disk drives. See your SCSI adapter option documentation for complete instructions for installing a SCSI adapter in the server and for additional information about SCSI adapters.

**Note:** An optional SCSI adapter or cable option is required to connect external SCSI devices.

To cable an optional SCSI adapter, complete the following steps:

1. Install the SCSI adapter (see “Installing an adapter” on page 30).
2. Connect the SCSI signal cable to the adapter and to one or more of the connectors on the rear of the SCSI devices.



3. Complete the installation of the optional SCSI adapter.

---

## Installing a security rope clip

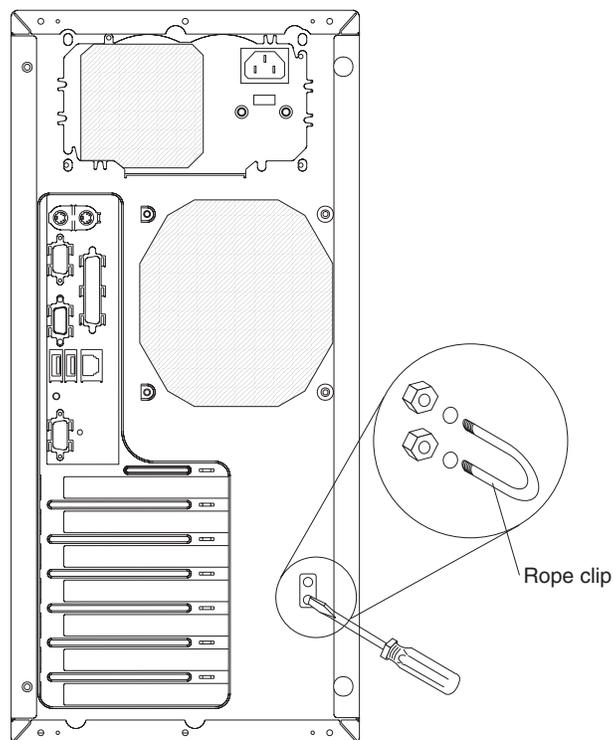
To help prevent hardware theft, you can add a security rope clip and cable to the server. After you add the security cable, make sure that it does not interfere with other cables that are connected to the server.

Before you begin, obtain the following items:

- A flat-blade screwdriver
- An adjustable wrench
- A 19 mm (0.75 in.) rope clip or wire rope (similar to National Manufacturing number 3230, stock number 176-735)
- Threaded nuts that fit the rope clip
- A security cable
- A lock, such as a combination lock or padlock

To install a rope clip, complete the following steps:

1. Remove the side cover. See “Removing the side cover” on page 18.
2. Use a screwdriver to remove the two metal knockouts.
3. Insert the rope clip through the rear panel; then, attach and tighten the nuts.
4. Thread the cable through the rope clip and around an object that is not part of or permanently secured to the building structure or foundation, and from which the cable cannot be removed. Fasten the cable ends together with a lock. After you add the security cable, make sure that it does not interfere with other cables that are connected to the server.



5. Replace the side cover (see “Installing the side cover” on page 35).

---

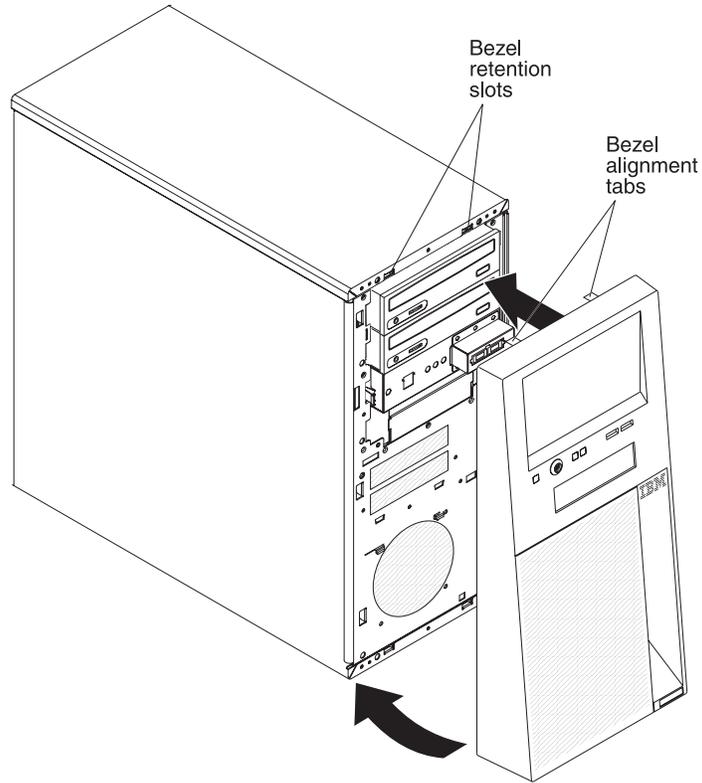
## Completing the installation

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

### Installing the bezel

To replace the bezel, complete the following steps:

1. Insert the two alignment tabs at the top of the bezel into the bezel retention slots at the top of the chassis.



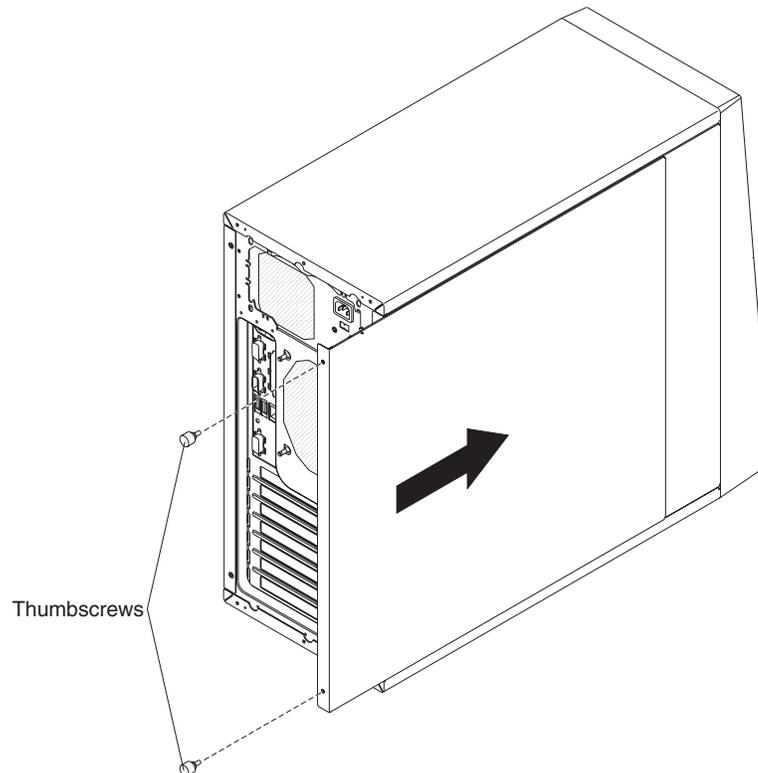
2. Push the bottom of the bezel toward the server until the bezel snaps into place.

## Installing the side cover

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

To replace the side cover, complete the following steps:

1. Before installing the cover, check that all cables, adapters, and other components are installed and seated correctly and that you have not left loose tools or parts inside the server.
2. Align the cover over the server (with the rear of the cover slightly hanging off the rear of the server) and slide the cover toward the front of the server until it is completely closed.



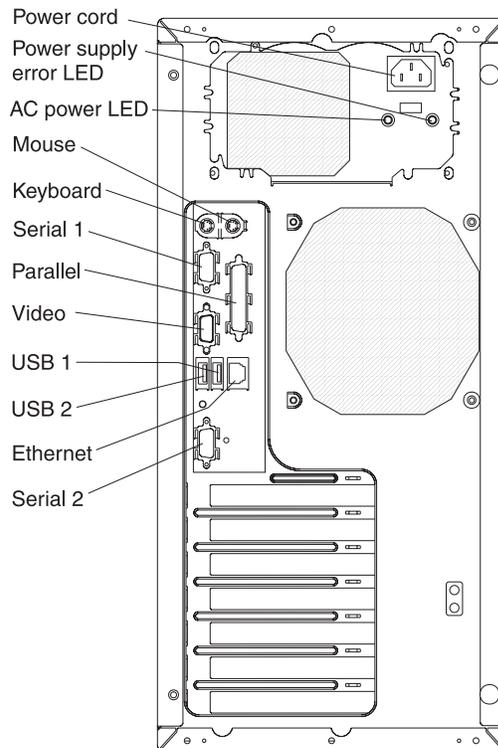
3. Use the two thumbscrews that you removed earlier to secure the cover to the server chassis.

## Connecting the cables

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

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

The following illustration shows the input/output (I/O) connectors on the rear of the server.



## Updating the server configuration

When you start the server for the first time after you add or remove an external 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. See Chapter 3, “Configuring the server,” on page 37 for additional information.

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

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

For information about configuring the integrated Gigabit Ethernet controller, see “Configuring the Broadcom NetXtreme Gigabit Ethernet controller” on page 45.

---

## Chapter 3. Configuring the server

The following configuration programs and utilities come with the server:

- **Configuration/Setup Utility program**

The Configuration/Setup Utility program is part of the basic input/output system (BIOS). Use it to configure serial port assignments, change interrupt request (IRQ) settings, change the startup-device sequence, set the date and time, and set passwords. For information about using this program, see “Using the Configuration/Setup Utility program.”

- **IBM ServerGuide Setup and Installation CD**

The ServerGuide program provides software-setup tools and installation tools that are designed for your server. Use this CD during the installation of the server to configure basic hardware features and to simplify the installation of your operating system. For information about using this CD, see “Using the ServerGuide Setup and Installation CD” on page 43.

- **Boot Menu program**

The Boot Menu program is part of the BIOS. Use it to override the startup sequence that is set in the Configuration/Setup Utility program and temporarily assign a device to be first in the startup sequence.

- **Broadcom NetXtreme Gigabit Ethernet Utility program**

The Broadcom NetXtreme Gigabit Ethernet Utility program is part of the BIOS code in your server. You can use it to configure the network as a startable device, and you can customize where the network startup option appears in your startup sequence. Enable the Broadcom NetXtreme Gigabit Ethernet Utility from the Configuration/Setup Utility program. For information, see “Enabling the Broadcom NetXtreme Gigabit Ethernet Utility program” on page 45.

- **Broadcom NetXtreme Ethernet controller configuration**

For information about configuring the Ethernet controller, see “Configuring the Broadcom NetXtreme Gigabit Ethernet controller” on page 45.

- **IBM Director**

IBM Director is a workgroup-hardware-management tool that you can use to centrally manage xSeries servers. If you plan to use IBM Director to manage the server, you can download the CD image at [http://www.ibm.com/eserver/xseries/systems\\_management/xseries\\_sm/dwnl.htm](http://www.ibm.com/eserver/xseries/systems_management/xseries_sm/dwnl.htm). For detailed information about IBM Director, see the IBM Director documentation that comes on the CD image.

---

### Using the Configuration/Setup Utility program

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

- View configuration information
- View and change assignments for devices and I/O ports
- Set the date and time
- Set and change passwords and Remote Control Security settings
- Set the startup characteristics of the server and the order of startup devices
- Set and change settings for advanced hardware features
- View, set, and change settings for power-management features
- View and clear error logs
- Change interrupt request (IRQ) settings

- Enable USB keyboard and mouse support
- Resolve configuration conflicts

## Starting the Configuration/Setup Utility program

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

1. Turn on the server.
2. When the prompt Press F1 for Configuration/Setup appears, press F1. If you have set both a power-on password and an administrator password, you must type the administrator password to access the full Configuration/Setup Utility menu. If you do not type the administrator password, a limited Configuration/Setup Utility menu is available.
3. Select settings to view or change.

## Configuration/Setup Utility menu choices

The following choices are on the Configuration/Setup Utility main menu. Depending on the version of the BIOS code, some menu choices might differ slightly from these descriptions.

- **System Summary**

Select this choice to view configuration information, including the type, speed, and cache size of the microprocessor and the amount of installed memory. When you make configuration changes through other options in the Configuration/Setup Utility program, the changes are reflected in the system summary; you cannot change settings directly in the system summary.

This choice is on the full and limited Configuration/Setup Utility menu.

- **Processor Summary**

Select this choice to view the processor information, including the type, speed, and cache size of the microprocessor.

- **System Information**

Select this choice to view information about the server. When you make changes through other options in the Configuration/Setup Utility program, some of those changes are reflected in the system information; you cannot change settings directly in the system information.

Select this choice to view the machine type and model of the server, the serial number, and the revision level or issue date of the BIOS code stored in electrically erasable programmable ROM (EEPROM).

This choice is on the full Configuration/Setup Utility menu only.

- **Devices and I/O Ports**

Select this choice to view or change assignments for devices and input/output (I/O) ports.

Select this choice to enable or disable integrated SCSI and Ethernet controllers and all standard ports (such as serial and parallel). **Enable** is the default setting for all controllers. If you disable a device, it cannot be configured, and the operating system will not be able to detect it (this is equivalent to disconnecting the device). If you disable the integrated SCSI controller and no SCSI adapter is installed, the server will have no SCSI capability. If you disable the integrated Ethernet controller and no Ethernet adapter is installed, the server will have no Ethernet capability.

This choice is on the full Configuration/Setup Utility menu only.

- **Parallel Port Setup**

Select this choice to enable or disable the parallel port and to adjust the parallel port resources and features.

- **Remote Console Redirection**

Select this choice to enable and configure serial remote video and keyboard redirection.

- **System MAC Address**

Select this choice to view the MAC address for network devices that are installed in the server.

**Note:** This choice appears only if at least one Preboot eXecution Environment (PXE) option, read only memory (ROM) starts during POST.

- **Advanced Chipset Control**

Select this choice to modify settings that control features of the core chip set on the system board.

**Attention:** Do not make changes in the **Advanced Chipset Control** option unless directed to do so by an IBM authorized service representative.

- **Video**

Select this choice to view the video information.

- **IDE Primary/Master**

Select this choice to view and change the setting for installed IDE/SATA devices.

- **IDE Secondary/Master**

Select this choice to view and change the setting for installed IDE/SATA devices.

- **Date and Time**

Select this choice to set the date and time in the server, in 24-hour format (*hour:minute:second*).

- **System Security**

Select this choice to set passwords. For more information about passwords, see “Passwords” on page 41. You can also enable the chassis-intrusion detector to alert you each time the server cover is removed.

- **Power-on Password**

Select this choice to set, change, or delete a power-on password. If a power-on password is set, you will be prompted to enter the password everytime you start the server before you can use it. See “Power-on password” on page 41 for more information.

- **Administrator Password**

Select this choice to set, change, or delete an administrator password. An administrator password is intended to be used by a system administrator; it limits access to the full Configuration/Setup Utility menu. If an administrator password is set, the full Configuration/Setup Utility menu is available only if you type the administrator password at the password prompt. See “Administrator password” on page 42 for more information.

- **Start Options**

Select this choice to view or change the start options. Changes in the start options take effect when you restart the server.

You can set keyboard operating characteristics, such as the keyboard speed, and you can specify whether the server starts with the keyboard number lock on or off. You can enable the server to run without a diskette drive, monitor, or keyboard.

The startup sequence specifies the order in which the server checks devices to find a boot record. The server starts from the first boot record that it finds. If the server has Wake on LAN hardware and software and the operating system supports Wake on LAN functions, you can specify a startup sequence for the Wake on LAN functions. You can also specify whether a PCI SCSI adapter has boot precedence.

If you enable the boot fail count, the BIOS default settings will be restored after three consecutive failures to find a boot record.

You can enable a virus-detection test that checks for changes in the boot record when the server starts.

This choice is on the full Configuration/Setup Utility menu only.

- **Startup Sequence Options**

Select this choice to view the Startup Sequence menu. The startup sequence specifies the order in which the computer checks devices to find a boot record. The server starts from the first boot record that it finds.

If you disable the integrated USB controller, the server will have no USB capability; to maintain USB capability, make sure that **Enabled** is selected for the **USB Host Controller** and **USB BIOS Legacy Support** options.

- **Advanced Setup**

Select this choice to change settings for advanced hardware features.

**Important:** The server might malfunction if these options are incorrectly configured. Follow the instructions on the screen carefully.

This choice is on the full Configuration/Setup Utility menu only.

- **PCI Bus Control**

Select this choice to view the system resources that are used by the installed PCI or PCI Express devices.

- **CPU Options**

Select this choice to view the options that control the behavior of the microprocessor, including enabling or disabling the microprocessor cache and Hyper-Threading Technology. The default status for Hyper-Threading Technology is **Enabled**.

**Attention:** Do not make changes in the **Advanced Processor Control** option unless directed to do so by an IBM authorized service representative.

- **Error Logs**

Select this choice to view or clear error logs.

- **POST Error Log**

Select this choice to view the three most recent error codes and messages that the system generated during POST. See the System Error/Event Log for a complete history of all errors logged.

- **System Event/Error Log**

Select this choice to view the system event and error messages that the system generated during POST and runtime. Select **Clear event/error logs** to clear the event and error log.

- **Save Settings**

Select this choice to save the changes that you have made in the settings.

- **Restore Settings**

Select this choice to cancel the changes that you have made in the settings and restore the previous settings.

- **Load Default Settings**

Select this choice to cancel the changes that you have made in the settings and restore the factory settings.

- **Exit Setup**

Select this choice to exit from the Configuration/Setup Utility program. If you have not saved the changes that you have made in the settings, you are asked whether you want to save the changes or exit without saving them.

## Passwords

From the **System Security** choice, you can set, change, and delete a power-on (user) password and an administrator password. The **System Security** choice is on the full Configuration/Setup menu only.

If you set only a power-on password, you must type the power-on password to complete the system startup and to have access to the full Configuration/Setup Utility menu.

An administrator password is intended to be used by a system administrator; it limits access to the full Configuration/Setup Utility menu. If you set only an administrator password, you do not have to type a password to complete the system startup, but you must type the administrator password to access the Configuration/Setup Utility menu.

If you set a power-on password for a user and an administrator password for a system administrator, you can type either password to complete the system startup. A system administrator who types the administrator password has access to the full Configuration/Setup Utility menu; the system administrator can give the user authority to set, change, and delete the power-on password. A user who types the power-on password has access to only the limited Configuration/Setup Utility menu; the user can set, change, and delete the power-on password, if the system administrator has given the user that authority.

### Power-on password

If a power-on password is set, when you turn on the server, the system startup will not be completed until you type the power-on password. You can use any combination of up to seven characters (A–Z, a–z, and 0–9) for the password.

When a power-on password is set, you can enable the Unattended Start mode, in which the keyboard and mouse remain locked but the operating system can start. You can unlock the keyboard and mouse by typing the power-on password.

If you forget the power-on password, you can regain access to the server in any of the following ways:

- If an administrator password is set, type the administrator password at the password prompt. Start the Configuration/Setup Utility program and reset the power-on password.
- Remove the server battery and then reinstall it. See the *Problem Determination and Service Guide* on the IBM xSeries Documentation CD for instructions for removing the battery.
- Change the pin position of the clear CMOS (password override) jumper on the system board to bypass the power-on password check (see “Erasing a lost or forgotten password (clearing CMOS)” on page 42).

## Administrator password

If an administrator password is set, you must type the administrator password for access to the full Configuration/Setup Utility menu. You can use any combination of up to seven characters (A–Z, a–z, and 0–9) for the password. The **Administrator Password** choice is on the Configuration/Setup Utility menu only if an optional IBM Remote Supervisor Adapter II is installed.

## Resetting passwords

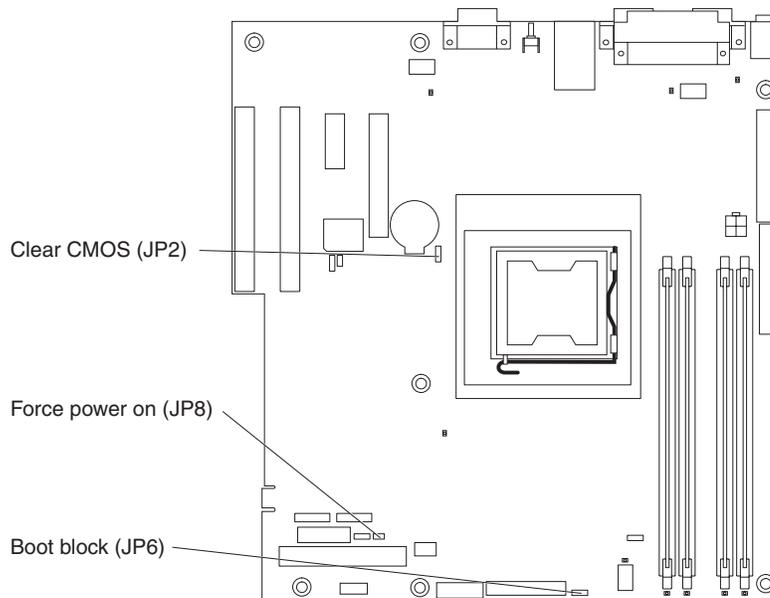
If you forget the power-on or administrator password, you can change the pin position of the clear CMOS jumper on the system board to bypass the power-on or administrator password check. This enables you to reset these passwords.

## Erasing a lost or forgotten password (clearing CMOS)

This section applies to lost or forgotten passwords.

To set the CMOS recovery jumper and erase a forgotten password, complete the following steps:

1. Review the safety information that begins on page v and “Handling static-sensitive devices” on page 17.
2. Turn off the server and all attached devices.
3. Disconnect the power cord.
4. Remove the side cover (see “Removing the side cover” on page 18).
5. Locate the CMOS recovery jumper (JP2) on the system board, removing any adapters that impede access to the jumper.



6. Move the CMOS recovery jumper from pins 1 and 2 to pins 2 and 3.
7. Wait 60 seconds; then, return the CMOS recovery jumper to pins 1 and 2.
8. Replace any adapters that were removed; then, replace the side cover (see “Installing the side cover” on page 35).

You can now start the server one time without having to use the user password and start the Configuration/Setup Utility program. At this time, you can either delete the old password or set a new user password. If you do not change or delete the password, the next time you start the server the original user password will be reinstated.

9. Connect the server to a power source, keyboard, monitor, and mouse.
10. Turn on the server. The Configuration/Setup Utility program starts.
11. Follow the instructions to erase the existing password or create a new password.
12. Select **Save Settings** and press Enter.

---

## Using the ServerGuide Setup and Installation CD

The *ServerGuide Setup and Installation CD* contains a setup and installation program that is designed for the IBM server. The ServerGuide program detects the server model and hardware options that are installed and uses that information during setup to configure the hardware. The ServerGuide program simplifies operating-system installations by providing updated device drivers and, in some cases, installing them automatically.

**Note:** The ServerGuide program works only with 32-bit Windows operating systems.

If the *ServerGuide Setup and Installation CD* did not come with your server, you can download the latest version of the ServerGuide program. You can download a free image of the *ServerGuide Setup and Installation CD*, or you can purchase the CD. To download the image, go to the IBM ServerGuide Web page at <http://www.ibm.com/pc/qtechinfo/MIGR-4ZKPPT.html>. To purchase the latest *ServerGuide Setup and Installation CD*, go to the ServerGuide fulfillment Web site at <http://www.ibm.com/pc/coupon/>.

The ServerGuide program has the following features:

- An easy-to-use interface
- Diskette-free setup, and configuration programs that are based on detected hardware
- ServeRAID Manager program, which configures your optional ServeRAID adapter
- Device drivers that are provided for your server model and detected hardware
- Operating-system partition size and file-system type that are selectable during setup

### ServerGuide features

Features and functions can vary slightly with different versions of the ServerGuide program. To learn more about the version that you have, start the *ServerGuide Setup and Installation CD* and view the online overview. Not all features are supported on all server models.

The ServerGuide program requires a supported IBM server with an enabled startable (bootable) CD or DVD drive. In addition to the *ServerGuide Setup and Installation CD*, you must have your operating-system CD to install the operating system.

The ServerGuide program performs the following tasks:

- Sets system date and time
- Detects an installed SCSI RAID adapter and runs the SCSI RAID configuration program
- Checks the microcode (firmware) levels of a ServeRAID adapter and determines whether a later level is available from the CD

- Detects installed hardware options and provides updated device drivers for most adapters and devices
- Provides diskette-free installation for supported Windows operating systems
- Includes an online readme file with links to tips for your hardware and operating-system installation

## Setup and configuration overview

When you use the *ServerGuide Setup and Installation* CD, you do not need setup diskettes. You can use the CD to configure any supported IBM server model. The setup program provides a list of tasks that are required to set up your server model. On a server with a ServeRAID adapter, you can run the SCSI RAID configuration program to create logical drives.

**Note:** Features and functions can vary slightly with different versions of the ServerGuide program.

When you start the *ServerGuide Setup and Installation* CD, the program prompts you to complete the following tasks:

- Select your language.
- Select your keyboard layout and country.
- View the overview to learn about ServerGuide features.
- View the readme file to review installation tips for your operating system and adapter.
- Start the operating-system installation. You will need your operating-system CD.

## Typical operating-system installation

The ServerGuide program can reduce the time it takes to install an operating system. It provides the device drivers that are required for your hardware and for the operating system that you are installing. This section describes a typical ServerGuide operating-system installation.

**Note:** Features and functions can vary slightly with different versions of the ServerGuide program.

1. After you have completed the setup process, the operating-system installation program starts. (You will need your operating-system CD to complete the installation.)
2. The ServerGuide program stores information about the server model, service processor, hard disk drive controllers, and network adapters. Then, the program checks the CD for newer device drivers. This information is stored and then passed to the operating-system installation program.
3. The ServerGuide program presents operating-system partition options that are based on your operating-system selection and the installed hard disk drives.
4. The ServerGuide program prompts you to insert your operating-system CD and restart the server. At this point, the installation program for the operating system takes control to complete the installation.

## Installing your operating system without ServerGuide

If you have already configured the server hardware and you are not using the ServerGuide program to install your operating system, complete the following steps to download the latest operating-system installation instructions from the IBM Support Web page:

1. Go to <http://www.ibm.com/support/>.

2. In the **Download** section, click **Downloads & drivers**.
3. On the “Downloads and drivers” page, in the **Brand** field, select, **Servers**.
4. In the **Family** field, select **xSeries 100**.
5. Click **Continue**.
6. In the **View by document type** field, select **OS installation**.
7. Select the instructions for your operating system.

---

## Using the Boot Menu program

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

To use the Boot Menu program to change the startup sequence, complete the following steps:

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

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

---

## Enabling the Broadcom NetXtreme Gigabit Ethernet Utility program

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

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

1. Turn on the server.
2. When the prompt Press F1 for Configuration/Setup Utility appears during startup, Press F1.
3. From the Configuration/Setup Utility main menu, select **Devices and I/O Ports** and press Enter.
4. Select **System Board Ethernet PXE/DHCP** and use the Right Arrow (→) key to set it to **Enabled**.
5. Select **Save Settings** and press Enter.

---

## Configuring the Broadcom NetXtreme Gigabit Ethernet controller

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

You do not have to set any jumpers or configure the controller. However, you must install a device driver to enable the operating system to address the controller. For updated information about configuring the controller, see <http://www.ibm.com/support/>.

---

## Updating IBM Director

If you plan to use IBM Director to manage the server, make sure you download the latest applicable IBM Director updates and interim fixes.

To install the latest version of IBM Director and any other applicable updates and interim fixes, complete the following steps.

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

1. Check for the latest version of IBM Director:
  - a. Go to [http://www.ibm.com/eserver/xseries/systems\\_management/xseries\\_sm/dwnl.html](http://www.ibm.com/eserver/xseries/systems_management/xseries_sm/dwnl.html).
  - b. 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>.
  - b. Click **Support & downloads**.
  - c. Click **Downloads & drivers**.
  - d. In the search field, type `director 8486` and click **Submit**.
  - 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.

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## Appendix. Notices

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C2T Interconnect	TechConnect
Chipkill	ThinkPad
EtherJet	Tivoli
e-business logo	Tivoli Enterprise
@server	Update Connector
FlashCopy	Wake on LAN
IBM	XA-32
IntelliStation	XA-64
NetBAY	X-Architecture
Netfinity	Xcel4
NetView	XpandOnDemand
OS/2 WARP	xSeries
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## Important notes

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

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

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

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

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

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

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