



**@server**

xSeries 345

Type 8670

# Option Installation Guide





IBM xSeries 345  
Type 8670



# Option Installation Guide

**Note:**

Before using this information and the product it supports, be sure to read the general information in “Notices” on page 43.

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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 ασφάλειας (safety information).

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

A termék telepítése előtt olvassa el a Biztonsági előírásokat!

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

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

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

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

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

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

Перед установкой продукта прочтите инструкции по технике безопасности.

Pred inštaláciou tohto zariadenia si pečítajte Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

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

Läs säkerhetsinformationen innan du installerar den här produkten.

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:

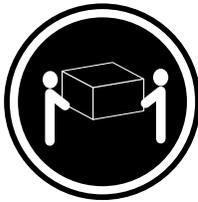
- Do not remove the covers. Removing the covers of the laser product could result in exposure to hazardous laser radiation. There are no serviceable parts inside the device.
- Use of controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation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

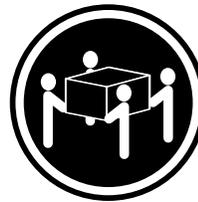
Statement 4



≥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.

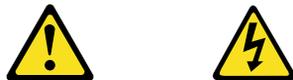


Statement 13



**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 the branch circuit protection requirements. Refer to the information that is provided with your IBM device for electrical specifications.

Statement 14



**CAUTION:**  
Hazardous voltage, current, and energy levels might be present. Only a qualified service technician is authorized to remove the covers where the following label is attached.



**Statement 15**



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

**Statement 16**



**CAUTION:**  
Some accessory or option board outputs exceed Class 2 or limited power source limits and must be installed with appropriate interconnecting cabling in accordance with the national electric code.

**Statement 17**



**CAUTION:**  
The following label indicates moving parts nearby.



---

## Chapter 1. Introduction

This *Option Installation Guide* provides the instructions to install, remove, and connect optional devices that are supported by your server.

In addition to this *Option Installation Guide*, the following xSeries™ 345 Type 8670 documentation is provided with your server:

- *Installation Guide*  
This printed publication contains setup and installation instructions.
- *Rack Installation Instructions*  
This printed publication contains the instructions to install your server in a rack.
- *Safety Book*  
This multilingual publication is provided in Portable Document Format (PDF) on the IBM® xSeries Documentation CD. It contains translated versions of the caution and danger statements that appear in the documentation for your server. Each caution and danger statement has an assigned number, which you can use to locate the corresponding statement in your native language.
- *User's Guide*  
This publication is provided in PDF on the IBM xSeries Documentation CD. It contains general information about your server.
- *Hardware Maintenance Manual and Troubleshooting Guide*  
This publication is provided in PDF on the IBM xSeries Documentation CD. It contains the information to help you solve a problem yourself or to provide helpful information to a service technician.

---

### Notices and statements in this book

The caution and danger statements used in this book also appear in the multilingual *Safety Information* book provided on the IBM xSeries Documentation CD. Each caution and danger statement is numbered for easy reference to the corresponding statements in the safety book.

The following types of notices and statements are used in this book:

- **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 possible damage to programs, devices, or data. An attention notice is placed just before the instruction or situation in which damage could occur.
- **Caution:** These statements indicate situations that can be potentially hazardous to you. A caution statement is placed just before the description of a potentially hazardous procedure step or situation.
- **Danger:** These statements indicate situations that can be potentially lethal or extremely hazardous to you. A danger statement is placed just before the description of a potentially lethal or extremely hazardous procedure step or situation.

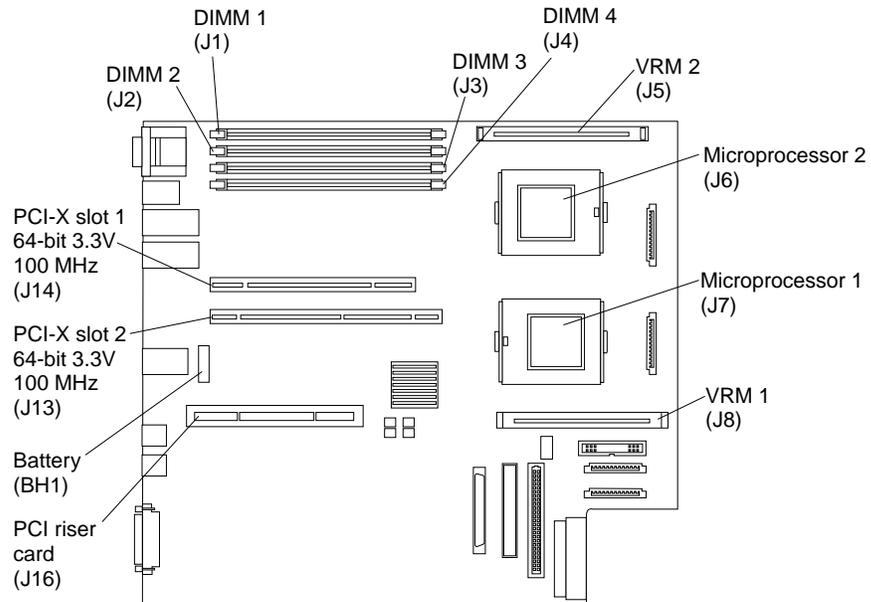


## Component locations

This section provides illustrations of the system-board and PCI riser-card component locations.

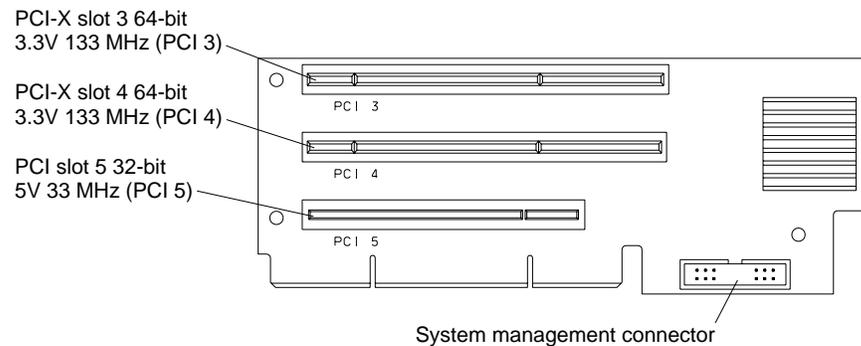
### System-board option connectors

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



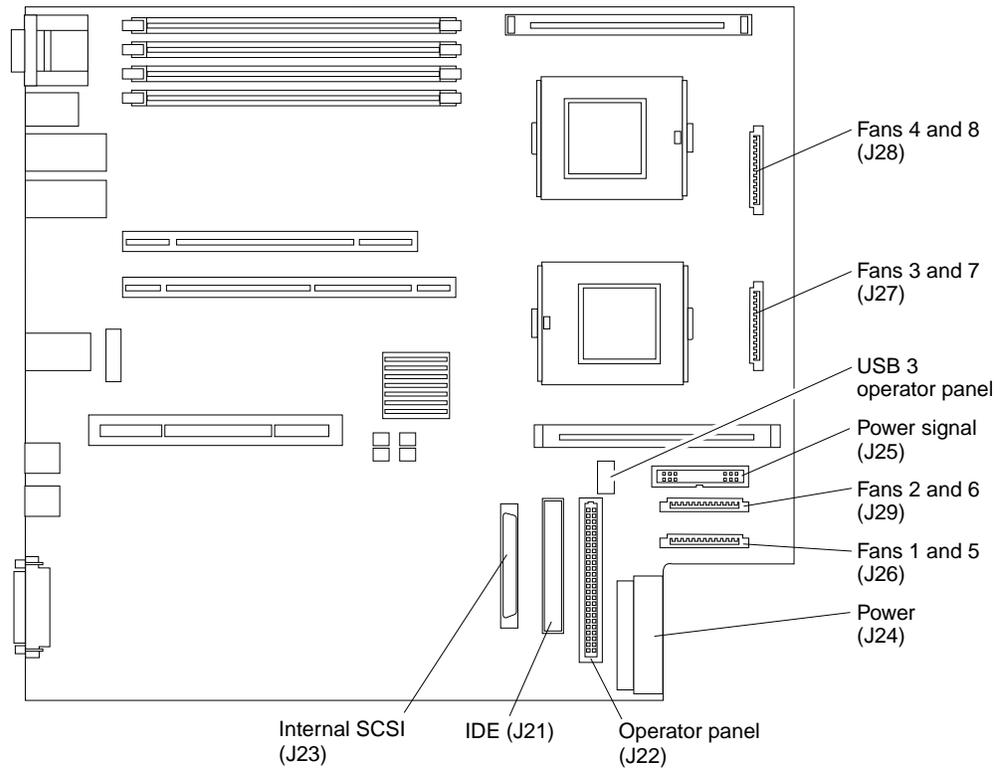
### PCI riser-card option connectors

The following illustration shows the location of the PCI riser-card connectors for user-installable options.



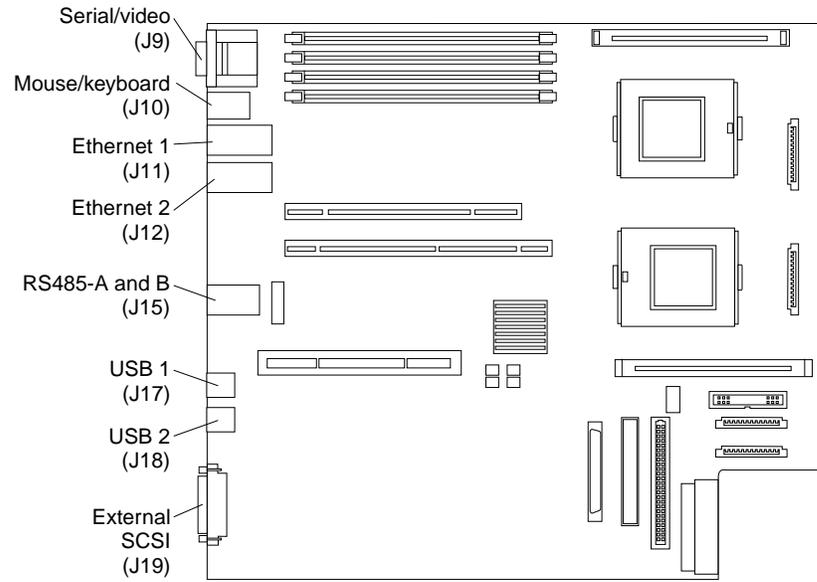
## System-board internal cable connectors

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



# System-board external port connectors

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



## System-board switches and jumpers

The following illustration shows the location of the switch block (SW2) and the flash boot jumper on the system board.

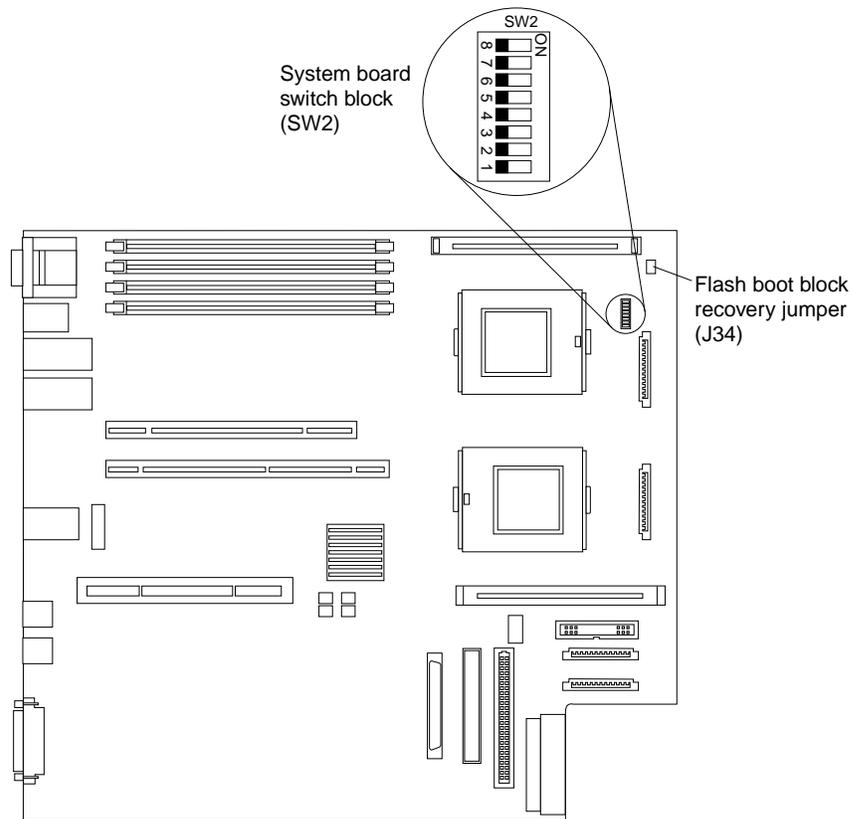


Table 1 describes the function of each switch on the switch block.

Table 1. Switches 1-8

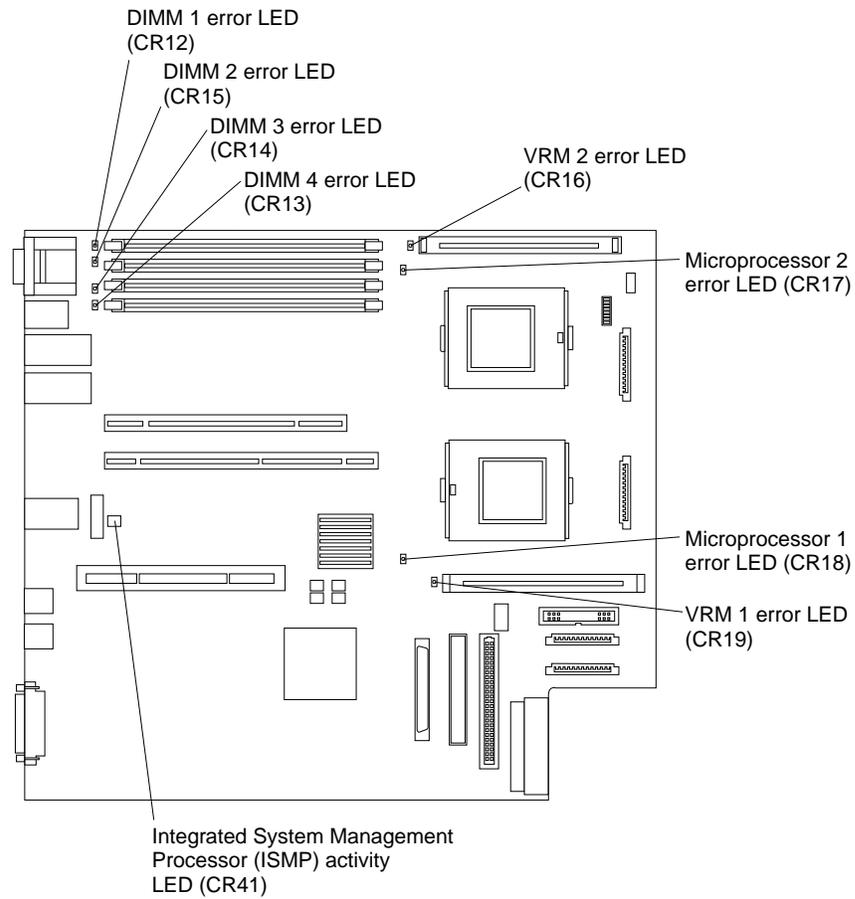
Switch number	Default value	Switch description
8	Off	Reserved.
7	Off	Reserved.
6	Off	Reserved.
5	Off	Reserved.
4	Off	Reserved.
3	Off	Power-on override. When toggled to On, this switch forces the power on, overriding the power-on button.
2	Off	<p>Power-on password override. Changing the position of this switch bypasses the power-on password check the next time the server is turned on and starts the Configuration/Setup Utility program so that you can change or delete the power-on password. You do not need to move the switch back to the default position after the password is overridden.</p> <p>Changing the position of this switch does not affect the administrator password check if an administrator password is set.</p> <p>See the <i>User's Guide</i> on the IBM xSeries Documentation CD for additional information about the power-on password.</p>
1	Off	H8 out serial port. This switch is reserved for service use only.

**Notes:**

1. Before changing any switch settings or moving any jumpers, turn off the server; then, disconnect all power cords and external cables. (Review the information in "Safety" on page v, "Installation guidelines" on page 9, "Handling static-sensitive devices" on page 10, and "Turning off the server" on page 12.)
2. Any system-board switch or jumper blocks that are not shown in the illustrations in this book are reserved.

## System-board LED locations

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



---

## Chapter 2. Installing options

This chapter provides instructions for adding options to your server. Some option-removal instructions are provided in case you need to remove one option to install another.

---

### Installation guidelines

Before you begin to install options in your server, read the following information:

- Become familiar with the safety and handling guidelines specified under “Handling static-sensitive devices” on page 10, and read the safety statements that come with the server options.
- You do not need to turn off the server to install or replace hot-swap power supplies, hot-swap drives, hot-swap fans, or hot-plug USB devices.
- The orange color on components and labels in your server identifies hot-swap or hot-plug components. You can install or remove hot-swap and hot-plug components while the system is running, provided that your system is configured to support this function. For complete details about installing or removing a hot-swap or hot-plug component, see the detailed information in this chapter.
- The blue color on components and labels identifies touch points where you can grip a component, move a latch, and so on.
- Make sure that you have an adequate number of properly grounded electrical outlets for your server, monitor, and any other options that you intend to install.
- Back up all important data before you make changes to hard disk drives.
- For a list of supported options for your server, go to <http://www.ibm.com/pc/us/compat/> on the World Wide Web.
- To maintain proper system cooling, do not operate the server for more than 10 minutes without either a drive or filler panel installed in each bay.
- During normal operation, each power-supply bay must have either a power supply or power-supply blank installed for proper cooling.
- Do not leave open space above or below an installed server in your rack cabinet. To help prevent damage to server components, always install a blank filler panel to cover the open space and to help ensure proper air circulation. See the documentation that comes with your rack cabinet for more information.

### System reliability considerations

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

- Each of the drive bays has either a drive or a filler panel installed.
- Each of the power supply-bays has a power supply installed or a power-supply blank installed.
- Make sure that space is available around the server to enable the server cooling system to work properly. See the documentation that comes with the rack for additional information.
- The server cover is in place during normal operation.
- A removed hot-swap drive is replaced within 2 minutes of removal.
- Cables for optional adapters are routed according to the instructions provided with the adapters.
- A failed fan is replaced immediately. If your server supports redundant cooling, a failed fan is replaced within 48 hours.
- The air baffle over the microprocessors remains in place during normal operation.

- The air baffle between the power supplies and the hot-swap fans remains in place during normal operation.

## Working inside the server with the power on

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

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

## Handling static-sensitive devices

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

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

- Limit your movement. Movement can cause static electricity to build up around you.
- Handle the device carefully, holding it by its edges or its frame.
- Do not touch solder joints, pins, or exposed printed circuitry.
- Do not leave the device where others can handle and possibly damage the device.
- While the device is still in its static-protective package, touch it to an unpainted metal part of the system unit 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 your system unit without setting it down. If it is necessary to set the device down, place it in its static-protective package. Do not place the device on your system unit cover or on a metal table.
- Take additional care when handling devices during cold weather because heating reduces indoor humidity and increases static electricity.

---

## Server power features

This section contains information about how to properly turn your server on and off.

### Turning on the server

You can turn on the server in any of the following ways:

- If the power cords are connected to a power source, you can press the power-control-button on the front of the server.

**Note:** You can install a circular disk over the power-control button to prevent accidental manual power-off. This disk, known as the power-control button shield, comes with your server.

- If the server is turned on and a power failure occurs, it restarts automatically when power is restored.
- You can turn on the server by using the optional Remote Supervisor Adapter.
- You can turn on the server by using the Integrated Management Processor (ISMP).
- When you plug in your server for the first time, Wake on LAN<sup>®</sup> can turn on the server.
- If your server was previously turned on, it must be properly placed in Standby mode for the Wake on LAN feature to turn on the server.

Complete the following steps to manually turn on the server:

1. Review the information in “Safety” on page v.
2. Turn on all external devices, such as the monitor.
3. Plug the server power cords into the power source.
4. Press the power-control button on the front of the server.

**Note:** While the server is powering up, the power-on LED on the front of the server is on.

## Turning off the server

Complete the following steps to manually turn off the server:

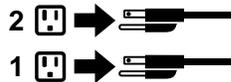
1. Review the information in “Safety” on page v.
2. See your operating system documentation for the proper procedure to shut down the operating system.

### 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.



3. Press the power-control button on the front of the server. This will put the server in Standby mode.
4. Disconnect the server from the power source.

#### Notes:

- a. After you turn off the server, wait at least 5 seconds before you turn on the server again.
- b. You might need to press and hold the power-control button for more than 4 seconds to cause an immediate shutdown of the server and to force the power off. You can use this feature if the operating system stops functioning.

## Standby mode

Standby mode refers to the condition in which the server operating system is not running and all core logic is shut down except for the service processor.

Complete the following steps to put the server into Standby mode:

1. See the operating system documentation for the proper procedure to shut down the operating system.

**Note:** Each operating system is different. Read all the documentation about shutting down the operating system before continuing.

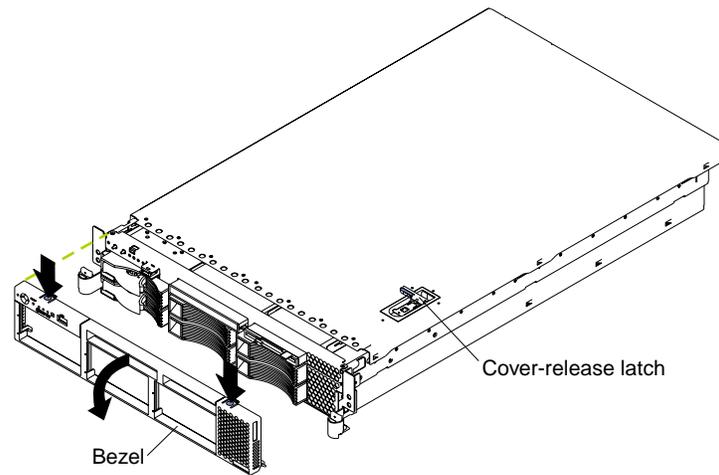
2. Press the power-control button on the front of the server.

You can put the server into Standby mode remotely by using the service processor.

---

## Removing the cover and bezel

The following illustration shows how to remove the cover and bezel.



Complete the following steps to remove the server top cover:

1. Review the information in “Safety” on page v, and “Installation guidelines” on page 9.
2. If you are planning to install or remove a microprocessor, memory-module, PCI adapter, or battery, turn off the server and all attached devices and disconnect all external cables and power cords (see “Turning off the server” on page 12).
3. Press down on the left and right side latches and pull the server out of the rack enclosure until both slide rails lock.

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

4. Lift the cover-release latch. Lift the cover off the server and set the cover aside.

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

To remove the bezel:

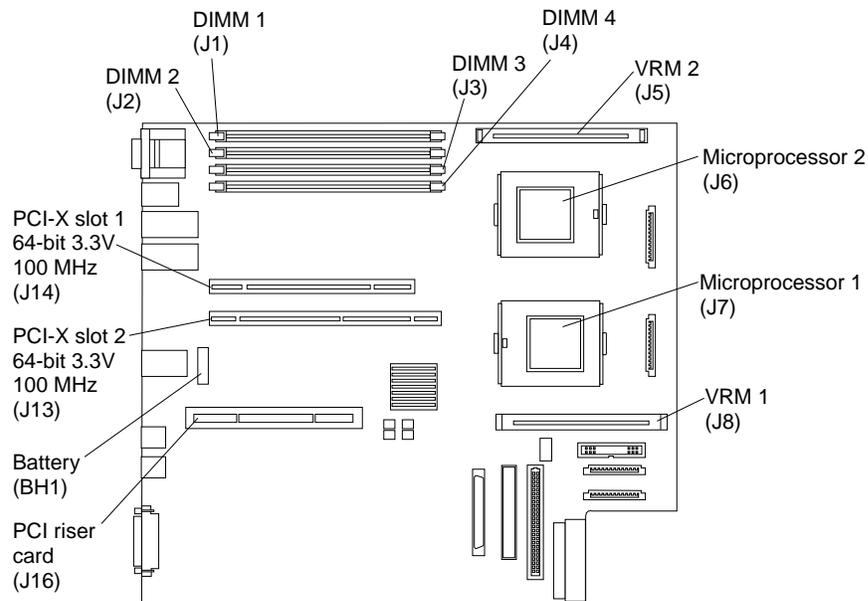
1. Press in on the tabs on the top of the bezel, and rotate the bezel away from the server front.
2. Store the bezel in a safe place

## Working with adapters

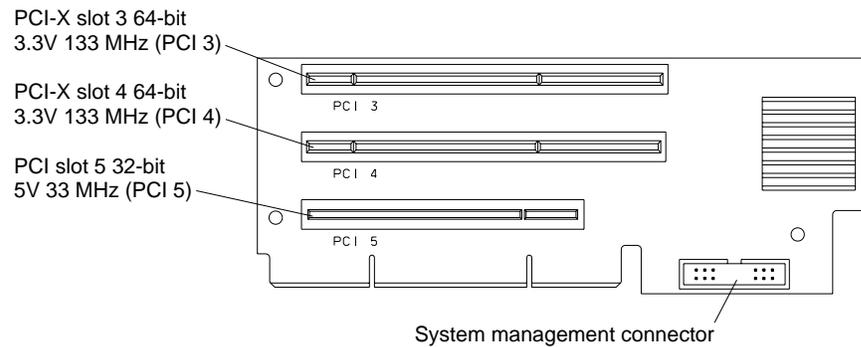
You can install up to five peripheral component interconnect (PCI) adapters in the connectors on the system board and PCI riser card. Before you continue with the adapter-installation procedures, review “Adapter considerations” on page 15.

The following illustrations show the location of the PCI and PCI-X adapter expansion slots on the system board and PCI riser card.

### System board



### PCI riser card



## Adapter considerations

Before you install an adapter, review the following information:

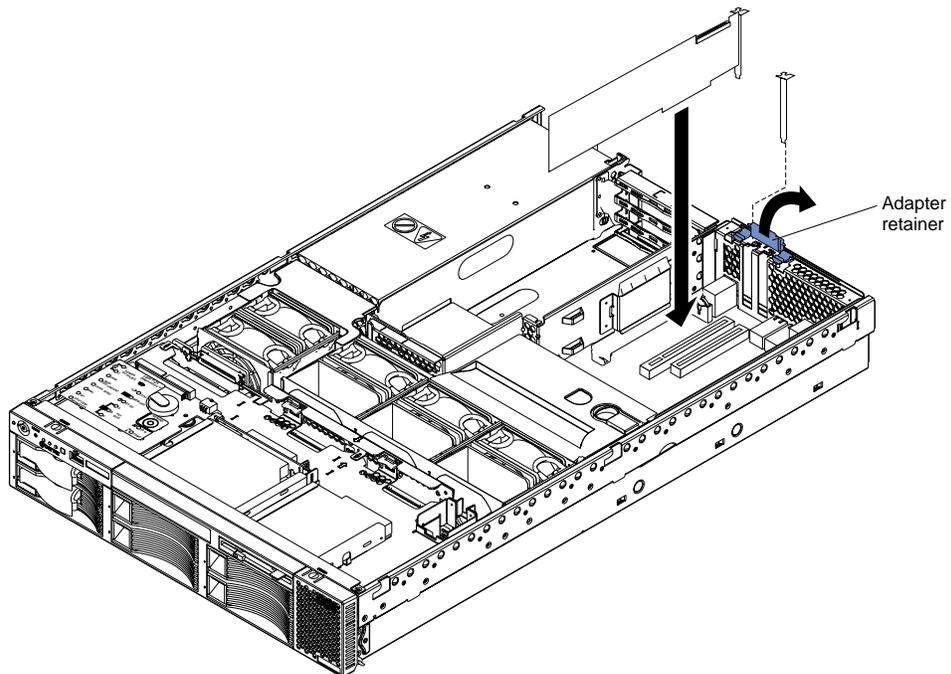
- Read the documentation that comes with your operating system.
- Locate the documentation that comes with the adapter and follow those instructions in addition to the instructions in this chapter. If you need to change the switch or jumper settings on your adapter, follow the instructions that come with the adapter.
- You can install only low-profile adapters in slots 1 and 2.
- You can install standard full-length adapters, with the adapter guides removed from the adapters, in slots 3 and 4.
- You can install only a half-length adapter in slot 5.
- The ServeRAID-5i controller can be installed only in PCI slot 2. The low-profile 2-U bracket that comes with the controller is required to install the controller.
- The optional IBM Remote Supervisor Adapter can be installed only in PCI slot 5. Use the ribbon cable that comes with the adapter to connect the adapter to the system management connector on the PCI riser-card.
- Your server supports 5.0 V and universal PCI adapters on the 32-bit PCI slot 5; your server supports only 3.3 V and universal PCI adapters in the 64-bit PCI/PCI-X slot 3 and 4.
- The PCI bus configuration is:
  - Non-hot-plug, 64-bit PCI-X slots 1 through 2 (PCI bus A, 100 MHz)
  - Non-hot-plug, 64-bit PCI-X slots 3 through 4 (PCI bus B, 133 MHz)
  - Non-hot-plug, 32-bit PCI slot 5 (PCI bus C, 33 MHz)
- The system scans PCI and PCI-X slots 1 through 5 to assign system resources; then the system starts (boots) the system devices in the following order, if you have not changed the default boot precedence: integrated Ethernet controller, integrated SCSI controller, and then PCI and PCI-X slots 5, 3, 4, 1, and 2.

### Notes:

1. Some models come with the ServeRAID-5i controller preinstalled.
2. If the ServeRAID-5i controller is installed, it takes control of the integrated SCSI controller with RAID capabilities and operates at 66 MHz. The ServeRAID-5i controller can be installed only in slot 2.
3. To change the boot precedence for PCI and PCI-X devices, start the Configuration/Setup Utility program and select **Start Options** from the main menu. See the *User's Guide* on the IBM xSeries Documentation CD for details about using the Configuration/Setup Utility program.

## Installing an adapter

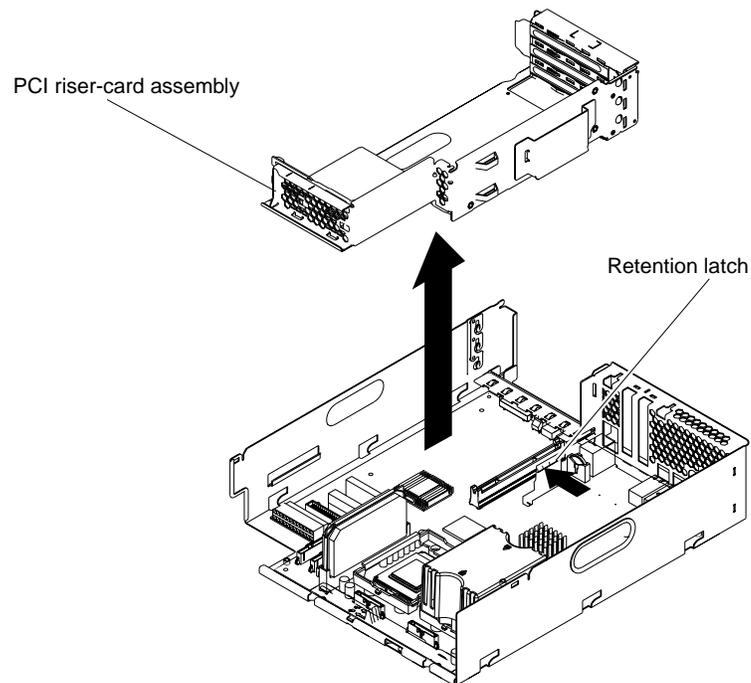
The following illustration shows how to install a PCI or PCI-X adapter.



Complete the following steps to install a PCI or PCI-X adapter:

1. Review the information in “Safety” on page v, and “Installation guidelines” on page 9.
2. Turn off the server and peripheral devices and disconnect all power cords and external cables (see “Turning off the server” on page 12); then, remove the cover (see “Removing the cover and bezel” on page 13).
3. Determine which expansion slot you will use for the adapter.

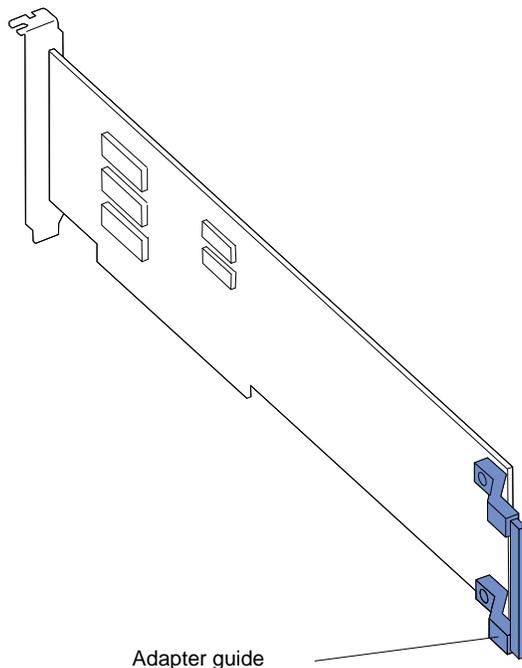
4. If you are installing an adapter in PCI slot 3, 4, or 5, remove the PCI riser-card assembly.



- a. Press on the retention latch to release the PCI riser-card assembly.
  - b. Lift the assembly from the server.
  - c. Place the assembly on a flat, level surface.
5. Open the adapter retainer and slide the expansion-slot cover out of the server or PCI riser-card assembly. Store it in a safe place for future use.  
**Attention:** Expansion-slot covers must be installed on all empty slots. This maintains the electronic emissions characteristics of the system and ensures proper cooling of system components.
  6. See the documentation that comes with your adapter for any cabling instructions. It might be easier for you to route cables before you install the adapter.
  7. Remove the adapter from the static-protective package.  
**Attention:** Avoid touching the components and gold-edge connectors on the adapter.

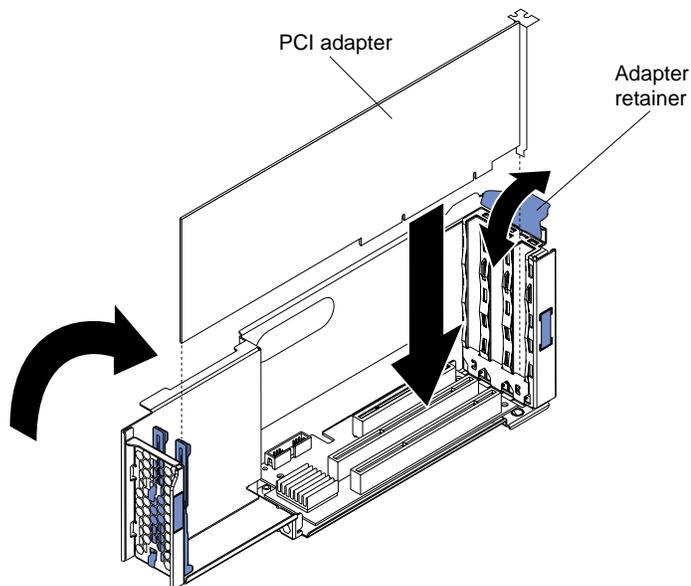
8. Install the adapter:

- a. If you are installing a full-length adapter, remove the blue adapter guide (if any) from the end of the adapter.



- b. Carefully grasp the adapter by its top edge or upper corners, and align it with the expansion slot.
- c. Press the adapter *firmly* into the expansion slot and close the adapter retainer.

**Attention:** When you install an adapter in the server, be sure that it is completely and correctly seated in the connector. Incomplete insertion might cause damage to the system board or the adapter.



9. If you removed the PCI riser-card assembly to install the adapter, press the PCI riser-card assembly *firmly* into the connector so that the retention latch is engaged.

**Note:** Make sure that the PCI riser-card assembly is properly seated on the system-board connector and that the cables under the PCI riser-card assembly are not pinched.

10. Connect any needed cables to the adapter. See the documentation that comes with your adapter for cabling instructions.

**Attention:**

- When you route the cables, do not block the ventilated space around any of the fans. In addition, route any cables that are plugged into the PCI adapter under adjacent adapters so they are not pinched between the top edge of the adapter and the shuttle side wall.
  - To ensure system reliability, an optional SCSI adapter cannot control internal hard disk drives.
11. If you have other options to install or remove, do so now; otherwise, go to “Installing the server cover and bezel” on page 33.

## Installing a ServeRAID-5i controller

You can install an optional RAID controller in your server to control the internal hot-swap hard disk drives, for example, to enable you to configure the internal hot-swap hard disk drives into disk arrays. You can also cable a RAID adapter to external hard disk drives. See your RAID controller option documentation for complete instructions on installing a RAID controller in your server and for additional information on RAID controllers.

**Notes:**

1. No rerouting of the internal SCSI cable is required if you are installing the ServeRAID-5i controller. The ServeRAID-5i controller uses the SCSI connector on the system board for output.
2. The ServeRAID-5i controller can be installed only in PCI-X slot 2. Slot 2 is the only PCI-X slot that supports the ServeRAID-5i controller requirements.
3. Connections made to external SCSI devices will be asynchronous.
4. Some models come with the ServeRAID-5i controller preinstalled.

Complete the following steps to install a ServeRAID-5i controller:

1. Review the information in “Safety” on page v, “Installation guidelines” on page 9, and “Handling static-sensitive devices” on page 10.
2. Turn off the server and peripheral devices and disconnect all power cords and external cables (see “Turning off the server” on page 12); then, remove the cover (see “Removing the cover and bezel” on page 13).
3. Open the adapter retainer and slide the slot 2 expansion-slot cover out of the server. Store it in a safe place for future use.

**Attention:** Expansion-slot covers must be installed on all empty slots. This maintains the electronic emissions characteristics of the system and ensures proper cooling of system components.

4. Install the low profile 2-U bracket on the adapter:
  - a. Remove the adapter from the static-protective package. Set the adapter down on a nonconductive, static-protected surface (place it component side up).

**Attention:** Avoid touching the components and gold-edge connectors on the adapter.
  - b. Remove the 3-U bracket from the adapter and replace it with the 2-U low profile bracket that comes with the RAID controller option. See the documentation that comes with your RAID controller option for instructions.

5. Install the adapter:
  - a. Carefully grasp the adapter by its top edge or upper corners, and align it with the expansion slot on the system board.
  - b. Press the adapter *firmly* into the expansion slot and close the adapter retainer.

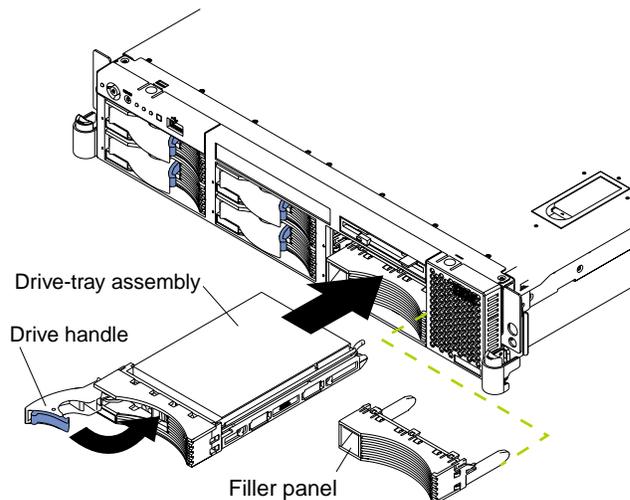
**Attention:** When you install an adapter in the server, be sure that it is completely and correctly seated in the connector. Incomplete insertion might cause damage to the system board or the adapter.
6. If you have other options to install or remove, do so now; otherwise, go to “Installing the server cover and bezel” on page 33.

---

## Installing a hot-swap drive

Your server supports six 1-inch (26 mm) slim 3.5-inch low-voltage differential (LVD) hard disk drives.

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



Complete the following steps to install a drive in a hot-swap bay.

**Notes:**

1. All hot-swap drives being used in the server should have the same throughput speed rating. Mixing hard disk drives with different speed ratings will cause all drives to operate at the lower throughput speed.
2. The SCSI ID assigned to each bay is printed on the bezel.

**Attention:** To maintain proper system cooling, do not operate the server for more than 10 minutes without either a drive or a filler panel installed in each bay.

1. Review the information in “Safety” on page v, and “Installation guidelines” on page 9.
2. Remove the filler panel from one of the empty hot-swap bays by inserting your finger into the depression at the left side of the filler panel and pulling it away from the server.
3. Install the hard disk drive in the hot-swap bay:
  - a. Ensure that the tray handle is open (that is, perpendicular to the drive).
  - b. Align the drive assembly with the guide rails in the bay.
  - c. Gently push the drive assembly into the bay until the drive stops.

- d. Push the tray handle to the closed (locked) position.
- e. Check the hard disk drive status LED to verify that the hard disk drive is operating properly.

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

**Note:** If you have a RAID configuration on your server using the integrated SCSI controller with RAID capabilities, or if your server has a RAID adapter installed, you might need to reconfigure your disk arrays after installing hard disk drives. See the RAID documentation on the IBM *xSeries Documentation* CD for information about RAID adapters.

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## Installing memory modules

Adding memory to your server is an easy way to make programs run faster. You can increase the amount of memory in your server by installing memory-module options. When you install memory, you must install a pair of matched double-data-rate (DDR) dual-inline-memory modules (DIMMs).

### Notes:

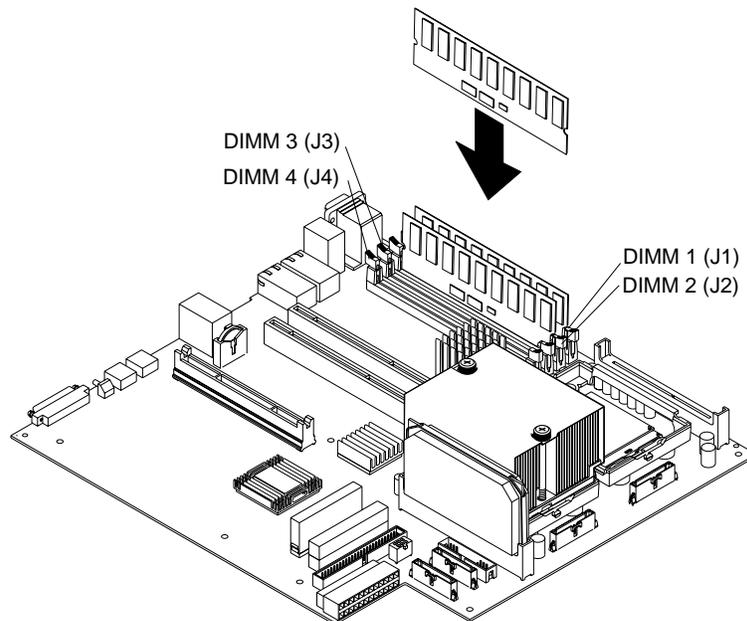
1. The system board contains four DIMM connectors and supports two-way memory interleaving.
2. The DIMM options available for your server are 256 MB, 512 MB, and 1 GB.
3. The amount of usable memory will be reduced depending on the system configuration. The BIOS will display the total amount of installed memory and the amount of configured memory.
4. Your server supports a minimum of two 256 MB DIMMs (for a total of 512 MB) installed in the DIMM 1 and DIMM 2 memory connectors (J1 and J2, respectively). When you install additional DIMMs, install them in pairs, with the next pair in DIMM connectors 3 and 4 (J3 and J4).
5. Both DIMMs in a pair must be the same size, speed, type, and technology. You can mix compatible DIMMs from various manufacturers.
6. The second pair of DIMMs do not have to be the same size, speed, type, and technology as the first pair.
7. Install only 100 MHz, 2.5 V, 184-pin, double-data-rate (DDR), PC2100, registered synchronous dynamic random-access memory (SDRAM) with error correcting code (ECC) DIMMs. These DIMMs must be compatible with the latest PC2100 (and downward compatible with PC1600) SDRAM Registered DIMM specification, which is available from <http://www.jedec.org/> on the World Wide Web. For a list of supported options for your server, go to <http://www.ibm.com/us/compat/> on the World Wide Web.
8. Your server supports Chipkill™ technology, if the DIMMs are all of the type 4x.
9. Save new configuration information only if you replace a faulty DIMM that was marked as **Disabled** in the Configuration/Setup Utility program **Memory Settings** menu. In this case, re-enable the memory row in the Configuration/Setup Utility program or reload the default memory settings. See the *User's Guide* on the IBM *xSeries Documentation* CD for more information.

Install the DIMMs in the order shown in the following table:

Table 2. DIMM order of installation

Pair	DIMM connectors
First	1 and 2 (J1, J2)
Second	3 and 4 (J3, J4)

The following illustration shows how to install DIMMs on the system board.



Before you begin, read the documentation that comes with your option.

Complete the following steps to install a DIMM.

1. Review the information in “Safety” on page v, and “Installation guidelines” on page 9.
2. Turn off the server and disconnect all power cords and external cables (see “Turning off the server” on page 12); then, remove the server cover (see “Removing the cover and bezel” on page 13).
3. Locate the DIMM connectors on the system board. Determine the connectors into which you will install the DIMMs.
4. Touch the static-protective package that contains the DIMM option to any unpainted metal surface on the server. Then, remove the DIMM from the package.
5. To install the DIMM, repeat the following steps for each DIMM that you install:
  - a. Turn the DIMM so that the DIMM keys align correctly with the connector on the system board.

**Attention:** To avoid breaking the retaining clips or damaging the DIMM connectors, handle the clips gently.
  - b. If closed, open the retaining clips; then, insert the DIMM by pressing the DIMM straight into the connector. Be sure that the retaining clips snap into the closed position.

**Note:** If a gap exists between the DIMM and the retaining clips, the DIMM has not been properly installed. In this case, open the retaining clips and remove the DIMM; then, reinsert the DIMM.

6. If you have other options to install or remove, do so now; otherwise, go to “Installing the server cover and bezel” on page 33.

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## Installing an additional microprocessor

Your server supports up to two microprocessors. With two microprocessors, your server can operate as a symmetric multiprocessing (SMP) server. With SMP, certain operating systems and application programs can distribute the processing load between the microprocessors. If your server comes with one microprocessor, you can install a second microprocessor.

Before you begin:

- Thoroughly review the documentation that comes with the microprocessor, so that you can determine whether you need to update the server BIOS code. You can download the latest level of BIOS code and many other code updates for your server at <http://www.ibm.com/pc/support/> on the World Wide Web.
- (Optional) Obtain an SMP-capable operating system. For a list of supported operating systems and other options, go to <http://www.ibm.com/pc/us/compat/> on the World Wide Web.

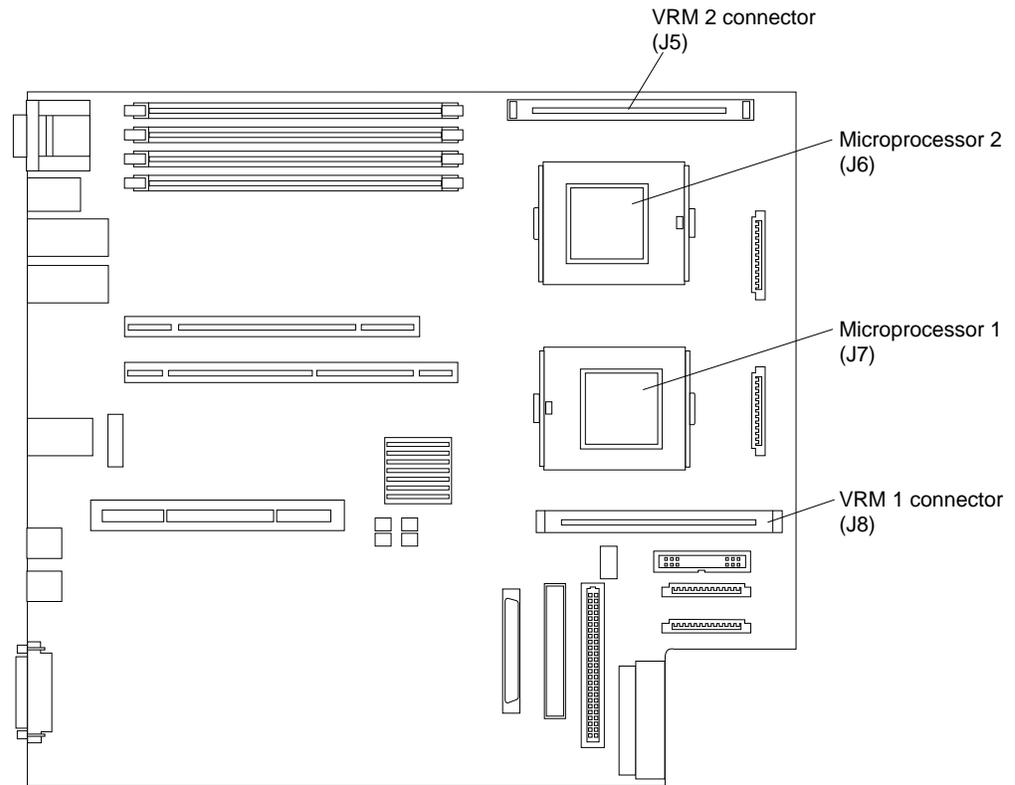
**Attention:**

- A startup (boot) processor must always be installed in socket J7 on the system board.
- To ensure proper server operation when you install an additional microprocessor, use microprocessors that have the same cache size and type, and the same clock speed. Microprocessor internal and external clock frequencies must be identical.

**Notes:**

1. To order additional microprocessor options, contact your IBM reseller or IBM marketing representative.
2. When you install the microprocessor in socket J6, you must also install the voltage regulator module (VRM) that comes with the microprocessor in VRM connector J5.
3. The microprocessor speeds are automatically set for this server; therefore, you do not need to set any microprocessor frequency-selection jumpers or switches.
4. If you need to replace a microprocessor, call for service.

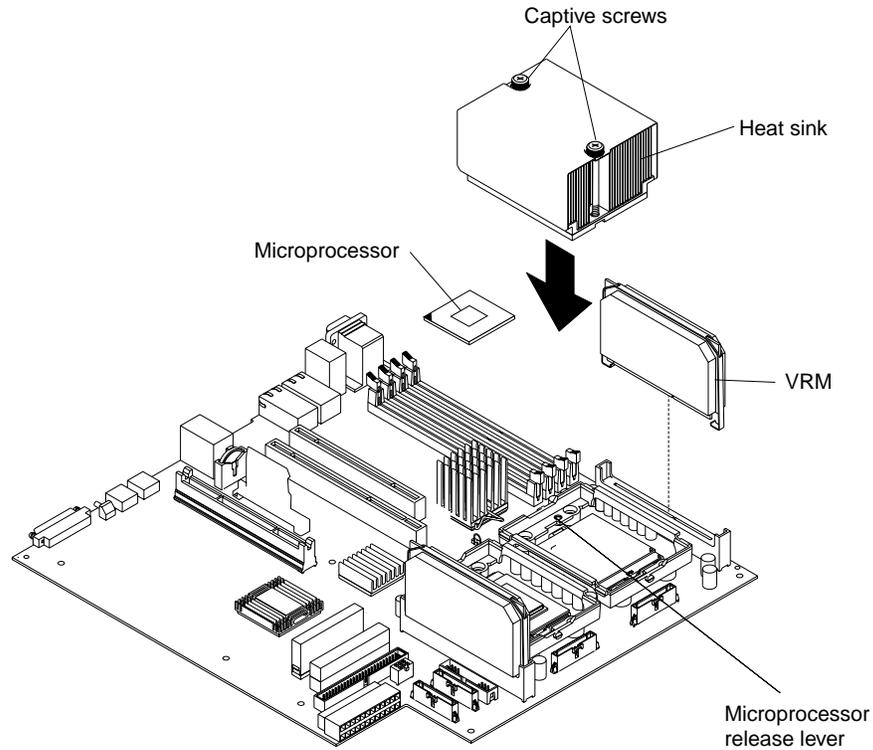
The following illustration is a simplified layout of the microprocessor connector locations and other microprocessor-related components on the system board.



**Note:** For additional illustrations of the system-board components, see “System-board option connectors” on page 3.

The following illustration shows how to install the second microprocessor on the system board.

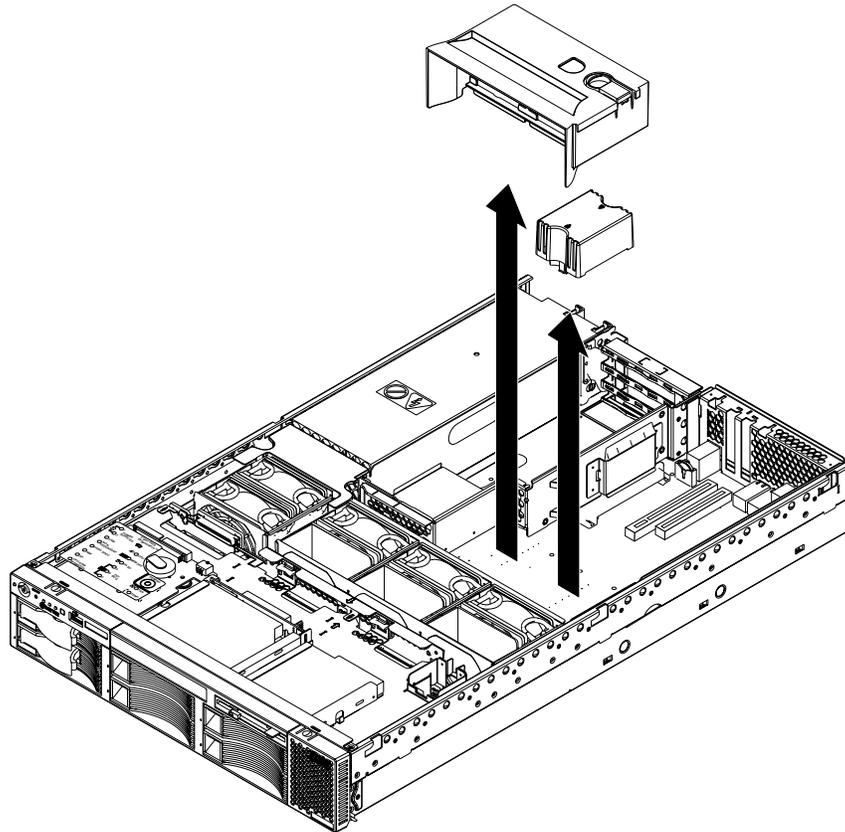
**Note:** Do not remove the first microprocessor from the system board to install the second microprocessor.



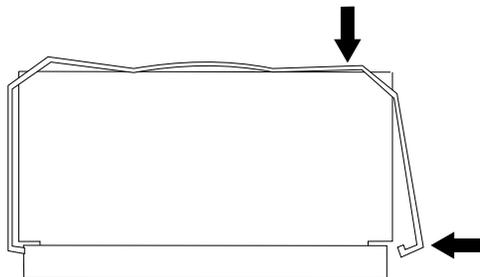
Complete the following steps to install an additional microprocessor:

1. Review the information in “Safety” on page v, and “Installation guidelines” on page 9.
2. Turn off the server and disconnect all power cords and external cables (see “Turning off the server” on page 12); then, remove the server cover (see “Removing the cover and bezel” on page 13).
3. Remove the air baffle covering the microprocessor section of the system board and set the air baffle aside.

4. Remove the air baffle from the empty microprocessor socket. Store it in a safe place for future use. An empty microprocessor socket must contain an air baffle.



5. Install a VRM in the VRM connector (J5). See the illustration at the beginning of these instructions for the location of the connectors:
  - a. Center the VRM over the connector. Make sure that the VRM is oriented and aligned correctly.
  - b. Carefully but firmly push down the VRM to seat the VRM in the connector.
  - c. Insert one end of the retainer clip on the side of the connector and fit the retainer clip over the VRM. Insert the free end of the retainer clip on the other side of the connector.

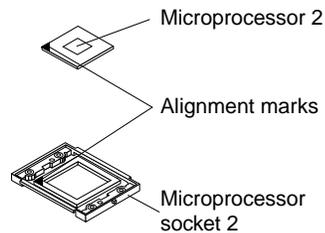


6. Locate the second microprocessor socket (connector J6) on the system board.

7. Install the microprocessor:
  - a. Pull out and lift up on the microprocessor-release lever to unlock the microprocessor socket.
  - b. Touch the static-protective package containing the new microprocessor to any *unpainted* metal surface on the server; then, remove the microprocessor from the package.
  - c. Center the microprocessor over the microprocessor socket. Align the triangle on the corner of the microprocessor with the triangle on the corner of the socket and carefully press the microprocessor into the socket.

**Attention:**

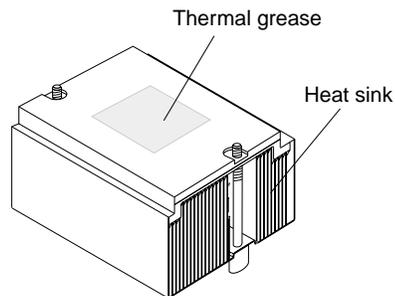
- Do not use excessive force when pressing the microprocessor into the socket.
- Make sure that the microprocessor is oriented and aligned correctly with pin number 1 in the socket before you try to close the lever. The following illustration shows the alignment marks for microprocessor 2 and microprocessor socket 2.



- d. Carefully close the lever to secure the microprocessor in the socket.
8. Install a heat sink on the microprocessor:

**Attention:**

- Do not set the heat sink down after you remove the plastic cover.



- Do not touch the thermal grease on the bottom of the heat sink. Touching the thermal grease will contaminate it. If the thermal grease on the microprocessor or heat sink becomes contaminated, contact your service technician.
  - a. Remove the plastic protective cover from the bottom of the heat sink.
  - b. Align and place the heat sink on top of the microprocessor with the thermal grease side down. Press firmly on the heat sink.
  - c. Secure the heat sink to the microprocessor by tightening the captive screws. Alternate between the two captive screws in the heat sink while tightening them.

**Attention:** If you do not alternate the tightening of the two captive screws, you might damage the microprocessor. Ensure that the screws are completely tightened; otherwise, the server will not function properly.

9. Install the air baffle over the microprocessor section of the system board.
10. If you have other options to install or remove, do so now; otherwise, go to “Installing the server cover and bezel” on page 33.

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## Installing a hot-swap power-supply option

Your server supports a maximum of two hot-swap power supplies.

**Note:** Hot-swap fans come with the power-supply option.

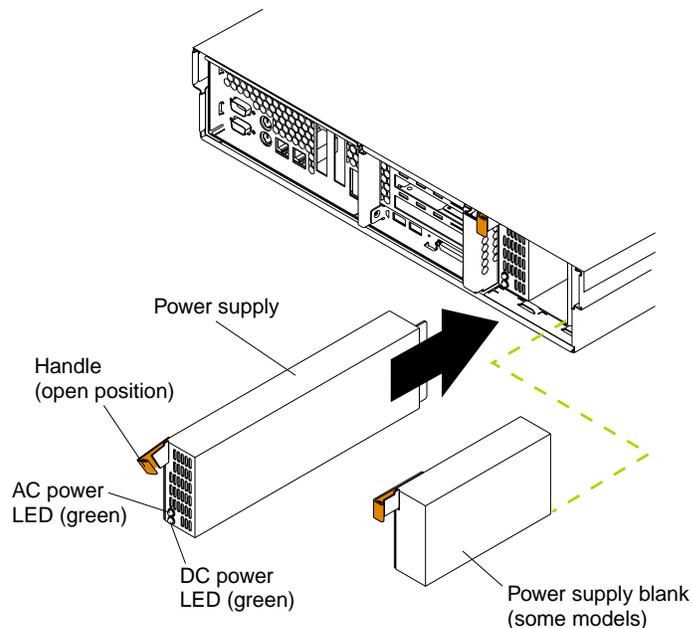
### Statement 8



**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.



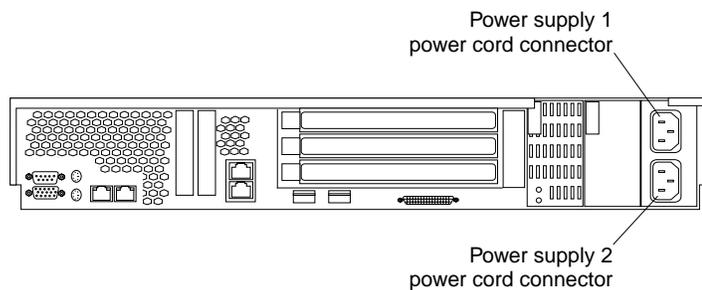
Complete the following steps to install a power supply:

1. (Some models) Remove the power-supply blank from the empty power-supply bay by pinching the side clip and pulling the power-supply blank from the bay. Save the power-supply blank in case you remove the power supply at a later time.

**Attention:** During normal operation, each power-supply bay must have either a power supply or power-supply blank installed for proper cooling.

2. Install the power supply in the bay:
  - a. Move the handle on the power supply into the open position, pinch the side-clip, and slide the power supply into the chassis.
  - b. Gently close the handle to seat the power supply in the bay.
3. Plug the power cord for the new power supply into the power-cord connector on the back of the server.

The following illustration shows the power-supply connectors on the back of the server.



4. Route the power cord through the cable-management arm. (See “Installing the server in a rack” on page 35).
5. Plug the power cord into a properly grounded electrical outlet.
6. Verify that the dc power LED and ac power LED on the power supply are lit, indicating that the power supply is operating correctly.

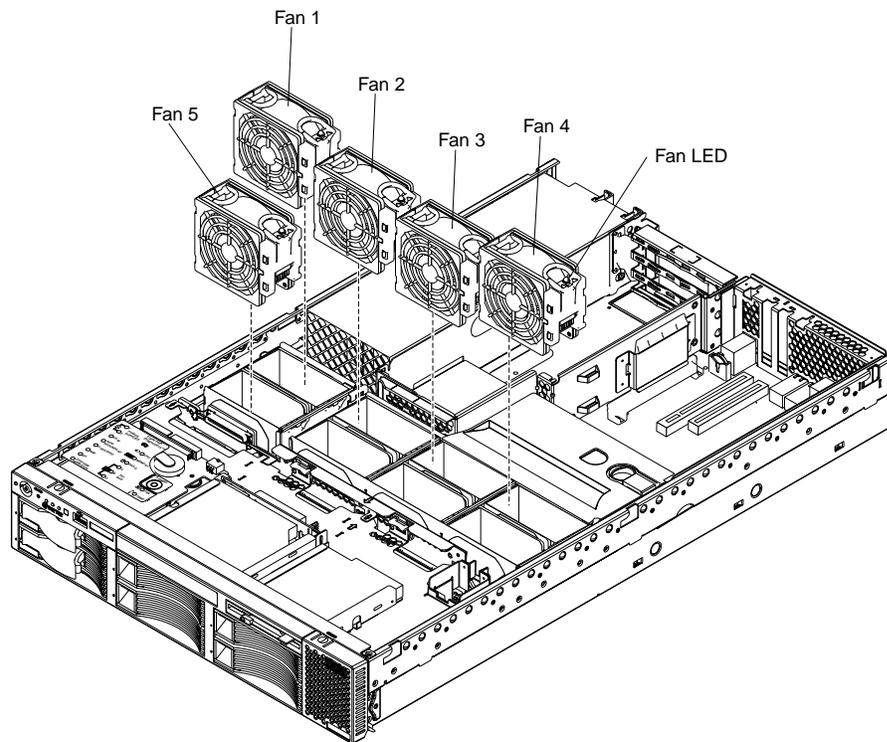
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## Replacing a hot-swap fan

Your server supports a maximum of eight hot-swap-fan assemblies. You do not need to turn off the power to the server to replace a hot-swap-fan assembly.

**Attention:** To ensure proper server operation, if a fan fails, replace it immediately.

The following illustration shows how to replace hot-swap fans.



Complete the following steps to replace a hot-swap-fan assembly:

1. Remove the cover. See “Removing the cover and bezel” on page 13. The LED on the failing fan assembly will be lit.

**Attention:** To ensure proper system cooling, do not remove the top cover for more than 30 minutes during this procedure.

2. Place your fingers into the two handles on the top of the failing fan.
3. Press the handles and lift the fan out of the server.
4. Orient the new fan so the LED on top of the fan is to the right of the server.

**Note:** Install the optional fans from the power-supply option in slots 6, 7, and 8.

5. Push the replacement fan assembly into the server until it clicks into place.
6. Replace the cover. See “Installing the server cover and bezel” on page 33.

---

## Replacing the battery

IBM has designed this product with your safety in mind. The lithium battery must be handled correctly to avoid possible danger. If you replace the battery, you must adhere to the following instructions.

**Note:** In the U. S., call 1-800-IBM-4333 for information about battery disposal.

If you replace the original lithium battery with a heavy-metal battery or a battery with heavy-metal components, be aware of the following environmental consideration. Batteries and accumulators that contain heavy metals must not be disposed of with normal domestic waste. They will be taken back free of charge by the manufacturer, distributor, or representative, to be recycled or disposed of in a proper manner.

To order replacement batteries, call 1-800-772-2227 within the United States, and 1-800-465-7999 or 1-800-465-6666 within Canada. Outside the U.S. and Canada, call your IBM reseller or IBM marketing representative.

**Note:** After you replace the battery, you must reconfigure your server and reset the system date and time.

### 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:

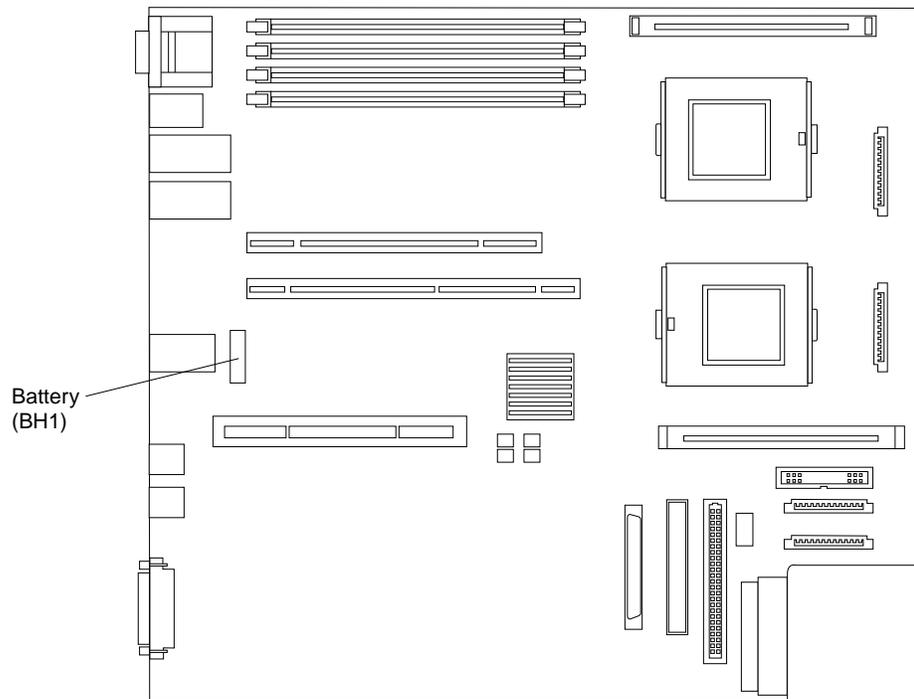
- **Throw or immerse into water.**
- **Heat to more than 100° C (212° F)**
- **Repair or disassemble**

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

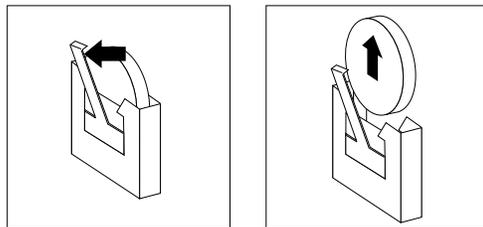
Complete the following steps to replace the battery:

1. Review the information in “Safety” on page v, and “Installation guidelines” on page 9.
2. Follow any special handling and installation instructions supplied with the battery.
3. Turn off the server and all attached devices and disconnect all power cords and external cables (see “Turning off the server” on page 12); then, remove the server cover (see “Removing the cover and bezel” on page 13).
4. Remove the adapters from PCI slots 1 and 2 (see “Working with adapters” on page 14).
5. Disconnect any internal cables, as necessary.

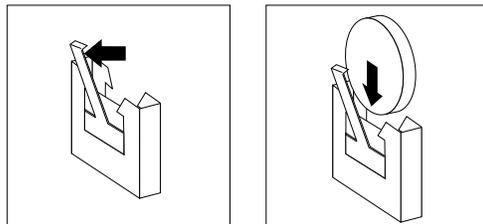
6. Locate the battery (connector BH1) on the system board.



7. Remove the battery:
  - a. Use one finger to press the top of the battery clip away from the battery.
  - b. Lift and remove the battery from the socket.



8. Insert the new battery:
  - a. Use one finger to press the top of the battery clip away from the battery.
  - b. Press the battery into the socket until it clicks into place. Make sure the battery clip holds the battery securely.



9. Reinstall the adapters that you removed, and reconnect the internal cables that you disconnected.
10. Connect all external cables and all power cords.
11. Reinstall the server cover (see "Installing the server cover and bezel" on page 33).

12. Start the Configuration/Setup Utility program and set configuration parameters as needed. See the *User's Guide* on the IBM xSeries Documentation CD for additional information about using the Configuration/Setup Utility program.

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## Completing the installation

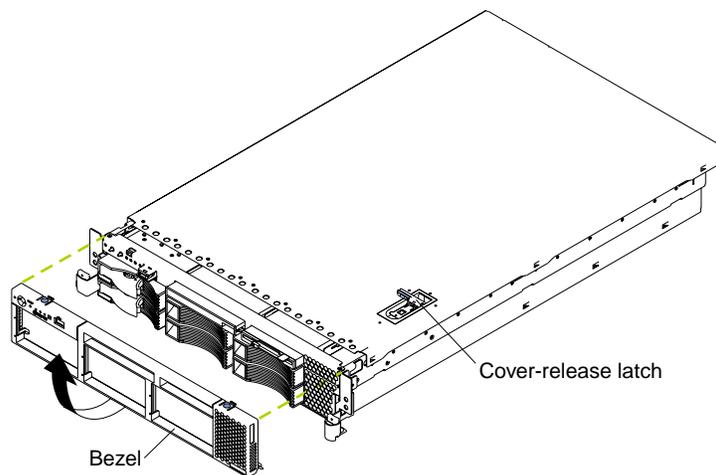
To complete your installation, reinstall the bezel, reinstall the server cover, reconnect all cables that you disconnected earlier, and for certain options, run the Configuration/Setup Utility program. Follow the instructions in this section.

### Attention:

- For proper cooling and airflow, replace the server cover before or shortly after turning on the server. Operating the server for extended periods of time (over 30 minutes) with the server cover removed might damage server components.
- To ensure proper server operation, do not remove the air-baffle assembly from the server except when installing or removing the components that are located under the air baffle.

## Installing the server cover and bezel

The following illustration shows how to install the server cover and bezel.



Complete the following steps to install the server cover:

1. Place the cover-release latch in the open (up) position.
2. Insert the bottom tabs of the top cover into the matching slots in the server chassis.
3. Press down on the cover-release latch to lock the cover in place.

Complete the following steps to install the bezel:

1. Align the hooks on the bottom of the bezel with the server.
2. Press the bezel toward the server until it clicks into place.

## Updating your server configuration

When you start your server for the first time after you add or remove an internal option or an external SCSI device, you might see a message telling you that the configuration has changed. The Configuration/Setup Utility program automatically starts so that you can save the new configuration information. See the *User's Guide* on the IBM xSeries Documentation CD for more information about the Configuration/Setup Utility program.

Some options have device drivers that you need to install. See the documentation that comes with your option for information about installing any required device drivers.

Your server comes with one or two microprocessors installed on the system board. If your server comes with two microprocessors or if your server comes with one microprocessor and you have installed an additional microprocessor, your server can now operate as an SMP server. Therefore, you might need to upgrade your operating system to support SMP. See the *User's Guide* on the IBM xSeries *Documentation* CD and your operating-system documentation for additional information.

If you have a RAID configuration on your server using the integrated SCSI controller or if your server has a RAID controller installed, and you have installed or removed a hard disk drive, you might need to reconfigure your disk arrays. See the RAID documentation on the IBM xSeries *Documentation* CD for information about reconfiguring your disk arrays.

## Connecting external options

If you install a SCSI adapter or use the external SCSI connector, you can attach external SCSI devices, such as a SCSI storage expansion enclosure, to your server. You can attach additional external options to the other input/output (I/O) connectors on the front and rear of your server. (See Chapter 3, "Input/output ports" on page 37 for more information.)

Complete the following steps to attach an external device:

1. Review the information in "Safety" on page v, and "Installation guidelines" on page 9. Also, read the documentation that comes with your options.
2. Turn off the server and all attached devices (see "Turning off the server" on page 12).
3. Follow the instructions that come with the option to prepare it for installation and to connect it to the server.

**Note:** If you are attaching an external SCSI device, see "Ultra320 SCSI controller system-board connectors" on page 39 for information about SCSI cabling and SCSI IDs.

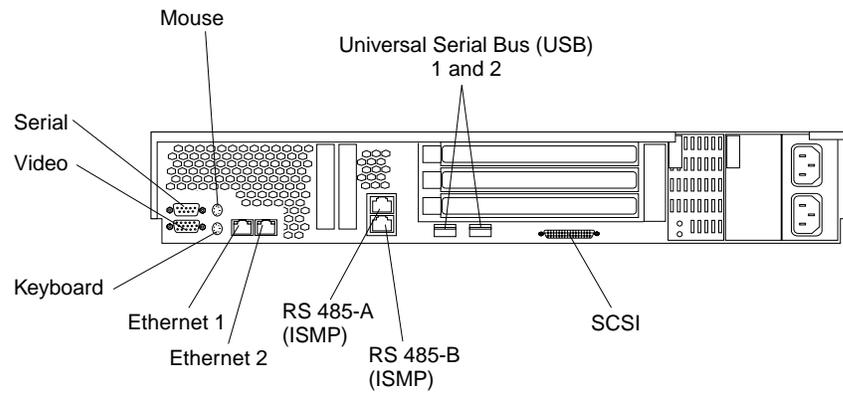
## Cabling the server

### Notes:

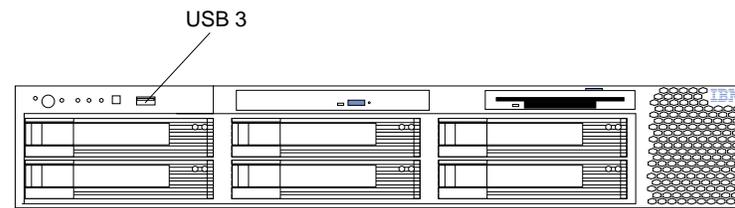
1. You must turn off the server (see "Turning off the server" on page 12) before connecting any cables to or disconnecting any cables from the server.
2. See the documentation that comes with your options for additional cabling instructions. It might be easier for you to route cables before you install certain options.
3. Cable identifiers are printed on the cables that come with your server and options. Use these identifiers to connect the cables to the correct connectors.

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

### Rear view



### Front view



## Installing the server in a rack

Detailed cabling instructions for a typical rack server configuration are in the *Rack Installation Instructions* that come with your server.



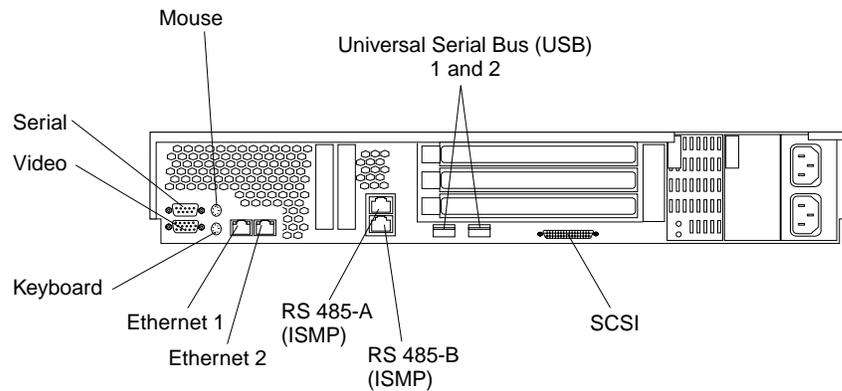
## Chapter 3. Input/output ports

This section provides information about the I/O ports on the rear of your server. These ports include the following:

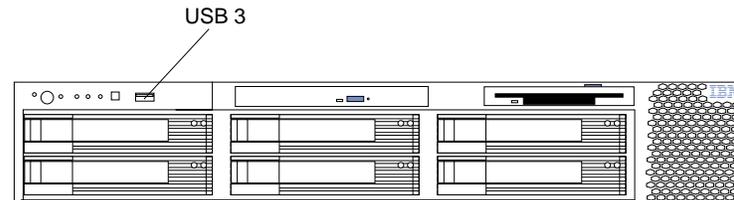
- One video port
- One keyboard port
- One auxiliary-device port (pointing device) port
- One dual channel Ultra320 SCSI controller (LVD) SCSI port
- One serial port
- Three Universal Serial Bus (USB) version 1.1 ports (USB 1 and USB 2 on the rear, USB 3 on the front)
- Two Ethernet ports
- Two RS-485 communication ports dedicated to the Integrated System Management Processor (ISMP)

The following illustration shows the I/O port connectors on the front and rear of your server.

### Rear view



### Front view



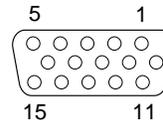
---

## Video port

Your server comes with an integrated super video graphics array (SVGA) video controller. This controller is not removable, but you can disable it through the Configuration/Setup Utility program or by installing a PCI video adapter.

**Note:** If you install a PCI video adapter, the server BIOS will automatically disable the integrated video controller.

The following illustration shows the 15-pin analog video connector on the rear of your server. This connector conforms to the industry standard.



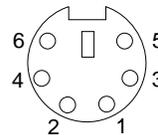
---

## Keyboard port

There is one keyboard connector on the rear of your server.

**Note:** If you attach a standard (non-USB) keyboard to the keyboard connector, the USB ports and devices will be disabled during the power-on self-test (POST).

The following illustration shows the keyboard connector on the rear of your server. This connector conforms to the industry standard for a PS/2 keyboard.

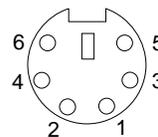


---

## Auxiliary-device (pointing device) port

The system board has one auxiliary-device port that supports a mouse or other pointing device.

The following illustration shows the auxiliary-device connector on the rear of your server. This connector conforms to the industry standard for a PS/2 pointing device.



---

## Ultra320 SCSI controller system-board connectors

Your server has an integrated dual channel small computer system interface (SCSI) controller with RAID capabilities. This controller supports two independent Ultra320 SCSI channels: one external and one internal. Each channel supports up to 15 SCSI devices. You can use the external LVD SCSI channel connector on the rear of your server to connect different types of SCSI devices, such as drives or printers.

This controller uses:

- Double-transition clocking to achieve up to 320 MB-per-second data-transfer rates
- Domain name validation to negotiate compatible data-transfer speeds with each device
- Cyclic redundancy checking (CRC), instead of the usual parity checking, to improve data reliability
- An active terminator for SCSI bus termination

The server comes with one SCSI cable, which connects the internal connector on the system board to the standard hot-swap-drive backplane. If you plan to attach external SCSI devices, you must order additional cables. To select and order the correct cables for use with external devices, contact your IBM reseller or IBM marketing representative.

## SCSI cabling requirements

For information about the maximum length of SCSI cable, go to the American National Standards Institute (ANSI) SCSI standards on the ANSI Web site at <http://www.ansi.org/> on the World Wide Web. Adhering to these standards will help to ensure that your server operates properly.

## SCSI IDs

Each SCSI device that is connected to a SCSI controller must have a unique SCSI ID. This ID enables the SCSI controller to identify the device and ensure that different devices on the same SCSI channel do not attempt to transfer data simultaneously. SCSI devices that are connected to different SCSI channels can have duplicate SCSI IDs. Table 3 lists the SCSI IDs for the hard disk drives and backplanes that are connected to one channel.

*Table 3. SCSI IDs for standard hot-swap hard disk drives, controller, and backplane*

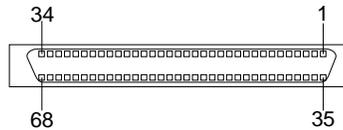
Device	SCSI ID
Drive bay 1	0
Drive bay 2	1
Drive bay 3	2
Drive bay 4	3
Drive bay 5	4
Drive bay 6	5
Controller	7
Backplane	8

The hot-swap-drive backplane controls the SCSI IDs for the internal hot-swap drive bays. However, when you attach an external SCSI device to an optional SCSI

adapter, you must set a unique ID for the device. See the information that comes with the device for instructions to set its SCSI ID.

## SCSI connectors

The following illustration shows a 68-pin, female D-shell SCSI connectors. These connectors conform to the SCSI standard.



---

## Serial port

Your server has one standard serial port. Some application programs require specific ports, and some modems function properly only at certain communication port addresses. You might need to use the Configuration/Setup Utility program to change communication port address assignments to prevent or resolve address conflicts.

### Viewing or changing the serial-port assignments

Complete the following steps to view or change the serial-port assignments:

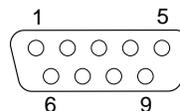
1. Restart the server and watch the monitor screen.
2. When the message Press F1 for Configuration/Setup appears, press F1.
3. From the main menu, select **Devices and I/O Ports**; then, press Enter.

**Note:** The **Devices and I/O Ports** choice appears only on the full configuration menu. If you set two levels of passwords, you must type the administrator password to access the full configuration menu.

4. Select the serial port; then, use the arrow keys to advance through the available settings.
5. Select **Save Settings**; then, select **Exit Setup** to exit from the Configuration/Setup Utility main menu.

### Serial-port connector

The following illustration shows the 9-pin, male D-shell serial-port connector on the rear of your server. This connector conforms to the industry standard.



---

## Universal Serial Bus version 1.1 ports

Your server has one Universal Serial Bus (USB) version 1.1 connector on the front of the server and two USB version 1.1 connectors on the rear of the server.

USB is a serial interface standard for telephony and multimedia devices. It uses Plug and Play technology to determine the type of device that is attached to the connector.

### Notes:

1. If you attach a standard (non-USB) keyboard to the keyboard connector, the USB ports and devices will be disabled during the power-on self-test (POST).
2. If you install a USB keyboard that has a mouse port, the USB keyboard emulates a mouse, and you will not be able to disable the mouse settings in the Configuration/Setup Utility program.
3. Check to make sure that your network operating system (NOS) supports USB devices.
4. For additional information about USB version 1.1 devices, go to <http://www.usb.org/>.

## USB cables and hubs

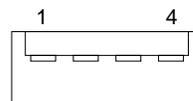
You need a 4-pin cable to connect USB devices. If you plan to attach more than three USB devices, you must use a hub to connect the devices. The hub provides multiple connectors for attaching additional external USB devices.

USB technology provides up to 12 Mb-per-second (Mbps) speed with a maximum of 127 devices and a maximum cable length of five meters (16 ft).

## USB-port connectors

Each USB port has an external connector on the front or rear of the server for attaching USB-compatible devices.

The following illustration shows a USB-port connector. These connectors conform to the USB version 1.1 standard.



---

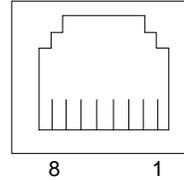
## Ethernet ports

Your server comes with an integrated dual-port Ethernet controller. This controller provides an interface for connecting to 10-Mbps, 100-Mbps, or 1000-Mbps networks and provides full-duplex capability, which enables simultaneous transmission and reception of data on the Ethernet LAN.

To access the Ethernet controller, connect a Category 5, or higher, unshielded twisted-pair (UTP) cable to either of the Ethernet (RJ-45) connectors on the rear of your server. See “System-board external port connectors” on page 5.

## Ethernet connectors

There are two RJ-45 Ethernet connectors on the back of the server. See “System-board external port connectors” on page 5 for the location of these connectors.



---

## Integrated system management ports

The RS-485 connectors are used for the ISMP interconnect function. The ISMP interconnect function uses these connectors to daisy-chain several system service processors together. This function enables the service processors to communicate with each other in half-duplex mode.

---

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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 1000000 bytes, and GB stands for approximately 1000000000 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.

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For units intended to be operated at 115 volts: Use a UL-listed and CSA-certified cord set consisting of a minimum 18 AWG, Type SVT or SJT, three-conductor cord, a maximum of 15 feet in length and a parallel blade, grounding-type attachment plug rated 15 amperes, 125 volts.

For units intended to be operated at 230 volts (U.S. use): Use a UL-listed and CSA-certified cord set consisting of a minimum 18 AWG, Type SVT or SJT, three-conductor cord, a maximum of 15 feet in length and a tandem blade, grounding-type attachment plug rated 15 amperes, 250 volts.

For units intended to be operated at 230 volts (outside the U.S.): Use a cord set with a grounding-type attachment plug. The cord set should have the appropriate safety approvals for the country in which the equipment will be installed.

IBM power cords for a specific country or region are usually available only in that country or region.

IBM power cord part number	Used in these countries and regions
13F9940	Argentina, Australia, China (PRC), New Zealand, Papua New Guinea, Paraguay, Uruguay, Western Samoa
13F9979	Afghanistan, Algeria, Andorra, Angola, Austria, Belgium, Benin, Bulgaria, Burkina Faso, Burundi, Cameroon, Central African Rep., Chad, China (Macau S.A.R.), Czech Republic, Egypt, Finland, France, French Guiana, Germany, Greece, Guinea, Hungary, Iceland, Indonesia, Iran, Ivory Coast, Jordan, Lebanon, Luxembourg, Malagasy, Mali, Martinique, Mauritania, Mauritius, Monaco, Morocco, Mozambique, Netherlands, New Caledonia, Niger, Norway, Poland, Portugal, Romania, Senegal, Slovakia, Spain, Sudan, Sweden, Syria, Togo, Tunisia, Turkey, former USSR, Vietnam, former Yugoslavia, Zaire, Zimbabwe
13F9997	Denmark
14F0015	Bangladesh, Burma, Pakistan, South Africa, Sri Lanka

IBM power cord part number	Used in these countries and regions
14F0033	Antigua, Bahrain, Brunei, Channel Islands, China (Hong Kong S.A.R.), Cyprus, Dubai, Fiji, Ghana, India, Iraq, Ireland, Kenya, Kuwait, Malawi, Malaysia, Malta, Nepal, Nigeria, Polynesia, Qatar, Sierra Leone, Singapore, Tanzania, Uganda, United Kingdom, Yemen, Zambia
14F0051	Liechtenstein, Switzerland
14F0069	Chile, Ethiopia, Italy, Libya, Somalia
14F0087	Israel
1838574	Thailand
6952301	Bahamas, Barbados, Bermuda, Bolivia, Brazil, Canada, Cayman Islands, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Japan, Korea (South), Liberia, Mexico, Netherlands Antilles, Nicaragua, Panama, Peru, Philippines, Saudi Arabia, Suriname, Taiwan, Trinidad (West Indies), United States of America, Venezuela

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