IBM

@server

326 Type 8848

Option Installation Guide

IBM

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Option Installation Guide

Note: Before using this information and the product it supports, read the general information in "Notices," on page 37.

Contents

Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الآمنية

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

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

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

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

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

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

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

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

A termék telepítése előtt olvassa el a Biztonsági előírásokat!

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

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

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

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

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

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

Перед установкой продукта прочтите инструкции по
технике безопасности.

Pred inštaláciou tohto zariadenia si pečítaje Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

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

Läs säkerhetsinformationen innan du installerar den här produkten.

Important:

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

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

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

Statement 1:

DANGER

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

To avoid a shock hazard:

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

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

Statement 2:

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

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

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

Statement 3:

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

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

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

DANGER

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

Class 1 Laser Product
Laser Klasse 1
Laser Klass 1
Luokan 1 Laserlaite
Appareil À Laser de Classe 1

Statement 4:

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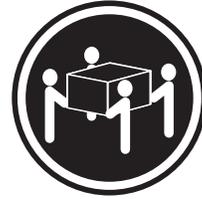
CAUTION:
Use safe practices when lifting.

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.

2

1

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)

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

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

Chapter 1. Introduction

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

Related documentation

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

- *User's Guide*

  This document is in Portable Document Format (PDF) on the IBM® @server *Documentation* CD. It contains general information about the server.

- *Installation Guide*

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

- *Safety Information*

  This document is in PDF on the IBM @server *Documentation* CD. It contains translated caution and danger statements. Each caution and danger statement that appears in the documentation has a number that you can use to locate the corresponding statement in your language in the *Safety Information* document.

- *Rack Installation Instructions*

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

- *Hardware Maintenance Manual and Troubleshooting Guide*

  This document is in PDF on the IBM @server *Documentation* CD. It contains information to help you solve problems yourself, and it contains information for service technicians.

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

The server might have features that are not described in the documentation that you received with the server. The documentation might be updated occasionally to include information about those features, or technical updates might be available to provide additional information that is not included in the server documentation. These updates are available from the IBM Web site. Complete the following steps to check for updated documentation and technical updates:

1. Go to http://www.ibm.com/pc/support/.
2. In the **Learn** section, click **Online publications**.
3. On the "Online publications" page, in the **Brand** field, select **Servers**.
4. In the **Family** field, select @server **326**.
5. Click **Continue**.

Notices and statements used in this document

The caution and danger statements that appear in this document are also in the multilingual *Safety Information* document, which is on the IBM @server *Documentation* CD. Each statement is numbered for reference to the corresponding statement in the *Safety Information* document.

The following notices and statements are used in this document:

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

Major components of the @server 326 Type 8848 server

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 locations of major components in a small computer system interface (SCSI) hot-swap hard disk drive model server. A Serial ATA (SATA) non-hot-swap hard disk drive model is also available.

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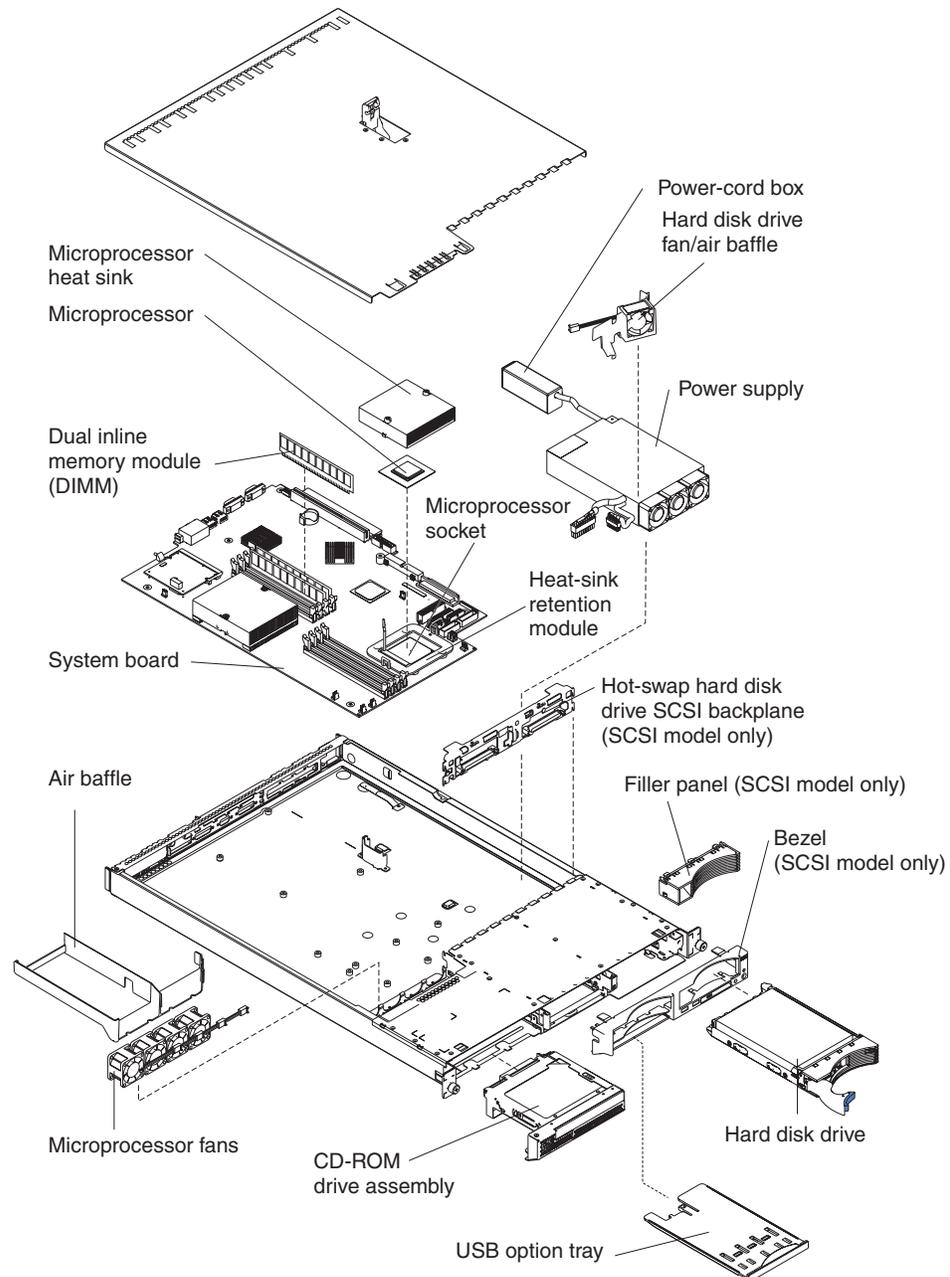
System-board internal connectors

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

System Management
SO-DIMM connector (J16)

Remote Supervisor
Adapter II (JMGT1)

Secondary IDE (IDE2)

SCSI backplane signal (SCSI1)
System board power (J10)

SCSI backplane power (J12)

Fan 1 (SFAN1)

Front panel signal (J13)

System board power (J11

Serial ATA connectors

Fan 2 (SFAN2)

Front USB (J15)

Fan 3 (SFAN3)

Fan 4 (SFAN4)

Fan 5 (SFAN5)

CD-ROM drive power (J14)
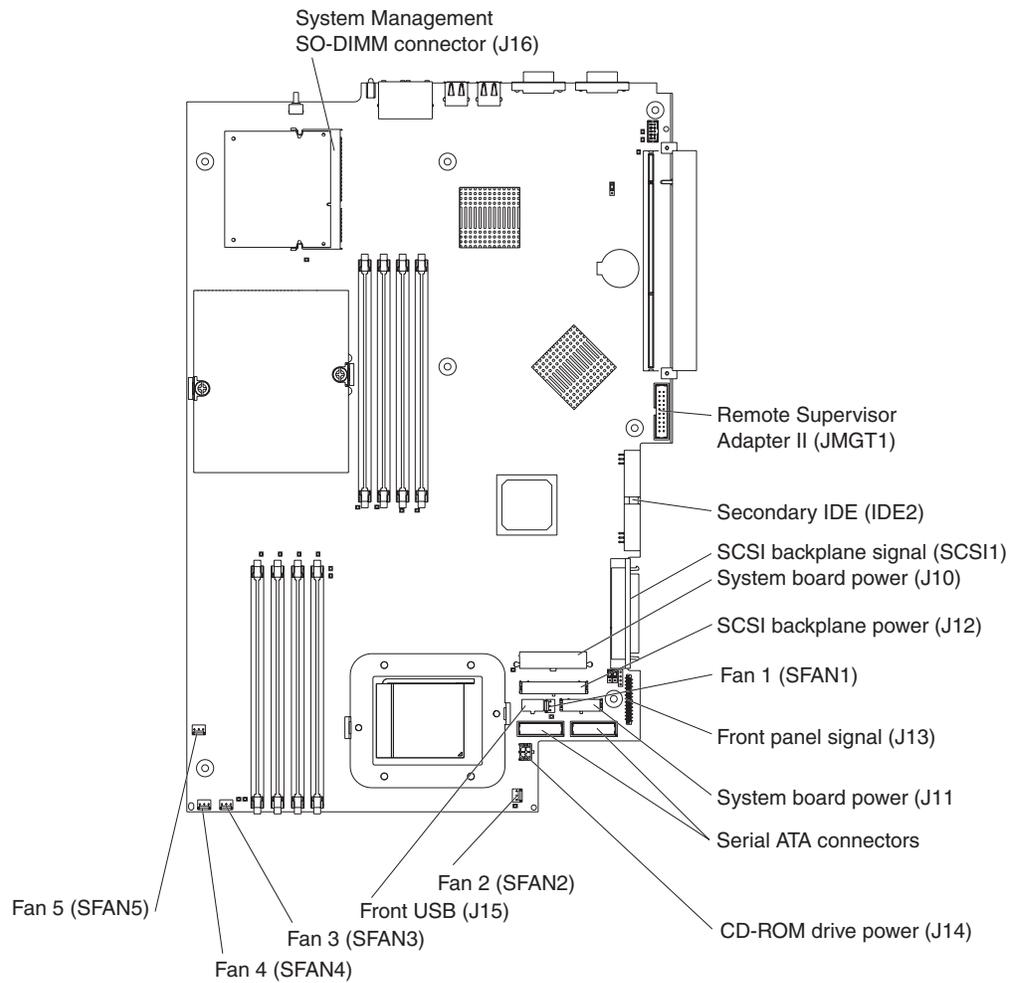
System-board switches and jumpers

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

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

133/100 MHz PCI-X jumper (JPCIXB1)

Boot block recovery jumper (JBBF1)

Clear CMOS jumper (JBAT1)
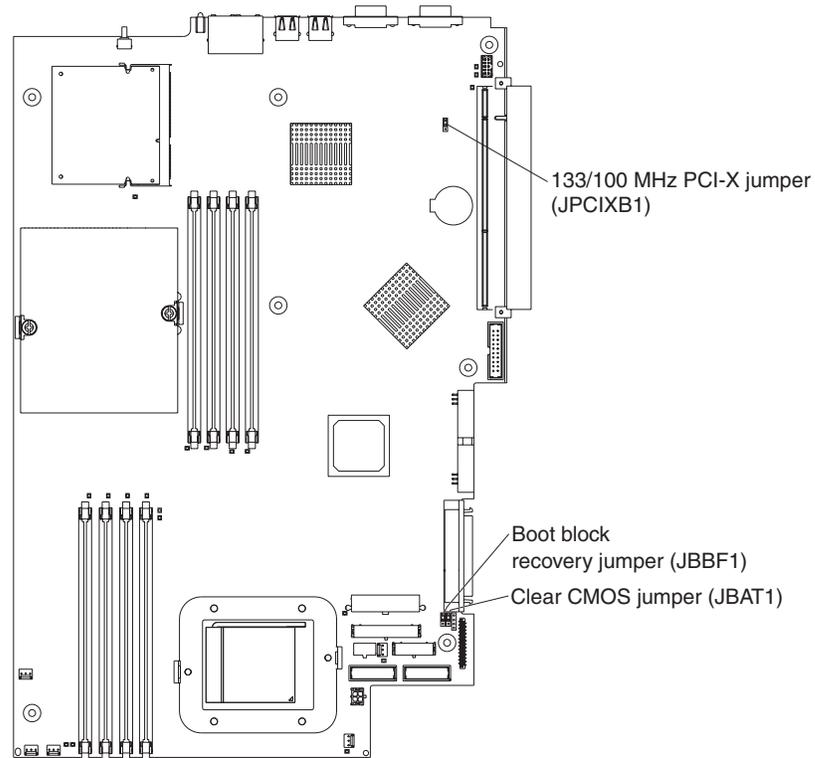
System-board external connectors

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

Ethernet ports (Dual)(JLAN1)

USB ports (USB2 and USB1)

Video port (JVGA1)

Serial port 1 (COM1)

Serial port 2 (COM2)
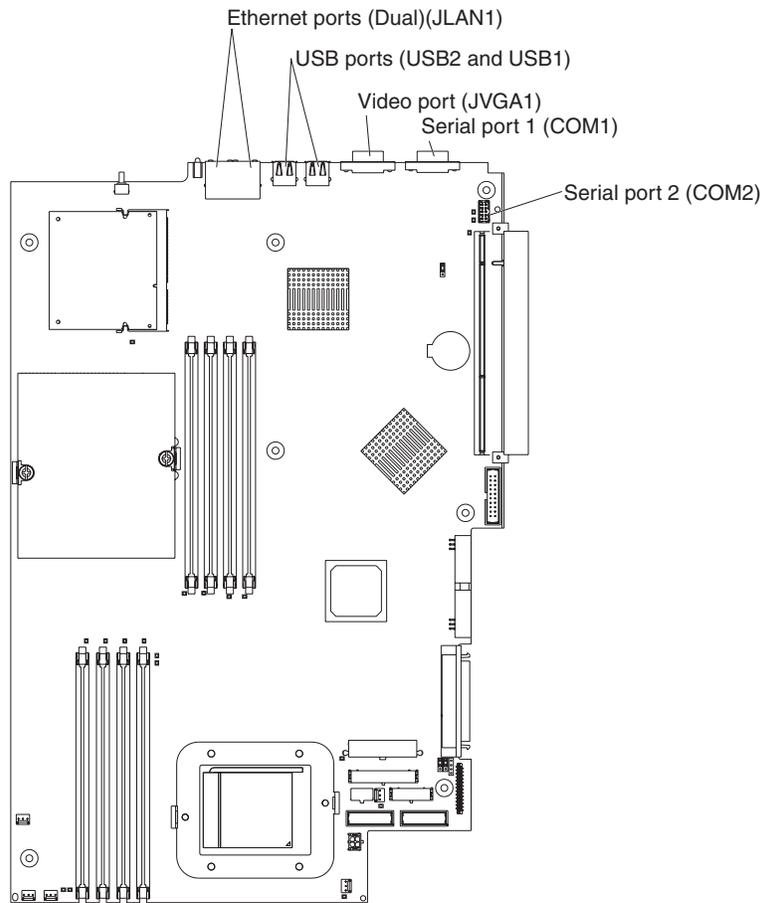
System-board LEDs

The following illustration shows the light-emitting diodes (LEDs) on the system board. For more information about the system-board LEDs, see the *Hardware Maintenance Manual and Troubleshooting Guide* on the IBM @server *Documentation* CD.
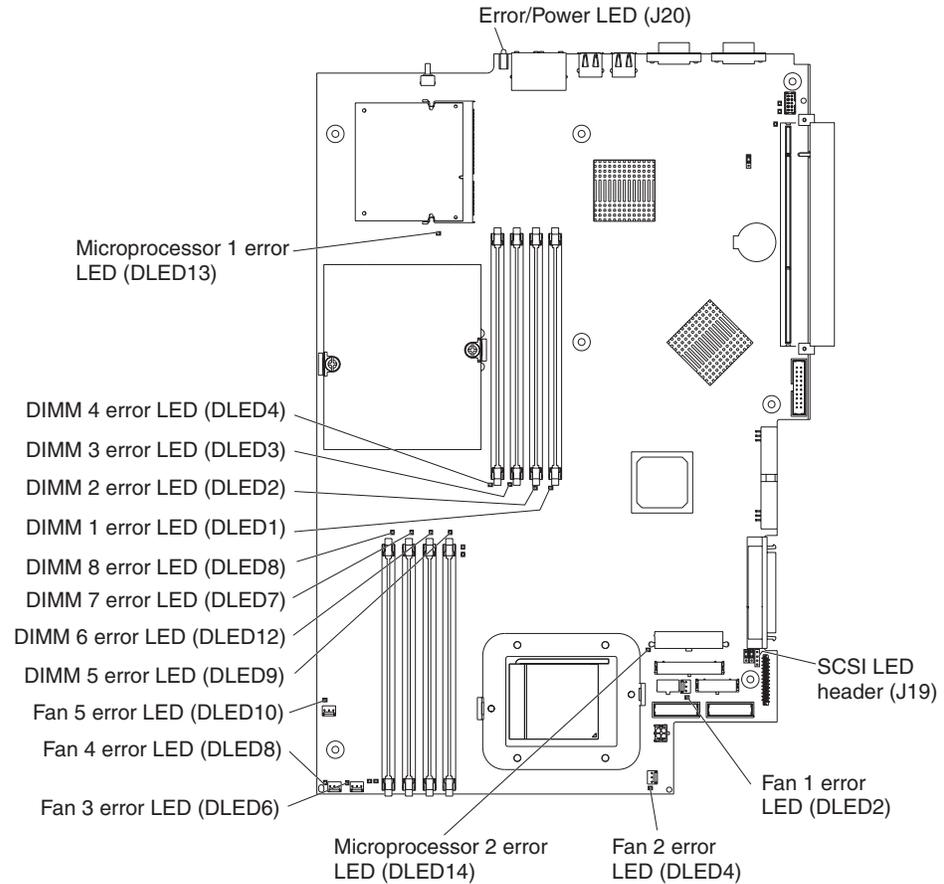
System-board option connectors

The following illustration shows the connectors on the system board for user-installable options.
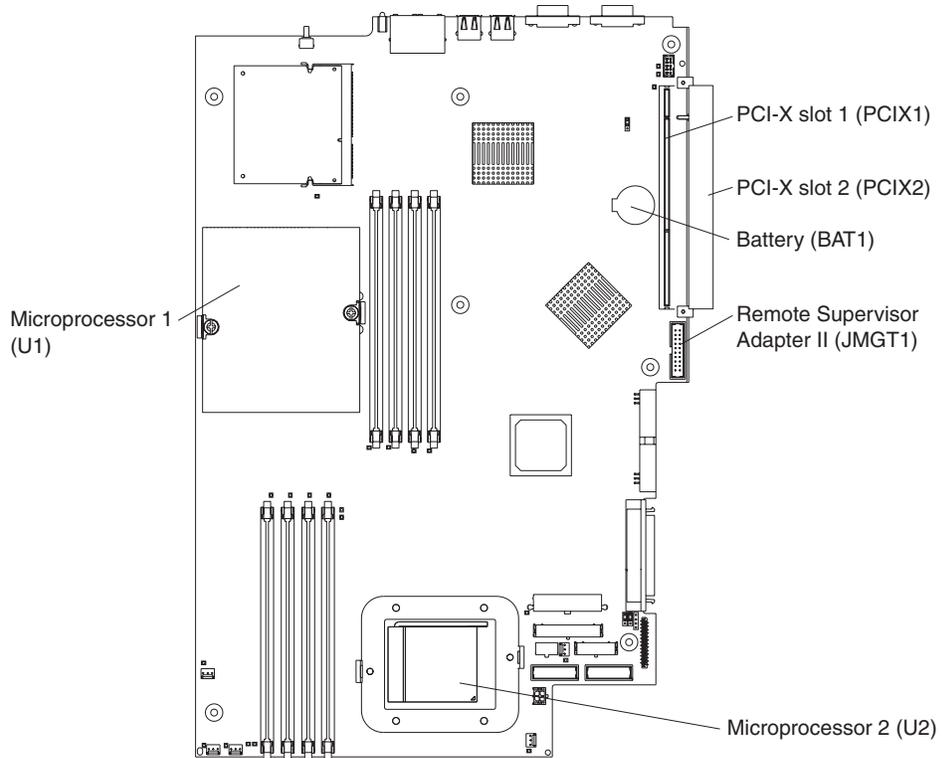
Note: The VRMs for the microprocessors are on the system board.

Chapter 2. Installing options

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

Installation guidelines

Before you begin installing options, read the following information:

- Read the safety information beginning on page v, and the guidelines in "Handling static-sensitive devices." This information will help you work safely with the server and options.
- Make sure that you have an adequate number of properly grounded electrical outlets for your server, monitor, and other devices.
- Back up all important data before you make changes to disk drives.
- Have a small flat-blade screwdriver available.
- For a list of supported options for the server, go to http://www.ibm.com/pc/us/compat/.

System reliability guidelines

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

- Each of the drive bays has a drive or a filler panel and electromagnetic compatibility (EMC) shield installed in it.
- There is adequate space around the server to allow the server cooling system to work properly. See the documentation that comes with the rack.
- You have followed the cabling instructions that come with optional adapters.
- You have replaced a failed fan as soon as possible.

Handling static-sensitive devices

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

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

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

Server power features

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

Turning on the server

Approximately 20 seconds after the server is connected to ac power, the power-control button becomes active, and you can turn on the server and start the operating system by pressing the power-control button.

The server can also be turned on in any of the following ways:
- If a power failure occurs while the server is turned on, the server will restart automatically when power is restored.
- If the server is connected to an Advanced System Management interconnect network that contains at least one server with an optional Remote Supervisor Adapter II installed, the server can be turned on from the Remote Supervisor Adapter II user interface.
- If your operating system supports the system-management software for an optional Remote Supervisor Adapter II (when available), the system-management software can turn on the server.
- If your operating system supports the Wake on LAN® feature, the Wake on LAN feature can turn on the server.

Turning off the server

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

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

Statement 5:

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

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

- You can turn off the server from the operating system, if your operating system supports this feature. After an orderly shutdown of the operating system, the server will be turned off automatically.
- You can press the power-control button to start an orderly shutdown of the operating system and turn off the server, if your operating system supports this feature.
- If the operating system stops functioning, you can press and hold the power-control button for more than 4 seconds to turn off the server.
- If the server is connected to an Advanced System Management interconnect network that contains at least one server with an optional Remote Supervisor Adapter II installed, the server can be turned off from the Remote Supervisor Adapter II user interface.
- If an optional Remote Supervisor Adapter II is installed in the server, the server can be turned off from the Remote Supervisor Adapter II user interface.
- If the Wake on LAN feature turned on the server, the Wake on LAN feature can turn off the server.
- The service processor can turn off the server as an automatic response to a critical system failure.
- You can turn off the server through a request from the service processor.

Removing the cover and bezel

Complete the following steps to remove the cover and bezel (with the server out of the rack):

1. Read the safety information beginning on page v, and "Installation guidelines" on page 9.
2. Turn off the server and all attached peripheral devices. Disconnect all power cords; then, disconnect all external signal cables from the server.

3. Remove the server from the rack. Lift the cover release latch; the cover slides to the rear approximately 13 mm (0.5 inch).
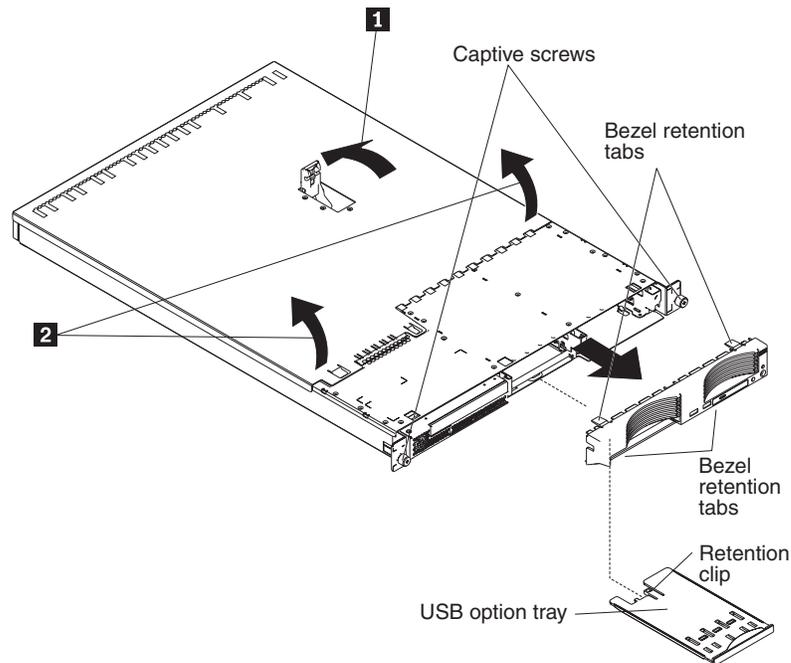
4. Lift the cover off the server.

   Attention: For proper cooling and airflow, replace the cover before turning on the server. Operating the server with the cover removed will damage server components.

5. If you are installing a non-hot-swap hard disk drive, remove the USB option tray. Press in on the USB option tray (below hard disk drive bay 1) to release it and slide the tray out until it stops; then, press the retention clip at the bottom rear of the tray and remove the tray from the server.

   Note: You need to remove the USB option tray and the bezel only if you are installing a non-hot-swap hard disk drive. It is not necessary if you are installing other options in the server.

6. Press on the bezel retention tabs on the top, right side and bottom of the server, and pull the bezel directly away from the server.

Installing an adapter

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

- 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 section. If you need to change switch settings or jumper settings on the adapter, follow the instructions that come with the adapter.
- The server comes with two peripheral component interconnect-extended (PCI-X) adapter expansion slots on the system board. You can install half-length adapters in slot 2. You can install full-length adapters in slot 1.
- In the default configuration for the PCI-X expansion slots (the jumper block on JPCIXB1 is on pins 2 and 3), slot 1 is a full-length 64-bit 133 MHz slot, and slot 2 is unavailable for use. When you move the jumper block on JPCIXB1 to pins 1

and 2, both expansion slots are configured as 64-bit 100 MHz slots. See "System-board switches and jumpers" on page 5 for the location of jumper JPCIXB1.

> **Note:** If you install both a 33 MHz adapter and a 66 MHz adapter, the PCI bus will operate at the slower speed.

- The server is designed specifically for PCI-X adapter support, but it also supports PCI adapters.
- The server supports 3.3 V and universal PCI and PCI-X adapters; it does not support 5.0-V-only adapters.
- The integrated video controller is on PCI bus 1. The integrated Ethernet controllers and the integrated SCSI controller are on PCI-X bus 2. PCI-X slot 1 and PCI-X slot 2 are on PCI-X bus 3.
- The server scans PCI-X slots 1 and 2 to assign system resources. By default, the server starts (boots) devices in the following order: system SCSI devices; PCI and PCI-X devices; then, IDE and SATA devices.

> **Note:** To change the boot precedence for PCI and PCI-X devices you must disable the devices through the Configuration/Setup Utility program. Start the Configuration/Setup Utility program and select **Startup** from the main menu. Then, select **Startup Sequence** and use the arrow keys to specify the startup order. For more information, see the *User's Guide* on the IBM @server *Documentation* CD.

- If you plan to install either an optional SCSI adapter or an optional redundant array of independent disks (RAID) adapter, you can install it in either of the PCI-X slots if the size of the adapter permits. The server supports a variety of RAID adapters for both internal and external configurations. For the most current list of supported RAID adapters, go to http://www.ibm.com/pc/us/compat/. For details about installing a RAID adapter, see the documentation that comes with the adapter.

> **Note:** A 64-bit 133 MHz adapter can be installed only in slot 1, and only if the jumper block on jumper JPCIXB1 is on pins 2 and 3.

• If you plan to use a RAID adapter to control internal hot-swap hard disk drives, disconnect the SCSI cable from the SCSI backplane signal connector (SCSI1) on the system board and connect it to the RAID adapter. The following illustration shows the cable routing if you are installing the RAID adapter in PCI-X slot 1. See the documentation that comes with the RAID adapter for any additional cabling instructions. That documentation also provides information about installing the RAID software and configuring the RAID adapter.

RAID adapter

SCSI cable

SCSI backplane
signal connector
(J8)

to hard disk drives

- If you plan to install an optional IBM Remote Supervisor Adapter II, install it in PCI-X slot 2. Use the ribbon cable that comes with the Remote Supervisor Adapter II to connect the 20-pin connector on the rear edge of the adapter to the Remote Supervisor Adapter II connector (JMGT1) on the system board. For details about installing a Remote Supervisor Adapter II, see the documentation that comes with the adapter. The following illustration shows the cable routing.
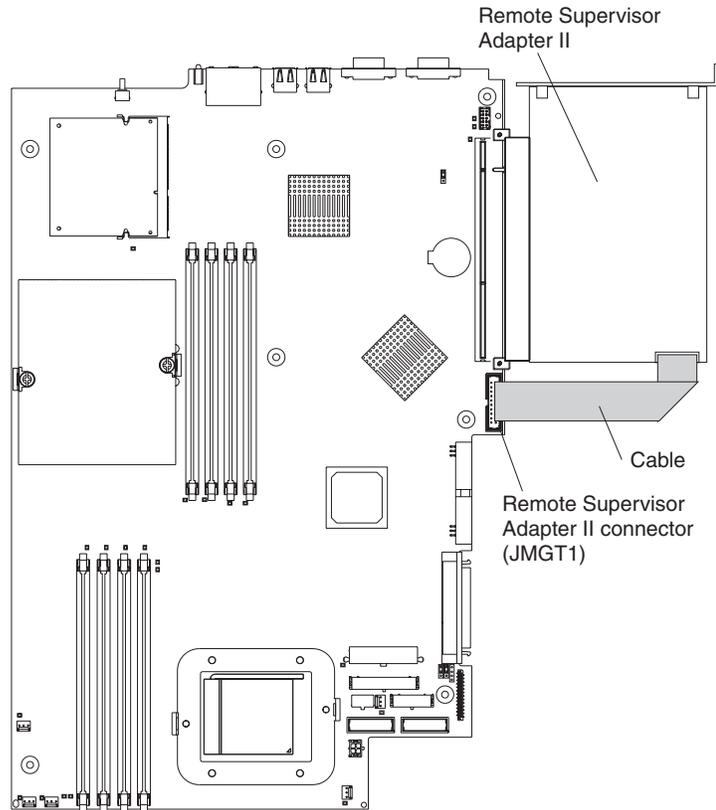
Complete the following steps to install an adapter:

1. Review the safety information beginning on page v, and "Installation guidelines" on page 9.
2. Turn off the server and all attached peripheral devices. Disconnect all power cords; then, disconnect all external signal cables from the server.
3. Remove the server from the rack; then, remove the server cover (see "Removing the cover and bezel" on page 11).
4. Determine which PCI-X slot you will use for the adapter.

PCI-X slot 1 (PCIX1)

PCI-X slot 2 (PCIX2)
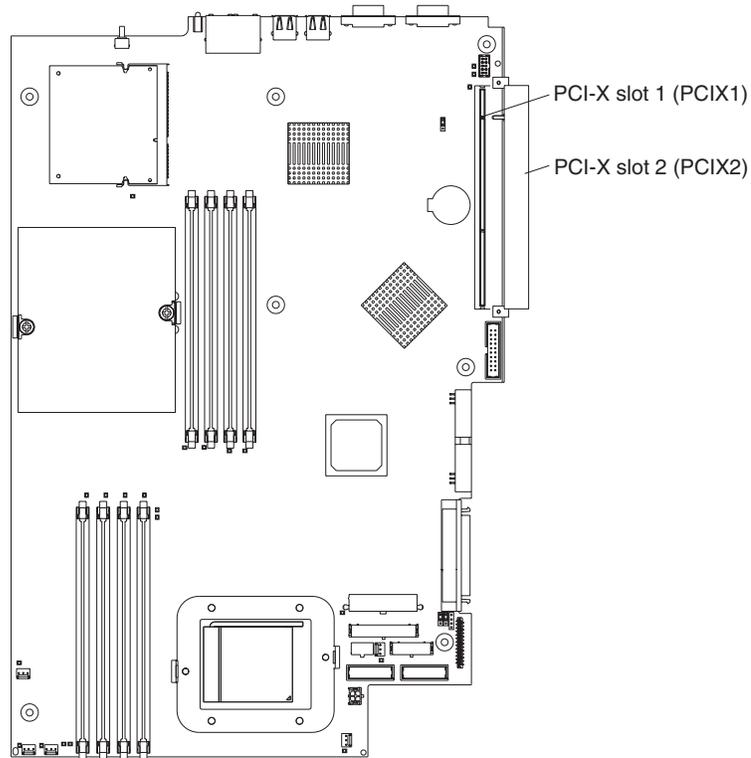
5. On the rear panel, squeeze the expansion-slot clip to unlock the clip; then, pull the clip out from the server until it stops and rotate the clip as shown in the following illustration. It remains loosely attached to the server.


Adapter
retention
bracket

Alignment tab

Power-cord
module

Retention clip

Expansion-
slot clip (adapter slot 1)

Expansion-
slot clip (adapter slot 2)
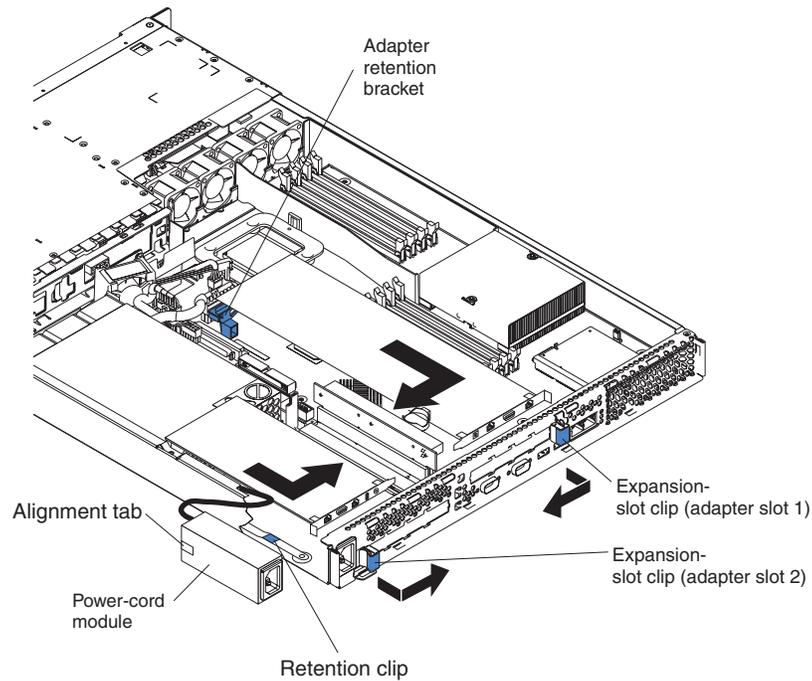
Attention: Avoid touching the components and gold-edge connectors on the adapter. Ensure that the adapter is completely and correctly seated in the slot. Incomplete insertion might cause damage to the system board or to the adapter.

6. Remove the expansion slot cover from the slot.
7. To gain access to PCI-X slot 1, remove the PCI riser card from its connector.

Riser card

System board
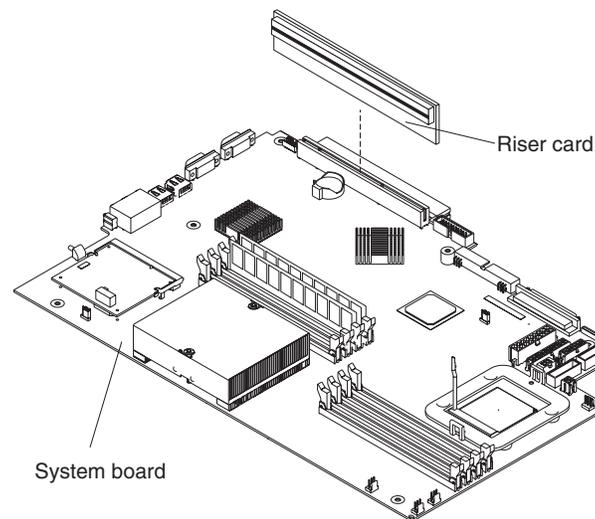
8. To gain access to PCI-X slot 2, remove the power-cord module.

   a. Press down on the retention clip at the front of the power-cord module and slide the module toward the front of the server until the alignment tab is free of the slot on the side of the server.

b. Lift and place the power-cord module out of the server as far as the power supply cable permits.

9. Install the adapter:

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

   a. Remove the adapter from the static-protective package and set any jumpers or switches on the adapter as directed by the adapter manufacturer. If you are installing a full-length adapter, you might have to remove a plastic bracket secured to the adapter with 2 screws before installing the adapter.

   Attention: When you install an adapter, make sure that the adapter is correctly seated in the connector before you turn on the server. Improperly seated adapters might cause damage to the system board, the riser card, or the adapter.

   b. If you are installing an adapter in PCI-X slot 1, attach the PCI riser card to the adapter. Reinstall the PCI riser card with the adapter already attached to the PCI riser card.

   c. Grasp the adapter by its top edge or upper corners, align it with the connector, and press it *firmly* into the connector.

10. Slide the expansion-slot clip toward the server until it snaps into place to secure the adapter in the adapter slot.

11. Connect any internal cables to the adapter. See the instructions that come with the adapter for details.

    Attention: Make sure that the cables do not block the flow of air from the fans.

12. If you removed the power-cord module to install the adapter in PCI-X slot 2, install the module by reversing the procedure in step 8a on page 17. Ensure that the alignment tab is fully seated in the slot on the side of the server.

13. If you installed the adapter in PCI-X slot 1, secure the adapter by flexing the adapter-retention bracket toward the front of the server and inserting the front corners of the adapter into the recesses in the latch.

14. Perform any configuration tasks required for the adapter.

    Note: If you installed a Remote Supervisor Adapter II:

    a. Refer to the documentation provided with the Remote Supervisor Adapter II for information about installing the Remote Supervisor Adapter II firmware and configuring the adapter.

    b. After you initially configure the adapter, you should create a backup copy of it so that if you need to replace the adapter in the future, you can restore the configuration and resume normal operation more quickly.

15. If you have other options to install, install them now. Otherwise, go to "Completing the installation" on page 33.

Installing a hard disk drive

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

- The server supports two 25.4-mm (1-inch), slim, 3.5-inch hard disk drives. SCSI server models come with a hot-swap SCSI backplane.

- The SCSI server models support low voltage differential (LVD) hot-swap drives. Each hot-swap drive is in a tray, which has a green activity LED and an amber status LED in the upper-right corner. These LEDs are lit if the drive is active and, in some cases, if the drive fails. Each hot-swap drive has a single-connector-attached (SCA) connector, which is connected directly into the hot-swap SCSI backplane. The backplane is attached to connector J12 on the system board and controls the SCSI IDs for the hot-swap drives.

    Note: The drive in bay 1 is assigned SCSI ID 0; the drive in bay 2 is assigned SCSI ID 1.

- A non-hot-swap hard disk drive does not require a backplane or tray and it does not have indicator LEDs. However, you must attach the blue rails that come with the drive before installing it in the server.

- A non-hot-swap hard disk drive has a jumper block on the rear. Install a jumper in the cable-selection position of the jumper block. For details, see the notes under step 4 on page 21, and the documentation that comes with the drive.

- If you install only one hard disk drive, for faster startup, install it in the primary startup device bay. For hot-swap SCSI drives, the drive in bay 1 is the primary startup device. For SATA drives, the drive in bay 2 is the primary startup device.

- If you are installing a hot-swap drive, continue with "Installing a hot-swap hard disk drive" on page 20. If you are installing a non-hot-swap drive, go to "Installing a non-hot-swap hard disk drive" on page 21.

Installing a hot-swap hard disk drive

Before you install a hot-swap hard disk drive, review the following information:

- Inspect the drive tray for any signs of damage.
- Ensure that the drive is installed in the tray correctly.
- If your server has an optional RAID adapter installed, see the documentation provided with the adapter for information about installing a hard disk drive.

Complete the following steps to install a hot-swap SCSI hard disk drive:
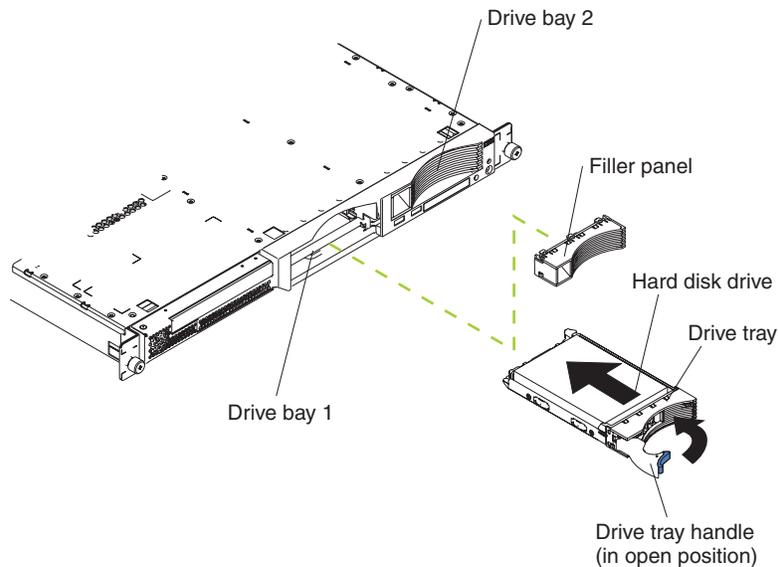
1. Read the safety information beginning on page v, and "Installation guidelines" on page 9.
2. Remove the filler panel from the applicable drive bay.

   Note: To ensure adequate system cooling, do not operate the server for more than 2 minutes without either a hard disk drive or a filler panel installed in each bay.
3. Install the new hard disk drive in the drive bay.
4. Check the hard disk drive status LED and activity LED to verify that the drive is operating correctly.
5. If you have other options to install, install them now. Otherwise, go to "Completing the installation" on page 33.

Installing a non-hot-swap hard disk drive

Before you install a non-hot-swap hard disk drive, read the following information:

- See the documentation that comes with the drive for any cabling instructions.
- Route the cable *before* you install the drive. Do not block the airflow from the fans.

Complete the following steps to install a non-hot-swap hard disk drive:
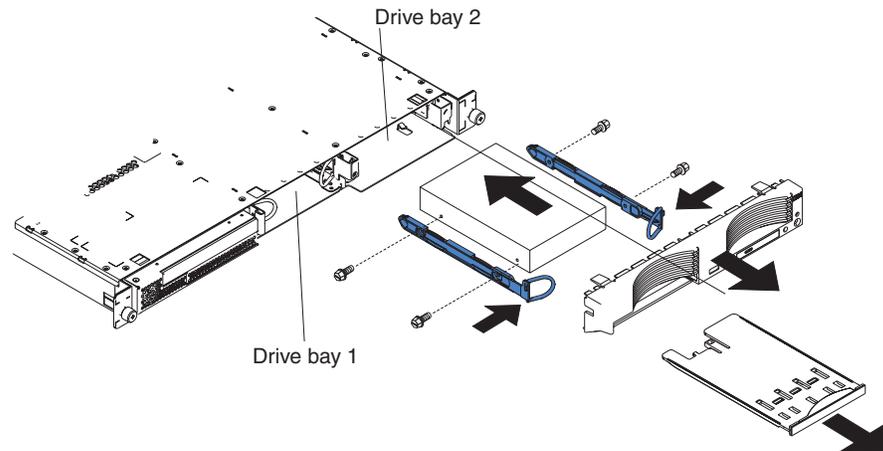
1. Read the safety information beginning on page v, and "Installation guidelines" on page 9.
2. Turn off the server and all attached peripheral devices. Disconnect all power cords; then, disconnect all external signal cables from the server.
3. Remove the server from the rack; then, remove the server cover (see "Removing the cover and bezel" on page 11).
4. Press in on the USB option tray to release it and slide the tray out until it stops; then, press the retention clip at the bottom rear of the tray and remove the tray from the server. Press on the bezel retention tabs and pull the bezel directly away from the server.

   Notes:

   a. If you have only one non-hot-swap hard disk drive, install it in the right-hand bay (bay 2) with a jumper installed in the cable-selection-enabled position of the jumper block on the rear of the drive.

   b. If you have two drives and you want the server to determine the master drive and subordinate drive automatically, install jumpers in the cable-selection-enabled position of the jumper block on both drives.

   c. If you want to assign master and subordinate drives manually, install a jumper in the master position for the drive in bay 2 and install a jumper in the subordinate position for the drive in bay 1.

5. Install the hard disk drive in the drive bay:

   a. Attach the rails to the sides of the drive using 2 screws for each rail.

   b. Slide the drive into the bay until the rail latches snap into place.

   c. Connect the signal and power cables to the rear of the drive. Keep the cables clear of the airflow path of the fan behind the drive bays.

6. If you have other options to install, install them now. Otherwise, go to "Completing the installation" on page 33.

Installing a memory module

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

- Your server uses interleaved dual inline memory modules (DIMMs), which you must add, remove, or replace in pairs. Each pair must be of the same type, capacity, and speed. The server comes with one pair of DIMMs installed in DIMM slots 1 and 2 on the system board.
- You can increase the amount of memory in the server by replacing the installed DIMMs with higher-capacity DIMMs or by installing additional pairs of DIMMs.
- To optimize system performance in a single-microprocessor configuration, install DIMMs in the following sequence:

DIMM pair	DIMM slots
1	1 and 2
2	3 and 4

- To optimize system performance in a dual-microprocessor configuration, install DIMMs in the following sequence:

DIMM pair	DIMM slots
1	1 and 2
2	7 and 8
3	3 and 4
4	5 and 6

- The server supports 512 MB, 1 GB, and 2GB DIMMs. The memory can be expanded to a maximum of 16 GB using PC2700 2GB DIMMs, and to a maximum of 8 GB using PC3200 DIMMs. See the ServerProven® list at http://www.ibm.com/pc/us/compat/ for a list of memory modules that the server supports.

  Important: For optimal system performance, make sure that the amount of memory installed is the same for each microprocessor. For example, if you want to install four 1GB DIMMs and four 512 MB DIMMs, install one pair of 1GB DIMMs and one pair of 512 MB DIMMs for each microprocessor so that the total amount of memory for each microprocessor equals 3 GB of RAM.

 The following illustration shows the memory slots on the system board.

DIMM 4 (DDR4)
DIMM 3 (DDR3)
DIMM 2 (DDR2)
DIMM 1 (DDR1)

DIMM 8 (DDR8)
DIMM 7 (DDR7)
DIMM 6 (DDR6)
DIMM 5 (DDR5)
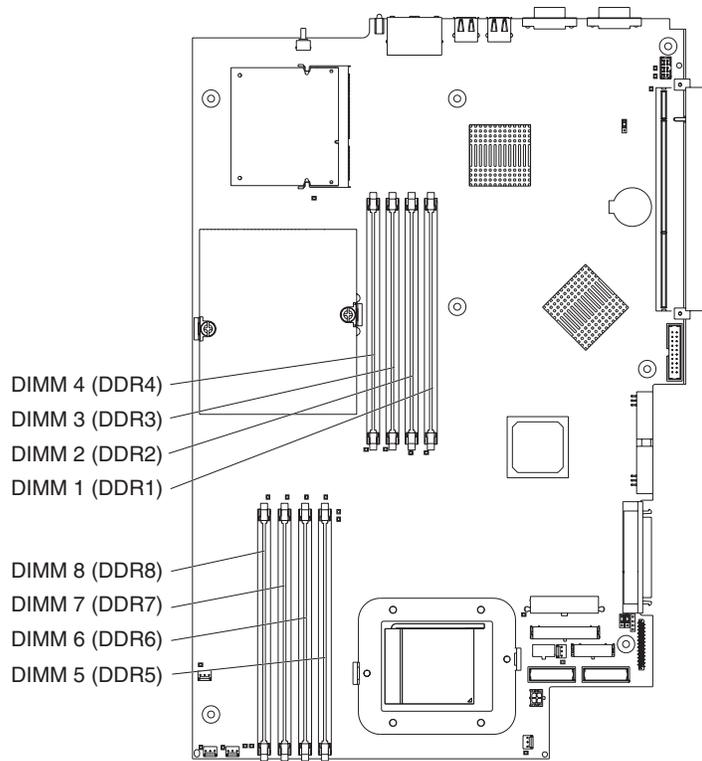
Complete the following steps to install DIMMs:

1. Review the safety information beginning on page v, and "Installation guidelines" on page 9.

2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.

3. Remove the server from the rack; then, remove the server cover (see "Removing the cover and bezel" on page 11).

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

4. Open the retaining clip on each end of the DIMM connector.

5. Touch the static-protective package containing the DIMM to any unpainted metal surface on the server. Then, remove the DIMM from the package.

6. Turn the DIMM so that the DIMM keys align correctly with the slot.
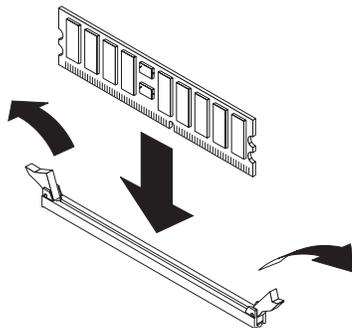
7. Insert the DIMM into the connector by aligning the edges of the DIMM with the slots at the ends of the DIMM connector. Firmly press the DIMM straight down into the connector by applying pressure on both ends of the DIMM

simultaneously. The retaining clips snap into the locked position when the DIMM is firmly seated in the connector. If there is a gap between the DIMM and the retaining clips, the DIMM has not been correctly inserted; open the retaining clips, remove the DIMM, and then reinsert it.

Important: In some memory configurations, the 3-3-3 beep code might sound during POST, followed by a blank monitor screen. If this occurs and the **Boot Diagnostic Screen** or **QuickBoot Mode** feature on the **Start Options** menu of the Configuration/Setup Utility program is enabled (its default setting), you must restart the server three times to force the basic input/output system (BIOS) to reset the configuration to the default configuration (the memory connectors enabled).

8. If you have other options to install, install them now. Otherwise, go to "Completing the installation" on page 33.

Installing an additional microprocessor

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

- The server comes with one microprocessor installed. The following illustration shows the two microprocessor sockets on the system board. The voltage regulator modules (VRMs) for microprocessors 1 and 2 are on the system board.
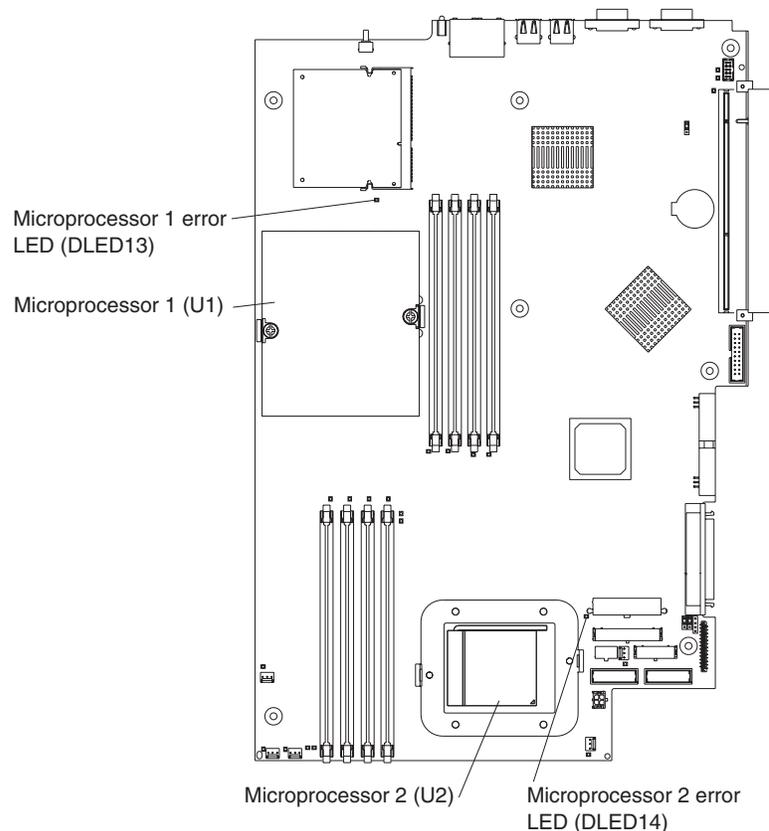
- If one microprocessor is installed, it is installed in microprocessor socket 1 (U1) and supports both the startup and application processes.
- If you install a second microprocessor in the server, the server operates as a symmetric multiprocessing (SMP) server, and operating-system application programs can distribute the processing load between the microprocessors. This

enhances performance for database and point-of-sale applications, integrated manufacturing solutions, and other applications. Microprocessor 2 is installed in socket 2 (U2).

- If one microprocessor and four DIMMs are installed in the server and you add a second microprocessor without adding more DIMMs, move the pair of DIMMs in memory slots 3 and 4 to memory slots 7 and 8.
- Read the documentation that comes with the microprocessor to determine whether you need to update the BIOS code. The most current level of BIOS code for the server is available at http://www.ibm.com/pc/support/. For additional information, see the *User's Guide* on the IBM @server *Documentation* CD.
- To use SMP, obtain an SMP-capable operating system. For a list of supported operating systems, go to http://www.ibm.com/pc/us/compat/.

Attention: To avoid damage and to ensure proper server operation, review the following information before you install a microprocessor:

- Make sure that the microprocessors are the same type, have the same cache size, and have the same clock speed.
- See the ServerProven list at http://www.ibm.com/pc/us/compat/ for a list of microprocessors that are supported by the server.

Complete the following steps to install a microprocessor:

1. Read the safety information beginning on page v, and "Installation guidelines" on page 9.
2. Turn off the server and all attached peripheral devices. Disconnect all power cords; then, disconnect all external signal cables from the server.
3. Remove the server from the rack; then, remove the server cover (see "Removing the cover and bezel" on page 11). Determine the socket where the microprocessor is to be installed.

   Attention:
   - Avoid touching the components and gold-edge connectors on the microprocessor. Make sure that the microprocessor is completely and correctly seated in the socket. Incomplete insertion might cause damage to the system board or to the microprocessor.
   - When you handle static-sensitive devices, take precautions to avoid damage from static electricity. For information about handling these devices, see "Handling static-sensitive devices" on page 9.
4. If you are installing a microprocessor in the microprocessor 2 socket, lift the microprocessor-locking lever to the open position.

Microprocessor-locking lever

Microprocessor socket
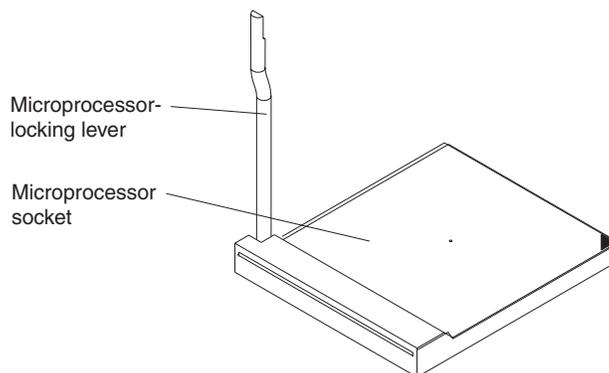
5. Install the microprocessor:
   a. Touch the static-protective package containing the new microprocessor to any *unpainted* metal surface on the server; then, remove the microprocessor from the package.
   b. Position the microprocessor over the microprocessor socket as shown in the following illustration. Carefully press the microprocessor into the socket.

   Attention: To avoid bending the pins on the microprocessor, do not use excessive force when pressing it into the socket.
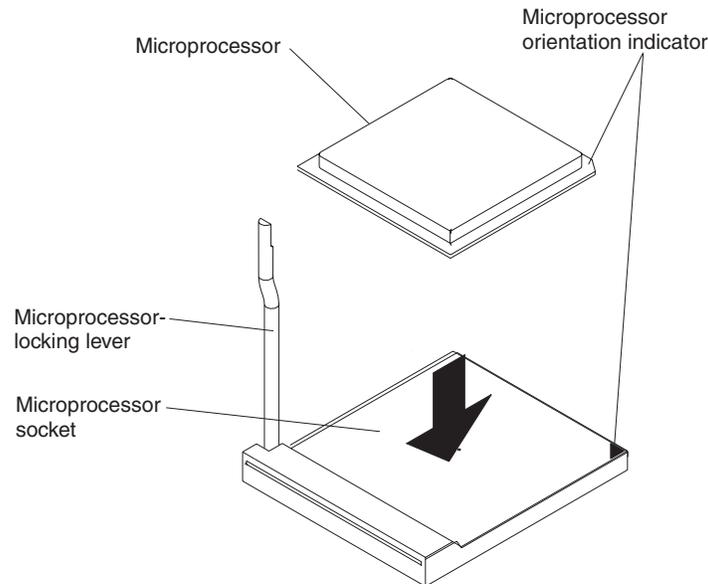
6. Close the microprocessor-locking lever to secure the microprocessor.

   Note: A new microprocessor comes in a kit with a heat sink.
7. Install the heat sink.

   Attention: Do not disturb or contaminate the thermal material on the bottom of the new heat sink. Doing so damages its heat-conducting capability and exposes the new microprocessor to overheating.
   a. Remove the heat sink from its package and remove the cover from the bottom of the heat sink.
   b. Make sure that the thermal material is still on the bottom of the heat sink, and position the heat sink on top of the microprocessor.
   c. Align the captive screws on the heat sink with the holes on the heat-sink retention module.
   d. Press firmly on the captive screws and tighten them, alternating between screws until they are tight. Do not overtighten the screws by using excessive force.

   Attention: If you need to remove the heat sink after installing it, note that the thermal material might have formed a strong bond between the heat sink and the microprocessor. Do not force the heat sink and microprocessor apart; doing so can damage the microprocessor pins. Loosening one captive screw fully before loosening the other captive screw helps break the bond between the components without damaging them.

Captive screws

Microprocessor 2

Heat sink

Heat-sink
retention module

Microprocessor socket
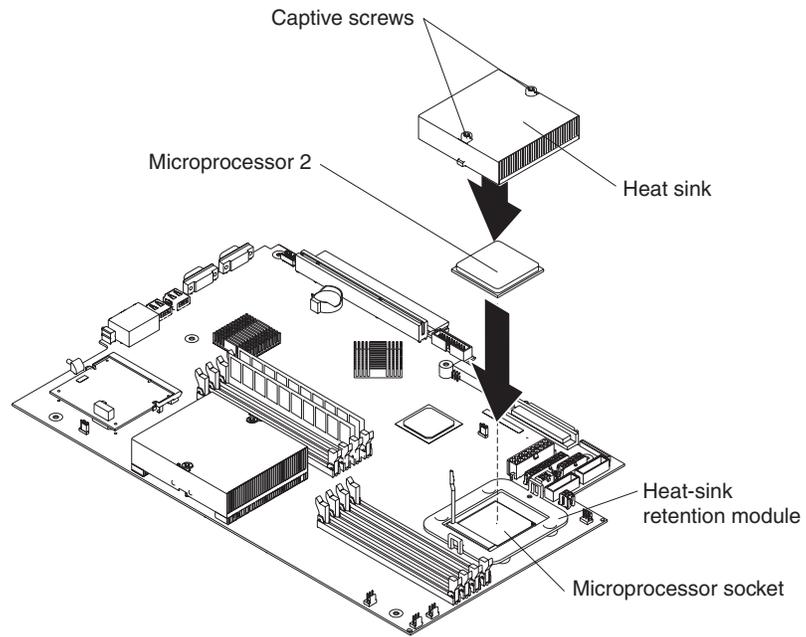
8. If you have other options to install, install them now. Otherwise, continue with "Completing the installation" on page 33.

Replacing the battery

When replacing the battery, you must replace it with a lithium battery of the same type, from the same manufacturer. To avoid possible danger, read and follow the safety statement below.

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

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

Statement 2:

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

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

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

**Note:** See "Battery return program" on page 39 for more information about battery disposal.

Complete the following steps to replace the battery:
1. Review the safety information beginning on page v, and "Installation guidelines" on page 9, and follow any special handling and installation instructions that come with the replacement battery.
2. Turn off the server and all attached peripheral devices. Disconnect all power cords; then, disconnect all external signal cables from the server.
3. Remove the server from the rack; then, remove the server cover (see "Removing the cover and bezel" on page 11).

   Attention: Do not remove the PCI adapter shield from the server.
4. Uncover the system board by pulling the PCI adapter shield to one side.

5. Locate the battery (connector BAT1) on the system board.

PCI-X slot 1 (PCIX1)

PCI-X slot 2 (PCIX2)

Battery (BAT1)

Remote Supervisor
Adapter II (JMGT1)

Microprocessor 1
(U1)

Microprocessor 2 (U2)
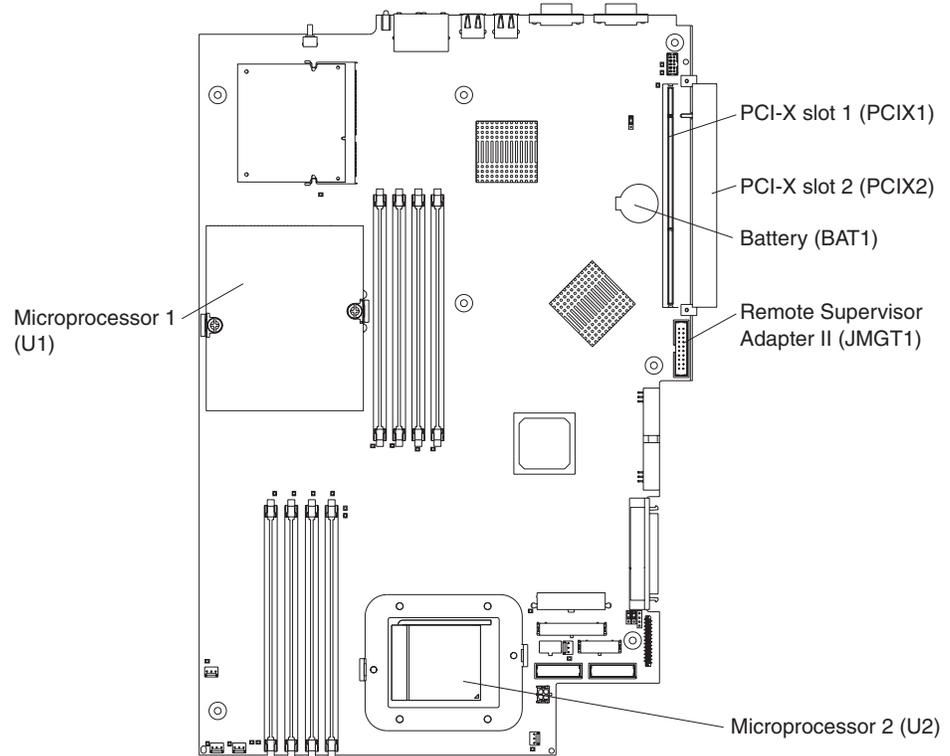
6. Remove the battery:
   a. Use one finger to press on the tab that secures the battery to its housing.
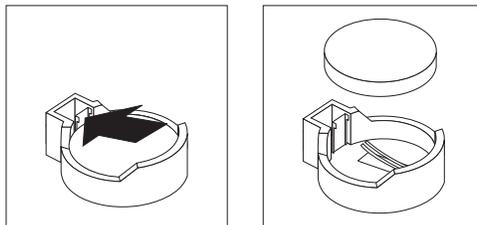
   b. Use one finger to slide the battery up and out from its socket. The spring mechanism will push the battery out toward you as you slide it from the socket.
7. Insert the new battery:
   a. Hold the battery so that the larger side is facing up.
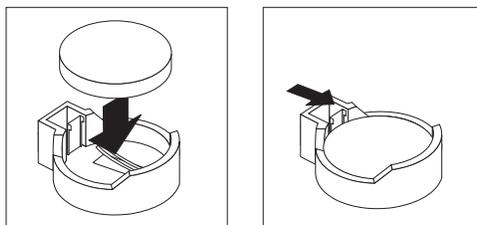
   b. Place the battery into its socket, and press the battery down until it snaps into place.
8. Put the PCI adapter shield back into place.
9. Reinstall the server cover, and connect the cables.

10. Turn on the server.

11. Start the Configuration/Setup Utility program and set configuration parameters.
   - Set the system date and time.
   - Set the user (power-on) password.
   - Reconfigure the server.

   For for information, see the section about using the Configuration/Setup Utility program in the *User's Guide* on the IBM @server *Documentation* CD.

Replacing a fan assembly

The server comes with five replaceable fans.

Complete the following steps to replace the fan assembly. Use this procedure to replace any fan in the server.

1. Review the safety information beginning on page v, and "Installation guidelines" on page 9.

2. Turn off the server and all attached peripheral devices. Disconnect all power cords; then, disconnect all external signal cables from the server.

3. Remove the server from the rack; then, remove the server cover (see "Removing the cover and bezel" on page 11).

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

4. Determine which fan to replace by checking the LED at each fan; a lit LED indicates the fan to replace.

   Note: For more information about the LEDs, see the *Hardware Maintenance Manual and Troubleshooting Guide* on the IBM @server *Documentation* CD.

5. Remove the fan from the server:
    a. Disconnect the fan cable from the system board.
   b. Lift the fan out of the server, noting its orientation in the server.
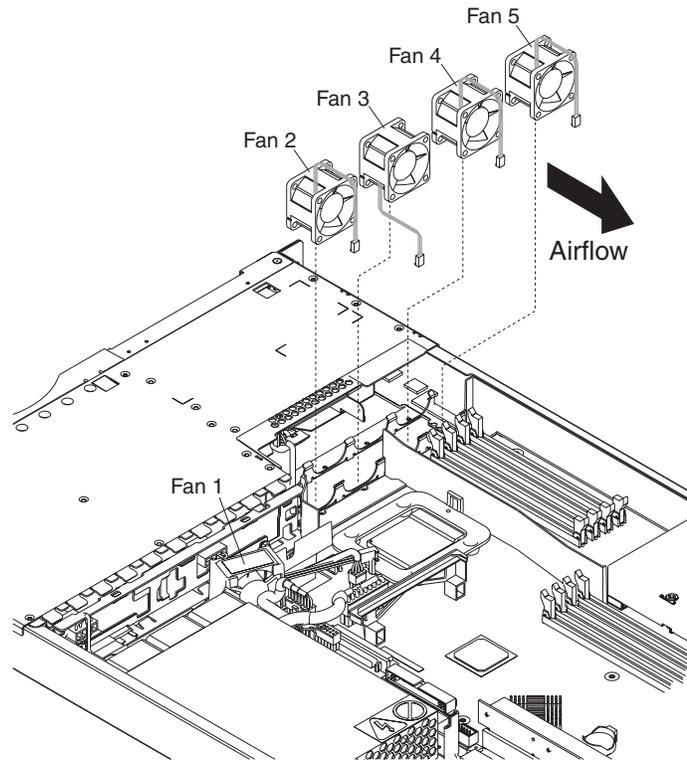
6. Position the replacement fan correctly:
    a. The airflow arrow on the side of the fan must point toward the rear of the server.
    b. Fans 2, 4, and 5 are positioned so that the fan cable exits from the fan near the top of the server.
    c. Fan 3 is positioned so that the fan cable exits from the fan near the bottom of the server (a 180° difference from Fans 2, 4, and 5).

    Note: Correct airflow is from the front to the rear of the server.
7. Connect the replacement fan cable to the system board.

    Note: If you are replacing more than one fan, install all fans in the server before connecting the cables to the system board.

Attention: Improper routing of the fan cables can result in crimps or cuts of the fan cabling, which might jeopardize fan performance. When routing cables, make sure that:

a. The cable for Fan 2 is routed up, and then through and around the heat sink duct, as shown in the following illustration.


Heat sink duct
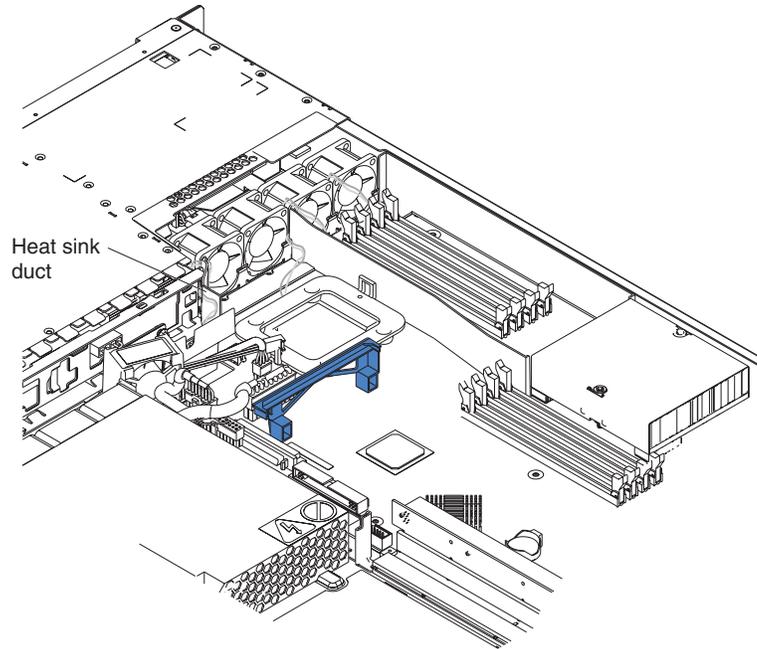
b. The cables for Fans 3, 4, and 5 are routed up, and then over to the appropriate connectors on the system board.

c. The fan cables do not come into contact with the metal fan bracket when installation is completed.

8. Continue with "Completing the installation" on page 33.

Completing the installation

Complete the following steps to complete the installation:

1. Position the internal cables so they do not interfere with the cover installation.

   Attention: Before sliding the cover forward, make sure that all the tabs on both the front and rear of the cover engage the chassis correctly. If all the tabs do not engage the chassis correctly, it will be very difficult to remove the cover later.

2. Position the cover on top of the server and slide it forward. Press down on the cover latch. The cover slides forward into position. Ensure that the cover engages the tabs at the front and rear of the server.
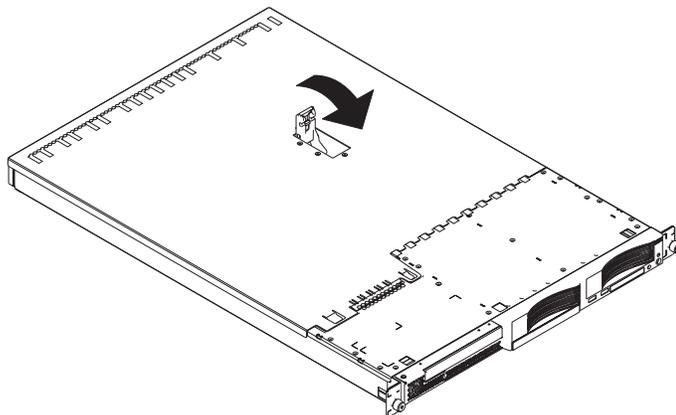
3. If you removed the bezel, position the bezel directly in front of the server and press it into place so that the retention tabs snap into the holes on the top, right side, and bottom of the server.

4. If you removed the USB option tray, insert it fully into the slot below hard disk drive bay 1.

5. Install the server in the rack. For details, see the *Rack Installation Instructions* that come with the server.

   Note: Depending on the options that you installed, after cabling the server, you might need to run the Configuration/Setup Utility program to update the server configuration. For more information, see "Updating the server configuration" on page 34 and the *User's Guide* on the IBM @server *Documentation* CD.

6. To attach peripheral devices and connect the power cord, continue with "Connecting the cables."

   Note: If you installed a SCSI drive, check the LEDs to verify proper operation after you reconnect the power cord.

Connecting the cables

This section provides basic information about attaching peripheral devices such as a keyboard and pointing device to the server.

For detailed information about external options and how to connect them to your server, see the documentation that comes with these options. For the location of external ports and connectors on the server, see the *User's Guide* on the IBM @server *Documentation* CD.

To attach non-USB devices to the server, use the cables that come with the devices and connect the cables to the appropriate ports on the server (see Chapter 3, "I/O connectors," on page 35).

To attach a USB device to the server, use the cable that comes with the device and connect the cable to one of the four USB ports on the server (see "Universal Serial Bus connectors" on page 36).

- If you want to attach a keyboard or mouse to this server, you must use a USB keyboard or a USB mouse. After installing a USB keyboard, you might need to use the Configuration/Setup Utility program to enable keyboardless operation and prevent POST error message 301 from being displayed during startup. For information about the Configuration/Setup Utility program, see the *User's Guide* on the IBM @server *Documentation* CD.

- You might want to create update diskettes that contain the latest baseboard management controller firmware and BIOS code. Use an external USB diskette drive if you want to attach a diskette drive to this server. For information about updating the baseboard management controller firmware and BIOS code, see the *User's Guide* on the IBM @server *Documentation* CD.

Depending on the options that you installed, after cabling the server, you might need to run the Configuration/Setup Utility program to update the server configuration. For more information, see "Updating the server configuration" and the *User's Guide* on the IBM @server *Documentation* CD.

Updating the server configuration

When you start the 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. For more information, see the section about configuring the server in the *User's Guide* on the IBM @server *Documentation* CD.

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

The server comes with at least one microprocessor installed on the system board. If you have installed an additional microprocessor, the server can now operate as an SMP server. Therefore, you might need to upgrade the operating system to support SMP. For additional information, see the operating-system documentation.

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

To configure the integrated Gigabit Ethernet controllers, see the section about configuring the Gigabit Ethernet controllers in the *User's Guide* on the IBM @server *Documentation* CD.

If you have just installed a Remote Supervisor Adapter II to manage the server from a remote location, see the documentation that comes with the adapter for information about setting up and configuring the adapter and using the adapter to manage the server remotely.

Chapter 3. I/O connectors

Your server has the following input/output (I/O) connectors:
* Two Ethernet (rear)
* One serial (rear)
* Four Universal Serial Bus (USB) (two front, two rear)
* One video (rear)

The following illustration shows the locations of the connectors on the front of the server.
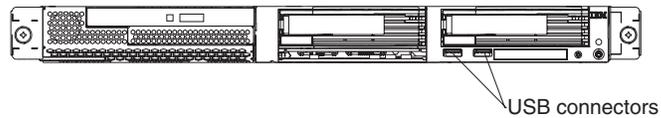
USB connectors

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

Power-cord connector

Serial connector

Video connector

USB connectors

Gigabit Ethernet 1 connector (LAN1)

Gigabit Ethernet 2 connector (LAN2)
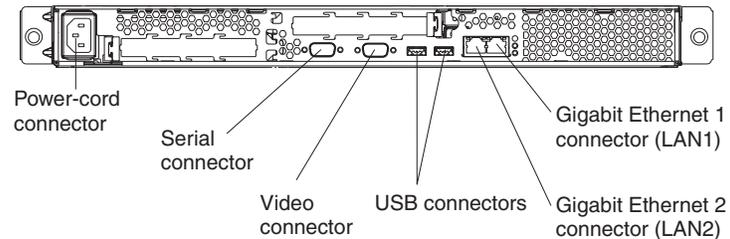
The following sections describe these connectors.

If you have an optional Remote Supervisor Adapter II (system-management adapter) installed in PCI-X slot 2, the adapter has an Ethernet connector, a serial connector, and an Advanced System Management (ASM) Interconnect connector. See the documentation that comes with the Remote Supervisor Adapter II for more information about these connectors and LEDs.

Ethernet (RJ-45) connectors

The following illustration shows two Ethernet connectors.

Activity LEDs   Link LEDs

1   8   1   8
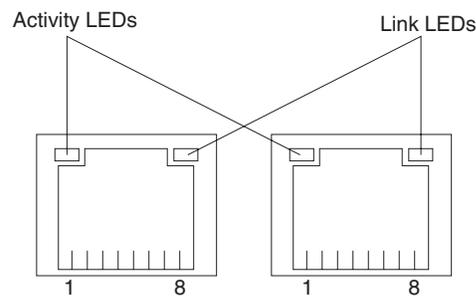
Connect Category 3, 4, or 5 unshielded twisted-pair cables to these connectors.
The 100BASE-TX and 1000BASE-T Fast Ethernet standards require Category 5 or
higher cabling.

For more information about the Ethernet controller, see the *User's Guide* on the
IBM @server *Documentation* CD.

Serial connector

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

1   5
6   9
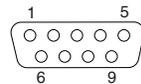
Universal Serial Bus connectors

Use a Universal Serial Bus (USB) connector to connect a USB device. USB
technology transfers data at up to 12 Mb per second (Mbps) with a maximum of
127 devices and a maximum signal distance of 5 meters (16 ft) per segment. Using
Plug and Play technology, USB devices are configured automatically. The following
illustration shows a USB connector.

1 2 3 4
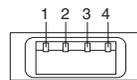
Use a 4-pin cable to connect a device to a USB connector. If you need to connect
more USB devices than the server has USB connectors for, use a USB hub to
connect additional devices.

Video connector

Use this connector to connect a monitor to the server. The connector is dark blue to
help you identify it. The following illustration shows a video connector.

5   1
15   11
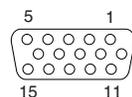
Appendix. Notices

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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.

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Notice to Customers

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這是甲類的資訊產品,在
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能會造成射頻干擾,在這
種情況下,使用者會被要
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声　　明
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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
02K0546	China
13F9940	Australia, Fiji, Kiribati, Nauru, New Zealand, Papua New Guinea
13F9979	Afghanistan, Albania, Algeria, Andorra, Angola, Armenia, Austria, Azerbaijan, Belarus, Belgium, Benin, Bosnia and Herzegovina, Bulgaria, Burkina Faso, Burundi, Cambodia, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Congo (Democratic Republic of), Congo (Republic of), Cote D'Ivoire (Ivory Coast), Croatia (Republic of), Czech Republic, Dahomey, Djibouti, Egypt, Equatorial Guinea, Eritrea, Estonia, Ethiopia, Finland, France, French Guyana, French Polynesia, Germany, Greece, Guadeloupe, Guinea, Guinea Bissau, Hungary, Iceland, Indonesia, Iran, Kazakhstan, Kyrgyzstan, Laos (People's Democratic Republic of), Latvia, Lebanon, Lithuania, Luxembourg, Macedonia (former Yugoslav Republic of), Madagascar, Mali, Martinique, Mauritania, Mauritius, Mayotte, Moldova (Republic of), Monaco, Mongolia, Morocco, Mozambique, Netherlands, New Caledonia, Niger, Norway, Poland, Portugal, Reunion, Romania, Russian Federation, Rwanda, Sao Tome and Principe, Saudi Arabia, Senegal, Serbia, Slovakia, Slovenia (Republic of), Somalia, Spain, Suriname, Sweden, Syrian Arab Republic, Tajikistan, Tahiti, Togo, Tunisia, Turkey, Turkmenistan, Ukraine, Upper Volta, Uzbekistan, Vanuatu, Vietnam, Wallis and Futuna, Yugoslavia (Federal Republic of), Zaire
13F9997	Denmark
14F0015	Bangladesh, Lesotho, Macao, Maldives, Namibia, Nepal, Pakistan, Samoa, South Africa, Sri Lanka, Swaziland, Uganda

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

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