IBM

@server

xSeries 235

Type 8671

Option Installation Guide

IBM xSeries 235 Type 8671

Option Installation Guide

Note:

Before using this information and the product it supports, be sure to read the general information in "Notices", on page 79.

Contents

Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الآمنية

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

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

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

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

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

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

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

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

A termék telepítése előtt olvassa el a Biztonsági előírásokat!

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

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

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

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

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

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

Перед установкой продукта прочтите инструкции по
технике безопасности.

Pred inštaláciou tohto zariadenia si pečítaje Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

Antes de instalar este producto lea la información de seguridad.

Läs säkerhetsinformationen innan du installerar den här produkten.

Statement 1

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

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

Statement 2

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

Do not:
• **Throw or immerse into water.**
• **Heat to more than 100°C (212°F)**
• **Repair or disassemble**

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

Statement 3

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

- **Do not remove the covers. Removing the covers of the laser product could result in exposure to hazardous laser radiation. There are no serviceable parts inside the device.**

- **Use of controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.**

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

Statement 4
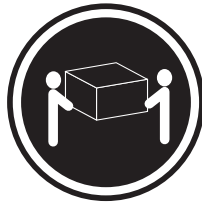
≥18 kg (39.7 lb)   ≥32 kg (70.5 lb)   ≥55 kg (121.2 lb)
CAUTION:
Use safe practices when lifting.

Statement 5

CAUTION:
The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.
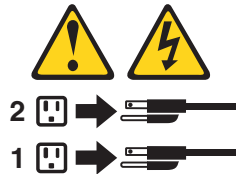
Statement 8

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

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

Statement 10

CAUTION:
Do not place any object weighing more than 82 kg (180 lb) on top of rack-mounted devices.

>82 kg (180 lb)

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

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

In addition to this *Option Installation Guide*, the following IBM® xSeries™ 235 Type 8671 documentation is provided with your server:

- *Installation Guide*
  This printed publication contains setup and installation instructions.
- *Rack Installation Instructions*
  This publication is provided in Portable Document Format (PDF) on the IBM *xSeries Documentation* CD. It contains the instructions to install your server in a rack.
- *Safety Information Book*
  This multilingual publication is provided in 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 needed to help you solve the problem yourself, or 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.

Major components of the xSeries 235 Type 8671 server

The orange color on components and labels in your server identifies hot-swap or hot-plug components. You can install or remove hot-swap or hot-plug components while the system is running, provided that your system is configured to support this function. For complete information about installing or removing a hot-swap or hot-plug component, see the detailed information in Chapter 2, "Installing options", on page 9.

The blue color on components and labels indicates touch points where a component can be gripped, a latch moved, and so on.

The following illustration shows the major components in your server.

Note: The illustrations in this document might differ slightly from your hardware.
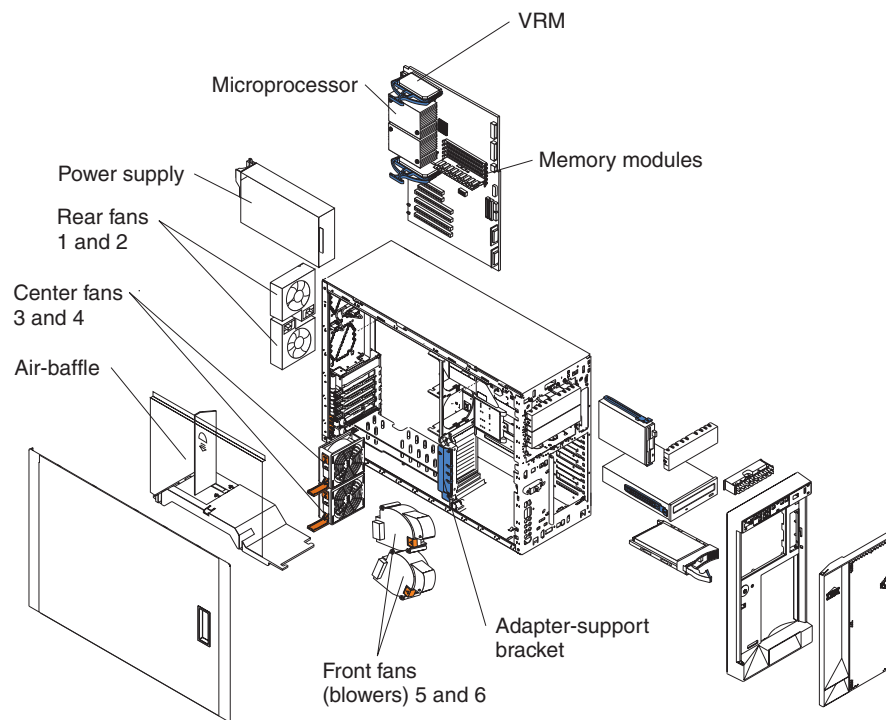
System-board component locations

This section provides illustrations of the system board showing the locations of connectors, switch and jumper blocks, and LEDs.

System-board option connectors

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

VRM 2 (J1)

Microprocessor 2 (U9)

Microprocessor 1 (U13)

VRM 1 (J17)

Remote Supervisor Adapter (J27)

PCI slot 1 32-bit 5.0 V (J32)

PCI-X slot 2 64-bit 3.3 V (J36)

PCI-X slot 3 64-bit 3.3 V (J38)

PCI-X slot 4 64-bit 3.3 V (J41)

PCI-X slot 5 64-bit 3.3 V 133 MHz hot-plug (J43)

PCI-X slot 6 64-bit 3.3 V 133 MHz hot-plug (J45)

DIMM 1 (J7)
DIMM 2 (J9)
DIMM 3 (J11)
DIMM 4 (J12)
DIMM 5 (J14)
DIMM 6 (J15)

Battery (BH1)
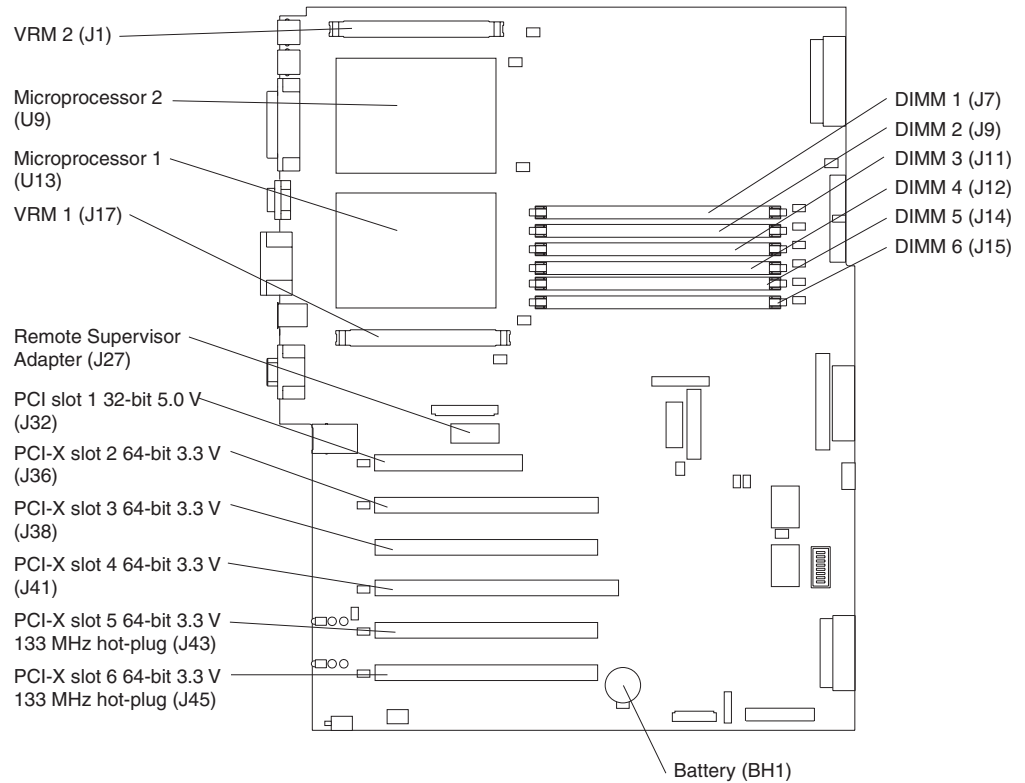
System-board internal cable connectors

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

System-board identification (some models)

533 MNz FSB CPU ONLY

Power (J4)

Power signal (J10)

Fans (J18)
Rear fans on
533 MHz system board
Center fans on all other
system boards

IDE CD-ROM drive (J21)

Fans (J25)
Center fans on
533 MHz system board
Rear fans on all other
system boards

Diskette drive (J22)

Light Path Diagnostics panel (J23)

Operator information panel (J24)

SCSI channel A (J44)

SCSI channel B (J51)

On/off/reset panel (J47)

Front fans (J50)
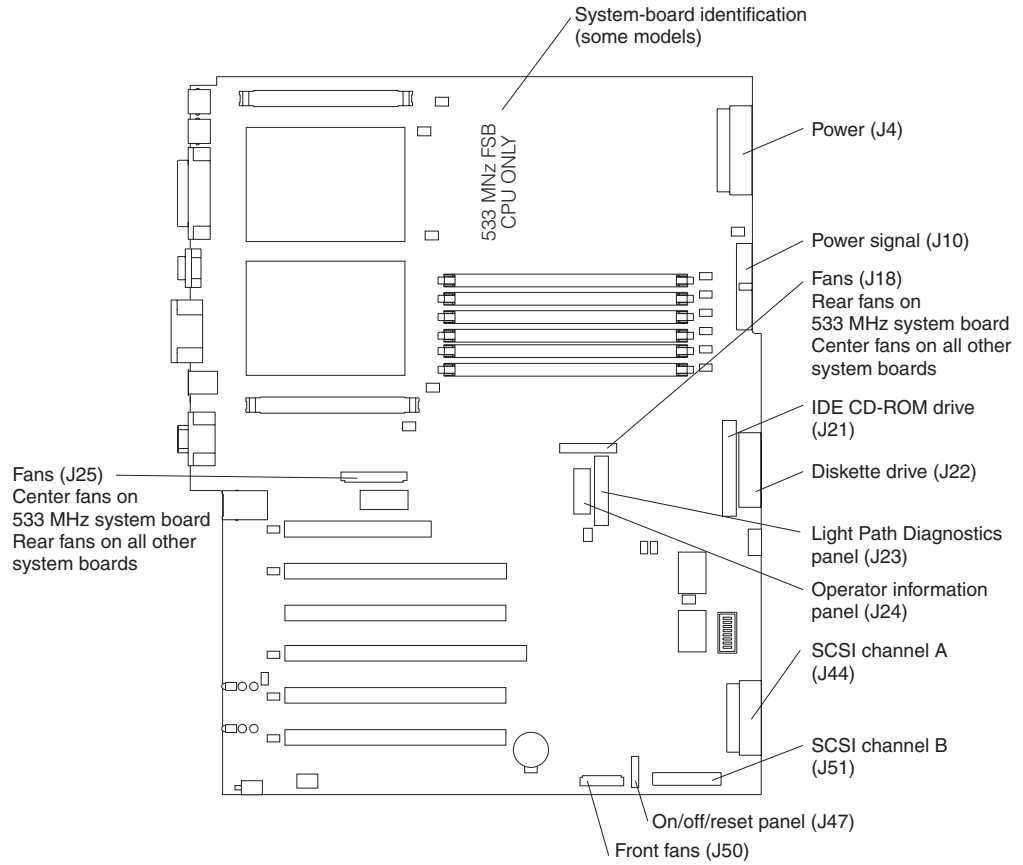
System-board external port connectors

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

Keyboard (J2)

Mouse (J3)

Parallel (J5)

Serial (J8)

RS-485 (J13)

Rear
USB (J16)

Video (J19)

Ethernet (J26)

Front USB (J29)

Optional serial
(533 MHz system board only)
(J48)
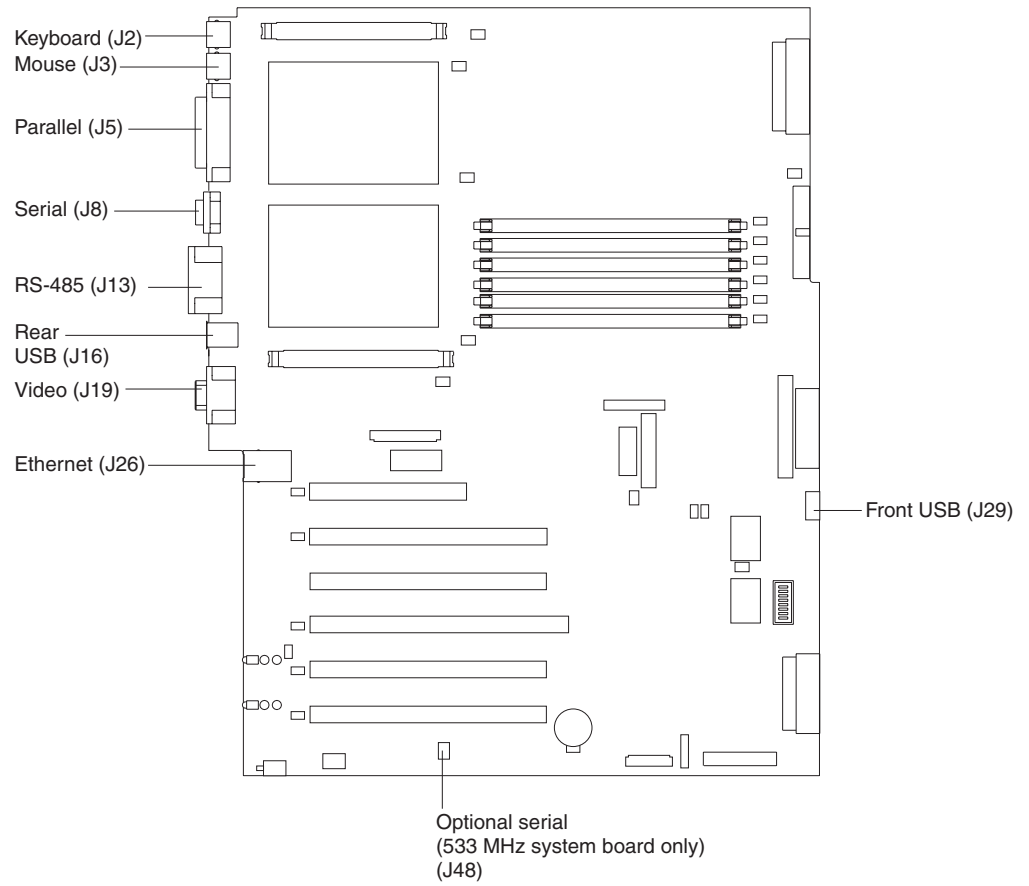
System-board switches and jumpers

The following illustration shows the system-board switch block (SW1) and jumper blocks (J28 and J42) on the system board.
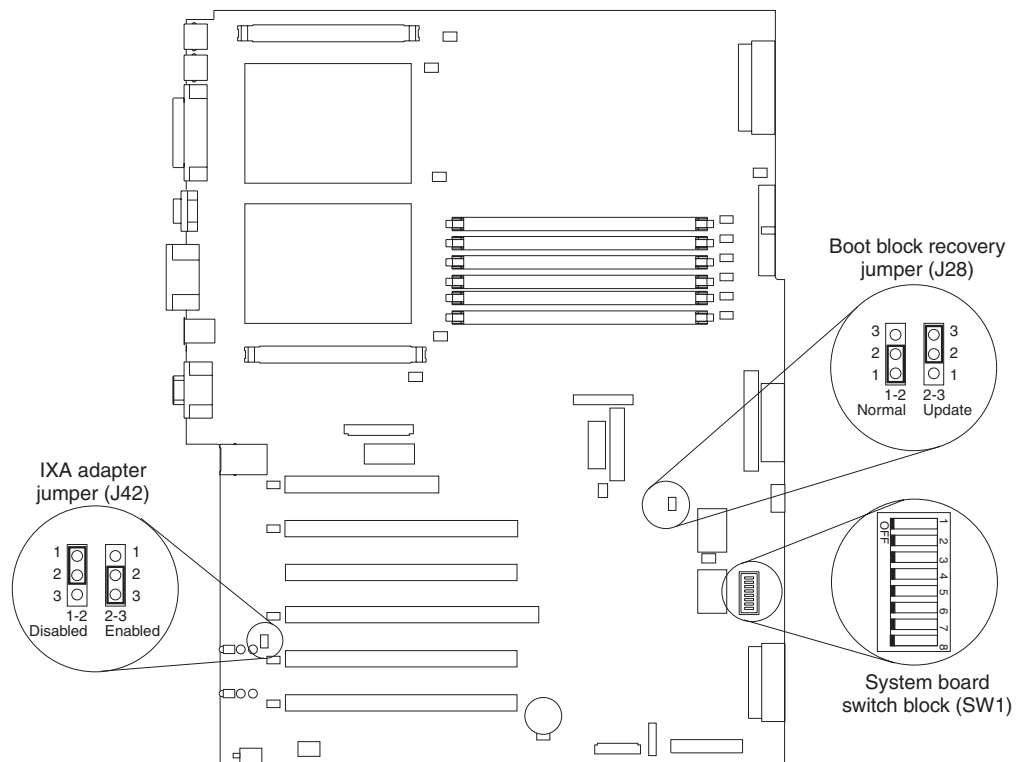
Table 1 describes the function of each switch on the switch block.

Table 1. Switches 1-8

Switch number	Default value	Switch description
8	Off	400 MHz system board - Reserved. 533 MHz system board - Disable Wake on LAN after ac power-on.
7	Off	Power-on override. When toggled to On, this switch forces the server to turn on, overriding the power-on button.
6	Off	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. Changing the position of this switch does not affect the administrator password check, if an administrator password is set. See the *User's Guide* on the IBM *xSeries Documentation* CD for additional information about the power-on password.
5	Off	Reserved.
4	Off	Reserved.
3	Off	Reserved.
2	Off	Reserved.

Table 1. Switches 1-8 (continued)

Switch number	Default value	Switch description
1	Off	Reserved.

CAUTION:
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.)

Note: 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 LEDs on the system board. You might need to refer to this illustration when solving server problems.
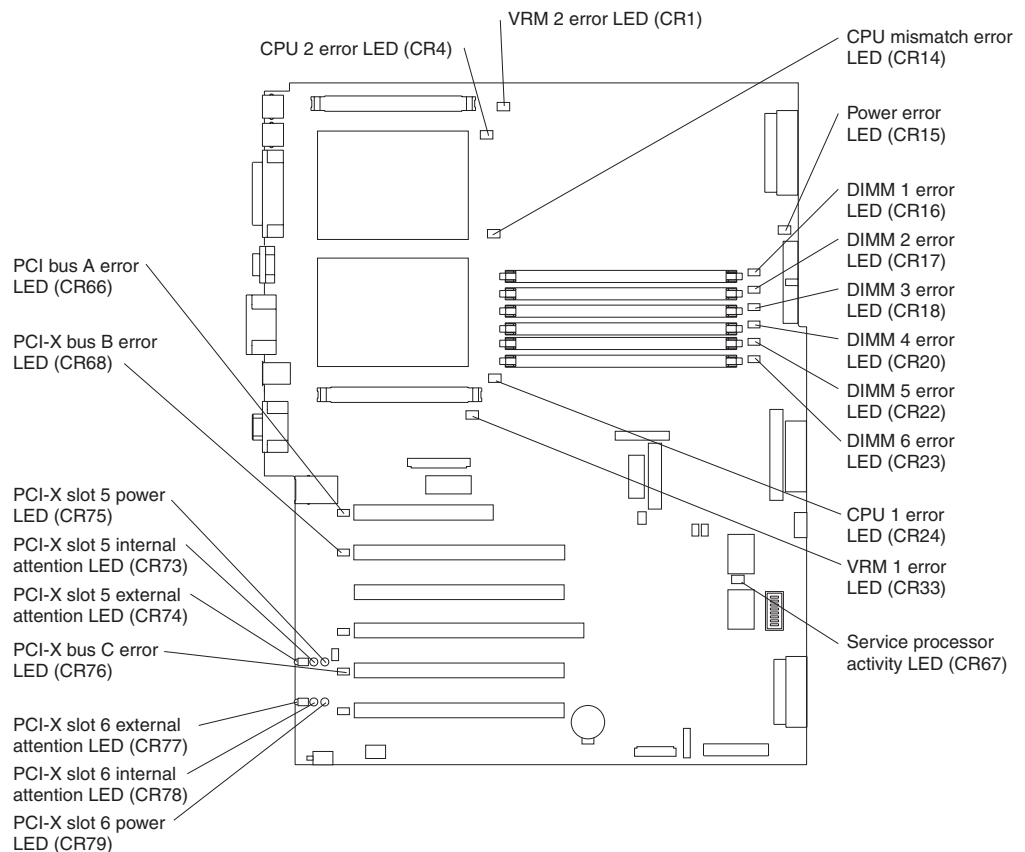
Chapter 2. Installing options

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 in "Safety" on page v.
- You do not need to turn off the server to install or replace hot-swap power supplies, hot-swap drives, hot-swap fans, Active PCI™ (hot-plug) adapters, or hot-plug Universal Serial Bus (USB) devices.
- The orange color on components and labels in your server identifies hot-swap or hot-plug component. 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 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.

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.
- For tower models, make sure that there is at least 50 mm (2 inches) of ventilated space at the sides of the server and 100 mm (4 inches) at the front and rear of the server.

  For rack configurations, 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.
- The air-baffle cover over the microprocessors remains closed 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 within 48 hours.
- The server is turned off and the power cords are disconnected before you open the air-baffle cover.
- The air-baffle assembly is always installed in the server except when you are installing or removing the components that are under the air-baffle cover.

- When the air-baffle assembly is installed in the server, the air-baffle cover is always closed.
- Microprocessor socket 2 always contains either a microprocessor baffle or a microprocessor.

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 server for at least 2 seconds. (This drains static electricity from the package and from your body.)
- Remove the device from its package and install it directly into the server without setting down the device. If it is necessary to set down the device, put it back into its static-protective package. Do not place the device on your server cover or on a metal surface.
- 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

Turning on the server refers to the act of plugging the power cords of your server into the power source and starting the operating system.

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.

    Notes:

    1. 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.

    2. After you plug the power cords of your server into the electrical outlets, wait approximately 20 seconds before pressing the power-control button. During this time, the system-management adapter is initializing; therefore, the power-control button does not respond.

- If the server is turned on and a power failure occurs, the server will restart automatically when power is restored.

- If ac power is present, the server is in Standby mode, and the server is connected to an ASM interconnect network that contains at least one system with an optional Remote Supervisor Adapter installed, the server can be turned on from the Remote Supervisor Adapter user interface.

- If ac power is present, the server is in Standby mode, and an optional Remote Supervisor Adapter is installed in the server, the server can be turned on from the Remote Supervisor Adapter user interface.

- When you plug in your server for the first time, Wake on LAN® 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 lit.

Turning off the server

Turning off the server refers to the act of disconnecting the server from the power source.

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.

2

1

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

   Note: 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 it into Standby mode. You can use this feature if the operating system stops functioning.

4. Disconnect the server from the power source.

   Note: After disconnecting all the power cords, wait approximately 15 seconds for your system to stop running. Watch for the power-on LED on the front of the server to stop flashing.

Standby mode

Standby mode refers to the condition in which the server is connected to an ac power source but the server operating system is not running and all core logic is shut down except for the service processor. In Standby mode, the server can respond to service processor requests, such as a remote request to turn on the server. When the server is in Standby mode, the power-on LED on the front of the server flashes (when the server is running, the power-on LED stays on and does not flash).

You can put the server in Standby mode in any of the following ways:

- You can press the power-control button on the server. This starts an orderly shutdown of the operating system, if this feature is supported by your operating system.
- If the server is connected to an ASM interconnect network that contains at least one system with an optional Remote Supervisor Adapter installed, the server can be placed in Standby mode from the Remote Supervisor Adapter user interface.
- If an optional Remote Supervisor Adapter is installed in the server, the server can be placed in Standby mode from the Remote Supervisor Adapter user interface.

  Attention: You must disconnect all the server power cords from the electrical outlets to remove all power from the server.

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.

   Notes:

   a. After you place the server in Standby mode, 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 operating system and to force it into Standby mode. You can use this feature if the operating system stops functioning.

The ISMP can put the server in Standby mode as an automatic response to a critical system failure. You can also put the server into Standby mode remotely by means of an optional Remote Supervisor Adapter or through connection to an ASM interconnect network.

Removing the server door (tower model)

The following illustration shows how to remove the door from the tower model server.
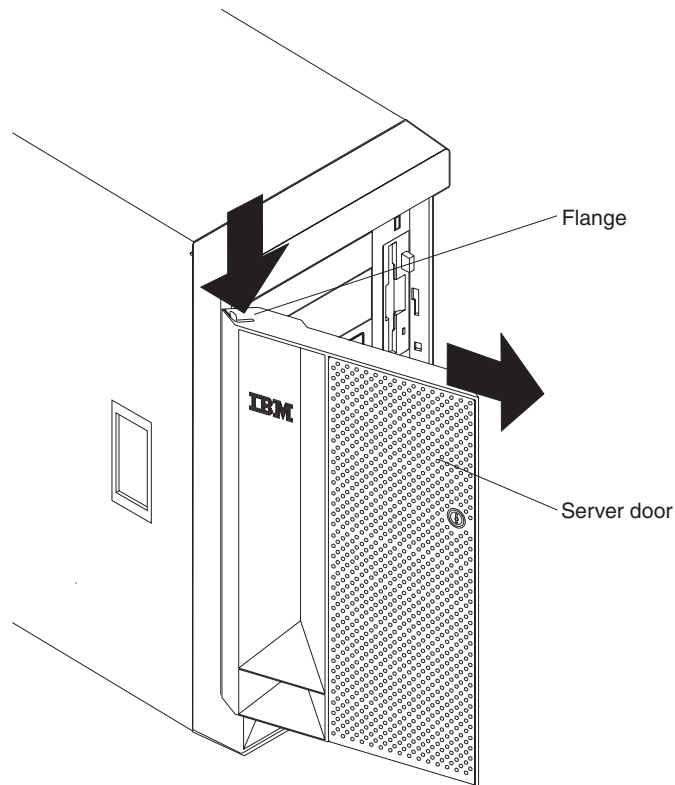
Flange

Server door

Complete the following steps to remove the server door:

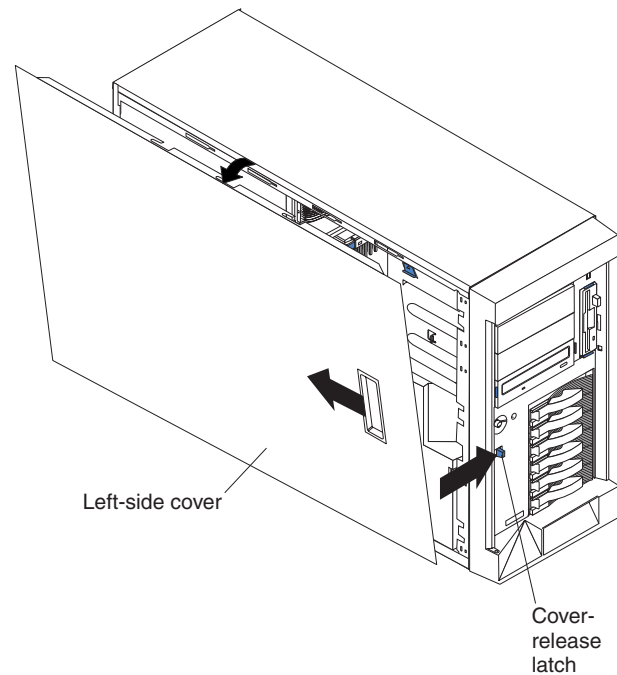1. Review the information in "Safety" on page v, "Installation Guidelines" on page 9, and "Handling static-sensitive devices" on page 10.
2. Unlock and open the server door.
3. Locate the flange on the top edge of the door.
4. Press the flange downward while pressing outward on the door; then, lift the door up and off the hinge. Set the door aside in a safe place.

Removing the server left-side cover and bezel (tower model)

This section describes how to remove the left-side cover and bezel from the tower model server.

Removing the left-side cover

The following illustration shows how to remove the left-side cover from the tower model server.

Left-side cover

Cover-
release
latch

Complete the following steps to remove the server left-side cover:

1. Review the information in "Safety" on page v, "Installation Guidelines" on page 9, and "Handling static-sensitive devices" on page 10.
2. Push the plastic cover-release latch on the front of the server to the right to release the cover.
3. While pushing the plastic cover-release latch, slide the left-side cover slightly toward the rear of the server; the cover will stop after approximately 25 mm (1 inch). Release the cover-release latch; then, lift the cover off the server and set the cover aside.

Removing the bezel

The following illustration shows how to remove the bezel from the tower model server.

Note: If you have not already removed the door, remove it as described in "Removing the server door (tower model)" on page 14.

Bezel-release lever

Complete the following steps to remove the bezel:

1. Review the information in "Safety" on page v, "Installation Guidelines" on page 9, and "Handling static-sensitive devices" on page 10.
2. Press up on the bezel-release lever.
3. Pull the top of the bezel away from the chassis; then, lift the bezel to disengage the bottom tabs.
4. Remove the bezel from the server and store the bezel in a safe place.

Removing the server top cover and bezel (rack configuration)

This section describes how to remove the top cover and bezel from a rack configuration server.

Removing the top cover

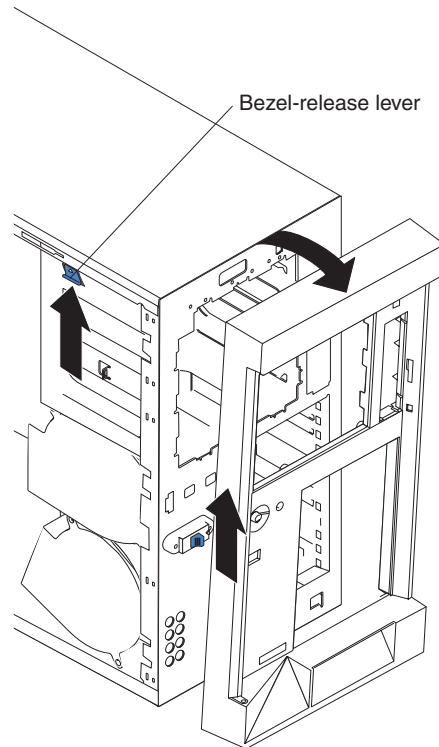The following illustration shows how to remove the top cover from a rack configuration server.

Complete the following steps to remove the server top cover:

1. Review the information in "Safety" on page v, "Installation Guidelines" on page 9, and "Handling static-sensitive devices" on page 10.
2. Press down on the plastic cover-release latch on the front of the server.
3. While pressing the plastic cover-release latch, slide the top cover slightly toward the rear of the server; the cover will stop after approximately 25 mm (1 inch). Release the cover-release latch; then, lift the cover off the server and set the cover aside.

Removing the bezel

The following illustration shows how to remove the bezel from a rack configuration server.
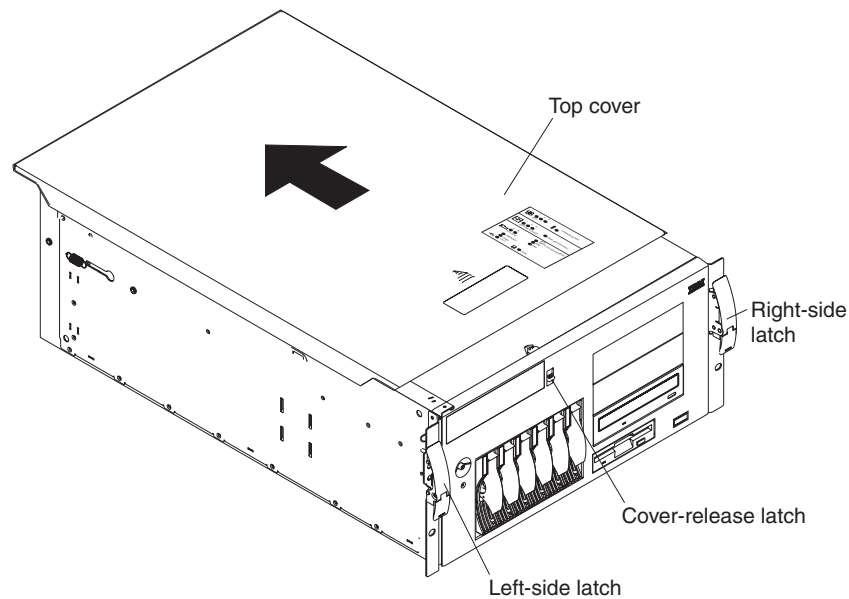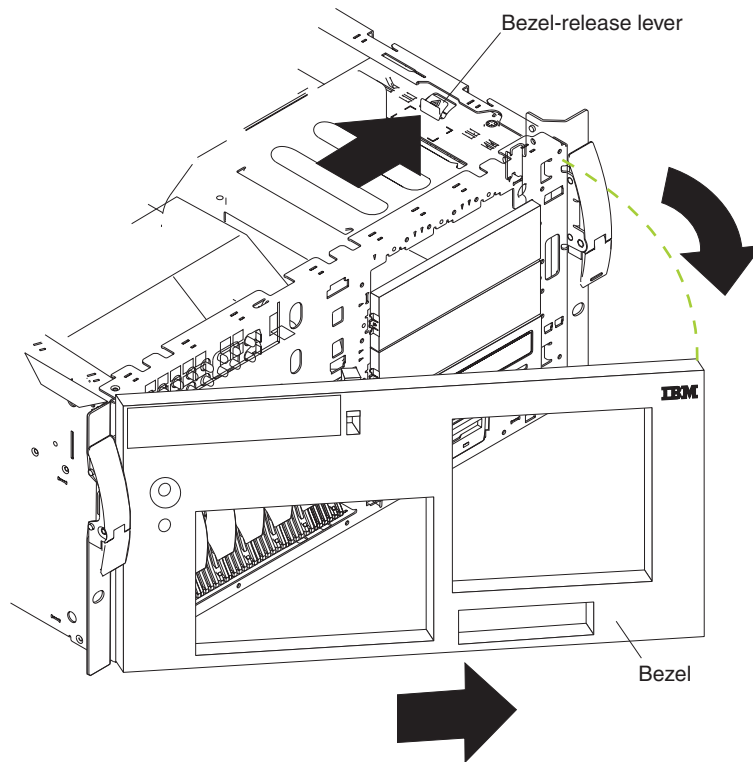

Complete the following steps to remove the bezel:

1. Review the information in "Safety" on page v, "Installation Guidelines" on page 9, and "Handling static-sensitive devices" on page 10.
2. Remove the server cover and locate the bezel-release lever.
3. Press the bezel-release lever to the unlocked position as indicated on the lever.
4. Pull the right side of the bezel away from the chassis; then, slide the bezel to the right to disengage the tabs.
5. Remove the bezel from the server and store the bezel in a safe place.

Removing and installing the adapter-support bracket

When working with some options, you must first remove the adapter-support bracket to access certain components or connectors on the system board.

Note: The center-fan bracket is attached to the adapter-support bracket. Both brackets are removed and installed together as a single unit.

Complete the following steps to remove the adapter-support bracket:

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 disconnect all power cords and external cables ("Turning off the server" on page 12); then, remove the server cover (see "Removing the server left-side cover and bezel (tower model)" on page 15 or "Removing the server top cover and bezel (rack configuration)" on page 17).

3. Slide the air-baffle assembly out of the guides; then, remove it from the server.

Air-baffle
assembly
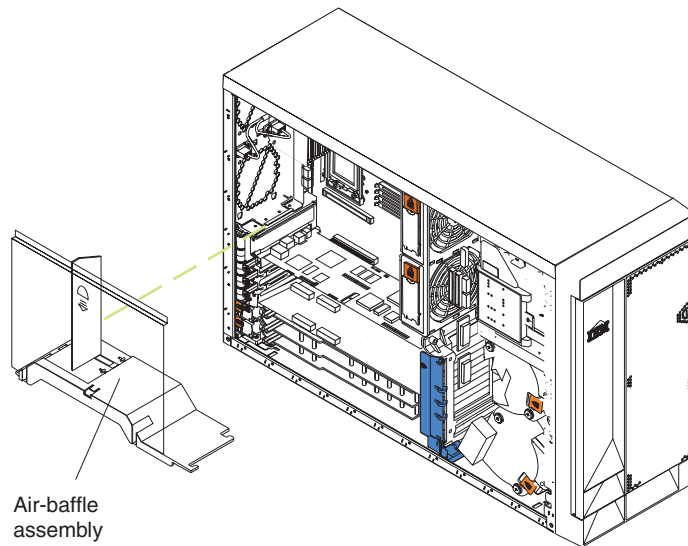
4. Disconnect any cables that are connected to the full-length adapters.

5. Lift the adapter-retention clip on top of the adapter-support bracket; then, remove the full-length adapters and plastic dividers. (See the illustration on page 23 for the location of the adapter-retention clip.)

6. Disconnect the end of the cable that is attached to the center-fans connector on the system board. See "System-board internal cable connectors" on page 4 for the location of the center-fans connector.

7. Remove the adapter-support bracket.

Center-
fan
bracket

Adapter-
support
bracket

Adapter-support
bracket latches

SCSI cable
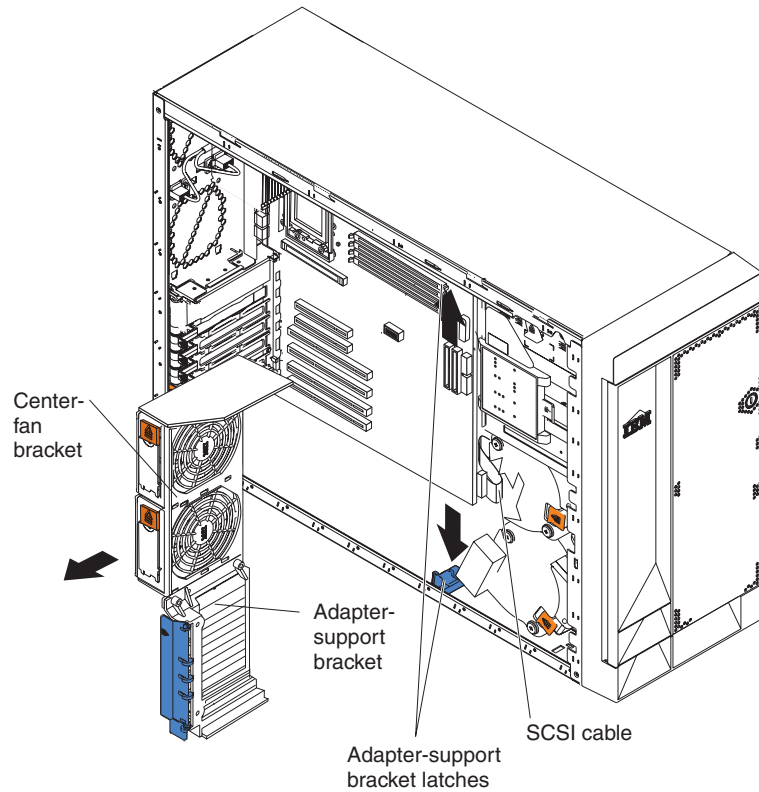
a. Press the release tab on each adapter-support bracket latch. There are two latches, one at each end of the adapter-support bracket.

b. Slide the adapter-support bracket out of the guides; then, remove it from the server.

Note: To reinstall the adapter-support bracket and other components that you removed or disconnected, reverse the preceding steps. Remember to reroute the cables that you disconnected and to reconnect the center-fans cable to the system board. See "System-board internal cable connectors" on page 4 for the location of the center-fans connector.

8. Continue with the option installation or removal procedure.

Working with adapters

This section describes how to install hot-plug and non-hot-plug PCI and PCI-X adapters. Before you continue with the adapter-installation procedures, review "Adapter considerations" on page 22.

The following illustration shows the PCI and PCI-X adapter expansion slots on the system board. Slots 5 and 6 are the Active PCI-X™ slots. Active PCI-X slots are also called hot-plug PCI-X slots.

Note: See the *Hardware Maintenance Manual and Troubleshooting Guide* on the IBM *xSeries Documentation* CD for information about the adapter power-on and attention LEDs.

PCI slot 1 32-bit 5.0 V (J32)

PCI-X slot 2 64-bit 3.3 V (J36)

PCI-X slot 3 64-bit 3.3 V (J38)

PCI-X slot 4 64-bit 3.3 V (J41)

PCI-X slot 5 64-bit 3.3V 133 MHz hot-plug (J43)

PCI-X slot 6 64-bit 3.3 V 133 MHz hot-plug (J45)
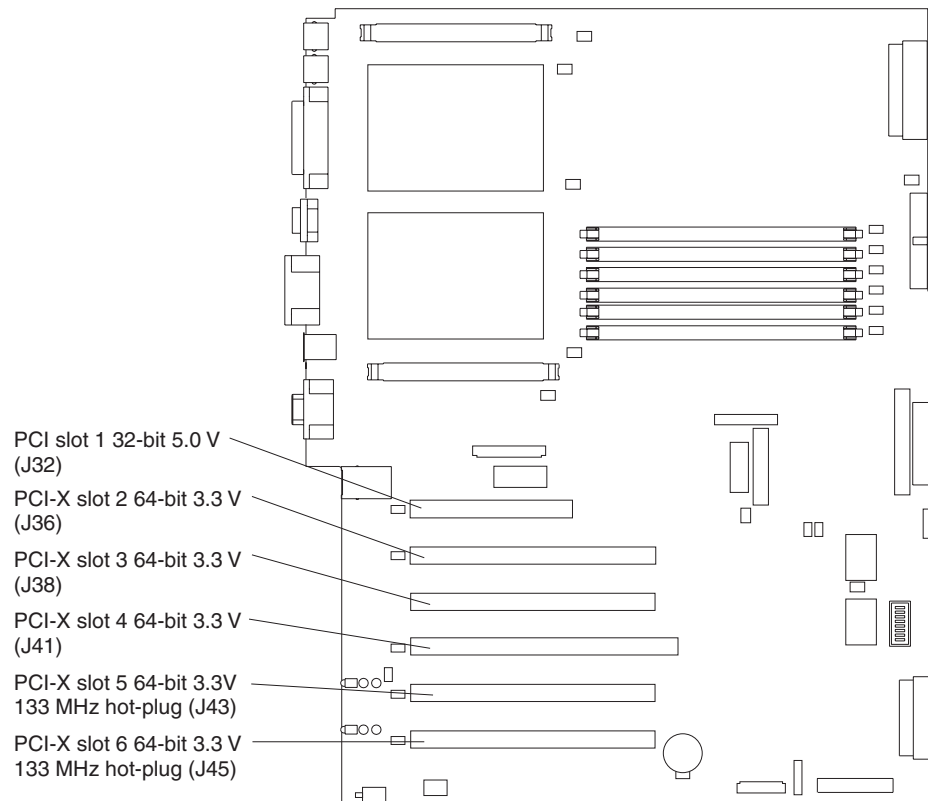
Adapter considerations

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 full-length adapters and non-hot-plug adapters in any expansion slot.
- The 32-bit PCI slot supports 5.0 V signaling PCI adapters; it does not support 3.3 V signaling adapters.
- The 64-bit PCI-X slots 2 through 6 support 3.3 V signaling PCI or PCI-X adapters; they do not support 5.0 V signaling adapters.
- The PCI bus configuration is:
  - Non-hot-plug, 32-bit PCI slot 1 is on PCI bus A, 33 MHz
  - Non-hot-plug, 64-bit PCI-X slots 2 and 3, and the integrated Ethernet controller, are on PCI bus B, 100 MHz (independent of slot 4)
  - Non-hot-plug, 64-bit PCI-X slot 4 and the integrated SCSI controller with RAID capabilities are on PCI bus B, 100 MHz (independent of slots 2 and 3)
  - Hot-plug, 64-bit PCI-X slot 5 is on PCI bus C, 133 MHz (independent of slot 6)
  - Hot-plug, 64-bit PCI-X slot 6 is on PCI bus C, 133 MHz (independent of slot 5)

  Notes:

  1. PCI bus A is often referred to as bus 0; PCI bus B is often referred to as bus 1 and bus 2; and PCI bus C is often referred to as bus 3 and bus 5. However, the bus numbers vary according to the adapters that are installed.
  2. If an optional ServeRAID-5i controller is installed, it overrides the standard functionality of the integrated SCSI controller with RAID capabilities and forces PCI-X slot 4 to 66 MHz. The ServeRAID-5i controller must be installed in slot 4 using the 3-U bracket that comes with the controller.
  3. The integrated SCSI controller with RAID capabilities is on PCI bus B.

- The optional IBM Remote Supervisor Adapter must be installed in PCI slot 1 only. Use the ribbon cable that comes with the adapter to connect the adapter to the Remote Supervisor Adapter connector (J27) on the system board.
- The system scans PCI and PCI-X slots 1 through 6 to assign system resources. The system then starts (boots) the system devices in the following order, if you have not changed the default boot precedence: integrated SCSI controller with RAID capabilities (or optional ServeRAID-5i controller), integrated Ethernet controller, and then PCI and PCI-X slots 1 through 6.

  Note: 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.

- The Active PCI-X slots contain:
  - Power-on LEDs
  - Internal attention LEDs
 - External attention LEDs

Installing a hot-plug adapter (slots 5 and 6)

This section contains the procedure for installing a hot-plug PCI or PCI-X adapter. If your operating system supports hot-plug PCI or PCI-X adapters, you can replace a failing hot-plug PCI or PCI-X adapter with a new adapter of the same type without turning off power to the server. If your operating system and adapter also support the hot-add feature, you can install a new adapter without turning off the power to the server.

Notes:

1. Although an optional Integrated xSeries Adapter (IXA) can be installed only in slots 5 and 6, it is not a hot-plug adapter. See "Installing a non-hot-plug adapter (any slot)" on page 26 for instructions for installing an IXA adapter.

2. Do not remove a hot-plug adapter before performing the operating-system-defined procedure for disabling the Active PCI-X (hot-plug) slot that contains the adapter. Failure to do so might cause your system to lock up. See your operating-system documentation for additional information.

3. You do not have to turn off the server to install hot-plug adapters in the hot-plug slots. However, you must turn off the server when performing any steps that involve installing or removing cables.

The following illustration shows how to install a PCI or PCI-X hot-plug adapter.
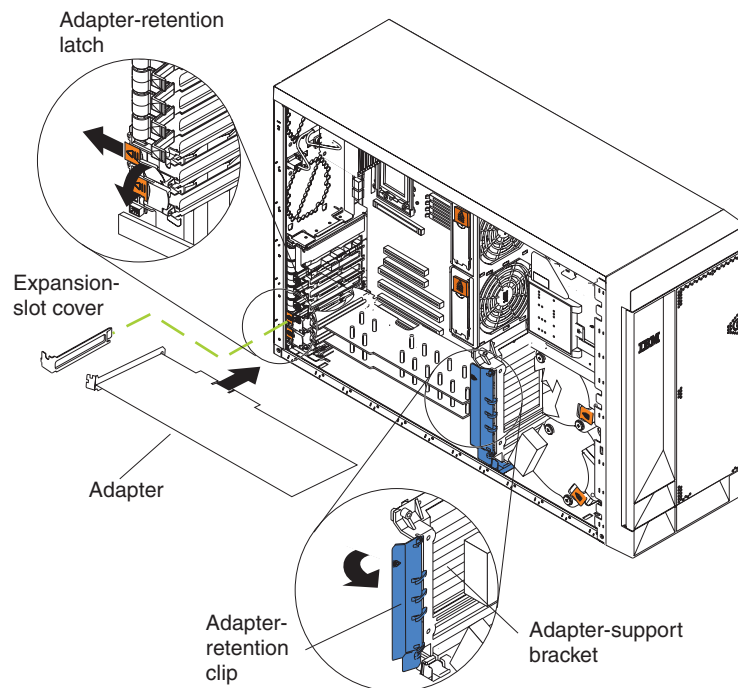
Complete the following steps to install a hot-plug PCI or PCI-X adapter:

1. Review the information in "Safety" on page v, "Installation Guidelines" on page 9, and "Handling static-sensitive devices" on page 10.

2. If you are installing an adapter that requires you to install or remove any cables, turn off the server and disconnect all power cords and external cables ("Turning off the server" on page 12).

3. Remove the server cover (see "Removing the server left-side cover and bezel (tower model)" on page 15 or "Removing the server top cover and bezel (rack configuration)" on page 17).

4. Determine which expansion slot you will use for the adapter.

   Note: Only PCI-X slots 5 and 6 support hot-plug adapters.

   Attention: Disabling a PCI-X slot turns off the power LED for that PCI-X slot. Make sure that the power LED for the hot-plug PCI-X slot is off before you continue with the next step. See "System-board LED locations" on page 7 for the location of the power LED.

5. Disable the selected PCI-X slot from your operating system. (See the documentation that comes with your operating system for information about disabling a hot-plug PCI-X slot.)

6. Slide the orange adapter-retention-latch release toward the rear of the server and hold it there while you lift the black adapter-retention latch to the unlocked (open) position as indicated by the arrow.

   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.

7. Remove the expansion-slot cover from the server. Store it in a safe place for future use.

8. If you are installing a full-length adapter, lift the adapter-retention clip on the adapter-support bracket. Otherwise, continue with the next step.

9. 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.

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

10. Remove the adapter from the static-protective package.

11. 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.

Adapter guide
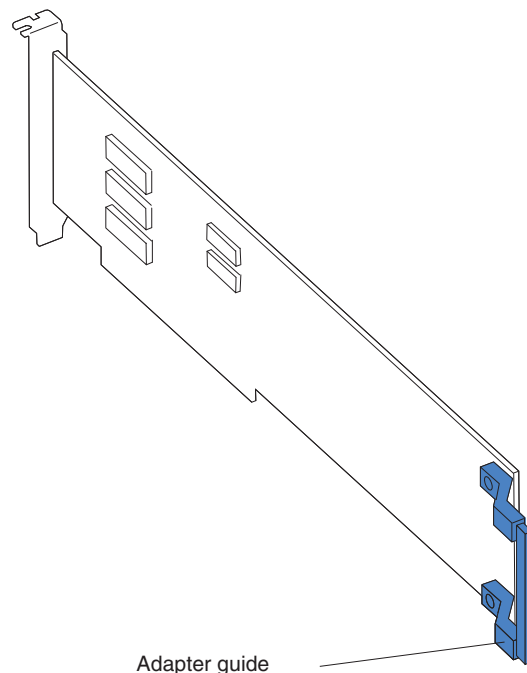
b. Carefully grasp the adapter by its top edge or upper corners, and align it with the expansion slot on the system board.

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

c. Press the adapter *firmly* into the expansion slot.

d. Lower the adapter-retention latch over the top corner of the adapter. The adapter-retention latch automatically locks into place.

   Important: Power cannot be restored to the adapter slot if the latch is not lowered into place.

12. If you installed a full-length adapter, close the adapter-retention clip on the adapter-support bracket. Otherwise, continue with the next step.

    Attention: When you route the cables, do not block the ventilated space around any of the fans.

13. Connect any needed cables to the adapter.

14. Enable the hot-plug PCI-X slot from your operating system. When the hot-plug PCI-X slot is enabled, the power LED for that hot-plug PCI-X slot comes on. See the documentation that comes with your operating system for information about enabling a hot-plug PCI-X slot.

15. If you have other options to install or remove, do so now; otherwise, go to "Installing the server bezel and left-side cover (tower model)" on page 62 or "Installing the server bezel and top cover (rack configuration)" on page 65.

Installing a non-hot-plug adapter (any slot)

The following illustration shows how to install a non-hot-plug PCI or PCI-X adapter.
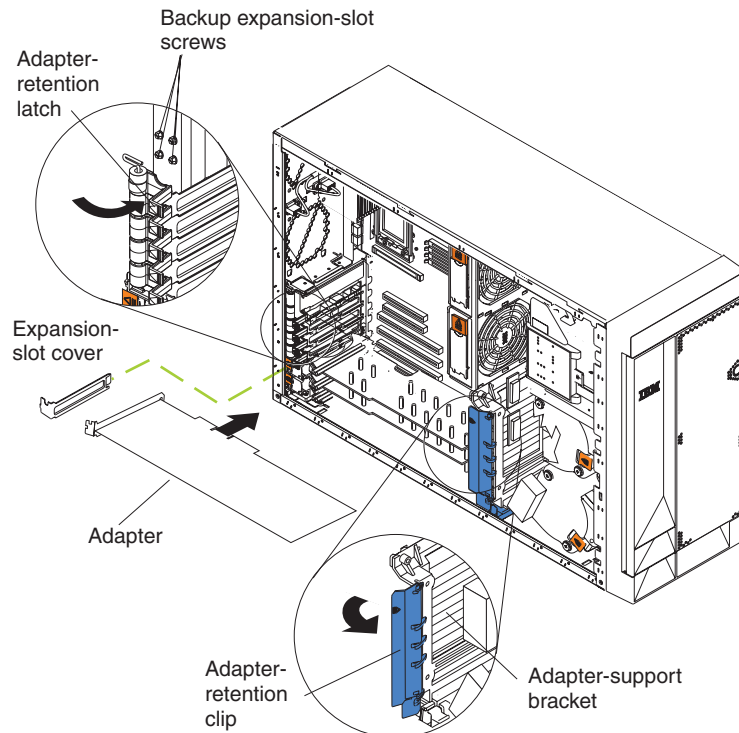
Attention: You must install the IXA adapter jumper (J42) between pins 2 and 3 when using an Integrated xSeries Adapter (IXA) in slots 5 and 6. See "System-board switches and jumpers" on page 6 for the location of the IXA adapter jumper.

Notes:

1. Although an optional IXA adapter is not a hot-plug adapter, it can be installed only in slots 5 and 6. It is a double width adapter that installs in slot 5 and spans slots 5 and 6.

2. You can install an optional ServeRAID™-5i controller only in PCI-X slot 4. Slot 4 is the only PCI-X slot that supports the ServeRAID-5i controller requirements. Install the ServeRAID-5i controller using the 3-U bracket that comes with the controller.

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

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 disconnect all power cords and external cables ("Turning off the server" on page 12); then, remove the server cover (see "Removing the server left-side cover and bezel (tower model)" on page 15 or "Removing the server top cover and bezel (rack configuration)" on page 17).

3. Determine which expansion slot you will use for the adapter.

4. If you are installing an adapter in PCI slot 1 or PCI-X slots 2 through 4, lift the tab on the expansion-slot cover. Continue with the next step.

   If you are installing an adapter in PCI-X slot 5 or 6, slide the orange adapter-retention-latch release toward the rear of the server and hold it there while you lift the black adapter-retention latch to the unlocked (open) position, as shown in the illustration on page 23.

   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.

5. Remove the expansion-slot cover from the server. Store it in a safe place for future use.

6. If you are installing an IXA adapter in slot 5 and 6, make sure that the IXA adapter jumper (J42) is installed between pins 2 and 3; otherwise, make sure it is installed between pins 1 and 2. (See "System-board switches and jumpers" on page 6 for the location of J42.)

7. If you are installing a full-length adapter, lift the adapter-retention clip on the adapter-support bracket. Otherwise, continue with the next step.

8. 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.

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

9. Remove the adapter from the static-protective package.

10. 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.

    Adapter guide
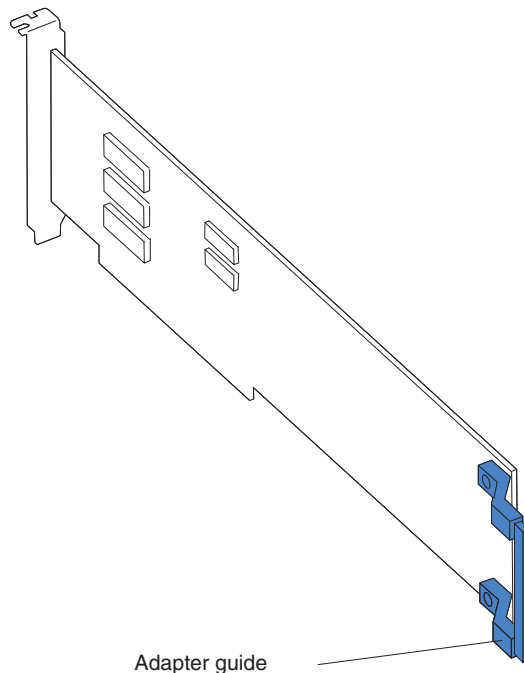
    b. Carefully grasp the adapter by its top edge or upper corners, and align it with the expansion slot on the system board.

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

c. Press the adapter *firmly* into the expansion slot.

> **Note:** If the server is subject to excessive movement or vibration, you can secure the adapter with a screw: insert one of the backup expansion-slot screws (stored next to slot 1) through the top of the adapter bracket into the screw hole to secure the adapter before proceeding to the next step.

d. Lower the adapter-retention latch over the top corner of the adapter. In slot 5 or 6, make sure the latch is in the locked (closed) position.

11. If you installed a full-length adapter, close the adapter-retention clip on the adapter-support bracket. Otherwise, continue with the next step.

12. Connect any needed cables to the adapter.

    Attention: When you route the cables, do not block the ventilated space around any of the fans.

13. If you have other options to install or remove, do so now; otherwise, go to "Installing the server bezel and left-side cover (tower model)" on page 62 or "Installing the server bezel and top cover (rack configuration)" on page 65.

Cabling example for a ServeRAID controller

You can install an optional IBM ServeRAID controller in your server to control the internal hot-swap hard disk drives. A ServeRAID controller can, for example, enable you to configure the internal hot-swap hard disk drives into disk arrays. The illustrations in this section show the cabling for internal hot-swap hard disk drives. You can also cable a ServeRAID adapter to external hard disk drives. See your ServeRAID controller option documentation for complete instructions for installing a ServeRAID controller in your server and for additional information about ServeRAID controllers.

Notes:

1. This cabling example does not apply to the ServeRAID-5i controller, which uses the integrated SCSI controller with RAID capabilities on the system board.

2. An optional ServeRAID-5i controller can be installed only in PCI-X slot 4. Slot 4 is the only PCI-X slot that supports the ServeRAID-5i controller requirements.

3. Connections made to external SCSI devices will be asynchronous.

If you are connecting the adapter to any internal SCSI backplane or device, you will need to purchase additional SCSI cables. Contact your IBM marketing representative or authorized reseller for additional information about the number and types of cables that your server configuration requires.

Your server comes with one SCSI cable that can only be used with the integrated SCSI controller with RAID capabilities that is on the system board. One end of this SCSI cable is attached to the connector on the SCSI backplane, and the other end is attached to the SCSI channel A connector on the system board. The SCSI channel B connector on the system board is available for use, but the server does not come with a cable attached to it.

The following procedure describes the cable routing that is necessary when you install a ServeRAID controller other than ServeRAID-5i.

Notes:

1. See the documentation that comes with your adapter for any cabling instructions.

2. 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. For example, the hard disk drive cables are labeled "HDD option."

Complete the following steps to cable the ServeRAID controller:

1. Determine the number of SCSI channels that you want to use on the ServeRAID controller.

2. Review the information in "Safety" on page v, "Installation Guidelines" on page 9, and "Handling static-sensitive devices" on page 10.

3. Turn off the server and disconnect all power cords and external cables ("Turning off the server" on page 12); then, remove the server cover (see "Removing the server left-side cover and bezel (tower model)" on page 15 or "Removing the server top cover and bezel (rack configuration)" on page 17).

4. Lift the adapter-retention clip on top of the adapter-support bracket; then, remove the full-length adapters.

5. Lift and remove the plastic dividers from PCI-X slots 5 and 6 by lifting the ends of the dividers out of the adapter support bracket and tilting the dividers up out of the server.

6. Disconnect internal cables as necessary, remove the air-baffle assembly, and remove the adapter-support bracket from the server. For complete details, see "Removing and installing the adapter-support bracket" on page 19.

   Note: You must remove the air-baffle assembly whenever you remove the adapter-support bracket.

7. Disconnect the internal SCSI cable from SCSI connector A (J44) or B (J51) on the system board. See "System-board internal cable connectors" on page 4 for the location of the SCSI connectors.

   Note: The SCSI cables that come with your server can only be used with the integrated SCSI controller with RAID capabilities. If a RAID controller other than the ServeRAID-5i is installed, you must use SCSI cables that are compatible with that controller. To select and order the correct cables for use with your RAID controller, contact your IBM marketing representative or authorized reseller.

8. Reinstall the adapter-support bracket in the server (see "Removing and installing the adapter-support bracket" on page 19).

   Important: To ensure proper cooling and server operation, you must keep the air-baffle cover closed.

   Note: You must reinstall the air-baffle assembly when you reinstall the adapter-support bracket. Make sure that no cable is under the adapter-support bracket or interferes with the center fans.

9. Reinstall the plastic dividers between the Active PCI-X adapter slots.

10. Reinstall the adapters that you removed. If you have not yet installed the ServeRAID controller, install it now.

    See "Installing a hot-plug adapter (slots 5 and 6)" on page 23 or "Installing a non-hot-plug adapter (any slot)" on page 26 for instructions for installing a hot-plug or non-hot-plug adapter; then, return to this step.

11. Replace the SCSI cable on the SCSI backplane with the SCSI cable for your new ServeRAID controller. The SCSI cable being replaced was one of the cables that was disconnected from the system board in step 7

12. Route the free end of the SCSI cable from the SCSI backplane through the adapter-support bracket opening and toward the ServeRAID controller (see the illustration in step 13).

13. Attach the free end of the SCSI cable to the selected internal SCSI channel connector on the ServeRAID controller. Make sure that the other end of the SCSI cable is attached to the connector on the SCSI backplane.

    Attention: When you route the SCSI cable, do not block the ventilated space around any of the fans.

    The following illustration shows how to route one SCSI cable to the ServeRAID controller.

ServeRAID adapter

SCSI connector A

SCSI cable
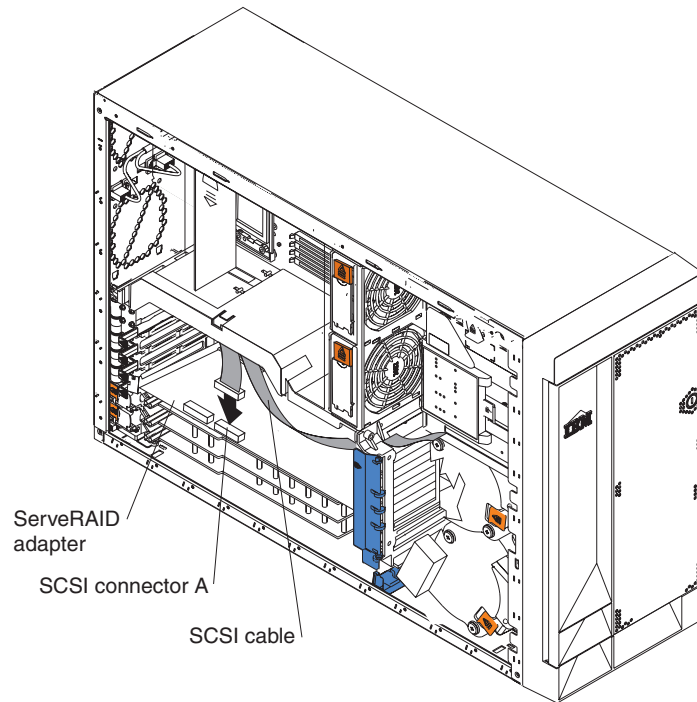
14. If you are connecting the adapter to a second SCSI backplane on the server, repeat steps 11 through 13 for the second backplane, and then continue with step 15. Otherwise, continue with step 15.

    The following illustration shows how to route two SCSI cables from backplanes to the ServeRAID controller (in PCI slot 3 in this illustration).

ServeRAID
adapter

SCSI connector B
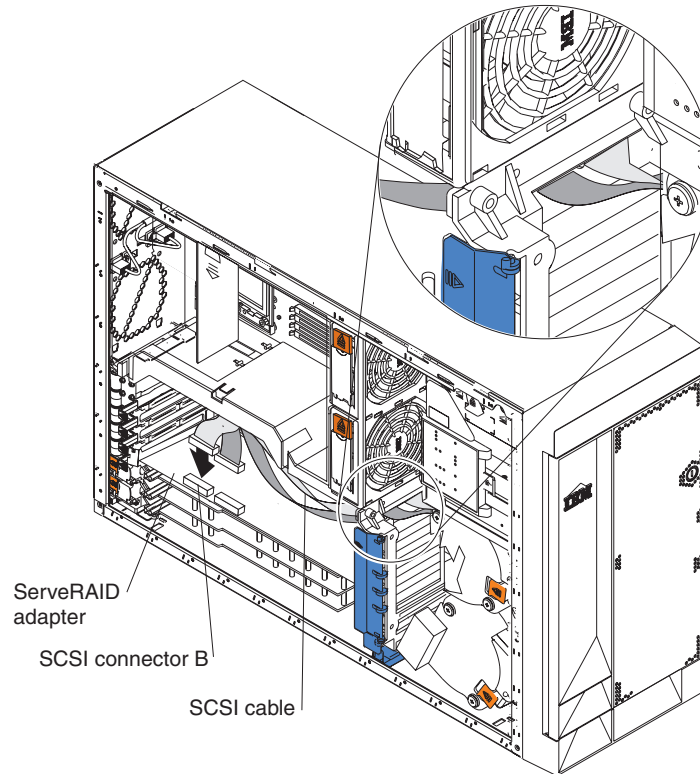
SCSI cable

Note: If you plan to attach external SCSI devices, you must order additional SCSI cables. To select and order the correct cables for use with external devices, contact your IBM marketing representative or authorized reseller.

15. If you have other options to install or remove, do so now; otherwise, go to "Installing the server bezel and left-side cover (tower model)" on page 62 or "Installing the server bezel and top cover (rack configuration)" on page 65.

Working with the 3-Pack Ultra320 Hot-Swap Expansion option

Your server contains hardware that enables you to replace a failed hard disk drive without turning off the server. Therefore, you have the advantage of continuing to operate your system while a hard disk drive is removed or installed. These drives are known as *hot-swap* drives. The hot-swap drives are attached to a hot-swap hard disk drive *backplane*. The backplane is a printed circuit board behind the drive bays. For more information about drive bays and drive installation, see "Installing internal drives" on page 36. The low voltage differential (LVD) SCSI hot-swap hard disk drive backplane supports a maximum of six slim-high, hot-swap hard disk drives.

If you install the 3-Pack Ultra320 Hot-Swap Expansion option, you can attach up to three additional drives. All of these drives must be LVD hard disk drives that operate at 320 MB per second or lower. The optional 3-Pack Ultra320 Hot-Swap Expansion Kit contains a hot-swap hard disk drive backplane that you install adjacent to the standard hot-swap hard disk drive backplane. It also includes the SCSI cable you need to install the option. Your server supports a maximum of two hot-swap drive backplanes.

Note: All drives being used in the server should have the same throughput speed rating: mixing speed ratings might cause all drives to operate at the lower throughput speed.

You can configure each SCSI channel (bus) independently. This is the typical backplane configuration. In this configuration:

- The hard disk drives that are connected to the standard backplane are attached to channel A.
- The hard disk drives that are connected to the 3-Pack Ultra320 Hot-Swap Expansion option backplane are attached to channel B.

Notes:

1. The standard LVD SCSI backplane is also known as the SCSI backplane or the hot-swap hard disk drive backplane.
2. The SCSI backplane that comes with the 3-Pack Ultra320 Hot-Swap Expansion Kit is also known as the 3-Pack backplane.
3. Table 3 on page 74 lists the SCSI identifiers (IDs) for the standard LVD SCSI backplane and hard disk drives. Table 4 on page 74 lists the SCSI IDs for the 3-Pack backplane and hard disk drives.
4. 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. For example, the hard disk drive cables are labeled "HDD option."
5. For information about other options and using the 3-Pack Ultra320 Hot-Swap Expansion option, see the documentation that comes with the option kit.
6. For additional information about cabling, see "Cabling example for a ServeRAID controller" on page 28 and "Cabling the server" on page 68.
7. The SCSI cables that come with your server can only be used with the integrated SCSI controller with RAID capabilities. If a RAID controller other than the ServeRAID-5i is installed, you must use SCSI cables that are compatible with that controller. To select and order the correct cables for use with your RAID controller, contact your IBM marketing representative or authorized reseller.

# Installing the 3-Pack Ultra320 Hot-Swap Expansion option

Notes:

1. The 3-Pack Ultra320 Hot-Swap Expansion Kit might contain some components that you will not need for this procedure. For information about the contents of this option kit, see the documentation that comes with the option kit.

2. The 3-Pack Ultra320 Hot-Swap Expansion option does not support use of a SCSI repeater card.

Complete the following steps to install the 3-Pack Ultra320 Hot-Swap Expansion option:

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 disconnect all power cords and external cables ("Turning off the server" on page 12); then, remove the server cover (see "Removing the server left-side cover and bezel (tower model)" on page 15 or "Removing the server top cover and bezel (rack configuration)" on page 17).

3. If necessary, remove the air-baffle assembly, adapter-support bracket, adapters, and plastic dividers. See "Removing and installing the adapter-support bracket" on page 19 and "Working with adapters" on page 21 for additional information.

   Attention: The server electromagnetic interference (EMI) integrity and cooling are both protected by having the front bays covered or occupied. When you install the 3-Pack Ultra320 Hot-Swap Expansion option, save the filler panels from the bay, in case you later remove the 3-Pack Ultra320 Hot-Swap Expansion option and do not replace it with another device.

4. Remove the two filler panels from the removable-media bay opening. Store the filler panels for future use.

5. Remove the custom metal slide rails and screws that are inside the 5.25-inch removable-media drive bays. Store the slide rails and screws for future use.

6. Complete the following steps to attach the SCSI backplane to the drive cage.

Drive cage

SCSI backplane

Screws M3 x 5 (4)
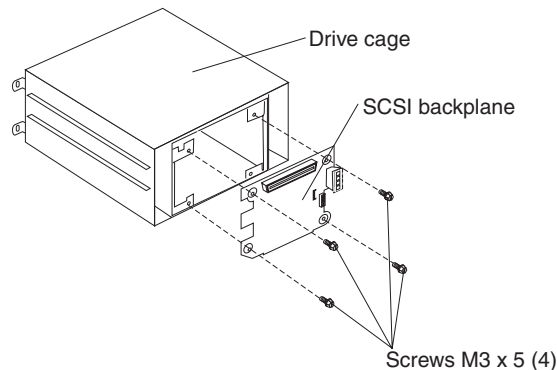
   a. Place the SCSI backplane on the rear of the cage with the hole and slot in the SCSI backplane aligned with the pins on the drive cage, making sure that the SCSI connector is at the top.

   b. Attach the SCSI backplane to the drive cage using four short M3 x 5 screws.

Note: The 3-Pack Hot-swap Hard Disk Drive Expansion Kit comes with four long M3.5 x 7 screws and four short M3 x 5 screws. Make sure you secure the SCSI backplane to the drive cage with the short screws.

7. Align the 3-Pack Ultra320 Hot-Swap Expansion option with the empty removable-media bay opening, adjacent to the standard hot-swap hard disk drive backplane.

8. Partially slide the 3-Pack Ultra320 Hot-Swap Expansion option into the guides through the front of the removable-media bay opening, as shown in the following illustration. Leave adequate room at the rear of the 3-Pack Ultra320 Hot-Swap Expansion option to connect the required cables.

Filler panel

3-Pack Ultra320 Hot-Swap Expansion option
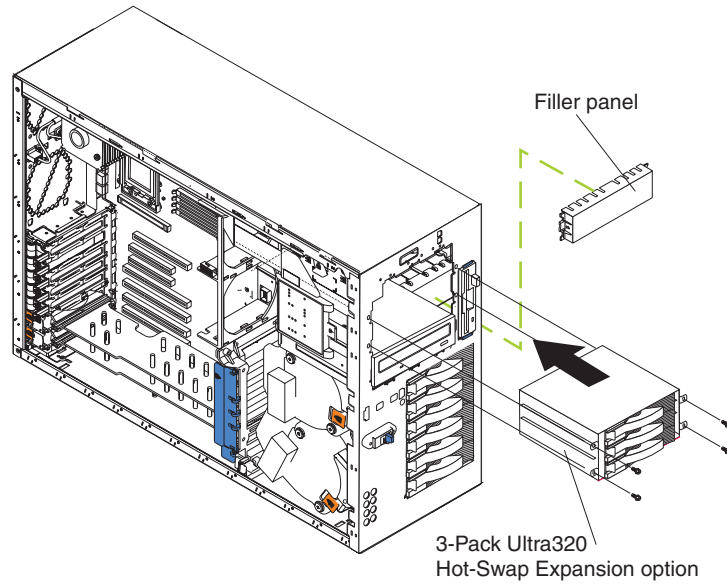
9. Locate the short SCSI cable that comes with this kit:

   Note: The SCSI cables that come with this kit can only be used with the integrated SCSI controller with RAID capabilities. If a RAID controller other than the ServeRAID-5i is installed, you must use SCSI cables that are compatible with that controller. To select and order the correct cables for use with your RAID controller, contact your IBM marketing representative or authorized reseller.

   a. Connect the end of the cable that is labeled "HDD backplane" to the new 3-Pack SCSI backplane as shown in the following illustration. (This illustration shows the rear connectors on the 3-Pack SCSI backplane, as viewed from the rear of the server.)

SCSI cable connector

SCSI power cable connector

I^{2}C cable connector

SCSI backplane
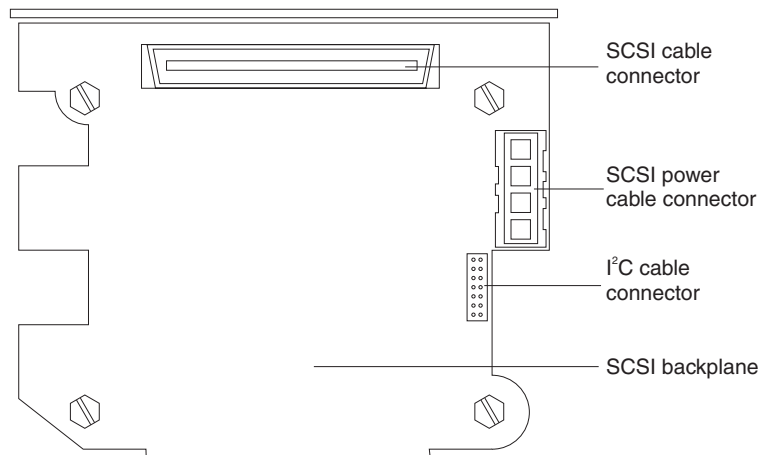
   b. Connect the other end of the cable to the SCSI connector on the system board if you are using the integrated SCSI controller with RAID capabilities. If you are using an optional RAID controller other than the ServeRAID-5i, connect the other end of the cable to the SCSI connector on this RAID controller.

   c. Secure both cable ends with the retention clips on the SCSI connectors.

10. Locate the I^{2}C cable that comes with this kit.

    Note: Both I^{2}C cable connectors are the same, enabling this cable to be connected in either direction.

    a. Connect one of the I^{2}C cable connectors to the SCSI backplane.

    b. Connect the other I^{2}C cable connector to the new 3-Pack SCSI backplane. See the illustration in step 9 for the cable connector location.

11. Connect the end of the power-supply power cable that is labeled "HDD2" to the new 3-Pack SCSI backplane. See the illustration in step 9 for the cable connector location.

12. Slide the 3-Pack Ultra320 Hot-Swap Expansion option into the server until it stops. Secure the 3-Pack Ultra320 Hot-Swap Expansion option to the server with the four screws that come with it.

13. If you removed the air-baffle assembly, adapters, plastic dividers, and adapter-support bracket in step 3 on page 33, reinstall them (see "Removing and installing the adapter-support bracket" on page 19).

    Note: Make sure that no cable is under the adapter-support bracket or interferes with the center fans.

14. Install additional internal hot-swap hard disk drives in the 3-Pack Ultra320 Hot-Swap Expansion option (see "Installing a hot-swap hard disk drive" on page 39).

   Note: The 3-Pack SCSI backplane sets the SCSI IDs for these hot-swap hard disk drives. See "SCSI IDs" on page 74 for additional information.

15. If you have other options to install or remove, do so now; otherwise, go to "Installing the server bezel and left-side cover (tower model)" on page 62 or "Installing the server bezel and top cover (rack configuration)" on page 65.

Installing internal drives

If you add different types of drives, your system can read multiple types of media and store more data. Several types of drives are available, such as:
- Diskette
- Hard disk
- CD-ROM
- DVD-ROM
- Tape, including digital linear tape (DLT), super digital linear tape (SDLT), and linear tape-open (LTO)

Note: The server supports both internal and external tape drives.

Your server contains hardware that enables you to replace a failed hard disk drive without turning off the server. Therefore, you have the advantage of continuing to operate your system while a hard disk drive is removed or installed. These drives are known as *hot-swap* drives.
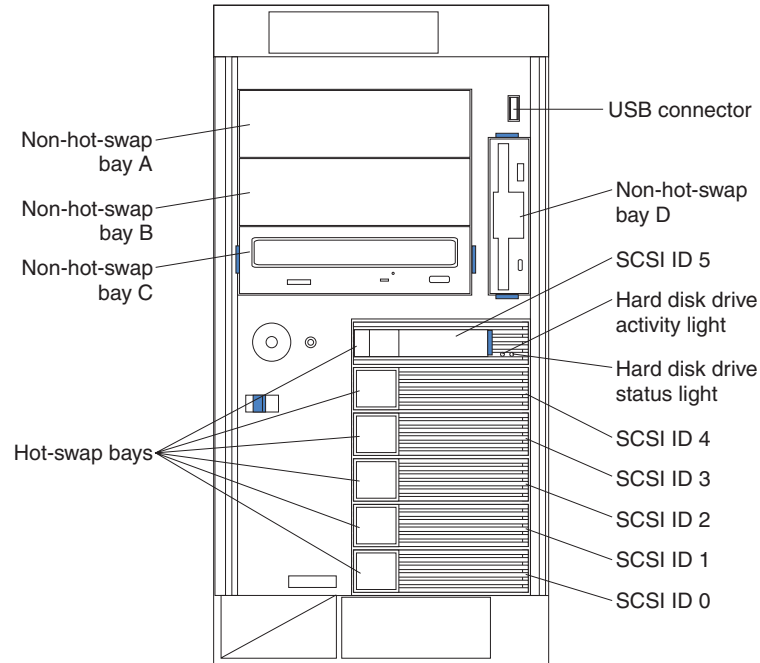
Each hot-swap drive has two indicator LEDs (see the *User's Guide* on the IBM *xSeries Documentation* CD). If the amber hard disk status LED for a drive is lit continuously, that individual drive is faulty and requires replacement. When the hard disk drive status LED indicates a drive fault, you can replace a hot-swap drive without turning off the server.

Each hot-swap drive that you plan to install must be mounted in a hot-swap-drive tray. The drive must have a Single Connector Attachment (SCA) connector. Hot-swap-drive trays come with hot-swap drives.
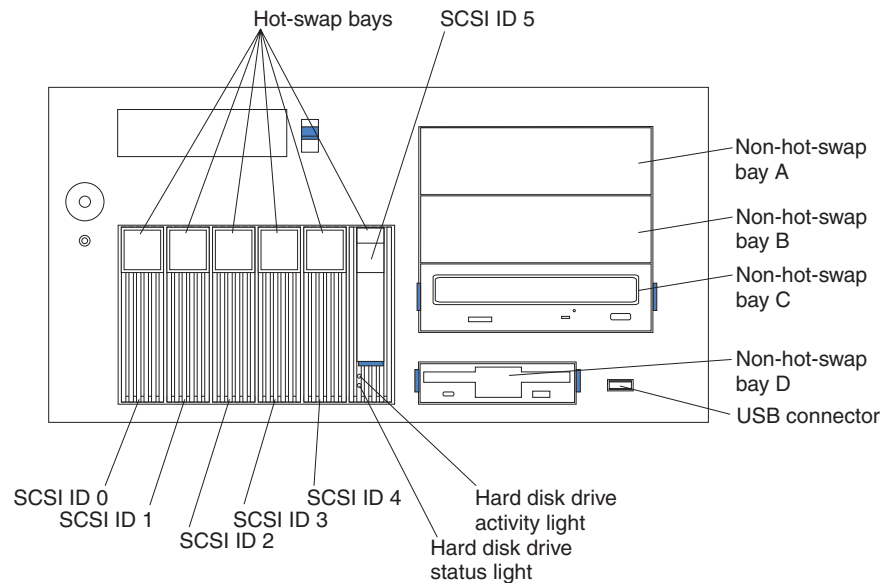
Internal drive bays

Internal drives are installed in *bays*.

Tower model

Non-hot-swap bay A

Non-hot-swap bay B

Non-hot-swap bay C

Hot-swap bays

USB connector

Non-hot-swap bay D

SCSI ID 5

Hard disk drive activity light

Hard disk drive status light

SCSI ID 4

SCSI ID 3

SCSI ID 2

SCSI ID 1

SCSI ID 0

Rack configuration

Hot-swap bays   SCSI ID 5

Non-hot-swap bay A

Non-hot-swap bay B

Non-hot-swap bay C

Non-hot-swap bay D

USB connector

SCSI ID 0

SCSI ID 1

SCSI ID 2

SCSI ID 3

SCSI ID 4

Hard disk drive activity light

Hard disk drive status light

Note: The SCSI IDs for the hot-swap drives are printed on the bezel, immediately adjacent to the hot-swap drive bays (see Table 3 on page 74).

- Your server comes with one 3.5-inch, 1.44 MB diskette drive.
- Your server also comes with one integrated drive electronics (IDE) CD-ROM drive. The CD-ROM drive bay supports a 5.25-inch, half-high, removable-media drive.

- You can install two additional 5.25-inch, half-high, removable-media drives or one additional 5.25-inch, full-high, removable-media drive in the removable-media drive bays (A and B). The server supports full-high and half-high DLT, SDLT, and LTO drives. For a list of supported options for your server, go to http://www.ibm.com/pc/us/compat/ on the World Wide Web.

  A three-drop power signal cable and a one-drop IDE cable come attached to the CD-ROM drive. Use this power signal cable to connect the removable-media drives. The one-drop SCSI signal cable that comes with your server will need to be replaced with a two-drop SCSI signal cable to provide a signal connection to the removable-media drives.

- You cannot install hot-swap drives in the removable-media or non-hot-swap drive bays on the front side of the server, unless you install the 3-Pack Ultra320 Hot-Swap Expansion option.

- Your server supports a maximum of six 1-inch (26 mm) slim-high, 3.5-inch, hot-swap hard disk drives in the standard hot-swap bays. In the tower model, the hot-swap bays are arranged vertically in the standard hard disk drive cage; the bay numbers are 0 through 5 (from bottom to top). In the rack configuration, the hot-swap bays are arranged horizontally in the standard hard disk drive cage; the bay numbers are 0 through 5 (from left to right). In the tower model, bays 0 through 5 are below the removable-media drive bays. In the rack configuration, bays 0 through 5 are to the left of the removable-media drive bays.

Notes:

1. To minimize the possibility of damage to the hard disk drives when you are installing them in a rack configuration, install the server in the rack before installing the hard disk drives.

2. You do not have to turn off the server to install hot-swap drives in the hot-swap drive bays. However, you must turn off the server when performing any steps that involve installing or removing cables.

3. You can install three additional hot-swap hard disk drives in the server after you install the 3-Pack Ultra320 Hot-Swap Expansion option (see "Working with the 3-Pack Ultra320 Hot-Swap Expansion option" on page 32). These drives are in the optional hard disk drive cage. The SCSI IDs are listed in Table 3 on page 74.

4. Some filler panels might come with a slim filler.

Installing a hot-swap hard disk drive

The following illustration shows how to install a hot-swap hard disk drive.
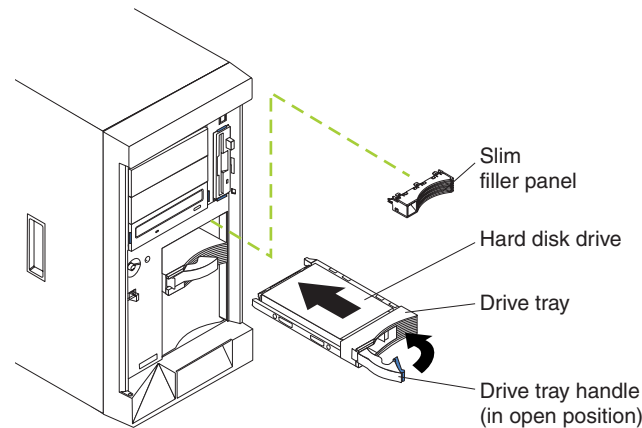
Complete the following steps to install a drive in a hot-swap bay.

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 for each bay.

Note: All hot-swap drives being used in the server should have the same throughput speed rating; mixing speed ratings might cause all drives to operate at the lower throughput speed.

1. Review the information in "Safety" on page v, "Installation Guidelines" on page 9, and "Handling static-sensitive devices" on page 10.
2. Remove the filler panel from one of the empty hot-swap bays.
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 indicator 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 needs to be replaced. If the green hard disk drive activity LED is flashing, the drive is being accessed.

Note: If your server is configured for RAID operation using the integrated SCSI controller with RAID capabilities or an optional ServeRAID controller, you might need to reconfigure your disk arrays after installing hard disk drives. See the ServeRAID documentation on the *IBM ServeRAID Support* CD for additional information about RAID operation and complete instructions for using ServeRAID Manager.

Installing a 5.25-inch removable-media drive

Your server also comes with one integrated drive electronics (IDE) CD-ROM drive. The CD-ROM drive bay supports a 5.25-inch, half-high, removable-media drive.

You can install two additional 5.25-inch, half-high, removable-media drives or one additional 5.25-inch, full-high, removable-media drive in the removable-media drive bays (A and B).

A three-drop power cable comes with your server. Use this cable to connect power to the removable-media drives. The one-drop SCSI signal cable that comes with your server will need to be replaced with a two-drop SCSI signal cable to provide a signal connection to the removable-media drives.

Note: The SCSI cables that come with your server can only be used with the integrated SCSI controller with RAID capabilities. If a RAID controller other than the ServeRAID-5i is installed, you must use SCSI cables that are compatible with that controller. To select and order the correct cables for use with your RAID controller, contact your IBM marketing representative or authorized reseller.

Check the instructions that come with the drive to see if you need to set any switches or jumpers on the drive.

Complete the following steps to install a removable-media drive in bay A or B (see "Internal drive bays" on page 37):

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 disconnect all power cords and external cables ("Turning off the server" on page 12); then, remove the server cover (see "Removing the server left-side cover and bezel (tower model)" on page 15 or "Removing the server top cover and bezel (rack configuration)" on page 17).
3. Choose the bay in which you want to install the drive.
4. Remove the filler panel from the removable-media bay opening. Store the filler panel for future use.

   Note: The server electromagnetic interference (EMI) integrity and cooling are both protected by having the front bays covered or occupied. When you install a drive, save the filler panel from the bay, in case you later remove the drive and do not replace it with another.

5. Touch the static-protective package that contains the drive to any unpainted metal surface on the server; then, remove the drive from the package and place it on a static-protective surface.
6. Set any jumpers or switches on the drive according to the documentation that comes with the drive.
7. Install the drive:

   See the following illustration when installing a 5.25-inch removable-media drive.

   Note: Use the blue plastic slide rails that come with the server as described in this step, unless the drive comes with custom metal slide rails.

If you are installing an SDLT drive, use the custom metal slide rails and screws that come with the option package. Follow the installation instructions that come with the option package; then, continue with step 7c.

If you are installing a full-high DLT drive, use the custom metal slide rails and screws that are inside the 5.25-inch removable-media drive bays. Follow the installation instructions that come with the option package; then, continue with step 7d.
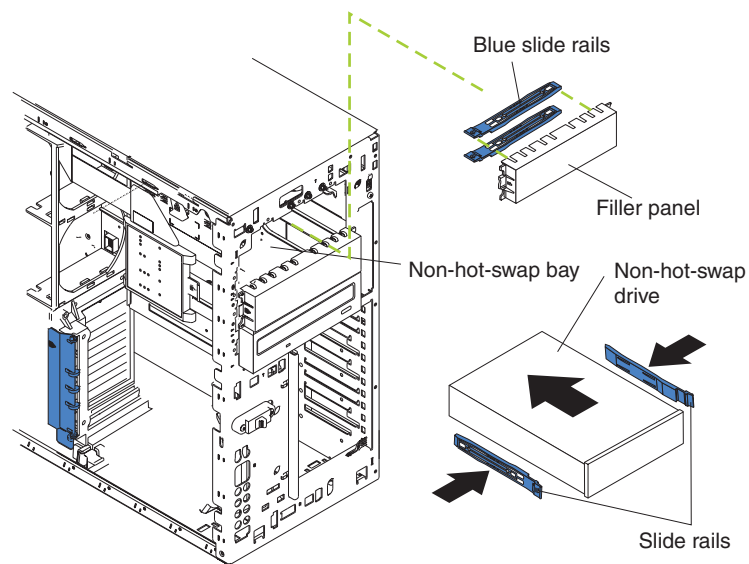
a. Remove the blue snap-on slide rails from inside the filler panel.

b. Clip the slide rails onto the sides of the drive.

c. Store the filler panel for later use.

d. Align the slide rails on the drive with the guide rails in the bay; then, slide the drive into the bay until it snaps into place.

8. Replace the one-drop SCSI signal cable in your server with a two-drop SCSI signal cable, connecting the additional connector on the two-drop SCSI signal cable to the rear of the removable-media drive.

9. Connect a power cable to the back of the drive. A three-drop power cable for removable-media drives comes installed in your server. It is attached to the standard CD-ROM drive. The connectors are keyed and can be inserted only one way.

10. If you have other options to install or remove, do so now; otherwise, go to "Completing the installation" on page 61.

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 dual inline memory modules (DIMMs).

Notes:

1. The system board contains 6 DIMM connectors and supports two-way memory interleaving.

2. The DIMM options available for your server are 128 MB, 256 MB, 512 MB, and 1 GB. Your server supports a minimum of 256 MB and a maximum of 6 GB of system memory.

3. The amount of usable memory will be reduced depending on the system configuration. A certain amount of memory must be reserved for system resources. The BIOS will display the total amount of installed memory and the amount of configured memory.

4. Your server comes with two 128 MB or 256 MB DIMMs, (for a total of 256 MB or 512 MB memory) installed in the DIMM 5 and DIMM 6 memory connectors (J14 and J15, respectively). When you install additional DIMMs, be sure to install them in pairs, with the next pair in DIMM connectors 3 and 4 (J11 and J12), and the final pair in DIMM connectors 1 and 2 (J7 and J9).

5. Each DIMM in a single pair must be the same size, speed, type, and technology. You can mix compatible DIMMs from various manufacturers.

6. Each DIMM pair does not have to contain DIMMs of the same size, speed, type, and technology as the other DIMM pairs.

7. Install only 133 MHz/266 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 SDRAM Registered DIMM specification. 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™ memory if the DIMMs are all type x4 and are larger than 128 MB. Using any 128 MB DIMMs, or DIMMs that are not type x4, on your server disables Chipkill memory.

9. You do not need to save new configuration information when installing or removing DIMMs. The only exception is if you replace a faulty DIMM that was marked as **Disabled** in the **Memory Settings** menu. In this case, you need to re-enable that memory row in the Configuration/Setup Utility 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 installation sequence

Pair	DIMM connectors	Diagnostic reference
First	6 and 5 (J15, J14)	Bank 3
Second	4 and 3 (J12, J11)	Bank 2
Third	2 and 1 (J9, J7)	Bank 1

The following illustration shows the DIMM connector locations and how to install DIMMs on the system board.

DIMM 6 (J15)
DIMM 5 (J14)
DIMM 4 (J12)
DIMM 3 (J11)
DIMM 2 (J9)
DIMM 1 (J7)
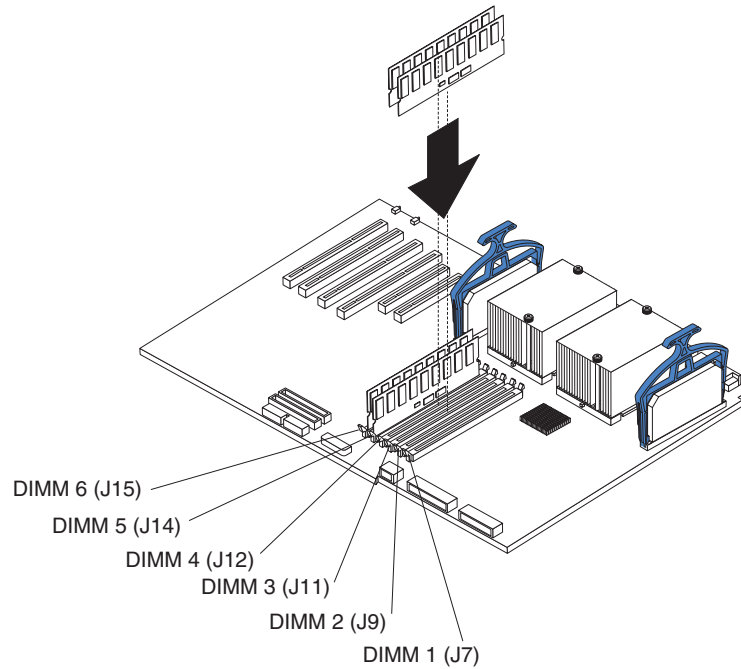
Before you begin, read the documentation that comes with your option.

Complete the following steps to install a DIMM:

1. Review the information in "Safety" on page v, "Installation Guidelines" on page 9, and "Handling static-sensitive devices" on page 10.

2. Turn off the server and disconnect all power cords and external cables ("Turning off the server" on page 12); then, remove the server cover (see "Removing the server left-side cover and bezel (tower model)" on page 15 or "Removing the server top cover and bezel (rack configuration)" on page 17).

3. Open the cover on the air-baffle assembly.

Air-baffle assembly
cover
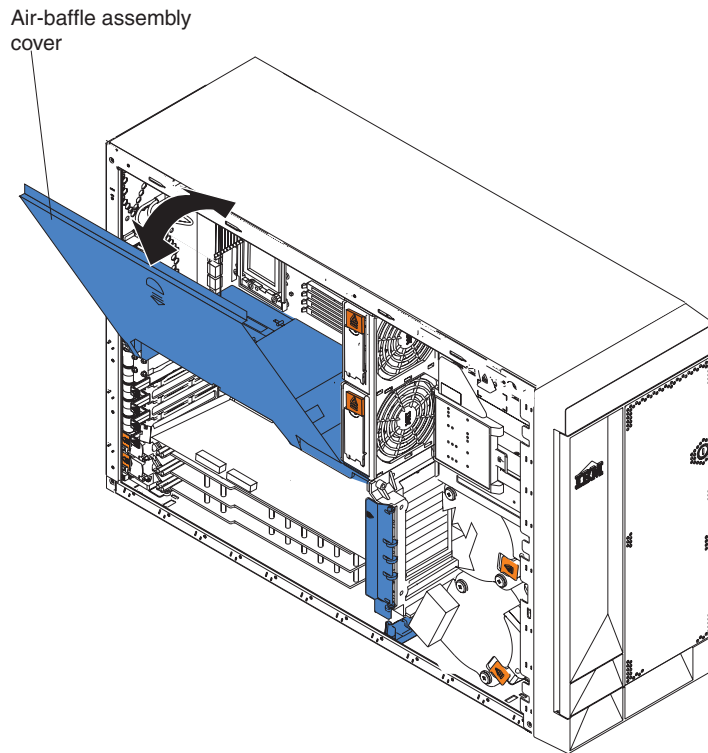
Note: It is not necessary to remove the air-baffle assembly to perform this step.

4. Locate the DIMM connectors on the system board. Determine the connectors into which you will install the DIMMs. (See Table 2 on page 42 for the correct DIMM installation sequence.)

5. 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.

6. To install the DIMMs, 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. Insert the DIMM by pressing the DIMM straight into the connector. Be sure that the retaining clips snap into the closed positions.

   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.

7. Close the cover on the air-baffle assembly.

8. If you have other options to install or remove, do so now; otherwise, go to "Installing the server bezel and left-side cover (tower model)" on page 62 or "Installing the server bezel and top cover (rack configuration)" on page 65.

Installing an additional microprocessor

Your server comes with one or two microprocessors installed on the system board. 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 among 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 to determine the required BIOS update. The latest level of BIOS code for your server is available through the World Wide Web. See the *User's Guide* on the IBM *xSeries Documentation* CD for the World Wide Web addresses.

- (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: 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. You can use the Configuration/Setup Utility program in your server to determine the specific type of microprocessor on your system board.

Important: A boot processor must always be installed in socket U13 of the system board.

Notes:

1. To order additional microprocessor options, contact your IBM marketing representative or authorized reseller. (Check the system board in your server. If your system board has a notation that you can only install a 533 MHz FSB microprocessor, then be sure that is what you order.)

2. When you install a microprocessor in socket U9, you must also install the voltage regulator module (VRM) that comes with the microprocessor, in VRM connector J1.

3. The microprocessor sockets in this server contain built-in termination for the microprocessor bus; therefore, terminator cards are not required for empty microprocessor sockets. However, for airflow, an empty microprocessor socket must contain a microprocessor baffle.

4. The microprocessor speeds are automatically set for this server; therefore, you do not need to set any microprocessor frequency-selection jumpers or switches.

5. 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.

Attention: The speed of the microprocessor must match the speed of the system board. The 533 MHz system board is identified as shown in the following illustration; the 400 MHz system board is not marked.
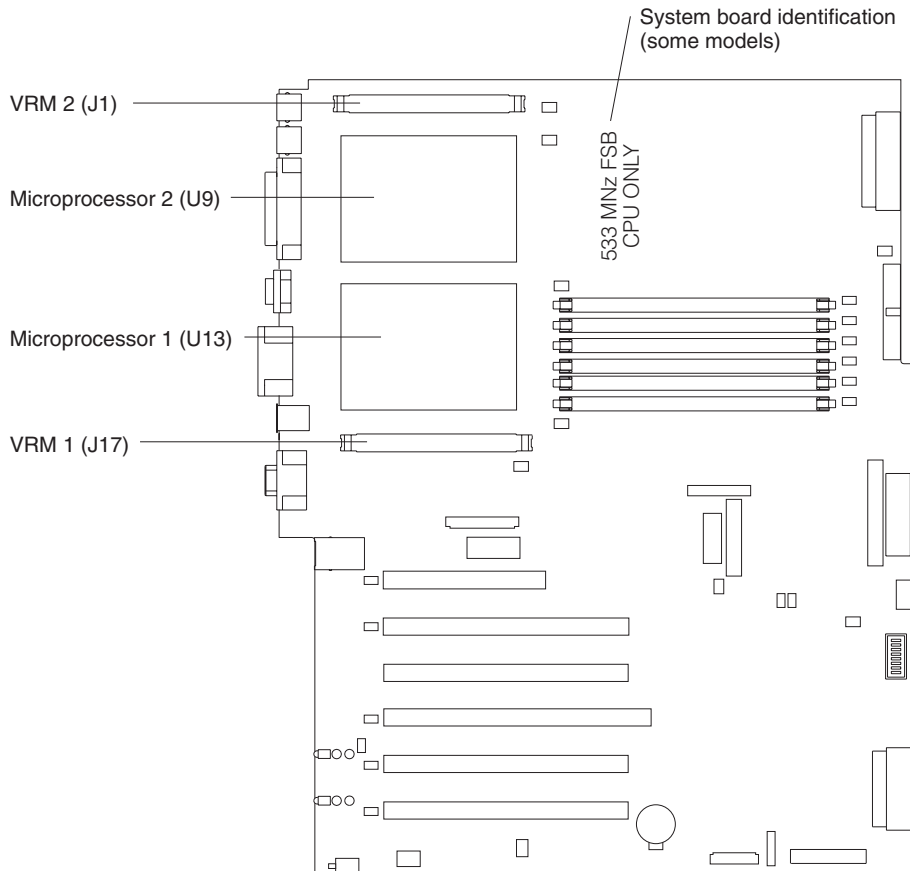
**Note:** For additional illustrations of the system-board components, see "System-board option connectors" on page 3.

Complete the following steps to install an additional microprocessor:

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 disconnect all power cords and external cables ("Turning off the server" on page 12); then, remove the server cover (see "Removing the server left-side cover and bezel (tower model)" on page 15 or "Removing the server top cover and bezel (rack configuration)" on page 17).

3. Open the cover on the air-baffle assembly. (See the illustration following step 3 on page 44, if needed.)

   Note: It is not necessary to remove the air-baffle assembly to perform this step.

4. Locate the second microprocessor socket (connector U9) on the system board.

5. Remove the microprocessor baffle from the microprocessor socket.

6. If the second microprocessor socket is covered with protective film, peel and remove the film.
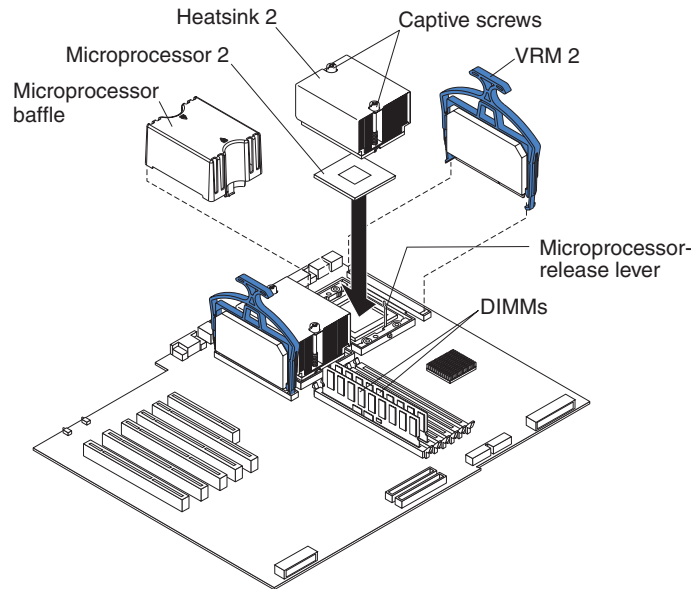
7. Install a VRM in the corresponding VRM connector (J1):

    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 clip handle to seat the VRM in the connector.

    c. Make sure that the VRM clip locks on the VRM connector at both sides.

    CAUTION:
    You must lift up the microprocessor-release lever before inserting the microprocessor into the socket. Inserting the microprocessor into the socket without lifting up the microprocessor-release lever can damage the microprocessor and system board.

8. Install the microprocessor:

    a. Touch the static-protective package containing the new microprocessor to any *unpainted* metal surface on the server; then, remove the microprocessor from the package.

    b. Pull out and lift up on the microprocessor-release lever to unlock the microprocessor socket.

    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 microprocessor-release lever. The following illustration shows the alignment marks for both microprocessors and sockets.
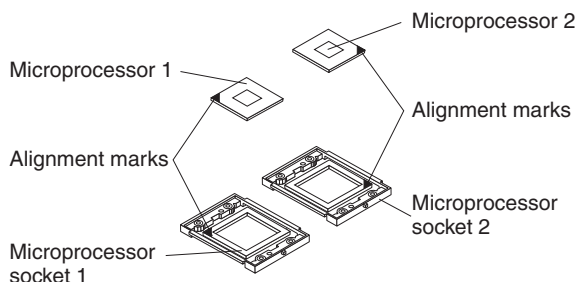
d. Carefully close the microprocessor-release lever to secure the microprocessor in the socket.

9. Install a heat sink on the microprocessor:

   a. Remove the protective film from the bottom of the heat sink.

      Notes:

      1) Do not set the heat sink down after you remove the protective film.
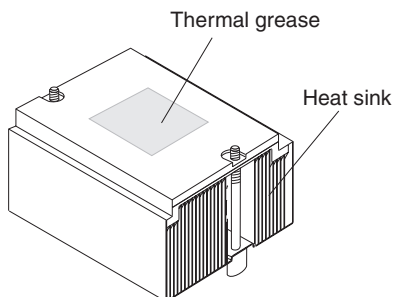
      2) Do not touch the thermal grease on the bottom of the heat sink. Touching the thermal grease will contaminate it. If the thermal grease on the microprocessor or heat sink becomes contaminated, contact your service technician.

   b. Align and place the heat sink on top of the microprocessor (grease side down) in the retention bracket. 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: Alternate the tightening of the two captive screws to prevent damage to the microprocessor. Ensure that the screws are completely tightened (until they stop); otherwise, damage to the microprocessor will occur.

10. Close the cover on the air-baffle assembly.

11. If you have other options to install or remove, do so now; otherwise, go to "Installing the server bezel and left-side cover (tower model)" on page 62 or "Installing the server bezel and top cover (rack configuration)" on page 65.

Replacing a hot-swap power supply

Some models of your server come with two hot-swap power supplies. You do not need to turn off the server to replace a hot-swap power supply, but you must replace only one power supply at a time.
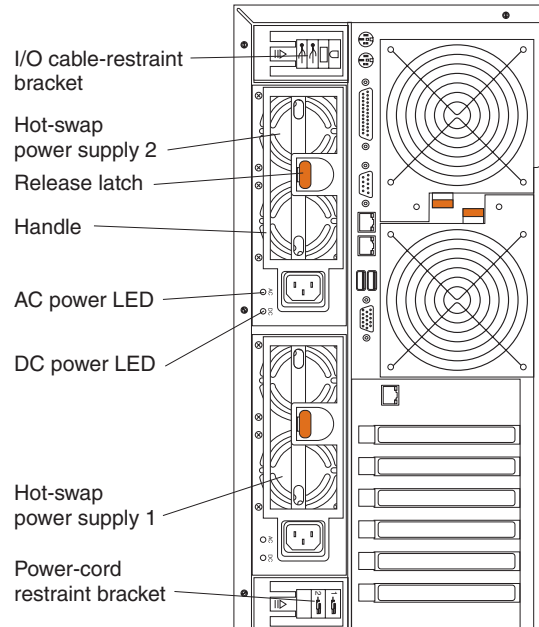
Before you continue with the power-supply replacement procedure, review the following.

Note: Two cable-restraint brackets are on the rear of the tower model servers. After you connect the cables to the selected devices, you can use these cable-restraint brackets to manage the cable routing. Route the power cords through the power-cord restraint bracket on the bottom. Route the remaining cables (for example, the cables that are connected to the I/O ports) through the I/O cable-restraint bracket on the top.

If you install or remove a power supply, observe the following precautions.

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 replace a hot-swap power supply:

1. Review the information in "Safety" on page v, "Installation Guidelines" on page 9, and "Handling static-sensitive devices" on page 10.
2. Unplug the power cord from the selected power supply.
3. Remove the old power supply.

I/O cable-restraint bracket

Power supply

Power-supply handle (in open position)

Power-cord restraint bracket
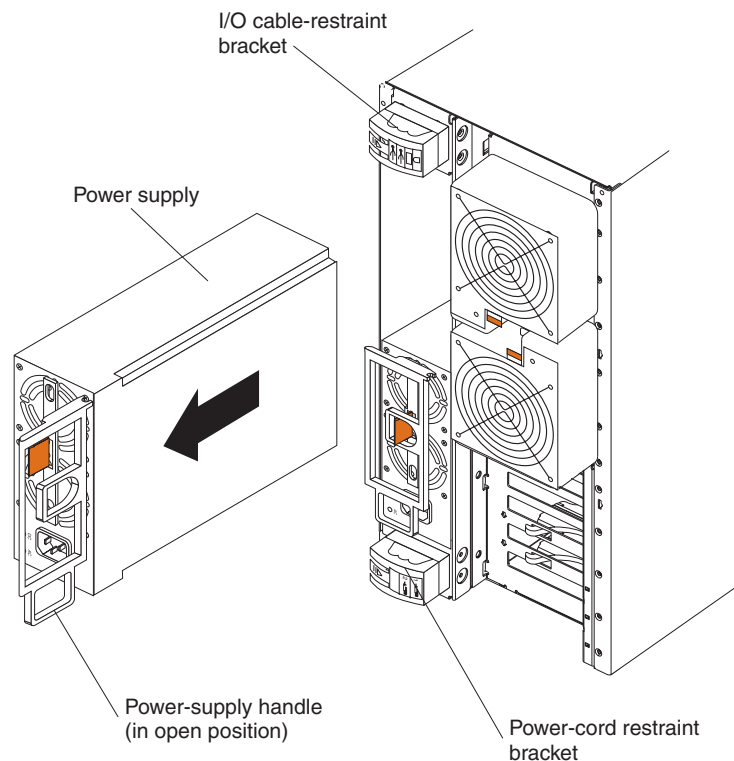
    a. Press the orange release lever and pull the power-supply handle. This moves the power supply out of the power-supply bay slightly.

    b. Pull the power supply out of the bay and set it aside.

4. Install the replacement power supply.

I/O cable-restraint bracket

Power supply

Power-supply handle (half open position)

Power-cord restraint bracket
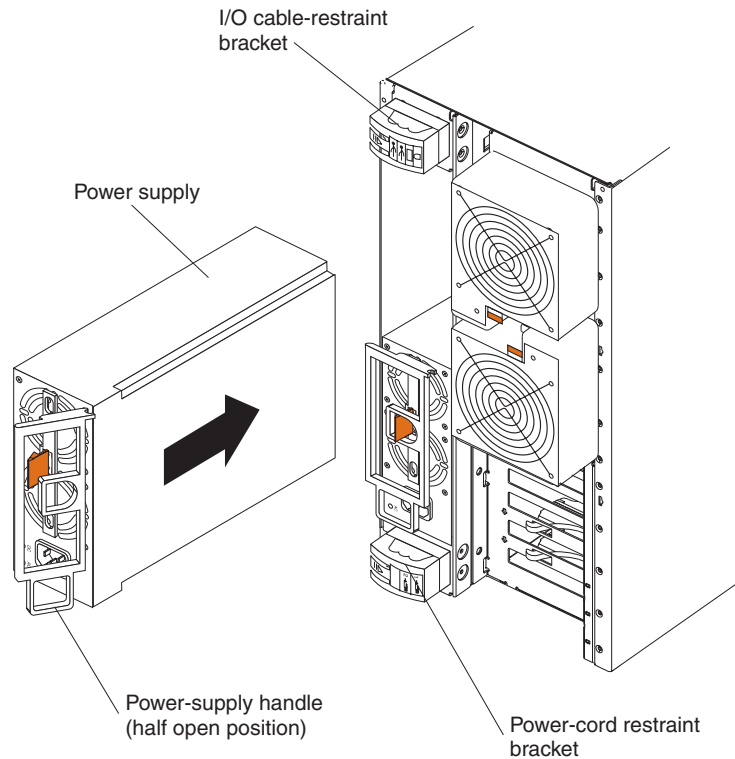
   a. Make sure the handle on the power supply is in the open position, hanging loosely.

   b. Slide the power supply all the way into the chassis; then, press the handle to the closed position until it clicks into place.

5. Plug one end of the power cord into the corresponding connector on the power supply; then, plug the other end of the power cord into a properly grounded electrical outlet.

   Note: You can route the power cord through the power-cord restraint bracket on the rear of the server (tower model only).

6. If the server is not on, turn on the server.

7. Verify that the dc power LED and the ac power LED on the power supply are lit, indicating that the power supply is operating properly.

Installing a hot-swap power-supply option

Your server comes with one fixed power supply or two hot-swap power supplies, depending on the server model. If your server has one fixed power supply, you can replace it with the hot-swap power-supply option, giving you two hot-swap power supplies. The two hot-swap power supplies provide power redundancy.

One fixed power supply

AC power LED (green)

DC power LED (green)

Fan 1 LED

Fan 2 LED

Ethernet link status LED

PCI-X slot 5 attention LED

PCI-X slot 6 attention LED

NMI button (service use only)

Two hot-swap power supplies

I/O cable-restraint bracket

Hot-swap power supply 2

Release latch

Handle

AC power LED

DC power LED

Hot-swap power supply 1

Power-cord restraint bracket
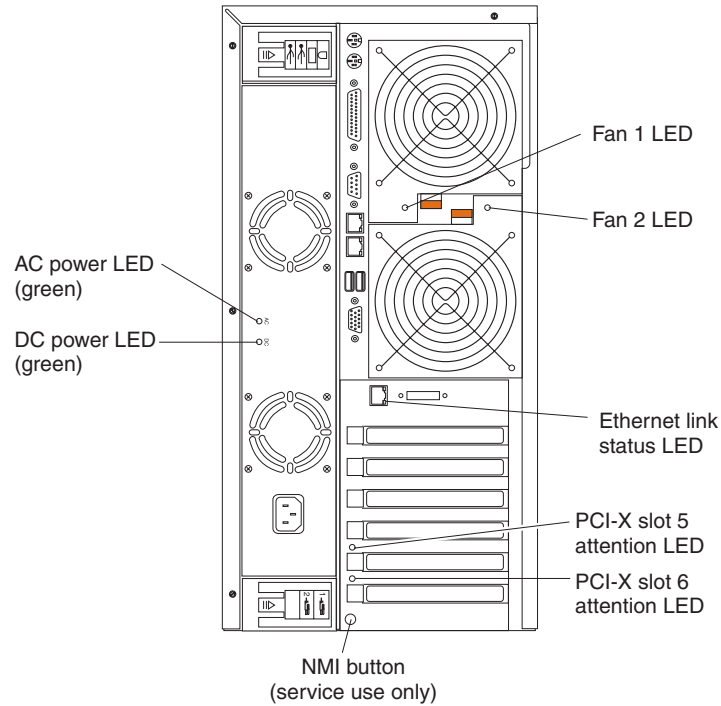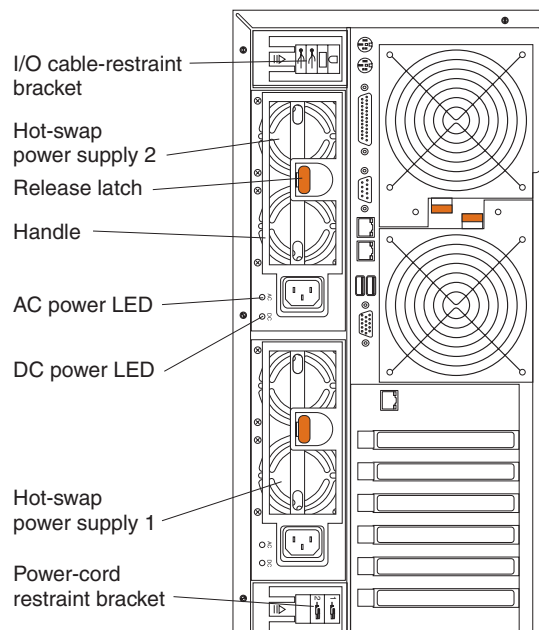
Before you continue with the power-supply removal and installation procedure, review the following information.

Notes:

1. During normal operation, both hot-swap power-supply bays must have power supplies installed for redundancy.

2. Two cable-restraint brackets are on the rear of the tower model servers. After you install the hot-swap power-supply option and connect the cables to the selected devices, you can use these cable-restraint brackets to manage the cable routing. Route the power cords through the power-cord restraint bracket on the bottom. Route the remaining cables (for example, the cables that are connected to the I/O ports) through the I/O cable-restraint bracket on the top.

If you install or remove a power supply, observe the following precautions.

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 remove the fixed power supply and install the hot-swap power-supply option.

Note: If your server is a tower model, you might find it easier to install the hot-swap power-supply option if you turn the server on its side so that the power supply is on the bottom.

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 disconnect all power cords and external cables ("Turning off the server" on page 12); then, remove the server cover (see "Removing the server left-side cover and bezel (tower model)" on page 15 or "Removing the server top cover and bezel (rack configuration)" on page 17).

3. Remove the adapter-support bracket. See "Removing and installing the adapter-support bracket" on page 19 for instructions.

4. Disconnect the power-supply cables from the system board and devices in your server.

   a. Disconnect the small-device power cable (P7) from the back of the diskette drive.

      Note: You might need to remove the diskette drive from the server in order to disconnect and reconnect its cables. The diskette drive is held in the server by release tabs that are accessed by removing the server front bezel.

   b. Disconnect the device power connector (P5) from the back of the CD-ROM drive.

c. Disconnect the other device power connectors (P4 and P6) from the rear of any other devices in the server.

d. Disconnect the SCSI cable (P2) from the SCSI backplane.

e. Disconnect the power cable (P1) from the J4 connector on the system board.

f. Disconnect the power signal cable (P3) from the J10 connector on the system board.

g. If your server has the 3-Pack Ultra320 Hot-Swap Expansion option installed, disconnect the power connector (P8) from the power connector on the 3-Pack backplane.

5. Remove the fixed power supply (see the following illustration).
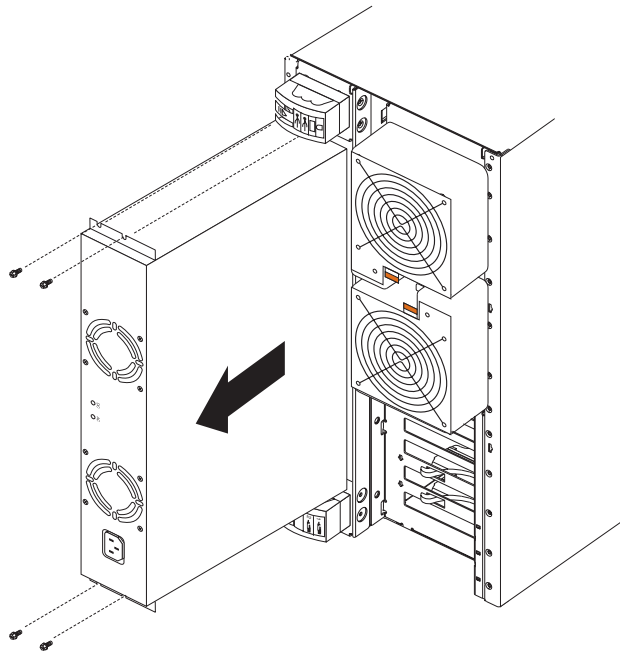
a. From the rear of the server, remove the two screws at each side of the fixed power supply.

b. Gently pull the power supply from the server, making sure the cables do not snag on the chassis or system board.

   Note: You might need to insert a fingernail or screwdriver blade behind one corner of the power supply to begin moving it.

Attention: When installing the power supply, do not pull it into position by its cables.

6. Install the hot-swap power-supply option.

    Note: The option consists of a hot-swap power-supply cage containing two hot-swap power supplies, with all necessary cables attached to the back of the option.

    Cables

    Hot-swap power supply option
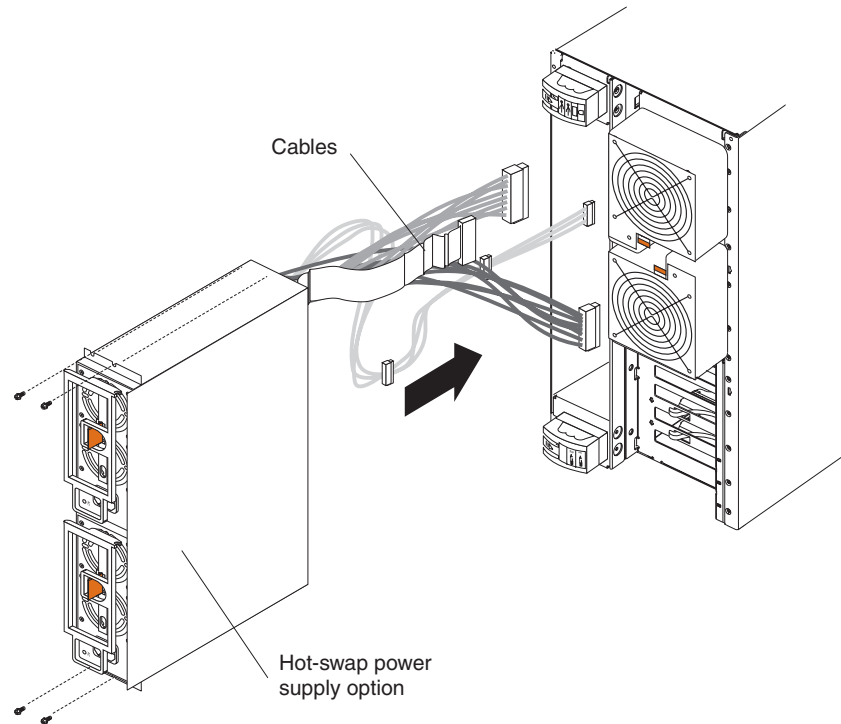
    a. Push the cables on the back of the power-supply option into the power-supply bay first; then, slide the hot-swap power-supply cage with power supplies into the power-supply bay.
    b. From inside the server, pull the cables on the back of the power-supply cage up from under the system board.
    c. Secure the hot-swap power-supply cage to the server by installing the two screws at each side of the hot-swap power-supply cage.

7. Connect the power-supply cables to the system board and devices in your server.

    Note: Each connector on these cables is unique. Only one type of cable can be attached to each connector on the system board, backplanes, or devices.

    a. Connect the small-device power cable (P7) to the back of the diskette drive.

        Note: You might need to remove the diskette drive from the server in order to disconnect and reconnect its cables. The diskette drive is held in the server by release tabs that are accessed by removing the server front bezel.

    b. Connect the P5 device power connector to the back of the CD-ROM drive.
    c. Connect the other device power connectors (P4 and P6) to the rear of any other devices in the server.
    d. Connect the SCSI cable (P2) to the SCSI backplane.
    e. Connect the power cable (P1) to the J4 connector on the system board.

f. Connect the power signal cable (P3) to the J10 connector on the system board.

g. If your server has the 3-Pack Ultra320 Hot-Swap Expansion option installed, connect the power connector (P8) to the power connector on the 3-Pack backplane.

8. Reinstall the adapter-support bracket. See "Removing and installing the adapter-support bracket" on page 19 for instructions.

9. Replace the server cover (see "Installing the server bezel and left-side cover (tower model)" on page 62 or "Installing the server bezel and top cover (rack configuration)" on page 65.

10. Plug one end of each power cord into the corresponding connector on the power supply; then, plug the other end of each power cord into a properly grounded electrical outlet.

   Note: You can route the power cords through the power-cord restraint bracket on the rear of the server (tower model only).

11. If the server is not on, turn on the server.

12. Verify that the dc power LED and the ac power LED on each power supply are lit, indicating that the power supply is operating properly.

Replacing a hot-swap fan

Your server comes with six hot-swap fans: two front fans (fans 5 and 6), two center fans (fans 3 and 4), and two rear fans (fans 1 and 2). The two front fans are also known as blowers. You do not need to turn off the power to the server to replace a hot-swap fan.

Attention: To help ensure proper cooling, if a fan fails, replace it within 48 hours.

The following illustration shows how to replace hot-swap fans.
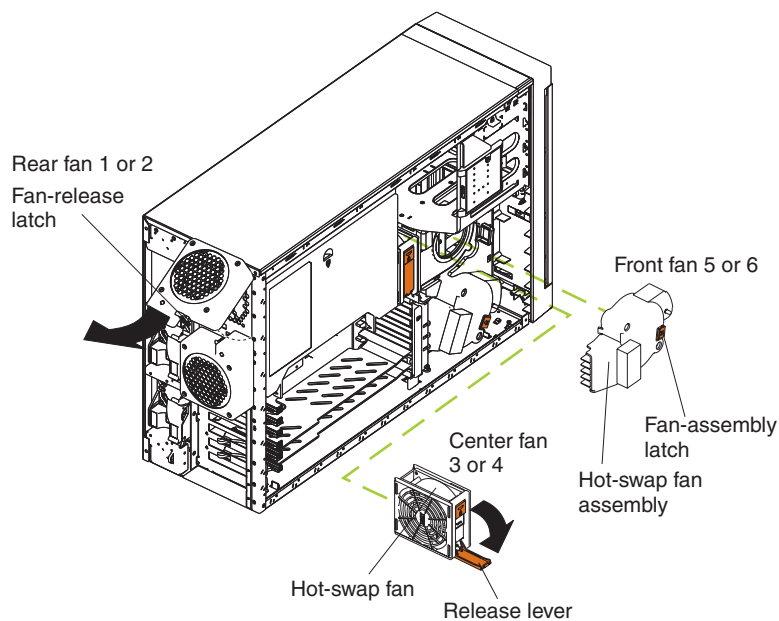
Determine which fan to replace by checking the LEDs on the fans. The front fans, center fans, and rear fans are installed differently from each other. This section contains separate instructions for each group of fans.

Replacing a front fan

Complete the following steps to replace front fan (blower) 5 or 6:

1. Review the information in "Safety" on page v, "Installation Guidelines" on page 9, and "Handling static-sensitive devices" on page 10.

2. Remove the server cover (see "Removing the server left-side cover and bezel (tower model)" on page 15 or "Removing the server top cover and bezel (rack configuration)" on page 17).

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

3. Press the orange fan-release latch in the direction indicated by the arrow.

4. Pull the fan out of the server.

5. Align the two tabs on the replacement fan with the notches in the server and press the fan into the corresponding connector. Press the front edge of the fan to engage the latch fully and secure the fan in the server.

6. Verify that the FAN LED on the diagnostic LED panel (see the *Hardware Maintenance Manual and Troubleshooting Guide* on the IBM *xSeries Documentation* CD) is not lit. If the FAN LED is lit, reseat the fan.

7. Reinstall the server cover (see "Installing the server bezel and left-side cover (tower model)" on page 62 or "Installing the server bezel and top cover (rack configuration)" on page 65).

Replacing a center fan

Complete the following steps to replace center fan 3 or 4:

1. Review the information in "Safety" on page v, "Installation Guidelines" on page 9, and "Handling static-sensitive devices" on page 10.

2. Remove the server cover (see "Removing the server left-side cover and bezel (tower model)" on page 15 or "Removing the server top cover and bezel (rack configuration)" on page 17).

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

3. Press the orange fan-release latch in the direction indicated by the arrow; the latch will rotate downward.

4. Pull the fan out of the server.

5. Press the orange fan-release latch in the direction indicated by the arrow and open the latch; then, slide the replacement fan into the server. Press the latch up to snap it into place and secure the fan in the server.

   Note: When you slide the fan into the server, make sure the orange fan-release latch is at the top.

6. Verify that the FAN LED on the diagnostic LED panel (see the *Hardware Maintenance Manual and Troubleshooting Guide* on the IBM *xSeries Documentation* CD for the location of the LED) is not lit. If the FAN LED is lit, reseat the fan.

7. Reinstall the server cover (see "Installing the server bezel and left-side cover (tower model)" on page 62 or "Installing the server bezel and top cover (rack configuration)" on page 65).

Replacing a rear fan

Complete the following steps to replace rear fan 1 or 2:

1. Review the information in "Safety" on page v, "Installation Guidelines" on page 9, and "Handling static-sensitive devices" on page 10.

2. Pull out on the orange fan-release latch on the rear fan bracket; then, lift the fan up and out of the hinge cutouts.

3. Touch an unpainted metal part of the server for at least 2 seconds; then, slide the replacement fan into the server. (Make sure that the fan fits correctly into the hinge cutouts on the rear of the server.)

4. When you have the fan properly seated, push on the fan-release latch until it clicks into place.

5. Verify that the FAN LED on the diagnostic LED panel (see the *Hardware Maintenance Manual and Troubleshooting Guide* on the IBM *xSeries Documentation* CD) is not lit. If the FAN LED is lit, reseat the fan.

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 marketing representative or authorized reseller.

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, "Installation Guidelines" on
   page 9, and "Handling static-sensitive devices" on page 10.
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; then, remove the server cover (see "Removing the server
   left-side cover and bezel (tower model)" on page 15 or "Removing the server
   top cover and bezel (rack configuration)" on page 17).
4. Lift the adapter-retention bracket on top of the adapter-support bracket; then,
   remove the full-length adapters and plastic dividers (see "Working with
   adapters" on page 21).
5. Remove the plastic shield covering the bottom portion of the system board.

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

VRM 2 (J1)

Microprocessor 2 (U9)

Microprocessor 1 (U13)

VRM 1 (J17)

Remote Supervisor Adapter (J27)

PCI slot 1 32-bit 5.0 V (J32)

PCI-X slot 2 64-bit 3.3 V (J36)

PCI-X slot 3 64-bit 3.3 V (J38)

PCI-X slot 4 64-bit 3.3 V (J41)

PCI-X slot 5 64-bit 3.3 V 133 MHz hot-plug (J43)

PCI-X slot 6 64-bit 3.3 V 133 MHz hot-plug (J45)

DIMM 1 (J7)
DIMM 2 (J9)
DIMM 3 (J11)
DIMM 4 (J12)
DIMM 5 (J14)
DIMM 6 (J15)

Battery (BH1)
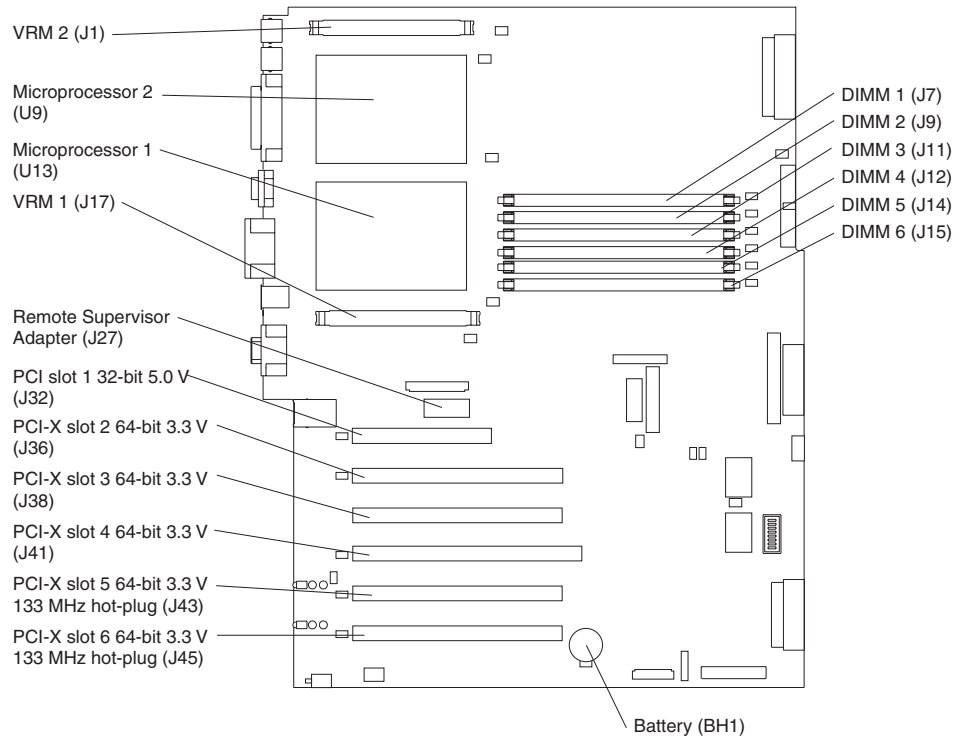
7. Remove the battery:

   a. Use one finger to press the top of the battery clip away from the battery until the battery releases upward from the socket.

   b. Lift and remove the battery from the socket.
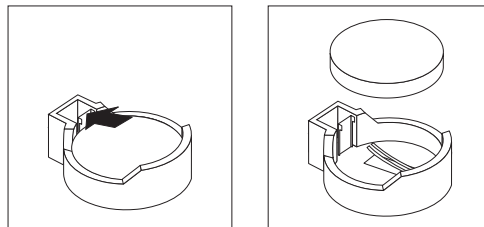
8. Insert the new battery:

   a. Tilt the battery so that you can insert it into the socket on the side opposite the battery clip.

   b. Press the battery down into the socket until it clicks into place. Make sure the battery clip holds the battery securely.
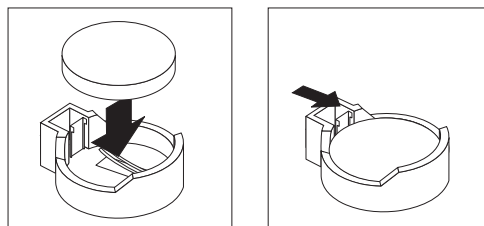
9. Replace the plastic shield covering the bottom portion of the system board.

10. Reinstall the adapters and plastic dividers that you removed, and close the adapter-retention bracket; then, reconnect the internal cables that you disconnected.

11. Reinstall the server cover (see "Installing the server bezel and left-side cover (tower model)" on page 62 or "Installing the server bezel and top cover (rack configuration)" on page 65).

    Note: You must wait approximately 20 seconds after you plug the power cord of your server into an electrical outlet before the power-control button becomes active.

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

Completing the installation

To complete your installation, you must reinstall the bezel, reinstall the server cover, reconnect all the 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 under the air-baffle cover.

Note: If you have just plugged the power cords of your server into electrical outlets, you will have to wait approximately 20 seconds before pressing the power-control button.

Installing the server bezel and left-side cover (tower model)

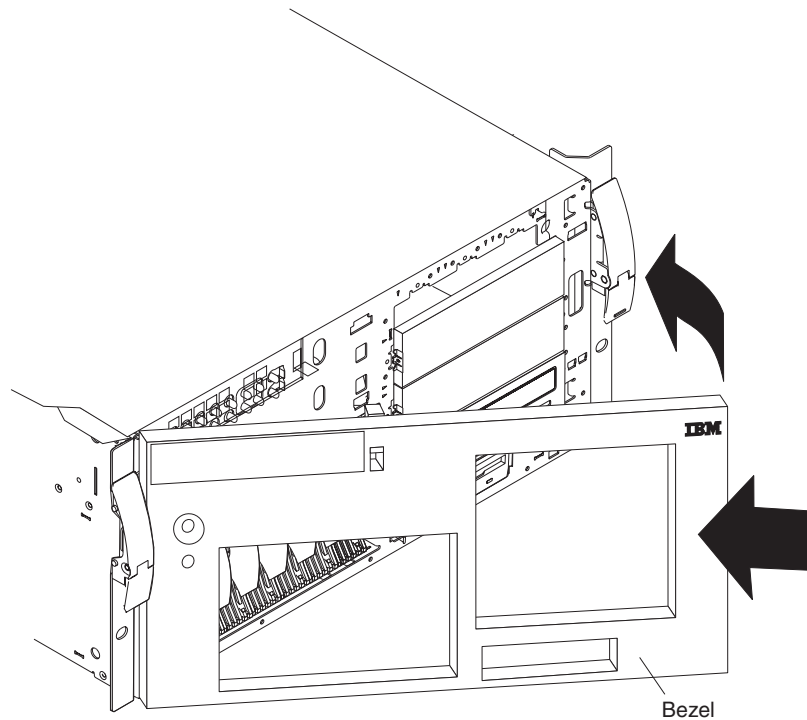The following illustration shows how to install the bezel on the tower model server.
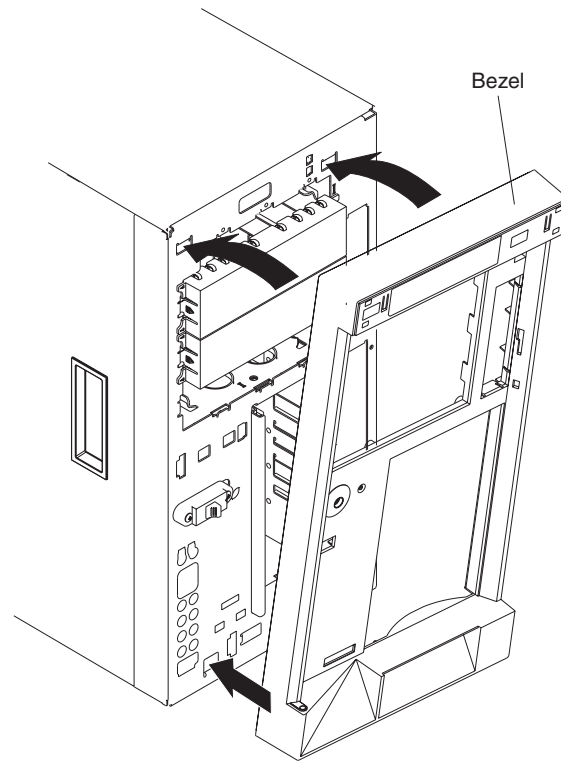
Bezel

Complete the following steps to install the bezel:

1. Review the information in "Safety" on page v, "Installation Guidelines" on page 9, and "Handling static-sensitive devices" on page 10.
2. Insert the two tabs on the bottom of the bezel into the matching holes on the server chassis.
3. Push the top of the bezel toward the server until the two tabs at the top of the bezel snap into place.

The following illustration shows how to install the left-side cover on the tower model server.

Slots
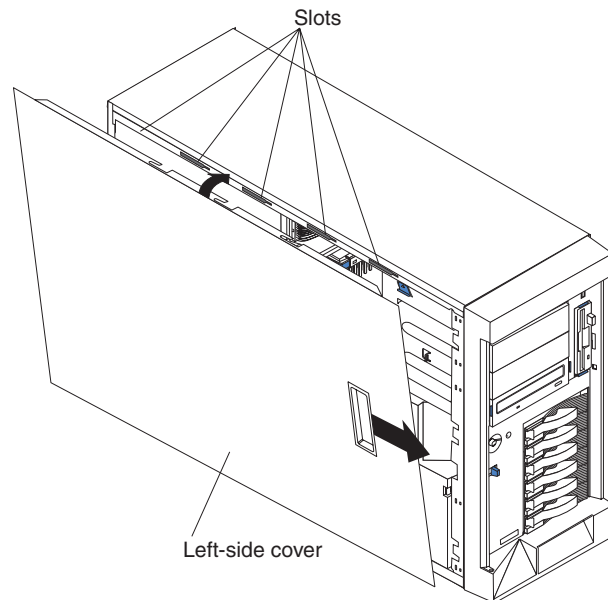
Left-side cover

Complete the following steps to install the server left-side cover:

1. Before installing the cover, check that all cables, adapters, and other components are installed and seated correctly and that you have not left loose tools or parts inside the server.

2. Place the bottom lip of the left-side cover over the bottom edge of the server chassis.

3. Rotate the left-side cover to a vertical position, inserting the tabs at the top of the left-side cover into the matching slots in the server chassis.

4. Slide the left-side cover forward until it locks in place.

5. If you disconnected any cables from the back of the server, reconnect the cables; then, plug the power cords into properly grounded electrical outlets.

   Note: If necessary, see Chapter 3, "Input/output ports", on page 71 for connector locations.

Installing the server door (tower model)

The following illustration shows how to install the door on the server.
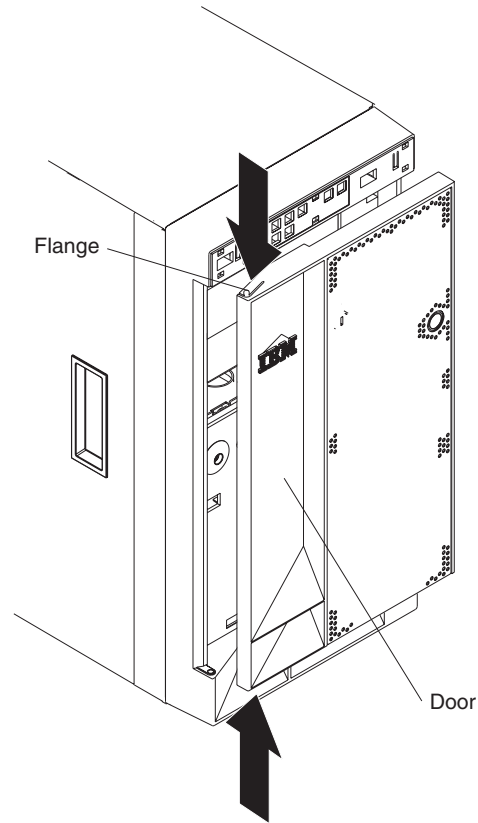
Complete the following steps to install the server door:

1. Review the information in "Safety" on page v, "Installation Guidelines" on page 9, and "Handling static-sensitive devices" on page 10.
2. Set the door on the bottom hinge.
3. Locate the flange on the top edge of the door.
4. Press the flange downward while pressing the top of the door toward the server until the flange connects with the top hinge. Release the flange.
5. Close the server door.

   Attention: Be sure to maintain a clearance of at least 100 mm (4 inches) on the front and rear of the server to allow for air circulation.

Installing the server bezel and top cover (rack configuration)

The following illustration shows how to install the bezel on a rack configuration server.

Bezel

Complete the following steps to install the bezel:

1. Review the information in "Safety" on page v, "Installation Guidelines" on page 9, and "Handling static-sensitive devices" on page 10.
2. Insert the two tabs on the bottom of the bezel into the matching holes on the server chassis.
3. Push the top of the bezel toward the server until the two tabs at the top of the bezel snap into place.

The following illustration shows how to install the server top cover on a rack configuration server.
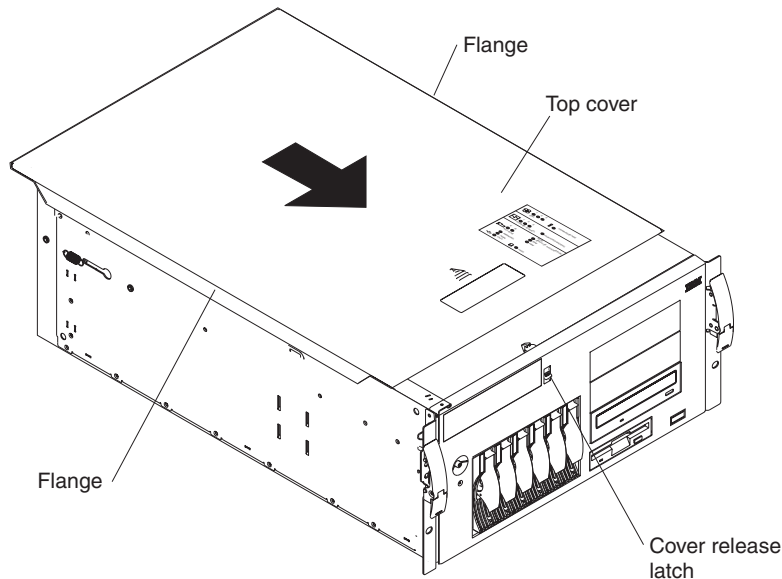
Complete the following steps to install the server top cover:

1. Before installing the cover, check that all cables, adapters, and other components are installed and seated correctly and that you have not left loose tools or parts inside the server.

2. Place the cover-release latch in the open (up) position.

3. Place the lip of the left side of the top cover over the top-left edge of the server chassis.

4. Rotate the top cover to a horizontal position, inserting the tabs at the right side of the top cover into the matching slots in the server chassis.

5. Slide the top cover forward until it locks in place.

6. If you disconnected any cables from the back of the server, reconnect the cables; then, plug the power cords into properly grounded electrical outlets.

   Note: If necessary, see Chapter 3, "Input/output ports", on page 71 for connector locations. The *Rack Installation Instructions* provided on the IBM *xSeries Documentation* CD also give additional rack installation and cabling information. These instructions also come with the Tower-to-Rack Conversion Kit.

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 ServerGuide™ information in the *User's Guide* on the IBM *xSeries Documentation* CD and to your operating-system documentation for additional information.

If your server has a RAID configuration using the integrated SCSI controller with RAID capabilities or has a ServeRAID controller installed and you have installed or removed a hard disk drive, see the ServeRAID documentation on the *IBM ServeRAID Support* CD for information about configuring your disk arrays.

Connecting external options

If you plan to attach external devices, you might need to order additional cables. To select and order the correct cables for use with external devices, contact your IBM marketing representative or authorized reseller.

If you install an optional SCSI adapter or use channel B on the integrated SCSI controller for external devices, you can attach external SCSI devices, such as a SCSI storage expansion enclosure, to your server. For a list of supported options for your server, go to http://www.ibm.com/pc/us/compat/ on the World Wide Web.

Note: See "Ultra320 SCSI system-board connectors" on page 73 for additional information about SCSI cabling and SCSI IDs.

If you plan to attach more than one external serial device, you must install the optional second serial port that comes with your server.

Installing the external SCSI connector

Complete the following steps to install the optional external SCSI connector needed to attach an external SCSI device:
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 disconnect all power cords and external cables ("Turning off the server" on page 12); then, remove the server cover (see "Removing the server left-side cover and bezel (tower model)" on page 15 or "Removing the server top cover and bezel (rack configuration)" on page 17).

    Attention: To ensure proper system cooling, do not remove the server cover for more than 30 minutes during this procedure.
3. Remove the external SCSI knockout on the rear of the server (see "Cabling the server" on page 68 for the external SCSI knockout location).
4. Follow the instructions that come with the option to prepare it for installation and to connect it to the server.
5. Route one end of the optional external SCSI cable to the external SCSI B connector (J51) on the system board (see "System-board internal cable connectors" on page 4 for the location of the SCSI connector); then, secure the external SCSI connector at the other end of the cable into the external SCSI knockout hole so the connector is accessible from the rear of the server.
6. Reinstall the server cover (see "Installing the server bezel and left-side cover (tower model)" on page 62 or "Installing the server bezel and top cover (rack configuration)" on page 65).
7. Reconnect all the devices, power cords, and cables that you disconnected; then, turn on the server and all attached devices.

Installing the second serial connector

Complete the following steps to install the optional second serial connector needed to attach more than one external serial device:

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 disconnect all power cords and external cables ("Turning off the server" on page 12); then, remove the server cover (see "Removing the server left-side cover and bezel (tower model)" on page 15 or "Removing the server top cover and bezel (rack configuration)" on page 17).

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

3. Remove the optional serial connector knockout on the rear of the server (see "Cabling the server" on page 68 for the optional serial connector knockout location).

4. Route one end of the optional serial connector cable to the optional serial connector (J48) on the system board (see "System-board internal cable connectors" on page 4 for the location of the optional serial connector); then, secure the serial connector at the other end of the cable into the serial knockout hole so the connector is accessible from the rear of the server.

5. Reinstall the server cover (see "Installing the server bezel and left-side cover (tower model)" on page 62 or "Installing the server bezel and top cover (rack configuration)" on page 65).

6. Reconnect all the devices, power cords, and cables that you disconnected; then, turn on the server and all attached devices.

Connecting an external device

You can attach additional external options to the input/output (I/O) connectors on the front and rear of your server. (See Chapter 3, "Input/output ports", on page 71 for more information.)

Complete the following steps to attach an external device:

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 all attached devices.

3. Follow the instructions that come with the option to prepare it for installation and to connect it to the server.

Cabling the server

Notes:

1. You must turn off the server before connecting any cables to or disconnecting any cables from the server. (Review the information in "Safety" on page v, "Installation Guidelines" on page 9, and "Handling static-sensitive devices" on page 10.)

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. For example, the hard disk drive cables are labeled "HDD option."

Two cable-restraint brackets are on the rear of the tower model servers. After you connect the cables to the selected devices, you can use these cable-restraint brackets to manage the cable routing. Route the power cords through the power-cord restraint bracket on the bottom. Route the remaining cables (for example, the cables that are connected to the I/O ports) through the I/O cable-restraint bracket on the top.

See the following illustrations for the locations of the input and output connectors on your server.

Note: The USB 3 connector is on the front of the server.
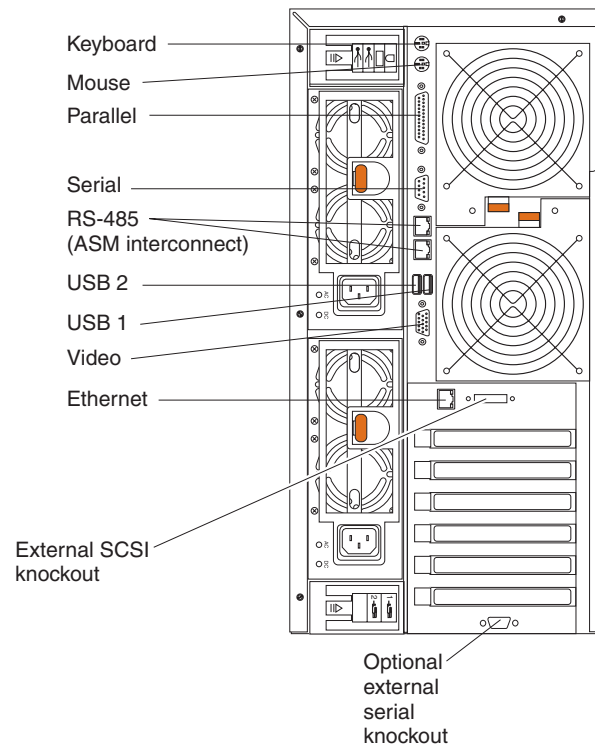
Keyboard cabling

There is one keyboard port on the back of the server. Connect a keyboard to this port.

Pointing device cabling

There is one pointing device port on the back of the server. Connect a pointing device to this port.

Parallel port cabling

There is one parallel port on the back of the server. You can connect a parallel device to this port.

Serial cabling

Your server has one standard serial port on the back of the server and one optional serial port. You can connect a serial devices to these ports.

Advanced System Management Interconnect cabling

There are two Advanced System Management (ASM) Interconnect ports on the back of the server. Use these ports to connect the server to a Remote Supervisor Adapter in a remote server. The ports support full asynchronous RS-485 communication through a daisy-chain cable in half-duplex mode. Both ports have automatic termination, and either port can be used if your server is at the beginning or end of an RS-485 network.

Notes:

1. Do not confuse the two ASM Interconnect ports that are next to the video port with the Gigabit Ethernet port.

2. If you install an optional Remote Supervisor Adapter in your server, use the RS-485 ports on the Remote Supervisor Adapter and not the integrated RS-485 ports on the back of your server.

USB cabling

There are three USB ports, one on the front and two on the back of the server. You can connect USB devices to these ports.

Video cabling

There is one video port on the back of the server. Connect a monitor to this port.

Gigabit Ethernet cabling

There is one Ethernet port on the back of the server. Use this port to connect the server to a LAN.

Note: Do not confuse the Gigabit Ethernet port with the two ASM Interconnect ports that are next to the video port.

Power cabling

Your server comes with one or two power cords that you can connect to an uninterruptible power supply or to an external source, such as a properly grounded electrical outlet.

Complete the following steps to attach the power supply power cords:

1. Connect each power-supply cord to one of the system power connectors on the rear of the server.

2. Plug the other end of each power-supply cord into a properly grounded electrical outlet or uninterruptible power supply.

   Note: Plugging the power-supply cords into electrical outlets might cause the server to start automatically. This is an acceptable action.

3. See the *User's Guide* or the *Installation Guide* on the IBM *xSeries Documentation* CD for detailed information about turning on the server.

Installing the server in a rack

Detailed cabling instructions for a typical rack server configuration are provided in the *Rack Installation Instructions* that are on the IBM *xSeries Documentation* CD. These instructions also come with the Tower-to-Rack Conversion Kit.

Chapter 3. Input/output ports

This section provides information about the following I/O ports on your server. Most of these ports are on the rear of your server.

- One parallel port
- One video port
- One keyboard port
- One auxiliary-device port (pointing device) port
- Two Ultra320 SCSI connectors on the system board
- One serial port (second serial port optional)
- Three Universal Serial Bus (USB) version 1.1 ports (USB 1 and USB 2 on the rear, USB 3 on the front)
- One Ethernet port
- Two RS-485 (ASM interconnect) ports dedicated to the system service processor

The following illustration shows the I/O port connectors on the rear of your server.
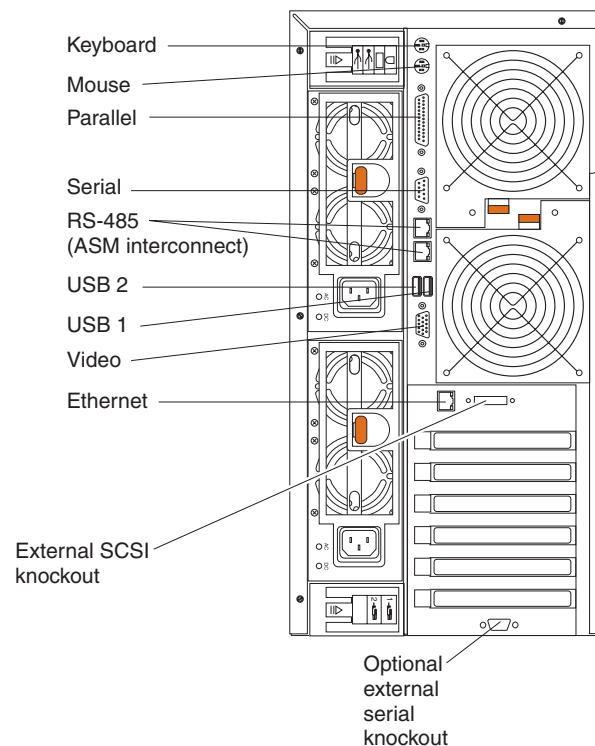
Two cable-restraint brackets are on the tower model on the rear of the server. After you connect the cables to the selected devices, you can use these cable-restraint brackets to manage the cable routing. Route the power cords through the power-cord restraint bracket on the bottom. Route the remaining cables (for example, the cables that are connected to the I/O ports) through the I/O cable-restraint bracket on the top.

Parallel port

Your server has one parallel port. This port supports three standard Institute of Electrical and Electronics Engineers (IEEE) 1284 modes of operation: Standard Parallel Port (SPP), Enhanced Parallel Port (EPP), and Extended Capability Port (ECP).

Viewing or changing the parallel-port assignments

You can use the built-in Configuration/Setup Utility program to configure the parallel port as bidirectional; that is, so that data can be both read from and written to a device. In bidirectional mode, the server supports the ECP and EPP modes.

To view or change the parallel-port assignment:

1. Restart the server and watch the monitor screen.
2. When the message `Press F1 for Configuration/Setup` appears, press F1.

   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.

3. From the main menu, select **Devices and I/O Ports**; then, press Enter.
4. Select the parallel port; then, use the arrow keys to advance through the available settings.

   Note: When you configure the parallel port as bidirectional, use an IEEE 1284-compliant cable. The maximum length of the cable must not exceed 3 meters (9.8 ft).

5. Select **Save Settings**; then, select **Exit Setup** to exit from the Configuration/Setup Utility main menu.

Parallel port connector

The following illustration shows the 25-pin, female D-shell parallel-port connector on the rear of your server. This connector conforms to the industry standard.
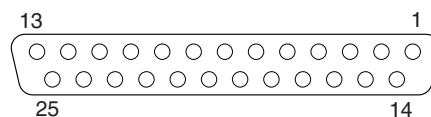
Video port

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.
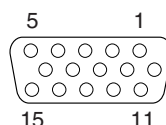
Keyboard port

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.

```
   6  ○  ▯  ○  5
   4  ○      ○  3
      ○   ○
      2     1
```
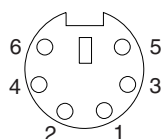
Auxiliary-device (pointing device) port

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.

```
   6  ○  ▯  ○  5
   4  ○      ○  3
      ○   ○
      2     1
```
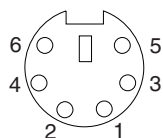
Ultra320 SCSI system-board connectors

Your server has an integrated dual-channel Ultra320 small computer system interface (SCSI) controller. This controller supports two independent, internal Ultra320 SCSI channels. The SCSI channel connectors are on the system board. Each channel supports up to 15 SCSI devices. This controller uses:

- Double-transition clocking to achieve up to 320 MB-per-second data-transfer rates
- Domain validation to negotiate compatible data-transfer speeds with each device
- Parity checking to ensure data reliability
- An active terminator for SCSI bus termination

The server comes with one SCSI cable that is connected from the internal SCSI channel A connector to the standard hot-swap-drive backplane. You can attach additional internal SCSI devices to the other internal SCSI channel B connector, or you can use channel B for external SCSI devices. To use channel B for external SCSI devices, remove the external SCSI knockout from the rear of the server (see "Cabling the server" on page 68 for external SCSI knockout location) and secure the free end of an optional channel B cable in the new opening.

If you want to attach external SCSI devices to the server without using the internal SCSI channel B, you must install an optional SCSI adapter.

Note: If you install a PCI RAID adapter to configure and manage the internal hot-swap drives, you must move the SCSI cable from the system-board

SCSI connector to an internal channel connector on the RAID adapter (except for the ServeRAID-5i controller, which uses the system-board integrated SCSI controller with RAID capabilities). See "Cabling example for a ServeRAID controller" on page 28 for additional information.

SCSI cabling requirements

For information about the maximum length of SCSI cable, see 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 and Table 4 list the SCSI IDs for the hard disk drives and backplanes that are connected to one channel. In the typical configuration, the standard hard disk drives and backplane are connected to channel A, and the optional 3-Pack hard disk drives and backplane are connected to channel B. See "Working with the 3-Pack Ultra320 Hot-Swap Expansion option" on page 32 for instructions for installing the 3-Pack option, and "Installing internal drives" on page 36 for instructions about installing hard disk drives.

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

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

Table 4. SCSI IDs for optional 3-Pack hot-swap hard disk drives and backplane

Device	SCSI ID
Drive bay 14	14
Drive bay 13	13
Drive bay 12	12
Backplane	9

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 the 68-pin, female D-shell SCSI connectors. These connectors conform to the SCSI standard.

Serial ports

Your server has one standard serial port that the operating system can use and one optional 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

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 settings available.

5. Select **Save Settings**; then, select **Exit Setup** to exit from the Configuration/Setup Utility main menu.

Serial-port connectors

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.
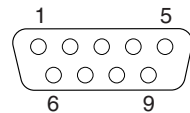
Universal Serial Bus version 1.1 ports

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 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 and rear of the server for attaching USB compatible devices.

The following illustration shows the USB-port connectors on the front and rear of your server. These connectors conform to the USB version 1.1 standard.
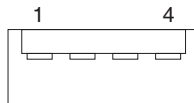
Gigabit Ethernet port

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

To access the Ethernet connector, connect a Category 3, 4, or 5 unshielded twisted-pair (UTP) cable to the Ethernet (RJ-45) connector on the rear of your server. See "System-board external port connectors" on page 5.

Note: The 100BASE-TX Fast Ethernet standard and1000BASE-T standard require that the cabling in the network be Category 5 or higher.

The Ethernet (RJ-45) connector has one LED that indicates Ethernet-link status. When this green LED is on, there is an active connection on the Ethernet port. Activity between the server and the network is indicated by the Ethernet transmit/receive activity LED on the front of the server (see the *User's Guide* on the IBM *xSeries Documentation* CD).

Ethernet connector

There is an RJ-45 Ethernet connector on the back of the server. See "System-board external port connectors" on page 5 for the location of this connector. The following illustration shows the pin-number assignments for the RJ-45 connector. These assignments apply to both 10BASE-T and 100/1000BASE-TX devices.
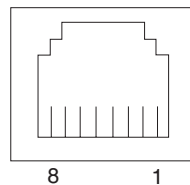
RS-485 (ASM interconnect) ports

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.

Appendix. Notices

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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.

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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.

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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.

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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.

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

Index

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