



IBM xSeries 346  
Type 8840

## Option Installation Guide

SC25-R345-40







@server

IBM xSeries 346  
Type 8840

## Option Installation Guide

SC25-R345-40

**Note:**

Before using this information and the product it supports, read the general information in “Notices,” on page 51.

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## Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الأمنية

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

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

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

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

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

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

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

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

A termék telepítése előtt olvassa el a Biztonsági előírásokat!

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

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

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

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

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

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

Перед установкой продукта прочтите инструкции по технике безопасности.

Pred inštaláciou tohto zariadenia si pečítajte Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

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

Läs säkerhetsinformationen innan du installerar den här produkten.

**Important:**

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

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

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

**Statement 1**



<p><b>Danger</b></p> <p><b>Electrical current from power, telephone, and communication cables is hazardous.</b></p> <p><b>To avoid a shock hazard:</b></p> <ul style="list-style-type: none"><li>• <b>Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.</b></li><li>• <b>Connect all power cords to a properly wired and grounded electrical outlet.</b></li><li>• <b>Connect to properly wired outlets any equipment that will be attached to this product.</b></li><li>• <b>When possible, use one hand only to connect or disconnect signal cables.</b></li><li>• <b>Never turn on any equipment when there is evidence of fire, water, or structural damage.</b></li><li>• <b>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.</b></li><li>• <b>Connect and disconnect cables as described in the following table when installing, moving, or opening covers on this product or attached devices.</b></li></ul>
--

<p>To connect:</p> <ol style="list-style-type: none"><li>1. Turn everything OFF.</li><li>2. First, attach all cables to devices.</li><li>3. Attach signal cables to connectors.</li><li>4. Attach power cords to outlet.</li><li>5. Turn device ON.</li></ol>	<p>To disconnect:</p> <ol style="list-style-type: none"><li>1. Turn everything OFF.</li><li>2. First, remove power cords from outlet.</li><li>3. Remove signal cables from connectors.</li><li>4. Remove all cables from devices.</li></ol>
---	---



### 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.

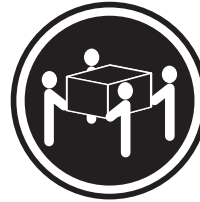
Statement 4



≥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.



**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.***

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## Chapter 1. Introduction

This *Option Installation Guide* contains instructions for installing, removing, and connecting optional devices that your server supports.

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### Related documentation

In addition to this *Option Installation Guide*, the following documentation comes with the server:

- *User's Guide*

This document is in Portable Document Format (PDF) on the IBM® *xSeries® Documentation CD*. It contains general information about the server, including information about features, how to configure the server, and how to get help.

- *Installation Guide*

This printed document contains instructions for setting up the server and basic instructions for installing some options.

- *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.

- *Rack Installation Instructions*

This printed document contains instructions for installing the server in a rack.

- *Hardware Maintenance Manual and Troubleshooting 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 your 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 your server documentation. These updates are available from the IBM Web site. Complete the following steps to check for updated documentation and technical updates:

1. Go to <http://www.ibm.com/pc/support/>.
2. In the **Learn** section, click **Online publications**.
3. On the "Online publications" page, in the **Brand** field, select **Servers**.
4. In the **Family field**, select **xSeries 346**.
5. Click **Continue**.

---

## Notices and statements used 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:

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

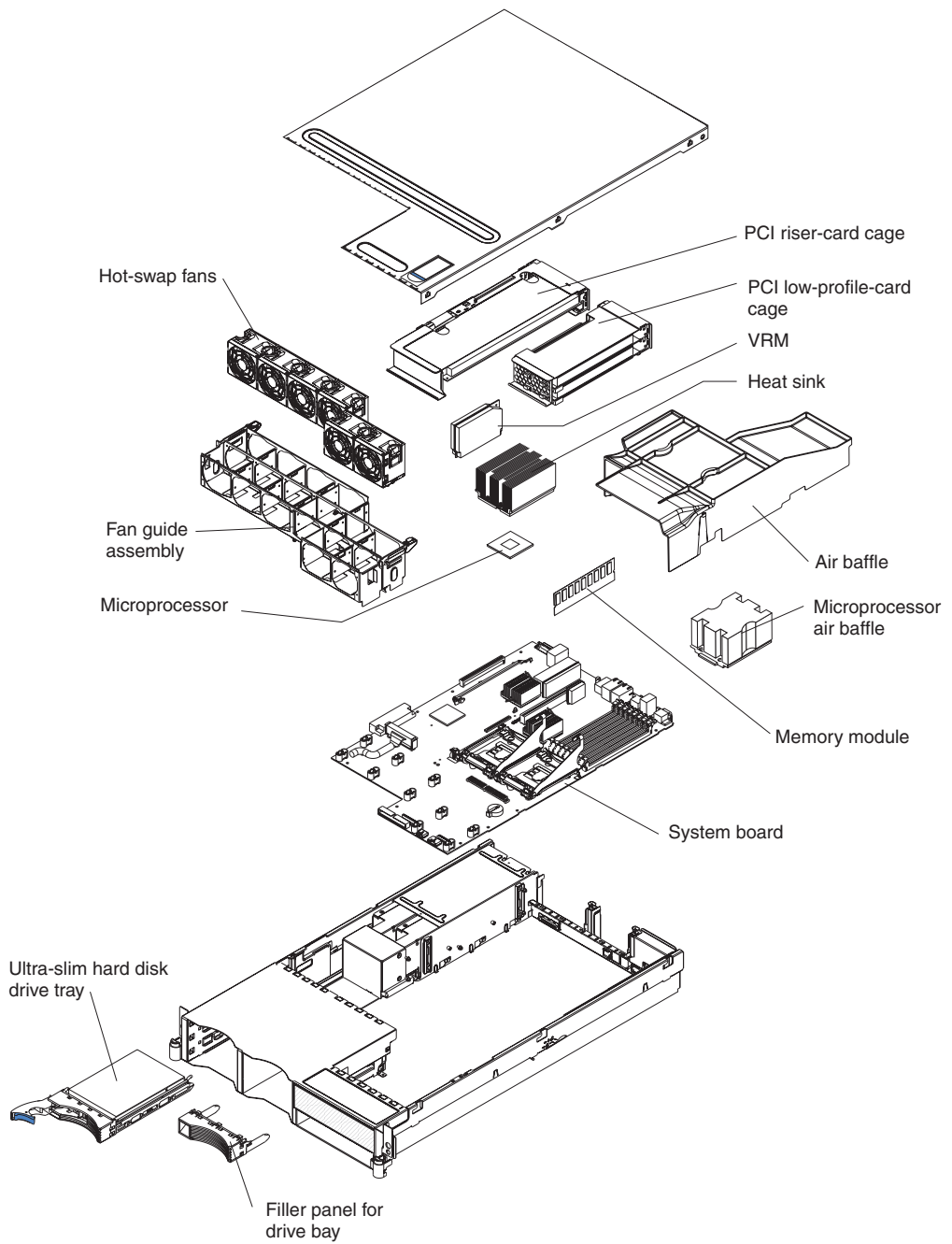
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## Major components of the xSeries 346 Type 8670 server

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

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

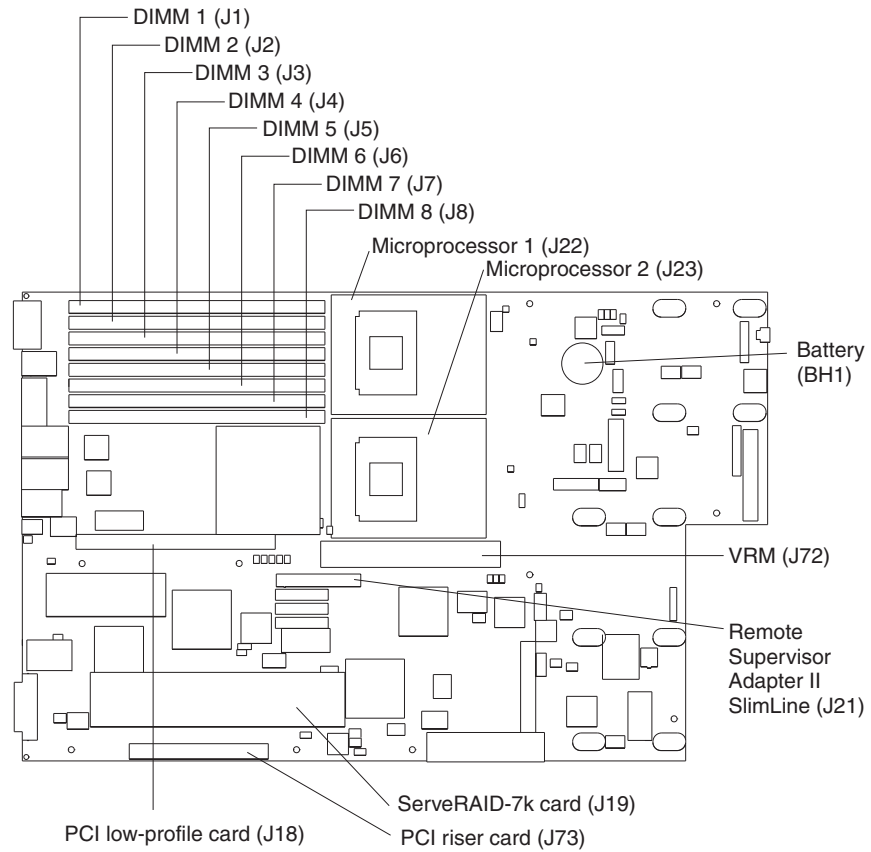
The following illustration shows the major components in the server. The illustrations in this document might differ slightly from your hardware.





## System-board option connectors

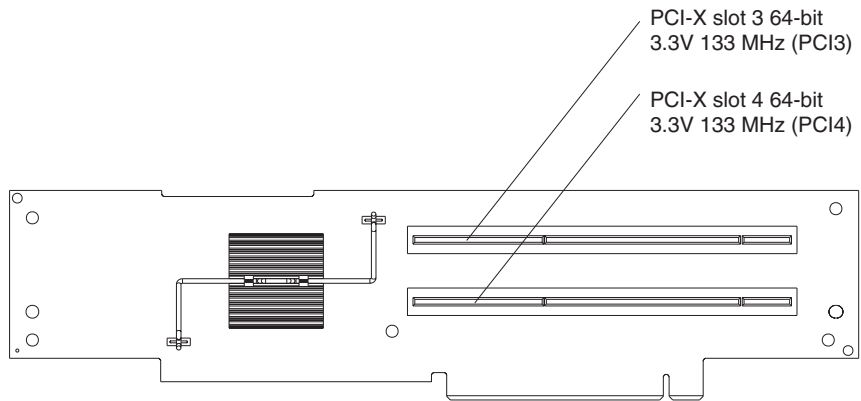
The following illustration shows the connectors on the system board for user-installable options.



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## PCI riser-card option connectors

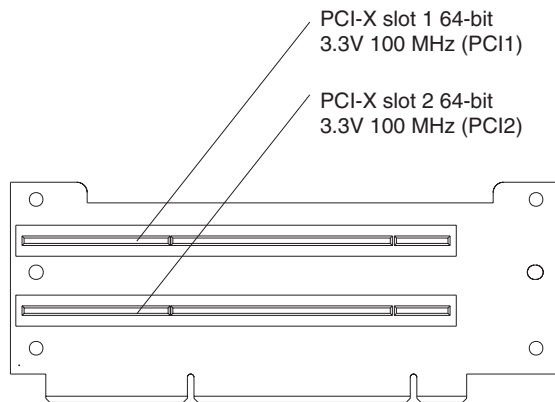
The following illustration shows the connectors on the PCI riser card for user-installable options.



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## PCI low-profile-card option connectors

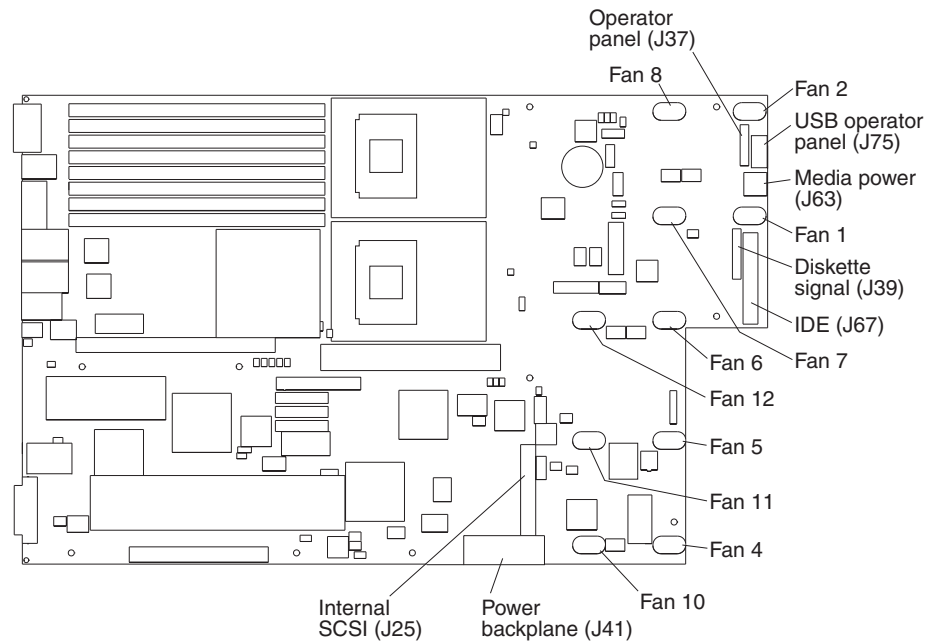
The following illustration shows the connectors on the PCI low-profile card for user-installable options.



---

## System-board internal cable connectors

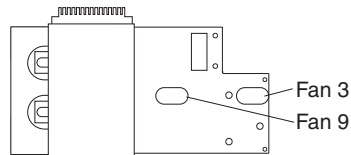
The following illustration shows the internal connectors on the system board.



---

## Power-backplane-card internal cable connectors

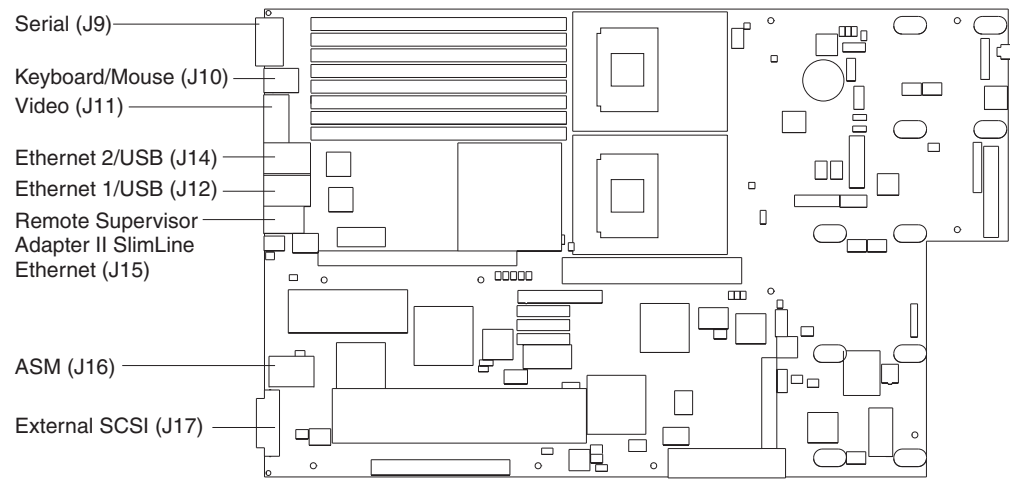
The following illustration shows the internal connectors on the power-backplane card.



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## System-board external connectors

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



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## System-board switches and jumpers

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

Any switches or jumpers on the system board that are not shown in the illustration are reserved. See the section about recovering the basic input/output system (BIOS) code in the *Hardware Maintenance Manual and Troubleshooting Guide* on the IBM xSeries Documentation CD for information about the boot block recovery jumper.

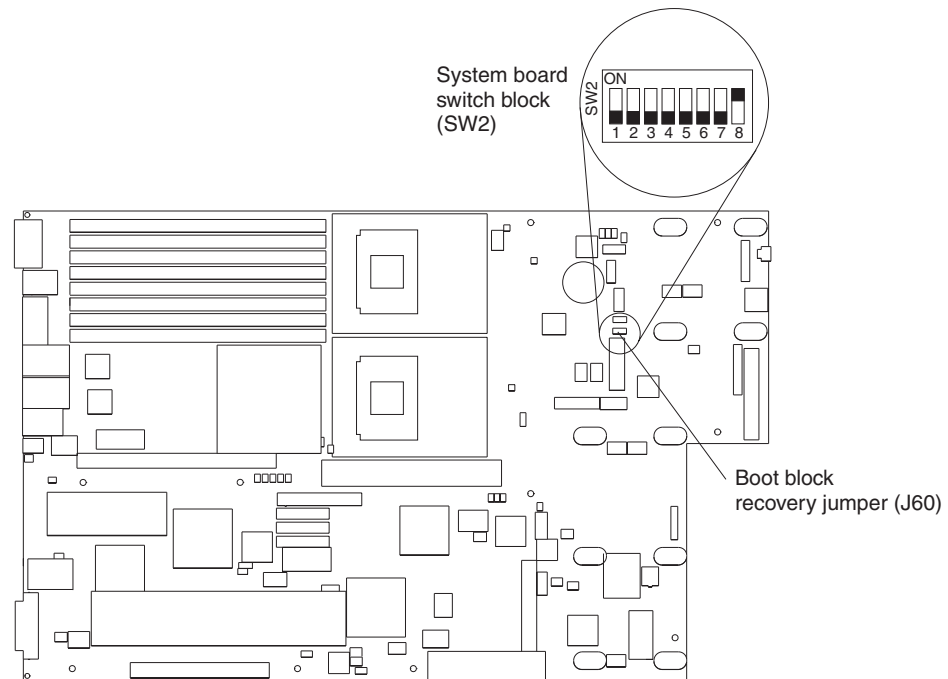


Table 1 describes the function of each switch on the switch block.

Table 1. Switches 1-8

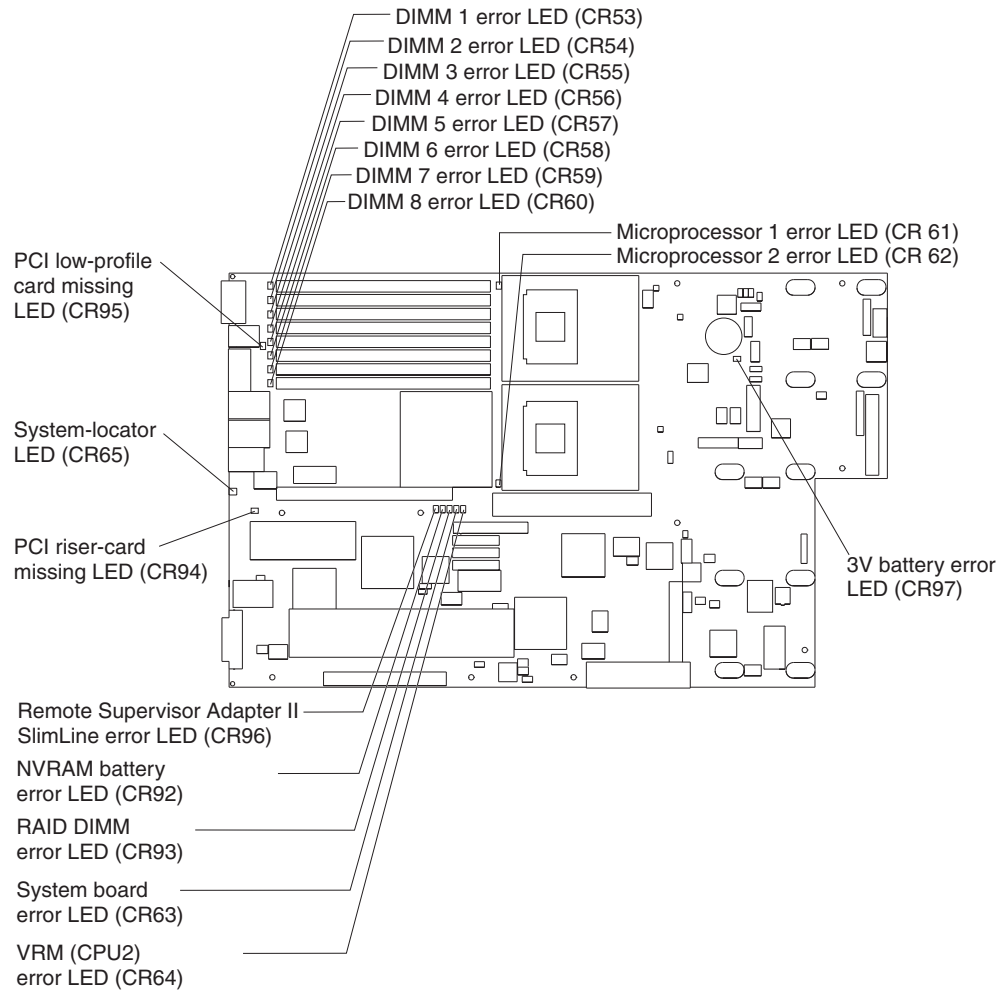
Switch number	Default value	Switch description
8	On	Reserved.
7	Off	Reserved.
6	Off	Reserved.
5	Off	Reserved.
4	Off	Reserved.
3	Off	Reserved.
2	Off	<p>Power-on password override. Changing the position of this switch bypasses the power-on password check the next time the server is turned on and starts the Configuration/Setup Utility program so that you can change or delete the power-on password. You do not have 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	Power-on override. When toggled to On, this switch forces the power on, overriding the power-on button.

**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 15,, "Handling static-sensitive devices" on page 16,, and "Turning off the server" on page 17.)
2. Any system-board switch or jumper blocks that are not shown in the illustrations in this document are reserved.

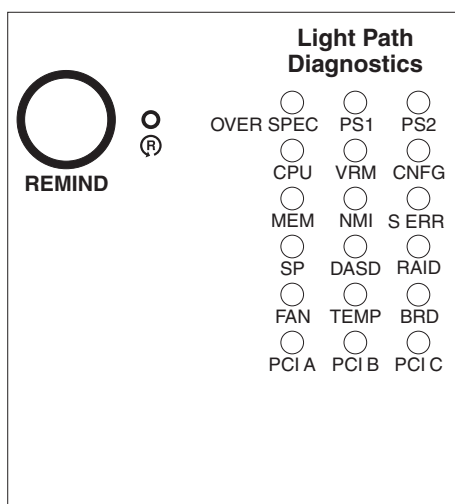
## System-board LEDs

The following illustration shows the light-emitting diodes (LEDs) on the system board.



## Light path diagnostics panel

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



To access the light path diagnostics panel, slide the latch to the left on the front of the light path diagnostics drawer.

For more information about light path diagnostics, see the *Hardware Maintenance Manual and Troubleshooting Guide* on the IBM xSeries Documentation CD.

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

LED	Problem	Action
None	An error has occurred and cannot be diagnosed, or the ASM processor has failed. The error is not represented by a light path diagnostics LED.	Check the system error log for information about the error.
OVER SPEC	The power supplies are using more power than their maximum rating.	Replace the failing power supply, or remove optional devices from the server.
PS 1	When the LED is lit, the power supply in bay 1 has failed. When the LED flashes, an invalid power-supply configuration has occurred.	If the power supply has failed, call for service. If a configuration error has occurred, make sure that the power supply is installed correctly.
PS 2	When the LED is lit, the power supply in bay 2 has failed. When the LED flashes, an invalid power-supply configuration has occurred.	If the power supply has failed, call for service. If a configuration error has occurred, make sure that the power supply is installed correctly.



LED	Problem	Action
CPU	When the LED is lit, a microprocessor has failed. When the LED flashes, an invalid microprocessor configuration has occurred.	<p>If a lit LED on the system board indicates a problem with a microprocessor, make sure that the microprocessor is installed correctly. See the <i>Option Installation Guide</i> on the IBM xSeries Documentation CD for information about installing a microprocessor.</p> <p>If the problem remains, call for service.</p> <p>If a configuration error has occurred, make sure that the microprocessors have the same cache size and type, and the same clock speed. Microprocessor internal and external clock frequencies must be identical.</p>
VRM	When the LED is lit, an error occurred on the microprocessor voltage regulator module (VRM). When the LED flashes, an invalid VRM configuration has occurred.	<p>Replace the VRM. If the problem remains, call for service.</p> <p>If a configuration error has occurred, make sure that the VRM is installed correctly. If the problem remains, replace the VRM.</p>
CNFG	When the LED flashes, a hardware configuration error has occurred.	Check the system error log for information about the error. The light path diagnostic LED for the component that is causing the configuration error also flashes.
MEM	When the LED is on, a memory error has occurred. When the LED flashes, an invalid DIMM configuration has occurred.	Replace the failing DIMM, which is indicated by the lit LED on the system board. If a configuration error has occurred, make sure the DIMMs are installed correctly.
NMI	A machine check error has occurred.	Check the system error log for information about the error.
S ERR	A soft error has occurred.	Check the system error log for information about the error.
SP	The service processor has failed.	<p>Remove ac power from the server; then, reconnect the server to ac power and restart the server.</p> <p>If the problem remains, call for service.</p>
DASD	A hard disk drive error has occurred.	Check the LEDs on the hard disk drives and replace the indicated drive.
RAID	A RAID controller error has occurred.	Check the system error log for information about the error. See the documentation that comes with the RAID controller.
FAN	<p>When the LED is lit, a fan has failed or is operating too slowly. A failing fan can also cause the TEMP LED to be lit.</p> <p>When the LED flashes, an invalid fan configuration has occurred.</p>	Replace the failing fan, which is indicated by the lit LED. If a configuration error has occurred, make sure that the fans are installed correctly.
TEMP	The system temperature has exceeded a threshold level.	<ul style="list-style-type: none"> <li>• Determine whether a fan has failed. If it has, replace it.</li> <li>• Make sure that the room temperature is not too high. See the <i>User's Guide</i> on the IBM xSeries Documentation CD for temperature information.</li> <li>• Make sure that the air vents are not blocked.</li> </ul> <p>If the problem remains, call for service.</p>
BRD	An error has occurred on the system board.	<ul style="list-style-type: none"> <li>• Check the LEDs on the system board to identify the component that is causing the error.</li> <li>• Check the system error log for information about the error.</li> </ul>

LED	Problem	Action
PCI A PCI B PCI C	An error has occurred on a PCI bus.	<ul style="list-style-type: none"> <li>• Check the system error log for information about the error.</li> <li>• If you cannot isolate the failing adapter through the information in the system error log, remove one adapter at a time from the failing PCI bus, and restart the server after each adapter is removed.</li> </ul> <p>If the problem remains, call for service.</p>

---

## Chapter 2. Installing options

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

---

### Installation guidelines

Before you begin installing options, read the following information:

- Read the safety information beginning on page v and the guidelines in “Handling static-sensitive devices” on page 16. This information will help you work safely with the server and options.
- Make sure that you have an adequate number of properly grounded electrical outlets for your server, monitor, and other devices.
- Back up all important data before you make changes to disk drives.
- Have a small flat-blade screwdriver available.
- You do not have to turn off the server to install or replace hot-swap power supplies, hot-swap fans, or hot-plug Universal Serial Bus (USB) devices.
- Blue on a component indicates touch points, where you can grip the component to remove it from or install it in the server, open or close a latch, and so on.
- Orange on a component or an orange label on or near a component indicates that the component can be hot-swapped, which means that if the server and operating system support hot-swap capability, you can remove or install the component while the server is running. (Orange can also indicate touch points on hot-swap components.) See the instructions for removing or installing a specific hot-swap component for any additional procedures that you might have to perform before you remove or install the component.
- For a list of supported options for the server, go to <http://www.ibm.com/pc/compat/>.

### System reliability considerations

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

- 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.

### Working inside the server with the power on

The server supports hot-plug, hot-add, and hot-swap devices and is designed to operate safely while 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 the server and other electronic devices. To avoid damage, keep static-sensitive devices in their static-protective packages until you are ready to install them.

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

- Limit your movement. Movement can cause static electricity to build up around you.
- 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 printed 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 it down. 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.

---

## Server power features

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

## Turning on the server

Approximately 5 seconds after the server is connected to ac power, the power-control button becomes active, and you can turn on the server and start the operating system by pressing the power-control button.

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

- If a power failure occurs while the server is turned on, the server will restart automatically when power is restored.
- If your operating system supports the systems-management software for an optional IBM Remote Supervisor Adapter II SlimLine, the systems-management software can turn on the server.

- If your operating system supports the Wake on LAN<sup>®</sup> 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 might be unavailable to the operating system. The amount of memory that is reserved for system resources depends on the operating system, the configuration of the server, and the configured PCI options.

## Turning off the server

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

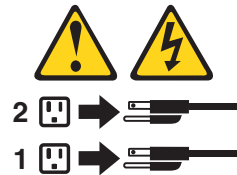
Some operating systems require an orderly shutdown before you turn off the server. See your operating-system documentation for information about shutting down the operating system.

### 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.



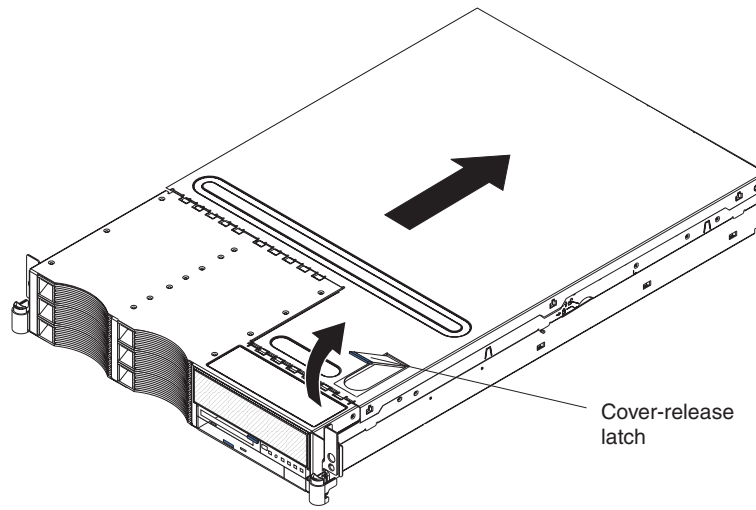
The server can be turned off in any of the following ways:

- 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.
- The service processor can turn off the server as an automatic response to a critical system failure.
- You can turn off the server through a request from the service processor.

---

## Removing the cover

The following illustration shows how to remove the cover.



Complete the following steps to remove the top cover:

1. Read the safety information beginning on page v, and “Installation guidelines” on page 15.
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 17).
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.

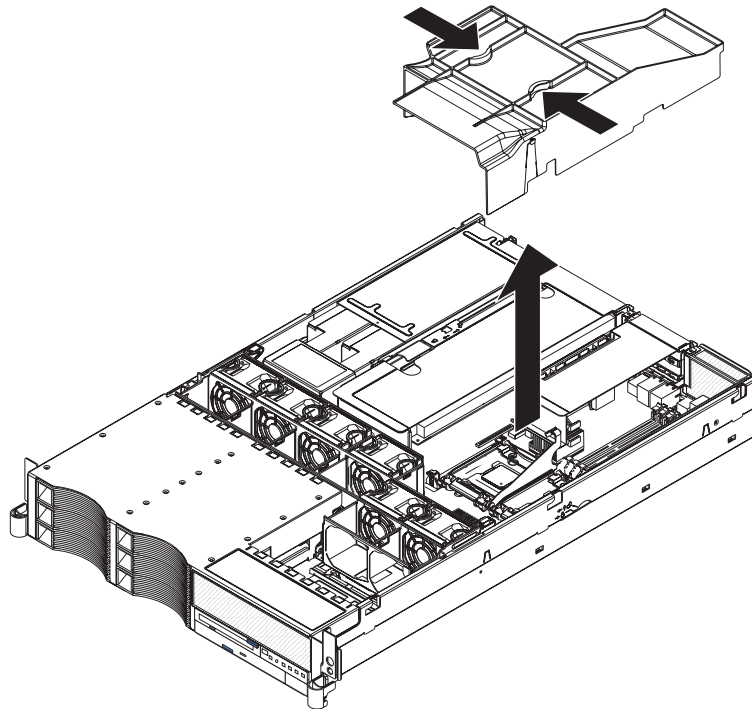
4. Lift the cover-release latch. Lift the cover off the server and set the cover aside.

**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.

---

## Removing the air baffle

When working with some options, you must first remove the air baffle to access certain components or connectors on the system board. The following illustration shows how to remove the air baffle.



Complete the following steps to remove the air baffle:

1. Read the safety information beginning on page v, and “Installation guidelines” on page 15.
2. Turn off the server and peripheral devices and disconnect all power cords and external cables (see “Turning off the server” on page 17); then, remove the cover (see “Removing the cover” on page 18).
3. Place your fingers into the two handles on the top of the air baffle.
4. Press the handles and lift the air baffle out of the server.

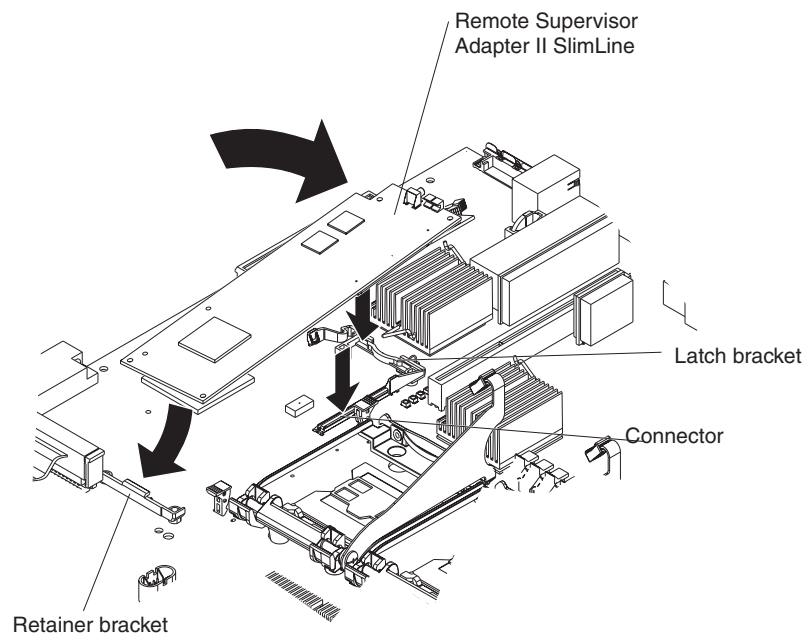
**Attention:** For proper cooling and airflow, replace the air baffle before turning on the server. Operating the server with the air baffle removed might damage server components.

## Working with adapters

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

Before you install an adapter, review the following information:

- 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 or jumper settings on the adapter, follow the instructions that come with the adapter.
- You can install only low-profile adapters in slots 1 and 2 on the PCI low-profile card.
- You can install standard full-length adapters in slots 3 and 4 on the PCI riser card.
- Your server supports only 3.3 V and universal PCI adapters.
- The PCI bus configuration is as follows:
  - Non-hot-plug, 64-bit PCI-X slots 1 through 2 (PCI bus A, 100 MHz)
  - Non-hot-plug, 64-bit PCI-X slot 3 (PCI bus B, 133 MHz)
  - Non-hot-plug, 64-bit PCI-X slot 4 (PCI bus C, 133 MHz)
- The system scans devices in the following order, if you have not changed the default boot precedence: integrated Ethernet controllers, integrated SCSI controller (SCSI channel B, then SCSI channel A), and then PCI and PCI-X slots 1, 2, 3, and 4.
- The optional Remote Supervisor Adapter II SlimLine can be installed only in a dedicated slot on the system board. For details about installing a Remote Supervisor Adapter II SlimLine, see the documentation that comes with the adapter. The following illustration shows how to install the Remote Supervisor Adapter II SlimLine.



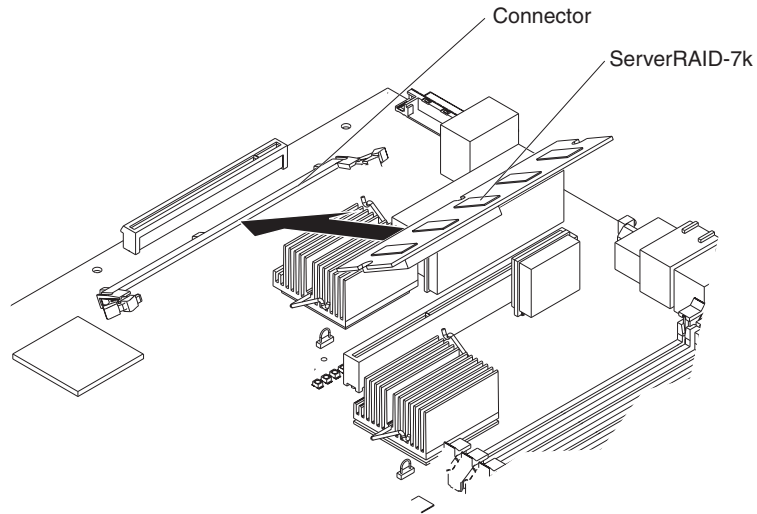
Slip the free end of the card under the tab on the retainer bracket; then, press the card in the connector and make sure that all tabs on the latch bracket secure the card in place.



- If you are installing an optional ServeRAID™-7k, review the following information:
  - No rerouting of the internal SCSI cable is required if you are installing the ServeRAID-7k.
  - The ServeRAID-7k can be installed only in a dedicated slot on the system board.

**Attention:** To avoid breaking the retaining clips or damaging the connectors, handle the clips gently.

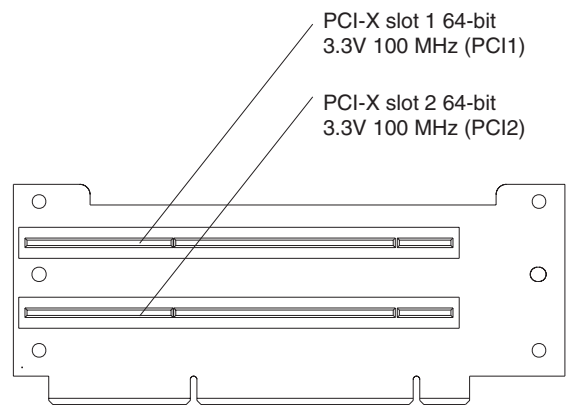
The following illustration shows how to install the ServeRAID-7k.



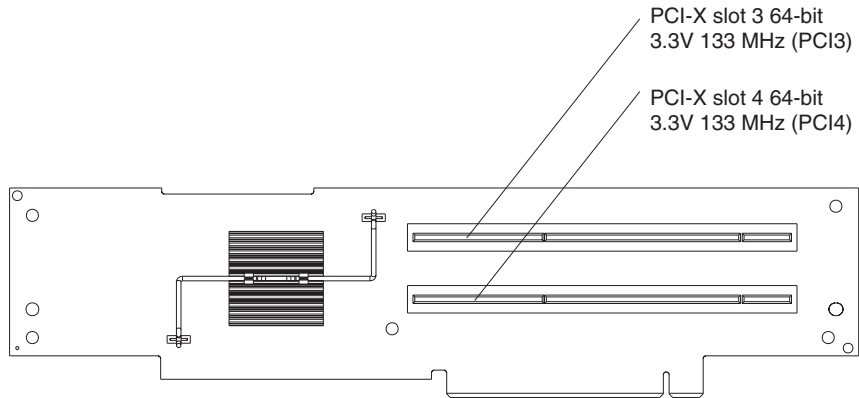
**Note:** If there is a gap between the card and the retaining clips, the card has not been properly installed. In this case, open the retaining clips and remove the card; then, reinsert the card.

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

**PCI low-profile card**

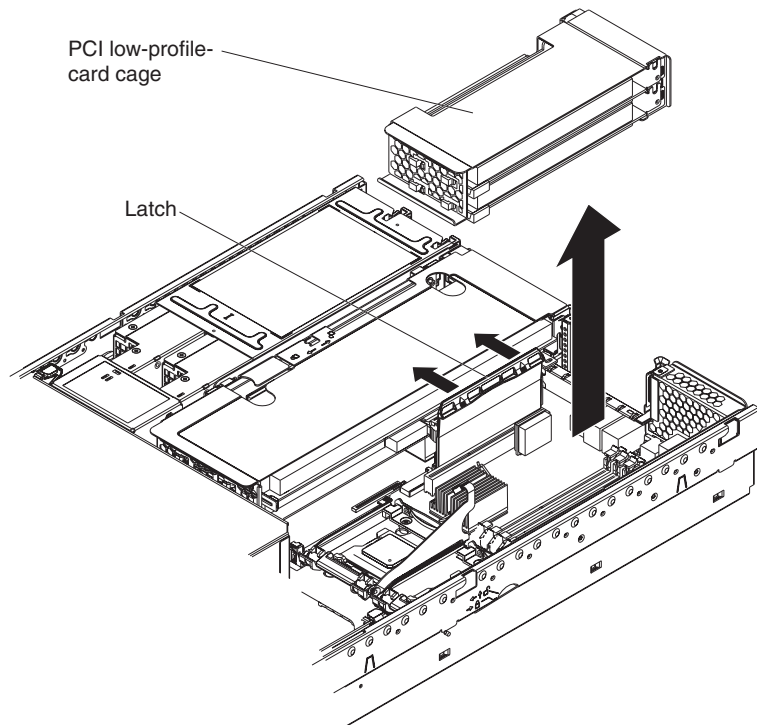


## PCI riser card

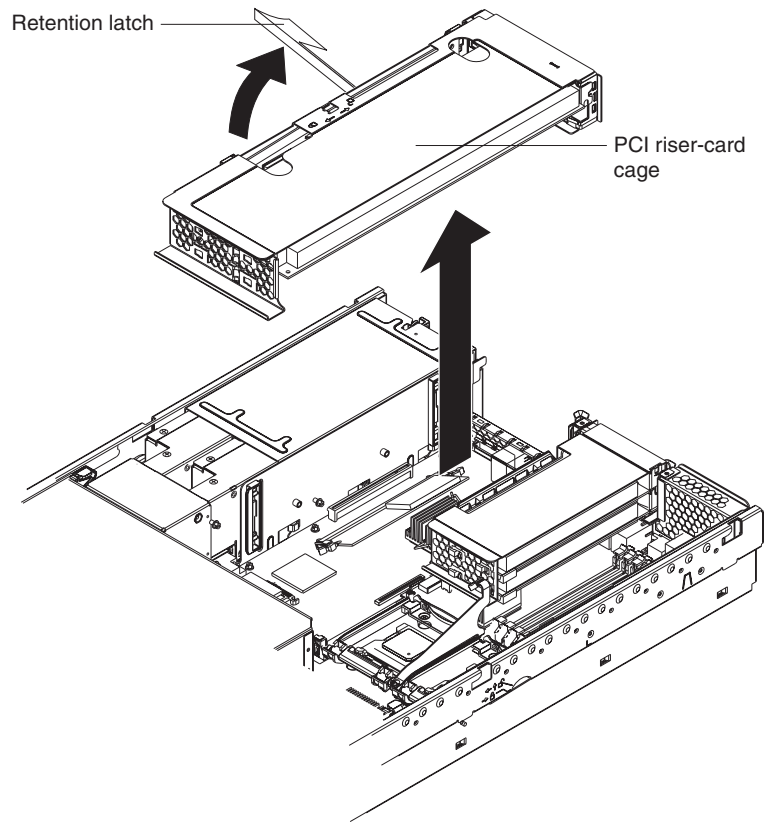


Complete the following steps to install an adapter:

1. Read the safety information beginning on page v, and “Installation guidelines” on page 15.
2. Turn off the server and peripheral devices and disconnect all power cords and external cables (see “Turning off the server” on page 17); then, remove the cover (see “Removing the cover” on page 18).
3. Determine which expansion slot you will use for the adapter.
4. If you are installing an adapter in PCI slot 1 or 2, remove the PCI low-profile-card cage.

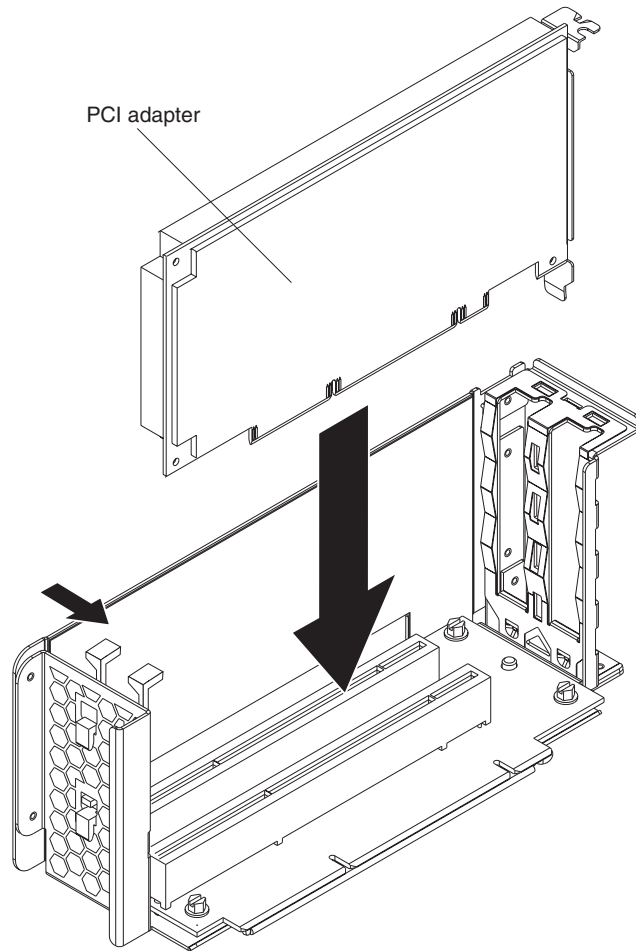


If you are installing an adapter in PCI slot 3 or 4, remove the PCI riser-card cage.

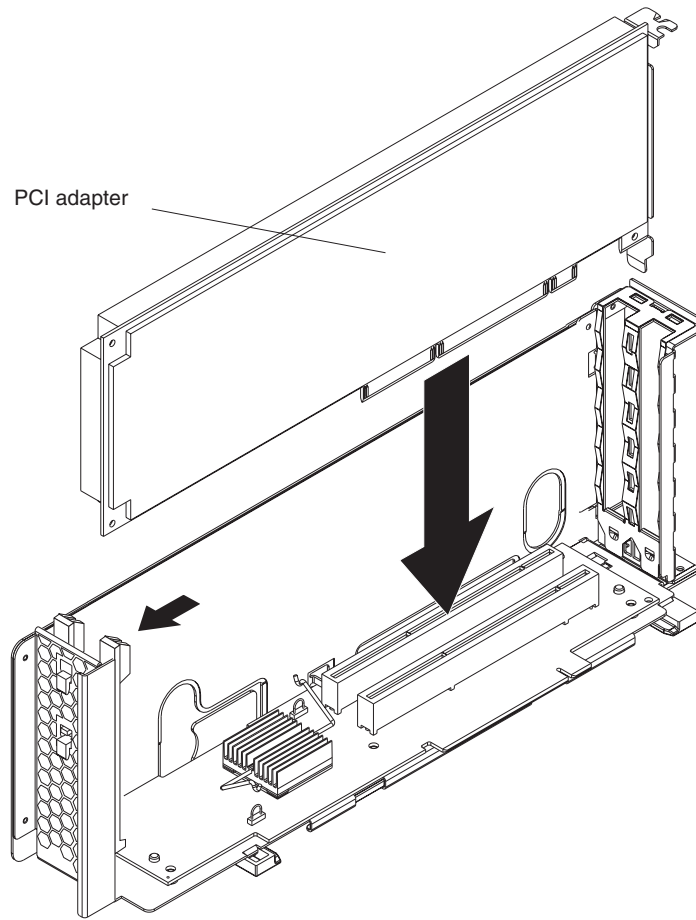


5. Slide the expansion-slot cover out of the PCI low-profile-card cage or PCI riser-card cage.

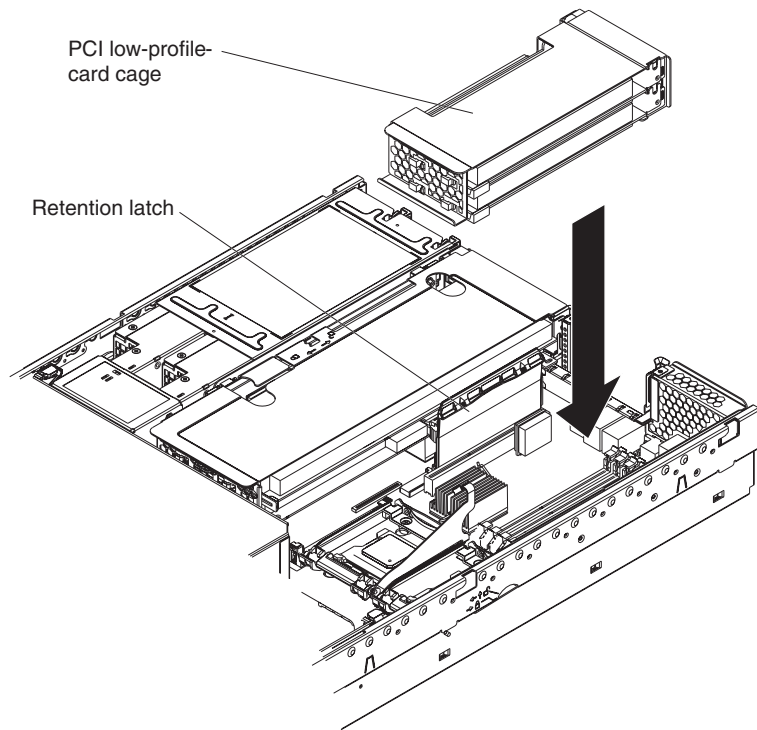
6. Install the adapter. The following illustration shows how to install an adapter in the PCI low-profile-card cage.



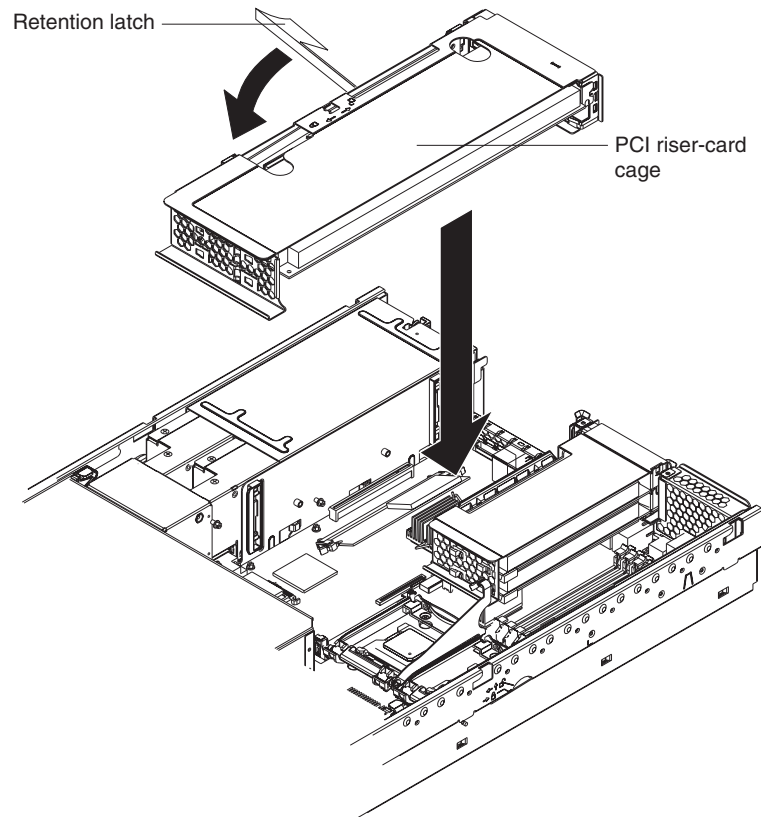
The following illustration shows how to install an adapter in the PCI riser-card cage.



7. If you removed the PCI low-profile-card cage to install the adapter, press the PCI low-profile-card cage *firmly* into the connector until the retention latch locks.



If you removed the PCI riser-card cage to install the adapter, press the PCI riser-card cage *firmly* into the connector and close the latch.



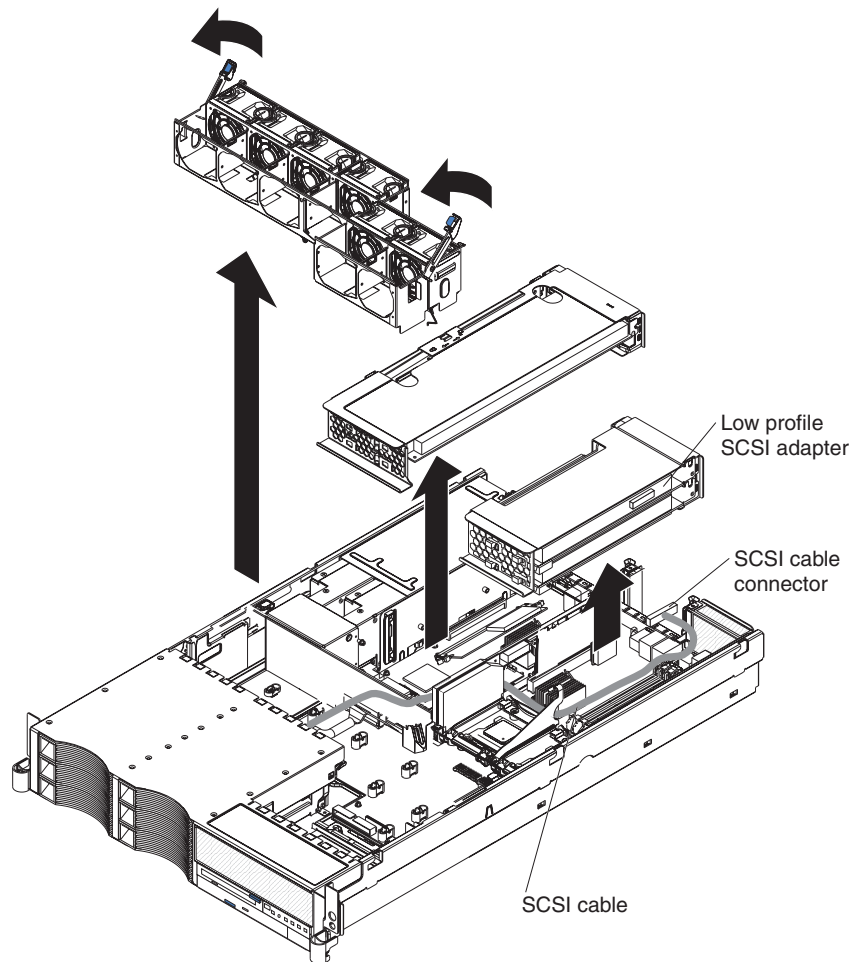
8. Connect any needed cables to the adapter.

**Attention:**

- When you route cables, do not block any connectors or the ventilated space around any of the fans.
- Make sure that cables are not routed on top of components under the PCI riser-card cage or the PCI low-profile-card cage.
- Make sure that cables are not pinched by the server components.

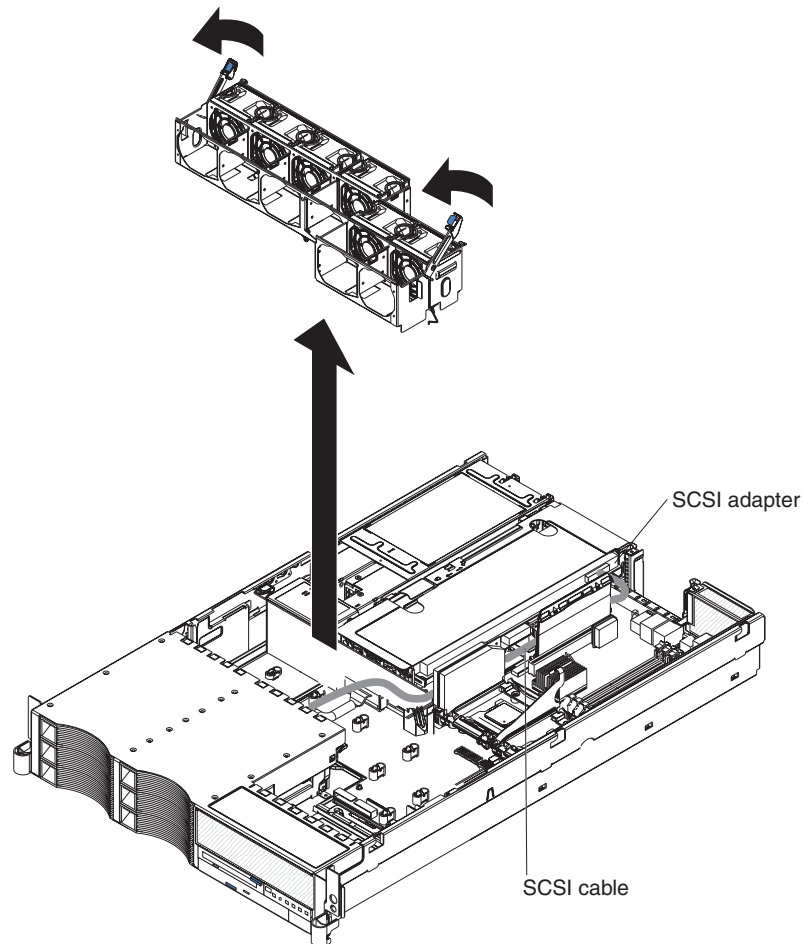
The following illustration shows the cable routing for an adapter installed in the PCI low-profile-card cage.

**Note:** Remove the PCI riser-card cage, the PCI low-profile card cage, and the fan guide before you route the cables. Reinstall the components when you complete the cable routing.



The following illustration shows the cable routing for an adapter installed in the PCI riser-card cage.

**Note:** Remove the fan guide before you route the cables. Reinstall the fan guide when you complete the cable routing.



9. Perform any configuration tasks that are required for the adapter.  
If you installed a Remote Supervisor Adapter II SlimLine, see the documentation that comes with the adapter for information about installing the firmware and configuring the option. Create a backup copy of the configuration so that if you need to replace the adapter in the future, you can restore the configuration.

If you have other options to install or remove, do so now. Otherwise, go to “Completing the installation” on page 42.

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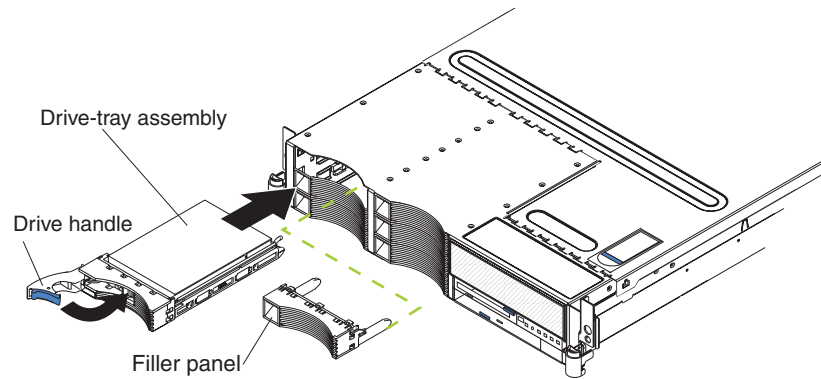
## Installing a hot-swap drive

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

- The server supports six 1-inch (26 mm) slim, 3.5-inch low-voltage differential (LVD) hard disk drives installed on Ultra-Slim hard disk drive trays. For a list of supported hard disk drives, go to the ServerProven Web site at <http://www.ibm.com/pc/compat/>.
- All hot-swap drives 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.
- The SCSI ID that is assigned to each bay is printed on the server front.



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.

**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. Read the safety information beginning on page v, and “Installation guidelines” on page 15.
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. Make sure 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 drive is faulty and must be replaced. If the green hard disk drive activity LED is flashing, the drive is being accessed.

**Note:** If you have a RAID configuration using the integrated SCSI controller with RAID capabilities, or if the server has a RAID adapter installed, you might have to reconfigure the 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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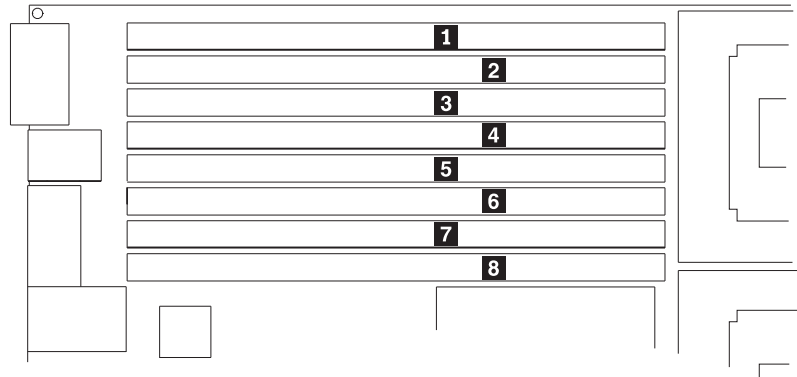
## Installing memory modules

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 256 MB, 512 MB, 1 GB, and 2 GB DIMMs, for a maximum of 16 GB of system memory. The server supports up to eight 1.8 V, 240-pin, PC3200, ECC DDR II SDRAM, 200 MHz DIMMs. Go to the ServerProven<sup>®</sup> list at <http://www.ibm.com/pc/compat/> for a list of memory modules that you can use with the server.
- The server comes with a minimum of two 256 MB DIMMs, installed in slots 1 and 2. When installing additional DIMMs, you must install two DIMMS at a time, in the order shown in the following table, to maintain performance.

Table 2. DIMM installation sequence

Pair	DIMM connectors
1	1 and 2
2	3 and 4
3	5 and 6
4	7 and 8



- Each DIMM in a pair must be the same size and technology to ensure that the server will operate properly.
- You can configure the server to use memory mirroring. Memory mirroring stores data in two pairs of DIMMs simultaneously. Memory mirroring reduces the amount of available memory. Enable memory mirroring through the Configuration/Setup Utility program. See the *User's Guide* on the IBM xSeries Documentation CD for details about enabling memory mirroring.  
When using memory mirroring, you must install two pairs of DIMMs at a time. The four DIMMs in each group must be identical. See Table 3 for the DIMM connectors that are in each group.

Table 3. Memory mirroring DIMM installation sequence

Group	DIMM connectors
1	1, 2, 3, and 4
2	5, 6, 7, and 8

- The server supports online-spare memory. This feature disables the failed memory from the system configuration and activates an online-spare memory pair of DIMMs to replace the failed active DIMM pair. Online-spare memory reduces the amount of available memory. Before you can enable this feature, you must install one additional pair of DIMMs. The online-spare memory DIMM pair must be the same speed, type, and the same size, or larger, than the active DIMM pair.  
Enable online-spare memory through the Configuration/Setup Utility program. The BIOS code assigns the online-spare memory DIMM pair according to your DIMM configuration. See the *User's Guide* on the IBM xSeries Documentation CD for information about enabling online-spare memory. See Table 4 for the online-spare memory DIMM connector assignments.

Table 4. Online-spare memory DIMM connector assignments

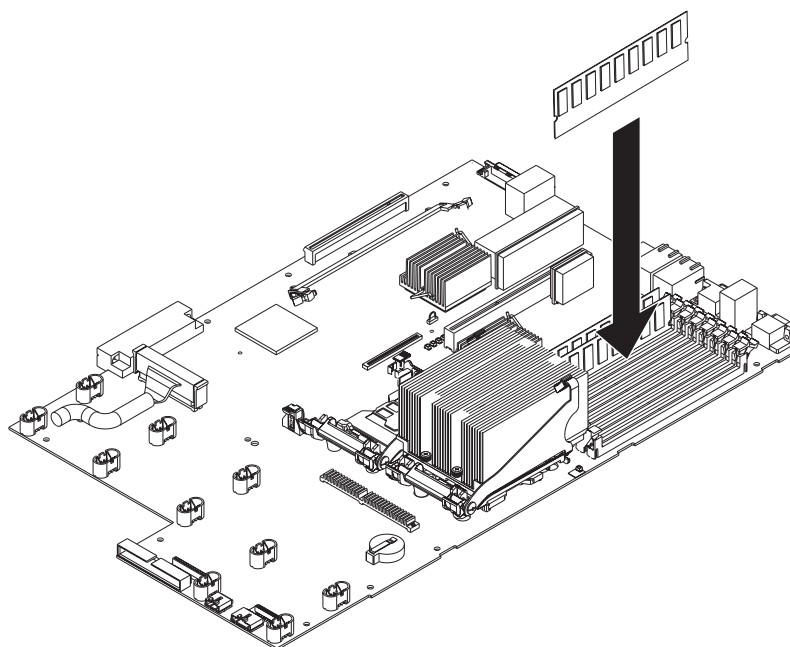
Active DIMM connectors	Online-spare memory DIMM connectors
1 and 2	3 and 4

Table 4. Online-spare memory DIMM connector assignments (continued)

Active DIMM connectors	Online-spare memory DIMM connectors
1 and 2 3 and 4	5 and 6
1 and 2 3 and 4 5 and 6	7 and 8

- You can enable either online-spare memory or memory mirroring, but not both at the same time.
- When you install or remove DIMMs, the server configuration information changes. When you restart the server, the system displays a message indicating that the memory configuration has changed.

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



Complete the following steps to install a DIMM:

1. Read the safety information beginning on page v, and “Installation guidelines” on page 15.
2. Turn off the server and disconnect all power cords and external cables (see “Turning off the server” on page 17); then, remove the server cover (see “Removing the cover” on page 18).
3. Remove the air baffle (see “Removing the air baffle” on page 19).
4. Locate the DIMM connectors on the system board and determine the connectors into which you will install the DIMMs.
5. Touch the static-protective package that contains the DIMM to any unpainted metal surface on the server. Then, remove the DIMM from the package.
6. Complete the following steps to install the DIMM. Repeat these 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 the retaining clips are closed, open them; then, insert the DIMM by pressing the DIMM straight into the connector. Make sure that the retaining clips snap into the closed position.

**Note:** If there is a gap 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.

7. Install the air baffle over the system board.

If you have other options to install or remove, do so now. Otherwise, go to “Completing the installation” on page 42.

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## Installing a microprocessor

The following notes describe the type of microprocessor that the server supports and other information that you must consider when installing a microprocessor:

- The server supports up to two microprocessors. With two microprocessors, the 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 the server comes with one microprocessor, you can install a second microprocessor.
- You might have to update the BIOS code. Be sure to read the documentation that comes with the microprocessor, so that you can determine whether you have to update the 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/>.
- (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/>.
- To order additional microprocessor options, contact your IBM marketing representative or authorized reseller.
- When you install an additional microprocessor in socket J23, you must also install the voltage regulator module (VRM) that comes with the microprocessor in VRM connector J72.
- The microprocessor speeds are automatically set for this server; therefore, you do not have to set any microprocessor frequency-selection jumpers or switches.
- If you have to replace a microprocessor, call for service.
- If the thermal-grease protective cover (for example, a plastic cap or tape liner) is removed from the heat sink or fan sink, do not touch the thermal grease on the bottom of the heat sink or fan sink or set down the heat sink or fan sink.

**Note:** Removing the heat sink or fan sink from the microprocessor destroys the even distribution of the thermal grease and requires replacing the thermal grease. Setting down the heat sink or fan sink onto any surface when the thermal-grease protective cover is removed will contaminate the thermal grease. If the thermal grease becomes contaminated with particles, it must be replaced.

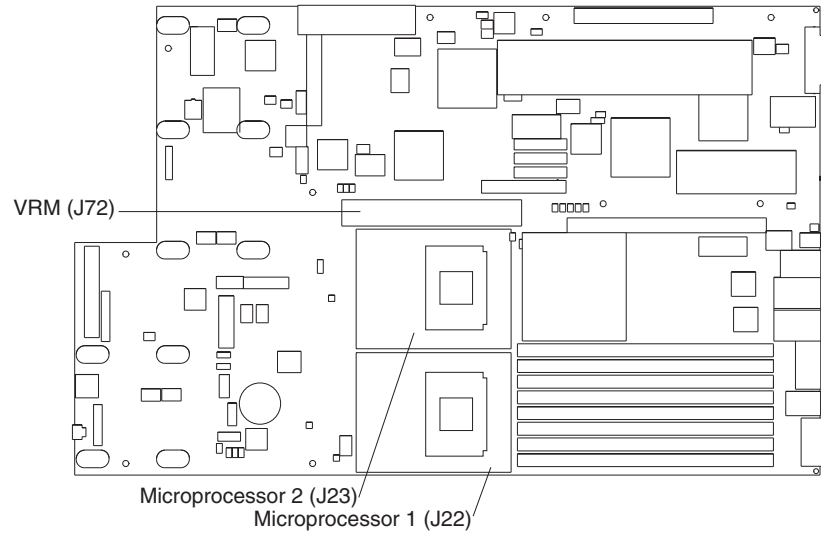
For information about replacing contaminated thermal grease on the heat sink or fan sink, contact IBM Services. For support phone numbers, go to <http://www.ibm.com/planetwide/>, or in the U.S. and Canada, call 1-800-IBM-SERV (1-800-426-7378).

Have the following information ready when you call:

- Machine type and model

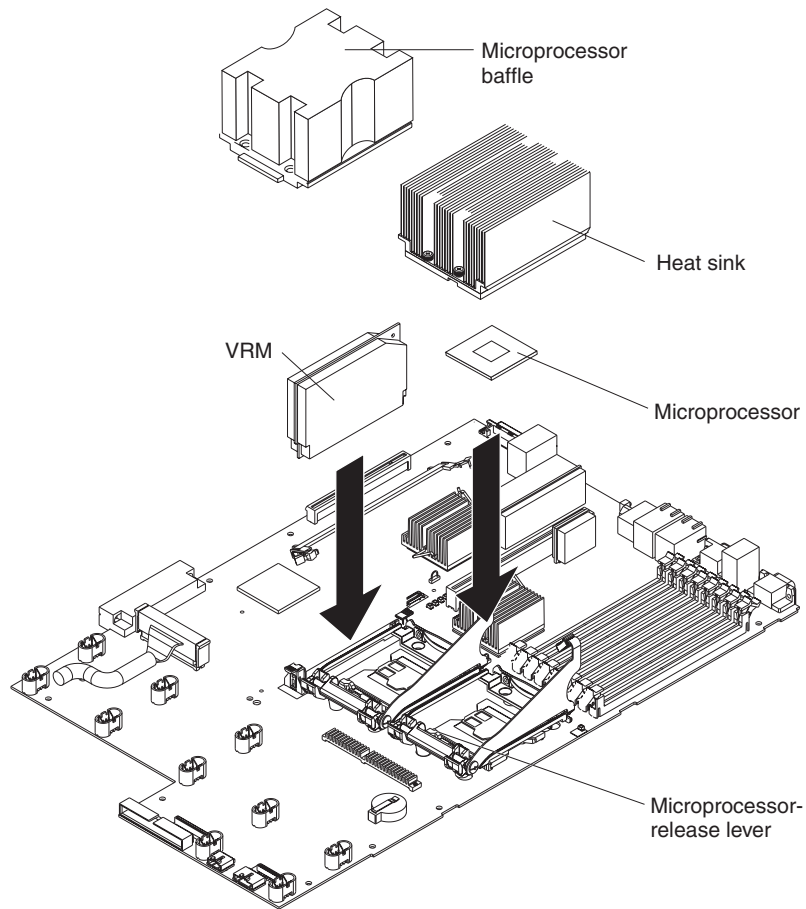
- Serial number of your server or computer
- Do not remove the first microprocessor from the system board to install the second microprocessor.

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 5.

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



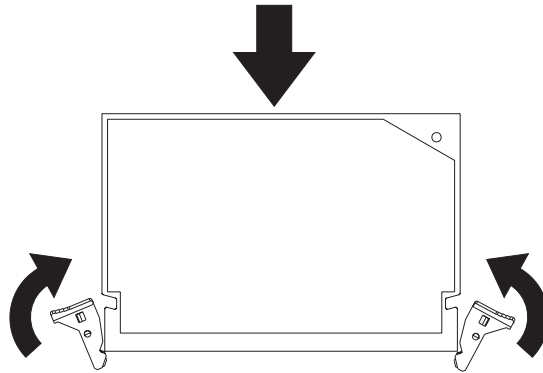
**Attention:**

- A startup (boot) processor must always be installed in socket J22 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.

Complete the following steps to install an additional microprocessor:

1. Read the safety information beginning on page v, and “Installation guidelines” on page 15.
2. Turn off the server and disconnect all power cords and external cables (see “Turning off the server” on page 17); then, remove the server cover (see “Removing the cover” on page 18).
3. Remove the air baffle (see “Removing the air baffle” on page 19).
4. Locate the second microprocessor socket (connector J23) on the system board.
5. Remove the microprocessor baffle.
  - a. Press the heat-sink release lever to unhook it from the tab on the microprocessor socket; then, pull the lever up.
  - b. Slide the microprocessor baffle while lifting the rear flange out of the heat-sink socket; then, lift it off the heat-sink socket and store it in a safe place.

6. Install a VRM in the VRM connector (J72).



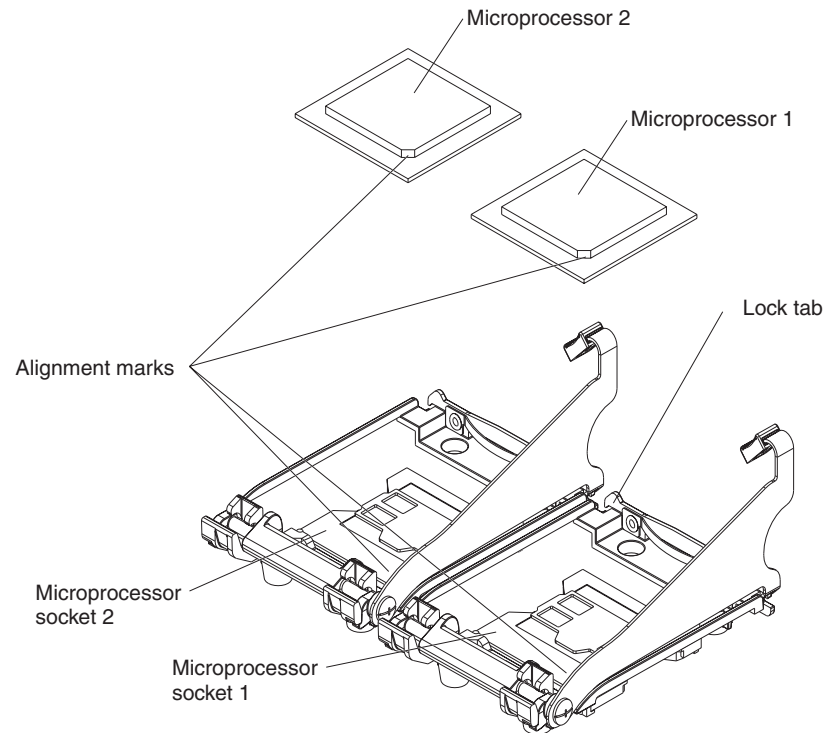
7. Install the microprocessor:
  - a. Touch the static-protective package containing the microprocessor to any unpainted metal surface on the server. Then, remove the microprocessor from the package.
  - b. Remove the protective cover, tape, or label from the surface of the microprocessor socket, if present.

**Attention:** You must ensure that the locking lever on the microprocessor socket is in the fully open position before you insert the microprocessor in the socket. Failure to do so might result in permanent damage to the microprocessor, microprocessor socket, and system board.
  - c. Rotate the locking lever on the microprocessor socket from its closed and locked position until it stops or clicks in the fully open position (approximately 135° angle).

**Attention:**

    - Do not use excessive force when pressing the microprocessor into the socket.
    - Make sure that the microprocessor is oriented and aligned with pin number 1 in the socket before you try to close the lever.
  - d. 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.

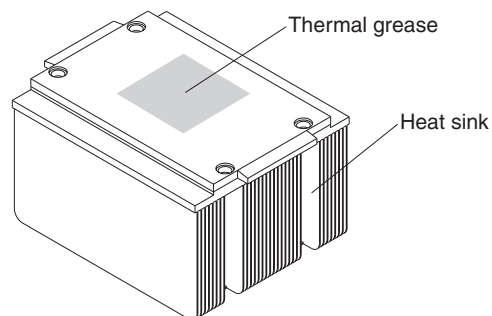


e. Carefully close the locking lever to secure the microprocessor in the socket.

8. Install a heat sink on the microprocessor.

**Attention:**

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

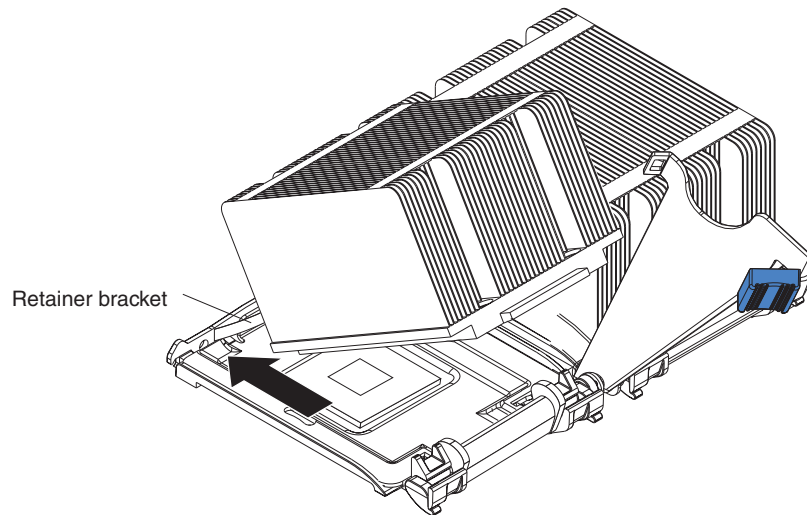


- Do not touch the thermal grease on the bottom of the heat sink or set down the heat sink. Touching the thermal grease will contaminate it. For details, see the information about thermal grease on page 32.

- a. Remove the plastic protective cover from the bottom of the heat sink.
- b. Make sure that the heat-sink lever is in the open position.



- c. Align the heat sink above the microprocessor with the thermal grease side down. Press firmly on the heat sink.



- d. Slide the flange of the heat sink into the opening beneath the retainer bracket.
  - e. Press down firmly on the heat sink until it is seated securely.
  - f. Attach the heat sink to the microprocessor by rotating the heat-sink lever to the closed position and hooking it underneath the lock tab.
9. Install the air baffle over the system board.

If you have other options to install or remove, do so now. Otherwise, go to “Completing the installation” on page 42.

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## Installing a hot-swap power supply

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

### Statement 8



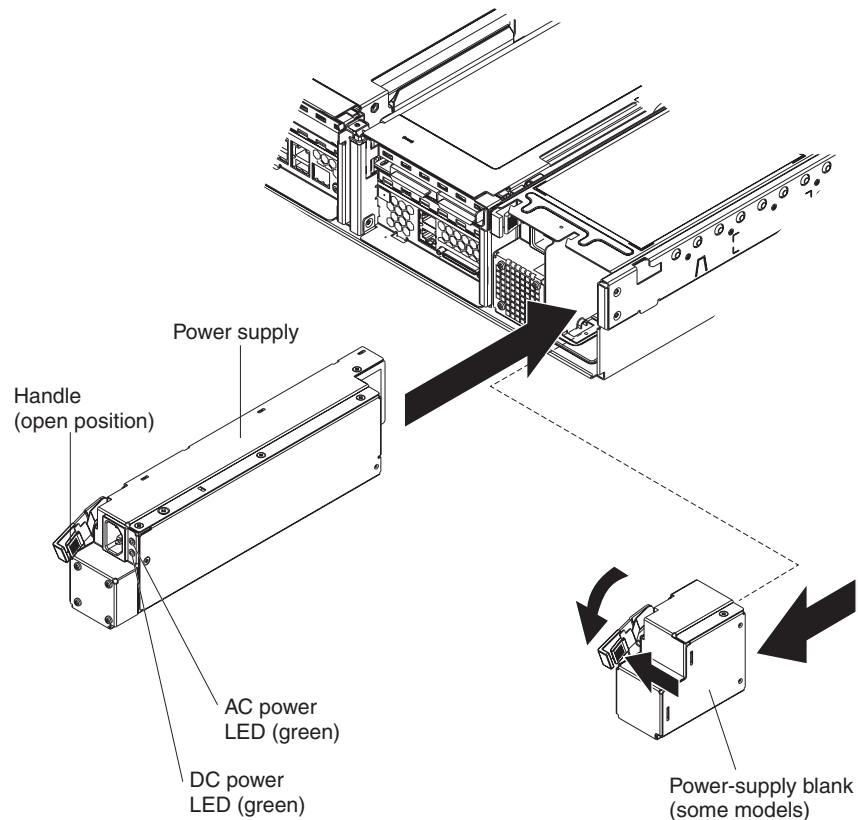
### CAUTION:

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.

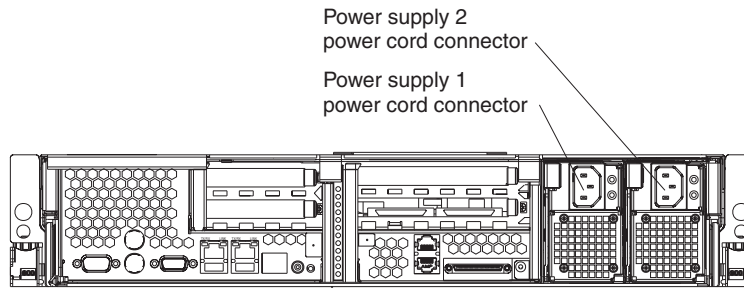
The following illustration shows how to install a power supply.



Complete the following steps to install a power supply:

1. Read the safety information beginning on page v, and “Installation guidelines” on page 15.
2. (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.
3. 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.
4. Connect the power cord for the new power supply to the power-cord connector on the power supply.

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



5. Connect the power cord to a properly grounded electrical outlet.
6. Make sure that the dc power LED and ac power LED on the power supply are lit, indicating that the power supply is operating correctly.

---

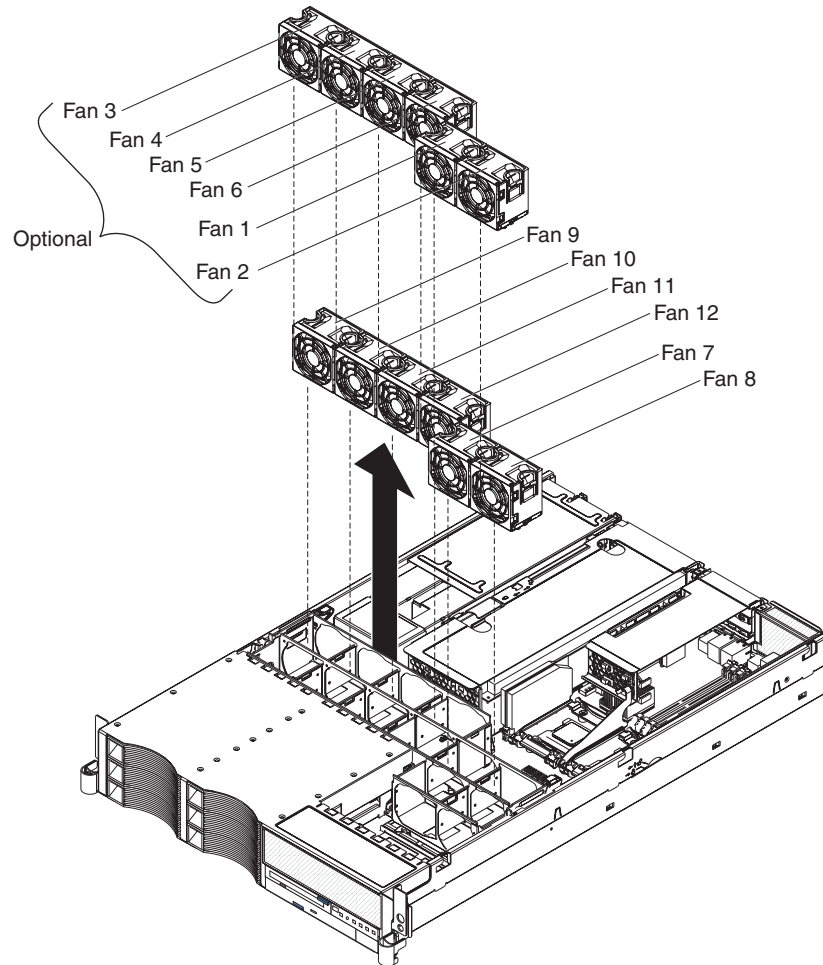
## Replacing a hot-swap fan

The following notes describe information that you must consider when installing a hot-swap fan.

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

- The server supports a maximum of 12 hot-swap fans.

- The following illustration shows the locations of the hot-swap fans.



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

1. Read the safety information beginning on page v, and “Installation guidelines” on page 15.
2. Remove the cover. See “Removing the cover” on page 18. 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.
3. Place your fingers into the two handles on the top of the failing fan.
4. Press the handles and lift the fan out of the server.
5. Orient the new fan so that the LED on top of the fan is to the right of the server.
6. Push the replacement fan assembly into the server until it clicks into place.
7. Replace the cover. See “Completing the installation” on page 42.

---

## Replacing the battery

The following notes describe information that you must consider when 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 the 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:

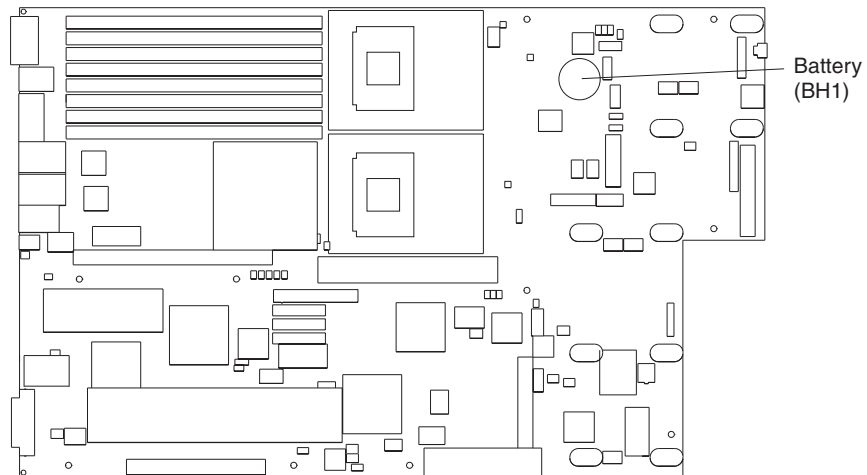
- **Throw or immerse into water.**
- **Heat to more than 100° C (212° F)**
- **Repair or disassemble**

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

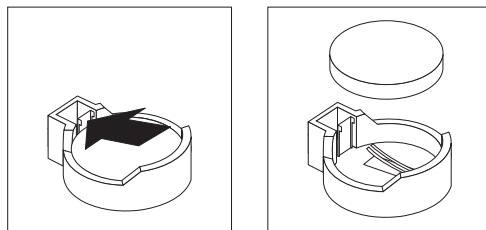
Complete the following steps to replace the battery:

1. Read the safety information beginning on page v, and “Installation guidelines” on page 15.
2. Follow any special handling and installation instructions that come 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 17); then, remove the server cover (see “Removing the cover” on page 18).
4. Remove the air baffle (see “Removing the air baffle” on page 19).
5. Disconnect any internal cables, as necessary.

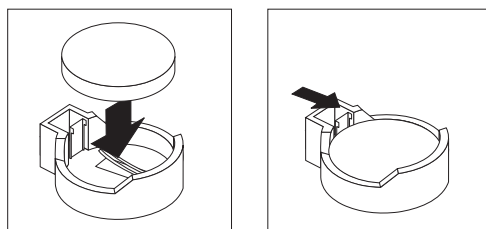
6. Locate the battery (connector BH1) on the system board.



7. Remove the battery:
  - a. Use one finger to press on the tab that secures the battery to its housing.
  - b. Use one finger to slide the battery from the socket.



8. Insert the new battery:
  - a. Hold the battery so that the larger side is facing up.
  - b. Place the battery into its socket, and press the battery down until it snaps into place.



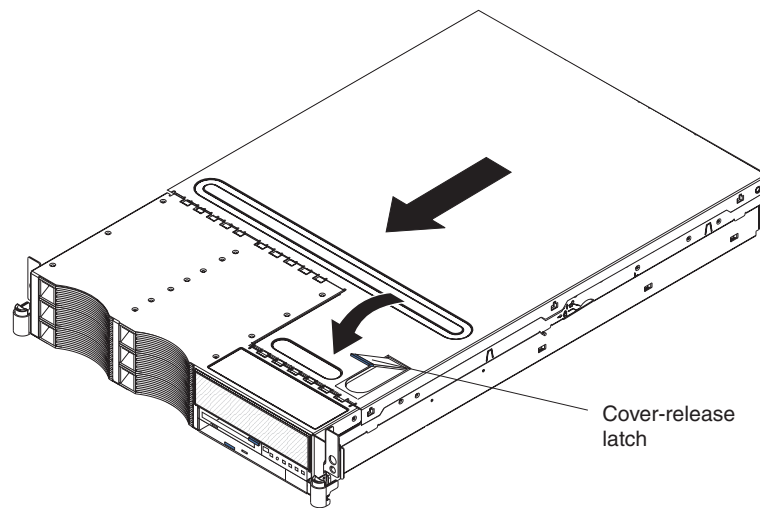
9. Reconnect the internal cables that you disconnected.
10. Connect all external cables and all power cords.
11. Reinstall the air baffle.
12. Reinstall the server cover (see "Completing the installation").
13. Start the Configuration/Setup Utility program and set configuration parameters as needed. See the *User's Guide* on the IBM xSeries Documentation CD for additional information about using the Configuration/Setup Utility program.

---

## Completing the installation

Complete the following steps to complete the installation:

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



2. Install the server in a rack. See the *Rack Installation Instructions* that come with the server for complete rack installation and removal instructions.

**Attention:**

- Install the server only in a rack cabinet with perforated doors.
  - Do not leave open spaces above or below an installed server in the 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 the rack cabinet for more information.
  - Install the server in a rack that meets the following requirements:
    - Minimum depth of 70 mm (2.76 in.) between the front mounting flange and the inside of the front door
    - Minimum depth of 157 mm (6.18 in.) between the rear mounting flange and the inside of the rear door
    - Minimum depth of 718 mm (28.27 in.) and maximum depth of 762 mm (30.00 in.) between the front and rear mounting flanges
3. To attach peripheral devices and connect the power cords, see “Connecting the cables.”

**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 from the server except when installing or removing the components that are located under the air baffle.

## Connecting the cables

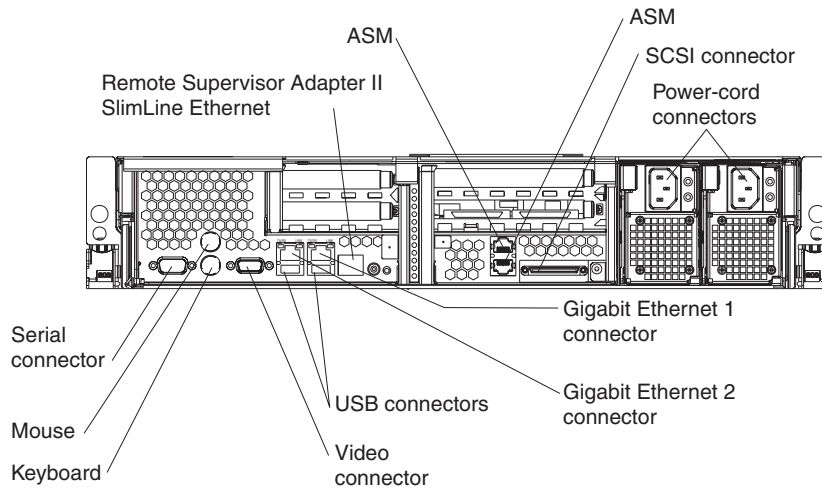
**Notes:**

1. You must turn off the server (see “Turning off the server” on page 17) before connecting any cables to or disconnecting any cables from the server.

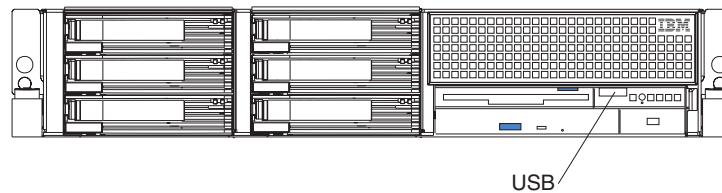
2. See the documentation that comes with your options for additional cabling instructions. It might be easier for you to route cables before you install certain options.
3. Cable identifiers are printed on the cables that come with the server and options. Use these identifiers to connect the cables to the correct connectors.

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

### Rear view



### Front view



## Updating the server configuration

When you start the server for the first time after you add or remove an internal option or 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. For more information, see the section about configuring the server in the *User's Guide* on the *IBM xSeries Documentation CD*.

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

The server comes with at least one microprocessor. If more than one microprocessor is installed, the server can operate as a symmetric multiprocessing (SMP) server. You might have to upgrade the operating system to support SMP. For more information, see the section about using the *ServerGuide Setup and Installation CD* in the *User's Guide* and the operating-system documentation.



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

If the server has a RAID configuration using the SCSI controller with integrated RAID and you have installed or removed a hard disk drive, you might have to reconfigure the disk arrays. See the RAID documentation on the IBM *ServeRAID-7e (Adaptec HostRAID) Support* CD for more information about reconfiguring the disk arrays.

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

## 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 the server. You can attach additional external options to the other input/output (I/O) connectors on the front and rear of the server. (See Chapter 3, "Input/output connectors," on page 47 for more information.)

Complete the following steps to attach an external device:

1. Read the safety information beginning on page v, and "Installation guidelines" on page 15. Also, read the documentation that comes with the option.
2. Turn off the server and all attached devices (see "Turning off the server" on page 17).
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 49 for information about SCSI cabling and SCSI IDs.



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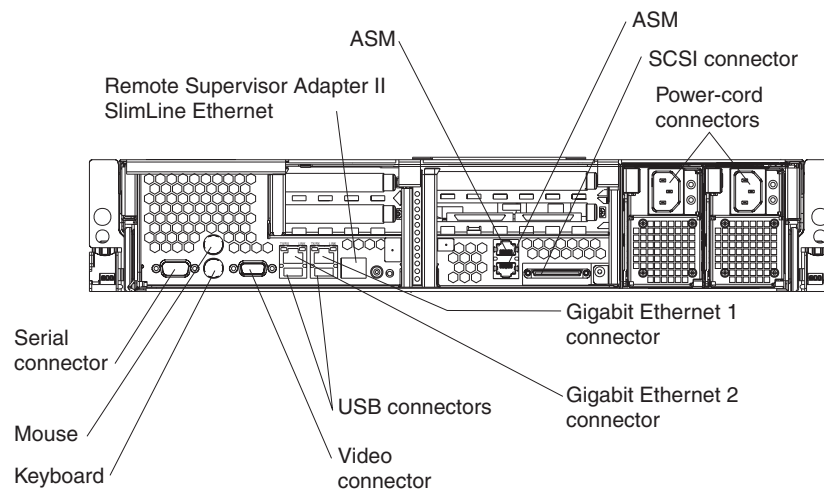
## Chapter 3. Input/output connectors

Your server has the following input/output (I/O) connectors:

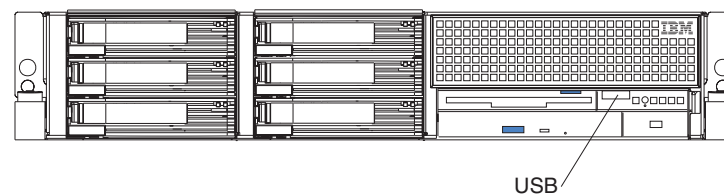
- One auxiliary-device (pointing device)
- Three Ethernet (one for remote server management using network, RJ-45)
- Two Advanced Systems Management (ASM)
- One keyboard
- One serial
- One Ultra320 SCSI controller (LVD) SCSI
- Three Universal Serial Bus (USB) (one on the front and two on the rear)
- One video

The following illustrations show the locations of these connectors.

### Rear view



### Front view

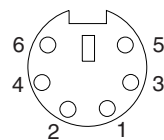


The following sections describe these connectors.

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### Auxiliary-device (pointing device) connector

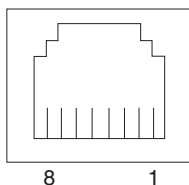
Use this connector to connect a mouse or other pointing device. The following illustration shows an auxiliary-device connector.



---

## Ethernet connectors

The following illustration shows an Ethernet connector.



Connect a Category 3, 4, or 5 unshielded twisted-pair cable to this connector. 100BASE-TX and 1000BASE-T Fast Ethernet standards require Category 5 or higher cabling.

The server has three Ethernet connectors. Two of the Ethernet connectors are attached to the Ethernet controllers. See the *User's Guide* on the IBM xSeries Documentation CD for more information about the Ethernet controllers.

To enable remote server management through a network, use the Remote Supervisor Adapter II SlimLine Ethernet connector. This connector is active only if an optional Remote Supervisor Adapter II SlimLine is installed. See the documentation that comes with the option for more information.

---

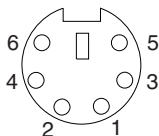
## Advanced Systems Management (ASM) connectors

Use either of these dual RJ-45 connectors to connect the server to an Integrated xSeries Adapter (IXA) that is installed in the server.

---

## Keyboard connector

Use this connector to connect a PS/2<sup>®</sup> (non-USB) keyboard to the server. The following illustration shows a keyboard connector.

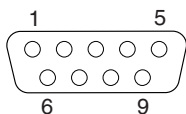


If you attach a keyboard to this connector, USB ports and devices are disabled during POST.

---

## Serial connector

Use a serial connector to connect a serial device. The following illustration shows a serial connector.



---

## Ultra320 SCSI controller system-board connectors

The integrated dual channel small computer system interface (SCSI) controller with integrated RAID 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 the 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 marketing representative or authorized reseller.

## 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/>. Adhering to these standards will help to ensure that the 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 5 lists the SCSI IDs for the hard disk drives and backplanes that are connected to one channel.

*Table 5. 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 for setting its SCSI ID.

## SCSI connector

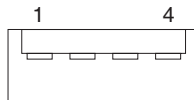
The following illustration shows a SCSI connector.



---

## Universal Serial Bus version 1.1 or 2.0 connectors

Use a Universal Serial Bus (USB) connector to connect a USB device. USB version 1.1 technology transfers data at up to 12 Mb per second (Mbps) with a maximum of 127 devices and a maximum signal distance of 5 meters (16 ft) per segment. If multiple USB devices are attached to the server, the USB hub must be version 2.0; otherwise, all USB 2.0 devices will transfer data at 12 Mbps. USB devices are configured automatically, using Plug and Play technology. The following illustration shows a USB connector.



Use a 4-pin cable to connect a device to a USB connector. If you need to connect more USB devices than the server has USB connectors for, use a USB hub to connect additional devices.

If you connect a PS/2 (non-USB) keyboard to the keyboard connector, USB ports and devices are disabled during POST.

If you connect a USB keyboard that has a mouse port, the keyboard emulates a mouse, and you cannot disable the mouse settings in the Configuration/Setup Utility program.

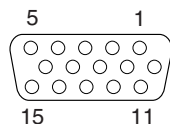
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## Video connector

The integrated super video graphics array (SVGA) video 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 BIOS will automatically disable the integrated video controller.

The following illustration shows a video connector.



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## Appendix. Notices

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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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## Product recycling and disposal

This unit contains materials such as circuit boards, cables, electromagnetic compatibility gaskets, and connectors which may contain lead and copper/beryllium alloys that require special handling and disposal at end of life. Before this unit is disposed of, these materials must be removed and recycled or discarded according to applicable regulations. IBM offers product-return programs in several countries. Information on product recycling offerings can be found on IBM's Internet site at <http://www.ibm.com/ibm/environment/products/prp.shtml>.

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## Battery return program

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

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

In the Netherlands, the following applies.



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## Electronic emission notices

### Federal Communications Commission (FCC) statement

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

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

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

### Industry Canada Class A emission compliance statement

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

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

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

### Australia and New Zealand Class A statement

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

### United Kingdom telecommunications safety requirement

#### Notice to Customers

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

## European Union EMC Directive conformance statement

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

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

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

## Taiwanese Class A warning statement

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

## Chinese Class A warning statement

聲 明  
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---

## Power cords

For your safety, IBM provides a power cord with a grounded attachment plug to use with this IBM product. To avoid electrical shock, always use the power cord and plug with a properly grounded outlet.

IBM power cords used in the United States and Canada are listed by Underwriter's Laboratories (UL) and certified by the Canadian Standards Association (CSA).

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.

<b>IBM power cord part number</b>	<b>Used in these countries and regions</b>
02K0546	China
13F9940	Australia, Fiji, Kiribati, Nauru, New Zealand, Papua New Guinea
13F9979	Afghanistan, Albania, Algeria, Andorra, Angola, Armenia, Austria, Azerbaijan, Belarus, Belgium, Benin, Bosnia and Herzegovina, Bulgaria, Burkina Faso, Burundi, Cambodia, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Congo (Democratic Republic of), Congo (Republic of), Cote D'Ivoire (Ivory Coast), Croatia (Republic of), Czech Republic, Dahomey, Djibouti, Egypt, Equatorial Guinea, Eritrea, Estonia, Ethiopia, Finland, France, French Guyana, French Polynesia, Germany, Greece, Guadeloupe, Guinea, Guinea Bissau, Hungary, Iceland, Indonesia, Iran, Kazakhstan, Kyrgyzstan, Laos (People's Democratic Republic of), Latvia, Lebanon, Lithuania, Luxembourg, Macedonia (former Yugoslav Republic of), Madagascar, Mali, Martinique, Mauritania, Mauritius, Mayotte, Moldova (Republic of), Monaco, Mongolia, Morocco, Mozambique, Netherlands, New Caledonia, Niger, Norway, Poland, Portugal, Reunion, Romania, Russian Federation, Rwanda, Sao Tome and Principe, Saudi Arabia, Senegal, Serbia, Slovakia, Slovenia (Republic of), Somalia, Spain, Suriname, Sweden, Syrian Arab Republic, Tajikistan, Tahiti, Togo, Tunisia, Turkey, Turkmenistan, Ukraine, Upper Volta, Uzbekistan, Vanuatu, Vietnam, Wallis and Futuna, Yugoslavia (Federal Republic of), Zaire
13F9997	Denmark
14F0015	Bangladesh, Lesotho, Macao, Maldives, Namibia, Nepal, Pakistan, Samoa, South Africa, Sri Lanka, Swaziland, Uganda

<b>IBM power cord part number</b>	<b>Used in these countries and regions</b>
14F0033	Abu Dhabi, Bahrain, Botswana, Brunei Darussalam, Channel Islands, China (Hong Kong S.A.R.), Cyprus, Dominica, Gambia, Ghana, Grenada, Iraq, Ireland, Jordan, Kenya, Kuwait, Liberia, Malawi, Malaysia, Malta, Myanmar (Burma), Nigeria, Oman, Polynesia, Qatar, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Seychelles, Sierra Leone, Singapore, Sudan, Tanzania (United Republic of), Trinidad and Tobago, United Arab Emirates (Dubai), United Kingdom, Yemen, Zambia, Zimbabwe
14F0051	Liechtenstein, Switzerland
14F0069	Chile, Italy, Libyan Arab Jamahiriya
14F0087	Israel
1838574	Antigua and Barbuda, Aruba, Bahamas, Barbados, Belize, Bermuda, Bolivia, Brazil, Caicos Islands, Canada, Cayman Islands, Costa Rica, Colombia, Cuba, Dominican Republic, Ecuador, El Salvador, Guam, Guatemala, Haiti, Honduras, Jamaica, Japan, Mexico, Micronesia (Federal States of), Netherlands Antilles, Nicaragua, Panama, Peru, Philippines, Taiwan, United States of America, Venezuela
24P6858	Korea (Democratic People's Republic of), Korea (Republic of)
34G0232	Japan
36L8880	Argentina, Paraguay, Uruguay
49P2078	India
49P2110	Brazil
6952300	Antigua and Barbuda, Aruba, Bahamas, Barbados, Belize, Bermuda, Bolivia, Caicos Islands, Canada, Cayman Islands, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Guam, Guatemala, Haiti, Honduras, Jamaica, Mexico, Micronesia (Federal States of), Netherlands Antilles, Nicaragua, Panama, Peru, Philippines, Saudi Arabia, Thailand, Taiwan, United States of America, Venezuela



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