System x3650 Type 7979

IBM

User's Guide

System x3650 Type 7979

User's Guide

IBM

Note:

Before using this information and the product it supports, read the general information in "Notices," on page 101.

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.

v

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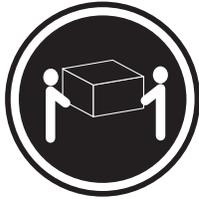
≥ 18 kg (39.7 lb)　　　　≥ 32 kg (70.5 lb)　　　　≥ 55 kg (121.2 lb)
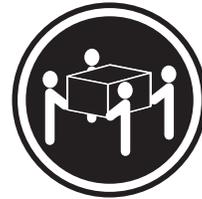
CAUTION:
Use safe practices when lifting.

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.

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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 26:

CAUTION:
Do not place any object on top of rack-mounted devices.

Attention: This server is suitable for use on an IT power distribution system, whose maximum phase to phase voltage is 240 V under any distribution fault condition.
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. The System x3650 Type 7979 server

The IBM® System x3650 Type 7979 server is a 2-U[1]-high server that is ideally suited for networking environments that require superior microprocessor performance, efficient memory management, and flexibility.

The server has two model styles, which are based on the size and number of hard disk drive bays:

- The *3.5-inch* models have six 3.5-inch hot-swap hard disk drive bays. Install only 3.5-inch drives in these models. If you intend to install a tape drive option, the tape drive will occupy two of the six 3.5-inch drive bays.
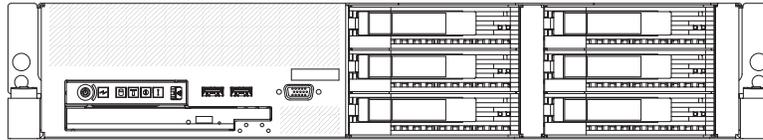
- The *2.5-inch* models have eight 2.5-inch hot-swap hard disk drive bays and one 3.5-inch tape drive bay. Install only 2.5-inch hard disk drives and an optional 3.5-inch tape drive in these models.

Throughout this documentation, the terms *2.5-inch models* and *3.5-inch models* will be used to distinguish between the server styles.

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

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

The server contains IBM X-Architecture™ technologies, which help increase performance and reliability. For more information, see "What your server offers" on page 5 and "Reliability, availability, and serviceability features" on page 7.

You can obtain up-to-date information about the server and other IBM server products at http:/www.ibm.com/systems/x/.

Related documentation

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

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1. Racks are measured in vertical increments of 1.75 inches each. Each increment is called a "U". A 1-U-high device is 1.75 inches tall.

1

- *Installation Guide*

  This printed document contains instructions for setting up the server and basic instructions for installing some options.
- *Warranty and Support Information*

  This document is in Portable Document Format (PDF) on the IBM *System x*™ *Documentation* CD. It contains information about the terms of the warranty and getting service and assistance.
- *Safety Information*

  This document is in PDF on the IBM *System x 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.
- *Problem Determination and Service Guide*

  This document is in PDF on the IBM *System x 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 *System x Documentation* CD.

The System x and xSeries Tools Center is an online information center that contains information about tools for updating, managing, and deploying firmware, device drivers, and operating systems. The System x and xSeries Tools Center is at http://publib.boulder.ibm.com/infocenter/toolsctr/v1r0/index.jsp.

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

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

1. Go to http://www.ibm.com/servers/eserver/support/xseries/index.html.
2. From the **Hardware** list, select **System x3650** and click **Go**.
3. Click the **Install and use** tab.
4. Click **Product documentation**.

Notices and statements in this document

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

The following notices and statements are used in this document:
- **Note:** These notices provide important tips, guidance, or advice.
- **Important:** These notices provide information or advice that might help you avoid inconvenient or problem situations.

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

Features and specifications

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

Racks are marked in vertical increments of 4.45 cm (1.75 inches). Each increment is referred to as a unit, or "U." A 1-U-high device is 1.75 inches tall.

Notes:

1. Power consumption and heat output vary depending on the number and type of optional features that are installed and the power-management optional features that are in use.

2. The sound levels were measured in controlled acoustical environments according to the procedures specified by the American National Standards Institute (ANSI) S12.10 and ISO 7779 and are reported in accordance with ISO 9296. Actual sound-pressure levels in a given location might exceed the average values stated because of room reflections and other nearby noise sources. The declared sound-power levels indicate an upper limit, below which a large number of computers will operate.

Table 1. Features and specifications

Microprocessor:
- Intel® Xeon™ FC-LGA 771 dual-core with 4096 KB (minimum) Level-2 cache
- Support for up to two microprocessors
- Support for Intel Extended Memory 64 Technology (EM64T)

Note:
- Use the Configuration/Setup Utility program to determine the type and speed of the microprocessors.
- For a list of supported microprocessors, see http://www.ibm.com/servers/eserver/serverproven/compat/us/

Memory:
- Twelve DIMM connectors
- Minimum: 1 GB
- Maximum: 48 GB
- Type: Fully Buffered DIMM (FBD) PC2-5300 DIMMs only
- Sizes: 512 MB, 1 GB, 2 GB, or 4 GB (when available), in pairs
- Chipkill™ supported

Drives:

CD/DVD: IDE 24x CD-RW/ 8x DVD combination

Expansion bays:
- Hot-swap hard disk drive bays: SAS only. Number and size depend on the server model. One of the following configurations:
  - Six 3.5-inch drive bays (optional tape drive requires two of these bays)
  - Eight 2.5-inch drive bays and one tape drive bay
- One 5.25-inch Ultrabay Enhanced bay (CD-RW/DVD drive installed)

Expansion slots:
- Two PCI Express x8 slots (x4 lanes) on system board (low profile)
- Support for either of the following optional riser cards:
  - Riser card with two PCI Express x8 slots (x8 lanes) (standard)
  - Riser card with two 133 MHz/64-bit PCI-X slots

Hot-swap fans:
- Standard: Five
- Maximum: Ten - provide redundant cooling

Hot-swap power supplies:

835 watts (100-240 V ac)
- Minimum: One
- Maximum: Two - provide redundant power

Size (2 U):
- Height: 85.4 mm (3.36 in.)
- Depth: 705 mm (27.8 in.)
- Width: 443.6 mm (17.5 in.)
- Weight: approximately 21.09 kg (46.5 lb) to 29.03 kg (64 lb) depending upon configuration

Integrated functions:
- Baseboard management controller
- Two Broadcom 10/100/1000 Ethernet controllers with Wake on LAN® support and TCP/IP Offload Engine (TOE) support
- One RAID controller, active only when a ServeRAID 8k or 8k-I SAS controller is installed
- One serial port
- One serial-attached SCSI (SAS) controller
- Seven Universal Serial Bus (USB) ports (two on front and four on rear of server, plus one internal), v2.0 supporting v1.1
- Two video ports (one on front and one on rear of server)
- One internal serial ATA (SATA) connector for tape
- Support for Remote Supervisor Adapter II SlimLine

Note: In messages and documentation, the term *service processor* refers to the baseboard management controller or the optional Remote Supervisor Adapter II SlimLine.

Video controller:
- ATI RN50 video on system board
- Compatible with SVGA and VGA
- 16 MB DDR video memory

ServeRAID SAS controller:
- ServeRAID™-8k-I SAS Controller that supports RAID levels 0, 1, 10 (standard)
- Upgradeable to ServeRAID-8k SAS Controller, 256 MB with battery backup, that supports RAID levels 0, 1, 1E, 5, 6, and 10

Environment:
- Air temperature:
  - Server on: 10° to 35°C (50.0° to 95.0°F); altitude: 0 to 914.4 m (3000 ft). Decrease system temperature by 0.75°C for every 1000-foot increase in altitude.
  - Server off: 10° to 43°C (50.0° to 109.4°F); maximum altitude: 2133 m (7000 ft)
  - Shipment: -40° to +60°C (-40° to 140°F); maximum altitude: 2133 m (7000 ft)
- Humidity:
  - Server on/off: 8% to 80%
  - Shipment: 5% to 100%

Acoustical noise emissions:
- Declared sound power, idle: 6.8 bel
- Declared sound power, operating: 6.8 bel

Heat output:

Approximate heat output in British thermal units (Btu) per hour:
- Minimum configuration: 1230 Btu per hour (360 watts)
- Maximum configuration: 3390 Btu per hour (835 watts)

Electrical input:
- Sine-wave input (50-60 Hz) required
- Input voltage range automatically selected
- Input voltage low range:
  - Minimum: 100 V ac
  - Maximum: 127 V ac
- Input voltage high range:
  - Minimum: 200 V ac
  - Maximum: 240 V ac
- Input kilovolt-amperes (kVA) approximately:
  - Minimum: 0.29 kVA
  - Maximum: 1.00 kVA

What your server offers

The server uses the following features and technologies:

- **Baseboard management controller**

  The baseboard management controller (BMC) provides basic service-processor environmental monitoring functions. If an environmental condition exceeds a threshold or if a system component fails, the baseboard management controller lights LEDs to help you diagnose the problem.

  The baseboard management controller also provides remote server management capabilities through the OSA SMBridge management utility program.

- **IBM Director**

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

- **IBM X-Architecture technology**

  IBM X-Architecture technology combines proven, innovative IBM designs to make your Intel-processor-based server powerful, scalable, and reliable. For more information, see http://www.ibm.com/servers/eserver/xseries/xarchitecture/enterprise.html.

  - **Active™ Memory**

    The Active Memory feature improves the reliability of memory through memory mirroring and online-spare memory. Memory mirroring stores data in two pairs of DIMMs simultaneously. Online-spare memory disables a failed pair of DIMMs from the system configuration and activates a pair of online-spare DIMMs. For more information, see "Installing a memory module" on page 56.

  - **Large system-memory capacity**

    The server supports up to 48 GB of system memory. The memory controller supports up to 12 industry-standard, x4 or x8, PC2-5300 fully-buffered dual inline memory modules (FBD DIMMs).

- **IBM *ServerGuide™ Setup and Installation* CD**

  The *ServerGuide Setup and Installation* CD that comes with the server provides programs to help you set up the server and install a Windows® operating system. The ServerGuide program detects installed hardware options and provides the correct configuration programs and device drivers. For more information about the *ServerGuide Setup and Installation* CD, see "Using the ServerGuide Setup and Installation CD" on page 79.

- **Integrated network support**

  The server comes with two integrated Broadcom Gigabit Ethernet controllers, which support connection to a 10-Mbps, 100-Mbps, or 1000-Mbps network. For more information, see "Configuring the Gigabit Ethernet controllers" on page 96.

- **Large data-storage and hot-swap capability**

  The 3.5-inch model server supports up to six slim, 3.5-inch hot-swap hard disk drives in the hot-swap bays. The 2.5-inch model server supports up to eight 2.5-inch hot-swap hard disk drives in the hot-swap bays. With the hot-swap feature, you can add, remove, or replace hard disk drives without turning off the server.

- **Light path diagnostics**

  Light path diagnostics provides LEDs to help you diagnose problems. For more information, see the section about light path diagnostics in the *Problem Determination and Service Guide.*

- **Memory mirroring**

  Memory mirroring improves the reliability of memory by writing information to the main memory and redundant locations in a mirrored pair of DIMMs.

- **Online-spare memory**

  Online-spare memory disables a failed pair of DIMMs from the system configuration and activates an online-spare DIMM pair to replace the failed pair.

- **PCI Express adapter capabilities**

  The server has two slots for low-profile PCI Express x4 adapters. These slots accept x8 adapters, but the adapters will operate as x4 adapters. The server also has two slots for PCI Express x8 adapters (on the riser card, full-height, one full-length and one half-length).

  Note: You can replace these PCI Express x8 slots with PCI-X 133 MHz slots by replacing the PCI Express riser-card assembly with an optional PCI-X riser-card assembly.

- **PowerExecutive**

  PowerExecutive™ is an IBM Director extension that measures and reports server power consumption as it occurs. This enables you to monitor power consumption in correlation to specific software application programs and hardware configurations. You can obtain the measurement values through the systems-management interface, and can view them using IBM Director. For more information, including the required levels of IBM Director and PowerExecutive, see the IBM Director documentation on the IBM Director CD, or see www.ibm.com/servers/eserver/ xseries/systems_management/ibm_director/ extensions.

- **Redundant connection**

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

- **Redundant cooling and power capabilities**

  The server supports up to 10 hot-swap fans, in multiples of 5, which provide redundant cooling. Redundant cooling enables continued operation if one of the fans fails. The server supports up to two 835-watt power supplies, which provide redundancy and hot-swap capability for a typical configuration. If the maximum load on the server is less than 835 watts and a problem occurs with one of the power supplies, the other power supply can meet the power requirements.

- **ServeRAID support**

  The server supports an internal ServeRAID-8k or 8k-I SAS Controller, which is required for you to use the hot-swap hard disk drives and to create redundant array of independent disks (RAID) configurations.

- **Systems-management capabilities**

  The server supports an optional IBM Remote Supervisor Adapter II SlimLine. When you use this adapter, you can manage the functions of the server locally and remotely. The Remote Supervisor Adapter II SlimLine also provides system monitoring, event recording, and dial-out alert capability.

- **TCP/IP offload engine (TOE) support**

  The Ethernet controllers in the server support TOE, which is a technology that offloads the TCP/IP flow from the microprocessors and I/O subsystem to increase the speed of the TCP/IP flow. When an operating system that supports TOE is running on the server and TOE is enabled, the server supports TOE operation. See the operating-system documentation for information about enabling TOE.

  Note: As of the date of this document, the Linux operating system does not support TOE.

Reliability, availability, and serviceability features

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

The server has the following RAS features:
- Automatic error retry and recovery
- Automatic restart after a power failure
- Backup basic input/output system (BIOS) switching under the control of the baseboard management controller
- Baseboard management controller (service processor)
- Built-in monitoring for fan, power, temperature, voltage, and power-supply redundancy
- Cable-presence detection on most connectors
- Chipkill memory protection
- Error codes and messages
- Error correcting code (ECC) L2 cache and system memory
- Fully-buffered DIMMs (FBD) support
- Hot-swap cooling fans with speed-sensing capability
- Hot-swap hard disk drives
- Hot-spare memory
- Information and light path diagnostics LED panels
- Memory mirroring
- Menu-driven setup, system configuration, and redundant array of independent disks (RAID) configuration programs
- Parity checking or CRC checking on the serially-attached SCSI (SAS) bus and PCI buses
- Power management: compliance with Advanced Configuration and Power Interface (ACPI)
- Power-on self-test (POST)
- Predictive Failure Analysis® (PFA) alerts
- Redundant Ethernet capabilities with failover support
- Redundant hot-swap power supplies and redundant hot-swap fans
- Remind button to temporarily turn off the system-error LED
- Remote system problem-determination support
- Standby voltage for systems-management features and monitoring
- Startup (boot) from LAN through Preboot Execution Environment (PXE) boot agent utility or dynamic host configuration protocol/boot protocol (DHCP/BOOTP)
- System auto-configuring from the configuration menu
- System error logging (POST and service processor)
- Systems-management monitoring through the Inter-Integrated Circuit (I^2C) bus
- Upgradeable POST, BIOS, diagnostics, service processor microcode, and read-only memory (ROM) resident code, locally or over the LAN

- Vital product data (VPD) on microprocessors, system board, power supplies, SAS (hot-swap-drive) backplane, and power backplane
- Wake on LAN capability

IBM Director

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

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

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

- Advanced self-management capabilities for maximum system availability
- Multiple operating-system platform support, including Microsoft® Windows 2000 Server, Windows Server 2003, Windows XP Professional, AIX, i5/OS, Red Hat Linux, SUSE Linux, VMware, and Novell NetWare. For a complete list of operating systems that support IBM Director, see the IBM Director Compatibility Document. This document is in Portable Document Format (PDF) at http://www.ibm.com/pc/support/site.wss/document.do?lndocid=MIGR-61788. It is updated every 6 to 8 weeks.
- Support for IBM and non-IBM servers, desktop computers, workstations, and mobile computers
- Support for systems-management industry standards
- Integration into leading workgroup and enterprise systems-management environments
- Ease of use, training, and setup

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

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

For more information about IBM Director, see the documentation on the *IBM Director* CD that comes with the server, the IBM Director Information Center at http://publib.boulder.ibm.com/infocenter/eserver/v1r2/topic/diricinfo/ fqm0_main.html, and the IBM xSeries Systems Management Web page at http://www.ibm.com/ servers/eserver/xseries/systems_management/, which presents an overview of IBM Systems Management and IBM Director.

The Update*Xpress* program

The Update*Xpress* program is available for most System x and xSeries® servers and server options. It detects supported and installed device drivers and firmware in the server and installs available updates. You can download the Update*Xpress* program from the Web at no additional cost, or you can purchase it on a CD. To

download the program or purchase the CD, go to http://www.ibm.com/servers/
eserver/xseries/systems_management/sys_migration/xpress.html.

Server controls, LEDs, and power

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

Front view

The following illustration shows the controls, light-emitting diodes (LEDs), and
connectors on the front of the 3.5-inch model server.
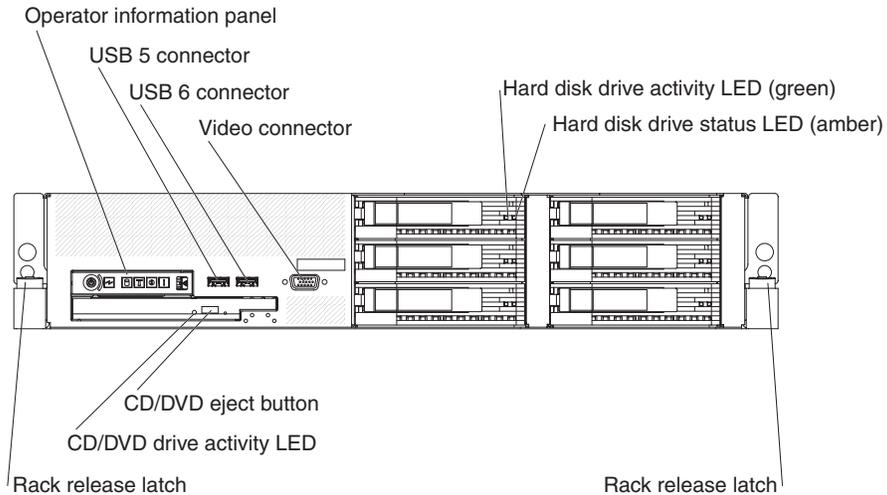
Operator information panel

USB 5 connector

USB 6 connector

Video connector

Hard disk drive activity LED (green)

Hard disk drive status LED (amber)

CD/DVD eject button

CD/DVD drive activity LED

Rack release latch

Rack release latch

The following illustration shows the controls, light-emitting diodes (LEDs), and
connectors on the front of the 2.5-inch model server.

Operator information panel

USB 5 connector

USB 6 connector

Video connector

Tape drive bay

Hard disk drive activity LED (green)

Hard disk drive status LED (amber)

CD/DVD eject button

CD/DVD drive activity LED

Rack release latch

Rack release latch
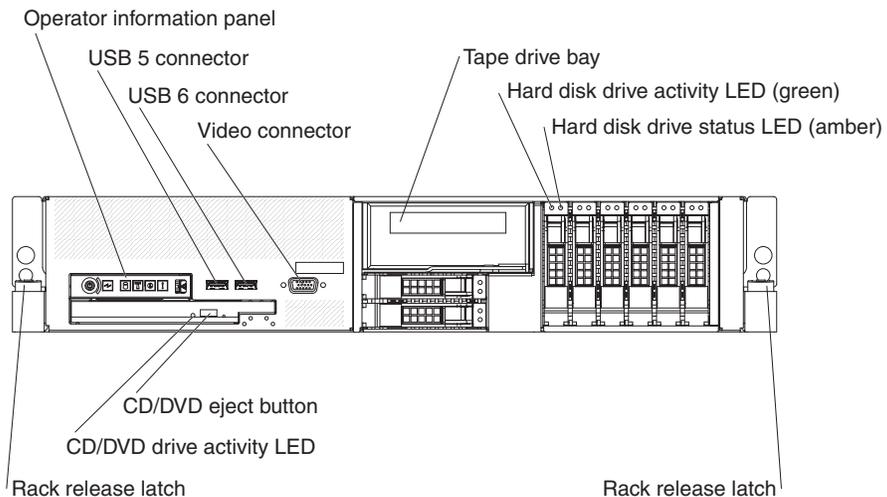
Operator information panel: This panel contains controls, LEDs, and connectors.
The following illustration shows the controls, LEDs, and connectors on the operator
information panel.

Power-on
LED | Hard disk drive
activity LED | Information
LED | Release
latch

Power-control
button | System
locator
LED | System-error
LED
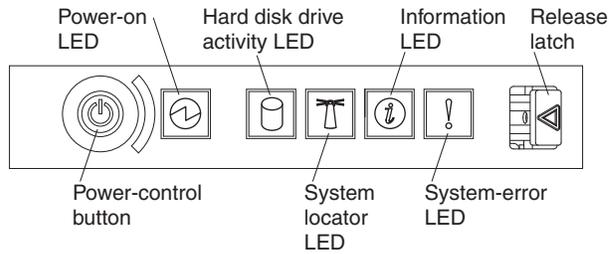
The following controls, LEDs, and connectors are on the operator information panel:

- **Power-control button:** Press this button to turn the server on and off manually. A power-control-button shield comes installed on the server to prevent the server from being turned off accidentally.
- **Power-on LED:** When this LED is lit and not flashing, it indicates that the server is turned on. When this LED is flashing, it indicates that the server is turned off and still connected to an ac power source. When this LED is off, it indicates that ac power is not present, or the power supply or the LED itself has failed.

   Note: If this LED is off, it does not mean that there is no electrical power in the server. The LED might be burned out. To remove all electrical power from the server, you must disconnect the power cord from the electrical outlet.
- **Hard disk drive activity LED:** When this LED is flashing, it indicates that a hard disk drive is in use.
- **System-locator LED:** Use this LED to visually locate the server among other servers. You can use IBM Director to light this LED remotely.
- **Information LED:** When this LED is lit, it indicates that a noncritical event has occurred. An LED on the light path diagnostics panel is also lit to help isolate the error.
- **System-error LED:** When this LED is lit, it indicates that a system error has occurred. An LED on the light path diagnostics panel is also lit to help isolate the error.
- **Release latch:** Slide this latch to the left to access the light path diagnostics panel, which is behind the operator information panel.

USB connectors: Connect a USB device, such as USB mouse, keyboard, or other USB device, to either of these connectors.

Video connector: Connect a monitor to this connector. The video connectors on the front and rear of the server can be used simultaneously.

Hard disk drive activity LED: Each hot-swap hard disk drive has an activity LED. When this LED is flashing, it indicates that the drive is in use.

Hard disk drive status LED: Each hot-swap hard disk drive has a status LED. When this LED is lit, it indicates that the drive has failed. When this LED is flashing slowly (one flash per second), it indicates that the drive is being rebuilt as part of a RAID configuration. When the LED is flashing rapidly (three flashes per second), it indicates that the controller is identifying the drive.
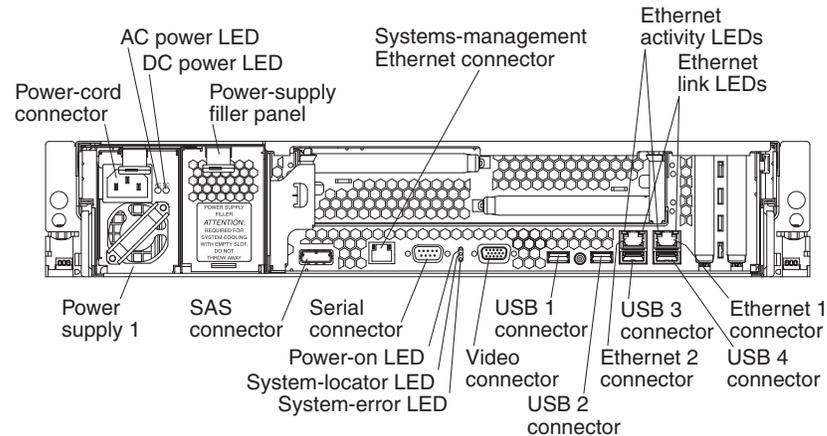
CD/DVD-eject button: Press this button to release a CD or DVD from the CD-RW/DVD drive.

CD/DVD drive activity LED: When this LED is lit, it indicates that the CD-RW/DVD drive is in use.

Rack release latches: Press these latches to release the server from the rack.

Rear view

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

Power-cord connector: Connect the power cord to this connector.

AC power LED: Each hot-swap power supply has an ac power LED and a dc power LED. When the ac power LED is lit, it indicates that sufficient power is coming into the power supply through the power cord. During typical operation, both the ac and dc power LEDs are lit. For any other combination of LEDs, see the *Problem Determination and Service Guide* on the IBM *System x Documentation* CD.

DC power LED: Each hot-swap power supply has a dc power LED and an ac power LED. When the dc power LED is lit, it indicates that the power supply is supplying adequate dc power to the system. During typical operation, both the ac and dc power LEDs are lit. For any other combination of LEDs, see the *Problem Determination and Service Guide* on the IBM *System x Documentation* CD.

Systems-management Ethernet connector: Use this connector to connect the server to a network for systems-management information control. This connector is active only if you have installed a Remote Supervisor Adapter II SlimLine, and it is used only by the Remote Supervisor Adapter II SlimLine.

Ethernet activity LEDs: When these LEDs are lit, they indicate that the server is transmitting to or receiving signals from the Ethernet LAN that is connected to the Ethernet port.

Ethernet link LEDs: When these LEDs are lit, they indicate that there is an active link connection on the 10BASE-T, 100BASE-TX, or 1000BASE-TX interface for the Ethernet port.

Ethernet connectors: Use either of these connectors to connect the server to a network.

USB connectors: Connect a USB device, such as USB mouse, keyboard, or other USB device, to any of these connectors.

Video connector: Connect a monitor to this connector. The video connectors on the front and rear of the server can be used simultaneously.

System-error LED: When this LED is lit, it indicates that a system error has occurred. An LED on the light path diagnostics panel is also lit to help isolate the error.

System-locator LED: Use this LED to visually locate the server among other servers. You can use IBM Director to light this LED remotely.

Power-on LED: When this LED is lit and not flashing, it indicates that the server is turned on. When this LED is flashing, it indicates that the server is turned off and still connected to an ac power source. When this LED is off, it indicates that ac power is not present, or the power supply or the LED itself has failed.

Serial connector: Connect a 9-pin serial device to this connector. The serial port is shared with the baseboard management controller (BMC). The BMC can take control of the shared serial port to perform text console redirection and to redirect serial traffic, using Serial over LAN (SOL).

SAS connector: Connect a serial-attached SCSI (SAS) device to this connector.

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 (the baseboard management controller or optional Remote Supervisor Adapter II SlimLine) 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 is not turned on.

Turning on the server

Approximately 5 seconds after the server is connected to ac power, the power-control button becomes active, and one or more fans might start running to provide cooling while the server is connected to power. You can turn on the server and start the operating system by pressing the power-control button.

The server can also be turned on in any of the following ways:
- If a power failure occurs while the server is turned on, the server will restart automatically when power is restored.
- If your operating system supports the Wake on LAN feature, the Wake on LAN feature can turn on the server.

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

Turning off the server

When you turn off the server and leave it connected to ac power, the server can respond to requests from the service processor, such as a remote request to turn on the server. While the server remains connected to ac power, one or more fans might continue to run. To remove all power from the server, you must disconnect it from the power source.
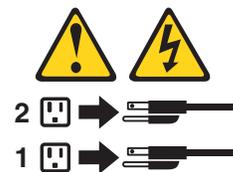
Some operating systems require an orderly shutdown before you turn off the server. See your operating-system documentation for information about shutting down the operating system.

Statement 5:

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

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

- You can turn off the server from the operating system, if your operating system supports this feature. After an orderly shutdown of the operating system, the server will be turned off automatically.

- You can press the power-control button to start an orderly shutdown of the operating system and turn off the server, if your operating system supports this feature.

- If the operating system stops functioning, you can press and hold the power-control button for more than 4 seconds to turn off the server.

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

- You can turn off the server through a request from the service processor.

Chapter 2. Installing options

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

Server components

The following illustration shows the major components in the server. The illustrations in this document might differ slightly from your hardware.
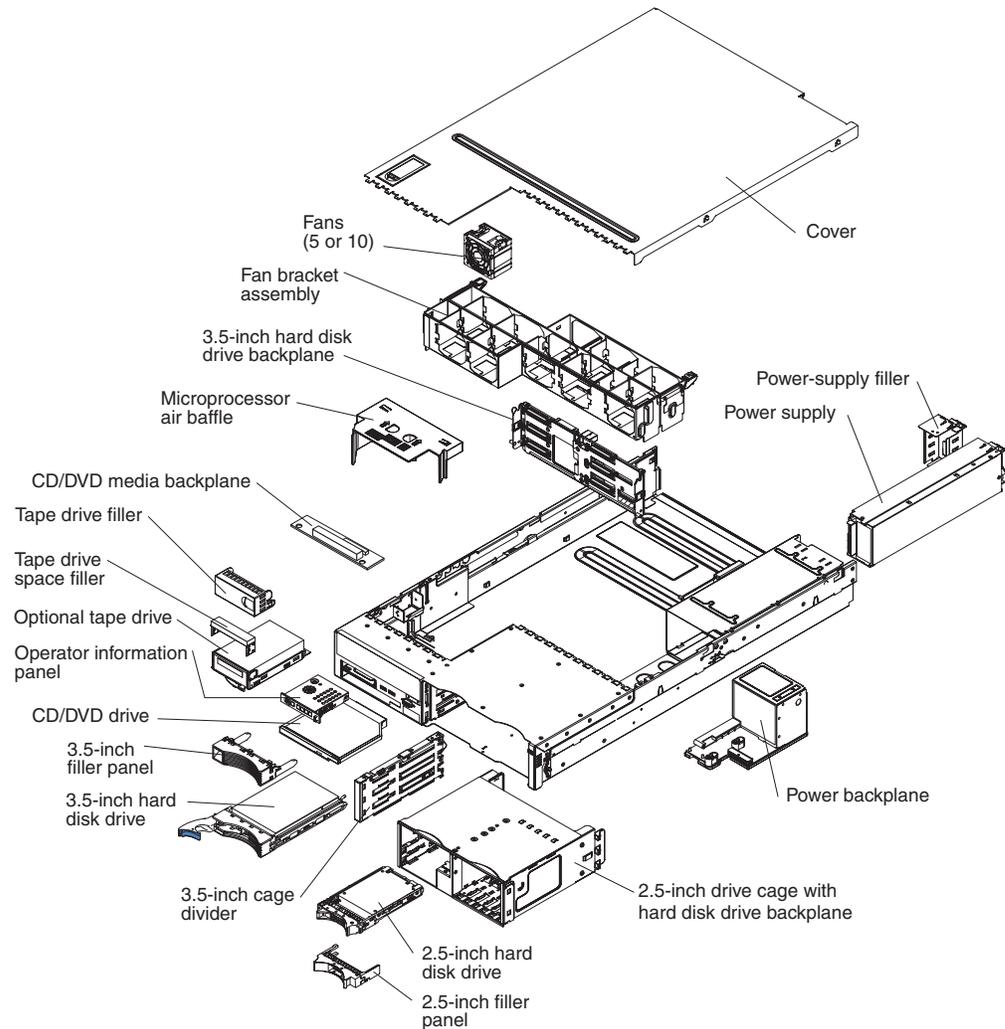
Fans (5 or 10)

Cover

Fan bracket assembly

3.5-inch hard disk drive backplane

Power-supply filler

Microprocessor air baffle

Power supply

CD/DVD media backplane

Tape drive filler

Tape drive space filler

Optional tape drive

Operator information panel

CD/DVD drive

3.5-inch filler panel

3.5-inch hard disk drive

Power backplane

3.5-inch cage divider

2.5-inch drive cage with hard disk drive backplane

2.5-inch hard disk drive

2.5-inch filler panel

System-board option connectors

The following illustration shows the connectors on the system board for user-installable options.
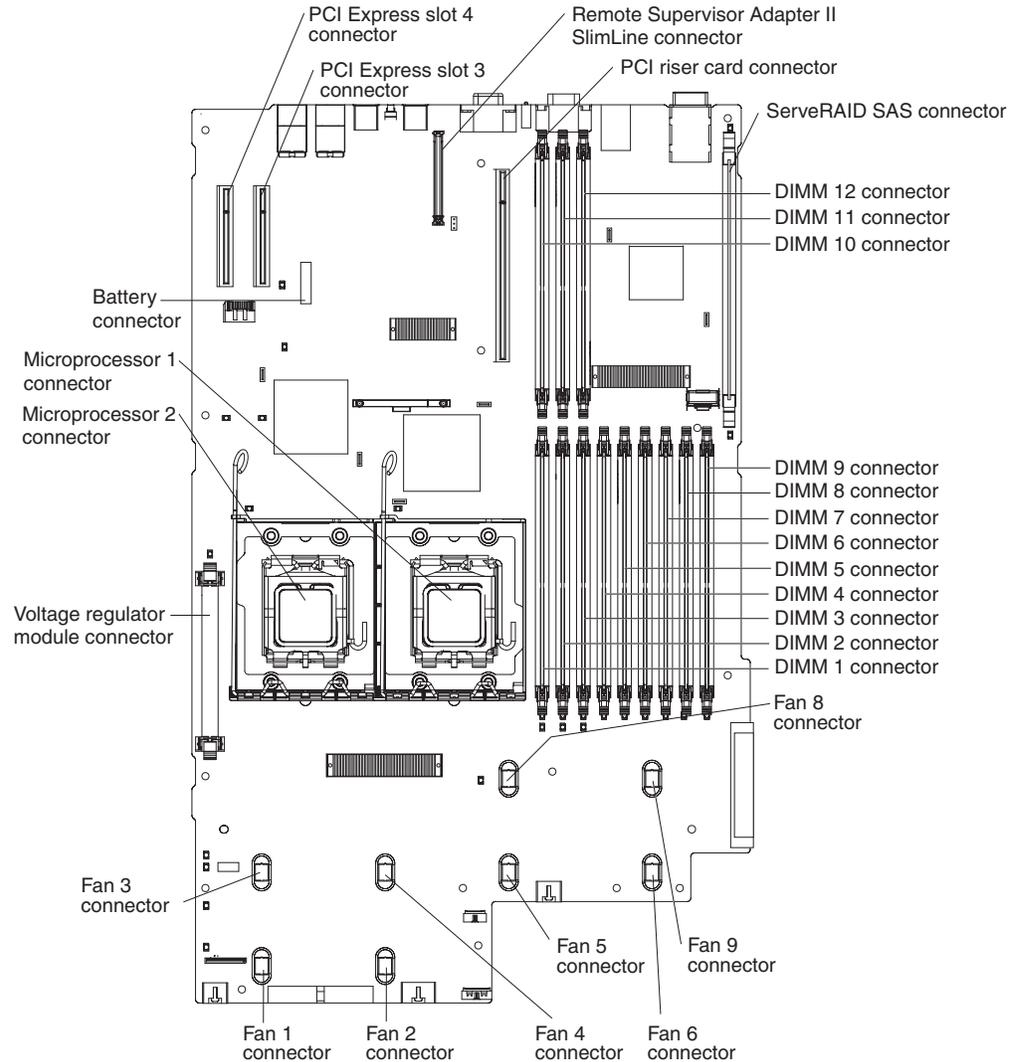
Note: The connectors for fans 7 and 10 are on the power backplane. See "Power-backplane-board connectors" on page 17.

PCI riser-card option connectors

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

Note: For clarity, in the following illustration the PCI riser-card assembly is inverted.
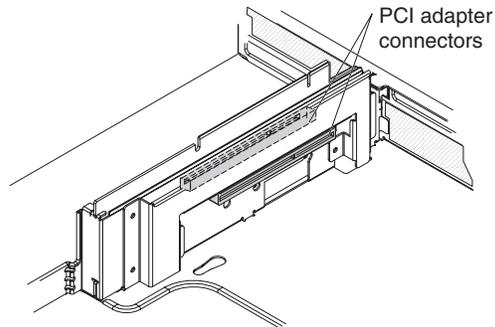
Power-backplane-board connectors

The following illustration shows the internal connectors on the power-backplane board.
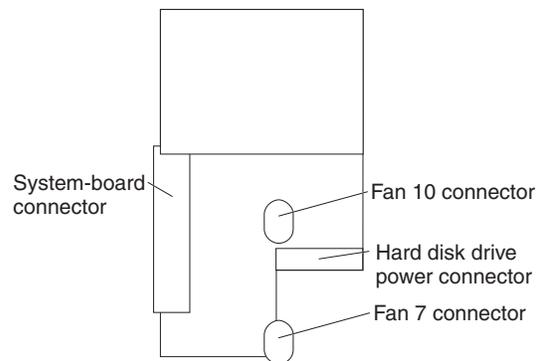
System-board internal cable connectors

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

IPMB connector

SATA tape drive
signal (J102)

Hard disk drive
backplane
signal (J92)

Power backplane
(J72)

Tape drive power
(J100)

Operator panel (J50)

Front USB (J80)

CD/DVD power (J12)

Front video (J51)

CD/DVD signal (J37)
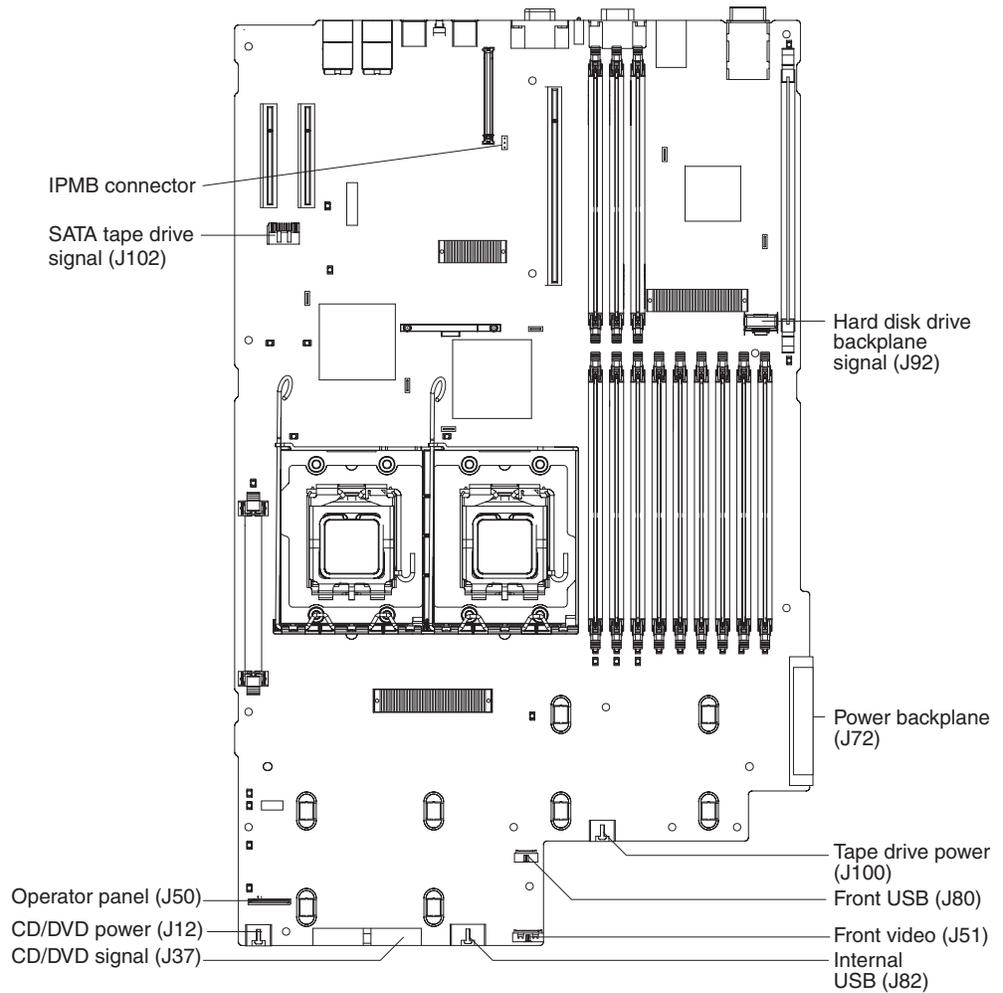
Internal
USB (J82)

System-board external connectors

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

USB 1
USB 2
Ethernet 2 / USB 3
Ethernet 1 / USB 4
Video
Serial
Systems-management Ethernet
SAS
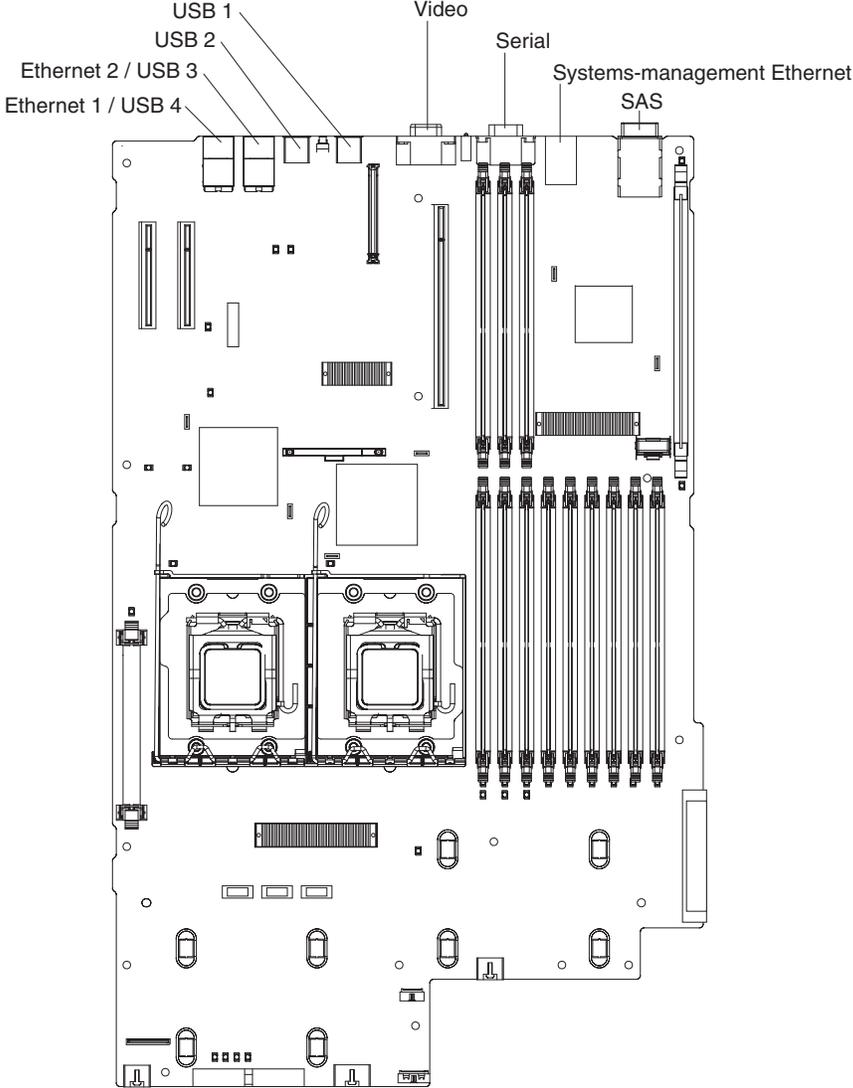
System-board switches and jumpers

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

Any switches or jumpers on the system board that are not shown in the illustration are reserved. See the section about recovering the basic input/output system (BIOS) code in the *Problem Determination and Service Guide* on the IBM *System x Documentation* CD for information about using the boot block recovery jumper.
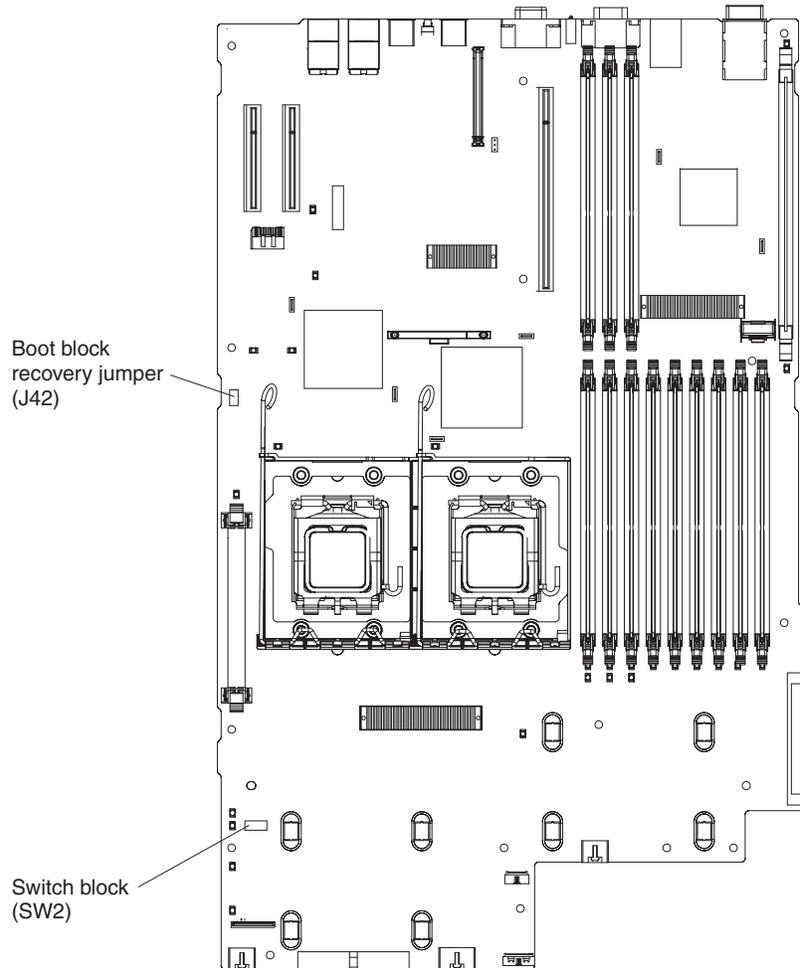
Boot block recovery jumper (J42)

Switch block (SW2)

Table 2 on page 21 describes the function of each switch on the switch block.

Table 2. Switches 1 - 8

Switch number	Default value	Switch description
8	Off	Reserved.
7	Off	Reserved.
6	Off	Reserved.
5	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 have 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 "Passwords" on page 76 for additional information about the power-on password.
4	Off	Reserved.
3	Off	Reserved.
2	Off	Reserved.
1	Off	Clear CMOS. When this switch is toggled to On, it clears the CMOS data, which clears the power-on password.

Notes:

1. Before you change any switch settings or move 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 27, "Handling static-sensitive devices" on page 28, and "Turning off the server" on page 12.)

2. Any system-board switch or jumper blocks that are not shown in the illustrations in this document are reserved.
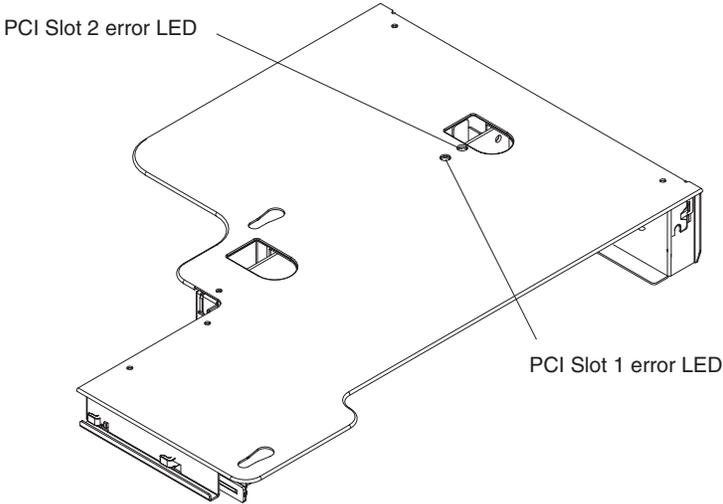
System-board LEDs

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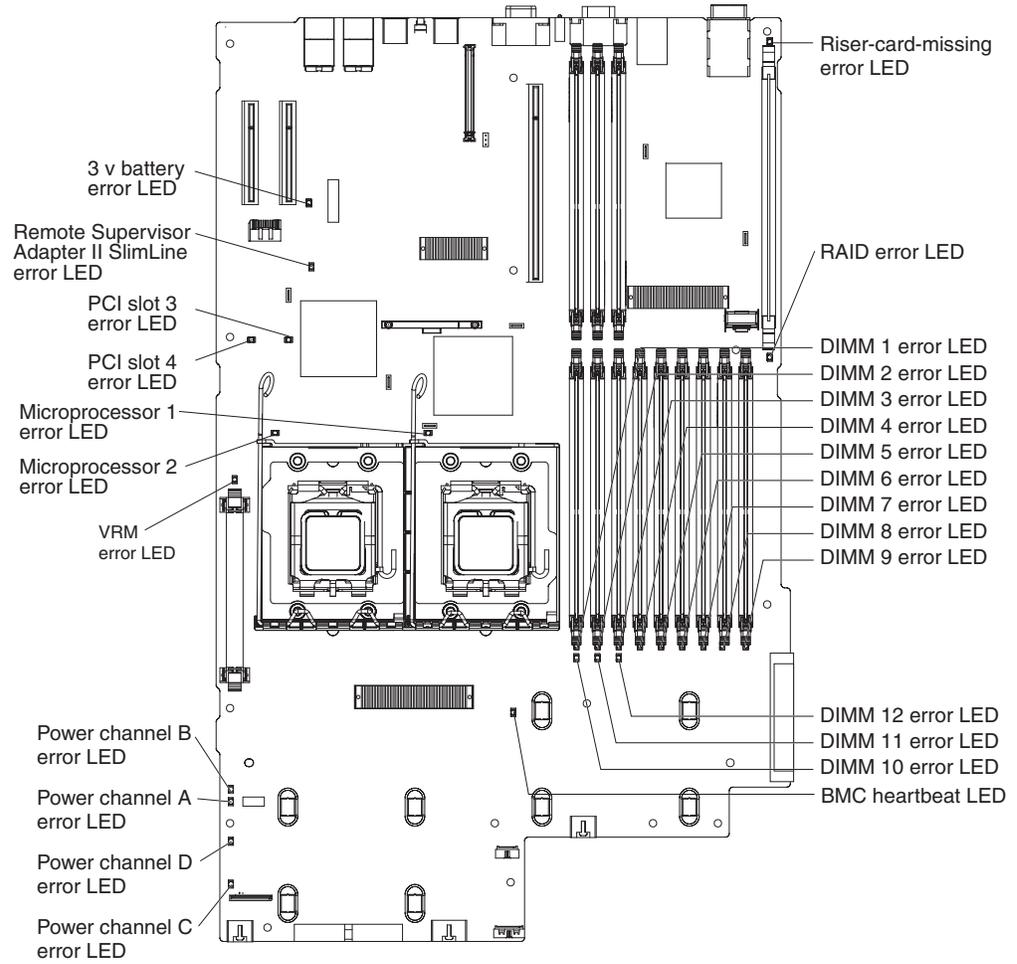
Riser-card assembly LEDs

The following illustration shows the light-emitting diodes (LEDs) on the riser-card assembly.

PCI Slot 2 error LED

PCI Slot 1 error LED

Light path diagnostics panel

The following illustration shows the controls and LEDs on the light path diagnostics panel.
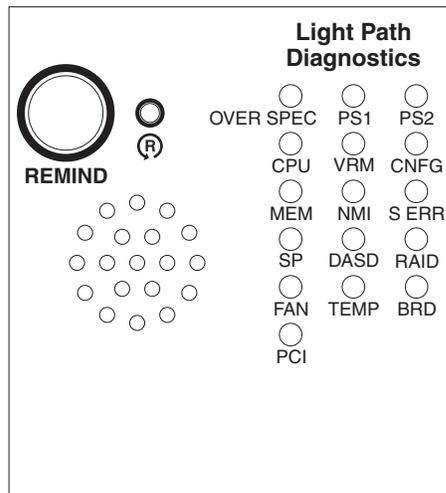
To access the light path diagnostics panel, slide the release latch on the front of the operator information panel to the left.

For more information about light path diagnostics, see the *Problem Determination and Service Guide* on the IBM *System x Documentation* CD.

The following table lists the LEDs on the light path diagnostics panel and suggested actions to solve the detected problems.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the parts listing in the *Problem Determination and Service Guide* to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

LED	Description	Action
None, but the system-error LED is lit.	An error has occurred and cannot be diagnosed, or the Advanced System Management (ASM) processor on the Remote Supervisor Adapter II SlimLine has failed. The error is not represented by a light path diagnostics LED.	Check the system-error log for information about the error.
OVER SPEC	The power supplies are using more power than their maximum rating.	1. Remove optional devices from the server. 2. Replace the failing power supply.
PS 1	The power supply in bay 1 has failed.	1. Make sure that the power supply is correctly seated. 2. Replace the failed power supply.
PS 2	The power supply in bay 2 has failed.	1. Make sure that the power supply is correctly seated. 2. Replace the failed power supply.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the parts listing in the *Problem Determination and Service Guide* to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

LED	Description	Action
CPU	A microprocessor has failed.	1. Make sure that the failing microprocessor, which is indicated by a lit LED on the system board, is installed correctly. See "Installing a microprocessor" on page 51 for information about installing a microprocessor. 2. Call for service.
VRM	An error occurred on the microprocessor voltage regulator module (VRM).	1. Replace the VRM. 2. Call for service.
CNFG	A hardware configuration error has occurred.	1. Check the microprocessors that were just installed to make sure that they are compatible with each other and with the VRM (see "Installing a microprocessor" on page 51 for compatiblity requirements). 2. (Trained service technician only) Replace an incompatible microprocessor. 3. Check the system-error logs for information about the error. Replace any components that are indicated.
MEM	A memory error has occurred.	Replace the failing DIMM, which is indicated by the lit LED on the system board.
NMI	A machine check error has occurred.	Check the system-error log for information about the error.
S ERR	Reserved.	
SP	The service processor has failed.	1. Remove ac power from the server; then, reconnect the server to ac power and restart the server. 2. Update the firmware on the BMC. 3. If a Remote Supervisor Adapter II SlimLine is installed, update the firmware; if the problem remains, replace the adapter. 4. Call for service
DASD	A hard disk drive error has occurred.	1. Check the LEDs on the hard disk drives and replace the indicated drive. 2. Call for service.
RAID	A RAID controller error has occurred.	Check the system-error log for information about the error.
FAN	A fan has failed, is operating too slowly, or has been removed. The TEMP LED might also be lit.	Replace the failing fan, which is indicated by a lit LED on the fan itself.
TEMP	The system temperature has exceeded a threshold level. A failing fan can cause the TEMP LED to be lit.	1. Determine whether a fan has failed. If it has, replace it. 2. Make sure that the room temperature is not too high. See "Features and specifications" on page 3 for temperature information. 3. Make sure that the air vents are not blocked. 4. Call for service.
BRD	An error has occurred on the system board.	1. Check the LEDs on the system board to identify the component that is causing the error. 2. Check the system-error log for information about the error.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the parts listing in the *Problem Determination and Service Guide* to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

LED	Description	Action
PCI	An error has occurred on a PCI bus or on the system board. An additional LED will be lit next to a failing PCI slot.	1. Check the LEDs on the PCI slots to identify the component that is causing the error. 2. Check the system-error log for information about the error. 3. If you cannot isolate the failing adapter through the LEDs and the information in the system-error log, remove one adapter at a time from the failing PCI bus, and restart the server after each adapter is removed. 4. Call for service.

Installation guidelines

Before you install options, read the following information:

- Read the safety information that begins on page v and the guidelines in "Handling static-sensitive devices" on page 28. This information will help you work safely.

- When you install your new server, take the opportunity to download and apply the most recent firmware updates. This step will help to ensure that any known issues are addressed and that your server is ready to function at maximum levels of performance. To download firmware updates for your server, go to http://www.ibm.com/servers/eserver/support/xseries/index.html, select **System x3650** from the **Hardware** list, and click the **Download** tab. For additional information about tools for updating, managing, and deploying firmware, see the System x and xSeries Tools Center at http://publib.boulder.ibm.com/infocenter/toolsctr/v1r0/index.jsp.

- Before you install optional hardware, make sure that the server is working correctly. Start the server, and make sure that the operating system starts, if an operating system is installed, or that a 19990305 error code is displayed, indicating that an operating system was not found but the server is otherwise working correctly. If the server is not working correctly, see "Solving problems" in the *Installation Guide* for diagnostic information.

- Observe good housekeeping in the area where you are working. Place removed covers and other parts in a safe place.

- If you must start the server while the cover is removed, make sure that no one is near the server and that no tools or other objects have been left inside the server.

- Do not attempt to lift an object that you think is too heavy for you. If you have to lift a heavy object, observe the following precautions:
  - Make sure that you can stand safely without slipping.
  - Distribute the weight of the object equally between your feet.
  - Use a slow lifting force. Never move suddenly or twist when you lift a heavy object.
  - To avoid straining the muscles in your back, lift by standing or by pushing up with your leg muscles.

- Make sure that you have an adequate number of properly grounded electrical outlets for the server, monitor, and other devices.

- Back up all important data before you make changes to disk drives.

- Have a small flat-blade screwdriver available.

- You do not have to turn off the server to install or replace hot-swap fans, redundant hot-swap power supplies, or hot-plug Universal Serial Bus (USB) devices. However, you must turn off the server before performing any steps that involve removing or installing adapter cables.

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

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

- When you are finished working on the server, reinstall all safety shields, guards, labels, and ground wires.
- For a list of supported options for the server, see http://www.ibm.com/servers/eserver/serverproven/compat/us/.

System reliability guidelines

To help ensure proper system cooling and system reliability, make sure that the following requirements are met:
- Each of the drive bays has a drive or a filler panel and electromagnetic compatibility (EMC) shield installed in it.
- If the server has redundant power, each of the power-supply bays has a power supply installed in it.
- There is adequate space around the server to allow the server cooling system to work properly. Leave approximately 50 mm (2.0 in.) of open space around the front and rear of the server. Do not place objects in front of the fans. For proper cooling and airflow, replace the server cover before you turn on the server. Operating the server for extended periods of time (more than 30 minutes) with the server cover removed might damage server components.
- You have followed the cabling instructions that come with optional adapters.
- You have replaced a failed fan within 48 hours.
- You have replaced a hot-swap drive within 2 minutes of removal.
- You do not operate the server without the air baffles installed. Operating the server without the air baffles might cause the microprocessors to overheat.
- Microprocessor socket 2 always contains either a heat-sink filler or a microprocessor and heat sink.

Working inside the server with the power on

Attention: Static electricity that is released to internal server components when the server is powered-on might cause the server to halt, which could result in the loss of data. To avoid this potential problem, always use an electrostatic-discharge wrist strap or other grounding system when working inside the server with the power on.

The server supports hot-plug, hot-add, and hot-swap devices and is designed to operate safely while it is turned on and the cover is removed. Follow these guidelines when you work inside a server that is turned on:
- Avoid wearing 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 and pencils, that could fall into the server as you lean over it.
- Avoid dropping any metallic objects, such as paper clips, hairpins, and screws, into the server.

Handling static-sensitive devices

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

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

- Limit your movement. Movement can cause static electricity to build up around you.
- The use of a grounding system is recommended. For example, wear an electrostatic-discharge wrist strap, if one is available. Always use an electrostatic-discharge wrist strap or other grounding system when working inside the server with the power on.
- 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 surface on the outside 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.

Removing the cover

The following illustration shows how to remove the cover.

Cover-release
latch
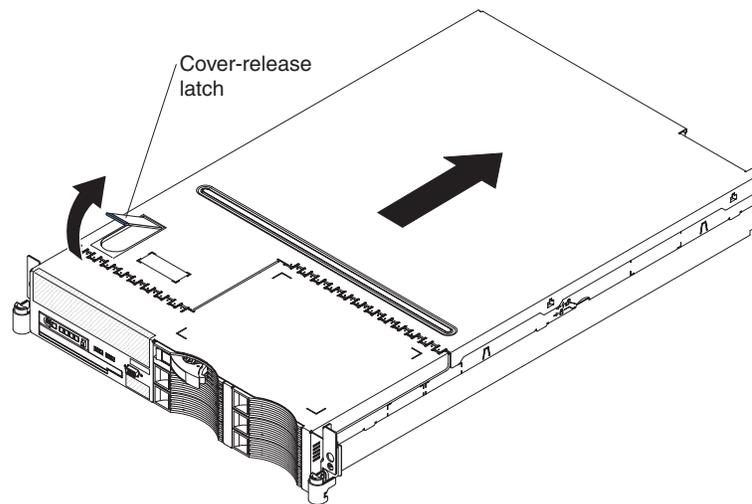
Important: Before you install optional hardware, make sure that the server is working correctly. Start the server, and make sure that the operating system starts, if an operating system is installed, or that a 19990305 error code is displayed, indicating that an operating system was not found but the server is otherwise working correctly. If the server is not working correctly, see the *Problem Determination and Service Guide* for diagnostic information.

To remove the cover, complete the following steps:

1. Read the safety information that begins on page v and "Installation guidelines" on page 27.
2. If you are planning to install or remove a microprocessor, memory module, PCI adapter, or battery, turn off the server and all attached devices and disconnect all external cables and power cords (see "Turning off the server" on page 12).

3. Press down on the left and right side latches and pull the server out of the rack enclosure until both slide rails lock.

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

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

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

Removing the riser-card assembly

The server comes with one riser-card assembly that contains two PCI Express x8 connectors. You can replace the PCI Express riser-card assembly with a PCI-X riser-card assembly, which contains two PCI-X 64-bit 133 MHz connectors. The PCI-X connectors support single-width IXA adapters. See http://www.ibm.com/ servers/eserver/serverproven/compat/us/ for a list of riser-card assemblies that you can use with the server.
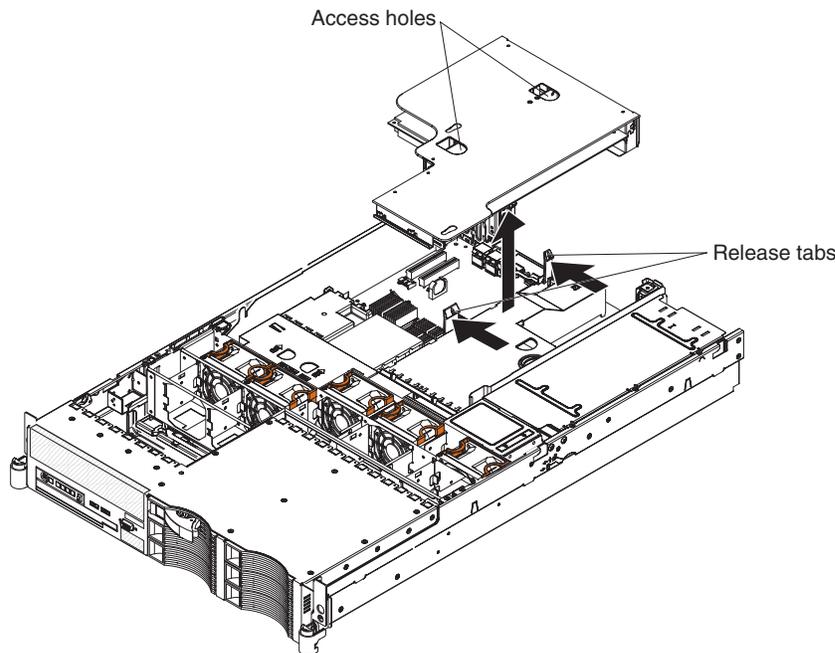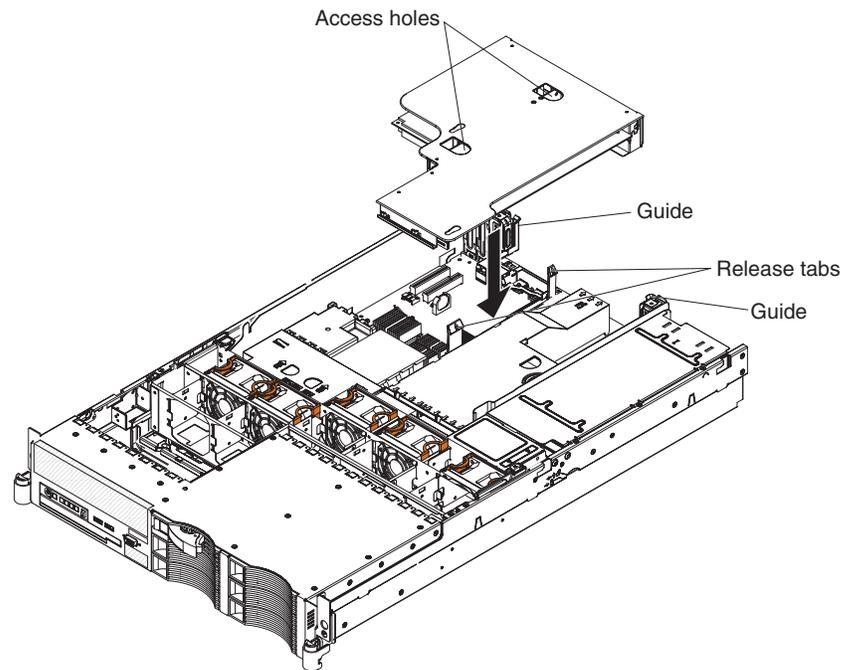

To remove the riser-card assembly, complete the following steps:

1. Read the safety information that begins on page v and "Installation guidelines" on page 27.
2. Turn off the server and peripheral devices, and disconnect the power cord and all external cables.
3. Remove the cover (see "Removing the cover" on page 29).
4. Push the two riser-card-assembly release tabs toward the low-profile PCI slots; then, grasp the assembly at the rear and side edges and lift it to remove it from the server. Place the riser-card assembly on a flat, static-protective surface.

Installing the riser-card assembly

To install the riser-card assembly, complete the following steps.

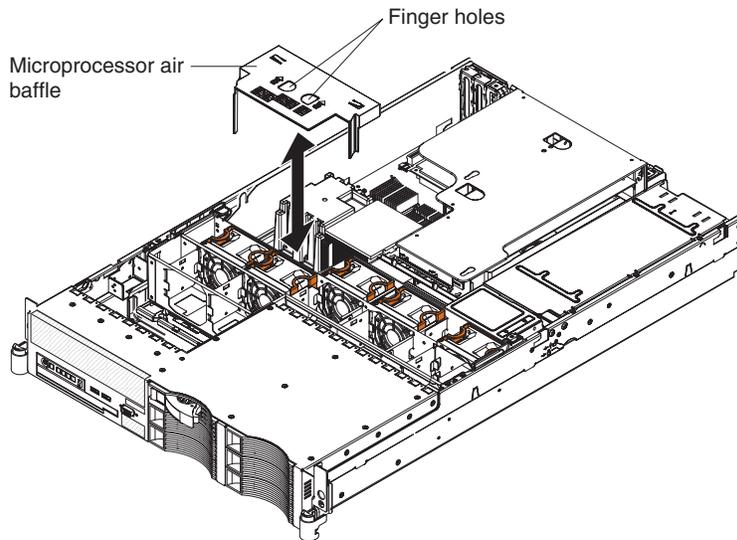Access holes

Guide

Release tabs

Guide

1. Read the safety information that begins on page v and "Installation guidelines" on page 27.
2. Make sure that the server and all peripheral devices are turned off and that the power cords and all external cables are disconnected.
3. Reinstall any adapters and reconnect any cables that you removed in other procedures.
4. Carefully align the riser-card assembly with the release tab posts, the guides on the rear of the server, and the riser-card connector on the system board; then, press down on the assembly. Make sure that the riser-card assembly is fully seated in the riser-card connector on the system board.

If you have other options to install, do so now. Otherwise, go to "Completing the installation" on page 67.

Removing the microprocessor air baffle

When you work with some optional devices, you must first remove the microprocessor air baffle to access certain components or connectors on the system board. The following illustration shows how to remove the microprocessor air baffle.
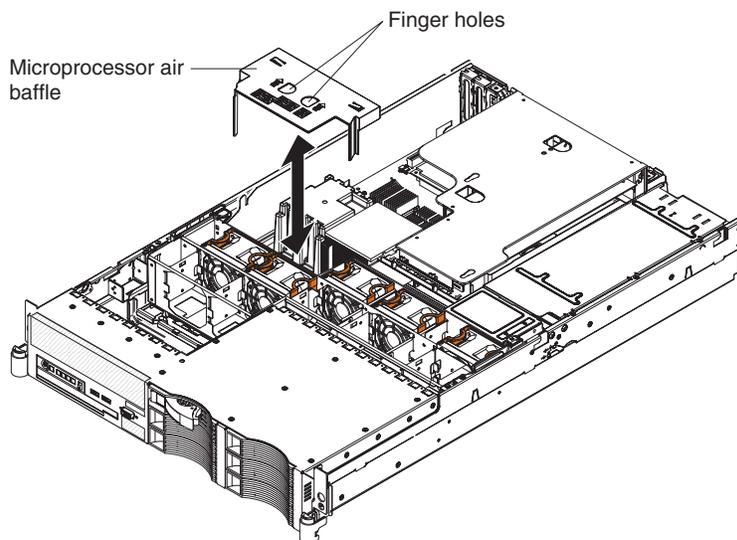
Microprocessor air baffle — Finger holes

To remove the microprocessor air baffle, complete the following steps:

1. Read the safety information that begins on page v and "Installation guidelines" on page 27.

2. Turn off the server and peripheral devices and disconnect all power cords and external cables (see "Turning off the server" on page 12); then, remove the cover (see "Removing the cover" on page 29).

3. Place your fingers into the two openings on the top of the air baffle and lift the air baffle out of the server.

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

Installing the microprocessor air baffle

Microprocessor air baffle — Finger holes

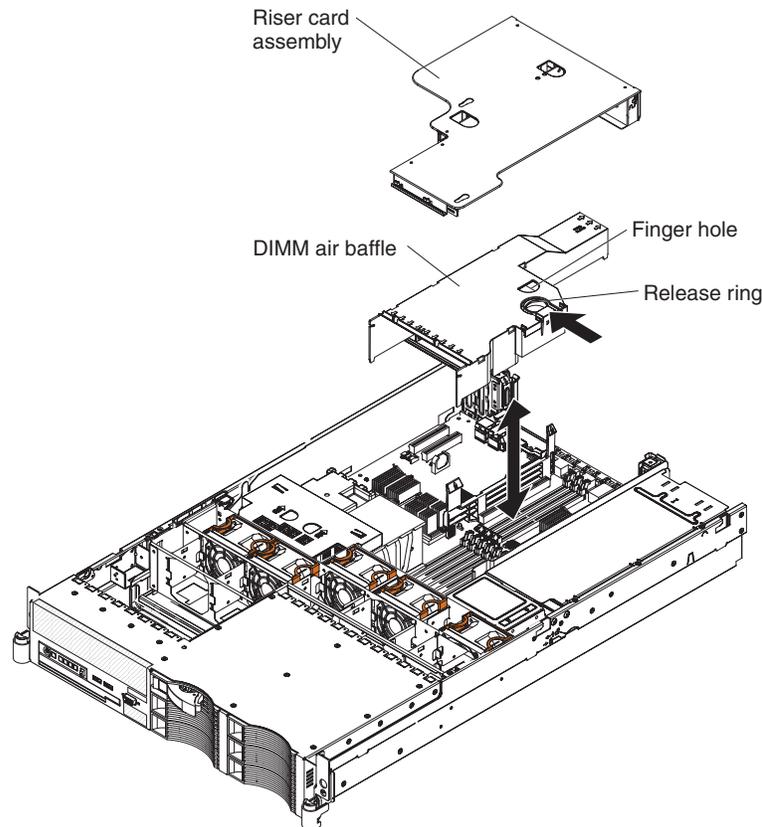To install the microprocessor air baffle, complete the following steps:

1. Read the safety information that begins on page v and "Installation guidelines" on page 27.

2. Make sure that the server and peripheral devices are turned off (see "Turning off the server" on page 12) and that all power cords and external cables are disconnected; then, remove the cover (see "Removing the cover" on page 29).

3. Place your fingers into the two openings on the top of the air baffle.

4. Align the tab on the left side of the air baffle with the slot in the left side of the chassis.

5. Lower the air baffle into the server.

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

Removing the DIMM air baffle

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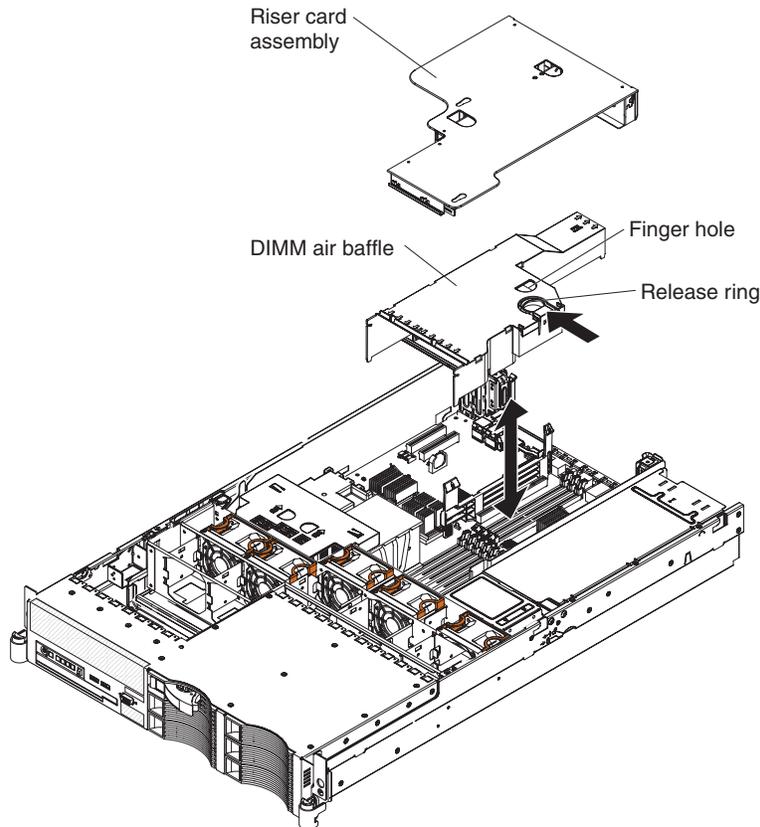

To remove the DIMM air baffle, complete the following steps:

1. Read the safety information that begins on page v and "Installation guidelines" on page 27.

2. Turn off the server and peripheral devices and disconnect all power cords and external cables (see "Turning off the server" on page 12); then, remove the cover (see "Removing the cover" on page 29).

3. Remove the riser-card assembly (see "Removing the riser-card assembly" on page 30).

4. Place your fingers into the handle and opening on the top of the air baffle.

5. Press the handle toward the opening and lift the air baffle out of the server.

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

Installing the DIMM air baffle

The following illustration shows how to install the DIMM air baffle.

To install the DIMM air baffle, complete the following steps:

1. Read the safety information that begins on page v and "Installation guidelines" on page 27.
2. Make sure that the server and peripheral devices are turned off (see "Turning off the server" on page 12) and that all power cords and external cables are disconnected; then, remove the cover (see "Removing the cover" on page 29).
3. Align the tabs on the sides of the air baffle with the slots on the power-supply cage.
4. Place your fingers into the handle and opening on the top of the DIMM air baffle.
5. Press the handle toward the opening and lower the air baffle so that the lip on the right side of the baffle covers the lip on the side of the power-supply cage.
6. Press the DIMM air baffle into place.

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

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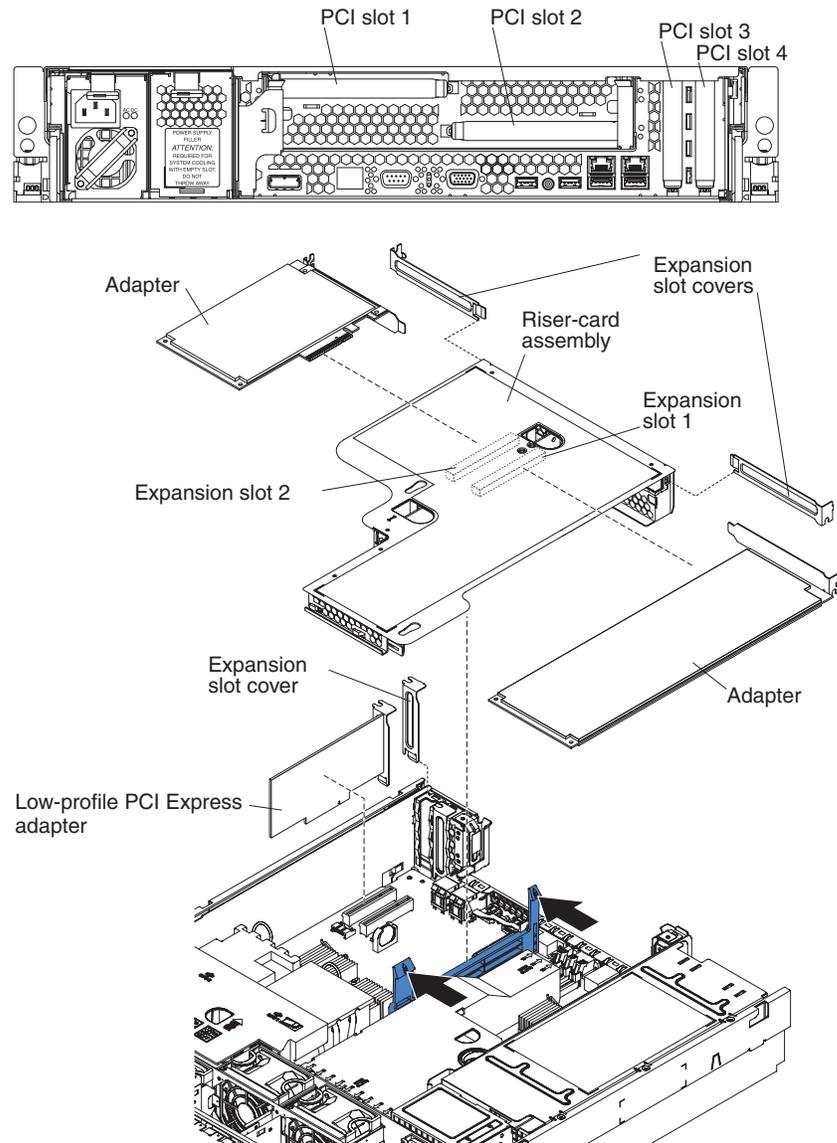
The following notes describe the types of adapters that the server supports and other information that you must consider when installing an adapter:

- You can install only low-profile adapters in PCI slots 3 and 4 on the system board.
- You can install a full-height, half-length adapter in slot 2 on the PCI riser card and a full-height, full-length adapter in slot 1 on the PCI riser card.
- An optional Remote Supervisor Adapter II SlimLine can be installed only in a dedicated slot on the system board. To install a Remote Supervisor Adapter II SlimLine, see "Installing a Remote Supervisor Adapter II SlimLine" on page 40.
- The server supports only 3.3 V and universal PCI adapters.
- The PCI bus configuration is as follows:
  - Non-hot-plug, low-profile PCI Express x8 (x4 lanes), slot 4
  - Non-hot-plug, low-profile PCI Express x8 (x4 lanes), slot 3
  - Non-hot-plug, half-length PCI Express x8 (x8 lanes), slot 2
 - Non-hot-plug, full-length PCI Express x8 (x8 lanes), slot 1

Note: If you have replaced the PCI Express riser-card assembly with the optional PCI-X riser-card assembly, slots 1 and 2 are non-hot-plug, 64-bit, 133-MHz PCI-X slots, which support Integrated xSeries Adapter (IXA) single-width adapters.

• The system scans devices in the following order, if you have not changed the default boot precedence: integrated Ethernet controllers, integrated SAS controller, and then PCI slots 1, 2, 3, and 4.
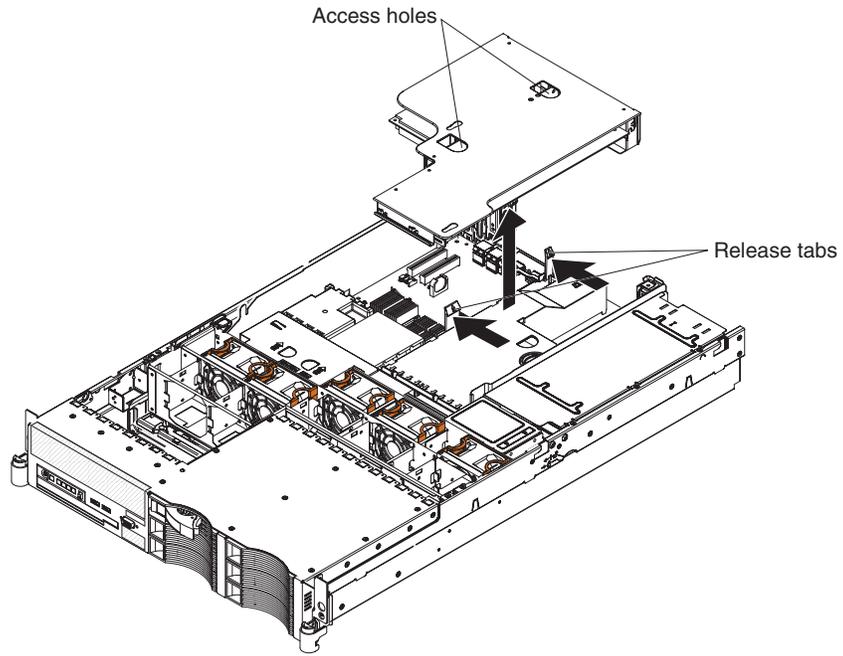
PCI riser card

The following illustration shows the location of the adapter expansion slots on the PCI riser card.

Note: For clarity, the riser-card assembly is inverted in the illustration.
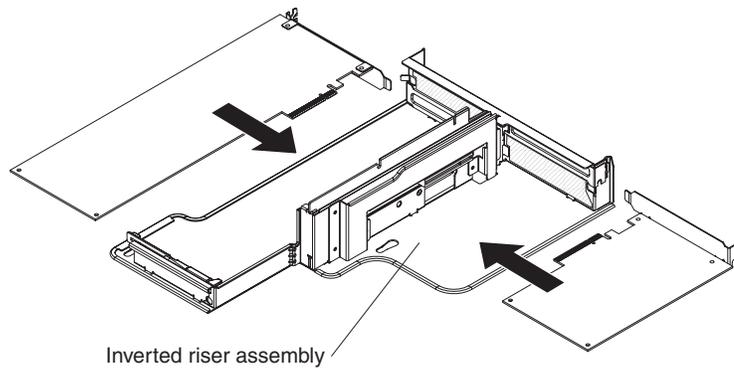

PCI adapter connectors
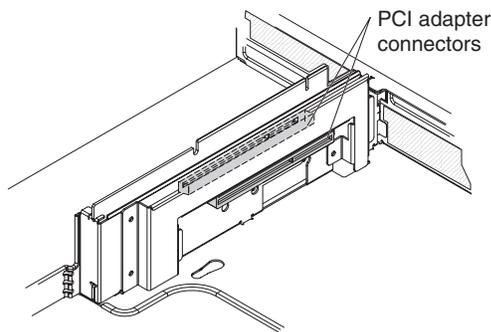
To install an adapter, complete the following steps:

1. Read the safety information that begins on page v and "Installation guidelines" on page 27.

2. Turn off the server and peripheral devices and disconnect all power cords and external cables (see "Turning off the server" on page 12); then, remove the cover (see "Removing the cover" on page 29).

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

4. If you are installing an adapter in PCI slot 1 or 2, remove the PCI riser-card assembly (see "Removing the riser-card assembly" on page 30).

Access holes

Release tabs

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

6. Install the adapter. The following illustration shows how to install an adapter in a PCI slot.

   Note: For clarity, the riser-card assembly is shown inverted in the following illustration.

Inverted riser assembly

7. If you removed the PCI riser-card assembly to install the adapter, align the riser-card assembly with the release-tab posts, rear guides, and connector; then, press the PCI riser-card assembly *firmly* into the connector (see "Installing the riser-card assembly" on page 31).

Access holes

Guide

Release tabs

Guide
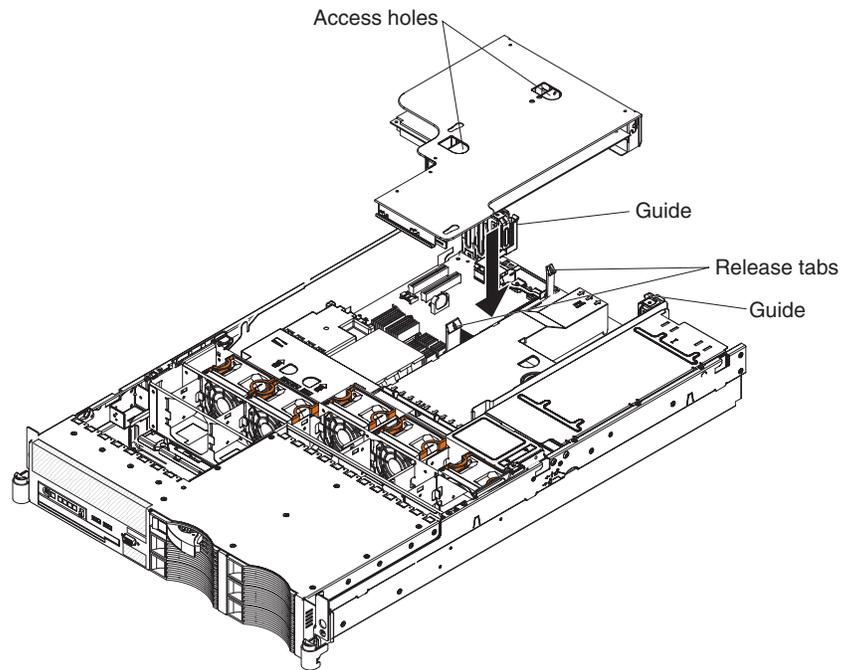
8. Connect any required cables to the adapter.

   Attention:

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

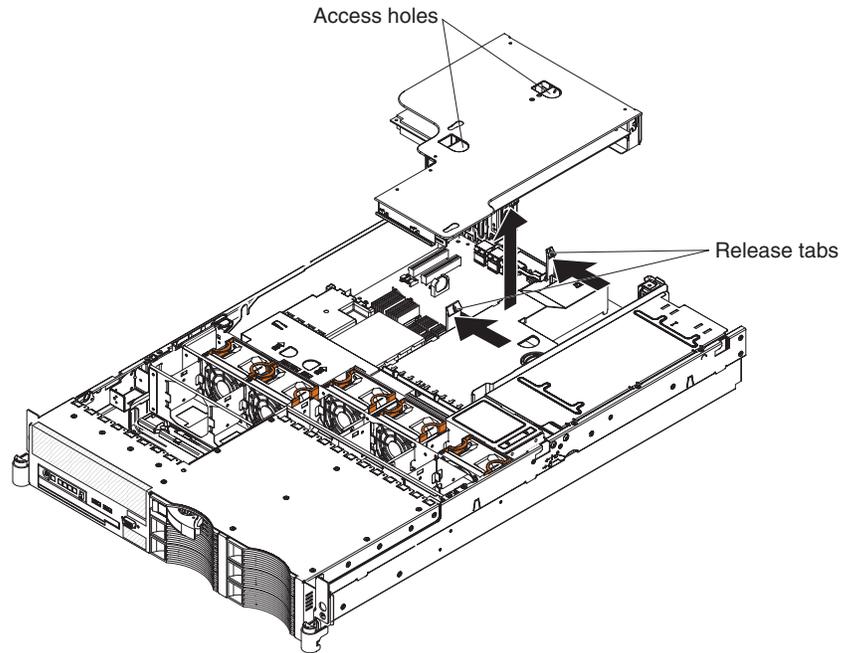9. Perform any configuration tasks that are required for the adapter.

If you have other options to install or remove, do so now. Otherwise, go to "Completing the installation" on page 67.

Removing an adapter

To remove an adapter, complete the following steps.
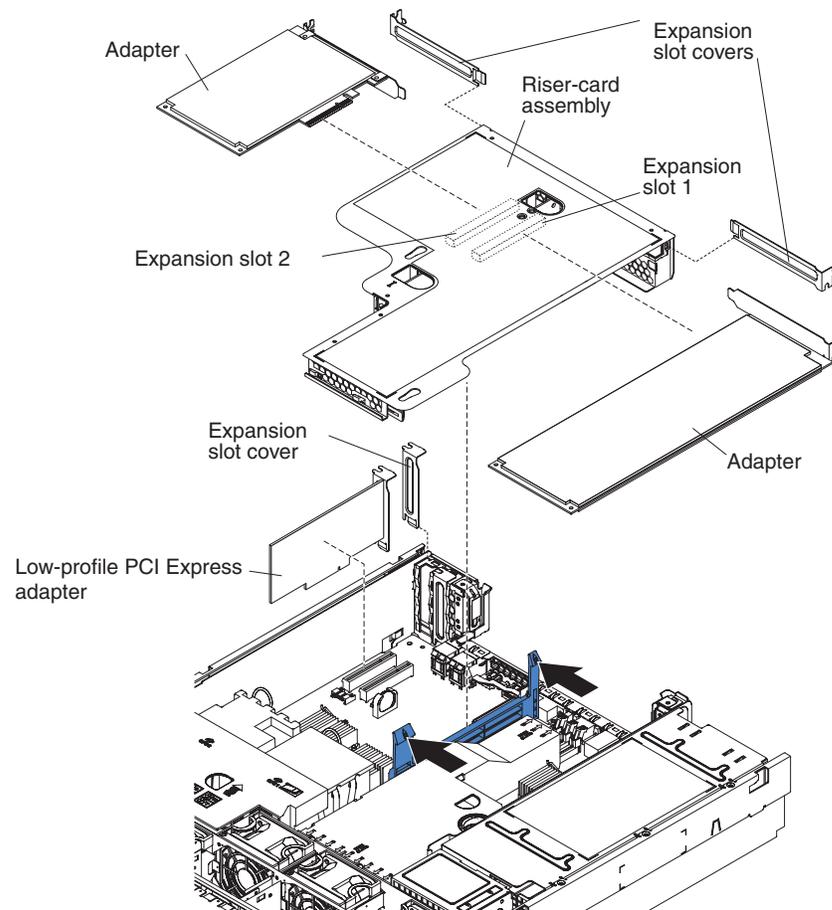
1. Read the safety information that begins on page v and "Installation guidelines" on page 27.
2. Turn off the server and peripheral devices and disconnect all power cords and external cables (see "Turning off the server" on page 12); then, remove the cover (see "Removing the cover" on page 29).
3. Pull the server out of the rack; then, remove the cover (see "Removing the cover" on page 29).
4. If the adapter is on the riser card, remove the riser-card assembly from the server (see "Removing the riser-card assembly" on page 30).

Access holes

Release tabs

5. Disconnect any cables from the adapter.

6. Carefully grasp the adapter by its top edge or upper corners, and pull the adapter from the PCI slot.

7. If you have other options to install or remove, do so now. Otherwise, go to "Completing the installation" on page 67.

Installing a Remote Supervisor Adapter II SlimLine

An optional Remote Supervisor Adapter II SlimLine can be installed only in a dedicated slot on the system board. See "System-board option connectors" on page 16 for the location of the connector. After the Remote Supervisor Adapter II SlimLine is installed, the systems-management Ethernet port on the rear of the server is active.

Note: Earlier versions of the Remote Supervisor Adapter II SlimLine might not work in this server. See http://www.ibm.com/servers/eserver/serverproven/compat/us/ for the supported Remote Supervisor Adapter II SlimLine.
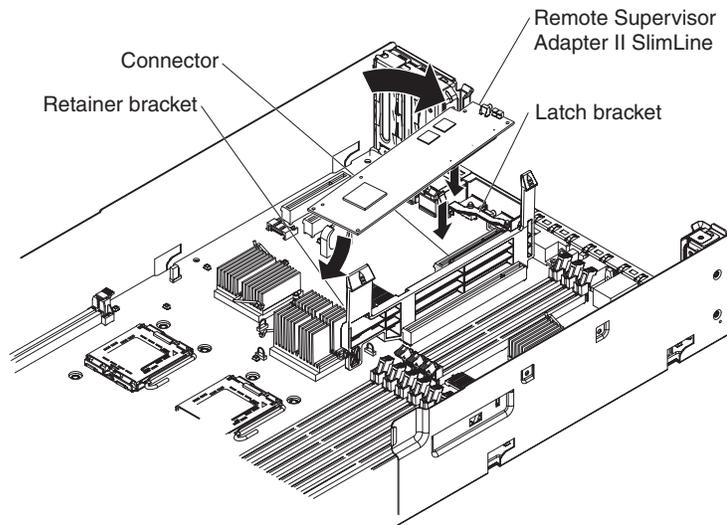
Remote Supervisor
Adapter II SlimLine

Connector

Retainer bracket

Latch bracket

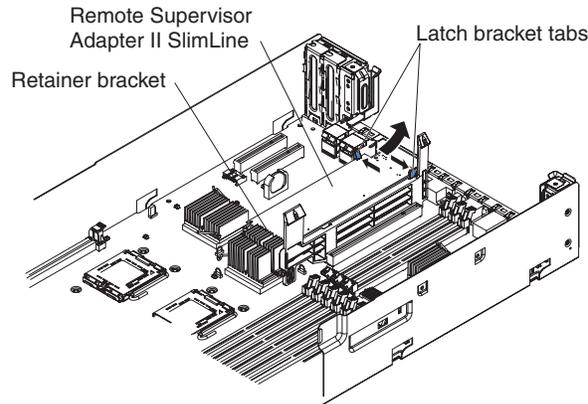To install a Remote Supervisor Adapter II SlimLine, complete the following steps:

1. Read the safety information that begins on page v and "Installation guidelines" on page 27.

2. Turn off the server and peripheral devices and disconnect all power cords and external cables (see "Turning off the server" on page 12); then, remove the cover (see "Removing the cover" on page 29).

3. Remove the PCI riser-card assembly (see "Removing the riser-card assembly" on page 30).

4. Turn the Remote Supervisor Adapter II SlimLine so that the keys on the connector align correctly with the connector on the system board.

5. Slip the free end of the Remote Supervisor Adapter II SlimLine under the tab on the retainer bracket, aligning the holes in the adapter with the posts on the retainer bracket and latch bracket; then, press the adapter into the connector on the system board and make sure that all tabs on the latch bracket secure the adapter in place.

6. Replace the PCI riser-card assembly.

See the documentation that comes with the Remote Supervisor Adapter II SlimLine for information about installing the firmware and configuring the option. Create a backup copy of the configuration so that if you have to replace the adapter in the future, you can restore the configuration.

If you have other options to install or remove, do so now. Otherwise, go to "Completing the installation" on page 67.

Removing the Remote Supervisor Adapter II SlimLine

Note: Before you remove a Remote Supervisor Adapter II SlimLine, create a backup copy of the configuration so that if you are replacing the adapter, you can restore the configuration.

To remove the Remote Supervisor Adapter II SlimLine, complete the following steps:
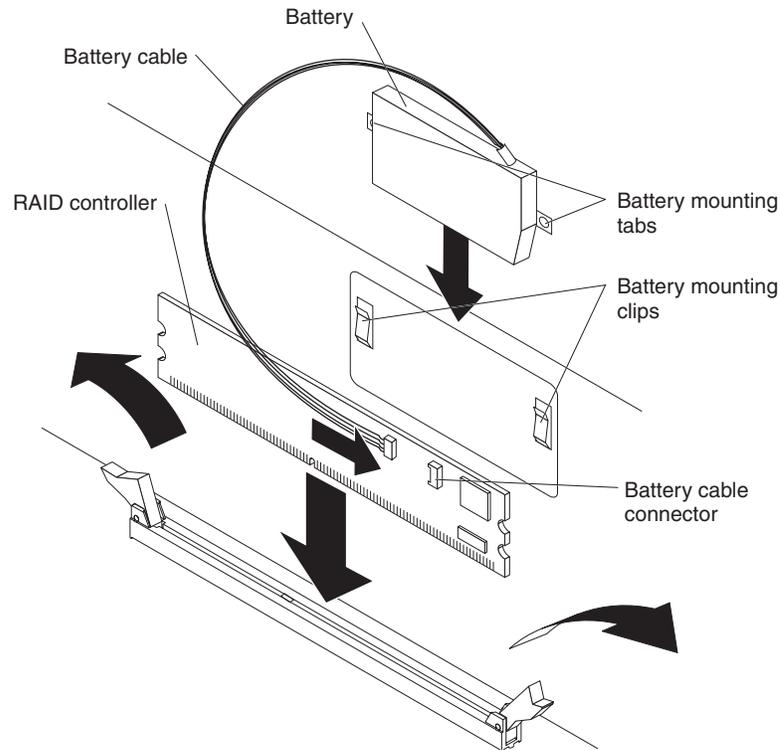
1. Read the safety information that begins on page v and "Installation guidelines" on page 27.
2. Turn off the server and peripheral devices and disconnect all power cords and external cables (see "Turning off the server" on page 12); then, remove the cover (see "Removing the cover" on page 29).
3. Remove the PCI riser-card assembly.
4. Spread the tabs of the latch bracket apart and lift the end of the Remote Supervisor Adapter II SlimLine, until the tabs release the adapter; then, slide the other end of the Remote Supervisor Adapter II SlimLine out of the retainer bracket.
5. Lift the Remote Supervisor Adapter II SlimLine out of the server.
6. Replace the PCI riser-card assembly.

If you have other options to install or remove, do so now. Otherwise, go to "Completing the installation" on page 67.

Replacing the ServeRAID SAS controller

The following illustration shows how to install the ServeRAID-8k SAS Controller.

Note: The ServeRAID-8k-I SAS Controller does not have a battery.

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

A ServeRAID SAS controller can be installed only in a dedicated slot on the system board. The server comes with a ServeRAID-8k-I SAS Controller installed. To replace the ServeRAID-8k-I SAS Controller with a ServeRAID-8k SAS Controller, complete the following steps:

1. Read the safety information that begins on page v and "Installation guidelines" on page 27.
2. Turn off the server and peripheral devices and disconnect all power cords and external cables (see "Turning off the server" on page 12); then, remove the cover (see "Removing the cover" on page 29).
3. Remove the riser-card assembly and the air baffle over the DIMMs (see "Removing the DIMM air baffle" on page 33).
4. Locate the ServeRAID SAS controller on the system board.
5. Open the retaining clip on each end of the connector.
6. Lift the ServeRAID SAS controller out of the connector.
7. Touch the static-protective package that contains the new ServeRAID SAS controller to any unpainted metal surface on the server. Then, remove the ServeRAID SAS controller from the package.
8. Turn the new ServeRAID SAS controller so that the keys on the bottom edge align correctly with the connector.

9. Firmly press the ServeRAID SAS controller straight down into the connector by applying pressure on both ends of the controller simultaneously. The retaining clips snap into the locked position when the controller is firmly seated in the connector.

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

10. Remove the battery from the ServeRAID-8k SAS Controller package.

11. Slide the battery mounting tabs into the battery mounting clips on the server wall that is next to the ServeRAID SAS controller connector.

12. Connect the battery to the ServeRAID-8k SAS Controller.

13. Replace the air baffle over the DIMMs (see "Installing the DIMM air baffle" on page 34).

14. Replace the riser-card assembly.

If you have other options to install or remove, do so now. Otherwise, go to "Completing the installation" on page 67.

Note: When you restart the server, you will be given the opportunity to import the existing RAID configuration to the new ServeRAID SAS controller.

Installing a hard disk drive

Locate the documentation that comes with the hard disk drive and follow those instructions in addition to the instructions in this chapter.

Important: Do not install a SCSI drive in this server; install only SAS drives.

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

- The server 3.5-inch models support six slim 3.5-inch hard disk drives installed on Ultra-Slim hard disk drive trays for 3.5-inch drives. For a list of supported 3.5-inch hard disk drives, see http://www.ibm.com/servers/eserver/serverproven/compat/us/.

- The server 2.5-inch models support eight 2.5-inch hot-swap hard disk drives installed on Ultra-Slim hard disk drive trays for 2.5-inch drives. For a list of supported 2.5-inch hard disk drives, see http://www.ibm.com/servers/eserver/serverproven/compat/us/.

- All hot-swap drives in the server should have the same throughput speed rating. Mixing hard disk drives with different speed ratings will cause all drives to operate at the lower throughput speed.

- The ID that is assigned to each bay is printed on the front of the server.

The following illustrations show how to install a hot-swap hard disk drive.

3.5-inch drives
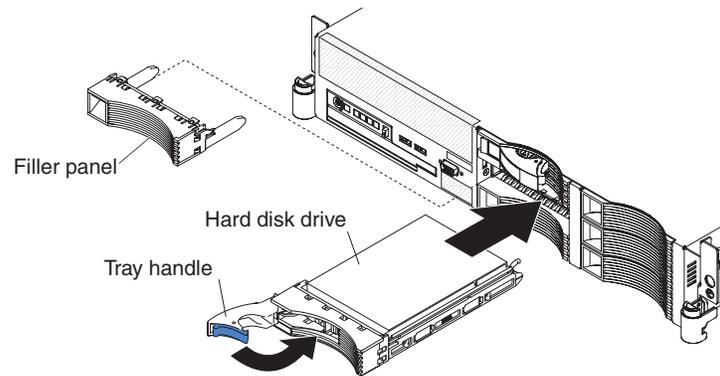
2.5-inch drives
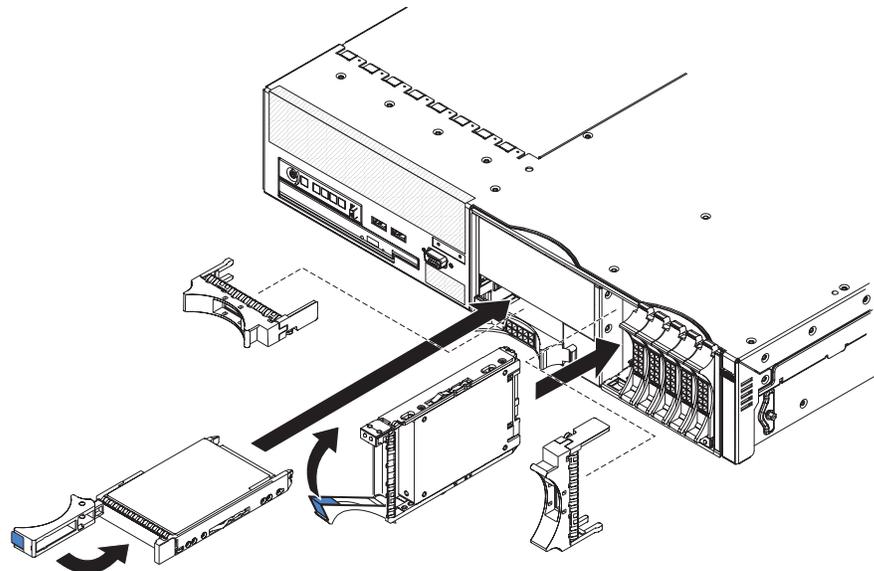
To install a drive in a hot-swap bay, complete the following steps.

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

1. Read the safety information that begins on page v and "Installation guidelines" on page 27.
2. Remove the filler panel from one of the empty hot-swap bays.
   - 3.5-inch models: Insert your finger into the depression at the left side of the filler panel and pull it away from the server.
   - 2.5-inch models: Grasp both sides of the front of the filler panel and pull it away from the server.
3. Install the hard disk drive in the hot-swap bay:
   a. Make sure that the tray handle is open (that is, perpendicular to the drive).
   b. Align the drive assembly with the guide rails in the bay.
   c. Gently push the drive assembly into the bay until the drive stops.
   d. Push the tray handle to the closed (locked) position.

e. Check the hard disk drive status LED to verify that the hard disk drive is operating correctly.

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

Note: You might have to reconfigure the disk arrays after you install hard disk drives. See the RAID documentation on the IBM *ServeRAID Support* CD for information about RAID controllers.
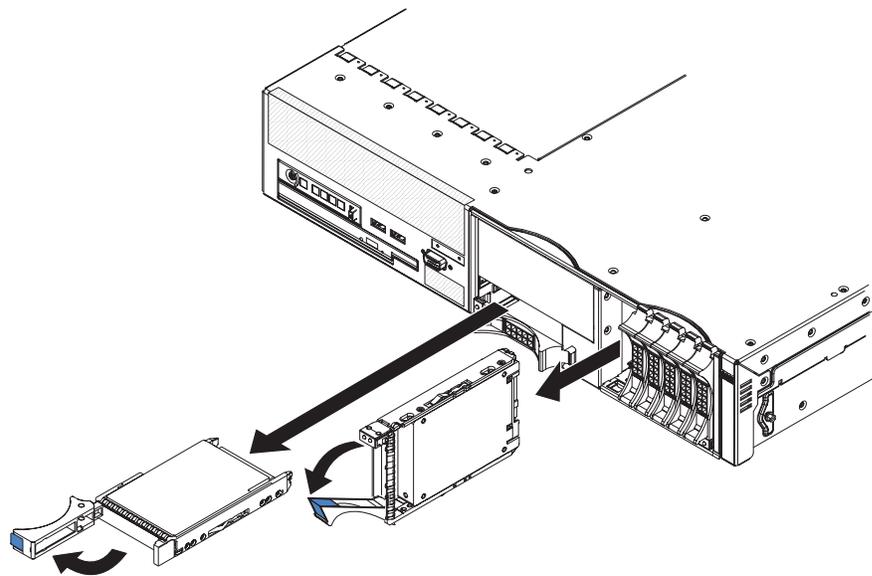
If you have other options to install or remove, do so now. Otherwise, go to "Completing the installation" on page 67.

Removing a hard disk drive

3.5-inch drives

Hard disk drive

Tray handle
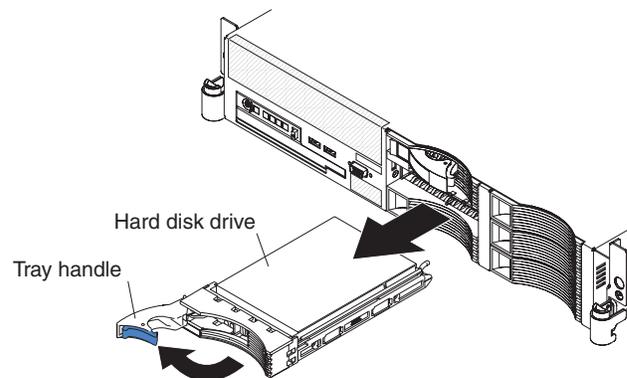
2.5-inch drives

To remove a hot-swap hard disk drive, complete the following steps:

1. Read the safety information that begins on page v and "Installation guidelines" on page 27.

2. Move the handle on the drive to the open position (perpendicular to the drive).

3. Pull the hot-swap drive assembly from the bay.

   Note: You might have to reconfigure the disk arrays after you remove a hard disk drive. See the RAID documentation on the IBM *ServeRAID Support* CD for information about RAID controllers.

If you have other options to install or remove, do so now. Otherwise, go to "Completing the installation" on page 67.

Installing an optional tape drive

Prepare the drive according to the instructions that come with the drive, setting any switches or jumpers; then, see "Installing the tape drive in a 3.5-inch model server" or "Installing the tape drive in a 2.5-inch model server" on page 49.

Installing the tape drive in a 3.5-inch model server

The optional tape drive installs in the two bottom-left hard disk drive bays. If you have hard disk drives in those bays, move the drives to other bays. The cables for the tape drive come with the tape drive option.
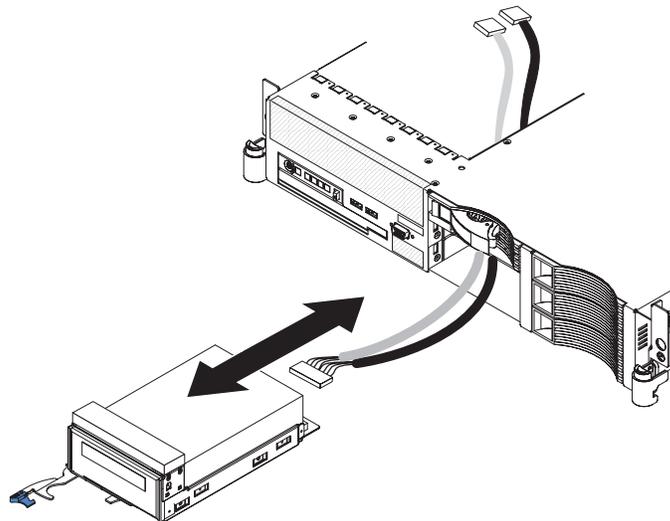
To install a tape drive in a 3.5-inch model server, complete the following steps:

1. Read the safety information that begins on page v and "Installation guidelines" on page 27.

2. If you have not attached the space filler from the tape drive option to the tape drive assembly, do so now.

3. Remove the server cover.

4. Remove the fan-bracket assembly.

5. Remove the filler panels from the two bottom left hard disk drive bays.

6. From the inside of the server, thread the tape-drive end of the cables through the slot in the left side of the hard disk drive cage and out the front of the server.

7. Connect the cables to the back of the tape drive.

8. Push the tape drive assembly into the bays, gently pulling the cables farther into the server as you do so, until the tape drive assembly stops.

9. Push the tray handle to the closed (locked) position.
10. Connect the cable connectors to the following system-board connectors (see "System-board internal cable connectors" on page 18 for the location of the connectors):
    - Signal connector: SATA tape drive signal connector, J102
    - Power connector: Tape drive power connector, J100

    The following illustration shows the routing of the SATA tape drive signal cable.

    Important: Make sure that the cables avoid any fan connectors.

11. Install the fan-bracket assembly.

If you have other options to install or remove, do so now. Otherwise, go to "Completing the installation" on page 67.

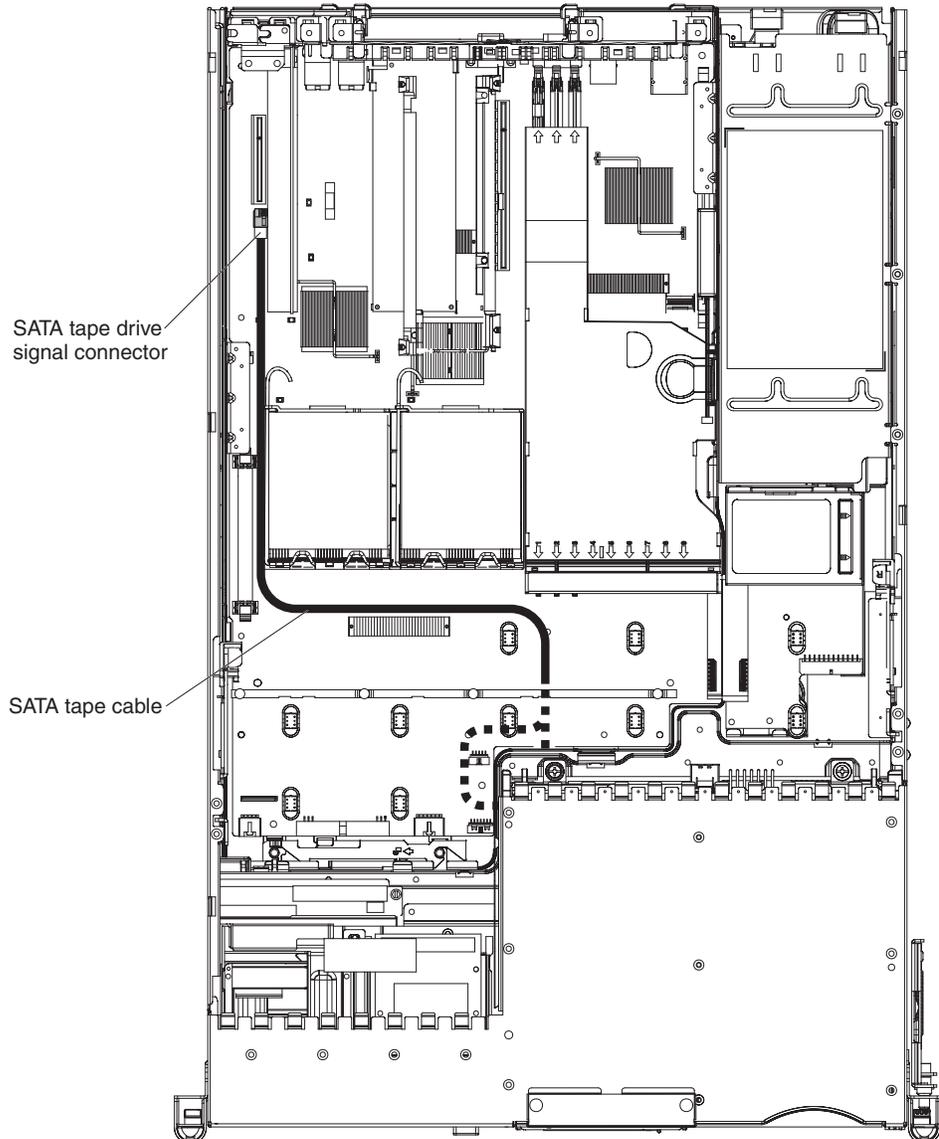# Installing the tape drive in a 2.5-inch model server
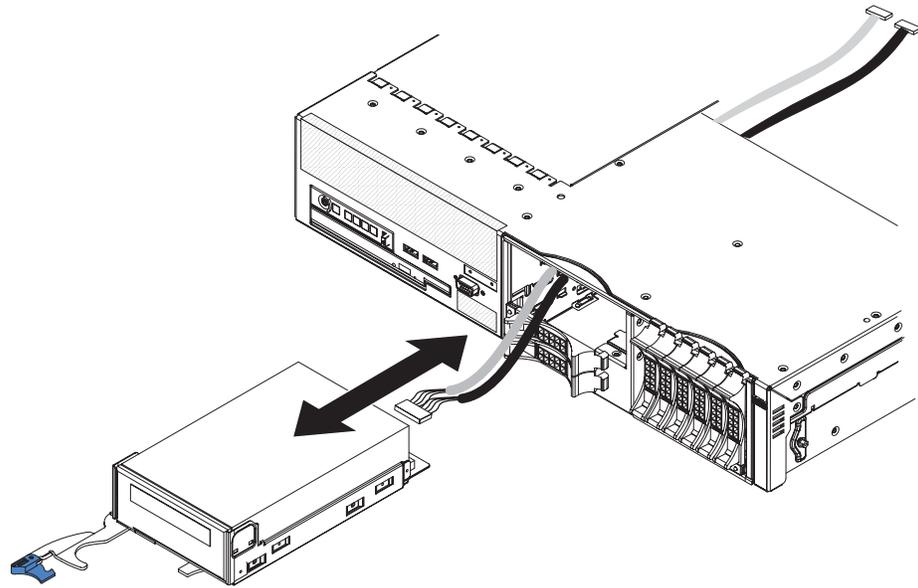
To install a tape drive in a 2.5-inch model server, complete the following steps:

1. Read the safety information that begins on page v and "Installation guidelines" on page 27.

2. If you installed the space filler from the tape drive option onto the tape drive assembly, remove it now.

3. Remove the server cover.

4. Remove the fan-bracket assembly.

5. Remove the filler panel from the tape drive bay.

6. From the inside of the server, thread the tape-drive end of the cables for your tape drive through the rear of the tape drive bay and out the front of the server.

7. Connect the cable or cables to the back of the tape drive.

8. Push the tape drive assembly into the tape drive bay, gently pulling the cables farther into the server as you do so, until the tape drive assembly stops.

9. Push the tray handle to the closed (locked) position.

10. Connect the cable connectors to the following system-board connectors (see "System-board internal cable connectors" on page 18 for the location of the connectors):

    • Signal connector: SATA tape drive signal connector, J102

    • Power connector: Tape drive power connector, J100

    The following illustration shows the routing of the SATA tape drive signal cable.
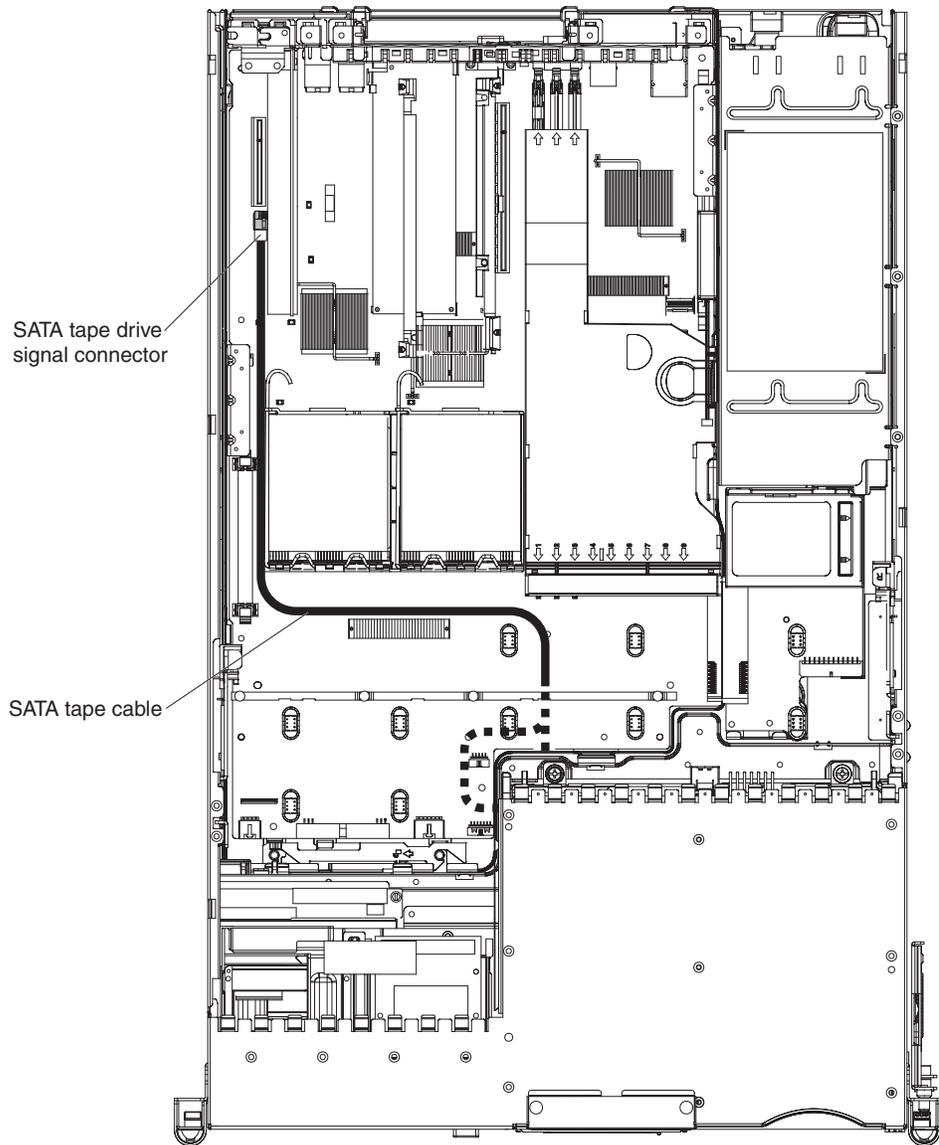
    Important: Make sure that the cables avoid any fan connectors.

SATA tape drive
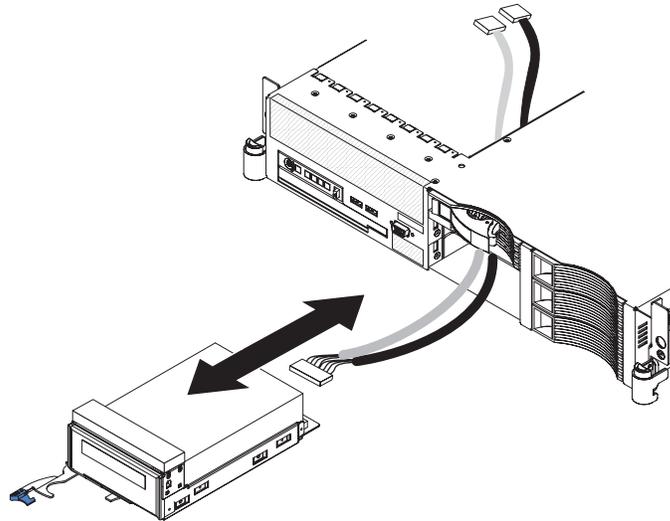signal connector

SATA tape cable

11. Install the fan-bracket assembly.

If you have other options to install or remove, do so now. Otherwise, go to
"Completing the installation" on page 67.

Removing an optional tape drive

The following illustration shows how to remove an optional tape drive from a 3.5-inch server model.

To remove a tape drive from the server, complete the following steps:

1. Read the safety information that begins on page v and "Installation guidelines" on page 27.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.
3. Remove the cover from the server.
4. Remove the fan-bracket assembly (see "Removing the fan-bracket assembly" on page 63).
5. Disconnect the tape drive cables from the connectors on the system board.
6. Open the tape drive tray release latch.
7. Gently pull the drive and cables out of the bay.

   Note: On a 3.5-inch model server, gently pull the drive cables through the slot in the left side of the bay and out the front of the server.
8. If you are not installing another drive in the bay, install a filler panel or panels in the bay.
9. Install the fan-bracket assembly (see "Installing the fan-bracket assembly" on page 65).
10. Replace the server cover.

Installing a microprocessor

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

- The server supports certain Intel Xeon dual-core flip-chip land grid array 771 (FC-LGA 771) microprocessors, which are designed for the LGA771 socket. See http://www.ibm.com/servers/eserver/serverproven/compat/us/ for a list of supported microprocessors.

- The server supports up to two microprocessors. If the server comes with one microprocessor, you can install a second microprocessor.
- When you install a microprocessor in microprocessor connector 2, you must also install the voltage regulator module (VRM), which comes with the microprocessor, in the VRM connector.
- Read the documentation that comes with the microprocessor to determine whether you must update the basic input/output system (BIOS) code for the server. To download the most current level of BIOS code and many other code updates for your server, go to http://www.ibm.com/servers/eserver/support/ xseries/index.html, select **System x3650** from the **Hardware** list, and click the **Download** tab.
- (Optional) Obtain an SMP-capable operating system. For a list of supported operating systems and other options, see http://www.ibm.com/servers/eserver/ serverproven/compat/us/.
- To order additional microprocessor options, contact your IBM marketing representative or authorized reseller.
- The microprocessor speeds are automatically set for this server; therefore, you do not have to set any microprocessor frequency-selection jumpers or switches.
- If you have to replace a microprocessor, call for service.
- If the thermal-grease protective cover (for example, a plastic cap or tape liner) is removed from the heat sink, do not touch the thermal grease on the bottom of the heat sink or set down the heat sink.
- Do not remove the first microprocessor from the system board to install the second microprocessor.

See "System-board option connectors" on page 16 for the location of the microprocessor connectors and the VRM connector.

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

Note: For simplicity, certain components are not shown in this illustration.
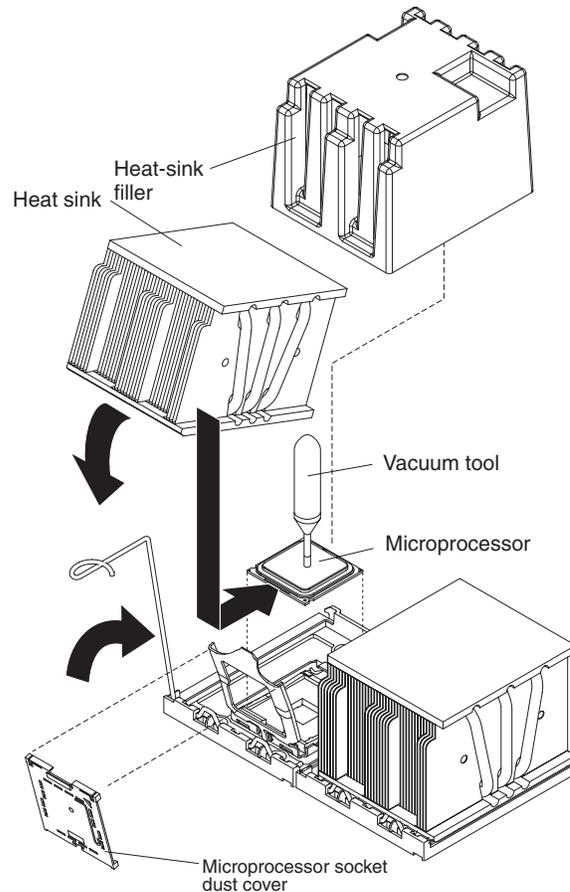
Attention:

- A startup (boot) microprocessor must always be installed in microprocessor connector 1 on the system board.
- To ensure correct 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.

To install an additional microprocessor, complete the following steps:

1. Read the safety information that begins on page v and "Installation guidelines" on page 27.
2. Turn off the server and disconnect all power cords and external cables (see "Turning off the server" on page 12); then, remove the server cover (see "Removing the cover" on page 29).
3. Remove the microprocessor air baffle (see "Removing the microprocessor air baffle" on page 31).

4. Install the VRM in the VRM connector.

Alignment key
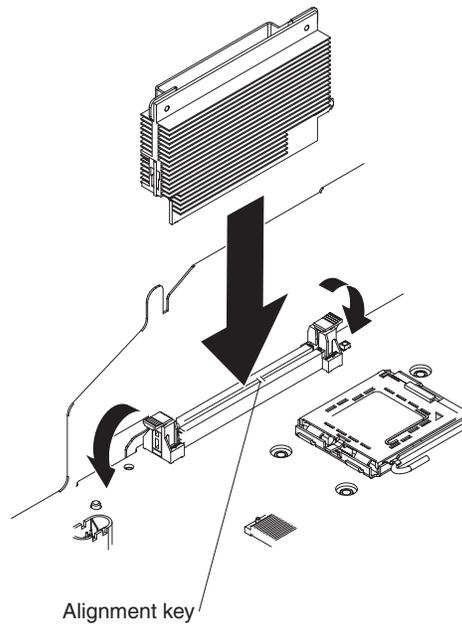
a. Touch the static-protective package containing the VRM to any unpainted metal surface on the outside of the server. Then, remove the VRM from the package.

b. Turn the VRM so that the keys align correctly with the VRM connector.

c. Firmly press the VRM straight down into the connector by applying pressure on both ends of the VRM simultaneously.

d. Make sure that the retaining clips are in the locked position when the VRM is firmly seated in the connector.

5. Locate the second microprocessor connector on the system board.

6. Install the microprocessor:

a. Touch the static-protective package that contains the microprocessor to any unpainted metal surface on the server. Then, remove the microprocessor from the package.

Microprocessor release lever

Microprocessor socket dust cover
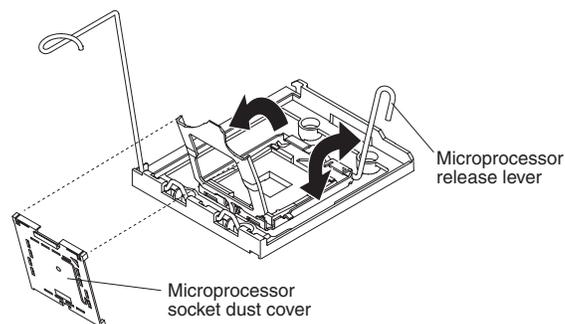
b. Remove the protective dust cover, tape, or label from the surface of the microprocessor socket, if one is present.

c. Rotate the microprocessor release lever on the socket from its closed and locked position until it stops in the fully open position.

Attention:

- Do not touch the microprocessor contacts; handle the microprocessor by the edges only. Contaminants on the microprocessor contacts, such as oil from your skin, can cause connection failures between the contacts and the socket.
- Use the vacuum tool that comes with the microprocessor to install the microprocessor. Dropping the microprocessor during installation or removal can damage the contacts.
- Do not use excessive force when you press the microprocessor into the socket.
- Make sure that the microprocessor is oriented and aligned and positioned in the socket before you try to close the lever.
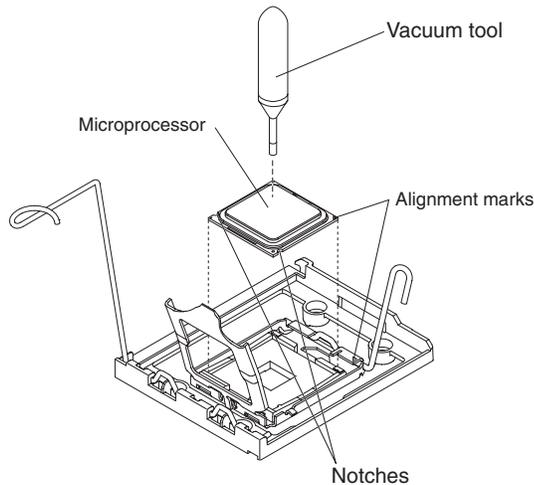
d. Align the microprocessor with the socket (note the alignment mark and the position of the notches); then, using the vacuum tool, carefully place the microprocessor on the socket. Close the microprocessor bracket frame.

   Note: The microprocessor fits only one way on the socket.

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

7. Install a heat sink on the microprocessor.

   Attention: Do not touch the thermal grease on the bottom of the heat sink or set down the heat sink after you remove the plastic cover. Touching the thermal grease will contaminate it.
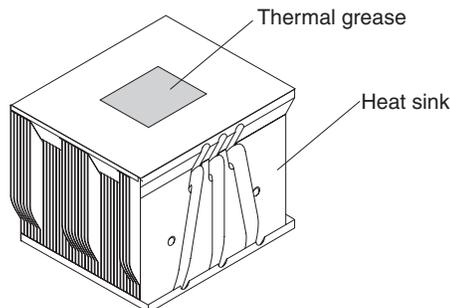
a. Make sure that the heat-sink release lever is in the open position.

b. Remove the plastic protective cover from the bottom of the heat sink.

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

Heat sink release lever

Retainer bracket

Microprocessor
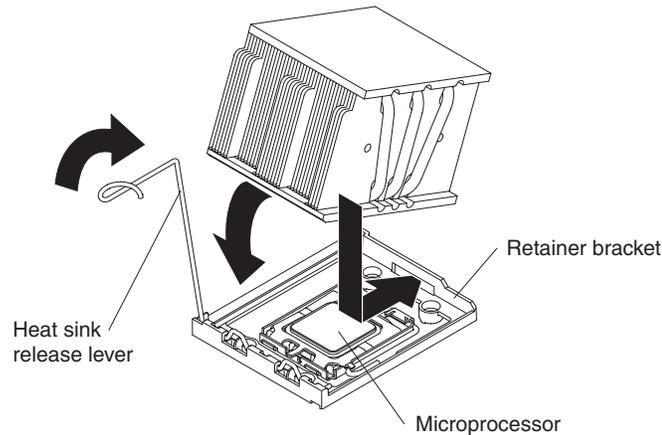
d. Slide the rear flange of the heat sink into the opening in the retainer bracket.

e. Press down firmly on the front of the heat sink until it is seated securely.

f. Rotate the heat-sink release lever to the closed position and hook it underneath the lock tab.

8. Install the microprocessor air baffle (see "Installing the microprocessor air baffle" on page 32).

If you have other options to install or remove, do so now. Otherwise, go to "Completing the installation" on page 67.

Installing a memory module

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

- The server supports up to 12 Fully Buffered DIMM PC2-5300 512 MB, 1 GB, 2 GB, and 4 GB DIMMs, for a maximum of 48 GB of system memory. See http://www.ibm.com/servers/eserver/serverproven/compat/us/ for a list of memory modules that you can use with the server.

  Note: Because some memory is reserved for system operation, the actual usable memory size that is reported by the operating system is less than the total installed size.

- The server comes with a minimum of two 512 MB DIMMs, installed in slots 1 and 4. When you install additional DIMMs, you must install two identical DIMMS at a time, in the order shown in the following table, to maintain performance.

Table 3. DIMM installation sequence

Pair	DIMM connectors
1	1 and 4
2	7 and 10
3	2 and 5
4	8 and 11
5	3 and 6
6	9 and 12
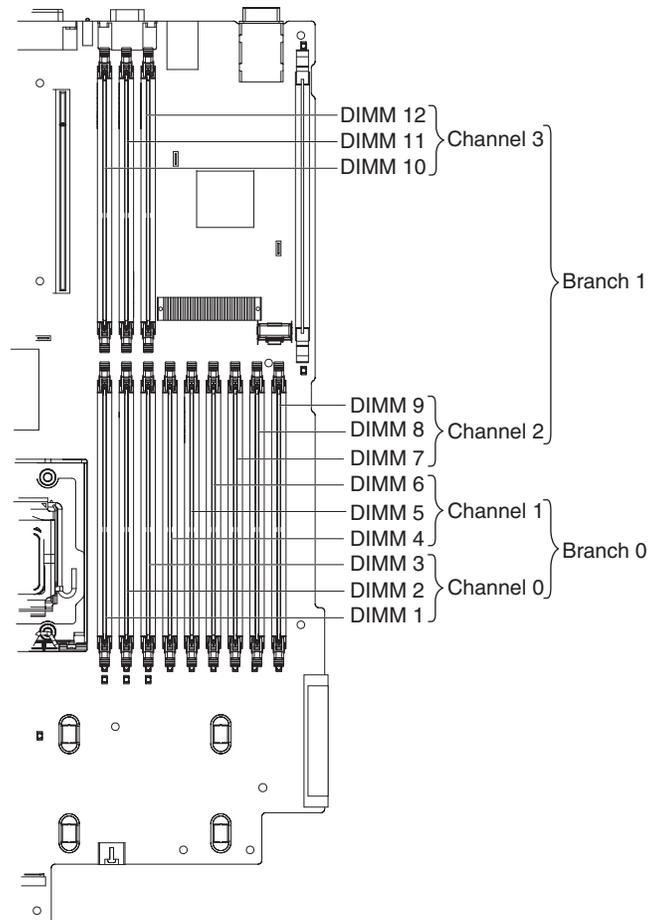
- Each DIMM in a pair must be the same size, speed, type, and technology to ensure that the server will operate correctly.
- You can configure the server to use memory mirroring. Memory mirroring stores data in two pairs of DIMMs simultaneously. If a failure occurs, the memory controller switches from the active pair to the mirroring pair. Memory mirroring reduces the amount of available memory. Enable memory mirroring through the Configuration/Setup Utility program. See "Configuration/Setup Utility menu choices" on page 72 for details about enabling memory mirroring.

  When you use memory mirroring, you must install two pairs of DIMMs at a time. The four DIMMs in each group must be identical. See Table 4 for the DIMM connectors that are in each group.

Table 4. Memory mirroring DIMM installation sequence

Group	DIMM connectors
1	1, 4, 7, and 10
2	2, 5, 8, and 11
3	3, 6, 9, and 12

Table 5. Memory mirroring DIMM functions

Group	Active DIMMs	Mirroring DIMMs
1	1, 4	7, 10
2	2, 5	8, 11

Table 5. Memory mirroring DIMM functions (continued)

Group	Active DIMMs	Mirroring DIMMs
3	3, 6	9, 12

- The server supports online-spare memory. This feature disables the failed memory from the system configuration and activates an online-spare pair of DIMMs to replace the failed active DIMM pair. Online-spare memory reduces the amount of available memory. Before you can enable this feature, you must install up to two additional pairs of DIMMs. The online-spare DIMM pairs must be the same speed, type, and the same size as, or larger than, the largest active DIMM pairs.

  Enable online-spare memory through the Configuration/Setup Utility program. The BIOS code assigns the online-spare DIMM pairs according to your DIMM configuration. Three online-spare configurations are supported. See Table 6 for the online-spare DIMM connector assignments.

Table 6. Online-spare DIMM connector assignments

Active DIMMs	Required online-spare DIMMs	Empty connectors
1 and 4	2 and 5	3, 6, 7, 8, 9, 10, 11, and 12
1, 4, 7, and 10	2, 5, 8, and 11	3, 6, 9, and 12
1, 4, 7, and 10 2, 5, 8, and 11	3, 6, 9, and 12	None

- You can enable either online-spare memory or memory mirroring, but not both at the same time. Online-spare memory provides more memory capacity than mirroring; mirroring provides better memory protection but less memory capacity than online-spare memory.
- When you install or remove DIMMs, the server configuration information changes. When you restart the server, the system displays a message that indicates that the memory configuration has changed.

To install a DIMM, complete the following steps.
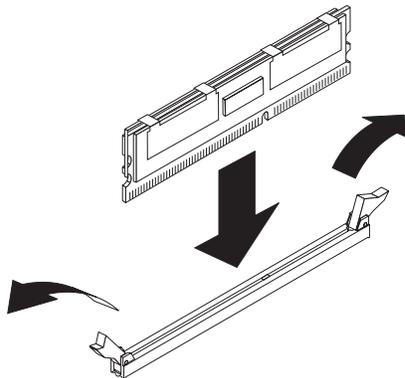
1. Read the safety information that begins on page v and "Installation guidelines" on page 27.
2. Turn off the server and peripheral devices, and disconnect the power cord and all external cables. Remove the cover (see "Removing the cover" on page 29).

   Attention: To avoid breaking the retaining clips or damaging the DIMM connectors, open and close the clips gently.
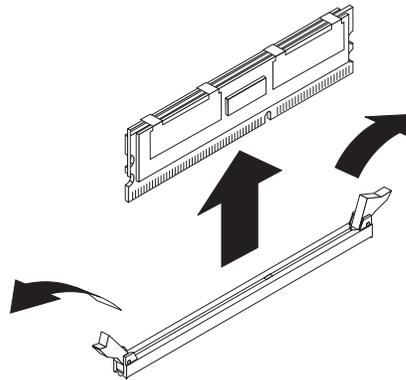
3. Remove the riser-card assembly (see "Removing the riser-card assembly" on page 30).

4. Remove the DIMM air baffle (see "Removing the DIMM air baffle" on page 33).

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

6. Touch the static-protective package that contains the DIMM to any unpainted metal surface on the server. Then, remove the DIMM from the package.

7. Turn the DIMM so that the DIMM keys align correctly with the connector.

8. 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.

   Important: 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.

If you have other options to install or remove, do so now. Otherwise, go to "Completing the installation" on page 67.

Removing a memory module

To remove a DIMM, complete the following steps.

1. Read the safety information that begins on page v and "Installation guidelines" on page 27.

2. Turn off the server and peripheral devices, and disconnect the power cord and all external cables. Remove the cover (see "Removing the cover" on page 29).

3. Remove the riser-card assembly (see "Removing the riser-card assembly" on page 30).

4. Remove the air baffle over the DIMMs (see "Removing the DIMM air baffle" on page 33).

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

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

6. Lift the DIMM out of the connector.

7. Replace the DIMM or remove the second DIMM of the pair.

If you have other options to install or remove, do so now. Otherwise, go to "Completing the installation" on page 67.

Installing a hot-swap power supply

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

Important: Only the configurations that are shown in the following table are supported. The fan numbers are printed on the microprocessor air baffle.

Installed power supplies	Required
Power supply 1	Fans in locations 3, 4, 8, 9, and 10
Power supplies 1 and 2	All 10 fans

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.

Hot-swap power supply 2

Power supply filler release lever

Power supply filler
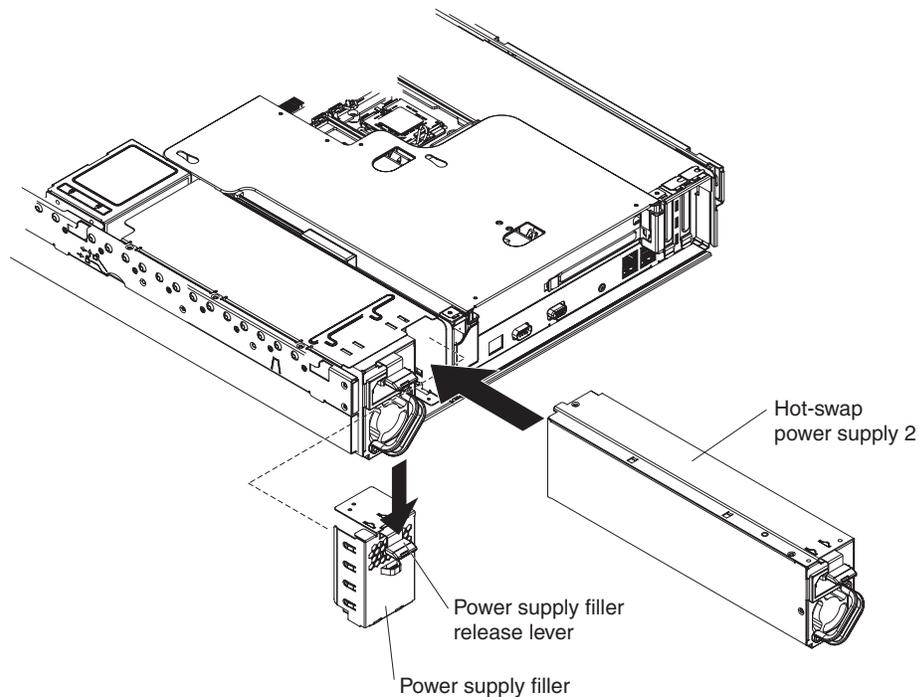
To install a power supply, complete the following steps:

1. Read the safety information that begins on page v and "Installation guidelines" on page 27.

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

   Important: During normal operation, each power-supply bay must contain either a power supply or power-supply blank for proper cooling.

3. Slide the power supply into the bay until the retention latch clicks into place.

4. Remove the server cover and install the five cooling fans that came with the power-supply option (see "Installing a fan" on page 62).

   Important: When power supply 1 is installed, the five fans for power supply 1 occupy the rear row only (fans 3, 4, 8, 9, and 10); when both power supplies are installed, all 10 fans must be installed. See the fan numbers on the microprocessor air baffle, or see the illustration in "Removing a fan" on page 63.

5. Connect the power cord for the new power supply to the power-cord connector on the power supply.

   The following illustration shows the power-supply connectors on the back of the server.
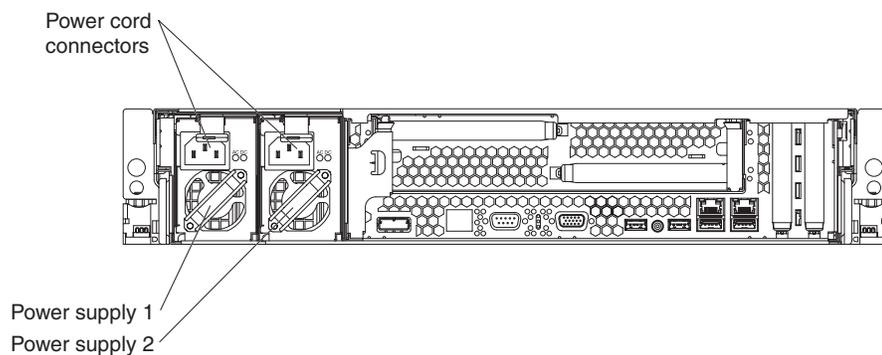
6. Route the power cord through the power-supply handle and through any cable clamps on the rear of the server, to prevent the power cord from being accidentally pulled out when you slide the server in and out of the rack.

7. Connect the power cord to a properly grounded electrical outlet.

8. Make sure that the dc power LED and ac power LED on the power supply are lit, indicating that the power supply is operating correctly.

If you have other options to install or remove, do so now. Otherwise, go to "Completing the installation" on page 67.

Removing a hot-swap power supply

Important: If the server has two power supplies and you remove either of them, the server will not have redundant power; if the server power load then exceeds 835 W, the server might not start or might not function correctly.

To remove a power supply, complete the following steps:

1. If only one power supply is installed, turn off the server and peripheral devices.

2. Disconnect the power cord from the power supply that you are removing.

3. Grasp the power-supply handle.

4. Press the orange release latch down and hold it down.

5. Pull the power supply part of the way out of the bay.

6. Release the release latch; then, support the power supply and pull it the rest of the way out of the bay.

If you have other options to install or remove, do so now. Otherwise, go to "Completing the installation" on page 67.

Installing a fan

For proper cooling, the server requires that five fans be installed for each hot-swap power supply installed.

The server comes with five replaceable fans. If you install a second hot-swap power supply, you must install the set of five fans that come with the power-supply option.

Important: Only the configurations that are shown in the following table are supported. The fan numbers are printed on the microprocessor air baffle.

Installed power supplies	Required fans
Power supply 1	Fans in locations 3, 4, 8, 9, and 10
Power supplies 1 and 2	All 10 fans

Attention: To ensure proper server operation, if a fan fails, replace it as soon as possible.
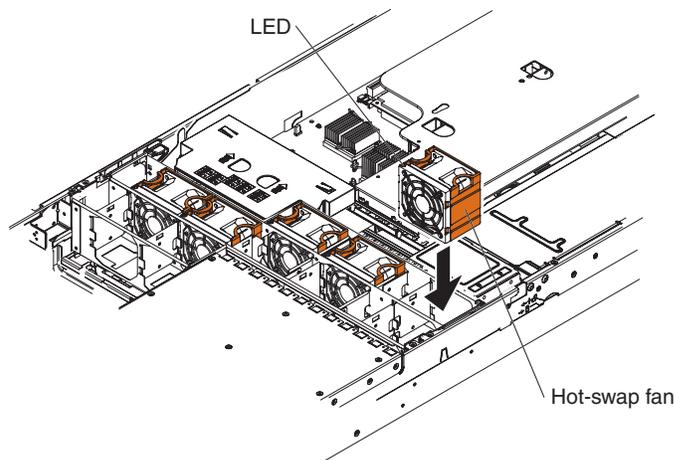
To install any of the 10 replaceable fans, complete the following steps:

1. Read the safety information that begins on page v and "Installation guidelines" on page 27.

2. If you have not done so already, slide the server out of the rack and remove the cover (see "Removing the cover" on page 29).

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

3. Orient the new fan over its position in the fan assembly bracket so that the LED on top of the fan is toward the left side of the server.

4. Push the new fan into the fan assembly bracket until it clicks into place.

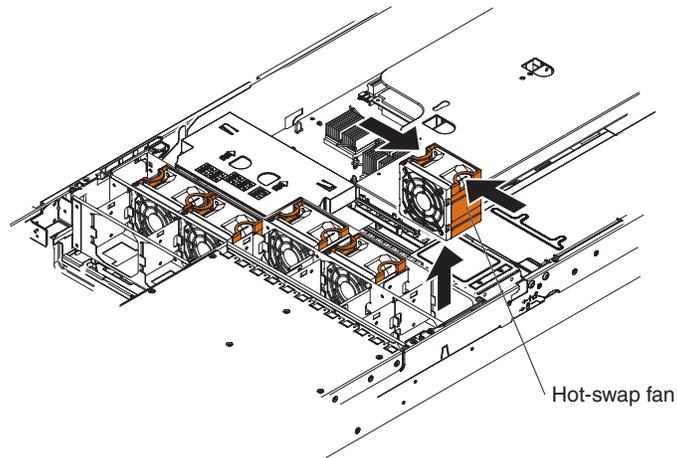5. Repeat until all the new fans are installed.

If you have other options to install or remove, do so now. Otherwise, go to "Completing the installation" on page 67.

Removing a fan

The server comes with up to 10 replaceable fans.

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

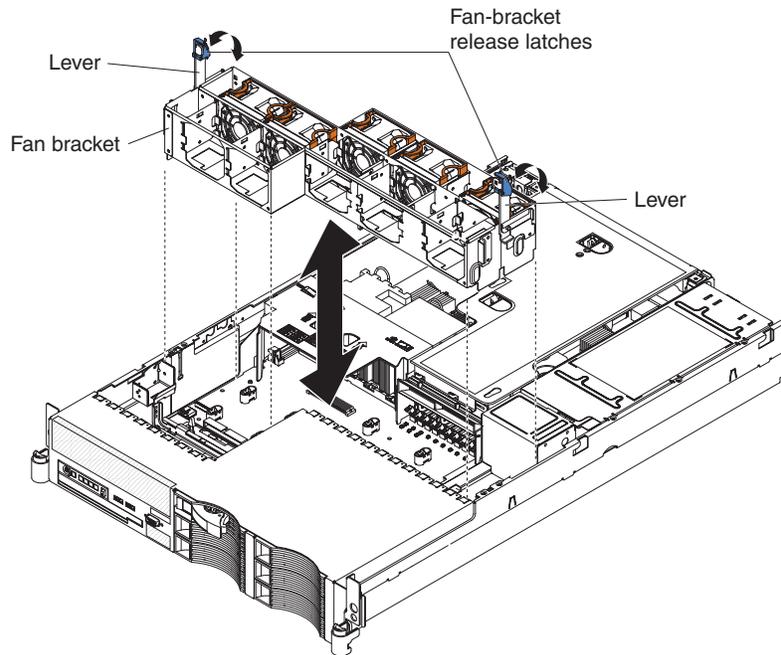To remove any of the 10 replaceable fans, complete the following steps.

Hot-swap fan

1. Read the safety information that begins on page v and "Installation guidelines" on page 27.
2. Slide the server out of the rack and remove the cover (see "Removing the cover" on page 29). The LED on the failing fan will be lit.
   Attention: To ensure proper system cooling, do not remove the top cover for more than 30 minutes during this procedure.
3. Place your fingers into the two handles on the top of the failing fan.
4. Pull the handles toward each other and lift the fan out of the server.
5. Replace the fan as soon as possible (see "Installing a fan" on page 62).

If you have other options to install or remove, do so now. Otherwise, go to "Completing the installation" on page 67.

Removing the fan-bracket assembly

To replace the CD-RW/DVD drive, you must remove the fan-bracket assembly; to route some cables, you might have to remove the fan-bracket assembly.

Note: To remove or install a fan, it is not necessary to remove the fan-bracket assembly. See "Removing a fan" and "Installing a fan" on page 62.

To remove the fan-bracket assembly, complete the following steps:

1. Read the safety information that begins on page v and "Installation guidelines" on page 27.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables. Remove the cover (see "Removing the cover" on page 29).
3. Place your thumbs on the metal tabs of the fan-bracket-assembly levers and pinch the tab and blue release latch together; then, raise the levers, raising the fan-bracket assembly.
4. Grasp the levers and lift the fan-bracket assembly out of the server.

Installing the fan-bracket assembly
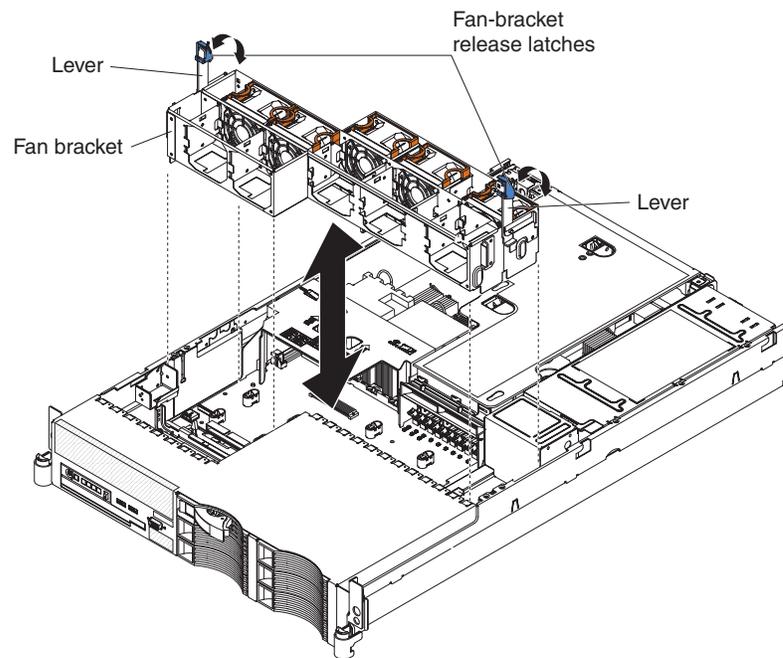
To install the fan-bracket assembly, complete the following steps:

1. Read the safety information that begins on page v and "Installation guidelines" on page 27.
2. Make sure that the server and all peripheral devices are turned off and that the power cords and all external cables are disconnected.
3. Align the guides on the left and right sides of the assembly with the slots in the sides of the chassis.
4. Lower the fan-bracket assembly into the chassis.
5. Push the fan-bracket-assembly levers toward the rear of the server until they stop; pinch the release latches and metal tabs together and push the levers down into place.
6. Press down on the lever metal tabs and on the fans to make sure that the fan-bracket assembly is fully seated.

If you have other options to install or remove, do so now. Otherwise, go to "Completing the installation" on page 67.

Replacing the CD-RW/DVD drive

To remove the CD-RW/DVD drive, complete the following steps.

Release tab

CD/DVD drive

1. Read the safety information that begins on page v and "Installation guidelines" on page 27.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.
3. Remove the cover (see "Removing the cover" on page 29).
4. Press the release tab down to release the drive; then, while pressing the tab, push the drive toward the front of the server.

Drive retention clip

Alignment pins
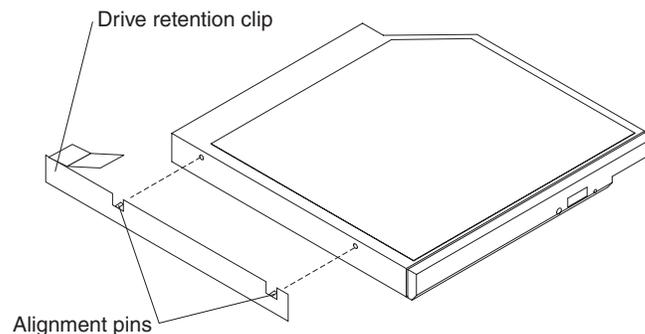
5. From the front of the server, pull the drive out of the bay.
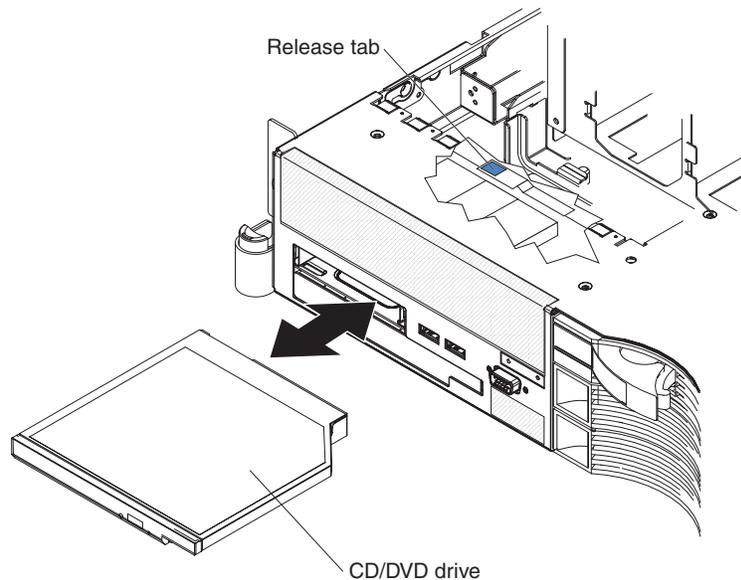6. Remove the retention clip from the drive.

To install a CD-RW/DVD drive, complete the following steps:

1. Read the safety information that begins on page v and "Installation guidelines" on page 27.
2. Make sure that the server and peripheral devices are turned off, and that the power cords and all external cables are disconnected. Remove the cover (see "Removing the cover" on page 29).

3. Follow the instructions that come with the drive to set any jumpers or switches.

Drive retention clip

Alignment pins
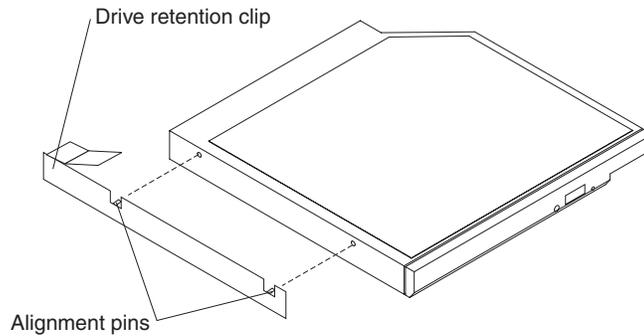
4. Attach the drive retention clip to the side of the drive.
5. Slide the drive into the CD/DVD drive bay until the drive clicks into place.

If you have other options to install or remove, do so now. Otherwise, go to "Completing the installation."

Completing the installation

To complete the installation, complete the following steps:

1. If you removed the PCI riser-card assembly, replace the riser-card assembly (see "Installing the riser-card assembly" on page 31).
2. If you removed any air baffles, replace the air baffles (see "Installing the microprocessor air baffle" on page 32 and "Installing the DIMM air baffle" on page 34).
3. If you removed the server cover, place the cover-release latch in the open (up) position. Insert the bottom tabs of the top cover into the matching slots in the server chassis. Press down on the cover-release latch to lock the cover in place.

Cover-release
latch
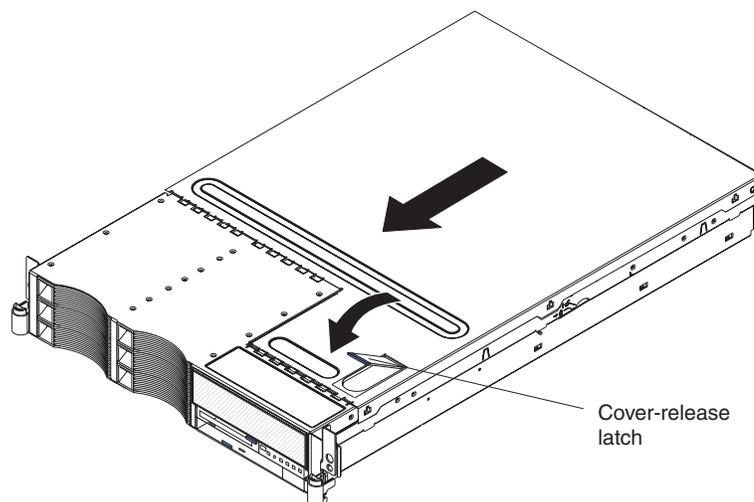
4. Install the server in a rack. See the *Rack Installation Instructions* that come with the server for complete rack installation and removal instructions.

Attention:

- Install the server only in a rack cabinet with perforated doors.
- Do not leave open spaces above or below an installed server in the rack cabinet. To help prevent damage to server components, always install a blank filler panel to cover the open space and to help ensure proper air circulation. See the documentation that comes with the rack cabinet for more information.
- Install the server in a rack that meets the following requirements:
  - Minimum depth of 70 mm (2.8 in.) between the front mounting flange and the inside of the front door
  - Minimum depth of 157 mm (6.2 in.) between the rear mounting flange and the inside of the rear door
  - Minimum depth of 718 mm (28.3 in.) and maximum depth of 762 mm (30.0 in.) between the front and rear mounting flanges

5. To attach peripheral devices and connect the power cords, see "Connecting the cables."

Installing the cover

Cover-release latch
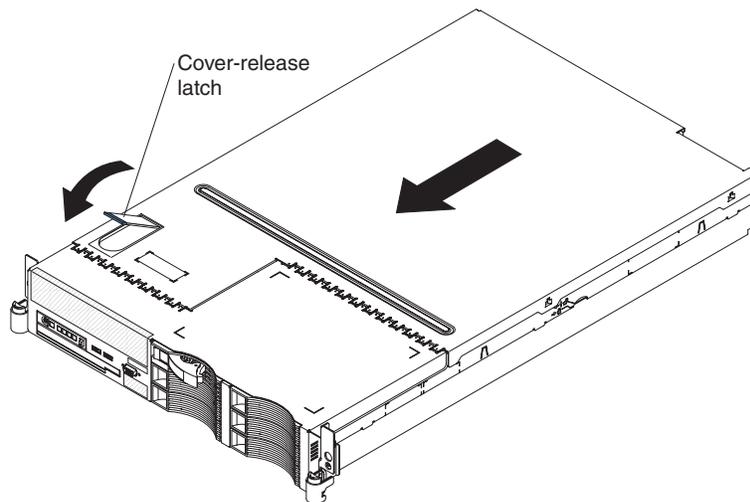
To install the cover, complete the following steps:

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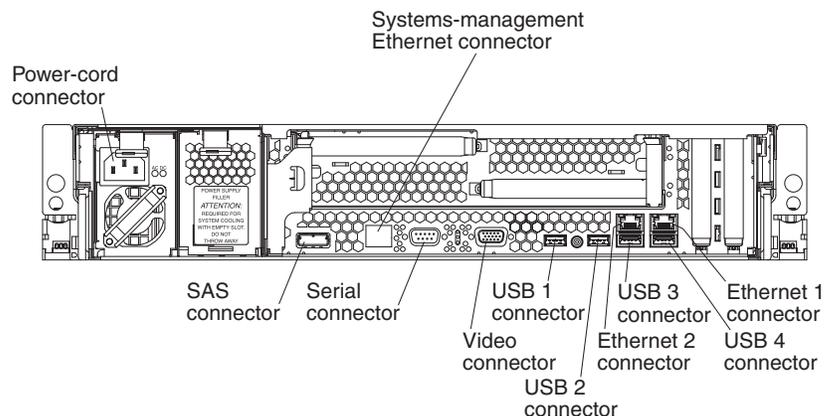4. Slide the server into the rack.

Connecting the cables

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

Front view

USB 5 connector
USB 6 connector
Video connector

Rear view

Systems-management
Ethernet connector

Power-cord
connector

SAS
connector

Serial
connector

USB 1
connector

Video
connector

USB 2
connector

USB 3
connector

Ethernet 2
connector

Ethernet 1
connector

USB 4
connector
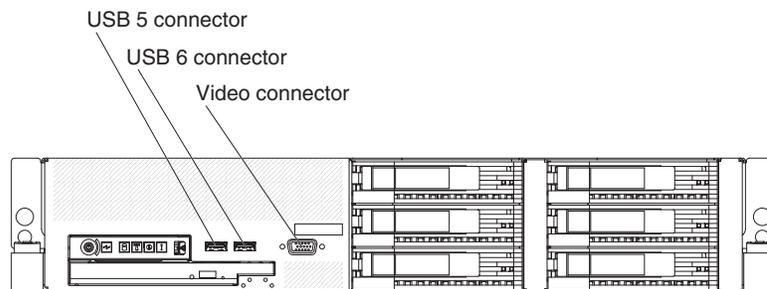
You must turn off the server before you connect or disconnect cables from the server.

See the documentation that comes with any external devices for additional cabling instructions. It might be easier for you to route cables before you connect the devices to the server.

Cable identifiers are printed on the cables that come with the server and optional devices. Use these identifiers to connect the cables to the correct connectors.

If the server comes with an installed operating system, see the documentation that comes with the operating system for additional cabling instructions.

Updating the server configuration

When you start the server for the first time after you add or remove an internal device, external SAS device, or USB keyboard or mouse, you might receive a message that the configuration has changed. The Configuration/Setup Utility program starts automatically so that you can save the new configuration settings. For more information, see Chapter 3, "Configuring the server," on page 71.

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

The server comes with at least one dual-core microprocessor, which enables the server to operate as a symmetric multiprocessing (SMP) server. You might have to upgrade the operating system to support SMP. For more information, see "Using the ServerGuide Setup and Installation CD" on page 79 and the operating-system documentation.

If you have installed or removed a hard disk drive, see "Using the IBM ServeRAID Configuration Utility program" on page 81 and "Using ServeRAID Manager" on page 82 for information about reconfiguring the disk arrays.

If you have installed a Remote Supervisor Adapter II SlimLine to manage the server remotely, see the *Remote Supervisor Adapter User's Guide*, which comes with the adapter, for information about setting up, configuring, and using the adapter.

For information about configuring the integrated Gigabit Ethernet controller, see "Configuring the Gigabit Ethernet controllers" on page 96.

Chapter 3. Configuring the server

The following configuration programs and capabilities come with the server:

- **IBM** *ServerGuide Setup and Installation* **CD**

  The ServerGuide program provides software-setup tools and installation tools that are designed for the server. Use this CD during the installation of the server to configure basic hardware features and to simplify the installation of your operating system. For information about using this CD, see "Using the ServerGuide Setup and Installation CD" on page 79.

- **Configuration/Setup Utility program**

  The Configuration/Setup Utility program is part of the basic input/output system (BIOS). Use it to configure serial port assignments, change interrupt request (IRQ) settings, change the startup-device sequence, set the date and time, and set passwords. For information about using this program, see "Using the Configuration/Setup Utility program" on page 72.

- **RAID configuration programs**

  - **IBM ServeRAID Configuration Utility program**

    Use the IBM ServeRAID Configuration Utility program to configure devices that are attached to the SAS controller. For information about using this program, see "Using the IBM ServeRAID Configuration Utility program" on page 81.

  - **ServeRAID Manager**

    ServeRAID Manager is available as a stand-alone program and as an IBM Director extension. Use ServeRAID Manager to define and configure your disk-array subsystem *before* you install the operating system. For information about using this program, see "Using ServeRAID Manager" on page 82.

- **Ethernet controller configuration**

  For information about configuring the Ethernet controllers, see "Configuring the Gigabit Ethernet controllers" on page 96.

- **Baseboard management controller utility programs**

  Use these programs to configure the baseboard management controller, to update the firmware and sensor data record/field replaceable unit (SDR/FRU) data, and to remotely manage a network. For information about using these programs, see "Using the baseboard management controller" on page 84.

- **IBM Director**

  IBM Director is a workgroup-hardware-management tool that you can use to centrally manage System x and xSeries servers. If you plan to use IBM Director to manage the server, you must check for the latest applicable IBM Director updates and interim fixes. For information about updating IBM Director, see "Updating IBM Director" on page 97. For more information about IBM Director, see the IBM Director documentation on the *IBM Director* CD that comes with the server.

- **Remote Supervisor Adapter II SlimLine configuration**

  For information about setting up and cabling a Remote Supervisor Adapter II SlimLine, see "Setting up a Remote Supervisor Adapter II SlimLine" on page 97.

- **Boot Menu program**

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

Using the Configuration/Setup Utility program

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

- View configuration information
- View and change assignments for devices and I/O ports
- Set the date and time
- Set and change passwords
- Set and change the startup characteristics of the server and the order of startup devices (startup-drive sequence)
- Set and change settings for advanced hardware features
- View and clear the error and event logs
- Resolve configuration conflicts

Starting the Configuration/Setup Utility program

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

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

Configuration/Setup Utility menu choices

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

- **System Summary**

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

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

- **System Information**

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

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

  – **Product Data**

    Select this choice to view the machine type and model of the server, the serial number, the system UUID, the system board identifier, the revision level or issue date of the BIOS code and diagnostics code, and the version, date, and build level of ROM code for the Remote Supervisor Adapter II SlimLine, if one is installed.

  – **System card data**

    Select this choice to view the identity of the system board, power supplies, DASD backplane, and power backplane.

- **Devices and I/O Ports**

  Select this choice to view or change assignments for devices and input/output (I/O) ports. You can configure the serial ports, configure remote console redirection, enable or disable integrated Ethernet controllers, the SAS controller, IDE channels, and PCI slots, and view the system Ethernet MAC addresses. If you disable a device, it cannot be configured, and the operating system will not be able to detect it (this is equivalent to disconnecting the device).

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

- **Date and Time**

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

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

- **System Security**

  Select this choice to set passwords. See "Passwords" on page 76 for more information.

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

  – **Administrator Password**

    Select this choice to set or change an administrator password. An administrator password is intended to be used by a system administrator; it limits access to the full Configuration/Setup Utility menu. If an administrator password is set, the full Configuration/Setup Utility menu is available only if you type the administrator password at the password prompt. For more information, see "Administrator password" on page 77.

  – **Power-on Password**

    Select this choice to set or change a power-on password. See "Power-on password" on page 76 for more information.

- **Start Options**

  Select this choice to view or change the start options, including the startup sequence, keyboard NumLock state, PXE boot option, and PCI device boot priority. Changes in the startup options take effect when you start the server.

  The startup sequence specifies the order in which the server checks devices to find a boot record. The server starts from the first boot record that it finds. If the server has Wake on LAN hardware and software and the operating system supports Wake on LAN functions, you can specify a startup sequence for the Wake on LAN functions. For example, you can define a startup sequence that checks for a disc in the CD-RW/DVD drive, then checks the hard disk drive, and then checks a network adapter.

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

- **Advanced Setup**

  Select this choice to change settings for advanced hardware features.

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

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

  – **System Partition VIsibility**

    Select this choice to make the System Partition hidden or visible.

  – **Memory Settings**

    Select this choice to enable or disable pairs of memory connectors, configure the memory mode (flat, memory-mirroring, or online-spare), and view the memory speed.

– **CPU Options**

Select this choice to specify the system cache type, and to enable or disable hyper-threading, the pre-fetch queue, and Virtualization Technology for all microprocessors in the server. Virtualization Technology enables the microprocessor to appear to be a dedicated processor to each running application in the system.

– **PCI Bus Control**

Select this choice to view the system resources that are used by installed PCI (PCI Express or PCI-X) devices. You can change the master latency timer value, view and configure PCI interrupt routing, and enable or disable the loading and execution of ROM code per PCI slot (see message 1801 in the *Problem Determination and Service Guide* on the IBM *System x Documentation* CD).

– **PCI Slot/Device Information**

This choice is available only if an optional Remote Supervisor Adapter II SlimLine is installed.

Select this choice to view the PCI device information, including PCI bus number, for each PCI slot. Highlight a slot; then, press Enter to view the details of the PCI devices that are connected to the slot. Follow the instructions on the screen to page forward or backward through the devices that are connected to the slot.

– **RSA II Settings**

This choice is available only if an optional Remote Supervisor Adapter II SlimLine is installed

Select this choice to configure the settings for the Remote Supervisor Adapter II SlimLine.

- **MAC Address**
  This is a nonselectable item that displays the MAC address of the Remote Supervisor Adapter II SlimLine.

- **DHCP IP Address**
  This is a nonselectable item that displays the current IP address of the Remote Supervisor Adapter II SlimLine.

- **DHCP Control**
  Specify whether to use the static IP address or use DHCP to dynamically assign the IP address for the Remote Supervisor Adapter II SlimLine. If DHCP times out while it is assigning an IP address, the system defaults to the static IP address.

- **Static IP Settings**

  Define the static IP address, subnet mask, and gateway address for the Remote Supervisor Adapter II SlimLine.

- **OS USB selection**
  Select the operating system to use to provide USB support for remote access to the Remote Supervisor Adapter II SlimLine. The remote keyboard and mouse access the Remote Supervisor Adapter II SlimLine through a USB port. **Linux OS** is the default setting.

– **Baseboard Management Controller (BMC) setting**

Select this choice to change settings for the BMC.

- **BMC Firmware Version**
  This is a nonselectable menu item that displays the BMC firmware version.

- **BMC Build Level**

  This is a nonselectable menu item that displays the BMC firmware build level.
- **BMC Build Date**

  This is a nonselectable menu item that displays the BMC firmware build date.
- **BMC POST Watchdog**

  Enable or disable the BMC POST watchdog. **Disable** is the default setting.
- **BMC POST Watchdog Timeout**

  Set the BMC POST watchdog timeout value. **5 minutes** is the default setting.
- **System-BMC Serial Port Sharing**

  Enable or disable sharing the serial port between the BMC and the system. **Disabled** is the default setting; it assigns the serial port to the BMC exclusively.
- **BMC Serial Port Access Mode**

  If serial-port sharing is enabled, specify the times and conditions during which the BMC shares the serial port.
- **Reboot System on NMI**

  Enable or disable restarting the system whenever a nonmaskable interrupt (NMI) occurs. **Disabled** is the default.
- **BMC Network Configuration**

  View the BMC MAC address and the current BMC IP address. Define the static BMC IP address, subnet mask, and gateway address, and specify whether to use the static IP address or have DHCP assign the BMC IP address.
- **BMC System Event Log**

  Select this choice to view the BMC system event log, which contains messages about system events, such as devices inserted or removed or a threshold reached. Select **Clear BMC SEL** to clear the BMC system event log.
- **User Account Settings**

  Define user names and passwords for logging in to the BMC to remotely control settings on the server such as power settings.

- **Event/Error Logs**

  Select this choice to view and clear the POST error log and the system event/error log.

  – **Post Error Log**

    Select this choice to view the three most recent error codes and messages that were generated during POST. Select **Clear POST Error Log** to clear the POST error log.

  – **System Event/Error Log**

    This choice is available only if an optional Remote Supervisor Adapter II SlimLine is installed.

    Select this choice to view the error messages in the system event/error log. You can use the arrow keys to move between pages in the error log. Select **Clear System Event/Error Log** to clear the system event/error log.

    The system event/error log contains all event and error messages that have been generated during POST, by the system management interface handler, and by the system service processor. Run the diagnostic programs to get more information about error codes that occur. See the *Problem*

Determination and Service Guide on the IBM *System x Documentation* CD for instructions for running the diagnostic programs.

- **Save Settings**

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

- **Restore Settings**

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

- **Load Default Settings**

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

- **Exit Setup**

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

Passwords

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

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

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

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

Power-on password

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

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

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

- If an administrator password is set, type the administrator password at the password prompt (see "Administrator password" on page 77). Start the Configuration/Setup Utility program and reset the power-on password.

- Remove the battery from the server and then reinstall it. For instructions for removing the battery, see the *Problem Determination and Service Guide* on the IBM *System x Documentation* CD.
- Change the position of the clear CMOS jumper on the system board to bypass the power-on password check. See "Resetting passwords" for additional information.

Attention: Before changing any switch settings or moving any jumpers, turn off the server; then, disconnect all power cords and external cables. See the safety information that begins on page v. Do not change settings or move jumpers on any system-board switch or jumper block that is not shown in this document.

Administrator password

If an administrator password is set, you must type the administrator password for access to the full Configuration/Setup Utility menu. You can use any combination of up to seven characters (A–Z, a–z, and 0–9) for the password.

If you forget the administrator password, you can reset it after you change the position of the clear CMOS jumper. See "Resetting passwords" for additional information.

Resetting passwords

If you forget the user or administrator password, you can move the clear-CMOS switch on the system board to On, to clear CMOS memory and bypass the power-on or administrator password check. The clear-CMOS switch is switch 1 on switch block SW2. The switch location is shown in the following illustration.

Boot block
recovery jumper
(J42)

Switch block
(SW2)
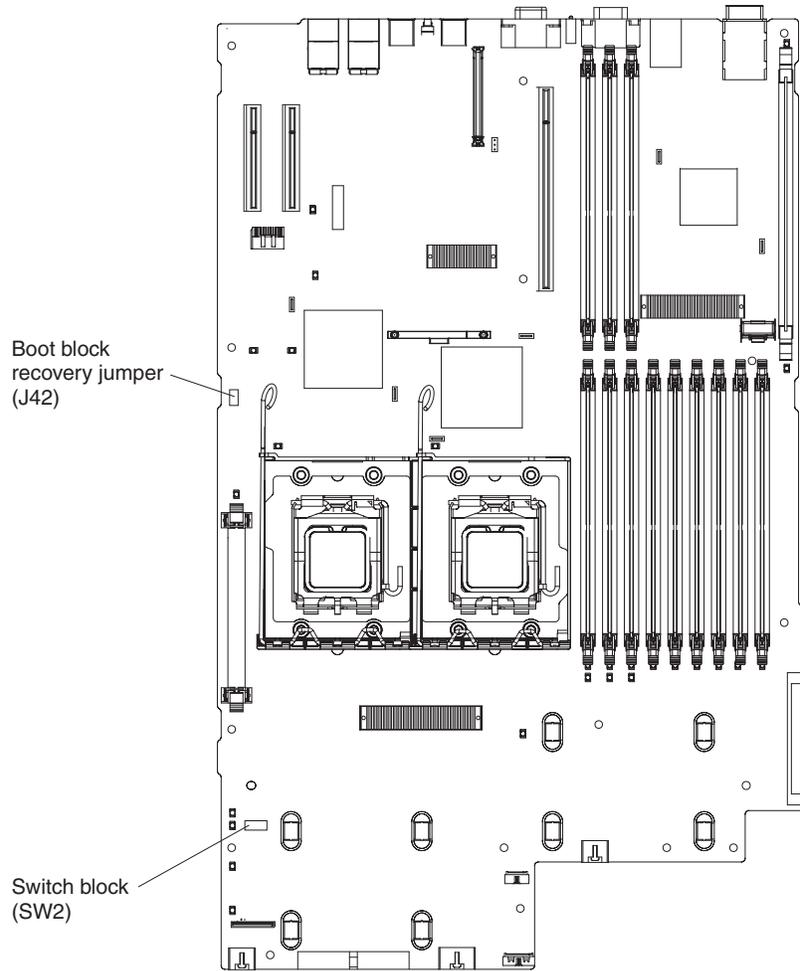
To clear CMOS and reset the passwords, complete the following steps:

1. Read the safety information that begins on page v and "Installation guidelines" on page 27.
2. Turn off the server and peripheral devices and disconnect all power cords and external cables.
3. Remove the server from the rack and place it on a flat, static-protective surface.
4. Remove the cover. See "Removing the cover" on page 29 for instructions.
5. Move the clear-CMOS switch (switch 1 on SW2) to the On position.
6. Install the cover and connect the server to a keyboard, monitor, and mouse; then, connect the server to a power source.
7. Turn on the server. You can now start the Configuration/Setup Utility program and either delete the old password or set a new power-on or administrator password.
8. Save the configuration and turn off the server; then, disconnect all power cords and external cables again.
9. Remove the cover, move the clear-CMOS switch back to the Off position, and reinstall the cover.
10. Replace the server in the rack and connect the external cables and power cords; then, turn on the server.

Using the ServerGuide Setup and Installation CD

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

If a later version of the ServerGuide program is available, you can download a free image of the *ServerGuide Setup and Installation* CD, or you can purchase the CD. To download the image, go to the IBM ServerGuide Web page at http://www.ibm.com/pc/qtechinfo/MIGR-4ZKPPT.html. To purchase the latest *ServerGuide Setup and Installation* CD, go to the ServerGuide fulfillment Web site at http://www.ibm.com/servers/eserver/xseries/systems_management/sys_migration/serverguide/sub.html.

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

ServerGuide features

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

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

The ServerGuide program performs the following tasks:
- Sets system date and time
- Detects the RAID adapter or controller and runs the SAS RAID configuration program
- Checks the microcode (firmware) levels of a ServeRAID adapter and determines whether a later level is available from the CD
- Detects installed hardware options and provides updated device drivers for most adapters and devices
- Provides diskette-free installation for supported Windows operating systems
- Includes an online readme file with links to tips for hardware and operating-system installation

Setup and configuration overview

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

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

When you start the *ServerGuide Setup and Installation* CD, the program prompts you to complete the following tasks:
- Select your language.
- Select your keyboard layout and country.
- View the overview to learn about ServerGuide features.
- View the readme file to review installation tips for your operating system and adapter.
- Start the operating-system installation. You will need your operating-system CD.

Typical operating-system installation

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

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

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

4. The ServerGuide program prompts you to insert your operating-system CD and restart the server. At this point, the installation program for the operating system takes control to complete the installation.

Installing your operating system without ServerGuide

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

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

1. Go to http://www.ibm.com/servers/eserver/support/xseries/index.html.
2. From the **Hardware** list, select **System x3650** and click **Go**.
3. Click the **Install and use** tab.
4. Click **Product documentation**.
5. Select the installation instructions for your operating system.

Using the IBM ServeRAID Configuration Utility program

Use the IBM ServeRAID Configuration Utility programs to perform the following tasks:

- Configure a redundant array of independent disks (RAID) array
- View or change the RAID configuration and associated devices

When you are using the IBM ServeRAID Configuration Utility programs to configure and manage arrays, consider the following information:

- Hard disk drive capacities affect how you create arrays. Drives in an array can have different capacities, but the RAID controller treats them as if they all have the capacity of the smallest hard disk drive.
- To help ensure signal quality, do not mix drives with different speeds and data rates.
- To update the firmware and BIOS code for an optional ServeRAID SAS controller, you must use the IBM *ServeRAID Support* CD that comes with the ServeRAID option.

Starting the IBM ServeRAID Configuration Utility program

To start the IBM ServeRAID Configuration Utility program, complete the following steps:

1. Turn on the server.
2. When the prompt `<<< Press <CTRL><A> for IBM ServeRAID Configuration Utility! >>>` appears, press Ctrl+A. If you have set an administrator password, you are prompted to type the password.
3. To select a choice from the menu (see "IBM ServeRAID Configuration Utility menu choices" on page 82), use the arrow keys.
4. Use the arrow keys to select the channel for which you want to change settings.
5. To change the settings of the selected items, follow the instructions on the screen.

IBM ServeRAID Configuration Utility menu choices

The following choices are on the IBM ServeRAID Configuration Utility menu:

- **Array Configuration Utility**

  Select this choice to create, manage, or delete arrays, or to initialize drives.

- **SerialSelect Utility**

  Select this choice to configure the controller interface definitions or to configure the physical transfer and SAS address of the selected drive.

- **Disk Utilities**

  Select this choice to format a disk or verify the disk media. Select a device from the list and read the instructions on the screen carefully before making a selection.

Configuring the controller

To configure a RAID array on the server, complete the following steps:

1. Turn on the server.
2. When the message `Press <CTRL><A> for IBM ServeRAID Configuration Utility` appears, press Ctrl+A.
3. Select **Array Configuration Utility**.
4. Select **Create Array**.
5. From the list of ready drives, select the drives that you want to group into the array.
6. From the list of RAID levels available, select the one you want to use, such as **RAID-1**.
7. (Optional) Type an identifier for the array.
8. When you are prompted for the array build method, select **Quick Init**.
9. Follow the instructions on the screen to complete the configuration; then, select **Done** to exit.
10. Restart the server.

Viewing the configuration

To view information about the RAID array, complete the following steps:

1. Turn on the server.
2. When the message `Press <CTRL><A> for IBM ServeRAID Configuration Utility` appears, press Ctrl+A.
3. Select **Array Configuration Utility**.
4. Select **Manage Arrays**.
5. Select an array and press Enter.
6. To exit from the program, press Esc.

Using ServeRAID Manager

Use ServeRAID Manager, which is on the *IBM ServeRAID Support* CD, to perform the following tasks:

- Configure a redundant array of independent disks (RAID) array
- Erase all data from a hard disk drive and return the disk to the factory-default settings
- View the RAID configuration and associated devices
- Monitor the operation of the RAID controller

To perform some tasks, you can run ServeRAID Manager as an installed program. However, to configure the SAS and RAID controllers and perform an initial RAID configuration on the server, you must run ServeRAID Manager in Startable CD mode, as described in the instructions in this section.

For additional information about RAID technology and instructions for using ServeRAID Manager to configure the SAS and RAID controllers, see the ServeRAID documentation on the *IBM ServeRAID Support* CD. Additional information about ServeRAID Manager is also available from the **Help** menu. For information about a specific object in the ServeRAID Manager tree, select the object and click **Actions --> Hints and tips**.

Configuring the RAID controller

By running ServeRAID Manager in Startable CD mode, you can configure the RAID controller before you install the operating system. The information in this section assumes that you are running ServeRAID Manager in Startable CD mode.

To run ServeRAID Manager in Startable CD mode, turn on the server; then, insert the CD into the CD-RW/DVD drive. If ServeRAID Manager detects an unconfigured controller and ready drives, the Configuration wizard starts.

In the Configuration wizard, you can select express configuration or custom configuration. Express configuration automatically configures the controller by grouping the first two physical drives in the ServeRAID Manager tree into an array and creating a RAID level-1 logical drive. If you select custom configuration, you can select the two physical drives that you want to group into an array and create a hot-spare drive.

Using express configuration

To use express configuration, complete the following steps:

1. In the ServeRAID Manager tree, click the controller.
2. Click **Express configuration**.
3. Click Next.
4. In the "Configuration summary" window, review the information. To change the configuration, click **Modify arrays**.
5. Click **Apply**; when you are asked whether you want to apply the new configuration, click **Yes**. The configuration is saved in the controller and in the physical drives.
6. Exit from ServeRAID Manager and remove the CD from the CD-RW/DVD drive.
7. Restart the server.

Using custom configuration

To use custom configuration, complete the following steps:

1. In the ServeRAID Manager tree, click the controller.
2. Click **Custom configuration**.
3. Click **Next**.
4. In the "Create arrays" window, from the list of ready drives, select the two drives that you want to group into the array.
5. Click the (Add selected drives) icon to add the drives to the array.
6. If you want to configure a hot-spare drive, complete the following steps:
   a. Click the **Spares** tab.

b. Select the physical drive that you want to designate as the hot-spare drive, and click the (Add selected drives) icon.

7. Click **Next**.

8. Review the information in the "Configuration summary" window. To change the configuration, click **Back**.

9. Click **Apply**; when you are asked whether you want to apply the new configuration, click **Yes**. The configuration is saved in the controller and in the physical drives.

10. Exit from ServeRAID Manager and remove the CD from the CD-RW/DVD drive.

11. Restart the server.

Viewing the configuration

You can use ServeRAID Manager to view information about RAID controllers and the RAID subsystem (such as arrays, logical drives, hot-spare drives, and physical drives). When you click an object in the ServeRAID Manager tree, information about that object appears in the right pane. To display a list of available actions for an object, click the object and click **Actions**.

Using the baseboard management controller

The baseboard management controller provides basic service-processor environmental monitoring functions for the server. If an environmental condition exceeds a threshold or if a system component fails, the baseboard management controller lights LEDs to help you diagnose the problem and also records the error in the BMC system event log.

The baseboard management controller also provides the following remote server management capabilities through the OSA SMBridge management utility program:

- **Command-line interface (IPMI Shell)**

  The command-line interface provides direct access to server management functions through the IPMI protocol. Use the command-line interface to issue commands to control the server power, view system information, and identify the server. You can also save one or more commands as a text file and run the file as a script.

- **Serial over LAN**

  Establish a Serial over LAN (SOL) connection to manage servers from a remote location. You can remotely view and change the BIOS settings, restart the server, identify the server, and perform other management functions. Any standard Telnet client application can access the SOL connection.

Enabling and configuring SOL using the OSA SMBridge management utility program

To enable and configure the server for SOL by using the OSA SMBridge management utility program, you must update and configure the BIOS code; update and configure the baseboard management controller (BMC) firmware; update and configure the Ethernet controller firmware; and enable the operating system for an SOL connection.

BIOS update and configuration

To update and configure the BIOS code to enable SOL, complete the following steps:

1. Update the BIOS code:

   a. Download the latest version of the BIOS code from http://www.ibm.com/servers/eserver/support/xseries/index.html

   b. Update the BIOS code, following the instructions that come with the update file that you downloaded.

2. Update the BMC firmware:

   a. Download the latest version of the BMC firmware from http://www.ibm.com/servers/eserver/support/xseries/index.html

   b. Update the BMC firmware, following the instructions that come with the update file that you downloaded.

3. Configure the BIOS settings:

   a. When you are prompted to start the Configuration/Setup Utility program, restart the server and press F1.

   b. Select **Devices and I/O Ports**; then, make sure that the values are set as follows:

      - **Serial Port A**: Auto-configure
      - **Serial Port B**: Auto-configure

   c. Select **Remote Console Redirection**; then, make sure that the values are set as follows:

      - **Remote Console Active**: Enabled
      - **Remote Console COM Port**: COM 1
      - **Remote Console Baud Rate**: 19200 or higher
      - **Remote Console Data Bits**: 8
      - **Remote Console Parity**: None
      - **Remote Console Stop Bits**: 1
      - **Remote Console Text Emulation**: ANSI
      - **Remote Console Keyboard Emulation**: ANSI
      - **Remote Console Active After Boot**: Enabled
      - **Remote Console Flow Control**: Hardware

   d. Press Esc twice to exit the **Remote Console Redirection** and **Devices and I/O Ports** sections of the Configuration/Setup Utility program.

   e. Select **Advanced Setup**; then, select **Baseboard Management Controller (BMC) Settings**.

   f. Set **BMC Serial Port Access Mode** to **Dedicated**.

   g. Press Esc twice to exit the **Baseboard Management Controller (BMC) Settings** and **Advanced Setup** sections of the Configuration/Setup Utility program.

   h. Select **Save Settings**; then, press Enter.

   i. Press Enter to confirm.

   j. Select **Exit Setup**; then, press Enter.

   k. Make sure that **Yes, exit the Setup Utility** is selected; then, press Enter.

Linux configuration

For SOL operation on the server, you must configure the Linux® operating system to expose the Linux initialization (booting) process. This enables users to log in to

the Linux console through an SOL session and directs Linux output to the serial console. See the documentation for your specific Linux operating-system type for information and instructions.

Use one of the following procedures to enable SOL sessions for your Linux operating system. You must be logged in as a root user to perform these procedures.

Red Hat Enterprise Linux ES 4 configuration:

Note: This procedure is based on a default installation of Red Hat Enterprise Linux ES 4. The file names, structures, and commands might be different for other versions of Red Hat Linux.

To configure the general Linux parameters for SOL operation when you are using the Red Hat Enterprise Linux ES 4 operating system, complete the following steps.

Note: Hardware flow control prevents character loss during communication over a serial connection. You must enable it when you are using a Linux operating system.

1. Add the following line to the end of the `# Run gettys in standard runlevels` section of the /etc/inittab file. This enables hardware flow control and enables users to log in through the SOL console.

   `7:2345:respawn:/sbin/agetty -h ttyS0 19200 vt102`

2. Add the following line at the bottom of the /etc/securetty file to enable a user to log in as the root user through the SOL console:

   `ttyS0`

LILO configuration: If you are using LILO, complete the following steps:

1. Modify the /etc/lilo.conf file:

   a. Add the following text to the end of the first `default=linux` line

      `-Monitor`

   b. Comment out the `map=/boot/map` line by adding a # at the beginning of this line.

   c. Comment out the `message=/boot/message` line by adding a # at the beginning of this line.

   d. Add the following line before the first `image=` line:

      `# This will allow you to only Monitor the OS boot via SOL`

   e. Add the following text to the end of the first `label=linux` line:

      `-Monitor`

   f. Add the following line to the first `image=` section. This enables SOL.

      `append="console=ttyS0,19200n8 console=tty1"`

   g. Add the following lines between the two `image=` sections:

      ```
      # This will allow you to Interact with the OS boot via SOL
      image=/boot/vmlinuz-2.4.9-e.12smp
          label=linux-Interact
          initrd=/boot/initrd-2.4.9-e.12smp.img
          read-only
          root=/dev/hda6
          append="console=tty1 console=ttyS0,19200n8 "
      ```

   The following examples show the original content of the /etc/lilo.conf file and the content of this file after modification.

Original /etc/lilo.conf contents
| ```
prompt
timeout=50
default=linux
boot=/dev/hda
map=/boot/map
install=/boot/boot.b
message=/boot/message
linear
image=/boot/vmlinuz-2.4.9-e.12smp
    label=linux
    initrd=/boot/initrd-2.4.9-e.12smp.img
    read-only
    root=/dev/hda6
image=/boot/vmlinuz-2.4.9-e.12
    label=linux-up
    initrd=/boot/initrd-2.4.9-e.12.img
    read-only
    root=/dev/hda6
``` |

Modified /etc/lilo.conf contents

```
prompt
timeout=50
default=linux-Monitor
boot=/dev/hda
#map=/boot/map
install=/boot/boot.b
#message=/boot/message
linear
# This will allow you to only Monitor the OS boot via SOL
image=/boot/vmlinuz-2.4.9-e.12smp
    label=linux-Monitor
    initrd=/boot/initrd-2.4.9-e.12smp.img
    read-only
    root=/dev/hda6
    append="console=ttyS0,19200n8 console=tty1"
# This will allow you to Interact with the OS boot via SOL
image=/boot/vmlinuz-2.4.9-e.12smp
    label=linux-Interact
    initrd=/boot/initrd-2.4.9-e.12smp.img
    read-only
    root=/dev/hda6
    append="console=tty1 console=ttyS0,19200n8 "
image=/boot/vmlinuz-2.4.9-e.12
    label=linux-up
    initrd=/boot/initrd-2.4.9-e.12.img
    read-only
    root=/dev/hda6
```

2. Run the **lilo** command to store and activate the LILO configuration.

When the Linux operating system starts, a `LILO boot:` prompt is displayed instead of the graphical user interface. Press Tab at this prompt to install all of the boot options that are listed. To load the operating system in interactive mode, type `linux-Interact` and then press Enter.

GRUB configuration: If you are using GRUB, modify the /boot/grub/grub.conf file:

1. Comment out the `splashimage=` line by adding a `#` at the beginning of this line.
2. Add the following line before the first `title=` line:

    `# This will allow you to only Monitor the OS boot via SOL`
3. Append the following text to the first `title=` line:

    `SOL Monitor`
4. Append the following text to the `kernel/` line of the first `title=` section:

    `console=ttyS0,19200 console=tty1`
5. Add the following five lines between the two `title=` sections:

    ```
    # This will allow you to Interact with the OS boot via SOL
    title Red Hat Linux (2.4.9-e.12smp) SOL Interactive
        root (hd0,0)
    kernel /vmlinuz-2.4.9-e.12smp ro root=/dev/hda6 console=tty1
    ```

```
                    console=ttyS0,19200
                    initrd /initrd-2.4.9-e.12smp.img
```

Note: The entry that begins with `kernel /vmlinuz` is shown with a line break after `console=tty1`. In your file, the entire entry must all be on one line.

The following examples show the original content of the /boot/grub/grub.conf file and the content of this file after modification.

Original /boot/grub/grub.conf contents
| ```
#grub.conf generated by anaconda
#
# Note that you do not have to rerun grub after making changes to this file
# NOTICE:  You have a /boot partition.  This means that
#          all kernel and initrd paths are relative to /boot/, eg.
#          root (hd0,0)
#           kernel /vmlinuz-version ro root=/dev/hda6
#           initrd /initrd-version.img
#boot=/dev/hda
default=0
timeout=10
splashimage=(hd0,0)/grub/splash.xpm.gz
title Red Hat Enterprise Linux ES (2.4.9-e.12smp)
    root (hd0,0)
    kernel /vmlinuz-2.4.9-e.12smp ro root=/dev/hda6
    initrd /initrd-2.4.9-e.12smp.img
title Red Hat Enterprise Linux ES-up (2.4.9-e.12)
    root (hd0,0)
    kernel /vmlinuz-2.4.9-e.12 ro root=/dev/hda6
    initrd /initrd-2.4.9-e.12.img
``` |

Modified /boot/grub/grub.conf contents

```
#grub.conf generated by anaconda
#
# Note that you do not have to rerun grub after making changes to this file
# NOTICE:  You have a /boot partition.  This means that
#          all kernel and initrd paths are relative to /boot/, eg.
#          root (hd0,0)
#          kernel /vmlinuz-version ro root=/dev/hda6
#          initrd /initrd-version.img
#boot=/dev/hda
default=0
timeout=10
# splashimage=(hd0,0)/grub/splash.xpm.gz
# This will allow you to only Monitor the OS boot via SOL
title Red Hat Enterprise Linux ES (2.4.9-e.12smp) SOL Monitor
    root (hd0,0)
    kernel /vmlinuz-2.4.9-e.12smp ro root=/dev/hda6 console=ttyS0,19200 console=tty1
    initrd /initrd-2.4.9-e.12smp.img
# This will allow you to Interact with the OS boot via SOL
title Red Hat Linux (2.4.9-e.12smp) SOL Interactive
    root (hd0,0)
    kernel /vmlinuz-2.4.9-e.12smp ro root=/dev/hda6 console=tty1 console=ttyS0,19200
    initrd /initrd-2.4.9-e.12smp.img
title Red Hat Enterprise Linux ES-up (2.4.9-e.12)
    root (hd0,0)
    kernel /vmlinuz-2.4.9-e.12 ro root=/dev/hda6
    initrd /initrd-2.4.9-e.12.img
```

You must restart the Linux operating system after you complete these procedures for the changes to take effect and to enable SOL.

SUSE SLES 9.0 configuration:

Note: This procedure is based on a default installation of SUSE Linux Enterprise Server (SLES) 9.0. The file names, structures, and commands might be different for other versions of SUSE Linux.

Configure the general Linux parameters for SOL operation when using the SLES 9.0 operating system.

Note: Hardware flow control prevents character loss during communication over a serial connection. You must enable it when using a Linux operating system.

1. Add the following line to the end of the `# getty-programs for the normal runlevels` section of the /etc/inittab file. This enables hardware flow control and enables users to log in through the SOL console.

   `7:2345:respawn:/sbin/agetty -h ttyS0 19200 vt102`

2. Add the following line after the `tty6` line at the bottom of the /etc/securetty file to enable a user to log in as the root user through the SOL console:

   `ttyS0`

3. Modify the /boot/grub/menu.lst file:

a. Comment out the `gfxmenu` line by adding a `#` in front of the word `gfxmenu`.

b. Add the following line before the first `title` line:

   `# This will allow you to only Monitor the OS boot via SOL`

c. Append the following text to the first `title` line:

   `SOL Monitor`

d. Append the following text to the `kernel` line of the first `title` section:

   `console=ttyS1,19200 console=tty0`

e. Add the following four lines between the first two `title` sections:

   `# This will allow you to Interact with the OS boot via SOL`

   `title linux SOL Interactive`

   `   kernel (hd0,1)/boot/vmlinuz root=/dev/hda2 acpi=oldboot vga=791`

   `   console=tty1 console=ttyS0,19200`

   `   initrd (hd0,1)/boot/initrd`

The following examples show the original content of the /boot/grub/menu.lst file and the content of this file after modification.

Original /boot/grub/menu.lst contents	Notes

`gfxmanu (hd0,1)/boot/message`
`color white/blue black/light-gray`
`default 0`
`timeout 8`
 	
`title linux`
`   kernel (hd0,1)/boot/vmlinuz root=/dev/hda2 acpi=oldboot vga=791`
`   initrd (hd0,1)/boot/initrd`
`title floppy`
`   root`
`   chainloader +1`
`title failsafe`
`   kernal (hd0,1)/boot/vmlinuz.shipped root=/dev/hda2 ide=nodma apm=off vga=normal nosmp`
`disableapic maxcpus=0 3`
 	
`   initrd (hd0,1)/boot/initrd.shipped`
	
	1
	
	1

Note 1: The kernel line is shown with a line break. In your file, the entire entry must all be on one line.	

Modified /boot/grub/menu.lst contents	Notes

`#gfxmanu (hd0,1)/boot/message`
`color white/blue black/light-gray`
`default 0`
`timeout 8`
 	
`# This will allow you to only Monitor the OS boot via SOL`
`title linux SOL Monitor`
`   kernel (hd0,1)/boot/vmlinuz root=/dev/hda2 acpi=oldboot vga=791 console=ttyS1,19200`
`console=tty1`
`   initrd (hd0,1)/boot/initrd`
`# This will allow you to Interact with the OS boot via SOL`
`title linux SOL Interactive`
` kernel (hd0,1)/boot/vmlinuz root=/dev/hda2 acpi=oldboot vga=791 console=tty1 console=ttyS0,19200`
` initrd (hd0,1)/boot/initrd`
`title floppy`
	
	1

Modified /boot/grub/menu.lst contents	Notes

<pre> root
  chainloader +1
title failsafe
  kernel (hd0,1)/boot/vmlinuz.shipped root=/dev/hda2 ide=nodma apm=off vga=normal nosmp
disableapic maxcpus=0 3
 	
  initrd (hd0,1)/boot/initrd.shipped</pre>
	1

Note 1: The kernel line is shown with a line break. In your file, the entire entry must all be on one line.	

You must restart the Linux operating system after you complete these procedures for the changes to take effect and to enable SOL.

Microsoft Windows 2003 Standard Edition configuration

Note: This procedure is based on a default installation of the Microsoft Windows 2003 operating system.

To configure the Windows 2003 operating system for SOL operation, complete the following steps. You must be logged in as a user with administrator access to perform this procedure.

1. Determine which boot entry ID to modify:

   a. Type `bootcfg` at a Windows command prompt; then, press Enter to display the current boot options for your server.

   b. In the `Boot Entries` section, locate the boot entry ID for the section with an OS friendly name of Windows Server 2003, Standard. Write down the boot entry ID for use in the next step.

2. To enable the Microsoft Windows Emergency Management System (EMS), at a Windows command prompt, type

   `bootcfg /EMS ON /PORT COM1 /BAUD 19200 /ID boot_id`

   where *boot_id* is the boot entry ID from step 1b; then, press Enter.

3. Verify that the EMS console is redirected to the COM1 serial port:

   a. Type `bootcfg` at a Windows command prompt; then, press Enter to display the current boot options for your server.

   b. Verify the following changes to the bootcfg settings:

      • In the `Boot Loader Settings` section, make sure that `redirect` is set to `COM1` and that `redirectbaudrate` is set to `19200`.

      • In the `Boot Entries` section, make sure that the `OS Load Options:` line has `/redirect` appended to the end of it.

   The following examples show the original bootcfg program output and the output after modification.

Original bootcfg program output
Boot Loader Settings ---------------------------- timeout: 30 default: multi(0)disk(0)rdisk(0)partition(1)\WINDOWS Boot Entries ---------------- Boot entry ID: 1 OS Friendly Name: Windows Server 2003, Standard Path: multi(0)disk(0)rdisk(0)partition(1)\WINDOWS OS Load Options: /fastdetect

Modified bootcfg program output
Boot Loader Settings ---------------------------- timeout: 30 default: multi(0)disk(0)rdisk(0)partition(1)\WINDOWS redirect: COM1 redirectbaudrate: 19200 Boot Entries ---------------- Boot entry ID: 1 OS Friendly Name: Windows Server 2003, Standard Path: multi(0)disk(0)rdisk(0)partition(1)\WINDOWS OS Load Options: /fastdetect /redirect

You must restart the Windows 2003 operating system after you complete this procedure for the changes to take effect and to enable SOL.

Installing the OSA SMBridge management utility program

Important: To obtain maximum benefit from the OSA SMBridge management utility program, install and load the program *before* problems occur.

To install the OSA SMBridge management utility program on a server running a Windows operating system, complete the following steps:

1. Go to http://www.ibm.com/servers/eserver/support/xseries/index.html and download the utility program and create the OSA BMC Management Utility CD.
2. Insert the OSA BMC Management Utility CD into the drive. The InstallShield wizard starts, and a window similar to that shown in the following illustration opens.

3. Follow the prompts to complete the installation.

   The installation program prompts you for a TCP/IP port number and an IP address. Specify an IP address, if you want to limit the connection requests that will be accepted by the utility program. To accept connections from any server, type `INADDR_ANY` as the IP address. Also specify the port number that the utility program will use. These values will be recorded in the smbridge.cfg file for the automatic startup of the utility program.

To install the OSA SMBridge management utility program on a server running a Linux operating system, complete the following steps. You must be logged in as a root user to perform these procedures.

1. Go to http://www.ibm.com/servers/eserver/support/xseries/index.html. Download the utility program and create the OSA BMC Management Utility CD.

2. Insert the OSA BMC Management Utility CD into the drive.

3. Type `mount/mnt/cdrom`.

4. Locate the directory where the installation RPM package is located and type `cd/mnt/cdrom`.

5. Type the following command to run the RPM package and start the installation:

   `rpm -I've smbridge-2.0-xx.rpm`

   where *xx* is the release level being installed.

6. Follow the prompts to complete the installation. When the installation is complete, the utility copies files to the following directories:

   /etc/init.d/SMBridge
   /etc/smbridge.cfg
   /usr/sbin/smbridged
   /var/log/smbridge/Liscense.txt
   /var/log/smbridge/Readme.txt

The utility starts automatically when the server is started. You can also locate the /ect/init.d directory to start the utility and use the following commands to manage the utility:

    smbridge status
    smbridge start
    smbridge stop
    smbridge restart

Using the baseboard management controller utility programs

Use the baseboard management controller utility programs to configure the baseboard management controller, download firmware updates and sensor data record/field replaceable unit (SDR/FRU) updates, and remotely manage a network.

Using the baseboard management controller configuration utility program

Use the baseboard management controller configuration utility program to view or change the baseboard management controller configuration settings. You can also use the utility program to save the configuration to a file for use on multiple servers.

Note: You must attach an optional USB diskette drive to the server to run this program.

To start the baseboard management controller configuration utility program, complete the following steps:

1. Insert the configuration utility diskette into the diskette drive and restart the server.
2. From a command-line prompt, type `bmc_cfg` and press Enter.
3. Follow the instructions on the screen.

Using the baseboard management controller firmware update utility program

Use the baseboard management controller firmware update utility program to download and apply a baseboard management controller firmware update and SDR/FRU data update. The firmware update utility program updates the baseboard management controller firmware and SDR/FRU data only and does not affect any device drivers.

Note: To ensure proper server operation, be sure to update the server baseboard management controller firmware before you update the BIOS code.

To update the firmware, if the Linux or Windows operating-system update package is available from the World Wide Web and you have obtained the applicable update package, follow the instructions that come with the update package.

Using the OSA SMBridge management utility program

Use the OSA SMBridge management utility program to remotely manage and configure a network. The utility program provides the following remote management capabilities:

- **CLI (command-line interface) mode**

    Use CLI mode to remotely perform power-management and system identification control functions over a LAN or serial port interface from a command-line interface. Use CLI mode also to remotely view the BMC system event log.

Use the following commands in CLI mode:

– **identify**

Control the system-locator LED on the front of the server.

– **power**

Turn the server on and off remotely.

– **sel**

Perform operations with the BMC system event log.

– **sysinfo**

Display general system information that is related to the server and the baseboard management controller.

- **Serial over LAN**

Use the Serial over LAN capability to remotely perform control and management functions over a Serial over LAN (SOL) network. You can also use SOL to remotely view and change the server BIOS settings.

At a command prompt, type `telnet localhost 623` to access the SOL network. Type `help` at the `smbridge>` prompt for more information.

Use the following commands in an SOL session:

– **connect**

Connect to the LAN. Type `connect -ip` *ip_address* `-u` *username* `-p` *password*.

– **identify**

Control the system-locator LED on the front of the server.

– **power**

Turn the server on and off remotely.

– **reboot**

Force the server to restart.

– **sel get**

Display the BMC system event log.

– **sol**

Configure the SOL function.

– **sysinfo**

Display system information that is related to the server and the globally unique identifier (GUID).

Configuring the Gigabit Ethernet controllers

The Ethernet controllers are integrated on the system board. They provide an interface for connecting to a 10-Mbps, 100-Mbps, or 1-Gbps network and provide full-duplex (FDX) capability, which enables simultaneous transmission and reception of data on the network. If the Ethernet ports in the server support auto-negotiation, the controllers detect the data-transfer rate (10BASE-T, 100BASE-TX, or 1000BASE-T) and duplex mode (full-duplex or half-duplex) of the network and automatically operate at that rate and mode.

You do not have to set any jumpers or configure the controllers. However, you must install a device driver to enable the operating system to address the controllers. For device drivers and information about configuring the Ethernet controllers, see the

Broadcom NetXtreme II Gigabit Ethernet Software CD that comes with the server. To find updated information about configuring the controllers, complete the following steps.

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

1. Go to http://www.ibm.com/servers/eserver/support/xseries/index.html.
2. From the **Hardware** list, select **System x3650** and click **Go**.
3. Click the **Install and use** tab.
4. Click **Product documentation**.

Updating IBM Director

If you plan to use IBM Director to manage the server, you must check for the latest applicable IBM Director updates and interim fixes.

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

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

1. Check for the latest version of IBM Director:
   a. Go to http://www.ibm.com/servers/eserver/xseries/systems_management/ xseries_sm/dwnl.html.
   b. If the drop-down list shows a newer version of IBM Director than what comes with the server, follow the instructions on the Web page to download the latest version.
2. Install IBM Director.
3. Download and install any applicable updates or interim fixes for the server:
   a. Go to http://www.ibm.com/servers/eserver/support/xseries/index.html.
   b. From the **Hardware** list, select **System x3650** and click **Go**.
   c. Click the **Download** tab.
   d. Select any applicable update or interim fix that you want to download.
   e. Click the link for the executable (.exe) file to download the file, and follow the instructions in the readme file to install the update or interim fix.
   f. Repeat steps 3d and 3e for any additional updates or interim fixes that you want to install.

Setting up a Remote Supervisor Adapter II SlimLine

You use an optional Remote Supervisor Adapter II SlimLine to obtain enhanced system management capabilities, beyond those of the integrated BMC. The Remote Supervisor Adapter II SlimLine has a dedicated Ethernet connection at the rear of the server.

This section describes how to set up, cable, and configure the Remote Supervisor Adapter II SlimLine so that you can manage the server remotely.

In addition to the information in this section, see the *IBM Remote Supervisor Adapter II User's Guide* for information about how to configure and use the Remote Supervisor Adapter II SlimLine to manage the server remotely through the Web-based interface or the text-based interface.

Note: The Web-based interface and text-based interface do not support double-byte character set (DBCS) languages.

Requirements

Make sure that the following requirements are met:

- The Web interface Remote Disk function requires the client system to be running Microsoft Windows 2000 or later. The Web interface Remote Control features require the Java™ 1.4 Plug-in or later. The following Web browsers are supported:
  - Microsoft Internet Explorer version 5.5 or later with the latest Service Pack
  - Netscape Navigator version 7.0 or later
  - Mozilla version 1.3 or later
- If you plan to configure Simple Network Management Protocol (SNMP) trap alerts on the Remote Supervisor Adapter II SlimLine, install and compile the management information base (MIB) on your SNMP manager.
- You will need an Internet connection to the client system to download software and firmware from the IBM Support Web site during the installation process. The Remote Supervisor Adapter II SlimLine firmware and the SNMP MIB are available on the *ServerGuide Setup and Installation* CD; the latest versions are available at http://www.ibm.com/servers/eserver/support/xseries/index.html.

Cabling the Remote Supervisor Adapter II SlimLine

You can manage the server remotely through the Remote Supervisor Adapter II SlimLine by using the dedicated systems-management Ethernet connector on the rear of the server.

For additional information about network configuration, see the *Remote Supervisor Adapter II Installation Guide*.

To cable the Remote Supervisor Adapter II SlimLine, complete the following steps:

1. Connect one end of a Category 3 or Category 5 Ethernet cable to the dedicated systems-management Ethernet connector. See "Rear view" on page 11 for the location of the systems-management Ethernet connector.
2. Connect the other end of the cable to the network.

Installing the Remote Supervisor Adapter II SlimLine firmware

The software and firmware files that you need are contained in one system service package installation kit. The kit contains the following files:

- Software and firmware installation instructions
- BIOS code update with support for the Remote Supervisor Adapter II SlimLine
- Diagnostics code update
- Remote Supervisor Adapter II SlimLine device drivers
- Remote Supervisor Adapter II SlimLine firmware update
- Integrated service processor firmware update
- Video device driver
- Firmware-update utility program

To download and install the software and firmware, complete the following steps.

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

1. Go to http://www.ibm.com/servers/eserver/support/xseries/index.html.
2. From the **Hardware** list, select **System x3650** and click **Go**.
3. Click the **Download** tab.
4. Select the system service package for the operating system that is running on the server in which the Remote Supervisor Adapter II SlimLine is installed.
5. Click the file link to download the system service package to *d*:\ibmssp, where *d* is the hard disk drive letter. (Create the directory if necessary.)
6. Extract the files into *d*:\ibmssp. See the readme.txt file, which is included with the extracted files, for a list of the files in the package.
7. Follow the instructions in *Remote Supervisor Adapter II Installation Instructions*, which is in Portable Document Format (PDF) in *d*:\ibmssp, to install the software and firmware.
8. Restart the server after the software and firmware are installed.

Completing the setup

See the *IBM Remote Supervisor Adapter II User's Guide* on the IBM *System x Documentation* CD for instructions for completing the configuration, including the following procedures:

- Configuring the Ethernet ports
- Defining login IDs and passwords
- Selecting the events that will receive alert notifications
- Monitoring remote server status, using the Remote Supervisor Adapter II SlimLine Web-based interface
- Controlling the server remotely
- Attaching a remote diskette drive, CD drive, or disk image to the server

After you configure the adapter, use the Web-based interface to create a backup copy of the configuration so that you can restore the configuration, if you have to replace the adapter. For more information, see the *Remote Supervisor Adapter II User's Guide*.

Appendix. Notices

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Important notes

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

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

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

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

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

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

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This appliance is labeled in accordance with European Directive 2002/96/EC concerning waste electrical and electronic equipment (WEEE). The Directive determines the framework for the return and recycling of used appliances as applicable throughout the European Union. This label is applied to various products to indicate that the product is not to be thrown away, but rather reclaimed upon end of life per this Directive.

注意: このマークは EU 諸国およびノルウェーにおいてのみ適用されます。

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L'etiquette du système respecte la Directive européenne 2002/96/EC en matière de Déchets des Equipements Electriques et Electroniques (DEEE), qui détermine les dispositions de retour et de recyclage applicables aux systèmes utilisés à travers l'Union européenne. Conformément à la directive, ladite étiquette précise que le produit sur lequel elle est apposée ne doit pas être jeté mais être récupéré en fin de vie.

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