System x3455 Types 7984 and 7986

IBM

User's Guide

System x3455 Types 7984 and 7986

User's Guide

Note: Before using this information and the product it supports, read the general information in Appendix B, "Notices," on page 85.

First Edition (September 2006)

Contents

Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الآمنية

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

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

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

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

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

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

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

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

A termék telepítése előtt olvassa el a Biztonsági előírásokat!

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

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

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

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

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

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

Перед установкой продукта прочтите инструкции по
технике безопасности.

Pred inštaláciou tohto zariadenia si pečítaje Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

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

Läs säkerhetsinformationen innan du installerar den här produkten.

Important:

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

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

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

Statement 1:

DANGER

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

To avoid a shock hazard:

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

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

Statement 2:

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

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

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

Statement 3:

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

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

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

DANGER

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

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

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

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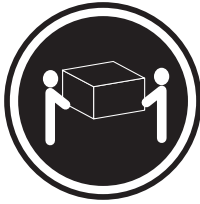
≥ 18 kg (39.7 lb)   ≥ 32 kg (70.5 lb)   ≥ 55 kg (121.2 lb)
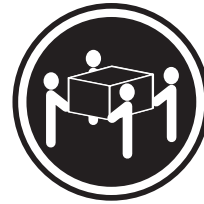
CAUTION:
Use safe practices when lifting.

Statement 5:

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

Statement 8:

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

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

Statement 26:

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

Statement 27:

CAUTION:
Hazardous moving parts are nearby.

Statement 28:

CAUTION:
The battery is a lithium ion battery. To avoid possible explosion, do not burn the battery. Exchange it only with the IBM-approved part. Recycle or discard the battery as instructed by local regulations. In the United States, IBM has a process for collection of this battery. For information, call 1-800-426-4333. Have the IBM part number for the battery unit available when you call.

Chapter 1. The System x3455 Types 7984 and 7986 server

The IBM® System x3455 Types 7984 and 7986 server is a 1-U-high[1] rack model server for high-volume network transaction processing. This high-performance, symmetric multiprocessing (SMP) server is ideally suited for networking environments that require superior microprocessor performance, input/output (I/O) flexibility, and high manageability.

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

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

You can obtain up-to-date information about the server at http://www.ibm.com/systems/x/. You can obtain information about other IBM server products at http://www.ibm.com/servers/eserver/support/xseries/index.html.

Related documentation

This *User's Guide* contains general information about the server, including how to install supported optional devices 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 optional devices.

- *Warranty and Support Information*

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

- *Safety Information*

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

- *Rack Installation Instructions*

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

- *Problem Determination and Service Guide*

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

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

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

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

If firmware and documentation updates are available, you can download them from the IBM Web site. The server might have features that are not described in the documentation that comes with the server, and 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. To check for updates, go to http://www.ibm.com/servers/eserver/ support/xseries/index.html, select **System x3455** from the **Hardware** list, click **Go**, and then click the **Download** tab. For firmware updates, click the **Download** tab. For documentation updates, click the **Install and use** tab, and click **Product documentation**.

Note: Changes are made periodically to the IBM Web site. Procedures for locating firmware and documentation might vary slightly from what is described in this document.

Notices and statements in this document

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

The following notices and statements are used in this document:

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

Features and specifications

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

Use the Configuration/Setup Utility program to determine the type and speed of the microprocessors.

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

Table 1. Features and specifications

Microprocessors:	Drives:	Video controller:

• Up to two dual-core AMD Opteron™ processors (one standard on all models)
 • 1 MB Level-2 cache per core
 	
 Note: Use the Configuration/Setup Utility program to determine the speed of the microprocessors.
 	
 Memory:
 • Minimum: 1024 MB
 • Maximum: 48 GB
 • Type: PC2-5300 error-correcting code (ECC), double-data-rate 2 (DDR2) SDRAM, registered DIMMs with Chipkill™ memory protection
 • Sizes: 512 MB, 1 GB, 2 GB, or 4 GB DIMMs in pairs
 Note: Chipkill memory protection is not supported on 512 MB DIMMs.
 • Six interleaved slots with the standard microprocessor
 • Six additional interleaved slots with an optional microprocessor
 • Standard: One pair of matching DIMMs
	• CD-RW/DVD: Ultrabay Enhanced IDE (standard only on some models)
	 • Non-hot-swap hard disk drives:
	   – One standard
	   – Slim-high 3.5-inch drives
	   – Serial Advanced Technology Attachment (SATA)
	     Note: Drive capacity and speed vary with model.
	   – Serial Attached SCSI (SAS) drives are supported if an optional SAS adapter is installed.
	   – Maximum: Two SATA or two SAS drives
	
	 Expansion slots:
	 • Two, used in either of the following configurations:
	   – One full-height, half-length Hyper Transport (HTX) riser card and one half-length PCI Express x16 riser card
	   – One full-height, half-length PCI Express x8 and one half-length PCI Express x16 riser card
	 • Each riser card supports one adapter
	 • Server supports a maximum of two adapters
		• ATI RN50b video controller on the system board
		 • Compatible with SVGA
		 • 16 MB DDR1 video memory
		
		 Power supply:
		
		 One 650 watt (115 - 230 V ac)
		
		 Cooling:
		 • Three nonredundant, non-hot-swappable fans with system-board connectors
		 • Two air baffles on the system board
		 • Two fans built into the power supply
		
		 Size:
		 • Height: 43 mm (1.7 in.)
		 • Depth:
		   – 660.5 mm (26.0 in.) with bezel
		   – 643.5 mm (25.3 in.) without bezel
		 • Width: 440 mm (17.3 in.)
		 • Weight: approximately 11.9 kg (26.2 lb) when fully configured
		
		 Integrated functions:
		 • Baseboard management controller
		 • One SATA controller
		 • Two Broadcom 10/100/1000 Ethernet controllers (dual-port design) with Wake on LAN® support
		 • Six Universal Serial Bus (USB) ports
		   – Two on the front of the server
		   – Four on the rear of the server
		 • One serial port
		 • One video port

Table 1. Features and specifications (continued)

Acoustical noise emissions:	Heat output:	Notes:
• Declared sound power, idling: 6.5 bels • Declared sound power, operating: 6.5 bels **Environment:** • Air temperature: – Server on: 10° to 35°C (50.0° to 95.0°F). Altitude: 0 to 914 m (2998.7 ft) – Server on: 10° to 32°C (50.0° to 89.6°F). Altitude: 914 m (2998.7 ft) to 2133 m (6998.0 ft) – Server off: 10° to 43°C (50.0° to 109.4°F). Maximum altitude: 2133 m (6998.0 ft) • Humidity: – Server on: 8% to 80% – Server off: 8% to 80% • Airflow rates: – Minimum: 34 CFM – Maximum: 74 CFM	Approximate heat output in British thermal units (Btu) per hour for dual multiprocessor configurations: • Minimum configuration: 430 Btu (126 watts) • Maximum configuration: 1707 Btu (500 watts) **Electrical input:** • Sine-wave input (50-60 Hz) required • Input voltage low range: – Minimum: 100 V ac – Maximum: 127 V ac • Input voltage high range: – Minimum: 200 V ac – Maximum: 240 V ac • Input kilovolt-amperes (kVA), approximately: – Minimum: 0.126 kVA – Maximum: 0.500 kVA	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.

What your server offers

The server uses the following features and technologies:

• **Baseboard management controller**

  The baseboard management controller (BMC) provides basic environmental monitoring functions. If an environmental condition exceeds a threshold or if a system component fails, the baseboard management controller lights LEDs to help you diagnose the problem and records the error in the error log. The baseboard management controller also provides remote server management capabilities through the SMBridge management utility program.

  Note: The System x3455 Types 7984 and 7986 server does *not* support the optional Remote Supervisor Adapter II SlimLine (systems-management adapter).

• **IBM Enhanced Diagnostics CD**

  Your 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 System x and xSeries servers. For more information, see the IBM Director documentation on the *IBM Director* CD.

• **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 Microsoft® Windows® operating system. The ServerGuide™ program detects installed optional hardware devices 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 64.

- **Integrated network support**

  The server comes with two integrated Broadcom Gigabit Ethernet controllers, which support connection to a 10 Mbps, 100 Mbps, or 1 Gbps network. For more information, see "Configuring the Gigabit Ethernet controllers" on page 81.

- **Large system-memory capacity**

  The memory bus in the server is enabled for up to 48 GB of system memory. The memory controller supports error-correcting code (ECC) for up to 12 industry-standard PC2-5300, 1.8 V, 184-pin, 8-byte, registered, double-data-rate 2 (DDR2) synchronous dynamic random-access memory (SDRAM) dual inline memory modules (DIMMs). The server supports 512 MB (type x8) DIMMs and the following sizes of type x4 DIMMs: 1 GB, 2 GB, and 4 GB.

  The memory controller also provides Chipkill memory protection if all DIMMs are of the type x4. Chipkill memory protection is a technology that protects the system from a single chip failure on a DIMM.

  Note: Chipkill memory protection is not supported on 512 MB DIMMs.

  In addition, the memory controller contains built-in technology that improves memory-to-microprocessor processing performance.

- **Online-spare memory**

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

- **Symmetric multiprocessing (SMP)**

  The server supports up to two AMD Opteron microprocessors. If the server comes with only one microprocessor, you can install an additional microprocessor to enhance performance and provide SMP capability.

- **Systems-management capabilities**

  The server comes with features that a network administrator or file server can use to remotely manage and control the server.

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 correct problems.

The server has the following RAS features:
- Advanced Configuration and Power Interface (ACPI)
- Automatic restart after a power failure
- Basic input/output system (BIOS) code boot-block recovery
- Chipkill memory protection
- Cooling fans with speed control
- Customer support center 24 hours per day, 7 days a week[2]
- Cyclic redundancy check (CRC)
- Diagnostic CD
- Diagnostic LEDs on the system board
- Diagnostic support of Ethernet adapters

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2. Service availability will vary by country. Response time will vary depending on the number and nature of incoming calls.

- Double-data-rate 2 synchronous dynamic RAM (DDR2 SDRAM) with serial presence detect (SPD)
- Error-correcting code (ECC) memory
- Error codes and messages
- Failover Ethernet support
- Hot-spare memory support
- Integrated baseboard management controller subsystem
- Menu-driven setup, system configuration, and diagnostic programs
- Microprocessor:
  - Built-in self-test (BIST)
  - Internal error signal monitoring
  - Internal thermal trip signal monitoring
  - Configuration checking
  - Voltage regulator device (VRD) failure identification through error LEDs
- Memory ECC/parity test
- Memory downsizing
- Monitoring support for temperatures, voltages, and fan speed
- Nonmaskable interrupt (NMI) switch
- Peripheral component interconnect (PCI), PCI Express (PCIe), and PCI-X bus parity
- Power-on self-test (POST)
- Positive field replaceable unit (FRU) identification (error LEDs) for defective DIMMs, microprocessors, hard disk drives, power supply, and fans
- Predictive Failure Analysis® (PFA) feature on DIMMs, microprocessors, hard disk drives, voltage regulators, power supply, and fans
- Read-only memory (ROM) checksums
- Redundant network interface card (NIC) support
- Remote system problem-analysis support
- Status LEDs on the system board
- System error logging
- Upgradeable BIOS code, baseboard management controller firmware, flash-ROM resident code, and diagnostics
- Vital product data (VPD), including serial-number information and replacement part numbers, on the system board, power supply, and hard disk drive backplane
- Wake on LAN capability

IBM Director

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

- View the hardware configuration of remote systems, in detail
- Centrally manage individual or large groups of IBM and non-IBM servers, desktop computers, workstations, and notebook 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 2000 Server, Windows Server 2003, Windows XP Professional, AIX®, i5/OS™, Windows XP Professional, Red Hat® Linux®, SUSE LINUX, VMware, and Novell NetWare. For a complete list of operating systems that support IBM Director, see the IBM Director Compatibility Document. This document is in Portable Document Format (PDF) at http://www.ibm.com/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 notebook 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.ibm.com/servers/eserver/xseries/ systems_management/xseries_sm.html, which presents an overview of IBM Systems Management and IBM Director.

The Update*Xpress* program

The Update*Xpress* program is available for most System x and xSeries servers and optional devices. 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/ibm_director/extensions/xpress.html. Additional information about Update*Xpress* is available from the System x and xSeries Tools Center at http://publib.boulder.ibm.com/infocenter/toolsctr/v1r0/ index.jsp.

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. Except for the CD or DVD drive activity LED, the CD-eject or DVD-eject button, and the rack release latches, these controls, LEDs, and connectors are on the operator information panel.
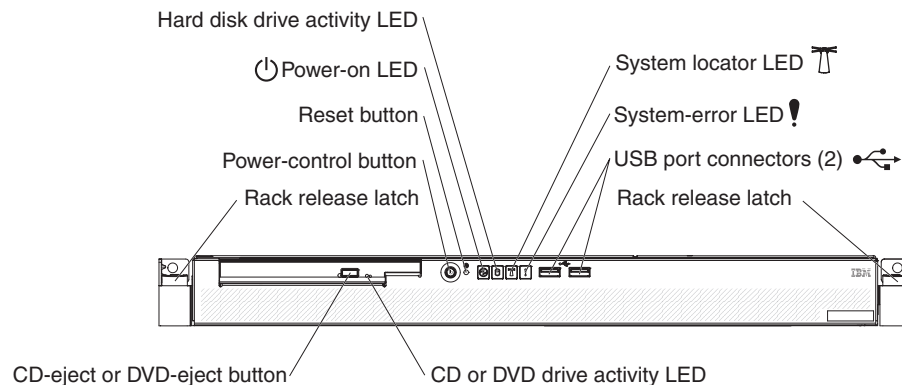

CD or DVD drive activity LED: When this LED is lit, it indicates that the CD drive or DVD drive is in use.

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

Rack release latches: Each side of the front of the server has a rack release latch. Press these latches to remove the server from the rack.

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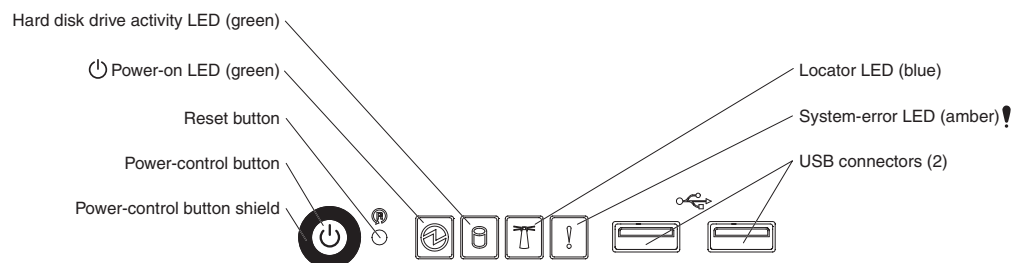
The following controls, LEDs, and connectors are on the operator information panel:

- **Power-control button:** Press this button to turn the server on and off manually. You might have to use a pen or the end of a straightened paper clip to press the button.

  A power-control-button shield comes with the server. You can install it to prevent the server from being turned off accidentally.

- **Reset button:** Press this button to reset the server and run the power-on self-test (POST). You might have to use a pen or the end of a straightened paper clip to press the button.
- **Power-on LED:** When this LED is lit and not flashing, it indicates that the server is turned on. When this LED is flashing, it indicates that the server is turned off and still connected to an ac power source. When this LED is off, it indicates that ac power is not present, or the power supply or the LED itself has failed.

    Notes:
    1. If this LED is off, it does not mean that there is no electrical power in the server. The LED might be defective, or has failed. To remove all electrical power from the server, you must disconnect the power cord from the electrical outlet.
    2. The ac power and dc power LEDs are on the power supply and can be viewed from the rear of the server. For additional information, see "Rear view" on page 10.
- **Hard disk drive activity LED:** When this LED is lit, it indicates that either of the hard disk drives is in use.
- **System locator LED:** This LED can be lit remotely by the system administrator to aid in visually locating the server. If the server supports IBM Director, you can use IBM Director to light this LED remotely. A system locator LED is also on the rear of the server.
- **System-error LED (!):** When this LED is lit, it indicates that a system error has occurred. An LED near the failing component on the system board also might be lit to help isolate the error.
- **USB connectors:** Connect a USB device to either of these connectors.

Notes:
1. If you want to attach a keyboard or mouse to this server, you must use a USB keyboard or a USB mouse. For detailed information about the USB keyboard and how to connect it to your server, see the documentation that comes with the USB keyboard.
2. The server supports keyboardless operation. If a USB keyboard is not connected to the server, when the server is turned on or restarted, error message 301 will be displayed during POST. No action is required. POST will continue within 1 minute.
3. If you want to attach a diskette drive to this server, you must use an external USB diskette drive.

Rear view

The following illustration shows the connectors, switches, and LEDs on the rear of the server.
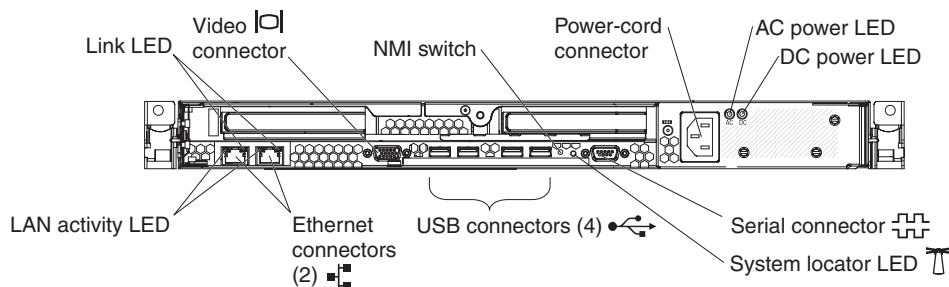
Link LEDs (Ethernet): These LEDs are on the dual Ethernet connector. When either LED is lit, it indicates that there is an active link between the server and the network device that is connected to the left or right connector.

Video connector: Connect a monitor to this connector.

NMI switch: This switch is reserved for use by service technicians only.

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

AC power LED: The power supply has an ac power LED and a dc power LED. When the ac power LED is lit, it indicates that sufficient power is coming into the power supply through the power cord. During typical operation, both the ac and dc power LEDs are lit. For additional information about the ac power and dc power LEDs, see the *Problem Determination and Service Guide* on the IBM *System x Documentation* CD.

DC power LED: The power supply has a dc power LED and an ac power LED. When the dc power LED is lit, it indicates that the power supply is supplying adequate dc power to the system. During typical operation, both the ac and dc power LEDs are lit. For additional information about the ac power and dc power LEDs, see the *Problem Determination and Service Guide* on the IBM *System x Documentation* CD.

Serial connector: Connect a 9-pin serial device to this connector.

System locator LED: This LED can be lit remotely by the system administrator to aid in visually locating the server. If the server supports IBM Director, you can use IBM Director to light this LED remotely. A system locator LED is also on the front of the server.

USB connectors: Connect a USB device to any of these four connectors.

Gigabit Ethernet 1 (LAN 1) connector: Use this connector to connect the server to a network.

Gigabit Ethernet 2 (LAN 2) connector: Use this connector to connect the server to a network.

LAN activity LEDs (Ethernet): These green LEDs are on the dual Ethernet connector. When either LED flashes, it indicates that data is being transmitted or received between the server and the local area network (LAN) device that is connected to the left or right connector. The flashing frequency is proportional to the amount of traffic on the network link.

Server power features

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

Turning on the server

Approximately 20 seconds after the server is connected to ac power, the power-control button becomes active, and one or more fans might start running to provide cooling while the server is connected to power. You can turn on and start the operating system by pressing the power-control button.

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

- If a power failure occurs while the server is turned on, the server will restart automatically when power is restored.
- If your operating system supports the Wake on LAN feature, the Wake on LAN feature can turn on the server.

Turning off the server

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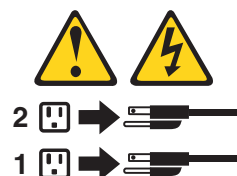
Some operating systems require an orderly shutdown before you turn off the server. See your operating-system documentation for information about shutting down the operating system.

Statement 5:

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

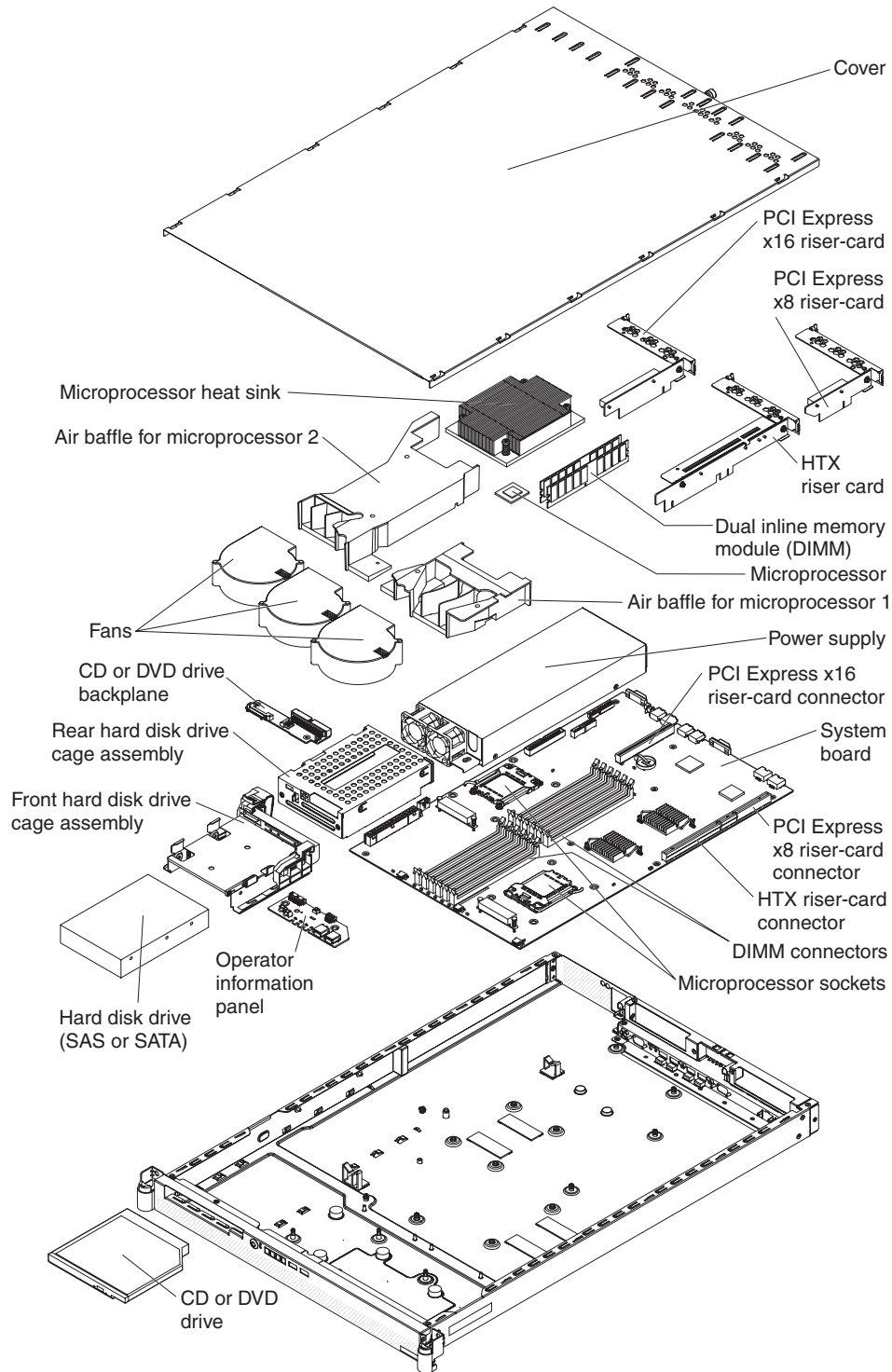The server can be turned off in any of the following ways:

- You can turn off the server from the operating system, if your operating system supports this feature. After an orderly shutdown of the operating system, the server will be turned off automatically.
- You can press the power-control button to start an orderly shutdown of the operating system and turn off the server, if your operating system supports this feature.
- If the operating system stops functioning, you can press and hold the power-control button for more than 4 seconds to turn off the server.
- The baseboard management controller can turn off the server as an automatic response to a critical system failure.
- You can turn off the server through a request from the baseboard management controller.

Chapter 2. Installing optional devices

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

13

Server components

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

Cover

PCI Express x16 riser-card

PCI Express x8 riser-card

Microprocessor heat sink

Air baffle for microprocessor 2

HTX riser card

Dual inline memory module (DIMM)

Microprocessor

Air baffle for microprocessor 1

Fans

Power supply

CD or DVD drive backplane

PCI Express x16 riser-card connector

Rear hard disk drive cage assembly

System board

Front hard disk drive cage assembly

PCI Express x8 riser-card connector

HTX riser-card connector

Operator information panel

DIMM connectors

Microprocessor sockets

Hard disk drive (SAS or SATA)

CD or DVD drive

System-board internal connectors

The following illustration shows the internal connectors on the system board.
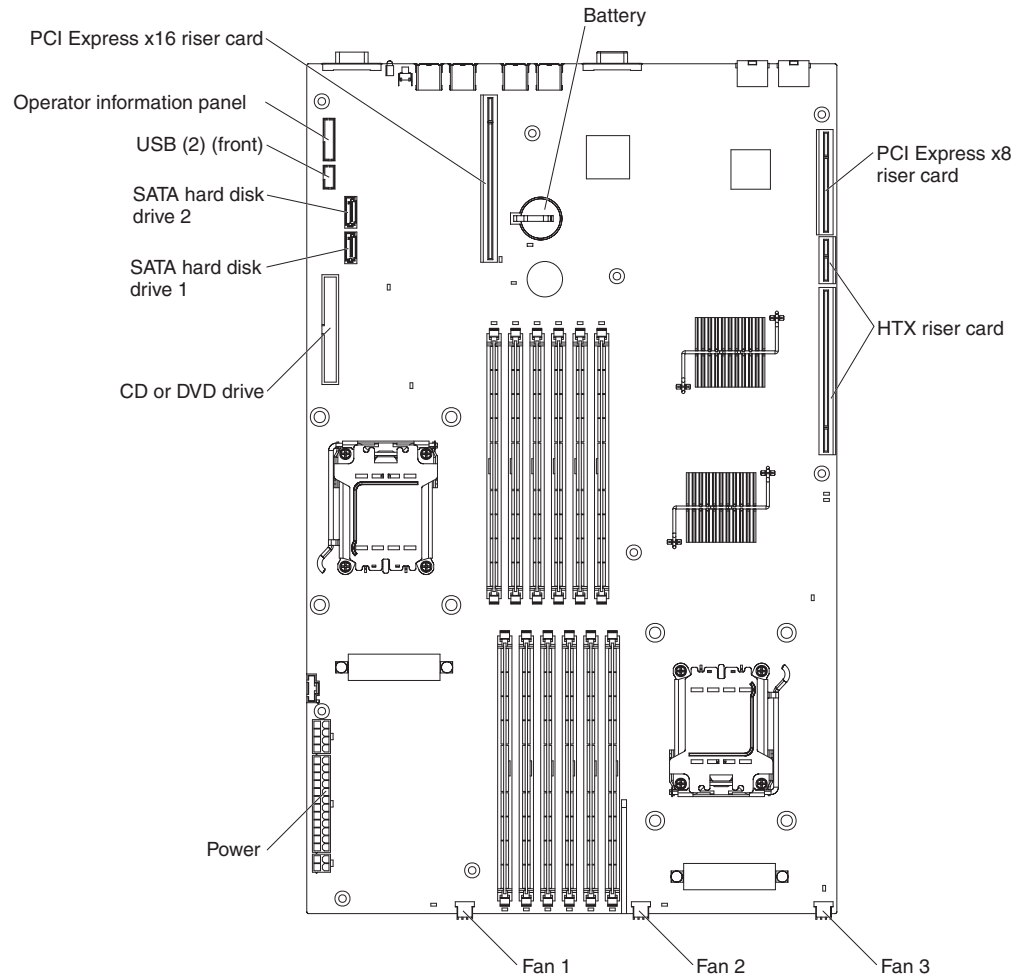
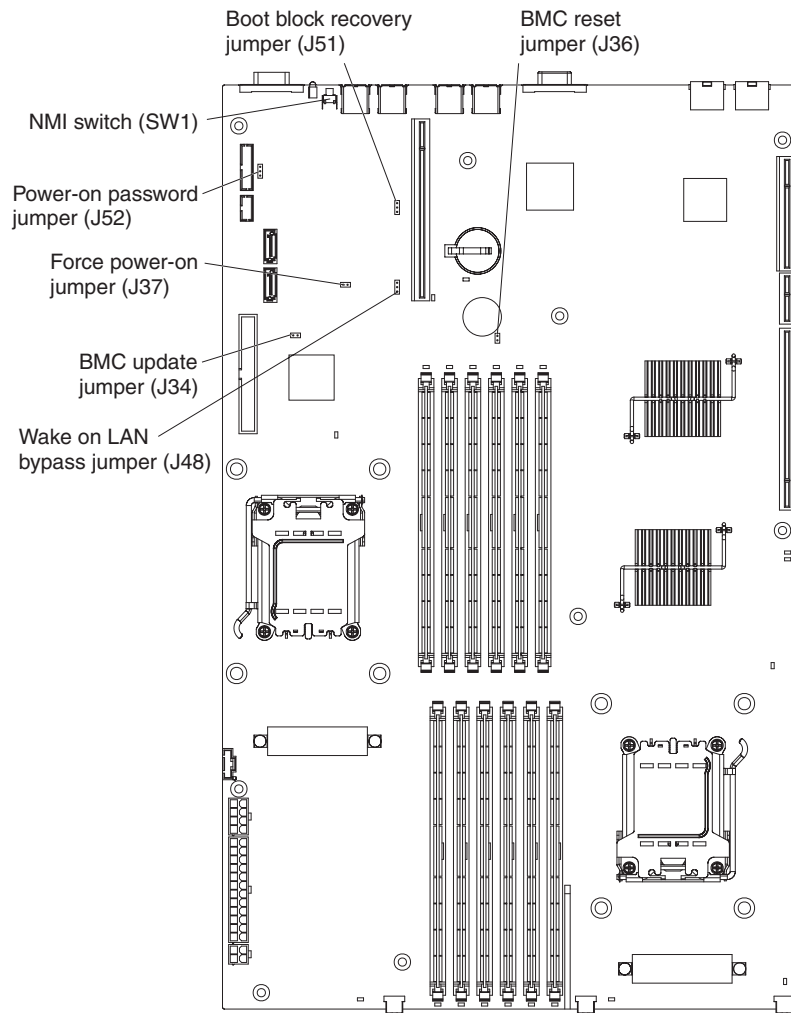# Operator information panel controls and internal connectors

The following illustration shows the controls and internal connectors on the operator information panel.

Signal cable connector

Light-path button

USB cable connector
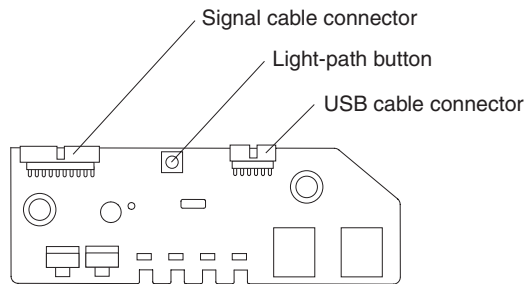
When the server is turned off, you can light the system-board error LEDs for up to 30 seconds to indicate detected faults by pressing the light-path button.

System-board switches and jumpers

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

Boot block recovery jumper (J51)

BMC reset jumper (J36)

NMI switch (SW1)

Power-on password jumper (J52)

Force power-on jumper (J37)

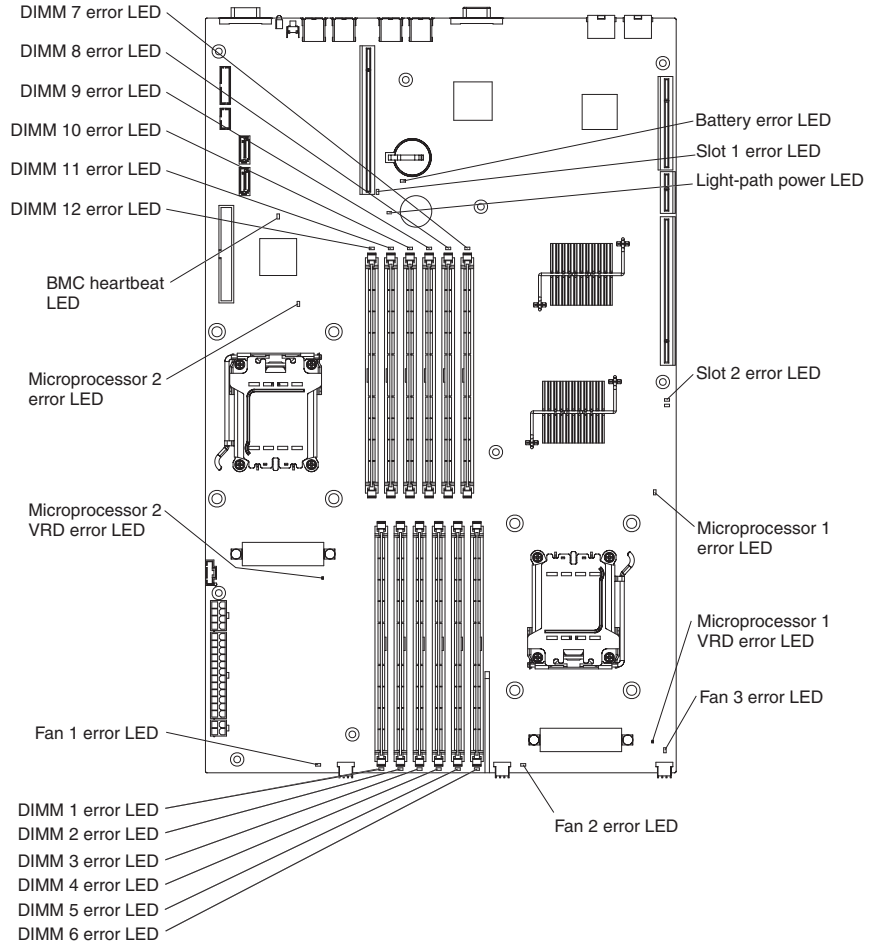BMC update jumper (J34)

Wake on LAN bypass jumper (J48)

System-board external connectors

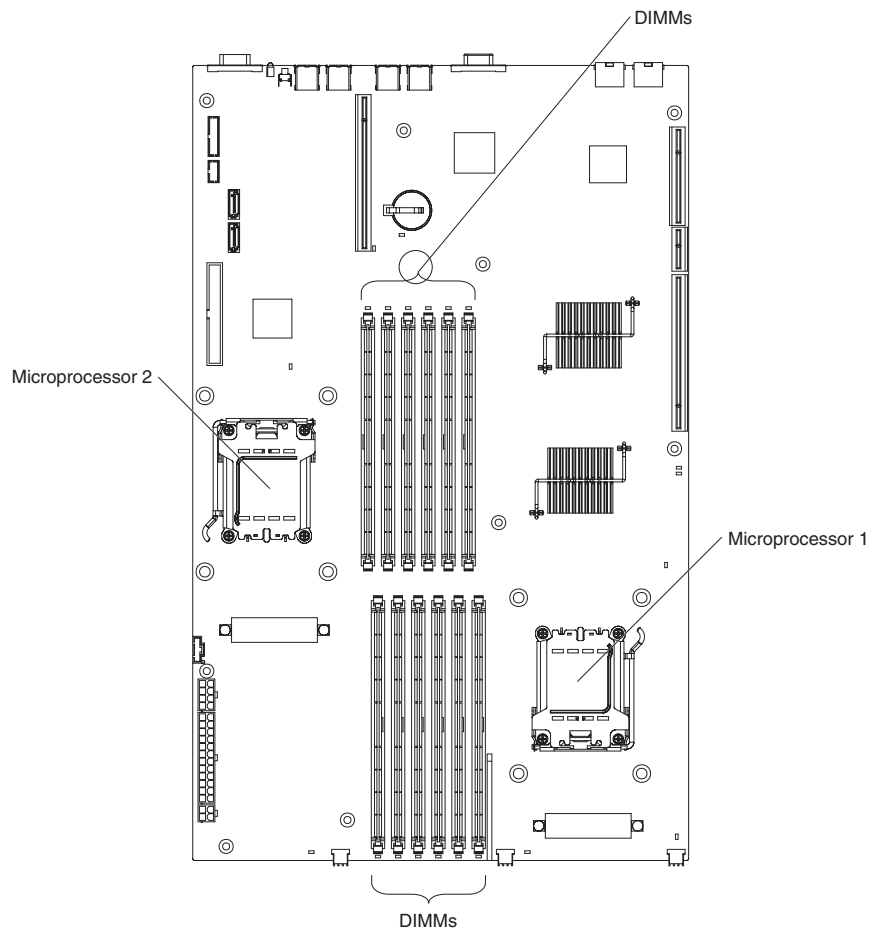The following illustration shows the external input/output connectors on the system board.
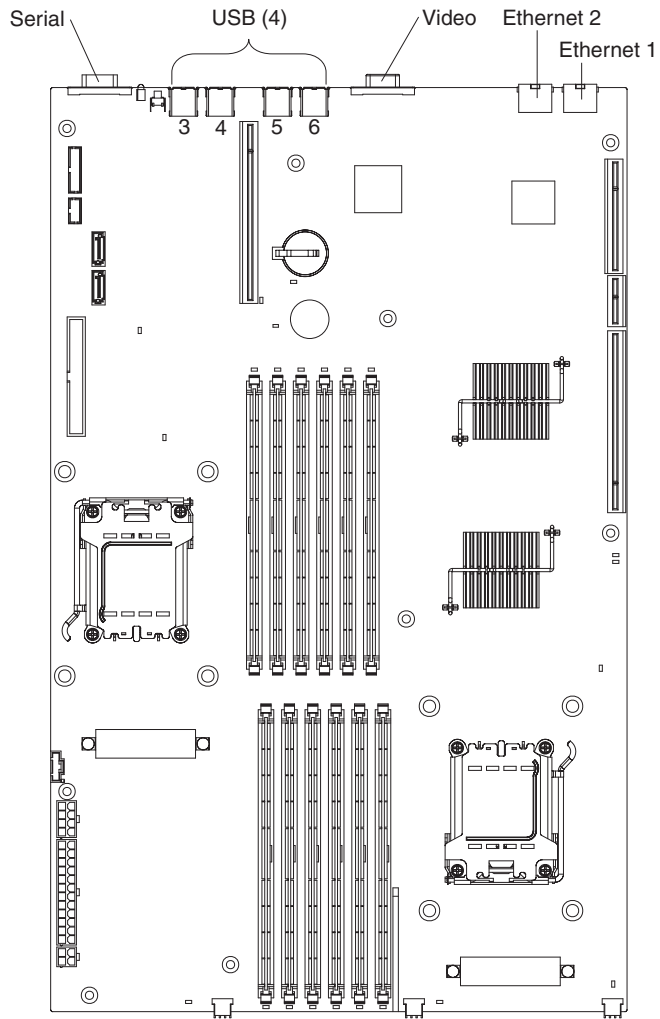
System-board LEDs

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

System-board optional-device connectors

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

Installation guidelines

Before you install optional devices, read the following information:

- Read the safety information that begins on page v and the guidelines in "Handling static-sensitive devices" on page 22. This information will help you work safely.

- When you install your new server, take the opportunity to download and apply the most recent firmware updates. This step will help to ensure that any known issues are addressed and that your server is ready to function at maximum levels of performance. To download firmware updates for your server, go to http://www.ibm.com/servers/eserver/support/xseries/index.html, select **System x3455** from the **Hardware** list, click **Go**, and then click the **Download** tab. For additional information about tools for updating, managing, and deploying firmware, see the System x and xSeries Tools Center at http://publib.boulder.ibm.com/infocenter/toolsctr/v1r0/index.jsp.

- Before you install optional hardware devices, make sure that the server is working correctly. Start the server, and make sure that the operating system starts, if an operating system is installed, or that a 1962 error code is displayed, indicating that an operating system was not found but the server is otherwise working correctly. If the server is not working correctly, see the *Problem Determination and Service Guide* on the IBM *System x Documentation* CD for diagnostic information.

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

- Make sure 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-plug Universal Serial Bus (USB) devices. However, you must turn off the server before you perform any steps that involve removing or installing adapter cables.

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

- When you are finished working on the server, reinstall all safety shields, guards, labels, and ground wires.

- For a list of supported optional devices for the server, see http://www.ibm.com/servers/eserver/serverproven/compat/us/.

System reliability guidelines

To help ensure proper cooling and system reliability, make sure that the following requirements are met:

- The CD or DVD drive bay 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 (2.0 in.) of open space around the left and right sides of the server. Leave approximately 166 mm (6.54 in.) of open space around the rear of the server. Do not place objects in front of the fans or air baffles. For proper cooling and airflow, replace the server cover before you turn on the server. Operating the server for extended periods of time with the server cover removed might damage server components.
- You have followed the cabling instructions that come with optional adapters.
- All fans are operating correctly.
- You do not operate the server without the air baffles installed. Operating the server without the air baffles might cause the microprocessors or other components to overheat.
- Microprocessor socket 1 always contains a microprocessor and heat sink.

  Important: The server will not start if microprocessor socket 1 is empty.
- Microprocessor socket 2 always contains either a microprocessor baffle or a microprocessor and heat sink.
- No dual inline memory modules (DIMMs) are installed in connectors 7 through 12 if microprocessor socket 2 (system-board identifier CPU2) is empty. The server does not support this configuration.
- Each installed adapter is of the same type (PCI Express or Hyper Transport) as the riser-card assembly in which it is installed. Operating the server with an unsupported adapter in a connector on the riser-card assembly might cause unpredictable results. For a list of supported adapters for the server, see http://www.ibm.com/servers/eserver/serverproven/compat/us/.
- You do not install a graphics adapter. Operating the server with an unsupported graphics adapter might cause unpredictable results.

Handling static-sensitive devices

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

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

- Limit your movement. Movement can cause static electricity to build up around you.
- The use of a grounding system is recommended. For example, wear an electrostatic-discharge wrist strap, if one is available.
- Handle the device carefully, holding it by its edges or its frame.
- Do not touch solder joints, pins, or exposed circuitry.
- Do not leave the device where others can handle and damage it.

- While the device is still in its static-protective package, touch it to an unpainted metal surface on the outside of the server for at least 2 seconds. This drains static electricity from the package and from your body.
- Remove the device from its package and install it directly into the server without setting down the device. If it is necessary to set down the device, put it back into its static-protective package. Do not place the device on the server cover or on a metal surface.
- Take additional care when handling devices during cold weather. Heating reduces indoor humidity and increases static electricity.

Removing the cover

Important: Before you install optional hardware, make sure that the server is working correctly. Start the server, and make sure that the operating system starts, if an operating system is installed, or that a 1962 error code is displayed, indicating that an operating system was not found but the server is otherwise working correctly. If the server is not working correctly, see the "Solving problems" chapter in the *Installation Guide* for diagnostic information.

Attention:
- For proper cooling and airflow, replace the cover before you turn on the server. Operating the server for extended periods of time with the cover removed might damage server components.
- Do *not* remove the server cover with the power on.

To remove the cover (with the server out of the rack), complete the following steps.
1. Read the safety information that begins on page v and "Installation guidelines" on page 21.
2. Turn off the server and all attached peripheral devices. Disconnect all power cords; then, disconnect all external signal cables from the server.

3. Remove the cover from the server:
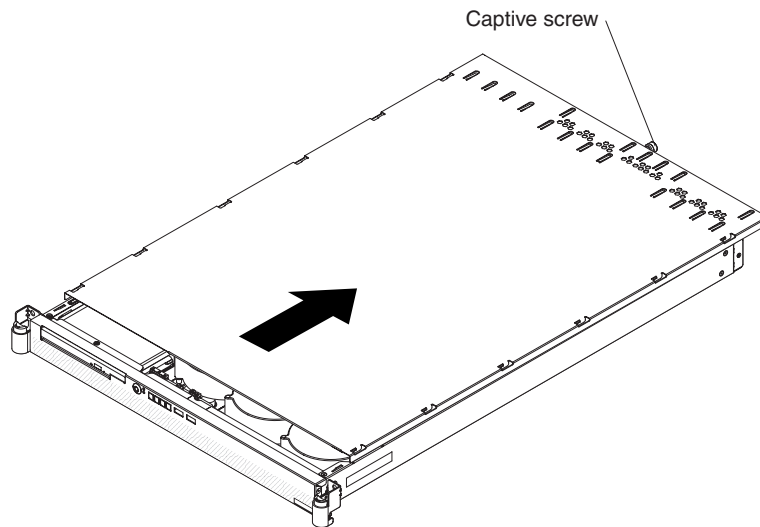
Captive screw

a. Loosen the captive screw on the back of the cover.
b. Disengage the tabs on the sides of the cover from the matching slots on the sides of the chassis.
c. Slide the cover toward the rear of the server, and lift the cover off the server.

Removing an air baffle

The server contains two air baffles, one customized for each microprocessor. These air baffles direct air to cool components inside the server. You might have to remove these air baffles to access certain components or connectors on the system board, such as microprocessors.

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

To remove an air baffle, complete the following steps.
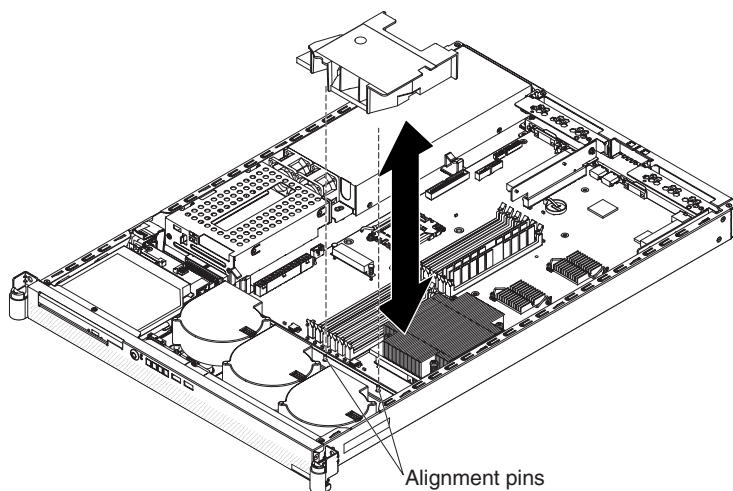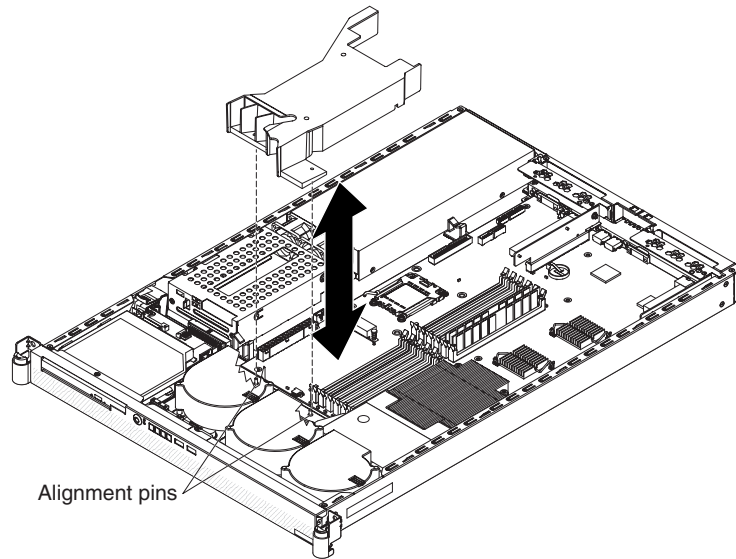
Alignment pins

Alignment pins

1. Read the safety information that begins on page v and "Installation guidelines" on page 21.
2. Turn off the server and all attached peripheral devices. Disconnect all power cords; then, disconnect all external signal cables from the server.
3. Remove the server from the rack; then, remove the server cover (see "Removing the cover" on page 23).
4. Lift the air baffle up, and out of the server. Store the air baffle in a safe place, and keep it available for later reinstallation.

If you have other devices to install or remove, do so now.

Installing an adapter

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

- Read the documentation that comes with your operating system.
- Locate the documentation that comes with the adapter and follow those instructions in addition to the instructions in this section. If you must change the switch settings or jumper settings on the adapter, follow the instructions that come with the adapter.
- The server has one PCI Express (PCIe) x16 riser-card connector, one PCIe x8 riser-card connector, and one Hyper Transport (HTX) riser-card connector. These connectors support half-length riser cards.
- All PCIe devices in the server must conform to the PCIe based specification, revision 1.1 compliant requirements.
- If you plan to install an adapter in the server, you must install the adapter on a riser card that the server supports. The server supports a maximum of two riser cards and two adapters.
  - You can install a PCIe x16 riser card in its designated connector in the server. In addition, you can install either a PCIe x8 riser card or an HTX riser card in its designated connector in the server.
  - You can install a half-length adapter on the PCIe x16 riser card. In addition, you can install a half-length adapter on either the PCIe x8 riser card or the HTX riser card. The server does not support both a PCIe x8 adapter and an HTX adapter in the same configuration.

- The server is designed specifically for PCIe x16, PCIe x8, and HTX adapter support. The server supports the following adapter configurations:
  - The PCIe x16 riser card supports PCIe x16, x8, x4, and x1 adapters.
  - The PCIe x8 riser card supports PCIe x8, x4, and x1 adapters.
  - The HTX riser card supports only HTX adapters.

  Important: For the most current list of supported adapters, see http://www.ibm.com/servers/eserver/serverproven/compat/us/.
- The server does not support the following types of adapters:
  - 5.0-V-only adapters
  - PCI adapters
  - PCI-X adapters
  - The optional IBM Remote Supervisor Adapter II SlimLine (systems-management adapter)
- The integrated video controller is on the PCI bus. The integrated Ethernet controllers are on the PCI-X 100 MHz bus. The integrated SATA controller is on the SATA bus. The PCIe x16 riser-card slot is on the PCIe x16 bus. The PCIe x8 riser-card slot is on the PCIe x8 bus. The HTX riser-card slot is on the HTX bus.
- The server scans PCIe and HTX slots to assign system resources. By default, the server starts (boots) devices in the following order: PCIe, PCI-X, and PCI devices; HTX devices; then, IDE and SATA devices.

  Note: To change the boot precedence for PCIe, PCI-X, PCI, and HTX devices, you must disable the devices through the Configuration/Setup Utility program. Start the Configuration/Setup Utility program and select **Startup** from the main menu. Then, select **Startup Sequence** and use the arrow keys to specify the startup order. For more information, see For more information, see Chapter 3, "Configuring the server," on page 57.

To install an adapter and its corresponding riser-card assembly, complete the following steps.

1. Read the safety information that begins on page v and "Installation guidelines" on page 21.
2. Turn off the server and all attached peripheral devices. Disconnect all power cords; then, disconnect all external signal cables from the server.
3. Remove the server from the rack; then, remove the server cover (see "Removing the cover" on page 23).
4. If you have not already done so, determine the type of adapter (PCIe x16, PCIe x8, or HTX) that you want to install. For the locations of the riser-card slots on the system board, see "Server components" on page 14.

   Attention: For correct server operation, each installed adapter must be of the same type (PCIe or HTX) as the riser-card assembly in which it is installed.
5. According to the type of adapter that you are installing, select the correct riser-card adapter connector (PCIe x16, PCIe x8, or HTX) in which to install the adapter.
6. Route the adapter cables, if any, before you install the adapter in the riser-card assembly.

   Attention: When you handle static-sensitive devices, take precautions to avoid damage from static electricity. For information about handling these devices, see "Handling static-sensitive devices" on page 22.
7. Touch the static-protective package that contains the adapter to any *unpainted* metal surface on the server. Then, remove the adapter from the package.

8. Set any jumpers or switches on the adapter as directed by the adapter manufacturer.

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

9. Place the adapter on a flat, static-protective surface.

10. Touch the static-protective package that contains the corresponding riser-card assembly to any *unpainted* metal surface on the server. Then, remove the riser-card assembly from the package.

11. Place the riser-card assembly on a flat, static-protective surface.
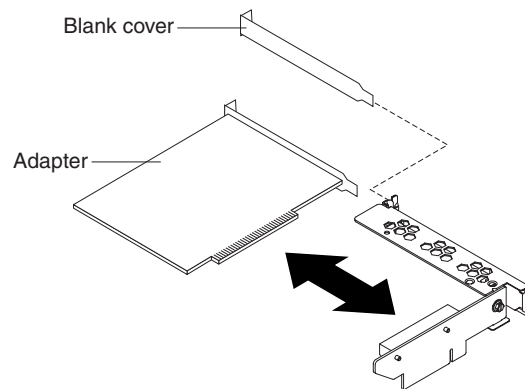
12. Grasp the adapter by its top edge or upper corners; then, align the edge connector on the adapter with the connector on the riser-card assembly. Press the adapter *firmly* into the riser-card assembly connector so that the adapter edge connector seats fully. This secures the adapter in the connector.
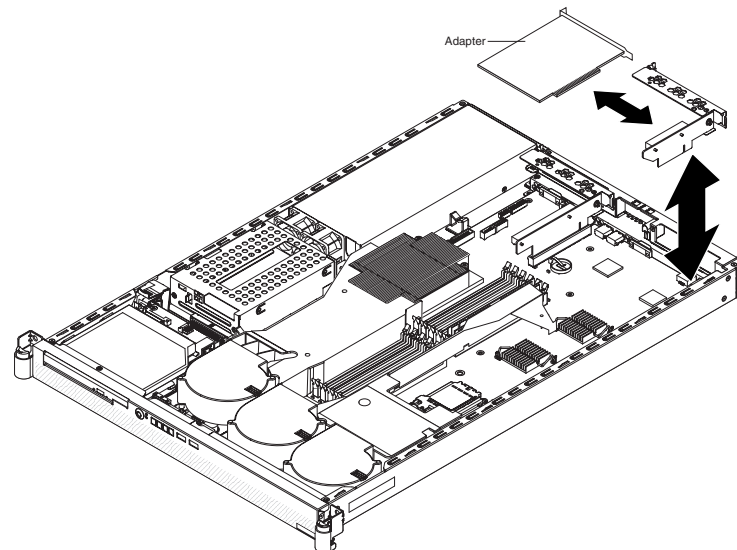
13. Install the riser-card assembly in the server. Carefully align the riser-card assembly with the guides at the rear of the server, and the riser-card connector on the system board; then, press down on the assembly. Make sure that the riser-card assembly is fully seated in the riser-card connector.

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

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

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

See the documentation that comes with the adapter for information about installing the adapter firmware and configuring the adapter. After you initially configure the adapter, create a backup copy of the configuration so that if you have to replace the adapter in the future, you can restore the configuration and resume normal operation more quickly.

If you have other devices to install or remove, do so now. Otherwise, go to "Completing the installation" on page 51.

Removing a riser card

The server supports PCIe x16, PCIe x8, and HTX adapters and riser cards. However, the server does not support both an HTX adapter and a PCIe x8 adapter in the same configuration. If one of the supported types of adapters is installed and you decide to remove it so that you can change your server configuration, you must first remove the corresponding riser-card assembly. The instructions in this section apply to all of the supported types of adapters and riser-card assemblies.

To remove a riser-card assembly, complete the following steps.

1. Read the safety information that begins on page v and "Installation guidelines" on page 21.
2. Turn off the server and all attached peripheral devices. Disconnect all power cords; then, disconnect all external signal cables from the server.
3. Remove the server from the rack; then, remove the server cover (see "Removing the cover" on page 23).
4. If you have not already done so, determine the type of riser-card assembly (PCIe x16, PCIe x8, or HTX) that you want to remove. For the locations of the riser-card slots on the system board, see "Server components" on page 14.

   Attention: Before you remove a riser-card assembly that contains an adapter, make sure that you have selected the correct riser-card assembly. Removing the wrong riser-card assembly might cause unpredictable results, if it contains an adapter that has already been installed and configured.
5. Disconnect any cables from the adapter.

6. Grasp the riser-card assembly at the rear edge and lift straight up to remove it from the server.
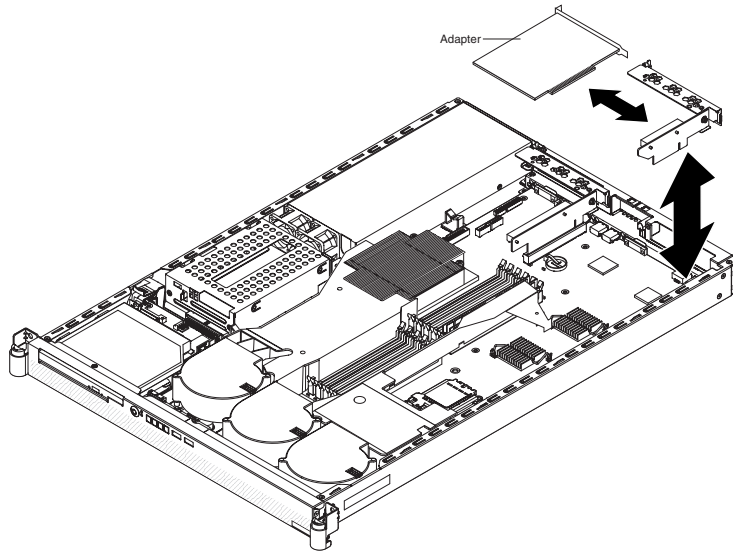
7. Place the riser-card assembly on a flat, static-protective surface.
8. If you plan to replace the adapter, carefully grasp the adapter by its top edge or upper corners, and pull the adapter from the slot on the riser-card assembly. Store the adapter in a static-protective environment for future use. Install a replacement adapter as described in "Installing an adapter" on page 25.
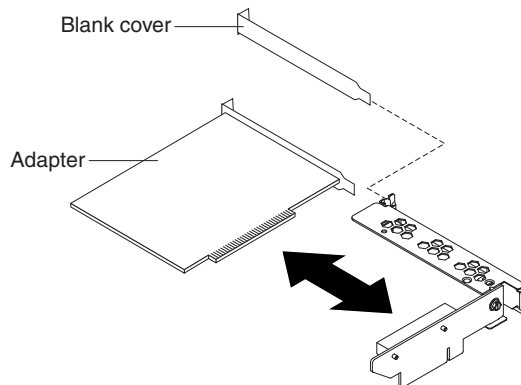
If you do not plan to replace the adapter, store the riser-card assembly in a static-protective environment for future use.

If you have other devices to install or remove, do so now. Otherwise, go to "Completing the installation" on page 51.

Installing a drive in the rear hard disk drive cage

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

- The server supports two 25.4 mm (1-inch), slim, 3.5-inch non-hot-swap hard disk drives.
- The server does not support hot-swap hard disk drives.
- The server comes with a front hard disk drive cage and a rear hard disk drive cage. In the standard configuration, the server comes with a hard disk drive in the front drive cage. You can install an additional hard disk drive in the rear drive cage. The rear drive cage is adjacent to the power supply.
- A non-hot-swap hard disk drive does not require a backplane or tray, and it does not have indicator LEDs. However, you must install the drive in either the front or rear drive cage that comes with the server.
- The front hard disk drive cage is under the CD or DVD drive assembly. Therefore, you must remove the CD or DVD drive assembly to access the front hard disk drive cage. If you decide to replace the hard disk drive in the front drive cage, follow the instructions in "Replacing the front hard disk drive" on page 36.
- You can install either two SAS hard disk drives or two SATA hard disk drives in the server. The server does not support combining SAS and SATA drives in the same configuration. Operating the server with an unsupported hard disk drive configuration might cause unpredictable results. For a list of supported drives for the server, see http://www.ibm.com/servers/eserver/serverproven/compat/us/.
- If you install only one hard disk drive, for faster startup, install it in the primary startup device location; that is, the front drive cage. If you install a second hard disk drive, install it in the rear drive cage.
- You do not have to set any jumpers or switches on the hard disk drives before you install the drives in the server.

Removing the rear hard disk drive cage assembly

Before you can install a hard disk drive in the rear hard disk drive cage or remove a drive from this drive cage, you must first remove this drive cage from the server.

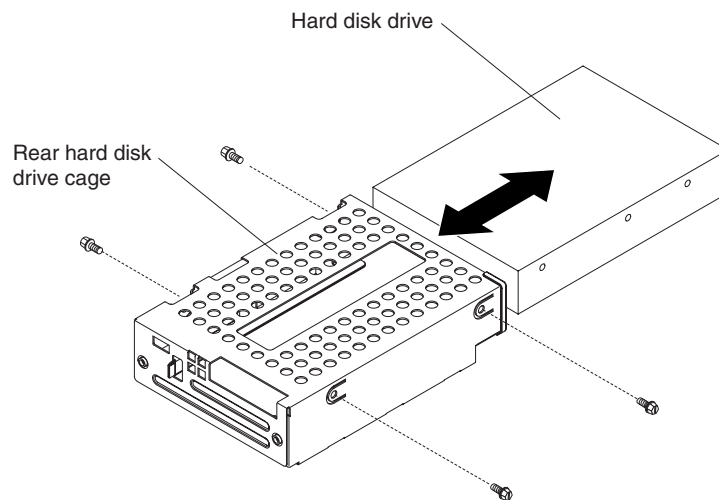To remove the rear hard disk drive cage assembly, complete the following steps.
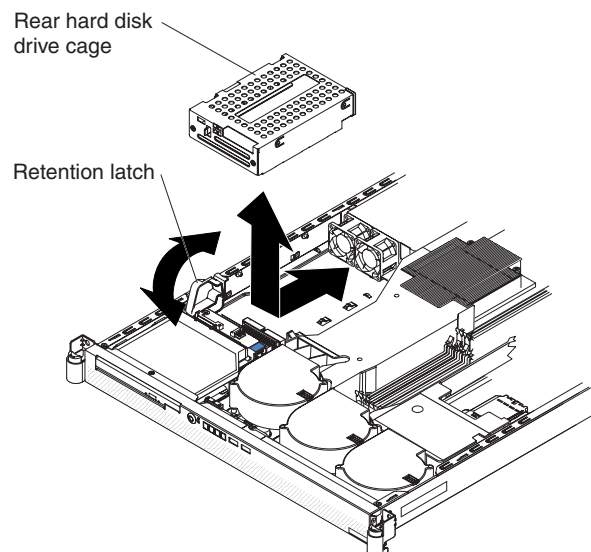
1. Read the safety information that begins on page v and "Installation guidelines" on page 21.
2. Turn off the server and all attached peripheral devices. Disconnect all power cords; then, disconnect all external signal cables from the server.
3. Remove the server from the rack; then, remove the server cover (see "Removing the cover" on page 23).
4. Open the drive-cage assembly retention latch; then, release the drive-cage assembly by sliding it slightly toward the front of the server.
5. If a hard disk drive is installed, disconnect the power and signal cables from the drive. Note the cable locations for later use when you install a replacement hard disk drive.
6. Lift the drive cage assembly out of the server.
7. Continue with "Installing the drive."

Installing the drive

Before you install a non-hot-swap hard disk drive, read the following information:
- See the documentation that comes with the drive for cabling instructions.
- Route the cable *before* you install the drive. Do not block the airflow from the fans.

To install a drive in the rear hard disk drive cage, complete the following steps.

1. Touch the static-protective package that contains the new drive to any *unpainted* metal surface on the outside of the server; then, remove the drive from the package.
2. Mount the drive in the rear hard disk drive cage, using the four mounting screws that come with the drive kit option.
3. Connect the signal and power cables to the rear of the drive. The signal cable for the drive in the rear hard disk drive cage is labeled "HDD2". Keep the cables clear of the airflow paths of the fans and air baffles.
4. Continue with "Installing the rear hard disk drive cage assembly" on page 32.

Installing the rear hard disk drive cage assembly

Reinstall the rear hard disk drive cage in the server if you have performed one of the following actions:

- You have installed a hard disk drive in this drive cage
- You have removed a drive from this drive cage, but do not plan to install a replacement drive

To install the rear hard disk drive cage assembly, complete the following steps.
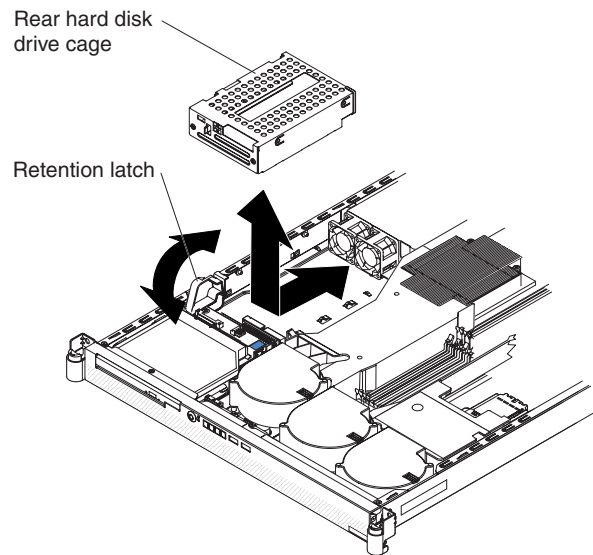
1. Insert the drive-cage assembly into the server; then, slide the drive-cage assembly toward the rear of the server until it seats securely.
2. Close the drive-cage assembly retention latch.

If you have other devices to install or remove, do so now. Otherwise, go to "Completing the installation" on page 51.

Removing the CD or DVD drive

Before you can perform any of the following tasks, you must remove the CD or DVD drive assembly from the server:

- Access the front hard disk drive cage so that you can remove or replace the drive in this drive cage
- Replace the CD or DVD drive with another drive

To remove the CD or DVD drive, complete the following steps.

1. If you are replacing a removed CD or DVD drive with a new drive, make sure that:
   - You have all the cables and other equipment that is specified in the documentation that comes with the new drive.
   - You have checked the instructions that come with the new drive to determine whether you must set any switches or jumpers on the drive.
   - You have removed the drive mounting clip on the side of the old drive and have it available for installation on the new drive.

Note: If you are installing or removing 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

2. Read the safety information that begins on page v and "Installation guidelines" on page 21.
3. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.
4. Remove the server cover (see "Removing the cover" on page 23).

Drive release button

CD or DVD drive

5. Press and hold the release button as you push the drive from the rear to slide it out of the bay.

   If you plan to reinstall the drive, place the drive on a flat, static-protective surface. Do *not* remove the drive mounting clip. Keep the drive available for reinstallation.

6. If you are replacing the removed drive with a new drive, slide the drive mounting clip to remove it from the drive. Place the drive mounting clip on a flat, static-protective surface. Keep the drive mounting clip available for attachment to the new drive.
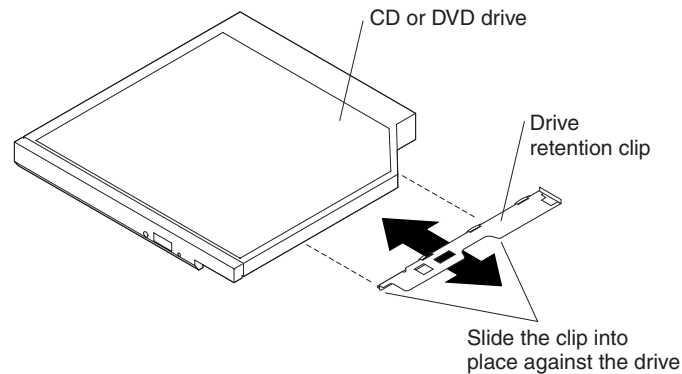
If you have other devices to install or remove, do so now. Otherwise, go to "Completing the installation" on page 51.

Replacing the front hard disk drive

Locate the documentation that comes with the hard disk drive and follow those instructions in addition to the instructions in this section. Also, review the considerations at the beginning of "Installing a drive in the rear hard disk drive cage" on page 30 for additional information.

If a CD or DVD drive is installed, the front hard disk drive cage is under the CD or DVD drive assembly. Therefore, you must remove the CD or DVD drive assembly to access the front hard disk drive cage.

Before you install a non-hot-swap hard disk drive, read the following information:
- See the documentation that comes with the drive for any cabling instructions.
- Route the cable *before* you install the drive. Do not block the airflow from the fans or air baffles.

To replace the front hard disk drive, complete the following steps.
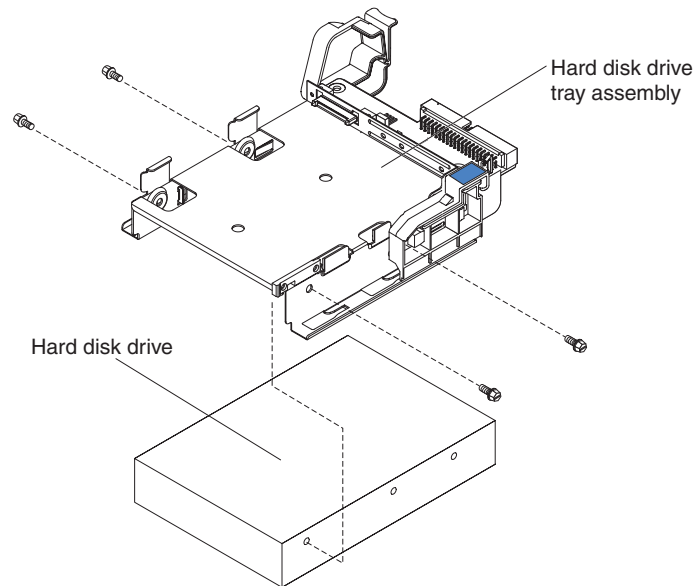
Hard disk drive tray assembly

Hard disk drive

1. Read the safety information that begins on page v and "Installation guidelines" on page 21.
2. Turn off the server and all attached peripheral devices. Disconnect all power cords; then, disconnect all external signal cables from the server.
3. Remove the server from the rack; then, remove the server cover (see "Removing the cover" on page 23).
4. If a CD or DVD drive is installed, remove it from the server (see "Removing the CD or DVD drive" on page 33).

5. Disconnect the power and signal cables from the CD or DVD drive backplane.

Retention latch

Hard disk drive
tray assembly
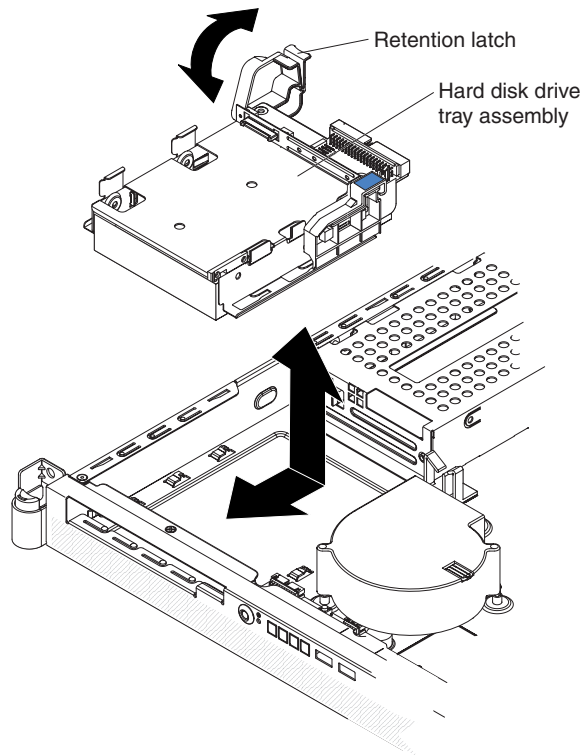
6. Open the drive-cage assembly retention latch; then, release the drive-cage assembly by sliding it slightly toward the rear of the server.
7. Disconnect the power and signal cables from the hard disk drive. Note the cable locations for later use when you install the replacement hard disk drive.
8. Lift the drive-cage assembly out of the server.
9. Place the drive-cage assembly on a flat, static-protective surface.
10. Remove the four hard disk drive mounting screws from the sides of the drive cage and slide the drive out of the cage.
11. Touch the static-protective package that contains the replacement drive to any *unpainted* metal surface on the outside of the server; then, remove the drive from the package.
12. Mount the drive in the front hard disk drive cage, using the four mounting screws that come with the drive kit option.
13. Connect the signal and power cables to the rear of the drive. The signal cable for the drive in the front hard disk drive cage is labeled "HDD1". Keep the cables clear of the airflow paths of the fans and air baffles.
14. Insert the drive-cage assembly into the server; then, slide the drive-cage assembly forward until it seats securely.
15. Close the drive-cage assembly retention latch.
16. Reinstall the CD or DVD drive in the server (see "Installing a CD or DVD drive" on page 39).

If you have other devices to install or remove, do so now. Otherwise, go to "Completing the installation" on page 51.

Installing a CD or DVD drive

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

- The server supports one CD or DVD drive.
- The server supports the following types of Ultrabay Enhanced integrated drive electronics (IDE) drives:
  - CD-RW/DVD-ROM combo
  - CD-RW
  - DVD-ROM
- Operating the server with an unsupported CD or DVD drive configuration might cause unpredictable results. For a list of supported drives for the server, see http://www.ibm.com/servers/eserver/serverproven/compat/us/.
- If a CD or DVD drive is installed in the server and you have to remove the front hard disk drive cage from the server, you must first remove the CD or DVD drive. Therefore, after you have finished reinstalling the front hard disk drive cage in the server, reinstall or replace the CD or DVD drive in the server, if you plan to use a CD or DVD drive.

To install or replace a CD or DVD drive, complete the following steps.

1. If you are replacing a removed CD or DVD drive with a new drive, make sure that:
   - You have all the cables and other equipment that is specified in the documentation that comes with the new drive.
   - You have checked the instructions that come with the new drive to determine whether you must set any switches or jumpers on the drive.
   - You have removed the drive mounting clip on the side of the old drive and have it available for installation on the new drive.

Note: If you are installing or removing 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

2. Read the safety information that begins on page v and "Installation guidelines" on page 21.

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

4. Remove the server cover (see "Removing the cover" on page 23).

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

6. If you are reinstalling a drive that you removed and that is still attached to the drive mounting clip, continue with the next step.

   If you are replacing the removed drive with a new drive, or if you have removed the drive mounting clip from the drive that are reinstalling, you must attach a drive mounting clip to the drive before you can install the drive in the server. Detach the drive mounting clip that comes attached to the side of the drive cage, as shown in the following illustration.

   Note: If you are reinstalling a drive, you can reattach the drive mounting clip that you removed, or you can store the clip for later use.
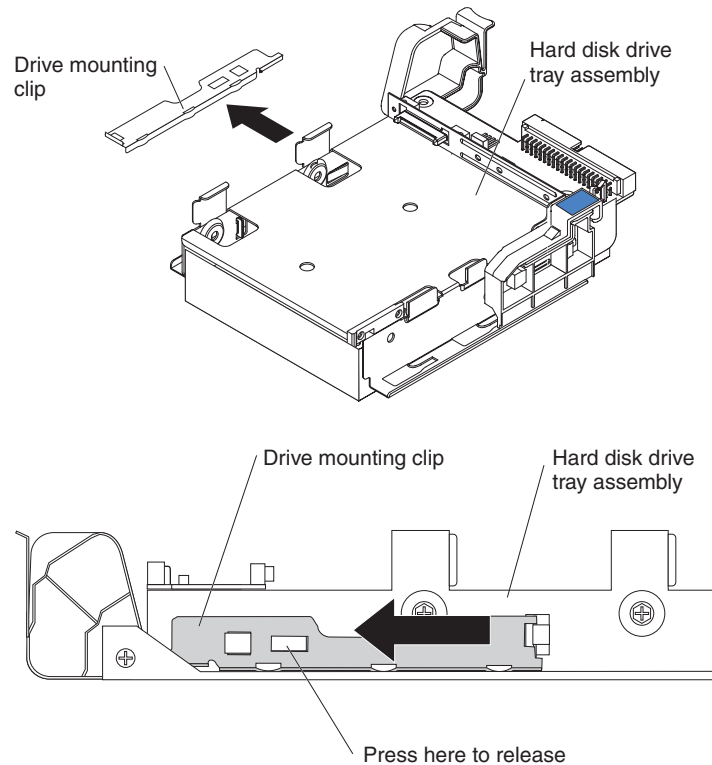
Then, slide the drive mounting clip to attach it to the side of the drive.

CD or DVD drive

Drive
retention clip

Slide the clip into
place against the drive
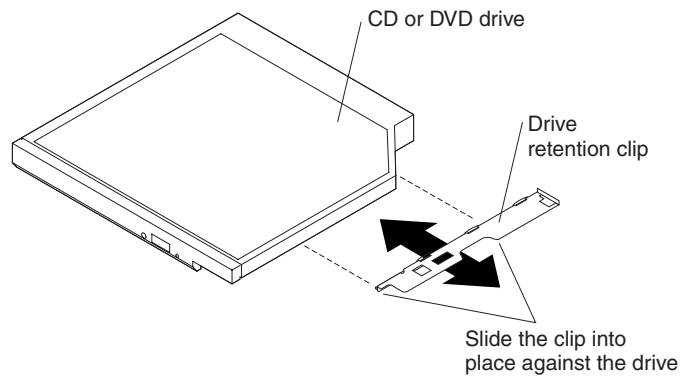
7. Slide the drive into the server until the drive clicks into place.
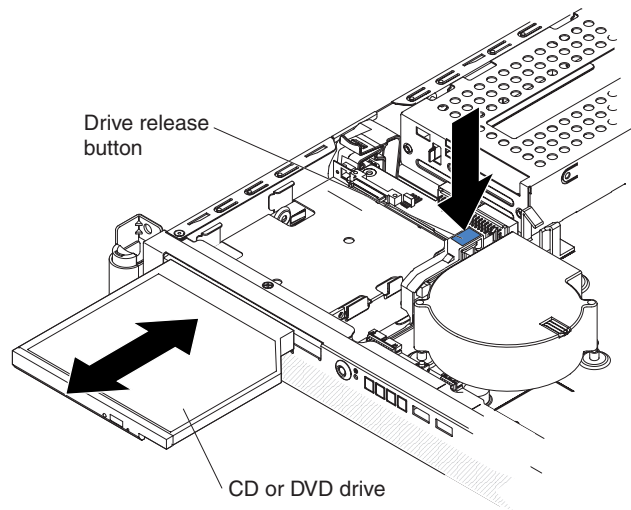
Drive release
button

CD or DVD drive

If you have other devices to install or remove, do so now. Otherwise, go to "Completing the installation" on page 51.

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 you install DIMMs:

- The server uses interleaved DIMMs, which you must add, remove, or replace in pairs. Both DIMMs in a pair must have the same size, type, speed, and technology. The server comes with one pair of DIMMs that are installed in DIMM connectors 1 and 2 on the system board.

- You can increase the amount of memory in the server by replacing the installed DIMMs with higher-capacity DIMMs or by installing additional pairs of DIMMs.

- To optimize system performance in a single-microprocessor or dual-microprocessor configuration, install DIMMs in the following sequence. Do not install DIMMs in connectors 7 through 12 if microprocessor socket 2 (system-board identifier CPU2) is empty.
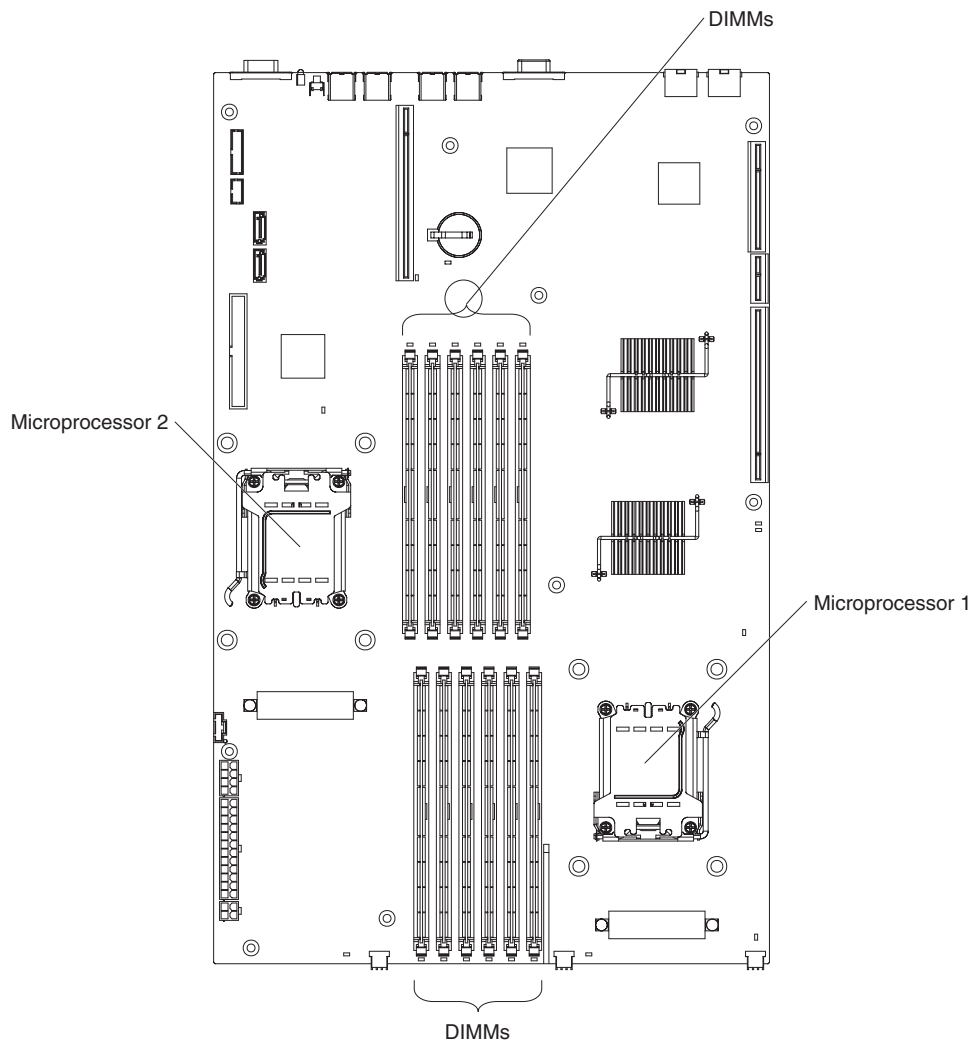
Table 2. DIMM installation sequence

| Number of DIMMs installed	DIMM connector population with one microprocessor installed	DIMM connector population with two microprocessors installed
2	1, 2	1, 2
4	1, 2, 3, 4	1, 2, 7, 8
6	1, 2, 3, 4, 5, 6	1, 2, 3, 4, 7, 8
8	Not supported	1, 2, 3, 4, 7, 8, 9, 10
10	Not supported	1, 2, 3, 4, 5, 6, 7, 8, 9, 10
12	Not supported	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12

- The server supports 512 MB (type x8) DIMMs and the following sizes of type x4 DIMMs: 1 GB, 2 GB, and 4 GB. The memory can be expanded to a maximum of 48 GB, using twelve 4 GB DIMMs. For a list of memory modules that the server supports, see the ServerProven® list at http://www.ibm.com/servers/eserver/ serverproven/compat/us/.

  The memory controller also provides Chipkill memory protection if all DIMMs are of the type x4. Chipkill memory protection is a technology that protects the system from a single chip failure on a DIMM.

  Note: Chipkill memory protection is not supported on 512 MB DIMMs.
- The server supports online-spare memory. For additional information, see "What your server offers" on page 4.
- The server does not support memory mirroring.
- When you restart the server after you add or remove DIMMs, the server displays a message indicating that the memory configuration has changed.
- 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 57.

The following illustration shows the DIMM connectors on the system board.
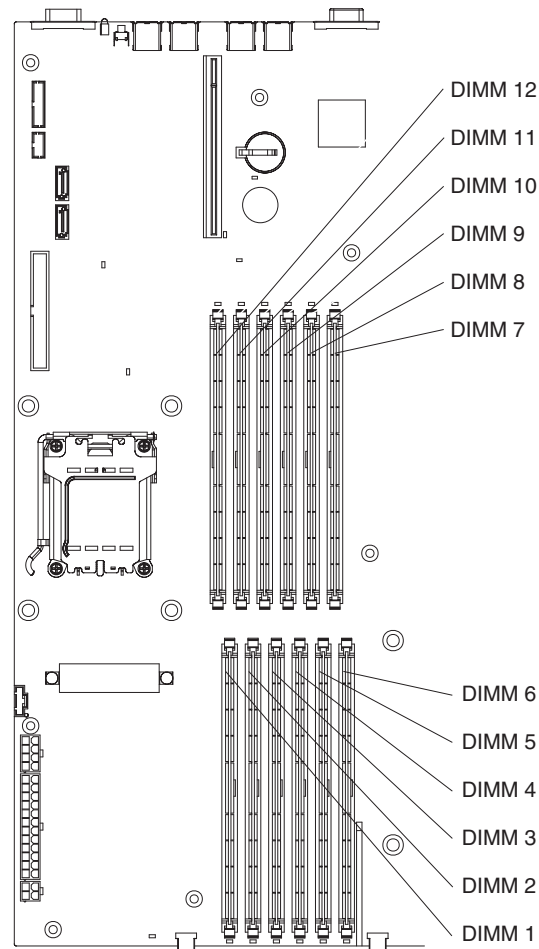
To install a DIMM, complete the following steps.

1. Read the safety information that begins on page v and "Installation guidelines" on page 21.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.
3. Remove the server from the rack; then, remove the server cover (see "Removing the cover" on page 23).
4. According to your server configuration, select the applicable DIMM installation sequence from Table 2 on page 44.

    Attention: To avoid breaking the retaining clips or damaging the DIMM connectors, open and close the clips gently.
5. Open the retaining clip on each end of the DIMM connector.
6. Touch the static-protective package that contains the DIMM to any *unpainted* metal surface on the server. Then, remove the DIMM from the package.

7. Turn the DIMM so that the DIMM keys align correctly with the connector.
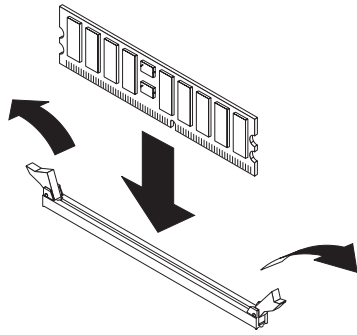
8. Insert the DIMM into the connector by aligning the edges of the DIMM with the slots at the ends of the DIMM connector. Firmly press the DIMM straight down into the connector by applying pressure on both ends of the DIMM simultaneously. The retaining clips snap into the locked position when the DIMM is firmly seated in the connector. If there is a gap between the DIMM and the retaining clips, the DIMM has not been correctly inserted; open the retaining clips, remove the DIMM, and then reinsert it.
9. Repeat step 5 on page 45 through step 8 for the second DIMM in the pair that you selected from Table 2 on page 44. DIMMs must be installed in pairs.

Important: When you restart the server after you have installed DIMMs, the 162 code will be displayed to indicate that the server memory configuration has changed. You must run the Configuration/Setup Utility program to configure the DIMMs. For additional information, see "Using the Configuration/Setup Utility program" on page 58.

If you have other devices to install or remove, do so now. Otherwise, go to "Completing the installation" on page 51.

Installing an additional microprocessor

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

- For a list of microprocessors that the server supports, see the ServerProven list at http://www.ibm.com/servers/eserver/serverproven/compat/us/.

- The server comes with one microprocessor. The server supports a maximum of two microprocessors. The following illustration shows the two microprocessor sockets on the system board.
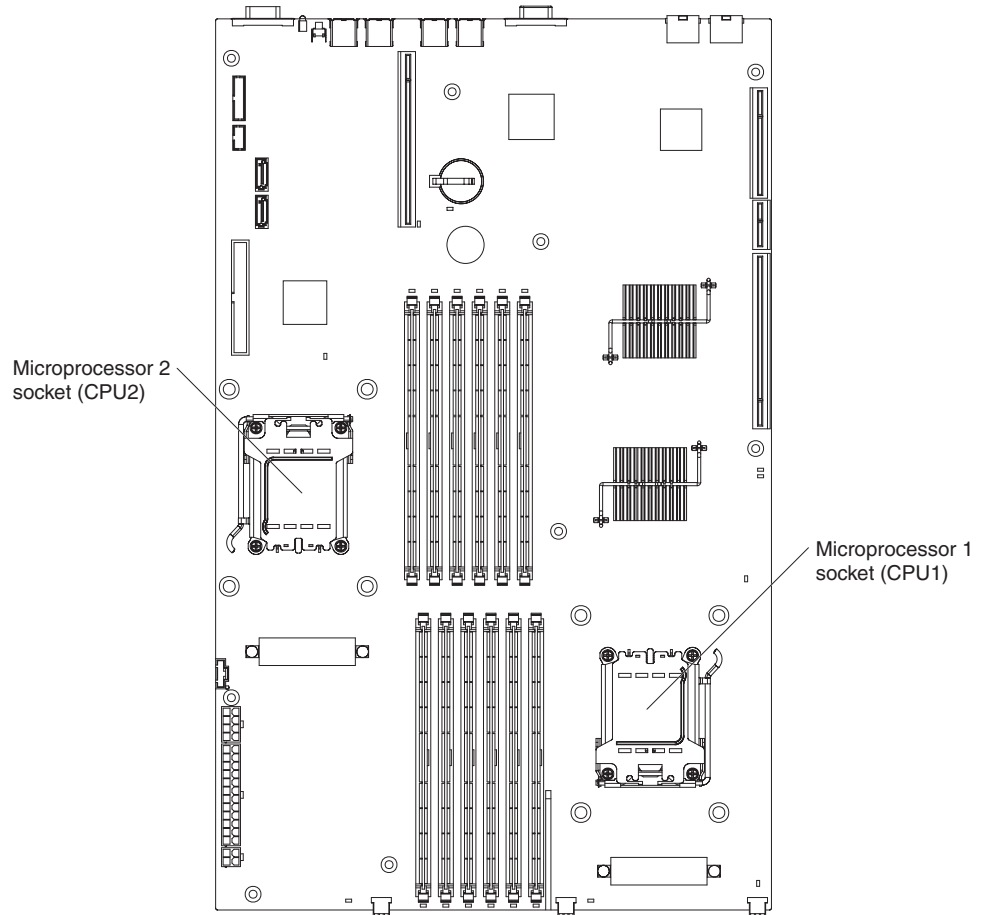
- If only one microprocessor is installed, make sure that it is installed in microprocessor socket 1 (system-board identifier CPU1). Microprocessor 1 supports both the startup and application processes.

- If you install a second microprocessor in the server, the server operates as a symmetric multiprocessing (SMP) server, and operating-system application programs can distribute the processing load between the microprocessors. This enhances performance for database and point-of-sale applications, integrated manufacturing solutions, and other applications. Microprocessor 2 is installed in socket 2 (system-board identifier CPU2).

- Read the documentation that comes with the microprocessor to determine whether you must update the BIOS code in the server. To download the most current level of BIOS code for your server, go to http://www.ibm.com/servers/eserver/support/xseries/index.html and follow the instructions.

- To use SMP, obtain an SMP-capable operating system. For a list of supported operating systems, see http://www.ibm.com/servers/eserver/serverproven/compat/us/.

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

- The server will not start if microprocessor socket 1 (system-board identifier CPU1) is empty.
- If two microprocessors are installed in the server, make sure that both microprocessors are the same type, have the same cache size, and have the same clock speed.
- Do not install DIMMs in connectors 7 through 12 if microprocessor socket 2 (system-board identifier CPU2) is empty. The server does not support this configuration.
- When you handle static-sensitive devices, take precautions to avoid damage from static electricity. For information about handling these devices, see "Handling static-sensitive devices" on page 22.
- Avoid touching the components and gold-pad connectors on the microprocessor. Make sure that the microprocessor is completely and correctly seated in the socket. Incomplete insertion might cause damage to the system board or to the microprocessor.
- Do not touch the thermal grease on the bottom of the heat sink or set down the heat sink after the plastic cover is removed. Touching the thermal grease will contaminate it. This damages its heat-conducting capability and exposes the new microprocessor to overheating.

To install an additional microprocessor, complete the following steps.

1. Read the safety information that begins on page v and "Installation guidelines" on page 21.
2. Turn off the server and all attached peripheral devices. Disconnect all power cords; then, disconnect all external signal cables from the server.
3. Remove the server from the rack; then, remove the server cover (see "Removing the cover" on page 23).
4. Remove the air baffle for microprocessor 2 (see "Removing an air baffle" on page 24).
5. Locate the microprocessor 2 socket (identifier CPU2) on the system board.

6. Remove the dust cover from the surface of the microprocessor 2 socket.

   a. Press down and out on the release lever on the microprocessor socket. Lift up the release lever until it stops in the fully-open position (approximately 135° angle) and the top edge of the release lever has moved away from the microprocessor socket.
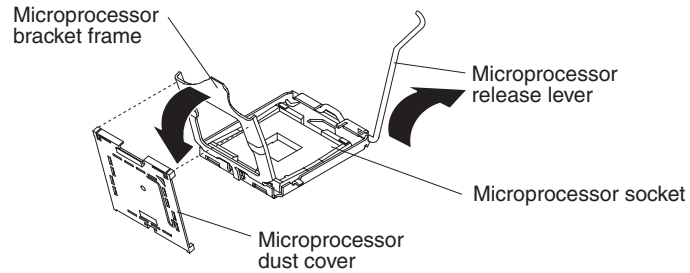
   b. Lift the hinged microprocessor bracket frame into the open position. Remove the protective cover from the bracket frame. Store the dust cover in a safe place.

7. Install the microprocessor:

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

   b. Align the microprocessor with the socket, as shown in the following illustration (note the alignment marks and the position of the notches); then, carefully place the microprocessor on the socket and close the microprocessor bracket frame.

   Attention: Do not use excessive force when you insert the microprocessor into the socket.

   Note: The microprocessor fits only one way on the socket.
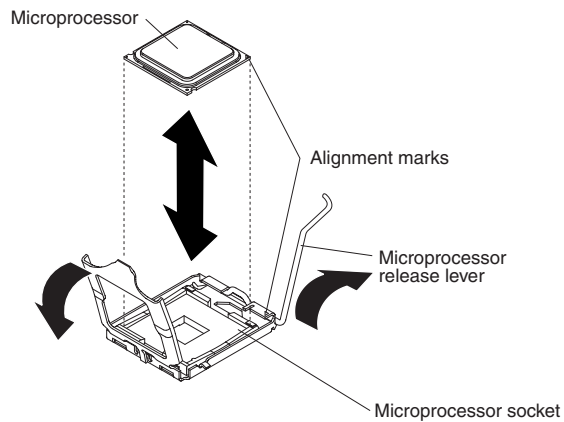
8. Carefully close the release lever to secure the microprocessor in the socket.

   Note: A new heat sink comes in a kit with a microprocessor.
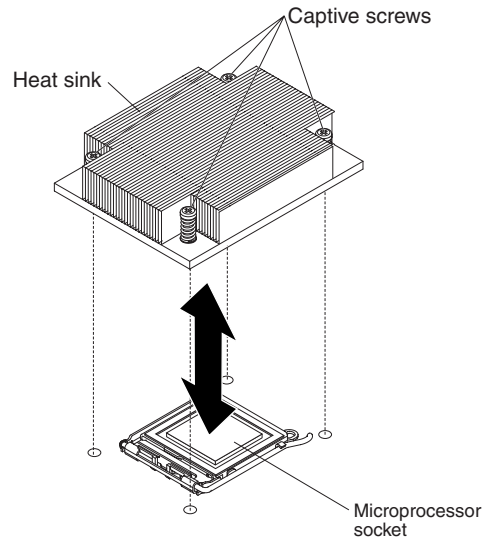
9. Install the heat sink.
   a. Remove the heat sink from its package and remove the cover from the bottom of the heat sink.
   b. Make sure that the thermal material is still on the bottom of the heat sink, and position the heat sink on top of the microprocessor.
   c. Align the captive screws on the heat sink with the holes that surround the microprocessor socket.
   d. Press firmly on the captive screws and tighten them, alternating among the screws on opposite sides of the heat sink until they are tight. Do not overtighten the screws by using excessive force.
10. Reinstall the air baffle for microprocessor 2 (see step1 on page 51).

If you have other devices to install or remove, do so now. Otherwise, go to "Completing the installation" on page 51.

Completing the installation

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

To complete the installation, complete the following steps:

1. If you have not already done so, reinstall the two air baffles, if you removed them. Repeat the following procedure for each air baffle:

   Put the air baffle into place from the top of the server, and align the holes near the front of the air baffle with the pins in the server. Make sure that the pins on the rear of the air baffle are seated in the system board.

Alignment pins

Alignment pins
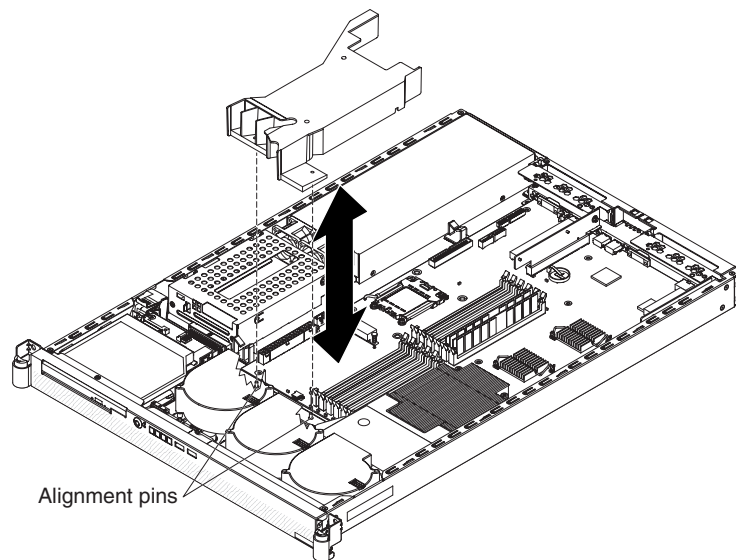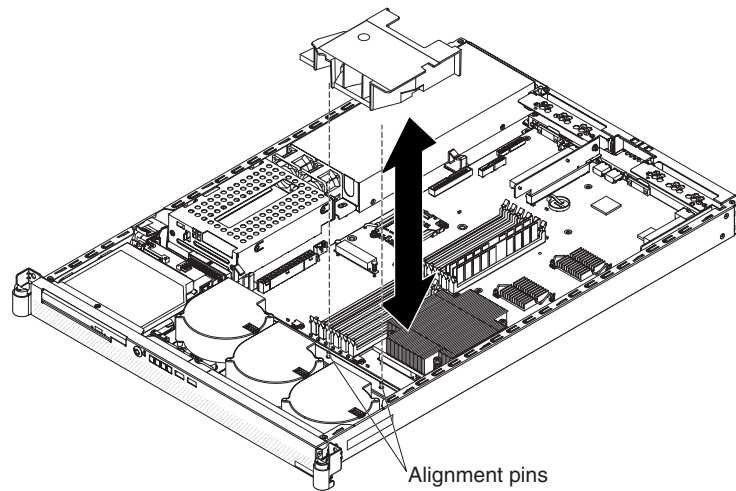
2. Position the internal cables so that they do not interfere with the cover installation.

3. Reinstall the cover on the server.

Captive screw
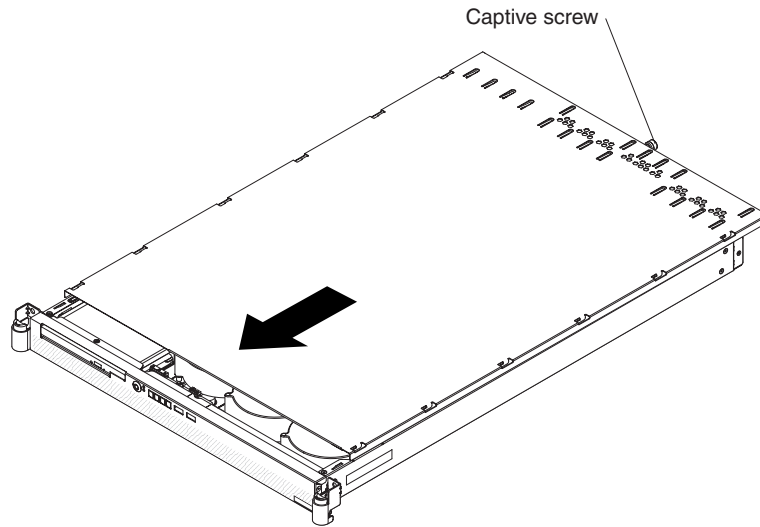
a. Position the cover on top of the server.

b. Align the tabs on the sides of the cover with the matching slots on the sides of the chassis; then, slide the tabs into the slots.

   Important: Before you slide the cover forward, make sure that all the tabs on the cover engage the chassis correctly. If all the tabs do not engage the chassis correctly, it will be very difficult to remove the cover later.

c. Slide the cover toward the front of the server.

d. Secure the cover to the server by tightening the captive screw on the back of the cover.

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

   Note: Depending on the optional devices that you installed, after you cable the server, you might have to run the Configuration/Setup Utility program to update the server configuration. For more information, see "Updating the server configuration" on page 55 and Chapter 3, "Configuring the server," on page 57.

5. To attach peripheral devices and connect the power cord, continue with "Connecting the cables" on page 53.

Connecting the cables

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

Cable identifiers are printed on the cables that come with the server and optional devices. Use these identifiers to connect the cables to the correct connectors, such as the identifiers in the following examples:

- The signal cable identifier for the CD or DVD in the CD or DVD drive is "ODD", for *optical disk drive*.
- The signal cable identifier for the drive in the front hard disk drive cage is "HDD1".
- The signal cable identifier for the drive in the rear hard disk drive cage is "HDD2".

It might be easier for you to route cables before you connect the devices to the server. For detailed information about external devices and how to connect them to the server, see the documentation that comes with these devices. For the location of external ports and connectors on the server, see "Server components" on page 14.

There are release levers on the Ethernet connectors. To disconnect a cable from one of these connectors, push down on the lever to release the cable.

Ethernet cable release lever

Ethernet cable
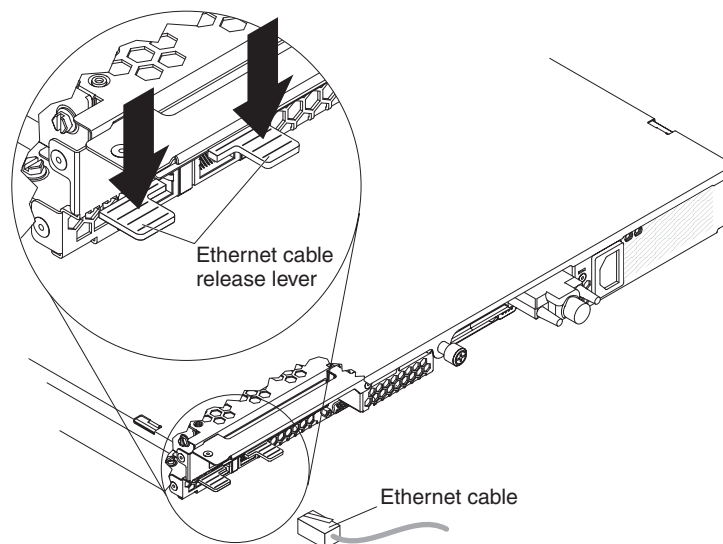
To attach non-USB devices to the server, use the cables that come with the devices and connect the cables to the applicable connectors on the server (see "Server components" on page 14).

To attach a USB device to the server, use the cable that comes with the device and connect the cable to:
- One of the two USB connectors on the front of the server (see "Front view" on page 8), or
- One of the four USB connectors on the rear of the server (see "Rear view" on page 10)

Important:
- If you want to attach a keyboard or mouse to this server, you must use a USB keyboard or a USB mouse. For detailed information about the USB keyboard and how to connect it to the server, see the documentation that comes with the USB keyboard.
- The server supports keyboardless operation. If a USB keyboard is not connected to the server, when the server is turned on or restarted, error message 301 will appear during POST. No action is required. POST will continue within 1 minute.
- If you want to attach a diskette drive to this server, you must use an external USB diskette drive.

Depending on the optional devices that you installed, after you cable the server, you might have to run the Configuration/Setup Utility program to update the server configuration. For more information, see "Updating the server configuration" on page 55 and Chapter 3, "Configuring the server," on page 57.

Updating the server configuration

When you start the server for the first time after you add or remove a device, you might receive a message indicating that the configuration has changed. The Configuration/Setup Utility program automatically starts so that you can save the new configuration information. For more information, see Chapter 3, "Configuring the server," on page 57.

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

The server comes with at least one microprocessor installed on the system board. If more than one microprocessor is installed, the server can operate as an SMP server. You might have to upgrade the operating system to support SMP. For more information, see "Using the ServerGuide Setup and Installation CD" on page 64 and the operating-system documentation.

If you have installed an adapter to manage the server remotely, see the documentation that comes with the adapter for information about setting up, configuring, and using the adapter.

To configure the integrated Gigabit Ethernet controllers, Chapter 3, "Configuring the server," on page 57.

Chapter 3. Configuring the server

The following configuration programs come with the server:

- **Configuration/Setup Utility program**

  The Configuration/Setup Utility program is part of the basic input/output system (BIOS). Use it to configure serial port assignments, change interrupt request (IRQ) settings, change the startup-device sequence, set the date and time, and set passwords. For information about using this program, see "Using the Configuration/Setup Utility program" on page 58.

  Note: In a multi-node configuration, some choices or settings are defined through the primary server, and others must be defined on the individual (secondary) servers. Before you create a scalable partition, make sure that choices and settings on the secondary servers are correct.

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

  The ServerGuide program provides software-setup tools and installation tools that are designed for the server. Use this CD during the installation of the server to configure basic hardware features, and to simplify the installation of your operating system. For information about using this CD, see "Using the ServerGuide Setup and Installation CD" on page 64.

- **Ethernet controller configuration**

  For information about configuring the Ethernet controllers, see "Configuring the Gigabit Ethernet controllers" on page 81.

- **Baseboard management controller utility programs**

  Use these programs to configure the baseboard management controller, to update the firmware and sensor data record/field replaceable unit (SDR/FRU) data, and to remotely manage a network. For information about using these programs, see "Using the baseboard management controller utility programs" on page 77.

- **Boot Menu program**

  The Boot Menu program is part of the BIOS. Use it to override the startup sequence that is set in the Configuration/Setup Utility program and temporarily assign a device to be first in the startup sequence. For information about using this program, see "Using the Boot Menu program" on page 80.

- **IBM Director**

  IBM Director is a workgroup-hardware-management tool that you can use to centrally manage System x and xSeries servers. If you plan to use IBM Director to manage the server, you must check for the latest applicable IBM Director updates and interim fixes. For information about updating IBM Director, see "Updating IBM Director" on page 82. For more information about IBM Director, see the IBM Director documentation on the *IBM Director* CD that comes with the server.

If you have installed an optional SAS redundant array of independent disks (RAID) adapter that the server supports, the adapter comes with RAID configuration programs that you can use. To configure the adapter and the hard disk drives that are connected to it, follow the instructions in the documentation that comes with the RAID configuration programs. For a list of supported adapters for the server, see http://www.ibm.com/servers/eserver/serverproven/compat/us/.

Using the Configuration/Setup Utility program

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

- View configuration information
- View and change assignments for devices and I/O ports
- Set the date and time
- Set and change passwords
- Set and change the startup characteristics of the server and the order of startup devices (startup-drive sequence)
- Set and change settings for advanced hardware features
- View, set, and change settings for baseboard management controller features
- View and clear error logs
- Change interrupt request (IRQ) settings
- Resolve configuration conflicts

Starting the Configuration/Setup Utility program

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

1. Turn on the server.
2. When the prompt `Press F1 for Configuration/Setup` is displayed, 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 choices 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, such as the machine type and model identifier of your server, the serial number, and the revision level or issue date of the BIOS code that is stored in electrically erasable programmable ROM (EEPROM).

  When you make changes through other choices 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.

You can enable or disable integrated Ethernet and other controllers and all standard ports (such as serial). **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 SATA controller, the server will have no SATA capability. If you disable the integrated video controller, the server will have no video capability. If you disable the integrated Ethernet controller and no Ethernet adapter is installed, the server will have no Ethernet capability.

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

– **Remote Console Redirection**

Select this choice to view and change the settings for the serial connection that is used to redirect the local keyboard-video-mouse console to a remote console.

To redirect the local keyboard-video-mouse console to a remote serial port, you must set the **Remote Console Serial Port** value to **Enabled**. The default value is **Disabled**.

– **System MAC Addresses**

Select this choice to view the media-access control (MAC) addresses of the two integrated Ethernet controllers. You cannot change these values.

• **Date and Time**

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

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

• **System Security**

Select this choice to set passwords. See "Passwords" on page 61 for more information.

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

– **Power-on password**

Select this choice to set or change a power-on password. See "Power-on password" on page 62 for more information.

– **Administrator Password**

Select this choice to set or change an administrator password. An administrator password is intended to be used by a system administrator; it limits access to the full Configuration/Setup Utility menu. If an administrator password is set, the full Configuration/Setup Utility menu is available only if you type the administrator password at the password prompt. See "Administrator password" on page 62 for more information.

• **Startup Option**

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

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

You can specify whether the server starts with the keyboard number lock on or off. The POST screens show the memory count, detected devices, and any errors encountered.

You can enable or disable legacy USB support. (Legacy USB support enables a non-USB-aware operating system such as DOS or UNIX® to recognize the USB keyboard and mouse.)

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.

Through the **Startup Sequence Options** menu, you can select up to eight Wake on LAN startup devices in addition to a maximum of eight other startup devices.

You can specify a startup sequence for the Wake on LAN functions if all of the following requirements are met:

– The server has Wake on LAN hardware and software.

– The operating system supports Wake on LAN functions.

– You have enabled the **Wake on Lan** choice on the **Startup Sequence Options** menu.

– You have enabled the **Planar Ethernet** choice on the **Startup Sequence Options** menu.

Note: For additional information about Wake on LAN functions, see the documentation that comes with the operating system, and the Wake on LAN hardware and software. For additional information about using the Preboot Execution Environment (PXE) boot agent functions to enable or disable operating-system wake-up support, see the *Broadcom NetXtreme Gigabit Ethernet Software CD* that comes with the server.

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

You also can specify that the integrated SATA controller or other devices have boot priority.

If you plan to use the Boot Menu program, you must first enable the F12 prompt so that the Boot Menu can be displayed on your monitor. To do this, you must enable the **F12 Boot Menu Prompt** menu choice.

- **Advanced Setup**

  Select this choice to view and change settings for advanced hardware features and to view the system event log information, such as the record, event type, and timestamp.

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

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

  – **Memory Settings**

    Select this choice to view the settings for the DIMMs. The only valid configuration change is to **Enable** the DIMMs.

  – **CPU Options**

    Select this choice to view, set, and change other memory configuration values. Some of the values on these menus cannot be changed manually; however, they will change automatically when related configuration values are changed manually. For example, if you change the value of **ECC Mode** on the **ECC Options** menu, the values of **DRAM ECC Scrub Control** and **ECC Scrub Redirection** also change automatically.

    - **Memory Controller Options**

      Select this choice to view and change memory controller configuration values.

    - **ECC Options**

      Select this choice to view and change ECC memory configuration values.

  – **PCI Bus Control**

    From this menu, select the **PCI Interrupt Routing** choice to view and change the interrupt request (IRQ) settings for the integrated controllers and other devices.

- **Baseboard Management Controller (BMC) Settings**

  Select this choice to view and change the settings for the baseboard management controller (BMC).

  You can view the firmware levels of the baseboard management controller, change the setting for the COM port that the baseboard management controller uses, enable or disable the POST watchdog and OS Loader watchdog, and view the BMC network configuration values, system event log, and BMC error log.

- **Error Logs**

  Select this choice to view or clear the system event/error logs.

  Select the **System Event/Error Log** choice to view the system event/error log, which contains the full text of the error messages that have been generated. Use the arrow keys to move among the pages in the event/error log.

  Select **Clear error logs** to clear the system event/error log.

  Run the diagnostic program on the server to get more information about any error codes that might occur. For instructions, see the *Problem Determination and Service Guide* on the IBM *System x Documentation* CD.

- **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 you have access to the full Configuration/Setup Utility menu.

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

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

the user can set, change, and delete the power-on password, if the system administrator has given the user that authority.

Power-on password

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

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

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

- If an administrator password is set, type the administrator password at the password prompt (see "Administrator password"). Start the Configuration/Setup Utility program and reset the power-on password.
- Change the position of the power-on password override jumper (J52) on the system board to bypass the power-on password check.
- Remove the server battery and then reinstall it.

After you regain access to the server, you can reset the power-on password. See "Resetting passwords" for additional information.

Administrator password

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

If you forget the administrator password, you can reset it. See "Resetting passwords" for additional information.

Resetting passwords

If you forget the power-on password or the administrator password, you can reset the password after you perform one of the following actions:

- You can change the position of the power-on password override jumper (J52) on the system board to bypass the power-on password check. This enables you to reset the passwords without clearing all of the current system configuration values.
- You can remove the server battery and then reinstall it. This clears the current system configuration values and resets them to their default values. For instructions for removing and installing the battery, see the *Problem Determination and Service Guide* on the IBM *System x Documentation* CD. After you reinstall the battery, you must access the Configuration/Setup Utility program, reset the system date and time, and reset all other configuration values where necessary.

The power-on password override jumper (J52) location is shown in the following illustration.

Boot block recovery
jumper (J51)

BMC reset
jumper (J36)

NMI switch (SW1)

Power-on password
jumper (J52)

Force power-on
jumper (J37)

BMC update
jumper (J34)

Wake on LAN
bypass jumper (J48)
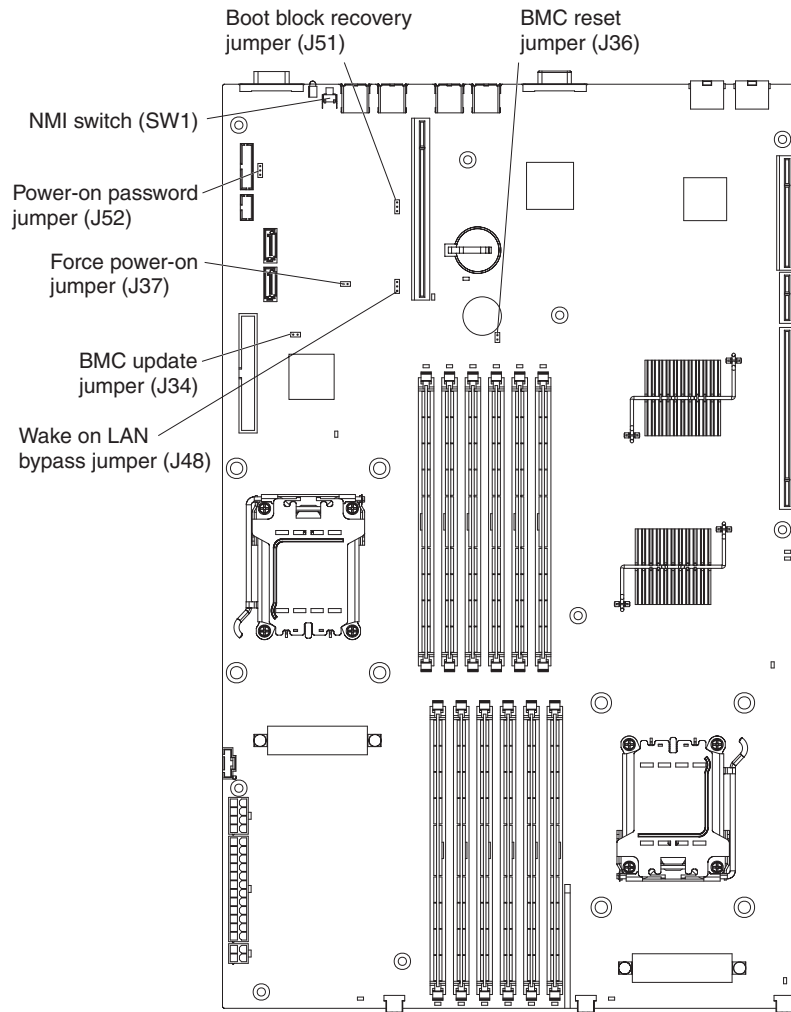
Attention: Before you change any switch settings or move any jumpers, turn off the server; then, disconnect all power cords and external cables. See the safety information that begins on page v. Do not change settings or move jumpers on any system-board switch or jumper blocks that are not shown in this document.

To change the position of the power-on password jumper, complete the following steps.

1. Review the safety information that begins on page v.
2. Turn off the server and peripheral devices and disconnect all power cords and external cables; then, remove the cover (see "Removing the cover" on page 23).
3. Move the jumper on J52 from pins 1 and 2 (the default) to pins 2 and 3 to bypass the power-on password check.
4. Replace the cover, connect the server to a monitor, and then connect it to a power source.
5. Turn on the server and wait until POST is completed.
6. Turn off the server and disconnect all power cords and external cables; then, remove the cover.
7. Move the jumper on J52 from pins 2 and 3 to pins 1 and 2.
8. Replace the cover, connect the server to a USB keyboard, monitor, USB mouse, and peripheral devices; then, connect the server to a power source.

To reset the power-on and administrator passwords, complete the following steps.

1. Turn on the server.
2. When the prompt `Press F1 for Configuration/Setup` is displayed, press F1.
3. Select **System Security** from the main menu.
4. Follow the instructions on the menu to reset each password.

Updating the BIOS code

Important: For correct server operation, be sure to update the baseboard management controller firmware before you update the BIOS code. For more information, see "Using the baseboard management controller utility programs" on page 77.

The most current level of BIOS code is available at http://www.ibm.com/servers/ eserver/support/xseries/index.html. After you make sure that the server has the latest baseboard management controller firmware level, you can update the BIOS code through one of the following methods:

- Downloading the latest BIOS code from this IBM Web site, creating an update CD or diskette, and using the CD drive or an external USB diskette drive to install the BIOS code.
- Installing an update package for the Linux or Microsoft Windows operating system, if it is available.

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 optional hardware devices that are installed and uses that information during setup to configure the hardware. The ServerGuide program simplifies operating-system installations by providing updated device drivers and, in some cases, installing them automatically.

If you are installing a Linux operating system, you can use ServerGuide to set up and configure the hardware; then, install a Linux operating system, using the procedure in "Installing your operating system without using ServerGuide" on page 66.

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

The ServerGuide program has the following features:

- An easy-to-use interface
- Diskette-free setup, and configuration programs that are based on detected hardware
- Device drivers that are provided for the server model and detected hardware
- Operating-system partition size and file-system type that are selectable during setup

ServerGuide features

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

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

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

Setup and configuration overview

When you use the *ServerGuide Setup and Installation* CD, you do not need setup diskettes. You can use the CD to configure any supported IBM server model. The setup program provides a list of tasks that are required to set up your server model.

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, baseboard management controller, hard disk drive controllers, and network adapters. Then, the program checks the CD for newer device drivers. This information is stored and then passed to the operating-system installation program.

3. The ServerGuide program presents operating-system partition options that are based on your operating-system selection and the installed hard disk drives.

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

Installing your operating system without using ServerGuide

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

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

1. Go to http://www.ibm.com/servers/eserver/support/xseries/index.html.

2. From the **Hardware** list, select **System x3455** and click **Go**.

3. Click the **Install and use** tab.

4. Click **Product documentation**.

5. Select the installation instructions for your operating system.

Using the baseboard management controller

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

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

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

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

- **Serial over LAN**

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

  Before you can perform remote management activities through an SOL connection, you must install the SMBridge management utility program on the server, and then enable and configure the server for SOL functions through the SMBridge management utility program. This enables you to use the SMBridge management utility program to remotely manage and configure a network. For instructions and additional information, see "Installing the SMBridge management utility program" on page 67 and "Enabling and configuring SOL through the SMBridge management utility program" on page 68.

  Important: The server Ethernet ports are set to DHCP (dynamic host configuration protocol) by default. To find your BMC on an existing network, you will need to

identify the server by the default host name. The default host name for each server is the last 8 characters of the BMC MAC address. The BMC MAC address can be found in the Configuration/Setup Utility program, on a label on the system board, and on a tag hanging from the front of the server. Once you have deployed your server, make sure that you remove the BMC MAC address tag from the front of the server so that it does not impede airflow through the front of the server.

The baseboard management controller comes with several utility programs that you can use to configure the baseboard management controller, download firmware updates and SDR/FRU updates, and remotely manage a network. For additional information about using these programs, see "Using the baseboard management controller utility programs" on page 77.

Installing the SMBridge management utility program

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

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

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

2. Insert the *BMC Management Utility* CD into the CD-RW/DVD drive. The InstallShield wizard starts, and a window similar to that shown in the following illustration opens.
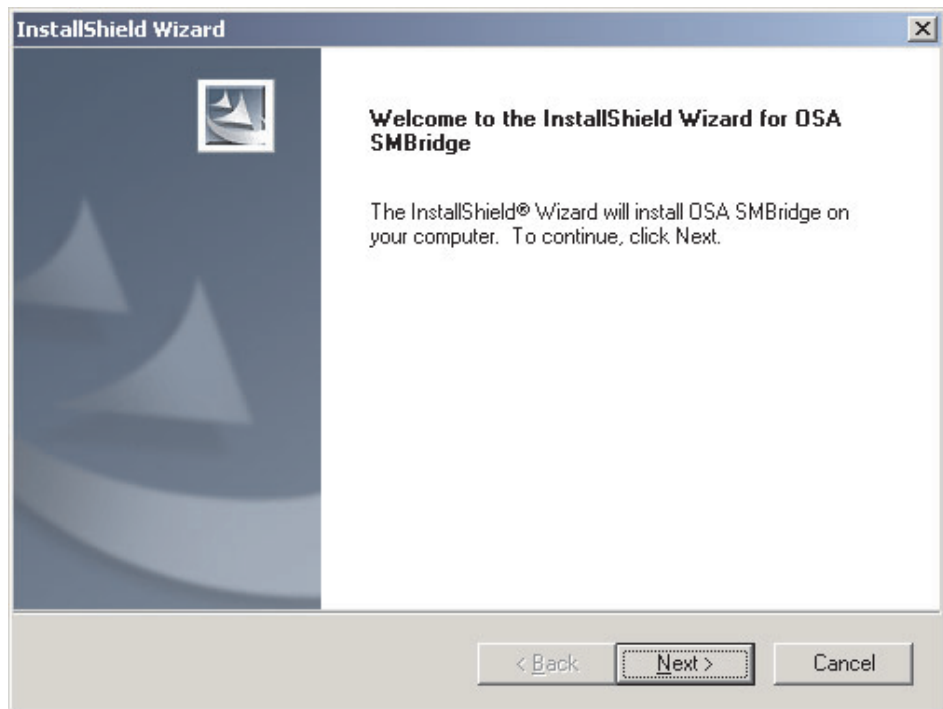
3. Follow the prompts to complete the installation.

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

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

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

2. Insert the Avocent *BMC Management Utility* CD into the drive.

3. Type `mount/mnt/cdrom`.

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

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

   `rpm -ivh smbridge-2.0-xx.rpm`

   where *xx* is the release level being installed.

6. Follow the prompts to complete the installation. When the installation is complete, the utility copies files to the following directories:
   /etc/init.d/SMBridge
   /etc/smbridge.cfg
   /usr/sbin/smbridged
   /var/log/smbridge/LICENSE

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

Note: For more information about the SMBridge management utility program, see "Using the SMBridge management utility program" on page 79.

Enabling and configuring SOL through the SMBridge management utility program

To enable and configure the server for SOL through the Avocent SMBridge management utility program, you must perform the following tasks:

1. Update and configure the BIOS code
2. Update and configure the baseboard management controller (BMC) firmware
3. Update and configure the Ethernet controller firmware
4. Enable the operating system for an SOL connection

BIOS update and configuration

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

1. Update the BIOS code:

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

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

2. Update the BMC firmware:

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

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

3. Configure the BIOS settings:

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

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

      Serial Port A: Port 3F8, IRQ4

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

      • **Remote Console Serial Port**: Enabled

      • **Baud Rate**: 19.2K

      • **Console Type**: vt100 8bit

      • **Flow Control**: None

      • **Console connection**: Direct

      • **Continue C.R. after POST**: On

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

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

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

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

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

   i. Press Enter to confirm.

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

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

Linux configuration

For SOL operation on the server, you must configure the Linux operating system to expose the Linux initialization (booting) process. This enables users to log in to the Linux console through an SOL session and directs Linux output to the serial console. See the documentation for your specific Linux operating-system type for information and instructions.

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

Red Hat Enterprise Linux ES 4 configuration:

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

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

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

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

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

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

   `ttyS0`

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

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

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

      `-Monitor`

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

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

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

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

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

      `-Monitor`

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

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

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

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

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

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

Modified /etc/lilo.conf contents

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

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

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

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

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

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

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

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

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

   `title Red Hat Linux (2.4.9-e.12smp) SOL Interactive`

   `    root (hd0,0)`

```
        kernel /vmlinuz-2.4.9-e.12smp ro root=/dev/hda6 console=tty1
            console=ttyS0,19200
            initrd /initrd-2.4.9-e.12smp.img
```

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

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

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

Modified /boot/grub/grub.conf contents

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

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

SUSE SLES 9.0 configuration:

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

To configure the general Linux parameters for SOL operation when using the SLES 9.0 operating system, complete the following steps.

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

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

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

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

   `ttyS0`

3. Complete the following steps to modify the /boot/grub/menu.lst file:

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

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

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

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

      `SOL Monitor`

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

      `console=ttyS0,19200 console=tty0`

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

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

      `title linux SOL Interactive`

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

      `    console=tty1 console=ttyS0,19200`

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

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

Original /boot/grub/menu.lst contents	Notes

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

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

Modified /boot/grub/menu.lst contents	Notes

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

Modified /boot/grub/menu.lst contents	Notes
| ```
title floppy
  root
  chainloader +1
title failsafe
  kernel (hd0,1)/boot/vmlinuz.shipped root=/dev/hda2 ide=nodma apm=off vga=normal nosmp
disableapic maxcpus=0 3

  initrd (hd0,1)/boot/initrd.shipped
``` | 1 |
| **Note 1:** The kernel line is shown with a line break. In your file, the entire entry must all be on one line. | |

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

Microsoft Windows 2003 Standard Edition configuration

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

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

1. Complete the following steps to determine which boot entry ID to modify:

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

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

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

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

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

3. Complete the following steps to verify that the EMS console is redirected to the COM1 serial port:

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

   b. Verify the following changes to the bootcfg settings:

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

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

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

Using the baseboard management controller utility programs

Use the baseboard management controller utility programs to configure the baseboard management controller, download firmware updates and SDR/FRU updates, and remotely manage a network.

Note: If the server does not start from the CD-RW/DVD drive or the external USB diskette drive, use the Configuration/Setup Utility program to configure the CD-RW/DVD drive or the external USB diskette drive as a startup device. (For information about the Configuration/Setup Utility program, see "Using the Configuration/Setup Utility program" on page 58.)

Using the baseboard management controller setup utility program

Use the baseboard management controller setup utility program to view or change baseboard management controller information, user management, LAN configuration, and LAN alert settings. To download the program, go to http://www.ibm.com/servers/eserver/support/xseries/index.html, select **System x3455** from the **Hardware** list, and click **Go**. Click the **Download** tab, and search for BMC software; then, copy the files bmc.exe and Init.ini to a setup utility CD or diskette.

To start the baseboard management controller setup utility program, complete the following steps.
1. Turn on the server.
2. If you are using a CD, insert the setup utility CD into the CD-RW/DVD drive.

   If you are using a diskette, insert the setup utility diskette into the external USB diskette drive.
3. From a command line, type `bmc` and press Enter.

For the program to interface with the baseboard management controller, the parameters in the Intf.ini file must be set correctly. To modify the Intf.ini file, use the baseboard management controller setup utility program or a text editor.

Using the baseboard management controller configuration utility program

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

To download the program, go to http://www.ibm.com/servers/eserver/support/xseries/index.html, select **System x3455** from the **Hardware** list, and click **Go**. Click the **Download** tab, and search for BMC software; then copy the file bmc_cfg.exe to a configuration utility CD or diskette.

To start the baseboard management controller configuration utility program, complete the following steps.
1. Turn on the server.
2. If you are using a CD, insert the configuration utility CD into the CD-RW/DVD drive.

   If you are using a diskette, insert the configuration utility diskette into the external USB diskette drive.
3. From a command line, type `bmc_cfg` and press Enter.

4. Follow the instructions on the screen.

For the program to interface with the baseboard management controller, the parameters in the Intf.ini file must be set correctly. To modify the Intf.ini file, use the baseboard management controller setup utility program or a text editor.

Using the baseboard management controller firmware update utility program

Use the baseboard management controller firmware update utility program to download a baseboard management controller firmware update. This program updates the baseboard management controller firmware only and does not affect any device drivers.

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

To download the program, go to http://www.ibm.com/servers/eserver/support/ xseries/index.html, select **System x3455** from the **Hardware** list, and click **Go**. Click the **Download** tab, and search for BMC software; then, copy the file Flash.exe to a firmware update CD or diskette.

To update the firmware, use one of the following procedures:
- If the Linux or Windows operating-system update package is available from the World Wide Web and you have obtained it, follow the instructions that come with the package.
- If you are using a CD or diskette, complete the following steps.
  1. Turn on the server.
  2. If you are using a CD, insert the firmware update CD into the CD-RW/DVD drive.

     If you are using a diskette, insert the firmware update diskette into the external USB diskette drive.
  3. From a command line, type `flash -?` and press Enter.

For the program to interface with the baseboard management controller, the parameters in the Intf.ini file must be set correctly. To modify the Intf.ini file, use the baseboard management controller setup utility program or a text editor.

Using the baseboard management controller SDR/FRU update utility program

Use the baseboard management controller SDR/FRU update utility program to download an SDR/FRU update.

To download the program, go to http://www.ibm.com/servers/eserver/support/ xseries/index.html, select **System x3455** from the **Hardware** list, and click **Go**. Click the **Download** tab, and search for BMC software; then, copy the file fsloader.exe to an SDR/FRU update CD or diskette.

To start the baseboard management controller SDR/FRU update utility program, complete the following steps.
1. Turn on the server.
2. If you are using a CD, insert the SDR/FRU update CD into the CD-RW/DVD drive.

If you are using a diskette, insert the SDR/FRU update diskette into the external USB diskette drive.

3. From a command line, type `fsloader -?` and press Enter.

Using the baseboard management controller management utility program

Use the baseboard management controller management utility program to remotely manage and configure a server network. The following features are available from the program:

- **IPMI (Intelligent Platform Management Interface) Shell**

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

- **Serial over LAN Proxy**

  Use this feature to remotely perform control and management functions over a Serial over LAN network. Use this feature also to remotely view and change the BIOS settings.

To download the utility program and create the baseboard management controller management utility CD, go to http://www.ibm.com/servers/eserver/support/xseries/index.html, select **System x3455** from the **Hardware** list, and click **Go**. Click the **Download** tab, and search for BMC software. The CD provides information about installing and using the program.

Using the SMBridge management utility program

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

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

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

  Use the following commands in CLI mode:

  - **identify**

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

  - **power**

    Turn the server on and off remotely.

  - **sel**

    Perform operations with the BMC system event log.

  - **sysinfo**

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

- **Serial over LAN**

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

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

  Use the following commands in an SOL session:

  – **connect**

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

  – **identify**

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

  – **power**

    Turn the server on and off remotely.

  – **reboot**

    Force the server to restart.

  – **sel get**

    Display the BMC system event log.

  – **sol**

    Configure the SOL function.

  – **sysinfo**

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

Using the Boot Menu program

The Boot Menu program is a built-in 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 the server is started, it returns to the startup sequence that is set in the Configuration/Setup Utility program.

Configuring the Gigabit Ethernet controllers

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

You do not have to set any jumpers or configure the controllers. However, you must install a device driver to enable the operating system to address the controllers. For device drivers and information about configuring the Ethernet controllers, see the *Broadcom NetXtreme Gigabit Ethernet Software CD* that comes with the server. To find updated information about configuring the controllers, complete the following steps.

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

1. Go to http://www.ibm.com/servers/eserver/support/xseries/index.html.
2. From the **Hardware** list, select **System x3455** and click **Go**.
3. Click the **Install and use** tab.
4. Click **Product documentation**.

Note: To use the Wake on LAN features that are on the configuration menu, your server must contain Wake on LAN hardware and software, and your operating system must support Wake on LAN functions.

The Ethernet controllers support optional modes, such as teaming, priority packets, load balancing, fault tolerance, and virtual LANs, which provide higher performance, security, and throughput for the server. These modes apply to the integrated Ethernet controllers and to the controllers on supported Ethernet adapters.

Updating IBM Director

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

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

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

1. Check for the latest version of IBM Director:
   a. Go to http://www.ibm.com/servers/eserver/xseries/systems_management/ xseries_sm/dwnl.html.
   b. If the drop-down list shows a newer version of IBM Director than what comes with the server, follow the instructions on the Web page to download the latest version.
2. Install IBM Director.
3. Download and install any applicable updates or interim fixes for the server:
   a. Go to http://www.ibm.com/servers/eserver/support/xseries/index.html.
   b. From the **Hardware** list, select **System x3455** and click **Go**.
   c. Click the **Download** tab.
   d. Select any applicable update or interim fix that you want to download.
   e. Click the link for the executable (.exe) file to download the file, and follow the instructions in the readme file to install the update or interim fix.

Appendix A. Getting help and technical assistance

If you need help, service, or technical assistance or just want more information about IBM products, you will find a wide variety of sources available from IBM to assist you. This appendix contains information about where to go for additional information about IBM and IBM products, what to do if you experience a problem with your system or optional device, and whom to call for service, if it is necessary.

Before you call

Before you call, make sure that you have taken these steps to try to solve the problem yourself:

- Check all cables to make sure that they are connected.
- Check the power switches to make sure that the system and any optional devices are turned on.
- Use the troubleshooting information in your system documentation, and use the diagnostic tools that come with your system. Information about diagnostic tools is in the *Hardware Maintenance Manual and Troubleshooting Guide* or *Problem Determination and Service Guide* on the IBM *Documentation* CD that comes with your system.

  Note: For some IntelliStation® models, the *Hardware Maintenance Manual and Troubleshooting Guide* is available only from the IBM support Web site.

- Go to the IBM support Web site at http://www.ibm.com/servers/eserver/support/ xseries/index.html to check for technical information, hints, tips, and new device drivers or to submit a request for information.

You can solve many problems without outside assistance by following the troubleshooting procedures that IBM provides in the online help or in the documentation that is provided with your IBM product. The documentation that comes with IBM systems also describes the diagnostic tests that you can perform. Most systems, operating systems, and programs come with documentation that contains troubleshooting procedures and explanations of error messages and error codes. If you suspect a software problem, see the documentation for the operating system or program.

Using the documentation

Information about your IBM system and preinstalled software, if any, or optional device is available in the documentation that comes with the product. That documentation can include printed documents, online documents, readme files, and help files. See the troubleshooting information in your system documentation for instructions for using the diagnostic programs. The troubleshooting information or the diagnostic programs might tell you that you need additional or updated device drivers or other software. IBM maintains pages on the World Wide Web where you can get the latest technical information and download device drivers and updates. To access these pages, go to http://www.ibm.com/servers/eserver/support/xseries/ index.html and follow the instructions. Also, some documents are available through the IBM Publications Center at http://www.ibm.com/shop/publications/order/.

Getting help and information from the World Wide Web

On the World Wide Web, the IBM Web site has up-to-date information about IBM systems, optional devices, services, and support. The address for IBM System x and xSeries information is http://www.ibm.com/systems/x/. The address for IBM IntelliStation information is http://www.ibm.com/intellistation/.

You can find service information for IBM systems and optional devices at http://www.ibm.com/servers/eserver/support/xseries/index.html.

Software service and support

Through IBM Support Line, you can get telephone assistance, for a fee, with usage, configuration, and software problems with System x and xSeries servers, BladeCenter® products, IntelliStation workstations, and appliances. For information about which products are supported by Support Line in your country or region, see http://www.ibm.com/services/sl/products/.

For more information about Support Line and other IBM services, see http://www.ibm.com/services/, or see http://www.ibm.com/planetwide/ for support telephone numbers. In the U.S. and Canada, call 1-800-IBM-SERV (1-800-426-7378).

Hardware service and support

Important: When you call for service, you will be asked to provide the four-digit machine type of your system, which is 7984 or 7986.

You can receive hardware service through IBM Services or through your IBM reseller, if your reseller is authorized by IBM to provide warranty service. See http://www.ibm.com/planetwide/ for support telephone numbers, or in the U.S. and Canada, call 1-800-IBM-SERV (1-800-426-7378).

In the U.S. and Canada, hardware service and support is available 24 hours a day, 7 days a week. In the U.K., these services are available Monday through Friday, from 9 a.m. to 6 p.m.

IBM Taiwan product service

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台灣國際商業機器股份有限公司
台北市松仁路7號3樓
電話：0800-016-888

IBM Taiwan product service contact information:
    IBM Taiwan Corporation
    3F, No 7, Song Ren Rd.
    Taipei, Taiwan
    Telephone: 0800-016-888

Appendix B. Notices

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AIX	NetBAY	Update Connector
Alert on LAN	Netfinity	Wake on LAN

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BladeCenter	Predictive Failure Analysis	XA-32
Chipkill	ServeRAID	XA-64
e-business logo	ServerGuide	X-Architecture
@server	ServerProven	XpandOnDemand
FlashCopy	System x	xSeries
i5/OS		

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Important notes

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

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

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

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

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

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

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

注意: このマークは EU 諸国およびノルウェーにおいてのみ適用されます。

この機器には、EU 諸国に対する廃電気電子機器指令 2002/96/EC(WEEE) のラベルが貼られています。この指令は、EU 諸国に適用する使用済み機器の回収とリサイクルの骨子を定めています。このラベルは、使用済みになった時に指令に従って適正な処理をする必要があることを知らせるために種々の製品に貼られています。

Remarque : Cette marque s'applique uniquement aux pays de l'Union Européenne et à la Norvège.

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

In accordance with the European WEEE Directive, electrical and electronic equipment (EEE) is to be collected separately and to be reused, recycled, or recovered at end of life. Users of EEE with the WEEE marking per Annex IV of the WEEE Directive, as shown above, must not dispose of end of life EEE as unsorted municipal waste, but use the collection framework available to customers for the return, recycling, and recovery of WEEE. Customer participation is important to minimize any potential effects of EEE on the environment and human health due to the potential presence of hazardous substances in EEE. For proper collection and treatment, contact your local IBM representative.

Battery return program

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

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

For Taiwan: Please recycle batteries.

For the European Union:

For California: Perchlorate material – special handling may apply. See http://www.dtsc.ca.gov/hazardouswaste/perchlorate/.

The foregoing notice is provided in accordance with California Code of Regulations Title 22, Division 4.5 Chapter 33. Best Management Practices for Perchlorate Materials. This product/part may include a lithium manganese dioxide battery which contains a perchlorate substance.

Electronic emission notices

Federal Communications Commission (FCC) statement

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

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

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

Industry Canada Class A emission compliance statement

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

Avis de conformité à la réglementation d'Industrie Canada

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

Australia and New Zealand Class A statement

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

United Kingdom telecommunications safety requirement

Notice to Customers

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

European Union EMC Directive conformance statement

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

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

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

Taiwanese Class A warning statement

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

Chinese Class A warning statement

声　　明
此为 A 级产品。在生活环境中,
该产品可能会造成无线电干扰。
在这种情况下,可能需要用户对其
干扰采取切实可行的措施。

Japanese Voluntary Control Council for Interference (VCCI) statement

この装置は、情報処理装置等電波障害自主規制協議会（ＶＣＣＩ）の基準に
基づくクラスＡ情報技術装置です。この装置を家庭環境で使用すると電波妨害を
引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求
されることがあります。

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