



@server

xSeries 206m Types 8485 and 8490

User's Guide





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User's Guide

Note:

Before using this information and the product it supports, read the general information in “Notices,” on page 65, and the *Warranty and Support Information* document on the IBM *xSeries Documentation* CD.

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Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الأمنية

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

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

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

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

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

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

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

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

A termék telepítése előtt olvassa el a Biztonsági előírásokat!

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

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

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

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

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

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

Перед установкой продукта прочтите инструкции по технике безопасности.

Pred inštaláciou tohto zariadenia si pečítajte Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

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

Läs säkerhetsinformationen innan du installerar den här produkten.

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 blade 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:

1. Turn everything OFF.
2. First, attach all cables to devices.
3. Attach signal cables to connectors.
4. Attach power cords to outlet.
5. Turn device ON.

To Disconnect:

1. Turn everything OFF.
2. First, remove power cords from outlet.
3. Remove signal cables from connectors.
4. Remove all cables from devices.

Statement 2:



CAUTION:

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

Do not:

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

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

Statement 3:



CAUTION:

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

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



DANGER

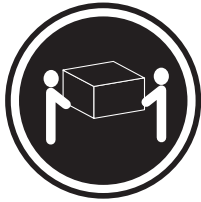
Some laser products contain an embedded Class 3A or Class 3B laser diode. Note the following.

Laser radiation when open. Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam.



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

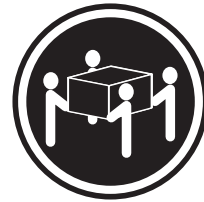
Statement 4:



≥ 18 kg (39.7 lb)



≥ 32 kg (70.5 lb)



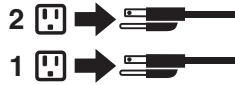
≥ 55 kg (121.2 lb)

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.



Statement 8:



CAUTION:

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



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

Statement 12:



CAUTION:

The following label indicates a hot surface nearby.



Statement 13:



DANGER

Overloading a branch circuit is potentially a fire hazard and a shock hazard under certain conditions. To avoid these hazards, ensure that your system electrical requirements do not exceed branch circuit protection requirements. Refer to the information that is provided with your device for electrical specifications.

Statement 15:



CAUTION:

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

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 xSeries 206m server

The IBM® *@server*® xSeries® 206m Machine Types 8485 and 8490 is a 5-U-high, high-performance server based on IBM X-Architecture™ technologies. It is ideally suited for networking environments that require superior microprocessor performance, improved systems management, and flexible memory and data management.

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.

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 contains IBM Enterprise X-Architecture technologies, which help increase performance, reliability, and availability. For more information about the IBM X-Architecture technologies and features in the server, see “What your server offers” on page 4 and “Reliability, availability, and serviceability” on page 5. For additional information about the IBM X-Architecture technologies and features, see <http://www.ibm.com/servers/eserver/xseries/xarchitecture/enterprise/index.html>.

You can obtain up-to-date information about the server and other IBM server products at <http://www.ibm.com/eserver/xseries/>.

For service or assistance information, see the *Installation Guide*.

Related documentation

This *User's Guide* provides 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:

- *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 *xSeries 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 *xSeries Documentation* CD. It contains translated caution and danger statements. Each caution and danger statement that appears in the documentation has a number that you can use to locate the corresponding statement in your language in the *Safety Information* document.
- *Problem Determination and Service Guide*
This document is in PDF on the IBM *xSeries Documentation* CD. It contains information to help you solve problems yourself, and it contains information for service technicians.

1. Racks are measured in vertical increments of 4.45 cm (1.75 inches) each. Each increment is called a “U.” A 1-U-high device is 1.75 inches tall.

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

The server might have features that are not described in the documentation that you received with the server. The documentation might be updated occasionally to include information about those features, or technical updates might be available to provide additional information that is not included in 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/support/>.
2. Under **Search technical support**, type **xSeries 206m**, and click **Search**.

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 *xSeries Documentation CD*. Each statement is numbered for reference to the corresponding statement in the *Safety Information* document.

The following notices and statements are used in this document:

- **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 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.

Table 1. Features and specifications

<p>Microprocessor:</p> <ul style="list-style-type: none"> • Intel® Pentium® 4 Processor • 1 MB or 2 MB Level-2 or Level-3 cache • 800 MHz front-side bus (FSB) <p>Memory:</p> <ul style="list-style-type: none"> • Minimum: 512 MB • Maximum: 8 GB • Types: PC2-4200 double-data-rate 2 (DDR2) • Connectors: four dual inline memory module (DIMM) connectors, two-way interleaved <p>Drives (depending on the model):</p> <ul style="list-style-type: none"> • Diskette (optional): 1.44 MB (two modes) • Hard disk drive: SAS or SATA • One of the following IDE drives: <ul style="list-style-type: none"> – CD-ROM – CD-RW (optional) – DVD-ROM (optional) – DVD-ROM/CD-RW (optional) <p>Expansion bays (depending on the model):</p> <ul style="list-style-type: none"> • Two 5.25-in. bays (one CD drive installed) • One 3.5-in. removable-media drive bay • Four 3.5-in. hard disk drive bays with one of the following bays: <ul style="list-style-type: none"> – Open hot-swap bays – Simple-swap bays with one hard disk drive installed – Non-hot-swap bays with one hard disk drive installed <p>PCI expansion slots (depending on the model):</p> <ul style="list-style-type: none"> • Four PCI expansion slots <ul style="list-style-type: none"> – One PCI Express x8 slot – One PCI Express x1 slot – Two PCI 32-bit/33 MHz slots • Six PCI expansion slots (models with the PCI-X expansion card) <ul style="list-style-type: none"> – One PCI Express x8 slot – One PCI Express x1 slot – Two PCI 32-bit/33 MHz slots – Two PCI-X 64-bit/100 MHz slots • One connector on PCI-X expansion card for the mini-PCI-X Serial Attached SCSI (SAS) adapter 	<p>Fans:</p> <p>Two or three speed-controlled fans</p> <p>Power supply:</p> <p>One of the following power supplies:</p> <ul style="list-style-type: none"> • Two redundant 430 watt (90-240 V ac) • One nonredundant 400 watt (90-240 V ac) <p>Size:</p> <ul style="list-style-type: none"> • Height: 438 mm (17.25 in.) • Depth: 540 mm (21.25 in.) • Width: 216 mm (8.5 in.) • Weight: 16.3 kg (36 lb) to 20.8 kg (45.8 lb) depending upon configuration <p>Integrated functions:</p> <ul style="list-style-type: none"> • Mini baseboard management controller (mini-BMC) • Broadcom 5721 10/100/1000 Ethernet controller on the system board with RJ-45 Ethernet port • Two serial ports • One parallel port • Four-port Serial ATA controller • One internal SAS port (mini-PCI slot) • Integrated RAID capability (HostRAID) • Four Universal Serial Bus (USB) v2.0 ports (two on front and two on rear) • Keyboard port • Mouse port • ATA-100 single-channel IDE controller (bus mastering) • ATI ES1000 video controller <ul style="list-style-type: none"> – Compatible with SVGA and VGA – 16 MB SDRAM video memory <p>Diagnostic LEDs:</p> <ul style="list-style-type: none"> • Fans • Memory <p>Acoustical noise emissions:</p> <ul style="list-style-type: none"> • Sound power, idling: 5.0 bel • Sound power, operating: 5.5 bel 	<p>Environment:</p> <ul style="list-style-type: none"> • Air temperature: <ul style="list-style-type: none"> – Server on: 10° to 35°C (50° to 95°F) Altitude: 0 to 914 m (2998.0 ft) – Server off: -40° to 60°C (-40° to 140°F) Altitude: 0 to 2133 m (7000.0 ft) • Humidity (operating and storage): 8% to 80% <p>Heat output:</p> <p>Approximate heat output in British thermal units (Btu) per hour:</p> <ul style="list-style-type: none"> • Minimum configuration: 630 Btu per hour (185 watts) • Maximum configuration: 1784 Btu per hour (523 watts) <p>Electrical input:</p> <ul style="list-style-type: none"> • Sine-wave input (50 or 60 Hz) required • Input voltage and frequency ranges automatically selected • Input voltage low range: <ul style="list-style-type: none"> – Minimum: 100 V ac – Maximum: 127 V ac • Input voltage high range: <ul style="list-style-type: none"> – Minimum: 200 V ac – Maximum: 240 V ac • Input kilovolt-amperes (kVA) approximately: <ul style="list-style-type: none"> – Minimum: 0.20 kVA (all models) – Maximum: 0.55 kVA <p>Notes:</p> <ol style="list-style-type: none"> 1. Power consumption and heat output vary depending on the number and type of optional features installed and the power-management optional features in use. 2. These 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.
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What your server offers

The server uses the following features and technologies:

- **Mini baseboard management controller (mini-BMC)**

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

- **High-performance graphics controller**

The server comes with an onboard graphics controller. This high-performance controller supports high resolutions and includes many performance-enhancing features for the operating-system environment.

- **IBM Enhanced Diagnostics CD**

The server comes with an *IBM Enhanced Diagnostics CD*, which you can use to diagnose problems.

- **IBM Director**

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

- **IBM Enterprise 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/index.html>.

- **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 32-bit 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 55.

- **Integrated network support**

The server comes with an integrated Broadcom NetXtreme Gigabit Ethernet controller, which supports connection to a 10-Mbps, 100-Mbps, or 1000-Mbps network. For more information, see “Configuring the Broadcom Gigabit Ethernet controller” on page 63.

- **Large data-storage capacity and hot-swap capabilities**

Some server models support up to four 25.4-mm (1-inch) slim-high, 3.5-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.

- **Large system-memory capacity**

The server supports up to 8 GB of system memory. The memory controller supports error correcting code (ECC) for up to four industry-standard, 1.8 V, 184-pin, double-data-rate 2 (DDR2), PC2-4200 unbuffered, synchronous dynamic random-access memory (SDRAM) dual inline memory modules (DIMMs).

- **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.

- **ServeRAID™ support**

The server supports ServeRAID adapters to create redundant array of independent disks (RAID) configurations. The server also has integrated RAID level-0 and level-1 support.

- **Systems-management capabilities**

The server supports an optional Remote Supervisor Adapter II, which provides service-processor functions in addition to those that the mini-BMC provides. When this adapter is used with the systems-management software that comes with the server, you can manage the functions of the server locally and remotely. The Remote Supervisor Adapter II also provides system monitoring, event recording, and dial-out alert capability.

See the documentation that comes with your systems-management software for more information. To order an optional Remote Supervisor Adapter II, contact your IBM marketing representative or authorized reseller.

Reliability, availability, and serviceability

Three important server 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:

- 1-year parts, 1-year labor limited warranty (Machine Type 8485) and 3-year parts, 3-year labor limited warranty (Machine Type 8490)
- Advanced Configuration and Power Interface (ACPI)
- Advanced Desktop Management Interface (DMI) features
- Automatic BIOS recovery to a backup image
- Automatic error retry or recovery
- Automatic memory downsizing on error detection
- Automatic restart on nonmaskable interrupt (NMI)
- Automatic Server Restart (ASR) logic supporting a system restart when the operating system becomes unresponsive
- Automatic server restart after a power failure, based on the BIOS setting
- Availability of microcode level
- Boot-block recovery
- Built-in, menu-driven setup, system configuration, and redundant array of independent disks (RAID) configuration
- Built-in monitoring for fan, power, temperature, and voltage
- CD-based diagnostic programs
- Cooling fans with speed-sensing capability
- Customer support center that is available 24 hours a day, 7 days a week²
- Diagnostic support of ServeRAID adapters
- Error codes and messages
- Error correcting code (ECC) double-data-rate 2 (DDR2) synchronous dynamic random-access memory (SDRAM) with serial presence detect (SPD)
- Error logging of POST failures

2. Service availability will vary by country. Response time varies; may exclude holidays.

- Hot-swap Serial Attached SCSI (SAS) hard disk drives
- Integrated Ethernet controller
- Support for the optional IBM Remote Supervisor Adapter II
- Key-lock support for physical security
- Memory change messages posted to the error log
- Mini baseboard management controller (mini-BMC) (service processor)
- Power management
- Power-on self-test (POST)
- Read-only memory (ROM) checksums
- Redundant Ethernet capabilities (requires an optional Ethernet adapter) with failover support
- Simple-swap Serial Advanced Technology Attachment (SATA) hard disk drives
- Standby voltage for system-management features and monitoring
- System auto-configuring from the configuration menu
- System-error LED on the front bezel and diagnostic LEDs on the system board
- Upgradeable mini-BMC firmware
- Upgradeable microcode for POST, basic input/output system (BIOS) code, and read-only memory (ROM) resident code, locally or over a LAN
- Vital product data (VPD); includes serial-number information and replacement part numbers, stored in nonvolatile memory, for easier remote maintenance
- 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 XP Professional, Red Hat Linux[®], SUSE LINUX, 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/servers/eserver/xseries/systems_management/sys_migration/ibmdiragent.html. 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 *IBM Director* CD that comes with the server, the IBM Director documentation on the CD, and the IBM xSeries Systems Management Web page at http://www-1.ibm.com/servers/eserver/xseries/systems_management/xseries_sm.html, which presents an overview of IBM Systems Management and IBM Director.

Update *Xpress* program

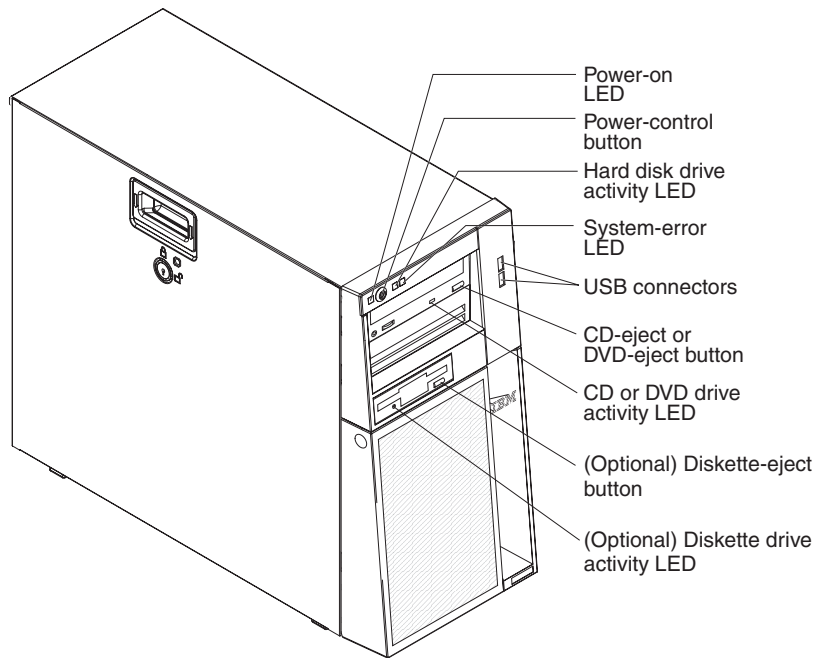
The Update*Xpress* program is available for most xSeries servers and server options. It detects supported and installed device drivers and firmware in the server and installs available updates. You can download the Update*Xpress* program from the Web at no additional cost, or you can purchase it on a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



Power-on LED

When this LED is lit, it indicates that the server is turned on. 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 cords from the electrical outlets.

Power-control button

Press this button to turn the server on and off manually.

Hard disk drive activity LED

When this LED is flashing, it indicates that a hard disk drive is in use.

System-error LED

When this amber LED is lit, it indicates that a system error has occurred. An LED on the system board might also be lit to help isolate the error. Detailed troubleshooting information is in the *Problem Determination and Service Guide* on the IBM xSeries Documentation CD.

USB connectors

Connect USB devices to these connectors.

CD-eject or DVD-eject button

Press this button to release a CD from the CD drive or a DVD from the DVD drive.

CD or DVD drive activity LED

When this LED is lit, it indicates that the CD drive or DVD drive is in use.

(Optional) Diskette-eject button

Press this button to release a diskette from the diskette drive.

(Optional) Diskette drive activity LED

When this LED is lit, it indicates that the diskette drive is in use.

Hot-swap hard disk drive activity LED (some models)

On some server models, each hot-swap drive has a hard disk drive activity LED. When this green LED is flashing, it indicates that the associated hard disk drive is in use.

When the drive is removed, this LED also is visible on the SAS backplane, next to the drive connector. The backplane is the printed circuit board behind drive bays 4 through 7.

Hot-swap hard disk drive status LED (some models)

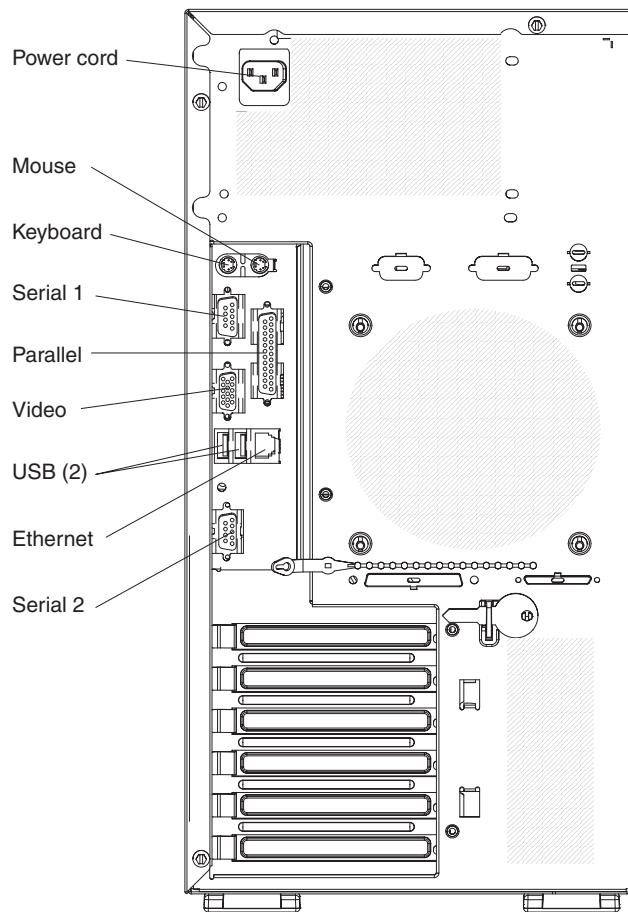
On some server models, each hot-swap hard disk drive has an amber status LED. If this amber status LED for a drive is lit, it indicates that the associated hard disk drive has failed.

If an optional ServeRAID adapter is installed in the server and the LED flashes slowly (one flash per second), the drive is being rebuilt. If the LED flashes rapidly (three flashes per second), the adapter is identifying the drive.

When the drive is removed, this LED also is visible on the SAS backplane, below the hot-swap hard disk drive activity LED.

Rear view

The following illustration shows the connectors on the rear of the server. For more information about these connectors, see “Server components” on page 13.



Power-cord connector

Connect the power cord to this connector.

Mouse connector

Connect a mouse or other PS/2[®] device to this connector.

Keyboard connector

Connect a PS/2 keyboard to this connector.

Serial 1 connector

Connect a 9-pin serial device to this connector.

Parallel connector

Connect a parallel device to this connector.

Video connector

Connect a monitor to this connector.

USB connectors

Connect USB devices to these connectors.

Ethernet connector

Use this connector to connect the server to a network.

Serial 2 connector

Connect a 9-pin serial device to this connector.

Ethernet transmit/receive activity LED

This LED is on the Ethernet connector on the rear of the server. When this LED is lit, it indicates that there is activity between the server and the network.

Ethernet link status LED

This LED is on the Ethernet connector on the rear of the server. When this LED is lit, it indicates that there is an active connection on the Ethernet port.

If an optional Remote Supervisor Adapter II (systems-management adapter) is installed, the server has additional connectors and LEDs. For more information about these connectors and LEDs, see the documentation that comes with this adapter. If you install the optional Remote Supervisor Adapter II, you must disconnect the video cable from the system board and connect it to the optional Remote Supervisor Adapter II.

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 is shut down; however, the server can respond to remote requests to turn on the server.

Turning on the server

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

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

- If a power failure occurs while the server is turned on, the server will restart automatically when power is restored.
- If your operating system supports the systems-management software for an optional Remote Supervisor Adapter II, the systems-management software can turn on the server.
- If your operating system supports the Wake on LAN feature, the Wake on LAN feature can turn on the server.
- If an optional Remote Supervisor Adapter II is installed in the server, the server can be turned on from the Remote Supervisor Adapter II user interface.

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 peripheral component interconnect (PCI) options.

Turning off the server

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

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

Statement 5:



CAUTION:

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



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

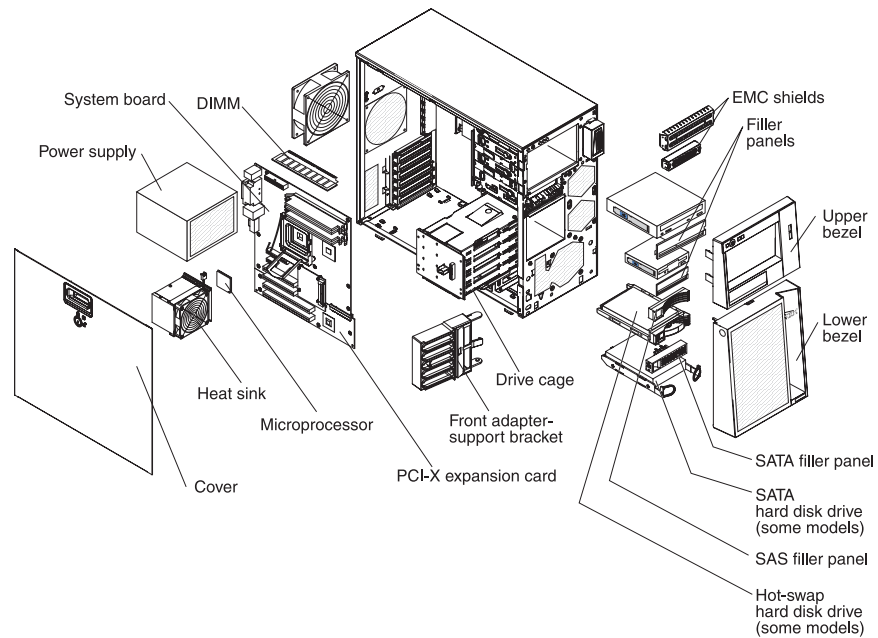
- You can turn off the server from the operating system, if your operating system supports this feature. After an orderly shutdown of the operating system, the server will be turned off automatically.
- You can press the power-control button to start an orderly shutdown of the operating system and turn off the server, if your operating system supports this feature.
- If the operating system stops functioning, you can press and hold the power-control button for more than 4 seconds to turn off the server.
- If an optional Remote Supervisor Adapter II is installed in the server, the server can be turned off from the Remote Supervisor Adapter II user interface.
- If the Wake on LAN feature turned on the server, the Wake on LAN feature can turn off the server.
- The server can turn itself off as an automatic response to a critical system failure.

Chapter 2. Installing options

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

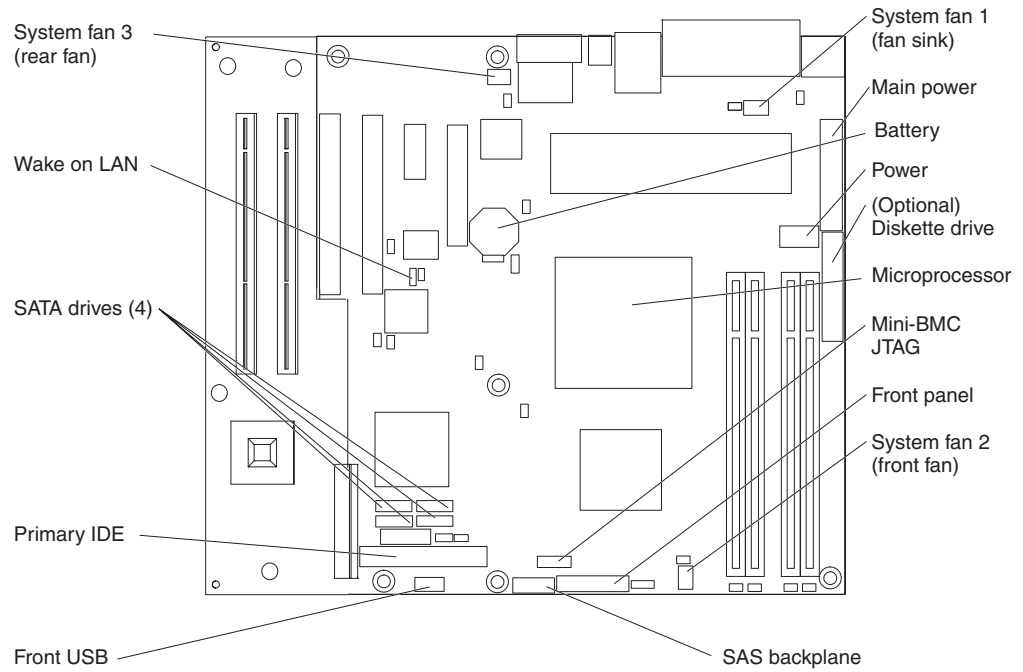
Server components

The following illustration shows the major components in the server (depending on the server model). The illustrations in this document might differ slightly from your hardware.



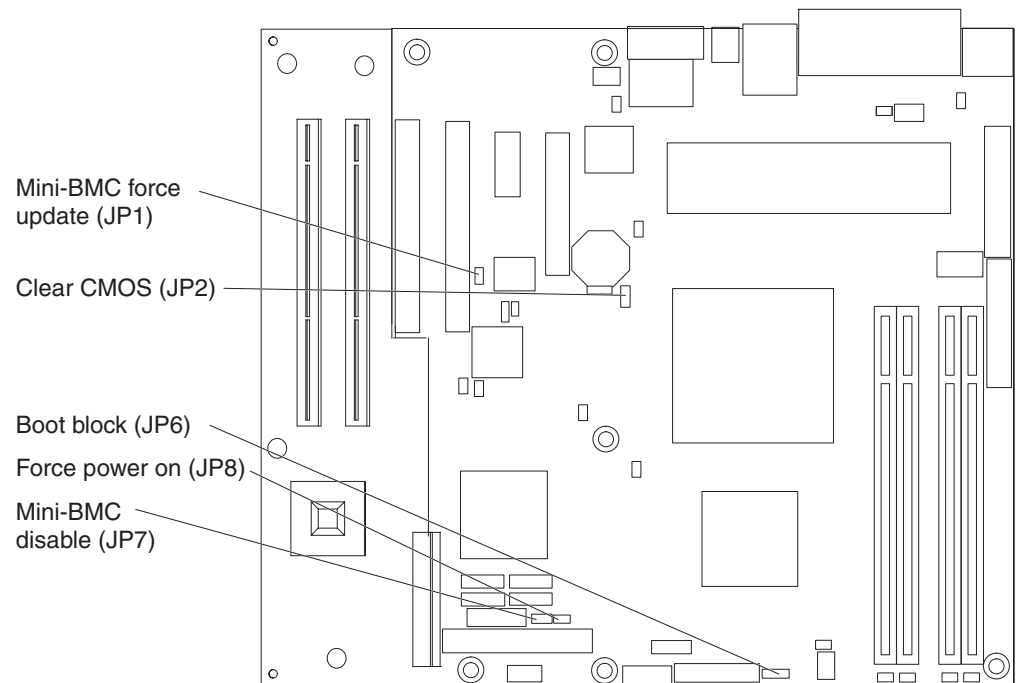
System-board internal connectors

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



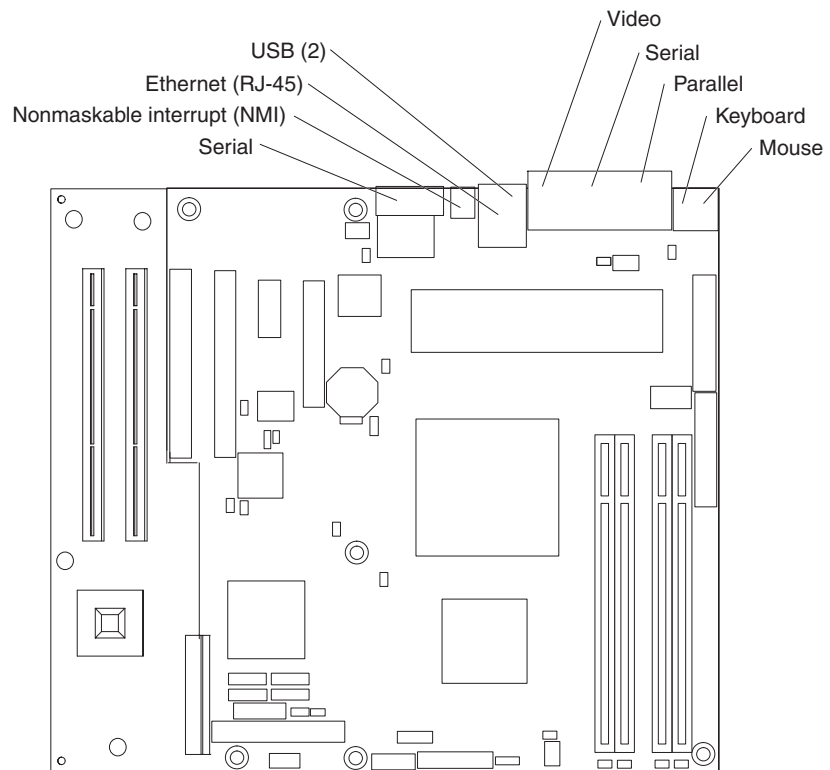
System-board switches and jumpers

The following illustration shows the jumpers on the system board. There are no changeable switches on the system board.



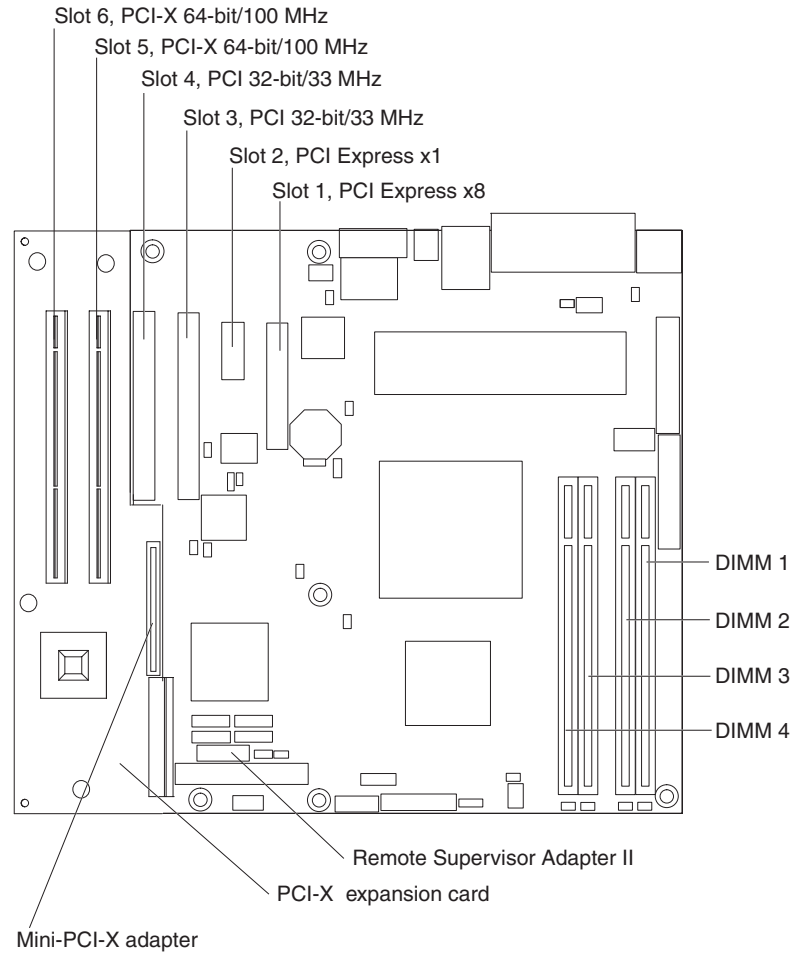
System-board external connectors

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



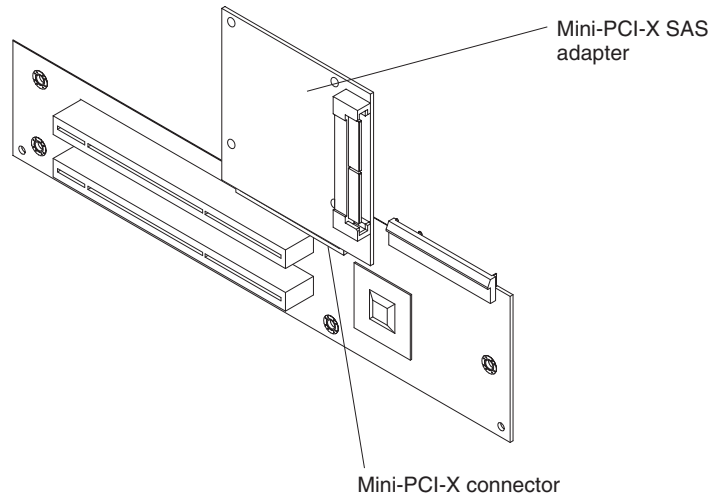
System-board and PCI-X expansion card option connectors

The following illustration shows the system-board and PCI-X expansion card connectors for user-installable options. The illustrations in this document include the optional PCI-X expansion card that is attached to the system board.



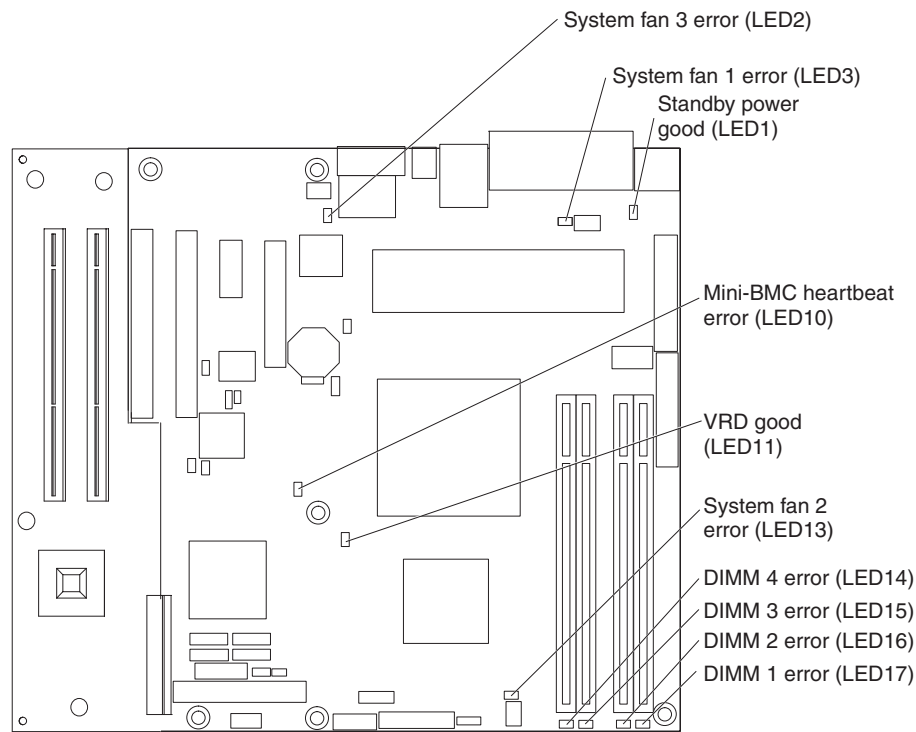
PCI-X expansion card

The following illustration shows the connectors on the optional PCI-X expansion card. The PCI-X expansion card comes installed in some hot-swap models. It provides the connector for the mini-PCI-X SAS controller and two additional I/O slots (slot 5 and slot 6).



System-board LEDs

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



For more information about the system-board LEDs, see the *Problem Determination and Service Guide* on the IBM xSeries Documentation CD.

Installation guidelines

Before you install options, read the following information:

- Read the safety information that begins on page v, the guidelines in “Working inside the server with the power on” on page 20, and “Handling static-sensitive devices” on page 21. This information will help you work safely.
- 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 power supplies, hot-swap fans, or hot-plug Universal Serial Bus (USB) devices.
- Blue on a component indicates touch points, where you can grip the component to remove it from or install it in the server, open or close a latch, and so on.
- Orange on a component or an orange label on or near a component indicates that the component can be hot-swapped, which means that if the server and operating system support hot-swap capability, you can remove or install the component while the server is running. (Orange can also indicate touch points on hot-swap components.) See the instructions for removing and 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 have to access the inside of the server, you might find it easier to lay the server on its side. Before laying the server on its side, rotate the two front stabilizing feet a quarter turn inward toward the server, so that they do not break. Before returning the server to an upright position, rotate the front stabilizing feet a quarter turn outward from the server.
- 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.
- There is adequate space around the server to allow the server cooling system to work properly. Leave approximately 50 mm (2 in.) of open space around the front and rear of the server. Do not place objects in front of the fans. For proper cooling and airflow, replace the server cover before turning on the server. Operating the server for extended periods of time (more than 30 minutes) with the server cover removed might damage server components.
- You have followed the cabling instructions that come with optional adapters.
- You have replaced a failed fan as soon as possible.
- You have replaced a hot-swap drive within 2 minutes of removal.

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.

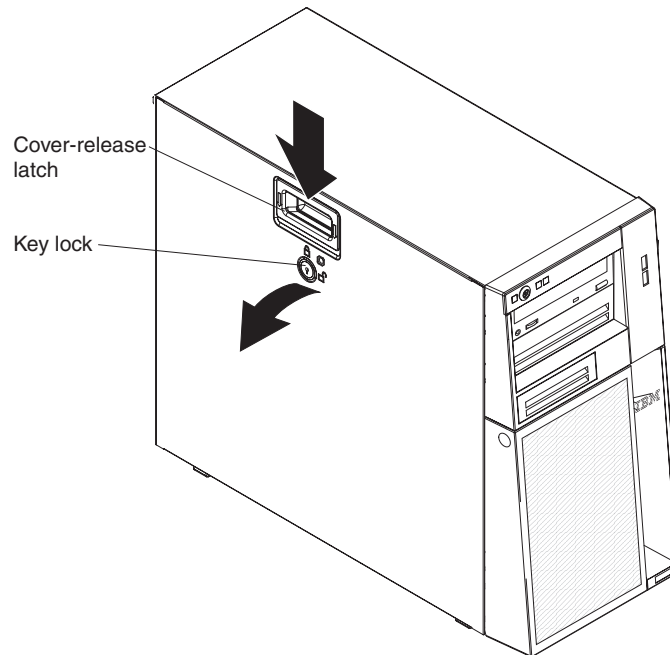
To reduce the possibility of electrostatic discharge, observe the following precautions:

- 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 side cover

To remove the server side cover, complete the following steps:

1. Review the safety information that begins on page v and “Installation guidelines” on page 19.
2. Turn off the server and all attached devices (see “Server power features” on page 11); then, disconnect all power cords and external cables.
3. Lay the server on its side.
4. Unlock the side cover; then, press the cover-release latch down, as indicated by the two arrows on the latch.



5. Lift the side cover off the server and set it aside.

To replace the side cover, see “Reinstalling the side cover” on page 46.

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

Removing the two-piece bezel

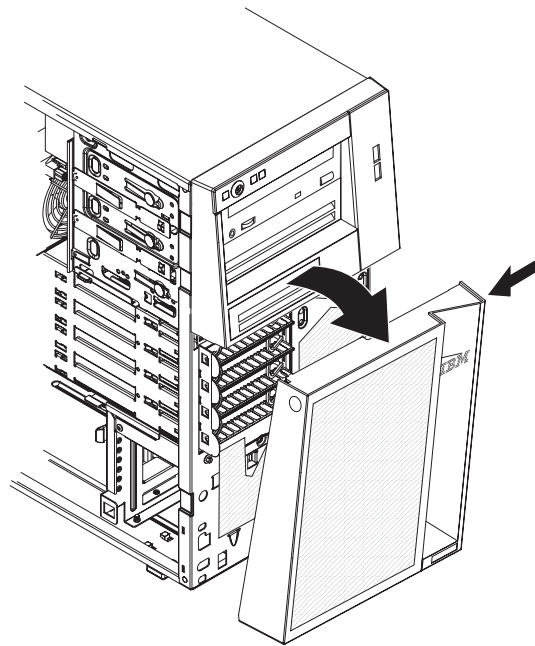
When working with some devices, such as drives in bays 1 through 7, you must first remove the two-piece bezel to access the devices.

Notes:

- Before you remove the upper bezel, you must:
 - Unlock and remove the side cover
 - Remove the lower bezel
- If you are removing only the lower bezel, you do not have to remove the side cover. However, the side cover must be unlocked.

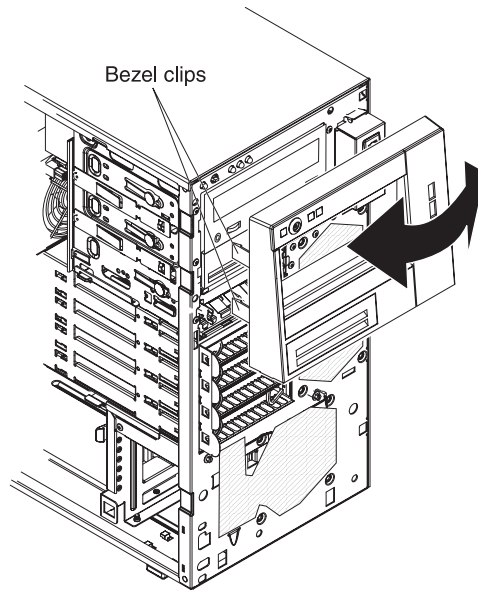
To remove the two-piece bezel, complete the following steps:

1. Unlock the side cover.
2. Remove the side cover (see “Removing the side cover” on page 22).
3. Press the round blue release button on the right side of the lower bezel and tilt the lower bezel forward to disengage it from the chassis.



4. Lift the lower bezel to disengage the two bottom tabs from the chassis. Set the lower bezel aside.

5. Carefully pull the two bezel clips on the left side of the upper bezel away from the chassis; then, rotate the upper bezel to the right side of the server to disengage the two right-side tabs from the chassis. Set the upper bezel aside.



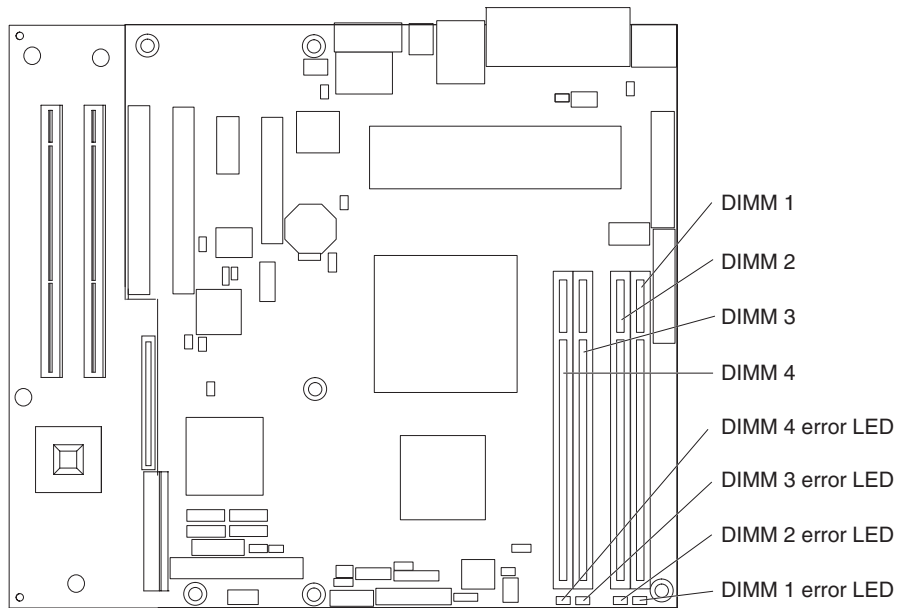
For instructions for replacing the two-piece bezel, see “Reinstalling the two-piece bezel” on page 44.

Installing a memory module

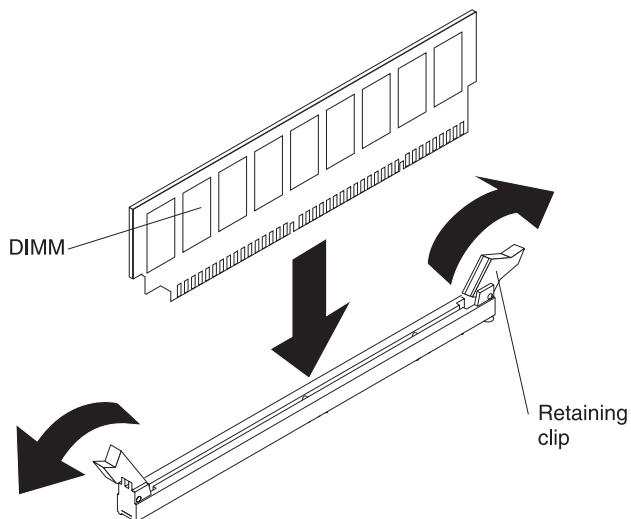
The following notes describe the types of dual inline memory modules (DIMMs) that the server supports and other information that you must consider when installing DIMMs:

- The server supports industry-standard, 533/667 MHz, PC2-4200, double-data-rate 2 (DDR2) dual inline memory modules (DIMMs).
- The system board contains four DIMM connectors and supports two-way memory interleaving.
- The DIMM options available for the server are 512 MB, 1 GB, and 2 GB. The server supports a minimum of 512 MB and a maximum of 8 GB of system memory.
- The server comes with one 512 MB DIMM or two 512 MB DIMMs installed. Depending on the DIMM sizes that you select, the server also supports two or four DIMMs. The 512 MB DIMM option kit contains one DIMM; however, the 1 GB DIMM and 2 GB option kits each contain two DIMMs.
- The amount of usable memory will be reduced depending on the system configuration. A certain amount of memory must be reserved for system resources. To view the total amount of installed memory and the amount of configured memory, run the Configuration/Setup Utility program and select **System Summary** from the menu. For additional information, see Chapter 3, “Configuring the server,” on page 49.
- For two-way memory interleaving, DIMMs must be installed in matched pairs. If one DIMM is installed in the DIMM 1 connector, when you install an additional DIMM, it must be installed in the DIMM 3 connector, and it must be the same size, speed, type, and technology as the DIMM in the DIMM 1 connector. You can mix compatible DIMMs from various manufacturers. If you install a second pair of DIMMs in the DIMM 2 and DIMM 4 connectors, they do not have to be the same size, speed, type, and technology as the DIMMs in the DIMM 1 and DIMM 3 connectors. However, the size, speed, type, and technology of the DIMMs that you install in the DIMM 2 and DIMM 4 connectors must match each other.
- Install only 1.8 V, 184-pin, double-data-rate 2 (DDR2), 533/667 MHz, PC2-4200, unbuffered synchronous dynamic random-access memory (SDRAM) with error correcting code (ECC) DIMMs. These DIMMs must be compatible with the latest DDR2 533/667 MHz SDRAM unbuffered DIMM specification. For a list of supported options for the server, see <http://www.ibm.com/servers/eserver/serverproven/compat/us/>; then, select your country and navigate to the list of options for the server.
- When you restart the server after adding or removing a DIMM, the server displays a message that the memory configuration has changed.

The following illustration shows the dual inline memory module (DIMM) connectors and corresponding LEDs on the system board.



Attention: Static electricity that is released to internal server components when the server is powered-on might cause the server to stop, 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.



To install a DIMM, complete the following steps:

1. Read the safety information that begins on page v and “Installation guidelines” on page 19.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.
3. Remove the side cover (see “Removing the side cover” on page 22).

4. Locate the DIMM connectors on the system board. Determine the connectors into which you will install the DIMMs. Install the DIMMs in the sequence shown in the following table.

Number of DIMMs	Connector sequence
One DIMM	1
Two DIMMs (interleaved configuration)	1, 3
Three DIMMs	Not supported
Four DIMMs (interleaved configuration)	1, 3, 2, 4

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

5. Open the retaining clips and, if necessary, remove any existing DIMM.
6. Touch the static-protective package that contains the DIMM to any unpainted metal surface on the server. Then, remove the new DIMM from the package.
7. Turn the DIMM so that the DIMM keys align correctly with the slot.
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. If there is a gap between the DIMM and the retaining clips, the DIMM has not been correctly installed. 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 44.

Installing a drive

Depending on the server model, one or more of the following drives might be installed in the server:

- Diskette drive (optional)
- Hard disk drive
- CD-ROM, CD-RW, or DVD/CD-RW combo drive

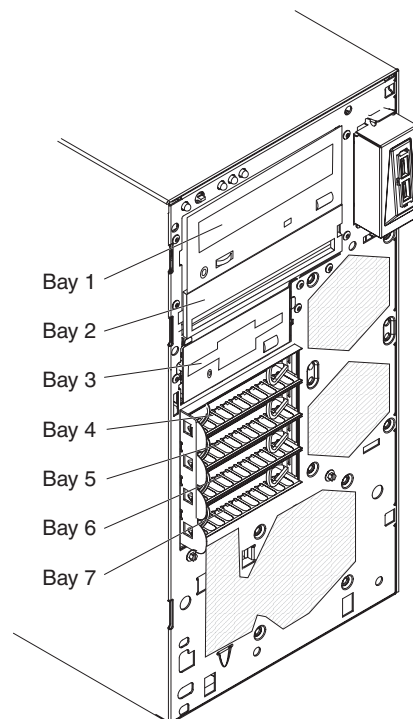
Some hot-swap Serial Attached SCSI (SAS) models might come with an integrated drive electronics (IDE) CD-ROM drive in bay 1 and four hot-swap hard disk drive bays.

Some simple-swap Serial Advanced Technology Attachment (SATA) models might come with an IDE CD-ROM drive in bay 1 and a simple-swap SATA hard disk drive in bay 4.

Some non-hot-swap SATA models might come with an IDE CD-ROM drive in bay 1 and a non-hot-swap SATA hard disk drive in bay 4.

Some hot-swap SATA models might come with an IDE CD-ROM drive in bay 1 and a hot-swap SATA hard disk drive in bay 4.

The following illustration shows the drive bays.



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

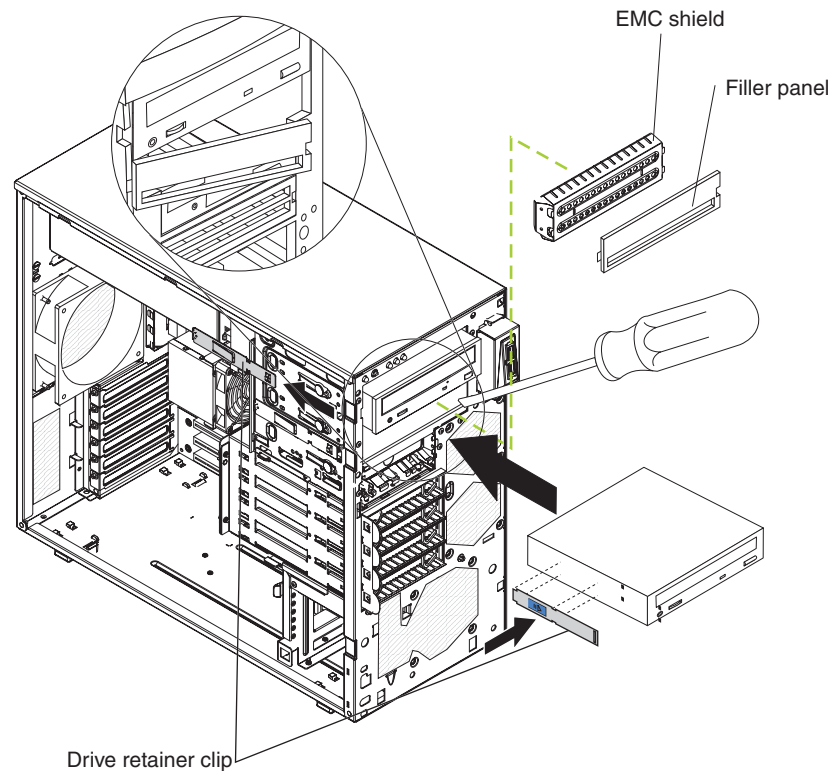
- Make sure that you have all the cables and other equipment specified in the documentation that comes with the drive.
- Check the instructions that come with the drive to see whether you have to set any switches or jumpers on the drive. If you are installing a SAS device, be sure to set the SAS ID for that device.

- Diskette drives, tape drives, CD drives, CD-RW drives, and DVD/CD-RW combo drives are examples of removable-media drives. You can install removable-media drives in bays 1, 2, and 3 only.
- To install a 3.5-in. drive in a 5.25-in. bay, you must use the 5.25-in. conversion kit.
- Only a 3.5-in. device can be installed in bay 3.
- The server supports only one diskette drive.

For additional information about installing a diskette drive, see the *Problem Determination and Service Guide* on the IBM xSeries Documentation CD.

- The electromagnetic interference (EMI) integrity and cooling of the server are protected by having all bays and PCI, PCI Express, and PCI-X slots covered or occupied. When you install a drive or PCI, PCI Express, or PCI-X adapter, save the EMC shield and filler panel from the bay or the PCI, PCI Express, or PCI-X adapter slot cover in the event that you later remove the option.
- For a complete list of supported options for the server, see <http://www.ibm.com/servers/eserver/serverproven/compat/us/>.

Installing a drive in bay 2 or 3



To install a drive in bay 2 or 3, complete the following steps:

1. Read the safety information that begins on page v and “Installation guidelines” on page 19.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.
3. Remove the side cover (see “Removing the side cover” on page 22).
4. Remove the two-piece bezel (see “Removing the two-piece bezel” on page 23).
5. Use a screwdriver to pry the filler panel and EMC shield away from the server.

Note: If you are installing a drive that contains a laser, observe the following safety precaution.

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

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

Note: You might find it easier to install the new drive from the front and then attach the cables.

8. Remove the drive retainer clip from the side of the drive cage of bays 1 and 2 (see the illustration at the beginning of this section). Slide the drive retainer clip to the left to remove it from the drive cage; then, snap the drive retainer clip into the screw holes on the side of the drive (the blue side of the drive retainer clip should be facing outward).

9. If you are installing a 5.25-in. drive in bay 2, push the drive into the bay. If you are installing a 3.5-in. drive in bay 2, you must attach the 5.25-in. conversion kit to the 3.5-in. drive.

Note: An optional diskette drive can be installed in bay 3.

10. Determine whether the drive is an IDE or SATA device; then, connect one end of the applicable signal cable into the rear of the drive and make sure that the other end of this cable is connected into the applicable IDE or SATA connector on the system board.
11. Route the signal cable so that it does not block the airflow to the rear of the drives or over the microprocessor and dual inline memory modules (DIMMs).
12. If you have another drive to install or remove, do so now.
13. Connect the power cable to the rear of the drive. The connectors are keyed and can be inserted only one way.

If you have other options to install or remove, do so now; otherwise go to “Completing the installation” on page 44.

Installing a hot-swap hard disk drive in bay 4, 5, 6, or 7

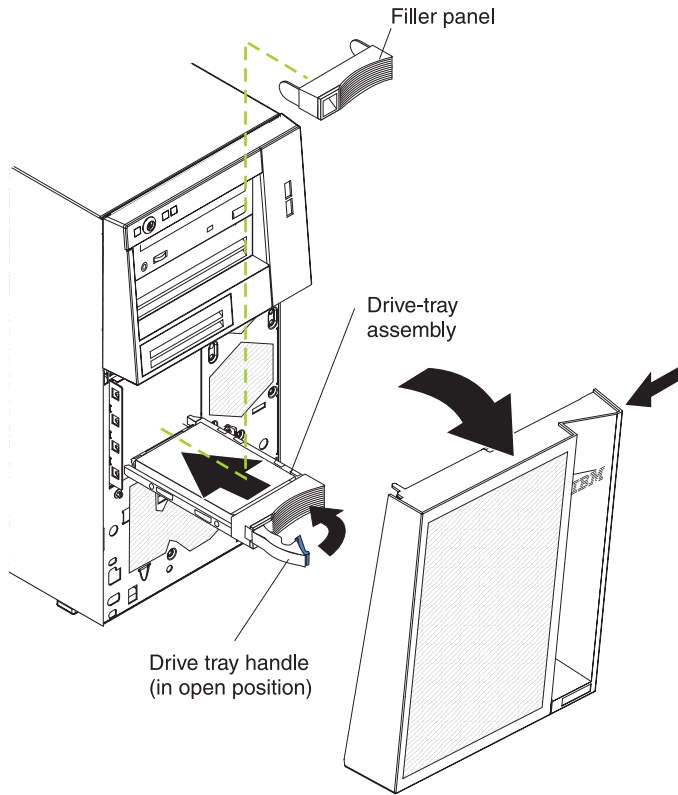
This procedure applies only to server models that have hot-swap hard disk drives. Some server models come with SAS or SATA hot-swap hard disk drives. Before you install a hot-swap hard disk drive, read the following information:

- The hot-swap drives must be either all SAS hard disk drives or all SATA hard disk drives; the two types cannot be combined.
- Inspect the drive tray for signs of damage.
- Make sure that the drive is correctly installed in the tray.
- 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 drive bay.
- You do not have to turn off the server to install hot-swap drives in the hot-swap drive bays.

The server hot-swap bays are connected to a SAS/SATA backplane. This backplane, also known as the hot-swap-drive backplane, is the printed circuit board behind these bays.

Attention: Static electricity that is released to internal server components when the server is powered-on might cause the server to stop, 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.

Note: If you install the maximum number of hot-swap hard disk drives (four), remove the EMC shield that is attached inside the lower bezel.



To install 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 19.
2. Unlock the side cover.
3. Remove the side cover and lower bezel (see “Removing the side cover” on page 22 and “Removing the two-piece bezel” on page 23).
4. Remove the filler panel from the bay in which you want to install the drive by inserting your finger into the depression area at the left side of the filler panel and pulling it away from the server.
5. Touch the static-protective package that contains the drive to any unpainted metal surface on the server; then, remove the drive from the package and place it on a static-protective surface.
6. Install the hard disk drive in the hot-swap bay:
 - a. Make sure that the drive tray handle is open.
 - b. Align the drive assembly with the guide rails in the bay.
 - c. Gently slide the drive assembly into the drive bay until the drive stops.
 - d. Push the drive tray handle to the closed (locked) position.
 - e. Check the hard disk drive status indicator to make sure that the hard disk drive is operating correctly. (You might have to restart the server before the drive is recognized.) If the amber hard disk drive status LED for a drive is lit continuously, it indicates that the drive is faulty and must be replaced. If the green hard disk drive activity LED is flashing, this indicates that the drive is being accessed.

Note: If the server is configured for RAID operation using an optional ServerRAID adapter, you might have to reconfigure your disk arrays after

installing hard disk drives. See the ServeRAID documentation on the *IBM ServeRAID Support* CD for additional information about RAID operation and complete instructions for using ServeRAID Manager.

7. If you are installing additional hot-swap hard disk drives, do so now.

If you have other options to install or remove, do so now; otherwise go to “Completing the installation” on page 44.

IDs for hot-swap hard disk drives

The hot-swap-drive backplane controls the IDs for the internal hot-swap drive bays. The following table lists the IDs for the hard disk drives and backplane that are connected to one channel in hot-swap models. In the typical configuration, the standard hard disk drives and backplane are connected to channel A.

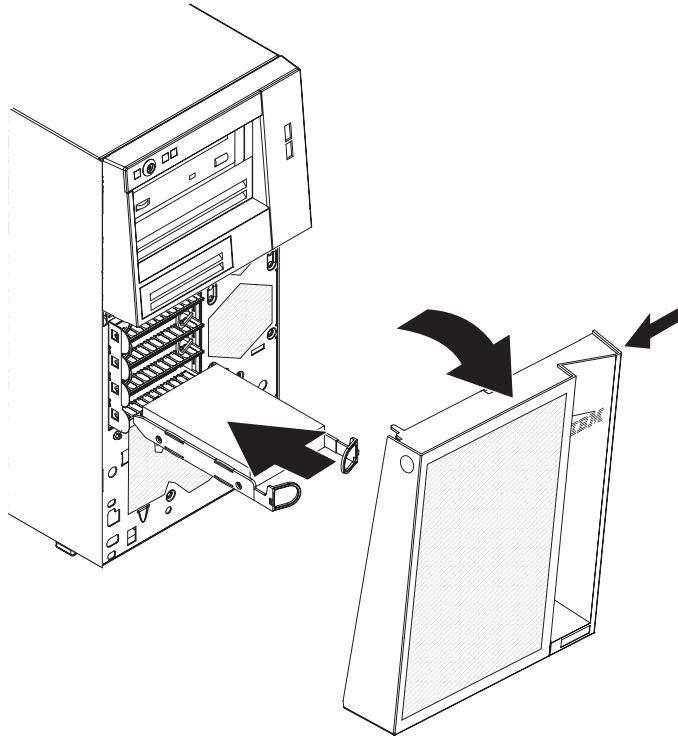
Device	ID
Drive bay 4	0
Drive bay 5	1
Drive bay 6	2
Drive bay 7	3

Installing a simple-swap SATA hard disk drive in bay 4, 5, 6, or 7

Some server models come with simple-swap SATA hard disk drives, which are accessible from the front of the server. Before you install a simple-swap SATA hard disk drive, read the following information:

- You can install four simple-swap SATA hard disk drives in the server.
- Install the drives in ascending order by bay number.

Attention: Simple-swap hard disk drives are not hot-swappable. Disconnect all power from the server before removing or installing a simple-swap hard disk drive.



To install a simple-swap hard disk drive, complete the following steps:

1. Read the safety information that begins on page v and “Installation guidelines” on page 19.
2. Turn off the server and peripheral devices and disconnect all external cables and power cords.
3. Unlock the side cover (the bezel will not disengage from the server if the cover is locked).
4. Remove the side cover and lower bezel (see “Removing the side cover” on page 22 and “Removing the two-piece bezel” on page 23).
5. Touch the static-protective package that contains the drive to any unpainted metal surface on the server; then, remove the drive from the package and place it on a static-protective surface.
6. Align the drive assembly with the guide rails in the bay (the connector end of the drive goes in first).
7. Pull the loops of the drive assembly toward each other; then, carefully slide the drive assembly into the drive bay until it stops and release the loops.

Note: Do not release the loops on the drive assembly until it is completely seated.

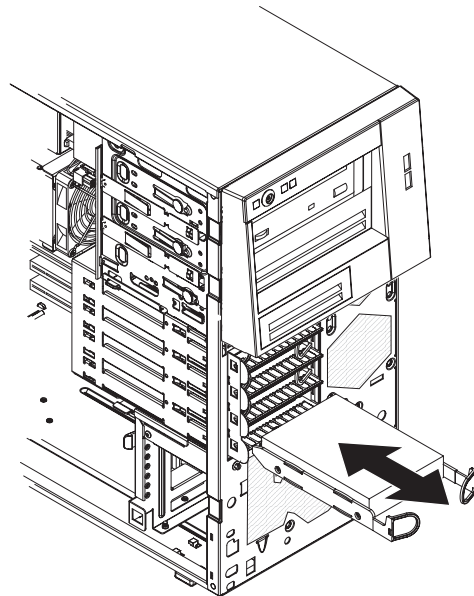
If you have other options to install or remove, do so now; otherwise, go to “Completing the installation” on page 44.

Installing a non-hot-swap SATA hard disk drive in bay 4, 5, 6, or 7

Some server models come with non-hot-swap SATA hard disk drives. Before you install a non-hot-swap SATA hard disk drive, read the following information:

- Read the documentation that comes with the drive for cabling instructions.
- Route the cable before you install non-hot-swap drives. Do not block the airflow from the fans.
- You can install four non-hot-swap SATA hard disk drives in the server.
- Install the drives in ascending order by bay number.

Attention: Disconnect all power from the server before removing or installing a non-hot-swap hard disk drive.



To install a non-hot-swap SATA hard disk drive, complete the following steps:

1. Read the safety information that begins on page v and “Installation guidelines” on page 19.
2. Turn off the server and peripheral devices and disconnect all external cables and power cords.
3. Unlock the side cover (the bezel will not disengage from the server if the cover is locked).
4. Remove the side cover and lower bezel (see “Removing the side cover” on page 22 and “Removing the two-piece bezel” on page 23).
5. Touch the static-protective package that contains the drive to any unpainted metal surface on the server; then, remove the drive from the package and place it on a static-protective surface.
6. Align the drive assembly with the guide rails in the bay (the connector end of the drive goes in first).

7. Pull the loops of the drive assembly toward each other; then, carefully slide the drive assembly into the drive bay until it stops and release the loops.

Note: Do not release the loops on the drive assembly until it is completely seated.

8. Attach the signal cable to the drive:
 - a. Attach one end of the signal cable to the corresponding connector on the rear of the drive.
 - b. Attach the other end of the signal cable to the corresponding connector on the system board.
9. Connect the power cable to the rear of the drive. The connectors are keyed and can be inserted only one way.

If you have other options to install or remove, do so now; otherwise, go to “Completing the installation” on page 44.

Power and signal cables for internal drives

The server uses cables to connect parallel IDE, simple-swap SATA, and SAS devices to the power supply and to the system board. (See “System-board internal connectors” on page 14 for the location of system-board connectors.) Review the following information before connecting power and signal cables to internal drives:

- The drives that are preinstalled in the server come with power and signal cables attached. If you replace any drives, remember which cable is attached to which drive.
- When you install a drive, make sure that one of the signal cable drive connectors is connected to the drive and that the connector at the other end of the signal cable is connected to the system board or a compatible adapter or controller that you have installed.
- If you have only one IDE device on a cable, it must be set as a master device.
- If two IDE devices are used on a single cable, one must be designated as the master device and the other as the subordinate device; otherwise, the server might not recognize some of the IDE devices. The master and subordinate designation is determined by switch or jumper settings on each IDE device.
- When you route a cable, make sure that it does not block the airflow to the rear of the drives or over the microprocessor or DIMMs.

The following cables are provided:

- **Power cables:** Four-wire power cables connect the drives to the power supply. At the end of these cables are plastic connectors that can be attached to different drives; these connectors vary in size. Use either a four-wire power cable or SATA power cable with SATA drives, but do not use both at the same time (use one or the other).
- **Signal cables:** Signal cables are typically flat cables, also called ribbon cables, that connect parallel IDE, SATA, SAS, and diskette drives to the system board. Two or three types of signal cables come with the server:
 - **IDE:** The wider IDE signal cable has three connectors. One of these connectors is attached to the drive, one is a spare, and the third is attached to the primary or secondary IDE connector on the system board. The spare connector can be used to connect an additional IDE drive to the server.
The CD-ROM drive is attached to an ATA 100 signal cable. ATA 100 signal cables are color-coded. The blue connector is attached to the system board.

The black connector is attached to the master IDE device. The gray middle connector is attached to the subordinate IDE device.

- **(Optional) Diskette drive:** The narrower signal cable has two connectors. One is attached to the diskette drive, and the other is attached to the connector (FDD1) on the system board.
- **SATA:** The narrower, black signal cable has two connectors. One is connected to the non-hot-swap SATA drive, and the other is attached to the connector on the system board.

Simple-swap SATA models come with four SATA cables that are already connected to the system board and the back panel at the rear of the simple-swap drives.

Hot-swap SATA models come with a single data cable that connects the SAS/SATA controller to the hot-swap backplane. This cable provides inherent connectivity for the four SATA drives that the server supports. Therefore, additional cabling is not required for these drives.

- **SAS:** Hot-swap SAS models come with a single data cable that connects the SAS/SATA controller to the hot-swap backplane. This cable provides inherent connectivity for the four SAS drives that the server supports. Therefore, additional cabling is not required for these drives.

For more information about the requirements for SAS cable and connecting SAS devices, see the documentation that comes with these devices.

For a list of supported options for the server, see <http://www.ibm.com/servers/eserver/serverproven/compat/us/>.

Installing an adapter

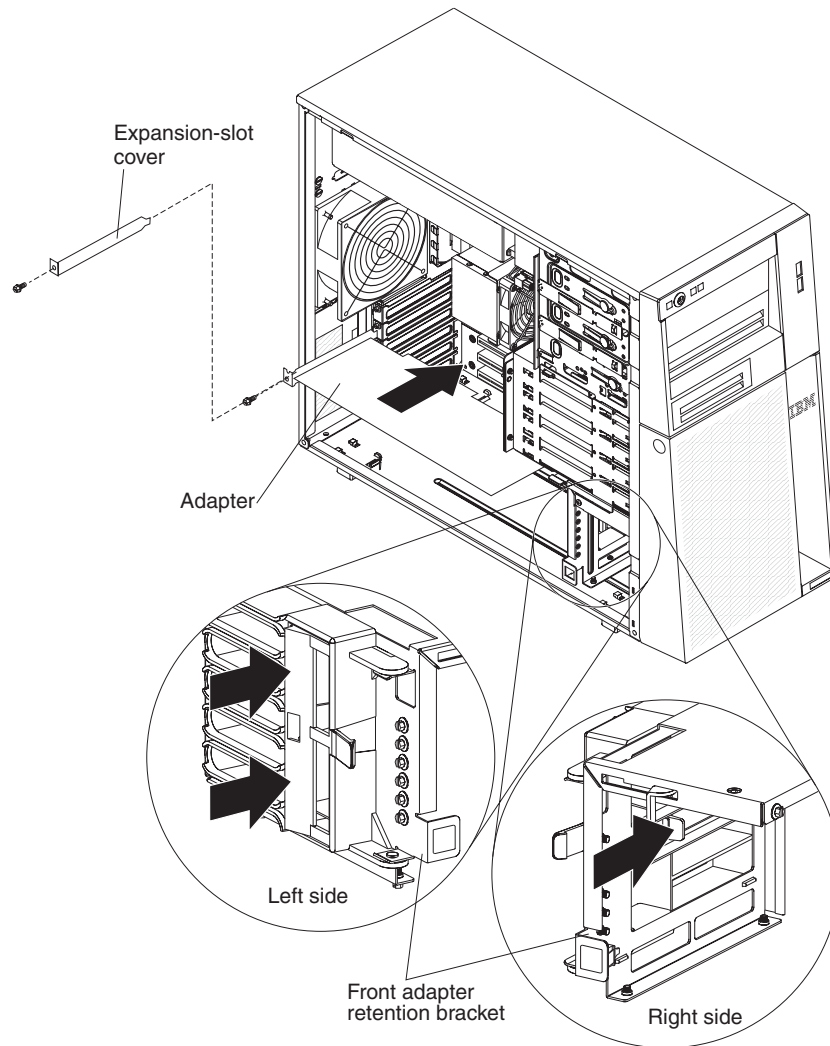
The following notes describe the types of adapters that the server supports and other information that you must consider when installing an adapter.

- Locate the documentation that comes with the adapter and follow those instructions in addition to the instructions in this section. If you need to change the switch setting or jumper settings on the adapter, follow the instructions that come with the adapter.
- Read the documentation that comes with your operating system.
- The server comes with two PCI slots and two PCI Express slots on the main system board. If your model comes with the optional PCI-X expansion card, it provides two PCI-X slots.
- You can install full-length adapters that are included in the ServerProven® list in slots 1 through 6 (depending on your model).
- The 32-bit slots 3 and 4 support 5.0 V keyed PCI adapters; they do not support 3.3 V keyed adapters. Universal adapters are supported in slots 3 and 4 if they are universally keyed and the server is not a hot-swap model. If you are installing 64-bit adapters in a hot-swap model, you must install them only in slots 5 and 6.
- An optional IBM Remote Supervisor Adapter II can be installed only in the following slots: PCI slots 3 and 4. Use the ribbon cable that comes with this adapter to connect it to the Remote Supervisor Adapter II cable connector on the system board. For additional information, see the documentation that comes with this adapter.
- When you start the server for the first time after installing a Remote Supervisor Adapter II, the startup process will take several minutes longer than a typical startup.

- If you install an optional IBM Remote Supervisor Adapter II, you must disconnect the video cable from the system board and connect it to the optional Remote Supervisor Adapter II.
- The optional ServeRAID-8i adapter can be installed only in PCI-X slot 6.
- The server scans PCI Express x1 slot 2, PCI Express x8 slot 1, and PCI slots 3 and 4 to assign system resources. If the optional PCI-X expansion card is attached to the system board, the server also scans PCI-X slots 5 and 6 to assign additional system resources. Then, the server starts the PCI devices in the following order, if you have not changed the default startup sequence: PCI Express x8 slot 1, PCI-X slot 5 (optional), PCI-X slot 6 (optional), PCI Express x1 slot 2, PCI slot 3, and PCI slot 4.
- For a list of supported options for the server, see <http://www.ibm.com/servers/eserver/serverproven/compat/us/>.

Attention: Static electricity that is released to internal server components when the server is powered-on might cause the server to stop, 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.

See “System-board and PCI-X expansion card option connectors” on page 17 for the locations of the expansion slots and the Remote Supervisor Adapter II cable connector.

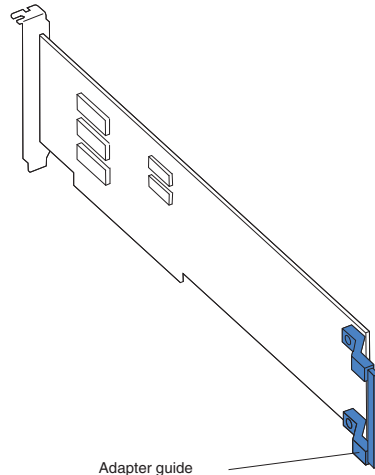


To install an adapter, complete the following steps:

1. Read the safety information that begins on page v and “Installation guidelines” on page 19.
2. Turn off the server and peripheral devices and disconnect all external cables and power cords; then, remove the side cover. See “Removing the side cover” on page 22.
3. Follow the cabling instructions, if any, that come with the adapter. Route the adapter cables before you install the adapter.
4. Follow the instructions that come with the adapter to set jumpers or switches, if any.
5. Rotate the rear adapter-retention bracket to the open (unlocked) position and remove it from the server.
6. Remove the screw that secures the expansion-slot cover to the chassis. Store the expansion-slot cover and screw in a safe place for future use.

Note: Expansion-slot covers must be installed on all vacant slots. This maintains the electronic emissions standards of the server and ensures proper ventilation of server components.

7. Touch the static-protective package that contains the adapter to any unpainted metal surface on the server. Then, remove the adapter from the static-protective package. Avoid touching the components and gold-edge connectors on the adapter.
8. If you are installing a full-length adapter, remove the blue adapter guide (if any) from the end of the adapter.



9. Carefully grasp the adapter by the top edge or upper corners, and align it with the expansion slot guides; then, press the adapter *firmly* into the expansion slot. Move the adapter directly from the static-protective package to the expansion slot.
10. Install an expansion-slot screw at the rear of the adapter.
11. If you are installing a full-length adapter, press on the release lever on the right side of the front adapter-retention bracket to release the retaining tab on the left side of the bracket.
12. Connect required cables to the adapter. Route cables so that they do not block the flow of air from the fans.
13. Reinstall the rear adapter-retention bracket; then, rotate the bracket to the closed (locked) position.

Note: If any adapters in the server are large or have heavy cables attached to them, you can remove the rear adapter-retention bracket and secure all of the adapters with expansion-slot screws.

If you have other options to install or remove, do so now; otherwise, go to “Completing the installation” on page 44.

Installing a hot-swap power supply

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

- The type and number of power supplies vary by server model. The server comes with at least one power supply.
- Some servers come with a hot-swap power supply that supports the redundant mode. The redundant mode requires two operational hot-swap power supplies in the server.

This procedure applies only to server models that have hot-swap power supplies. If the server contains a non-hot-swap power supply that requires replacement, the power supply must be replaced by a service technician.

When you remove or install a hot-swap power supply, observe the following precautions.

Statement 8:

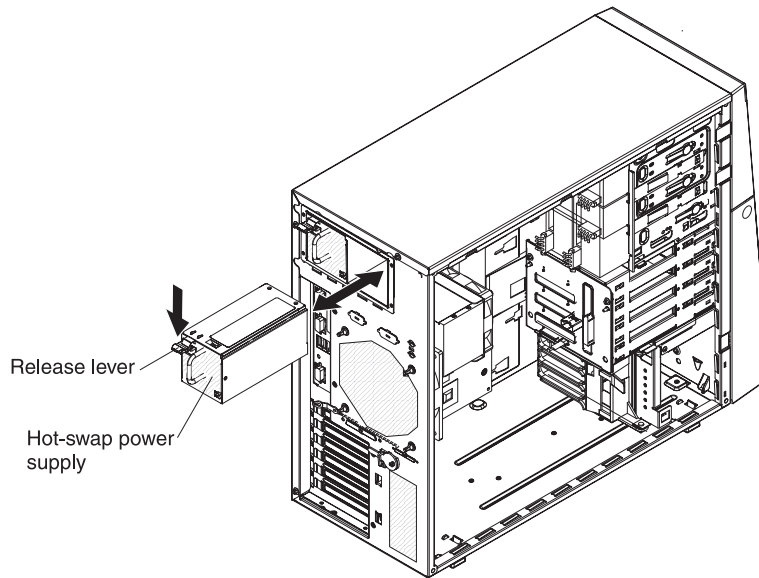


CAUTION:

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



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



To replace a hot-swap power supply, complete the following steps:

1. Review the safety information that begins on page v and “Installation guidelines” on page 19.
2. Turn off the server and attached devices; then, disconnect all power cords and external cables.
3. Remove the side cover (see “Removing the side cover” on page 22).
4. Disconnect the power cord from the power supply that is to be removed.
5. Press down on the orange release lever and pull the power supply out of the bay, using the handle.
6. If you are instructed to return the hot-swap power supply, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.
7. Touch the static-protective package that contains the hot-swap power supply to any unpainted metal surface on the server; then, remove the power supply from the package and place it on a static-protective surface.
8. Place the power supply into the bay guides.
9. Press down on the orange release lever and push the power supply toward the front of the chassis until it locks into place.
10. Connect one end of the power cord into the connector on the back of the power supply and connect the other end of the power cord into a properly grounded electrical outlet.
11. Make sure that both the ac and dc power LEDs on the rear of the power supply are lit, indicating that the power supply is operating correctly.
12. Install the side cover (see “Reinstalling the side cover” on page 46).
13. Connect the external cables and power cords.

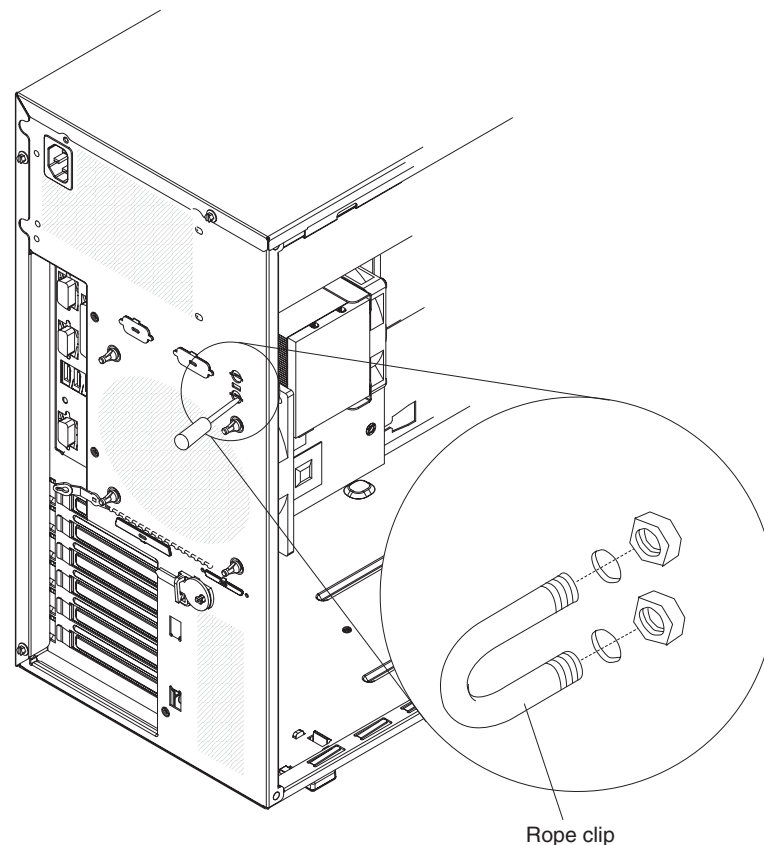
If you have other options to install or remove, do so now; otherwise go to “Completing the installation” on page 44.

Installing a security rope clip

To help prevent hardware theft, you can add a security rope clip and cable to the server. After you add the security cable, make sure that it does not interfere with other cables that are connected to the server.

Before you begin, obtain the following items:

- A flat-blade screwdriver
- An adjustable wrench
- A 19 mm (0.75 in.) rope clip or wire rope (similar to National Manufacturing number 3230, stock number 176-735)
- Threaded nuts that fit the rope clip
- A security cable
- A lock, such as a combination lock or padlock



To install a rope clip, complete the following steps:

1. Turn off the server and all attached devices. Disconnect all external cables and power cords; then, remove the side cover. See “Removing the side cover” on page 22.
2. Use a screwdriver to remove the two metal knockouts.
3. Insert the rope clip through the rear panel; then, attach and tighten the nuts.
4. Thread the cable through the rope clip and around an object that is not part of or permanently secured to the building structure or foundation, and from which

the cable cannot be removed. Fasten the cable ends together with a lock. After you add the security cable, make sure that it does not interfere with other cables that are connected to the server.

If you have other options to install or remove, do so now; otherwise, go to “Completing the installation.”

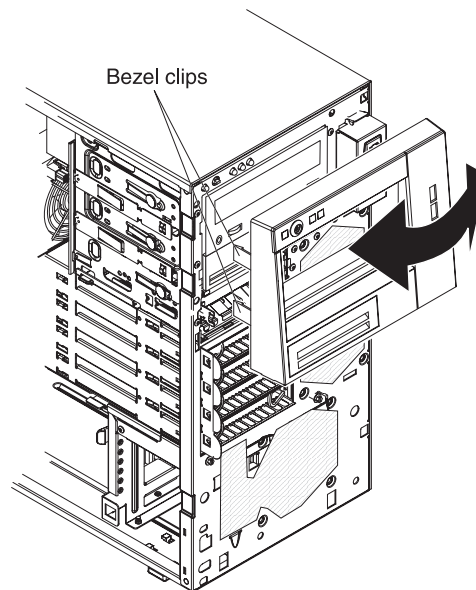
Completing the installation

To complete the installation, you must reinstall the two-piece bezel, reinstall the side cover, connect all the cables and, for certain options, run the Configuration/Setup Utility program. Follow the instructions in this section.

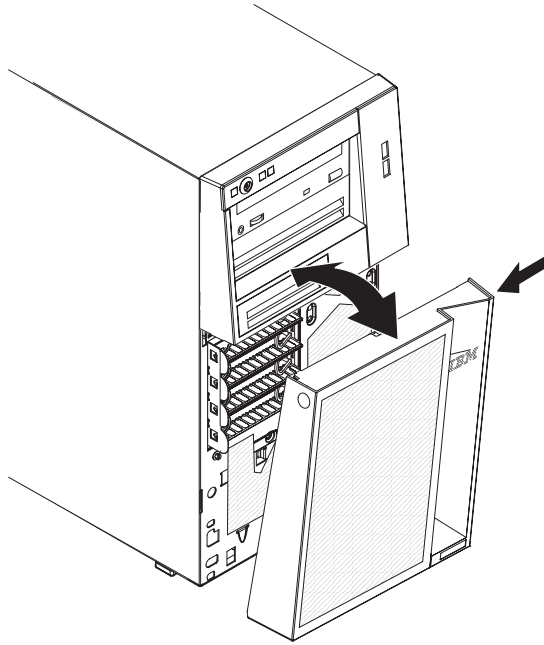
Reinstalling the two-piece bezel

To reinstall the two-piece bezel, complete the following steps:

1. Install the upper bezel on the front of the server chassis:
 - a. Insert the two right-side tabs on the upper bezel into the matching holes on the right side of the chassis.
 - b. Rotate the upper bezel to the left side of the chassis and press the bezel clips into the matching indentations on the left side of the chassis until the bezel clips snap into place.



2. Install the lower bezel on the front of the server chassis.

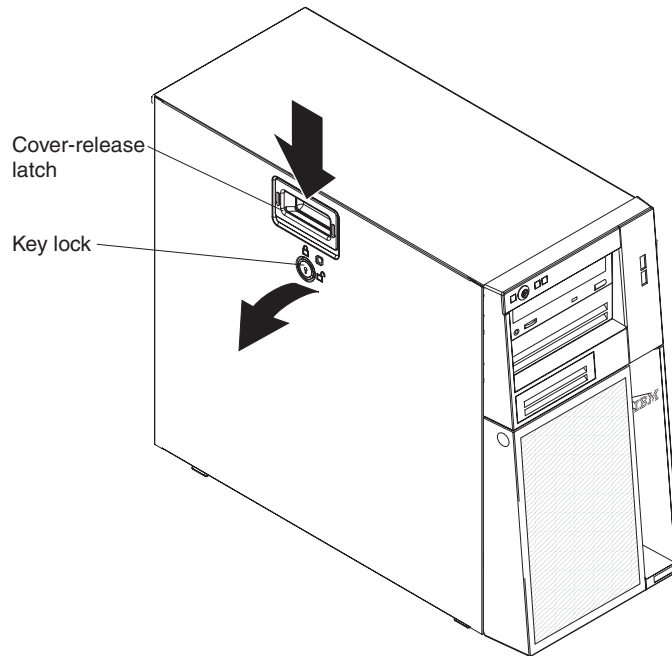


- a. Insert the two bottom tabs on the lower bezel into the matching holes in the front of the chassis.
- b. Tilt the top of the lower bezel into position on the chassis until the lower bezel locks securely into place.

Reinstalling the side cover

If you removed the bezel, reinstall it before you reinstall the side cover. See “Reinstalling the two-piece bezel” on page 44.

Note: The rear adapter-retention bracket rests against the server side cover. You might find it easier to lay the server on its side to replace the side cover.



To reinstall the side cover, complete the following steps:

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

Note: The cover-release latch must be in the unlocked (opened) position before you install the side cover.

2. Insert the tabs inside the cover into the slots on the server chassis.

Note: Make sure that each tab on the side cover is in its corresponding slot before closing the cover-release latch.

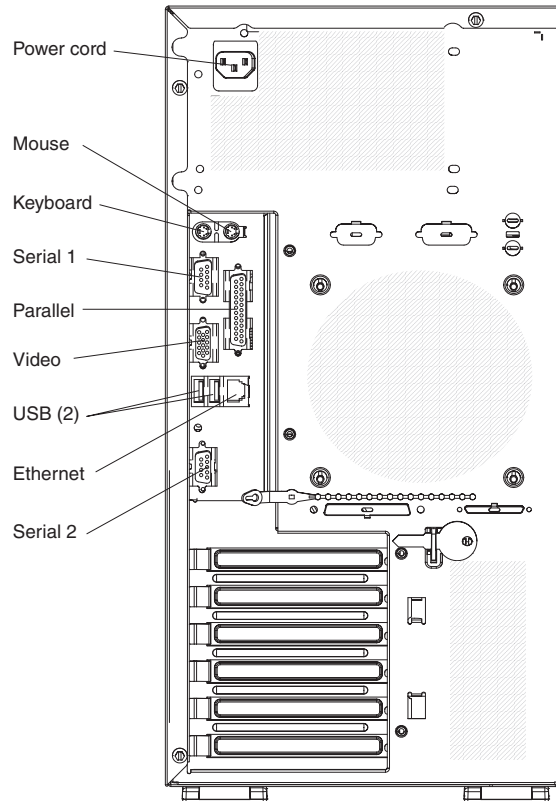
3. Close the cover-release latch to secure the side cover in place.
4. Lock the side cover.

Connecting the cables

Attention: To prevent damage to equipment, connect the power cords last.

If the server cables and connector panel have color-coded connections, match the color of the cable end with the color of the connector. For example, match a blue cable end with a blue panel connector, a red cable end with a red connector, and so on.

The following illustration shows the input/output (I/O) connectors on the rear of the server.



Updating the server configuration

When you start the server for the first time after you add or remove an internal option or an external device, you might receive a message that the configuration has changed. The Configuration/Setup Utility program starts automatically so that you can save the new configuration settings. For additional information, see “Using the Configuration/Setup Utility program” on page 50.

Some options have device drivers that you must install. For information about installing device drivers, see the documentation that comes with each option.

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

Connecting external devices

If you install an optional adapter that the server supports, you can attach external devices to the server.

To attach an external device, complete the following steps:

1. Read the safety information that begins on page v, “Installation guidelines” on page 19, and the documentation that comes with the device.
2. Turn off the server and all attached devices.
3. Follow the instructions that come with the device to prepare it for installation and to connect it to the server.

Note: If you are attaching an external device, see the documentation that comes with the device for information about cabling.

Installing the server in a rack

An optional Tower-to-Rack Kit is needed to convert the server from a tower model to a rack model. You can then install the server in a rack cabinet. To order a Tower-to-Rack Kit for the server, contact your IBM marketing representative or authorized reseller.

Chapter 3. Configuring the server

The following configuration programs and utilities are provided with the server:

- **Configuration/Setup Utility program**

The Configuration/Setup Utility program is part of the basic input/output system (BIOS) code. 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 utility program, see “Using the Configuration/Setup Utility program” on page 50.

- **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, such as an integrated SAS/SATA controller with RAID capabilities, and to simplify the installation of the operating system. For information about using this CD, see “Using the ServerGuide Setup and Installation CD” on page 55.

- **Boot Menu program**

The Boot Menu program is part of the BIOS code. 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.

- **Broadcom Gigabit Ethernet Utility program**

The Broadcom Gigabit Ethernet Utility program is part of the BIOS code. You can use it to configure the network as a startable device, and you can customize where the network startup option appears in your startup sequence. Enable the Broadcom Gigabit Ethernet Utility from the Configuration/Setup Utility program. For information, see “Enabling the Broadcom Gigabit Ethernet Utility program” on page 63.

- **Ethernet controller configuration**

For information about configuring the Ethernet controller, see “Configuring the Broadcom Gigabit Ethernet controller” on page 63.

- **IBM Director**

IBM Director is a workgroup-hardware-management tool that you can use to centrally manage 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 64. For more information about IBM Director, see the IBM Director documentation on the *IBM Director* CD that comes with the server.

- **SAS/SATA Configuration Utility program**

Use the SAS/SATA Configuration Utility program to configure devices that are attached to the SAS/SATA controller (hot-swap SAS/SATA models only). For information about using this program, see “Using the SAS/SATA Configuration Utility program (hot-swap SAS/SATA models only)” on page 57.

- **Adaptec® HostRAID™ configuration programs**

- **Adaptec RAID Configuration Utility programs (for Serial ATA RAID)**

Use the Array Configuration Utility, in the Adaptec RAID Configuration Utility programs, to configure the integrated SATA controller with integrated RAID and the devices that are attached to it (simple-swap models). For more information about using these utility programs, see “Using the Adaptec RAID Configuration Utility programs (for Serial ATA HostRAID)” on page 59.

– **SAS/SATA Utility program (for SAS/SATA HostRAID)**

Use the HostRAID feature of the SAS/SATA Utility program to configure the SAS/SATA controller with integrated RAID and the devices that are attached to it. For more information about using this utility program, see “Using the SAS/SATA Utility program (for SAS/SATA HostRAID)” on page 60.

• **ServeRAID Manager**

ServeRAID Manager is available as a stand-alone program and as an IBM Director extension. If a ServeRAID controller is installed in the server, use ServeRAID Manager to define and configure the disk-array subsystem *before* you install the operating system. For information about using this program, see “Using ServeRAID Manager” on page 61.

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 and Remote Control Security settings
- Set the startup characteristics of the server and the order of startup devices
- Set and change settings for advanced hardware features
- Set and change settings for the mini baseboard management controller (mini-BMC)
- View and clear error logs

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 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 type, speed, and cache sizes of the microprocessors 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.

- **Devices and I/O Ports**

Select this choice to view or change assignments for devices and input/output (I/O) ports.

Select this choice to enable or disable integrated Ethernet controllers and all standard ports (such as serial and parallel). **Enable** is the default setting for all controllers. 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). If you disable the integrated Ethernet controller and no Ethernet adapter is installed, the server will have no Ethernet capability. If you disable the integrated USB controller, the server will have no USB capability; to maintain USB capability, make sure that **Enabled** is selected for the **USB Support** and **USB 2.0 Support** options.

If the server is a SATA model, select this choice to configure the SATA ports.

Select this choice to enable and configure serial remote video and keyboard redirection, and to set other remote console values.

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*).

- **System Security**

Select this choice to set password settings. See “Passwords” on page 53 for more information about passwords. You can also enable the chassis-intrusion detector to alert you each time that the server cover is removed.

- **Power-on Password**

Select this choice to set or change a power-on password. See “Power-on password” on page 54 for more information.

- **Administrator Password**

This choice is on the Configuration/Setup Utility menu only if an optional IBM Remote Supervisor Adapter II is installed.

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 54.

- **Start Options**

Select this choice to view or change the start options. Changes in the start options take effect when you restart the server.

You can set keyboard operating characteristics, such as the keyboard speed, and you can specify whether the server starts with the keyboard number lock on or off. You can enable the server to run without a diskette drive, monitor, or keyboard.

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. You can also specify whether an integrated controller or a PCI adapter has boot precedence.

If you enable the boot fail count, the BIOS default settings will be restored after three consecutive failures to find a boot record.

You can enable a virus-detection test that checks for changes in the boot record when the server starts.

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.

- **Power Button**

Select this choice to enable or disable the power-control button. **Enabled** is the default setting.

- **Wake-up from**

Select this choice to choose Normal or the power-control button as the wake-up control.

- **CPU Options**

Select this choice to enable or disable Hyper-Threading, the pre-fetch queue, C1 enhanced mode, and no-execute mode memory protection.

The default setting for Hyper-Threading is **Enabled**.

- **PCI Bus Control**

Select this choice to view the system resources that are used by the installed PCI, PCI Express, or PCI-X devices.

- **Baseboard management controller (BMC) settings**

Select this choice to view information and to change mini baseboard management controller (mini-BMC) settings.

- **IPMI Specification Version**

This is a nonselectable menu item that displays the IPMI version.

- **BMC Hardware/Firmware Version**

This is a nonselectable menu item that displays the mini-BMC firmware version.

- **Existing Event Log number**

This is a nonselectable menu item that displays the number of entries in the system-event log.

- **BIOS POST Watchdog**

Enable or disable the mini-BMC POST watchdog. **Disabled** is the default setting.

- **POST Watchdog Timeout**

Set the mini-BMC POST watchdog timeout value. **5 min** is the default setting.

- **LAN Settings**

Select this choice to view the mini-BMC network configuration information.

- **System Event Log**

Select this choice to view the mini-BMC system-event log, which contains all system error and warning messages that have been generated. Use the arrow keys to move between pages in the log. If an optional IBM Remote

Supervisor Adapter is installed, the full text of the error messages is displayed; otherwise, the log contains only numeric error codes. Run the diagnostic program to get more information about error codes that occur. For instructions, see the diagnostic information in the *Problem Determination and Service Guide* on the IBM xSeries Documentation CD. Select **Clear error logs** to clear the mini-BMC system-event log.

Important: If the system-error LED on the front of the server is lit but there are no other error indications, clear the mini-BMC system-event log. This log does not clear itself, and if it begins to fill up, the system-error LED will be lit. Also, after you complete a repair or correct an error, clear the mini-BMC system-event log to turn off the system-error LED on the front of the server.

- **Error Log**

Select this choice to view or clear error logs.

- **POST Error Log**

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

- **System Event/Error Log**

Select this choice to view the three most recent error codes and messages that the system generated during POST and all system status messages from the service processor. Select **Clear error logs** to clear the system event/error log.

Important: If the system-error LED on the front of the server is lit but there are no other error indications, clear the system event/error log. This log does not clear itself, and if it begins to fill up, the system-error LED will be lit. Also, after you complete a repair or correct an error, clear the system event/error log to turn off the system-error LED on the front of the server.

- **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 and to 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 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.

When 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. Start the Configuration/Setup Utility program and reset the power-on password.
- Remove the server battery and then reinstall it. For instructions for removing the battery, see the *Problem Determination and Service Guide* on the IBM xSeries Documentation CD.
- Change the pin position of the clear CMOS jumper (JP2) on the system board to bypass the power-on password check.

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. The **Administrator Password** choice is on the Configuration/Setup Utility menu only if an optional IBM Remote Supervisor Adapter II is installed.

Resetting passwords

If you forget the power-on password, you can change the pin position of the clear CMOS jumper (JP2) on the system board to bypass the power-on password check. This enables you to reset the power-on password. However, if you forget the administrator password, you must replace the system board.

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.

Note: The ServerGuide program works only with 32-bit Windows operating systems.

If the *ServerGuide Setup and Installation* CD did not come with the server, you can download the latest version of the ServerGuide program. 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 or integrated SAS controller with RAID capabilities
- Device drivers that are provided for the server model and detected hardware
- File-system type that is 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 the operating-system CD to install the operating system.

The ServerGuide program performs the following tasks:

- Sets system date and time
- Detects an installed SAS 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 your 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 the server model. On a server with a ServeRAID adapter or integrated SAS/SATA controller with RAID capabilities, you can run the Adaptec RAID configuration programs 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 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/support/>.
2. Under **Search technical support**, type 8485 or 8490 (depending on the machine type for your server model), and click **Search**.
3. Select the instructions for your operating system.

Using the Boot Menu program

The Boot Menu program is a built-in, menu-driven configuration program that you can use to temporarily redefine the first startup device without changing settings in the Configuration/Setup Utility program.

To use the Boot Menu program, complete the following steps:

1. Turn off the server.
2. Restart the server.
3. Press F12.
4. Select the startup device.

The next time that the server is started, it returns to the startup sequence that is set in the Configuration/Setup Utility program.

Using the SAS/SATA Configuration Utility program (hot-swap SAS/SATA models only)

Important: RAID options and HostRAID are not supported on the SCO 6.0 and UnixWare 7.14 operating systems.

Use the SAS/SATA Configuration Utility program to configure SAS devices. The SAS/SATA Configuration Utility program is available on hot-swap SATA or SAS models only.

Starting the SAS/SATA Configuration Utility program

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

1. Turn on the server.
2. When the prompt <<< Press <CTRL><A> for SAS/SATA Configuration Utility! >>> appears, press Ctrl+A. If you have set an administrator password, you are prompted to type the password.

Note: If the prompt <<< Press <CTRL><A> for SAS/SATA Configuration Utility! >>> does not appear, start the Configuration/Setup Utility (see “Starting the Configuration/Setup Utility program” on page 50), select **Devices and I/O Ports --> Advanced Chipset Control --> Serial ATA**, and make sure that the Serial ATA options are set to the following values:

Native Mode Operation:	Auto
SATA Controller Mode Option:	Enhanced
SATA RAID	Enabled

3. To select a choice from the menu, 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. Be sure to press Enter to save your changes.

SAS/SATA Configuration Utility menu choices

The following choices are on the SAS/SATA Configuration Utility menu:

- **Array Configuration Utility**

Select this choice to create, manage, or delete arrays, add or delete a hot-spare drive, or initialize drives.

- **SerialSelect Utility**

Note: This choice appears on hot-swap SAS or SATA servers only. It does not appear on a simple-swap SATA server.

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. For SAS disks, you can also turn on the indicator LED on the disk, set the disk to be bootable, change the write cache settings, or set the connection rate. Select a device from the list and read the instructions on the screen carefully before making a selection.

Using the Adaptec HostRAID configuration programs

Important: RAID options and HostRAID are not supported on the SCO 6.0 and UnixWare 7.14 operating systems.

Use the Adaptec RAID Configuration Utility programs and SAS/SATA Configuration Utility (also referred to as IBM ServeRAID-7e) to add RAID level-0 and level-1 functionality to the integrated SATA controller (simple-swap SATA models) and the SAS/SATA controller (hot-swap models). Be sure to use these programs as described in this document. Use these 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 Adaptec RAID Configuration Utility programs and SAS/SATA Configuration Utility program to configure and manage arrays, consider the following information:

- The SAS/SATA controller with integrated RAID (hot-swap models) and the integrated SATA controller (simple-swap SATA models) with integrated SATA RAID support RAID level-0 and level-1 with the option of having a hot-spare drive. An optional ServeRAID controller provides additional RAID levels.
- You cannot use the *ServerGuide Setup and Installation* CD to configure the integrated SATA controller with integrated RAID and the SAS/SATA controller with integrated RAID.
- 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 controller, you must use the IBM *ServeRAID Support* CD that comes with the ServeRAID option.

- If you install a different type of RAID controller in the server, use the method that is described in the instructions that come with the controller to view or change settings for attached devices.

Using the Adaptec RAID Configuration Utility programs (for Serial ATA HostRAID)

Use the Array Configuration Utility, in the Adaptec RAID Configuration Utility programs, to add RAID level-0 and level-1 functionality to the integrated SATA controller. This utility is a part of the BIOS code.

Note: To add RAID functionality to a hot-swap SATA model, see “Using the SAS/SATA Utility program (for SAS/SATA HostRAID)” on page 60.

For additional information about using the Adaptec RAID Configuration Utility programs, see the documentation on the IBM *ServeRAID-7e (Adaptec HostRAID) Support CD*. If this CD did not come with the server, you can download it from <http://www.ibm.com/support/>.

The integrated Serial ATA RAID feature (SATA HostRAID) comes disabled by default. You must enable it and install the device drivers before you can use it. The SATA RAID feature configuration utilities, device drivers, and information are available on the IBM *ServeRAID-7e (Adaptec HostRAID) Support CD*.

Enabling the Serial ATA HostRAID feature

To enable the SATA RAID feature, 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 an administrator password, you are prompted to type the password.
3. Select **Devices and I/O Ports --> Advanced Chipset Control --> Serial ATA**.
4. Select **SATA Controller Mode Option**. Change the value to **Enhanced**.
5. Scroll down and select **SATA RAID Enable**.
6. Select **Enabled**.
7. Press Esc; then, select **Yes** to save the changes.

Using the Serial ATA HostRAID feature

The instructions in this section are for using the Array Configuration Utility program to access and perform an initial RAID level-1 configuration. If you install a different type of RAID adapter, use the method that is described in the instructions that come with the adapter to view or change settings for the attached devices.

For additional information about using the Array Configuration Utility program to create, configure, and manage arrays, see the documentation on the IBM *ServeRAID-7e (Adaptec HostRAID) Support CD*.

Configuring the controller: To use the Array Configuration Utility program to configure a RAID level-1 array, complete the following steps:

1. Turn on the server.
2. When the prompt Press <CTRL><<A> for Adaptec RAID Configuration Utility appears, press Ctrl+A.
3. Select **Array Configuration Utility**.
4. Select **Create Array**.

5. From the list of ready drives, select the two drives that you want to group into the array.
6. When you are prompted to select the RAID level, select **RAID-1**.
7. (Optional) Type an identifier for the array.
8. When you are prompted for the array build method, select **Quick Int**.
9. Follow the instructions on the screen to complete the configuration, and select **Done** to exit.
10. Restart the server.

Viewing the configuration: To view information about the SATA controller, complete the following steps:

1. Start the Array Configuration Utility.
2. From the Array Configuration Utility window, select **Manage Arrays**.
3. Select an array and press Enter.
4. Press Esc to exit from the program.

Using the SAS/SATA Utility program (for SAS/SATA HostRAID)

Use the SAS/SATA Configuration Utility to add RAID level-0 and level-1 functionality to the SAS/SATA controller (hot-swap models only). This utility is part of the BIOS code.

Note: To add RAID functionality to the integrated SATA controller (simple-swap models), see “Using the Adaptec RAID Configuration Utility programs (for Serial ATA HostRAID)” on page 59.

The integrated SAS/SATA RAID feature comes disabled by default. You must enable it and install the device drivers before you can use it. The RAID configuration utilities, device drivers, and information are available on the IBM *ServeRAID-7e (Adaptec HostRAID) Support CD*. If this CD did not come with the server, you can download it from <http://www.ibm.com/support/>.

Enabling the SAS/SATA HostRAID feature

To enable the SAS/SATA HostRAID feature, complete the following steps:

1. Turn on the server.
2. When the prompt Press <CTRL><A> for SAS/SATA Configuration Utility appears, press Ctrl+A. If you have set an administrator password, you are prompted to type the password.
3. Select **SerialSelect Utility**; then, select **Controller Configuration**.
4. Select **RAID Support**.
5. Select **Enabled**.
6. Press Esc; then, select **Yes** to save the changes.

Using the SAS/SATA HostRAID feature

The instructions in this section describe how to access the SAS/SATA HostRAID feature (hot-swap models only) from the SAS/SATA Configuration Utility program and perform an initial RAID level-1 configuration. If you install a different type of RAID adapter in the server, use the method that is described in the instructions that come with the adapter to view or change settings for attached devices.

For additional information about how to use the HostRAID feature, see the documentation on the IBM *ServeRAID-7e (Adaptec HostRAID) Support CD*.

Configuring the controller: To use the SAS/SATA HostRAID feature to configure a RAID level-1 array, complete the following steps:

1. Turn on the server.
2. When the message Press <CTRL><A> for SAS/SATA Configuration Utility appears, press Ctrl+A.
3. Select **Array Configuration Utility**.
4. Select **Create Array**.
5. From the list of ready drives, select the two drives that you want to group into the array.
6. When you are prompted to select the RAID type, select **RAID-1**.
7. (Optional) Type an identifier for the array.
8. When you are prompted for the array build method, select **Quick Int**.
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 SAS/SATA controller, complete the following steps:

1. Start the SAS/SATA Configuration Utility program.
2. From the SAS/SATA Configuration Utility window, select **Manage Arrays**.
3. Select an array and press Enter.
4. To exit from the program, press Esc.

Using ServeRAID Manager

Important: RAID options and HostRAID are not supported on the SCO 6.0 and UnixWare 7.14 operating systems.

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 hot-swap SAS 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 controllers

To perform some tasks, you can run ServeRAID Manager as an installed program. However, to configure the SAS/SATA controller 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. If you install a different type of RAID adapter in the server, use the method that is described in the instructions that come with the adapter to view or change settings for attached devices.

For additional information about RAID technology and instructions for using ServeRAID Manager, 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 controller

By running ServeRAID Manager in Startable CD mode, you can configure the 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 IBM *ServeRAID Support* CD into the CD 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. From the toolbar, click **Create**.
3. Click **Express configuration**.
4. Click **Next**.
5. In the “Configuration summary” window, review the information. To change the configuration, click **Modify arrays** or **Modify logical drives**.

Note: Some operating systems have size limitations for logical drives. Before you save the configuration, make sure that the size of the logical drive is appropriate for your operating system.

6. 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.
7. Exit from ServeRAID Manager and remove the CD from the CD drive.
8. Restart the server.

Using custom configuration

To use custom configuration, complete the following steps:

1. In the ServeRAID Manager tree, click the controller.
2. From the toolbar, click **Create**.
3. Click **Custom configuration**.
4. Click **Next**.
5. Click the applicable tab in the right pane. In the “Create arrays” window, from the list of ready drives, select the two drives that you want to move into the array.
6. Click the icon to add the drives to the array.
7. 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 icon to add the drive.
8. Click **Next**.
9. In the “Configuration summary” window, review the information. To change the configuration, click **Back**.

10. 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.
11. Exit from ServeRAID Manager, and remove the CD from the CD drive.
12. 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 mini baseboard management controller

The mini baseboard management controller (mini-BMC) provides environmental monitoring for the server. If environmental conditions exceed thresholds or if system components fail, the mini-BMC lights LEDs to help you diagnose the problem and also records the error in the mini-BMC system-event log. For more information, see the description of **Baseboard management controller (BMC) settings** on page 52.

Important: If the system-error LED on the front of the server is lit but there are no other error indications, clear the mini-BMC system-event log. This log does not clear itself, and if it begins to fill up, the system-error LED will be lit. Also, after you complete a repair or correct an error, clear the mini-BMC system-event log to turn off the system-error LED on the front of the server.

Note: If an optional IBM Remote Supervisor Adapter II is installed, the mini-BMC is disabled, and the Remote Supervisor Adapter II handles the server monitoring activities. For additional information about the Remote Supervisor Adapter II, see the documentation that comes with this adapter.

Enabling the Broadcom Gigabit Ethernet Utility program

The Broadcom Gigabit Ethernet Utility is part of the BIOS code. You can use it to configure the network as a startable device, and you can customize where the network startup option appears in the startup sequence.

To enable the Broadcom Gigabit Ethernet Utility program, complete the following steps:

1. From the Configuration/Setup Utility main menu, select **Devices and I/O Ports** and press Enter.
2. Select **Planar Ethernet** and use the Right Arrow (→) key to set it to **Enabled**.
3. Select **Save Settings** and press Enter.

Configuring the Broadcom Gigabit Ethernet controller

The Ethernet controller is integrated on the system board. It provides an interface for connecting to a 10-Mbps, 100-Mbps, or 1-Gbps network and provides full duplex (FDX) capability, which enables simultaneous transmission and reception of data on the network. If the Ethernet port in the server supports auto-negotiation, the

controller detects the data-transfer rate (10BASE-T, 100BASE-TX, or 1000BASE-T) and duplex mode (full-duplex or half-duplex) of the network and automatically operates at that rate and mode.

You do not have to set any jumpers or configure the controller. However, you must install a device driver to enable the operating system to address the controller. To find updated information about configuring the controller, 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/support/>.
2. Under **Search technical support**, type 8485 or 8490 (depending on the machine type for your server model), and click **Search**.
3. In the **Additional search terms** field, type ethernet, and click **Go**.

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 the IBM Director program.
3. Download and install any applicable updates or interim fixes for the server:
 - a. Go to <http://www.ibm.com/support/>.
 - b. Click **Downloads and drivers**.
 - c. From the **Category** list, select **xSeries (Intel and AMD processor-based)**.
 - d. From the **Sub-category** list, select **xSeries 206m** and click **Continue**.
 - e. In the **Search within results** field, type director and click **Search**.
 - f. Select any applicable update or interim fix that you want to download.
 - g. 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.
 - h. Repeat steps 3f and 3g for any additional updates or interim fixes that you want to install.

Appendix. Notices

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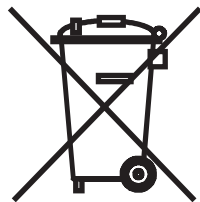
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