



@server

xSeries 255 Type 8685

# Hardware Maintenance Manual and Troubleshooting Guide







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xSeries 255 Type 8685

Hardware Maintenance Manual and Troubleshooting  
Guide

**Note**

Before using this information and the product it supports, be sure to read Appendix C, "Notices" on page 203.

**Fourth Edition (November 2002)**

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## About this manual

This manual contains diagnostic information, a Symptom-to-FRU index, service information, error codes, error messages, and configuration information for the IBM® @server xSeries™ 255.

**Important:** The field replaceable unit (FRU) procedures are intended for trained servicers who are familiar with IBM xSeries products. See the parts listing in “System” on page 162 to determine if the component being replaced is a customer replaceable unit (CRU) or a FRU.

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## Important safety information

Be sure to read all caution and danger statements in this book before performing any of the instructions. See “Safety information” on page 169.

Leia todas as instruções de cuidado e perigo antes de executar qualquer operação.

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### 注意和危险声明 (简体中文)

重要事项:

本书中的所有注意和危险声明之前都有编号。该编号用于英语的注意或危险声明与 *Safety Information* 一书中可以找到的翻译版本的注意或危险声明进行交叉引用。

例如，如果一个注意声明以编号 1 开始，那么对该注意声明的翻译出现在 *Safety Information* 一书中的声明 1 中。

在按说明执行任何操作前，请务必阅读所有注意和危险声明。

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### 注意及危险声明 (中文)

重要資訊：

本書中所有「注意」及「危險」的聲明均以數字開始。此一數字是用來作為交互參考之用，英文「注意」或「危險」聲明可在「安全資訊」(Safety Information) 一書中找到相同內容的「注意」或「危險」聲明的譯文。

例如，有一「危險」聲明以數字 1 開始，則該「危險」聲明的譯文將出現在「安全資訊」(Safety Information) 一書的「聲明」1 中。

執行任何指示之前，請詳讀所有「注意」及「危險」的聲明。

Prenez connaissance de toutes les consignes de type Attention et Danger avant de procéder aux opérations décrites par les instructions.

Lesen Sie alle Sicherheitshinweise, bevor Sie eine Anweisung ausführen.

Accertarsi di leggere tutti gli avvisi di attenzione e di pericolo prima di effettuare qualsiasi operazione.

**중요:**

본 *Server Library*에 있는 모든 주의 및 위험 경고문은 번호로 시작합니다. 이 번호는 영문 주의 혹은 위험 경고문과 이 절에 나오는 번역된 버전의 주의 혹은 위험 경고문을 상호 참조하는 데 사용됩니다.

예를 들어, 주의 경고문이 번호 1로 시작하면, 번역된 해당 주의 경고문을 본 절의 경고문 1에서 찾아볼 수 있습니다.

모든 지시사항을 수행하기 전에 반드시 모든 주의 및 위험 경고문을 읽으십시오.

Lea atentamente todas las declaraciones de precaución y peligro ante de llevar a cabo cualquier operación.

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## Online support

You can download the most current diagnostic, BIOS flash, and device driver files from <http://www.ibm.com/pc/support> on the World Wide Web.

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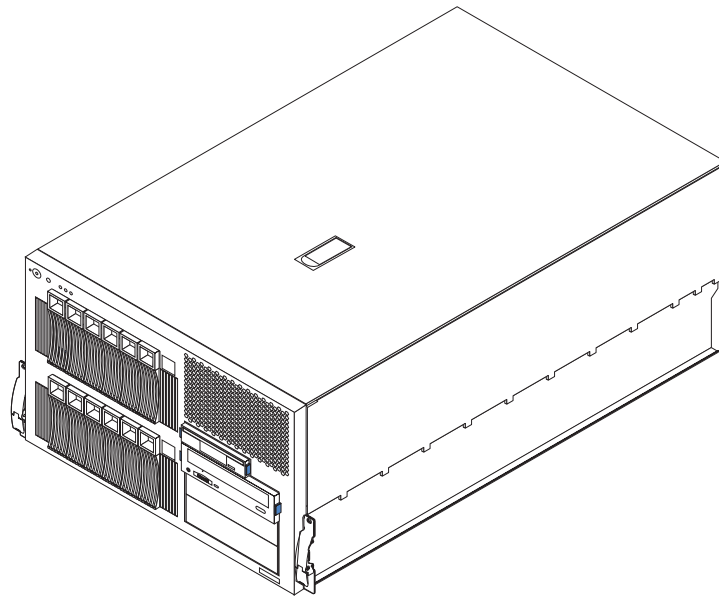
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## Chapter 1. General information

The IBM @server xSeries 255 Type 8685 server, which features IBM X-Architecture™ technology, is a high-performance server that can be upgraded to a symmetric multiprocessing (SMP) server through a microprocessor upgrade. It is ideally suited for networking environments that require superior microprocessor performance, efficient memory management, flexibility, and large amounts of reliable data storage.

If you have access to the World Wide Web, you can obtain up-to-date information about your server model and other IBM server products at <http://www.ibm.com/eserver/xseries/> on the World Wide Web.

**Note:** The illustrations in this document might differ slightly from your hardware.



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## Related publications

This *Hardware Maintenance Manual and Troubleshooting Guide* is provided in Portable Document Format (PDF). It contains information to help you solve the problem yourself or to provide helpful information to a service technician.

In addition to this *Hardware Maintenance Manual and Troubleshooting Guide*, the following xSeries 255 Type 8685 documentation is provided with the server:

- *User's Guide*  
The *User's Guide* provides general information about the server, including information about features, how to configure the server, how to use the *ServerGuide™ Setup and Installation CD*, and how to get help.
- *Installation Guide*  
This printed publication contains setup and installation instructions.
- *Rack Installation Instructions*  
This printed publication contains the instructions to install the server in a rack.
- *Safety Information Book*  
This multilingual publication is provided in PDF on the *IBM xSeries Documentation CD*. It contains translated versions of the caution and danger

statements that appear in the documentation for the server. Each caution and danger statement has an assigned number, which you can use to locate the corresponding statement in your native language.

- *Option Installation Guide*  
This publication is provided in PDF on the IBM *xSeries Documentation* CD. It contains instructions to install, remove, and connect optional devices supported by your server.

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

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## Notices and statements used in this book

The caution and danger statements used in this book also appear in the multilingual *Safety Information* book provided on the IBM *xSeries Documentation* CD. Each caution and danger statement is numbered for easy reference to the corresponding statements in the safety book.

The following types of notices and statements are used in this book:

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

## Features and specifications

Table 1 provides a summary of the features and specifications for your server.<sup>1</sup>

Table 1. Features and specifications

<p><b>Microprocessor:</b></p> <ul style="list-style-type: none"> <li>• Intel® Xeon™ MP</li> <li>• 1 MB or 512 KB level-3 cache depending upon model</li> <li>• 400 MHz front-side bus (FSB)</li> <li>• Support for up to four microprocessors with Intel Hyper-Threading technology and Intel NetBurst™ microarchitecture</li> </ul> <p><b>Memory:</b></p> <ul style="list-style-type: none"> <li>• Maximum: 12 GB</li> <li>• Type: ECC, double-data rate (DDR), SDRAM, registered DIMMs</li> <li>• Slots: 2-way or 4-way interleaved, 12 slots</li> <li>• Hot Spare memory</li> </ul> <p><b>Drives standard:</b></p> <ul style="list-style-type: none"> <li>• Diskette: 1.44 MB</li> <li>• CD-ROM: IDE</li> </ul> <p><b>Available expansion bays:</b></p> <ul style="list-style-type: none"> <li>• Hot-swap: <ul style="list-style-type: none"> <li>– Six slim-high in upper drive cage</li> <li>– Six slim-high in lower drive cage with optional SCSI backplane installed</li> </ul> </li> <li>• Non-hot-swap: Two 5.25-inch</li> </ul> <p><b>Expansion slots:</b></p> <ul style="list-style-type: none"> <li>• Six hot-plug PCI-X 100 MHz/64-bit</li> <li>• One non-hot-plug PCI 33 MHz/32-bit</li> </ul> <p><b>Hot-swap power supplies:</b></p> <p>370 W (115-230 V ac)</p> <ul style="list-style-type: none"> <li>• Minimum: Two</li> <li>• Maximum: Four for redundancy</li> </ul> <p><b>Redundant cooling:</b></p> <p>Nine hot-swap fans</p>	<p><b>Video:</b></p> <ul style="list-style-type: none"> <li>• ATI RageXL video controller</li> <li>• Compatible with SVGA and VGA</li> <li>• 8 MB video memory</li> </ul> <p><b>Size (tower model):</b></p> <ul style="list-style-type: none"> <li>• Height: 356 mm (14.0 in.)</li> <li>• Depth: 700 mm (27.6 in.)</li> <li>• Width: 483 mm (19 in.)</li> <li>• Weight: 47 kg (104 lb) to 55 kg (121.2 lb) depending upon configuration</li> </ul> <p><b>Size (7 U) (rack model):</b></p> <ul style="list-style-type: none"> <li>• Height: 311 mm (12.3 in.)</li> <li>• Depth: 650 mm (25.6 in.)</li> <li>• Width: 440 mm (17.3 in.)</li> <li>• Weight: 47 kg (104 lb) to 55 kg (121.2 lb) depending upon configuration</li> </ul> <p><b>Integrated functions:</b></p> <ul style="list-style-type: none"> <li>• Dual-channel Ultra160 SCSI controller (one internal and one external channel)</li> <li>• Wake on LAN® support</li> <li>• One Broadcom 10/100/1000 Mbps Ethernet controller</li> <li>• One serial port</li> <li>• Four Universal Serial Bus ports</li> <li>• Keyboard port</li> <li>• Mouse port</li> <li>• Video port</li> <li>• Integrated system management processor (ISMP) with two ISMP (RS-485) RJ-45 connectors</li> </ul> <p><b>Acoustical noise emissions:</b></p> <ul style="list-style-type: none"> <li>• Sound power, idle: 6.3 bel maximum</li> <li>• Sound power, operating: 6.3 bel maximum</li> <li>• Bystander (1 m) Sound pressure, operating: 47 dBa maximum</li> <li>• Bystander (1 m) Sound pressure, idle: 47 dBa maximum</li> </ul>	<p><b>Environment:</b></p> <ul style="list-style-type: none"> <li>• Air temperature: <ul style="list-style-type: none"> <li>– Server on: 10° to 35°C (50° to 95°F). Altitude: 0 to 914 m (3000 ft).</li> <li>– Server on: 10° to 32°C (50° to 89.6°F). Altitude: 914 m (3000 ft) to 2133 m (7000 ft).</li> <li>– Server off: 10° to 43°C (50° to 110°F). Maximum altitude: 2133 m (7000 ft).</li> </ul> </li> <li>• Humidity: <ul style="list-style-type: none"> <li>– Server on: 8% to 80%</li> <li>– Server off: 8% to 80%</li> </ul> </li> </ul> <p><b>Heat output:</b></p> <p>Approximate heat output in British thermal units (Btu) per hour:</p> <ul style="list-style-type: none"> <li>• Minimum configuration: 461 Btu (0.14 kilowatts)</li> <li>• Maximum configuration: 3412 Btu (1.0 kilowatts)</li> </ul> <p><b>Electrical input:</b></p> <ul style="list-style-type: none"> <li>• Sine-wave input (50-60 Hz) required</li> <li>• Input voltage low range: <ul style="list-style-type: none"> <li>– Minimum: 100 V ac</li> <li>– Maximum: 127 V ac</li> </ul> </li> <li>• Input voltage high range: <ul style="list-style-type: none"> <li>– Minimum: 200 V ac</li> <li>– Maximum: 240 V ac</li> </ul> </li> <li>• Input kilovolt-amperes (kVA) approximately: <ul style="list-style-type: none"> <li>– Minimum: 0.08 kVA</li> <li>– Maximum: 1.07 kVA</li> </ul> </li> </ul>
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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 "U." A 1-U-high device is 1.75 inches tall.

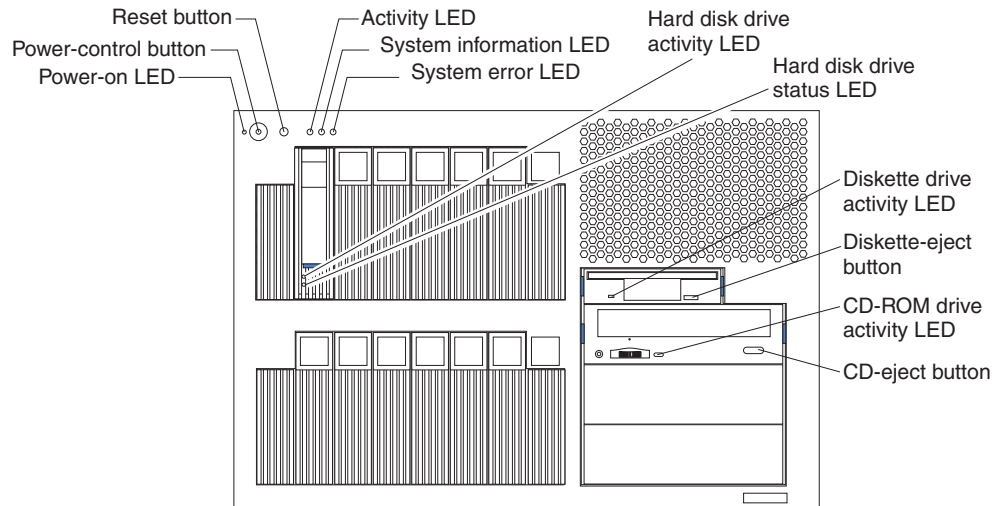
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## Server controls and indicators

This section identifies the controls and indicators on the front and rear of your server.

### Front view

#### Tower and rack models



#### Notes:

1. The illustrations in this document might differ slightly from your hardware.
2. An amber LED illuminates when a system error or event has occurred. To identify the error or event, check the LEDs on the Light Path Diagnostics™ panel located on the server (see “Light Path Diagnostics” on page 34), or review the Error Log in the Configuration/Setup Utility program (see “Viewing error logs from the Configuration/Setup Utility program” on page 30). For more information about the Configuration/Setup Utility program, see “Choices available from the Configuration/Setup Utility main menu” on page 11.

**Power-on (system power) LED:** When this green LED is on, system power is present in the server. When this LED flashes, the server is in Standby mode (the system power supply is turned off and ac current is present). When this LED is off, a power supply, ac power, or an LED has failed.

**Power-control button:** Press this button to manually turn the server on or off or to place the server in Standby mode (see “Standby mode” on page 8).

**Power-control button shield:** You can install this circular disk over the power-control button to prevent accidental manual power-off. This disk is provided with your server.

**Reset button:** Press this button to reset the server and run the power-on self-test (POST).

**ACT (activity) LED:** This green LED is on when there is activity on the server.

**INFO (system information) LED:** When this amber LED is on, the server power supplies are nonredundant, or some other noncritical event has occurred. The event

is recorded in the Error log. Check the Light Path Diagnostics panel for more detailed information (see “Light Path Diagnostics” on page 34).

**FAULT (system-error) LED:** This amber LED is on when a system error occurs. An LED on the Light Path Diagnostics panel will also be on to further isolate the error.

**Hard disk drive activity LED:** Each hot-swap drive has a hard disk drive activity LED. When this green LED is flashing, the drive is being accessed.

**Hard disk drive status LED:** Each hot-swap drive has a hard disk drive status LED. When this amber LED is on continuously, the drive has failed. If an optional SCSI or RAID adapter is installed in the server, when the LED flashes slowly (one flash per second), the drive is being rebuilt. When the LED flashes rapidly (three flashes per second), the controller is identifying the drive.

**Diskette drive activity LED:** When this LED is on, it indicates that the diskette drive is in use.

**Diskette-eject button:** Press this button to release a diskette from the drive.

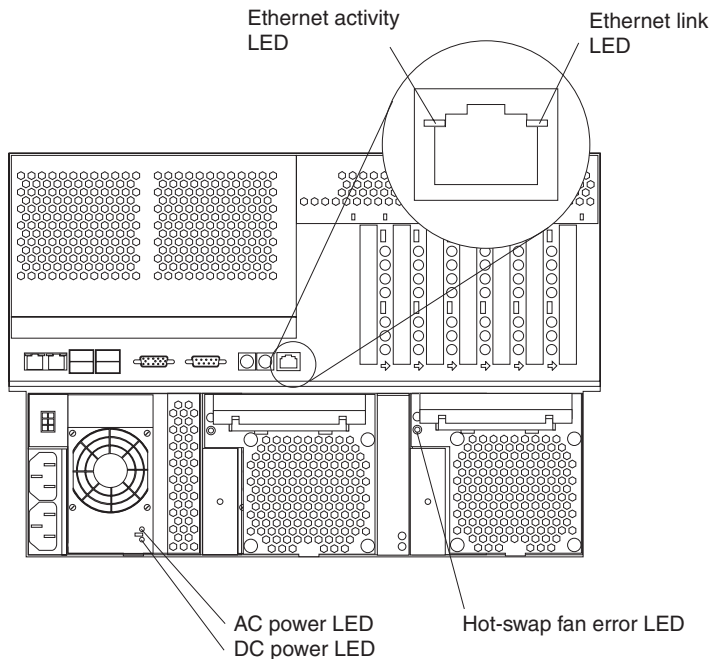
**CD-ROM drive activity LED:** When this LED is on, it indicates that the CD-ROM drive is in use.

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

## Rear view

### Notes:

1. The illustrations in this document might differ slightly from your hardware.
2. An amber LED illuminates when a system error or event has occurred. To identify the error or event, check the LEDs on the Light Path Diagnostics panel located on the server, or review the Error Log in the Configuration/Setup Utility program. For complete details about the Light Path Diagnostics panel, see “Light Path Diagnostics” on page 34. For more information about the Configuration/Setup Utility program, see “Choices available from the Configuration/Setup Utility main menu” on page 11.



**Ethernet activity LED:** When this green LED is on, there is activity between the server and the network. The Ethernet activity LED is located on the Ethernet (RJ-45) connector on the rear of the server.

**Ethernet link LED:** When this green LED is on, there is an active connection on the Ethernet port. The Ethernet link LED is located on the Ethernet (RJ-45) connector on the rear of the server.

**Hot-swap fan error LEDs:** These LEDs provide status information about fans 7, 8, and 9 (the bottom rear fans in the power-supply bays).

**AC power LED:** This green LED provides status information about the power supply. During typical operation, both the ac and dc power LEDs are on.

**DC power LED:** This green LED provides status information about the power supply. During typical operation, both the ac and dc power LEDs are on.

## Turning on the server

**Statement 13:**





## DANGER

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

After you plug one end of each server power cord into the power-supply outlets on the rear of the server and the other end of each power cord into an electrical outlet, the server can start in any of the following ways:

- You can press the power-control button on the front of the server to start the server.

### Notes:

1. You can install a circular disk over the power-control button to prevent accidental manual power-off. This disk, known as the power-control button shield, comes with your server.
  2. After you plug the power cords of your server into the electrical outlets, wait approximately 20 seconds before pressing the power-control button. During this time, the ISMP is initializing; therefore, the power-control button does not respond.
- If the server is turned on and a power failure occurs, the server will start automatically when power is restored.
  - If ac power is present, the server is in Standby mode, and the server is connected to an Advanced System Management (ASM) interconnect network that contains at least one system with an optional Remote Supervisor Adapter installed, the server can be turned on from the Remote Supervisor Adapter user interface.
  - If ac power is present, the server is in Standby mode, and an optional Remote Supervisor Adapter is installed in the server, the server can be turned on from the Remote Supervisor Adapter user interface.
  - When you plug in your server for the first time, the Wake on LAN feature can turn on the server.
  - If your server was previously turned on, it must be properly placed in Standby mode for the Wake on LAN feature to turn on the server.
  - If your operating system supports the Preboot eXecution Environment (PXE) option and the PXE option is enabled through the **Planar Ethernet PXE/DHCP** menu choice under **Start Options** on the Configuration/Setup Utility program menu (see “Using the Configuration/Setup Utility program” on page 11), the integrated Gigabit Ethernet controller (see “Configuring the Gigabit Ethernet controller” on page 24) can turn on the server.

Complete the following steps to manually turn on the server:

1. Review the information in “Before you begin” on page 41, “Handling static-sensitive devices” on page 42, and “Safety information” on page 169.
2. Turn on all external devices, such as the monitor.
3. Plug the server power cords into the power source.
4. Press the power-control button on the front of the server.

**Note:** While the server is turning on, the power-on LED on the front of the server is lit.

## Turning off the server

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

- If the system is connected to an ASM interconnect network that contains at least one system with an optional Remote Supervisor Adapter installed, the system can be turned off from the Remote Supervisor Adapter user interface.
- If an optional Remote Supervisor Adapter is installed in the system, the system can be turned off from the Remote Supervisor Adapter user interface.

Complete the following steps to manually turn off the server:

1. Review the information in “Before you begin” on page 41, “Handling static-sensitive devices” on page 42, and “Safety information” on page 169.
2. See your operating system documentation for the proper procedure to shut down the operating system.

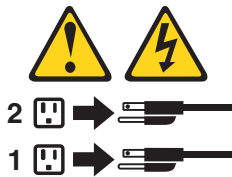
When you turn off the server, observe the following precaution.

### 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.**



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

**Note:** You might need to press and hold the power-control button for more than 4 seconds to cause an immediate shutdown of the server and to force it into Standby mode. You can use this feature if the operating system stops functioning.

4. Disconnect the server from the power source.

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

## Standby mode

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

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

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

Complete the following steps to put the server in Standby mode:

1. See the operating-system documentation for the proper procedure to shut down the operating system.

**Note:** Each operating system is different. Read all the documentation about shutting down the operating system before continuing.

2. Press the power-control button on the front of the server.

**Notes:**

- a. After you place the server in Standby mode, wait at least 5 seconds before you turn on the server again.
- b. You might need to press and hold the power-control button for more than 4 seconds to cause an immediate shutdown of the operating system and to force it into Standby mode. You can use this feature if the operating system stops functioning.

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



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## Chapter 2. Configuration

The following configuration programs are provided with your server:

- **Configuration/Setup Utility**

This program is part of the *basic input/output system (BIOS)* code that comes with your server. You can use this program to configure serial and parallel port assignments, change interrupt request (IRQ) settings, change the drive startup sequence, set the date and time, and set passwords. See “Using the Configuration/Setup Utility program” for more information.

- **SCSISelect Utility program**

With the built-in SCSISelect Utility program, you can configure the devices that are attached to the integrated SCSI controller. Use this program to change default values, resolve configuration conflicts, and perform a low-level format on a SCSI hard disk drive. See “Using the SCSISelect utility program” on page 19 for more information.

- **ServerGuide CD**

The ServerGuide CD includes software setup and installation tools that are specifically designed for your IBM server. You can use this CD during the initial installation of your server to configure the server hardware and simplify your network operating system installation. See “Using the ServerGuide Setup and Installation CD” on page 21 for more detailed information.

- **SCSI or RAID programs**

The SCSI or RAID programs come with the optional SCSI or RAID adapter and with server models that have a SCSI or RAID adapter preinstalled. If your server has a SCSI or RAID adapter installed, you must use the SCSI or RAID Configuration program to define and configure your disk-array subsystem *before* you install your operating system.

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### Using the Configuration/Setup Utility program

This section provides the instructions to start the Configuration/Setup Utility program and descriptions of the available menu choices.

#### Starting the Configuration/Setup Utility program

Complete the following steps to start the Configuration/Setup Utility program:

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

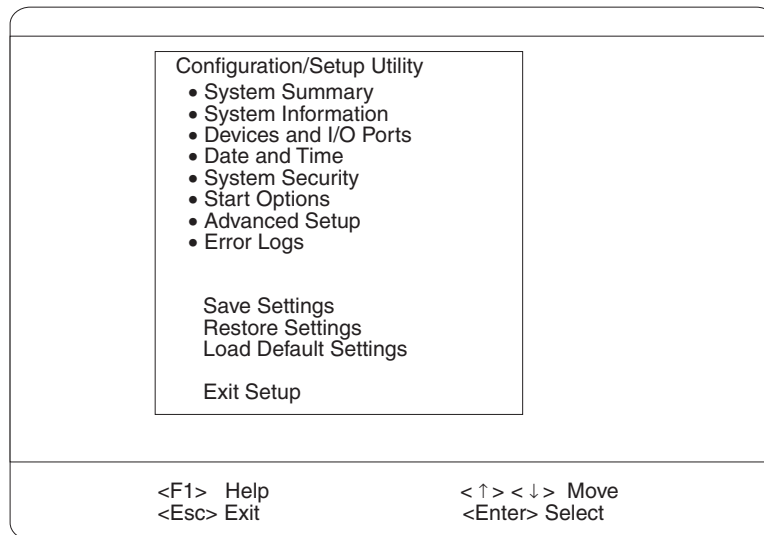
**Note:** If you have set both levels of passwords (user and administrator), you must type the administrator password to access the full Configuration/Setup Utility menu.

3. Follow the instructions that appear on the screen.

#### Choices available from the Configuration/Setup Utility main menu

From the Configuration/Setup Utility main menu, you can select settings that you want to change. The Configuration/Setup Utility main menu is similar to the

following.



**Notes:**

1. You can press F1 to display help information for a selected menu item.
2. The choices on some menus might differ slightly, depending on the BIOS version in your server.

The following choices are available from the main menu:

- **System Summary**

Select this choice to display configuration information. This includes the type and speed of the microprocessors and the amount of memory that is installed.

Select this choice to view the microprocessor settings, such as identifiers, cache sizes, and speeds.

Changes that you make to configuration settings appear on this summary screen. You cannot edit the fields.

This choice appears on both the full and limited Configuration/Setup Utility menus.

- **System Information**

Select this choice to display information about your server. Changes that you make on other menus might appear on this summary screen. You cannot edit any fields. The **System Information** choice appears only on the full Configuration/Setup Utility main menu.

- **Product Data**

Select this choice to view system information, such as the machine type and model, the server serial number, and the revision level or issue date of the BIOS that is stored in the flash electrically erasable programmable ROM (EEPROM).

- **Devices and I/O Ports**

Select this choice to view or change the assignments for devices and input/output ports. This choice appears only on the full Configuration/Setup Utility main menu.

You can use this choice to enable or disable the integrated SCSI, video, and Ethernet controllers.

- The default setting is **Enable** for all the controllers. If you select **Disable**, the system will not configure the disabled device, and the operating system will not detect the device. (This is equivalent to unplugging the device.)
- If the on-board SCSI controller is disabled and no other controller and mass storage device are installed, operating-system startup cannot occur.
- If the video controller is disabled and no video adapter is installed, the server will have no video capability.

Select **System Service Processor Settings** to view the interrupt-request setting (IRQ) that is used by the ISMP (service processor). You can then use the arrow keys to select a new IRQ setting for the ISMP from the list of available choices.

- **Date and Time**

Select this choice to set the system date and time and to change the system time that is sent to the ISMP (service processor) when the server is started. This choice appears only on the full Configuration/Setup Utility main menu.

The system time is in a 24-hour format (hour:minute:second).

- **System Security**

Select this choice to set passwords or a system owner's name. This choice appears only on the full Configuration/Setup Utility main menu.

You can implement two levels of password protection:

- **Power-on Password**

Select this choice to set or change a power-on password. See “Using passwords” on page 16 for more information.

- **Administrator Password**

If an optional Remote Supervisor Adapter is installed in the server, you can also set the administrator password and the remote-control password.

Select this choice to set or change an administrator password.

**Attention:** If an administrator password is set and then forgotten, it cannot be overridden or removed. You must replace the Remote Supervisor Adapter in PCI slot 1.

The administrator password provides access to all choices on the Configuration/Setup Utility main menu. You can set, change, or delete both the administrator and power-on passwords and allow a power-on password to be changed by the user.

See “Using passwords” on page 16 for more information.

- **Start Options**

Select this choice to view or change the start options. This choice appears only on the full Configuration/Setup Utility main menu. Start options take effect when you start your server.

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

**Note:** If you attach a standard (non-USB) keyboard to the keyboard port, the USB ports and devices will be disabled during the power-on self-test (POST). You might need to enable keyboardless operation to prevent the POST error message 301 from being displayed during startup. For detailed information about this option and how to connect it to your server, refer to the documentation that comes with the option.

The server uses a startup sequence to determine the device from which the operating system is loaded. For example, you can define a startup sequence that checks for a startable diskette in the diskette drive, then checks the hard disk drive in bay 1, and then checks a network adapter.

You can set the **Planar Ethernet PXE/DHCP** menu choice to enable or disable the Preboot eXecution Environment (PXE) option for the integrated Gigabit Ethernet controller. The default setting for this menu item is **Planar Ethernet**, which enables the PXE option. To disable this option, select **Disabled**.

If the **Boot Fail Count** choice is enabled, you can restore the BIOS system defaults after three consecutive boot failures. If this choice is disabled, the BIOS system defaults can be loaded only from the Configuration/Setup Utility main menu.

You can enable a virus-detection test that checks for changes in the master boot record at startup.

- **Advanced Setup**

Select this choice to change values for advanced hardware features, such as cache control, PCI configuration, Hot Spare Memory, and Hyper-Threading technology. This choice appears only on the full Configuration/Setup Utility main menu.

A warning message appears above the choices on this menu to alert you that the system might malfunction if these options are configured incorrectly. Follow the instructions on the screen carefully.

- **System Partition Visibility**

Select this choice to indicate whether the System Partition is visible. To make the System Partition visible, set this value to **Visible**. To make the System Partition invisible, set this value to **Hidden**. See “Using the ServerGuide Setup and Installation CD” on page 21 for additional information about the System Partition.

- **Core Chipset Control**

Select this choice to modify settings that control features of the core chip set on the system board.

To maintain optimum system operation in the event of a memory failure, you can enable the Hot Spare Memory feature on the **Core Chipset Control** menu. This feature removes the failed memory from the system configuration and activates a Hot Spare Memory pair or quad of DIMMs to replace the failed memory pair or quad of DIMMs. Before you can enable the Hot Spare Memory feature, you must also install at least one additional memory pair or quad of DIMMs and adhere to special requirements as described in “Installing memory modules” on page 82. You can also enable the Memory Remapping feature on the **Core Chipset Control** menu. To enable the Hot Spare Memory and Memory Remapping features, change the values from **No** to **Yes**.

- **CPU Options**

Select this choice to enable or disable the microprocessor cache. In addition, you can set the microprocessor cache mode to write-back (WB) or write-through (WT). Selecting write-back mode will provide better system performance.

- **PCI Bus Control**



Select this choice to view and identify system resources that are used by PCI and PCI-X devices. PCI and PCI-X devices automatically communicate with the server configuration information. This usually results in automatic configuration of a PCI or PCI-X device.

After making changes, select:

- **PCI MLT** to assign Master Latency Timer (MLT) values for the PCI and PCI-X devices in the server.
- **PCI Interrupt Routing** to assign interrupt values for the PCI and PCI-X devices in the server.

#### – **Memory Settings**

Select this choice to manually enable a pair or quad of memory.

##### **Notes:**

1. A pair or quad is also known as a memory bank.
2. You cannot disable memory. Memory can only be disabled by the server.
3. For details on enabling the Hot Spare Memory feature, see the description of the **Core Chipset Control** menu under **Advanced Setup**.

If a memory error is detected during POST or memory configuration, the server can automatically disable the failing memory pair or quad and continue operating with reduced memory capacity. If this occurs, you must manually enable the memory pair or quad after the problem is corrected. Select **Memory Settings** from the **Advanced Setup** menu, and use the arrow keys to highlight the pair or quad that you want to enable; then, use the arrow keys to select **Enable**.

**Note:** For details on enabling the Hot Spare Memory feature, see the description of the Core Chipset Control menu under Advanced Setup.

#### – **Integrated System Management Processor Settings**

Select this choice to set the server to automatically restart after a nonmaskable interrupt (NMI) occurs. The default setting for this menu item is **Enabled**.

#### • **Error Logs**

Select this choice to view or clear error logs.

- Select **POST Error Log** to view the three most recent error codes and messages that the system generated during POST.

Select **Clear event/error logs** from the **POST Error Log** menu to clear the Error log.

- Select **System Event/Error Log** to view the System Event/Error log. The System Event/Error log contains all the system error and warning messages that the system has generated. You can use the arrow keys to move between pages in the System Event/Error log.

Select **Clear event/error logs** from the **System Event/Error Log** menu to clear the Error or Event log.

#### • **Save Settings**

Select this choice to save your customized settings.

#### • **Restore Settings**

Select this choice to delete your changes and restore the previous settings.

#### • **Load Default Settings**

Select this choice to cancel your changes and restore the factory settings.

#### • **Exit Setup**

If you have made any changes, the program will prompt you to save the changes or exit without saving the changes.

## Additional Configuration/Setup Utility menu choices

When you install an optional Remote Supervisor Adapter in your server, you can view additional menu choices in the Configuration/Setup Utility program, such as:

- **System Card Data on the System Information menu**

Select this choice to view vital product data (VPD) for some server components.

- **PCI Slot Information**

Select this choice to view the properties of adapters that are installed in PCI and PCI-X slots.

**Important:** You must use the menu selections to save custom settings for the **PCI Slot/Device Information** choice. The **Save Settings**, **Restore Settings**, and **Load Default Settings** choices on the main menu of the Configuration/Setup Utility do not save the PCI Slot/Device Information settings.

After making changes, select:

- **Save and exit the PCI Utility** to save the changes and return to the **Advanced Setup** choice.
- **Exit the PCI Utility without saving changes** to ignore the changes, restore the previous settings, and return to the **Advanced Setup** choice.

You can use **PCI Device Control** to enable or disable the PCI and PCI-X slots from this menu. The default setting is **Enable** for all the PCI slots. If you select **Disable**, the system will not configure the disabled device, and the operating system will not detect the device. (This is equivalent to unplugging the device.)

- **Administrator Password**

Select this choice to set or change the administrator password.

- **Remote Control Security Settings**

Select this choice to set a remote-control password. When you set a remote-control password, you can also set the number of failed attempts to enter the correct remote-control password, and the required duration before another attempt can be made.

For a list of supported options for your server, go to <http://www.ibm.com/us/compat/> on the World Wide Web. To order an optional Remote Supervisor Adapter, contact your IBM reseller or IBM marketing representative.

## Using passwords

The **System Security** choice appears only on the full Configuration/Setup Utility menu. After you select this choice, you can implement two levels of password protection: power-on password and administrator password.

### Power-on password

After you set a power-on password, you can enable the Unattended Start mode. This locks the keyboard and mouse but allows the operating system to start. The keyboard and mouse remain locked until you type the correct password.

You can use any combination of up to seven characters (A–Z, a–z, and 0–9) for your power-on password. Keep a record of your password in a secure place. When a power-on password is set, POST is not completed until you type the password. If you forget the power-on password, you can regain access to the server through one of the following methods:

- Type the administrator password at the power-on prompt, if an administrator password has been set. (If necessary, see “Administrator password” for details.) Start the Configuration/Setup Utility program, and change the power-on password.
- Change the position of the power-on password override switch (switch 6 on switch block 2 on the system board) to bypass the power-on password check. You can then start the Configuration/Setup Utility program and change the power-on password (see “Starting the Configuration/Setup Utility program” on page 11).

**Notes:**

1. Before changing any switch settings or moving any jumpers, turn off the server; then, disconnect all power cords and external cables.
  2. Any system-board switch or jumper blocks that are not shown in the illustrations in this book are reserved.
- Power-on password override (switch 6 on switch block 2)  
 Changing the position of this switch bypasses the power-on password check if the switch has been moved since the server was last turned on. You do not need to move the switch back to the default position after the password is overridden. The default position is Off. To bypass the power-on password check, change the position to On  
 Changing the position of this switch does not affect the administrator password check if an administrator password is set.
  - Remove the battery and then reinstall the battery (see “Replacing the battery” on page 103).

**Administrator password**

Select this choice to set an administrator password. The administrator password provides access to all choices on the Configuration/Setup Utility main menu. You can set, change, or delete both the administrator and power-on passwords and allow a power-on password to be changed by the user.

**Attention:** If an administrator password is set and then forgotten, it cannot be overridden or removed. You must replace the Remote Supervisor Adapter in PCI slot 1.

The following table provides a summary of the password features.

*Table 2. Power-on and administrator password features*

Type of password	Features
Power-on password	<ul style="list-style-type: none"> <li>• Type the password to complete the system startup.</li> <li>• All choices are available on the Configuration/Setup Utility main menu.</li> </ul>
Administrator password	<ul style="list-style-type: none"> <li>• No password is required to start the system.</li> <li>• Type the password to access the Configuration/Setup Utility program.</li> <li>• All choices are available on the Configuration/Setup Utility main menu.</li> </ul>

Table 2. Power-on and administrator password features (continued)

Type of password	Features
Administrator <i>and</i> power-on password	<ul style="list-style-type: none"><li>• You can type either password to complete the system startup.</li><li>• The administrator password provides access to all choices on the Configuration/Setup Utility main menu. You can set, change, or delete both the administrator and power-on passwords and allow a power-on password to be changed by the user.</li><li>• The power-on password provides access to a limited set of choices on the Configuration/Setup Utility main menu. This limited access might include changing or deleting the power-on password.</li></ul>

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## Using the SCSISelect utility program

SCSISelect is a built-in, menu-driven configuration utility program that you can use to:

- View the default SCSI IDs
- Locate and correct configuration conflicts
- Perform a low-level format on a SCSI hard disk (some servers)

The following sections provide the instructions to start the SCSISelect Utility and descriptions of the available menu choices.

**Note:** If your server has a RAID adapter installed, use the configuration method supplied with the RAID adapter to view or change SCSI settings for attached devices.

### Starting the SCSISelect utility program

Complete the following steps to start the SCSISelect utility program:

1. Turn on the server.
2. When the <<< Press <CTRL><A> for SCSISelect Utility! >>> prompt appears, press Ctrl+A.

**Note:** If an administrator password has been set, you are prompted to type the password to start the SCSISelect Utility program.

3. When prompted, select either channel A (external) or channel B (internal).
4. Use the arrow keys to select a choice from the menu.
  - Press Esc to return to the previous menu.
  - Press F5 to switch between color and monochrome modes (if your monitor permits).
5. Follow the instructions on the screen to change the settings of the selected items; then, press Enter.

### Choices available from the SCSISelect menu

The following choices appear on the SCSISelect Utility menu:

- **Configure/View Host Adapter Settings**

Select this choice to view or change the SCSI controller settings. To reset the SCSI controller to its default values, press F6; then, follow the instructions that appear on the screen.

You can view or change the following controller settings:

  - **Host Adapter SCSI ID**

Select this choice to view the SCSI controller ID, which is usually 7.
  - **SCSI Parity Checking**

The assigned value for this setting is **Enabled**, and it cannot be changed.
  - **Host Adapter SCSI Termination**

The assigned value for this setting is **Enabled**, and it cannot be changed.
  - **Boot Device Options**

Select this choice to configure startable device parameters. Before you can make updates, you must know the ID of the device whose parameters you want to configure.
  - **SCSI Device Configuration**

Select this choice to configure SCSI device parameters. Before you can make updates, you must know the ID of the device whose parameters you want to configure.

**Note:** The Maximum Sync Transfer Rate represents the transfer rate for Ultra SCSI devices.

- The transfer rate for Ultra160 LVD devices is 160.0 MBps.
- The transfer rate for Ultra2 SCSI LVD devices is 80.0 MBps.
- The transfer rate for Fast SCSI devices is 20.0 MBps.

– **Advanced Configuration Options**

Select this choice to view or change the settings for advanced configuration options.

• **SCSI Disk Utilities**

Select this choice to view the SCSI IDs that are assigned to each device or to format a SCSI device.

To use the utility program, select a drive from the list. Read the screens carefully before making a selection.

**Note:** If you press Ctrl+A before the selected drives are ready, an Unexpected SCSI Command Failure screen might appear. Restart the server and watch the SCSISelect messages as each drive spins up. After the drive that you want to view or format spins up, press Ctrl+A.

• **Format Disk**

**Attention:** The Low-Level Format program erases *all* data and programs.

If this choice appears on the SCSISelect menu, select this choice to perform a low-level format on a hard disk drive. Depending on the hard disk drive capacity, the Low-Level Format program could take up to 2 hours.

Use the Low-Level Format program:

- When you are installing software that requires a low-level format
- When you get recurring messages from the diagnostic tests directing you to run the Low-Level Format program on the hard disk drive
- As a last resort before replacing a failing hard disk drive

**Note:** If your server has a PCI RAID adapter installed, see the RAID adapter documentation for instructions for performing low-level formats on hard disk drives attached to the adapter.

To start the Low-Level Format program:

1. If the hard disk drive is working, make a backup copy of all the files and programs on the hard disk. (See your operating-system information for instructions.)
2. Select **Format Disk**; then, follow the instructions on the screen.

**Note:** A hard disk typically contains more tracks than its stated capacity (to allow for defective tracks). A message appears on the screen if the defect limit is reached. If this happens, replace the hard disk drive.

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## Using the ServerGuide Setup and Installation CD

The *ServerGuide Setup and Installation* CD includes an easy-to-use setup and installation program that is specifically designed for your IBM server. The ServerGuide program detects the server model and hardware options that are installed and uses that information during setup to configure the hardware. The ServerGuide program simplifies network operating system (NOS) installations by providing updated device drivers and, in some cases, installing them automatically.

If a later version of the ServerGuide program is available, you can download a free image of the *ServerGuide Setup and Installation* CD, or you can purchase the CD. To download the latest ServerGuide program, 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, see the "ServerGuide Updates" flyer that comes with your server library, or go to the ServerGuide fulfillment Web site at <http://www.ibm.com/pc/coupon/>.

The ServerGuide program has the following features to make setup easier:

- An easy-to-use interface with online help
- Diskette-free setup, and configuration programs that are based on detected hardware
- Performance Optimizer program, which easily tunes your SCSI RAID adapter settings for your server environment
- A system BIOS update program, which updates the BIOS code directly from the CD
- Device drivers that are provided for your server model and detected hardware
- NOS 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-ROM drive. In addition to the *ServerGuide Setup and Installation* CD, you must have your NOS CD to install your NOS.

The ServerGuide program has the following features:

- Sets system date and time.
- Detects the SCSI RAID adapter or controller and runs the SCSI RAID configuration program.
- Updates the licensed internal code (firmware) level without diskettes.
- Checks the system BIOS code and microcode (firmware) levels of supported options to determine whether a later level is available from the CD. You can perform updates without using diskettes.
- Provides the Performance Optimizer program to easily tune your SCSI RAID adapter settings for your server environment.
- Creates a System Partition on the default drive. You can run server-specific utility programs after setup.
- Detects installed hardware options and provides updated device drivers for most adapters and devices.
- Creates a setup-replication diskette for replicating setup selections for other servers of the same model.

- Provides diskette-free installation for supported operating systems.
- Provides a replicated installation path for multiple installations of supported operating systems.
- Includes an online README file with links to tips for your hardware and NOS 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 ServerGuide program checks your system BIOS, service processors, and other system hardware to determine if system updates are available. The setup program provides a list of tasks that are required to set up your server model. On SCSI RAID servers, you can run the SCSI RAID configuration program to create logical drives.

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

When you start the *ServerGuide Setup and Installation* CD, the program performs the following tasks:

- The ServerGuide program prompts you for your language, country, and keyboard layout. (This information is stored and later passed to the NOS installation program.)
- The ServerGuide program displays choices for running the configuration programs. For example:
  - The Express Configuration method runs the required programs for your server, based on the hardware that is detected.
  - The Custom Configuration method displays all programs that are available for your server, and you decide which programs to run.
  - The Replicated Configuration method provides the option of duplicating your setup selections to other servers that are the same model.
- If you select the Custom Configuration method, the following features are optional. If you select the Express Configuration method, some or all of these features are run, depending on the hardware that is detected:
  - The Set Date and Time feature is provided so that you do not have to use the Configuration/Setup Utility program to access these settings.
  - The Clear Hard Disks feature is provided so you can delete all partitions on all hard disk drives. If the server has a SCSI RAID adapter installed, you can select to restore the configuration on the SCSI RAID adapter to the factory default settings.
  - The ServerGuide program checks the server BIOS code and microcode (firmware) levels for supported options and then checks the CD for a newer level. The CD content might be newer than the BIOS code and firmware level. The ServerGuide program can perform a flash update of the BIOS code and supported microcode (firmware) options without using diskettes.
  - The SCSI RAID configuration program starts, leading you through the entire configuration process.
  - The Performance Optimizer program easily tunes your server for your environment.
  - The ServerGuide program creates a System Partition on the default drive.



- The ServerGuide program displays a confirmation summary, so that you will know when you have completed all the required tasks. Then, you are ready to install your NOS.

**Notes:**

1. Plug and Play adapters are configured automatically. Non-Plug and Play adapters or non-IBM adapters might require switch settings, additional device drivers, and installation after the NOS is installed. See the documentation that comes with the adapter.
2. Diagnostics for your server come in BIOS code or on a separate diagnostics CD.

## System Partition

The ServerGuide program creates a 50 MB System Partition on the default drive. The System Partition contains server-specific utility programs such as service processor disk operating system (DOS) utilities, system diagnostics, flash BIOS updates, and other programs. Programs in the System Partition vary by server model, and not all server models run utility programs from the System Partition. To determine which ones do, start the *ServerGuide Setup and Installation* CD and view the online overview.

After setup is complete, you can access programs in the System Partition by restarting the server and pressing Alt+F1 when the prompt is displayed. The **System Partition** menu displays the programs that are available on your server model.

## Typical NOS installation

You can use the ServerGuide program to shorten your installation time. The ServerGuide program provides the device drivers that are required for your hardware and for the NOS that you are installing. This section describes a typical ServerGuide NOS installation.

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

1. After you have completed the setup process, the NOS installation program starts. (You will need your NOS CD to complete the installation.)
2. The ServerGuide program stores information about the server model, service processor, hard disk drive controllers, and network adapters. Then, the program checks the CD for newer device drivers. This information is stored and then passed to the NOS installation program.
3. With some NOS installations, you can create a NOS-replication diskette for setting up additional servers. This diskette contains the Internet protocol (IP) address, server name, and other selections.
4. The ServerGuide program presents NOS partition options that are based on your NOS selection and the installed hard disk drives.
5. If you are installing the NOS from diskette, the ServerGuide program lists the diskettes that you must create and the optional diskettes that you might want to create. The diskettes that you can create are the device-driver diskettes for the installed adapters or controllers.
6. The ServerGuide program prompts you to insert your NOS CD and restart the server. At this point, the installation program for the NOS takes control to complete the installation.

## Setting up or updating multiple servers

You can use the ServerGuide program to create diskettes that help you set up or update multiple servers. You can modify information on the diskettes as you use them to set up or update other servers.

**Note:** Availability and function can vary by server model and by the hardware that is installed.

You can create a setup-replication diskette, which contains your hardware configuration selections. Use this diskette to replicate selections to other servers that are of the same model.

You can create a NOS-replication diskette, which contains information that you need to complete multiple installations. Not all operating systems support NOS-replication diskettes.

## Installing your NOS without ServerGuide

If you have already configured the server hardware and you decide not to use the ServerGuide program to install your NOS, complete the following steps to download the latest NOS installation instructions from the IBM Support Web page:

1. Go to <http://www.ibm.com/pc/support/>.
2. Under **Browse**, click **Servers**.
3. From the **Family** drop-down list, select your server model.
4. If NOS installation instructions are available for your server model, **OS installation** is in the list in the upper-left corner of the Web page. Click **OS installation** and select the instructions for your NOS.

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## Configuring the Gigabit Ethernet controller

The Ethernet controller is integrated on the system board. This controller provides an interface for connecting to 10-Mbps, 100-Mbps, or 1000-Mbps networks and provides full duplex (FDX) capability, which enables simultaneous transmission and reception of data on the Ethernet local area network (LAN). You do not need to set any jumpers or configure the controller for your operating system before you use the Ethernet controller. However, you must install a device driver to enable your operating system to address the Ethernet controller. The device drivers are provided on the *ServerGuide Setup and Installation CD*.

When you connect your server to the network, the Ethernet controller automatically detects the data-transfer rate (10-Mbps, 100-Mbps, or 1000-Mbps) on the network and then sets the controller to operate at the appropriate rate. In addition, if the Ethernet ports that your server is connected to support auto-negotiation, the Gigabit Ethernet controller will set the appropriate duplex state. That is, the Ethernet controller will adjust to the network data rate, whether the data rate is standard Ethernet (10BASE-T), Fast Ethernet (100BASE-TX/1000BASE-T), half duplex (HDX), or full duplex (FDX). The controller supports half-duplex (HDX) and full-duplex (FDX) modes at both speeds.

For information on configuring your Ethernet controller, see the *Broadcom NetXtreme Gigabit Ethernet Software CD* that comes with your server. For updated information about configuring your Ethernet controller, go to the IBM Support Web site at <http://www.ibm.com/pc/support> and navigate to the area for your specific server type. From this area you can download documentation, the most current

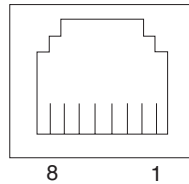
device drivers for your server, and software that supports advanced networking functions. After downloading, run the downloaded program *launch.exe*.

## High-performance Ethernet modes

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

## Ethernet port connector

The following illustration shows the pin-number assignments for the RJ-45 connector. These assignments apply to the 10BASE-T, 100BASE-TX, and 1000BASE-T devices.





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## Chapter 3. Diagnostics

This section provides basic troubleshooting information to help you resolve some common problems that might occur with your server.

If you cannot locate and correct the problem using the information in this section, see Appendix A, “Getting help and technical assistance” on page 167 for more information.

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### General checkout

The server diagnostic programs are stored in upgradeable read-only memory (ROM) on the system board. These programs are the primary method of testing the major components of the server: the system board, Ethernet controller, video controller, RAM, keyboard, mouse (pointing device), diskette drive, serial ports, and hard disk drives. You can also use the diagnostic programs to test some external devices. See “Diagnostic programs and error messages” on page 30.

If you cannot determine whether a problem is caused by the hardware or by the software, you can run the diagnostic programs to confirm that the hardware is working properly.

When you run the diagnostic programs, a single problem might cause several error messages. When this occurs, work to correct the cause of the first error message. After the cause of the first error message is corrected, the other error messages might not occur the next time you run the test.

A failed system might be part of a shared DASD cluster (two or more systems sharing one or more external storage devices). Before you run diagnostics, verify that the failing system is not part of a shared DASD cluster.

A system might be part of a cluster if:

- The system is identified as part of a cluster.
- One or more external storage units are attached to the system and at least one of the attached storage units is also attached to another system or unidentifiable source.
- One or more systems are located near the failing system.

If the failing system is suspected to be part of a shared DASD cluster, you can run all diagnostic tests except the diagnostic tests that test the storage unit (DASD residing in the storage unit) or the storage adapter attached to the storage unit.

#### Notes:

1. For systems that are part of a shared DASD cluster, run one test at a time in looped mode. Do not run all tests in looped mode, because this could enable the DASD diagnostic tests.
2. If multiple error codes are displayed, diagnose the first error code that is displayed.
3. If the computer stops with a POST error, go to “POST error codes” on page 147.
4. If the computer stops and no error is displayed, go to “Undetermined problems” on page 157.
5. For power supply problems, see “Power-supply LED errors” on page 146.
6. For safety information, see “Safety information” on page 169.

7. For intermittent problems, check the error log.

**001 IS THE SYSTEM PART OF A CLUSTER?**

**YES.** Schedule maintenance for the system. Shut down all systems related to the cluster. Run the storage test.

**NO.** Go to step **002** .

**002 IF THE SYSTEM IS NOT PART OF A CLUSTER:**

1. Turn off the server and all external devices.
2. Check all cables and power cords.
3. Set all display controls to the middle position.
4. Turn on all external devices.
5. Turn on the server.
6. Record any POST error messages that are displayed on the screen. If an error is displayed, look up the first error in the “POST error codes” on page 147.
7. Check the information LED panel System Error LED; if it is on, see “Diagnostic panel system error LED” on page 132.
8. Check the System Error log. If an error was recorded by the system, see Chapter 6, “Symptom-to-FRU index” on page 129.
9. Start the diagnostic programs.
10. Check for the following responses:
  - One beep.
  - Readable instructions or the main menu.

**003 DID YOU RECEIVE BOTH OF THE CORRECT RESPONSES?**

**NO.** Find the failure symptom in Chapter 6, “Symptom-to-FRU index” on page 129.

**YES.** Run the diagnostic programs. If necessary, see “Diagnostic programs and error messages” on page 30.

If you receive an error, see Chapter 6, “Symptom-to-FRU index” on page 129.

If the diagnostic programs were completed successfully and you still suspect a problem, see “Undetermined problems” on page 157.

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## Diagnostic tools overview

The following tools are available to help you identify and resolve hardware-related problems:

- **POST beep codes, error messages, and error logs**

The power-on self-test (POST) generates beep codes and messages to indicate successful test completion or the detection of a problem. See “POST error logs” for more information.

- **Diagnostic programs and error messages**

The server diagnostic programs are stored in upgradeable read-only memory (ROM) on the processor board. These programs are the primary method of testing the major components of your server. See “Diagnostic programs and error messages” on page 30 for more information.

- **Light Path Diagnostics**

Your server has light-emitting diodes (LEDs) to help you identify problems with server components. These LEDs are part of the Light Path Diagnostics™ that are built into your server. By following the path of lights, you can quickly identify the type of system error that occurred. See “Identifying problems using status LEDs” on page 32 for more information.

- **Error symptoms**

Other error symptoms, along with suggested steps to correct the problems, are described at “Error symptoms” on page 139.

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## POST error logs

When you turn on the server, it performs a series of tests to check the operation of server components and some of the options that are installed in the server. This series of tests is called the power-on self-test, or POST.

If POST finishes without detecting any problems, a single beep sounds, and the first screen of your operating system or application program appears.

If POST detects a problem, more than one beep sounds, and an error message appears on your screen. See “Beep symptoms” on page 129 and “POST error codes” on page 147 for more information.

**Notes:**

1. If you have a power-on password or administrator password set, you must type the password and press Enter, when prompted, before POST will continue.
2. A single problem might cause several error messages. When this occurs, work to correct the cause of the first error message. After you correct the cause of the first error message, the other error messages usually will not occur the next time you run the test.

The POST error log contains the three most recent error codes and messages that the system generated during POST. The System Error log contains all messages issued during POST and all system status messages from the service processor.

You can view the contents of the System Error log from the Configuration/Setup Utility program or from the diagnostic programs.

## Viewing error logs from the Configuration/Setup Utility program

Start the Configuration/Setup Utility program; then, select **Error Logs** from the main menu. See “Using the Configuration/Setup Utility program” on page 11 for more information.

## Viewing error logs from diagnostic programs

Start the diagnostic programs (“Starting the diagnostic programs” on page 31); select **Hardware Info** from the top of the diagnostic programs screen; select **System Error Log** from the list that appears; then, follow the instructions on the screen.

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## Diagnostic programs and error messages

The server diagnostic programs are stored in upgradeable read-only memory (ROM) on the system board. These programs are the primary method of testing the major components of your server.

Diagnostic error messages indicate that a problem exists; they are not intended to be used to identify a failing part. Troubleshooting and servicing of complex problems that are indicated by error messages should be performed by trained service personnel.

Sometimes the first error to occur causes additional errors. In this case, the server displays more than one error message. Always follow the suggested action instructions for the *first* error message that appears.

The following sections contain the error codes that might appear in the detailed test log and summary log when the diagnostic programs are run.

The error code format is as follows:

fff-ttt-iii-date-cc-text message

where:

- |                     |  |
|---------------------|--|
| <b>fff</b>          | is the three-digit function code that indicates the function being tested when the error occurred. For example, function code 089 is for the microprocessor.                           |
| <b>ttt</b>          | is the three-digit failure code that indicates the exact test failure that was encountered. (These codes are for trained service personnel; see “Diagnostic error codes” on page 135). |
| <b>iii</b>          | is the three-digit device ID. (These codes are for trained service personnel; see “Diagnostic error codes” on page 135).   |
| <b>date</b>         | is the date that the diagnostic test was run and the error recorded.   |
| <b>cc</b>           | is the check value that is used to verify the validity of the information.   |
| <b>text message</b> | is the diagnostic message that indicates the reason for the problem.   |

## Text messages

The diagnostic text message format is as follows:

Function Name: Result (test specific string)

where:



**Function Name**

is the name of the function being tested when the error occurred. This corresponds to the function code (fff) shown in the error code format in the previous section.

**Result**

can be one of the following:

<b>Passed</b>	This result occurs when the diagnostic test is completed without any errors.
<b>Failed</b>	This result occurs when the diagnostic test discovers an error.
<b>User Aborted</b>	This result occurs when you stop the diagnostic test before it is complete.
<b>Not Applicable</b>	This result occurs when you specify a diagnostic test for a device that is not present.
<b>Aborted</b>	This result occurs when the test could not proceed, for example, because of the system configuration.
<b>Warning</b>	This result occurs when a possible problem is reported during the diagnostic test, such as when a device driver is not found.

**test specific string**

is additional information that you can use to analyze the problem.

## Starting the diagnostic programs

You can press F1 while running the diagnostic programs to obtain help information. You also can press F1 from within a help screen to obtain online documentation from which you can select different categories. To exit from the help information and return to where you left off, press Esc.

Complete the following steps to start the diagnostic programs:

1. Turn on the server and watch the screen.

**Note:** To run the diagnostic programs, you must start the server with the highest level password that is set. That is, if an administrator password is set, you must enter the administrator password, not the power-on password, to run the diagnostic programs.

2. When the message F2 for Diagnostics appears, press F2.
3. Type the appropriate password; then, press Enter.
4. Select either **Extended** or **Basic** from the top of the screen.
5. When the Diagnostic Programs screen appears, select the test you want to run from the list that appears; then, follow the instructions on the screen.

**Notes:**

- a. If the server stops during testing and you cannot continue, restart the server and try running the diagnostic programs again. If the problem remains, replace the component that was being tested when the server stopped.
- b. The keyboard and mouse (pointing device) tests assume that a keyboard and mouse are attached to the server.

- c. If you run the diagnostic programs with either no mouse or a USB mouse attached to your server, you will not be able to navigate between test categories using the **Next Cat** and **Prev Cat** buttons. All other functions provided by mouse-selectable buttons are also available using the function keys.
- d. You can test the USB keyboard by using the regular keyboard test. The regular mouse test can test a USB mouse. Also, you can run the USB interface test only if there are no USB devices attached.
- e. You can view server configuration information (such as system configuration, memory contents, interrupt request (IRQ) use, direct memory access (DMA) use, device drivers, and so on) by selecting **Hardware Info** from the top of the screen.

If the diagnostic programs do not detect any hardware errors but the problem persists during normal server operations, a software error might be the cause. If you suspect a software problem, see the information that comes with the software package.

### Viewing the test log

When the tests are completed, you can view the test log by selecting **Utility** from the top of the screen and then selecting **View Test Log**.

#### Notes:

1. You can view the test log only while you are in the diagnostic programs. When you exit the diagnostic programs, the test log is cleared (saved test logs are not affected). To save the test log so that you can view it later, click **Save Log** on the diagnostic programs screen and specify a location and name for the saved log file.
2. To save the test log to a diskette, you must use a diskette that you have formatted yourself; this function does not work with preformatted diskettes. If the diskette has sufficient space for the test log, the diskette may contain other data.

### Viewing the System Error log

You can also view the System Error log from the diagnostic programs. See the instructions in "Viewing error logs from diagnostic programs" on page 30.

## Diagnostic error message tables

For descriptions of the error messages that might appear when you run the diagnostic programs, see "Diagnostic error codes" on page 135.

#### Notes:

1. Depending on your server configuration, some of these error messages might not appear when you run the diagnostic programs.
2. If diagnostic error messages appear that are not listed in the following tables, make sure that your server has the latest levels of BIOS, Advanced System Management Processor, ServeRAID™, and diagnostics microcode installed.

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## Identifying problems using status LEDs

Your server has LEDs to help you identify problems with some server components. These LEDs are part of the Light Path Diagnostics built into the server. By following the path of lights, you can quickly identify the type of system error that occurred.

## LEDs for Active PCI slots

Each Active (hot-plug) PCI slot has two LEDs associated with it: one Power-on LED and one Attention LED. The illustration in “System-board LED locations” on page 49 shows the location of these LEDs.

### Power-on LED

This LED is on when the hot-plug PCI slot has power. An adapter must not be added to or removed from the PCI slot when the Power-on LED is on.

When this LED is off, the hot-plug PCI slot has no power applied. An adapter can be added to or removed from the PCI slot when the Power-on LED is off.

See your operating-system documentation to determine if your operating system supports hot-plug PCI adapters and, if so, how to disable the hot-plug PCI slot.

### Attention LED

Each hot-plug PCI slot has an Attention LED that can be seen from inside the server.

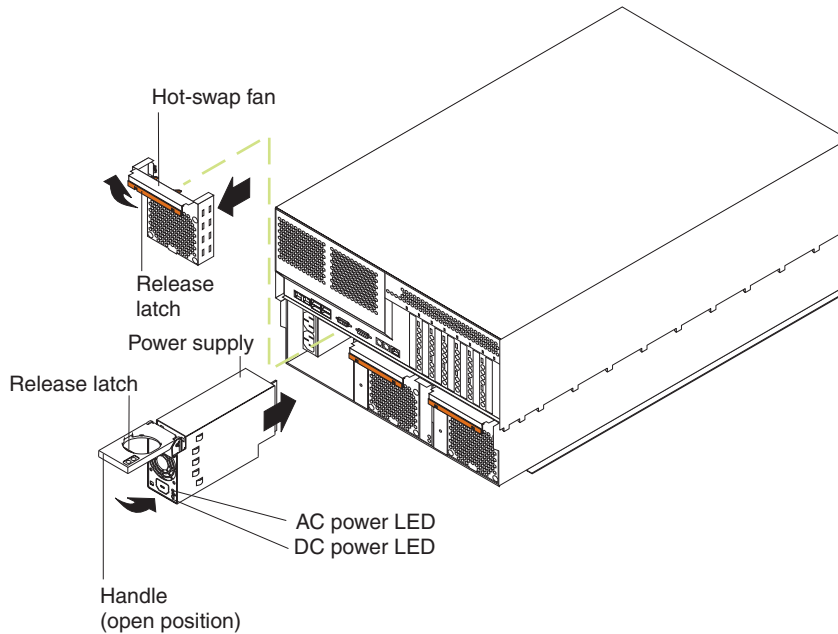
An Attention LED flashes approximately once per second when it is on. The meaning of the Attention LED is defined by your operating system. See your operating-system documentation to determine if your operating system supports hot-plug PCI adapters and, if so, what the Attention LED indicates.

The following table describes the Power-on and Attention LEDs.

Power-on LED	Attention LED	Description and action
On	Flashing	The adapter requires attention. The slot still has power applied. Do not remove or install an adapter in the slot. See your operating-system documentation for instructions.
On	Off	Normal operation; no intervention is required.
Off	Flashing	The adapter requires intervention. Power is removed from the slot. An adapter can be removed or installed in the slot.
Off	Off	Power is removed from the slot. An adapter can be removed or installed in the slot.

## Power-supply LEDs

The ac and dc power LEDs on the power supply provide status information about the power supply. The following illustration shows the location of the ac and dc power LEDs.



The following table describes the ac and dc power LEDs.

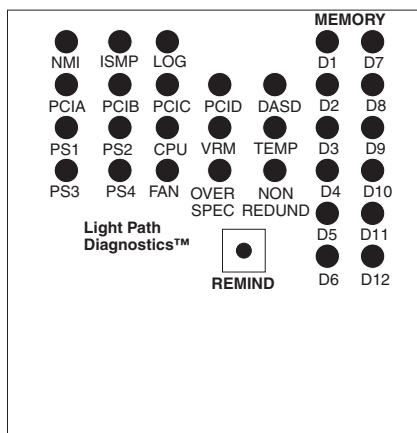
For more information about the ac and dc power LEDs, see “Power-supply LED errors” on page 146.

## Light Path Diagnostics

You can use the Light Path Diagnostics feature built into your server to quickly identify the type of system error that occurred. Your server is designed so that LEDs remain illuminated when the server shuts down, as long as the power supplies are operating properly. This feature helps you to isolate the problem if an error causes the server to shut down.

### Diagnostic panel LEDs

The following illustration shows the location of the error LEDs and the Remind button on the Light Path Diagnostics panel. See “Diagnostic panel system error LED” on page 132 for information on identifying problems using these LEDs.



#### Notes:

1. If the memory is configured for 2-way or 4-way memory interleaving and a single DIMM fails, the lights for all of the interleaved DIMMs on that bank will be lit. See “Memory errors” on page 36.

2. The Light Path Diagnostics panel is also called the LED card or the diagnostic LED panel.
3. Depending on your server model, these items might appear in a different orientation on the Light Path Diagnostics panel.
4. If an integrated system board VRM or memory board VRM has failed, run diagnostics (“Starting the diagnostic programs” on page 31) and see Chapter 6, “Symptom-to-FRU index” on page 129.
5. See the documentation that comes with the system-management software for more information on the ISMP and system-management adapter.

### **Remind button**

You can use the Remind button to place the front panel system-error LED into the Remind mode. By pressing the button, you acknowledge the failure but indicate that you will not take immediate action. If a new failure occurs, the system-error LED will turn on again.

In the Remind mode, the system-error LED flashes every 2 seconds. The system-error LED remains in the Remind mode until one of the following situations occurs:

- All known problems are resolved
- The system is restarted
- A new problem occurs

You can use the Remind button to delay server maintenance until a later time. Also, resetting the system-error LED enables the LED to react to another error. If the LED is still on from the first error, it will not indicate additional errors. If you press the Remind button (causing the LED to flash every 2 seconds) and another error occurs, the LED will stop flashing and will instead be lit continuously to alert you to the new error.

### **Light Path Diagnostics**

The system-error LED on the operator information panel is lit when certain system errors occur. If the system-error LED on your server is lit, you can determine the cause of the error and the action you should take by checking the table at “Diagnostic panel system error LED” on page 132.

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## **Error symptoms**

This section describes methods for troubleshooting other error symptoms.

### **Error symptom charts**

You can use the error symptom charts to find solutions to problems that have definite symptoms (see “Error symptoms” on page 139).

If you cannot find the problem in the error symptom charts, go to “Starting the diagnostic programs” on page 31 to test the server.

### **Small computer system interface messages**

If you receive a SCSI error message when running the SCSISelect Utility program, see “SCSI error codes” on page 154.

**Note:** If your server does not have a hard disk drive, ignore any message that indicates that the BIOS is not installed.

## Memory errors

If the memory is configured for 2-way or 4-way memory interleaving and a single DIMM fails, the lights for all of the interleaved DIMMs on that bank will be lit. Before replacing all DIMMs on that bank:

1. Reseat all DIMMs on that bank.
2. Check for a memory mismatch.
3. Run the diagnostic programs (see “Starting the diagnostic programs” on page 31) and Chapter 6, “Symptom-to-FRU index” on page 129.

If a memory error is identified by the bank in which the failing DIMM is located, use the following table to determine the correct group of DIMMs:

Table 3. Memory bank installation

Pairs	2-way installation order	4-way installation order	Bank number
1	1. D2, D8 (std)	1. D2, D8, D1, D7	Bank 3
2	2. D4, D10	2. D4, D10, D3, D9	Bank 2
3	3. D6, D12	3. D6, D12, D5, D11	Bank 1

## ServerGuide error symptoms

Look for the symptom in the left column of the chart. Probable solutions to the problem are in the right column.

Table 4. ServerGuide Setup and Installation CD

Symptom	Suggested action
The <i>ServerGuide Setup and Installation CD</i> will not start.	<ul style="list-style-type: none"> <li>• Ensure that the server is supported and has a startable (bootable) CD-ROM drive.</li> <li>• If the startup (boot) sequence settings have been altered, ensure that the CD-ROM drive is first in the startup sequence.</li> <li>• If more than one CD-ROM drive is installed, ensure that only one drive is set as the primary drive. Start the CD from the primary drive.</li> </ul>
The SCSI RAID program cannot view all installed drives, or the NOS cannot be installed.	<ul style="list-style-type: none"> <li>• Ensure that there are no duplicate SCSI IDs or IRQ assignments.</li> <li>• Ensure that the hard disk drive is connected properly.</li> </ul>
The Operating System Installation program continuously loops.	Make more space available on the hard disk.
The ServerGuide program will not start your NOS CD.	Ensure that the NOS CD you have is supported by the ServerGuide program. See the <i>ServerGuide Setup and Installation CD</i> label for a list of supported NOS versions.
The NOS cannot be installed; the option is not available.	Ensure that the NOS is supported on your server. If the NOS is supported, either there is no logical drive defined (SCSI RAID systems) or the ServerGuide System Partition is not present. Run the ServerGuide program, and ensure that setup is complete.

## Power checkout

Power problems can be difficult to solve. For example, a short circuit can exist anywhere on any of the power distribution buses. Usually a short circuit will cause the power subsystem to shut down because of an overcurrent condition.

A general procedure for troubleshooting power problems is as follows:

1. Turn off the server and disconnect all ac power cords.
2. Check for loose cables in the power subsystem. Also check for short circuits, for example, if there is a loose screw causing a short circuit on a circuit board.
3. Remove adapters and disconnect the cables and power connectors to all internal and external devices until the server is at the minimum configuration required to start the server (see “Minimum operating requirements” on page 158).
4. Reconnect all ac power cords and turn on the server. If the server starts up successfully, replace adapters and devices one at a time until the problem is isolated. If the server does not start up from the minimal configuration, replace FRUs of minimal configuration one at a time until the problem is isolated.

To use this method, it is important to know the minimum configuration required for a system to start (see page 158). For specific problems, see “Power-supply LED errors” on page 146.

## Troubleshooting the Ethernet controller

This section provides troubleshooting information for problems that might occur with the 10/100/1000 Mbps Ethernet controller.

### Network connection problems

If the Ethernet controller cannot connect to the network, check the following conditions:

- Make sure that the cable is installed correctly.  
The network cable must be securely attached at all connections. If it does the cable is attached but the problem remains, try a different cable.  
If you set the Ethernet controller to operate at either 100 Mbps or 1000 Mbps, you must use Category 5 or higher cabling.
- Determine whether the hub supports auto-negotiation. If it does not, try configuring the integrated Ethernet controller manually to match the speed and duplex mode of the hub.
- Check the Ethernet controller LEDs on the operator information panel and on the rear of the server.

These LEDs indicate whether a problem exists with the connector, cable, or hub.

- The Ethernet transmit/receive activity LED, on the operator information panel, is lit when the Ethernet controller sends or receives data over the Ethernet Network. If the Ethernet transmit/receive activity LED is off, make sure that the hub and network are operating and that the correct device drivers are installed.
- The Ethernet link status LED, on the rear of the server, is lit when the Ethernet controller receives a LINK pulse from the hub. If the LED is off, there might be a defective connector or cable or a problem with the hub.
- Make sure that you are using the correct device drivers which are supplied with your server.
- Check for operating-system-specific causes for the problem.
- Make sure that the device drivers on the client and server are using the same protocol.

- Test the Ethernet controller.

How you test the Ethernet controller depends on which operating system you are using (see the Ethernet controller device driver README file).

### Ethernet controller troubleshooting chart

Use the following troubleshooting chart to find solutions to 10/100/1000 Mbps Ethernet controller problems that have definite symptoms.

Table 5. Ethernet troubleshooting chart

Ethernet controller problem	FRU/actions
The server stops running when loading device drivers.	<p>The PCI BIOS interrupt settings are incorrect.</p> <p>Check the following:</p> <ul style="list-style-type: none"> <li>• Determine if the interrupt (IRQ) setting assigned to the Ethernet controller is also assigned to another device in the Configuration/Setup Utility program.</li> </ul> <p>Although interrupt sharing is allowed for PCI devices, some devices do not function well when they share an interrupt with a dissimilar PCI device. Try changing the IRQ assigned to the Ethernet controller or the other device. For example, for NetWare Versions 3 and 4, it is recommended that disk controllers not share interrupts with LAN controllers.</p> <ul style="list-style-type: none"> <li>• Make sure that you are using the most recent device driver available from the World Wide Web.</li> <li>• Run the network diagnostic program.</li> <li>• Reseat or replace the adapter.</li> </ul>
Ethernet link status LED does not work.	<p>Check the following:</p> <ul style="list-style-type: none"> <li>• Make sure that the hub is turned on.</li> <li>• Check all connections at the Ethernet controller and the hub.</li> <li>• Use another port on the hub.</li> <li>• If the hub does not support auto-negotiation, manually configure the Ethernet controller to match the hub.</li> <li>• If you manually configured the Duplex mode, make sure that you also manually configure the speed.</li> <li>• Run diagnostics on the LEDs.</li> <li>• Reseat or replace the adapter.</li> </ul>
The Ethernet transmit/receive activity LED does not work.	<p>Check the following:</p> <p><b>Note:</b> The Ethernet transmit/receive activity LED is lit only when data is sent to or by this Ethernet controller.</p> <ul style="list-style-type: none"> <li>• Make sure that you have loaded the network device drivers.</li> <li>• The network might be idle. Try sending data from this server.</li> <li>• Run diagnostics on the LEDs.</li> </ul>
Data is incorrect or sporadic.	<p>Check the following:</p> <ul style="list-style-type: none"> <li>• Make sure that you are using Category 5 or higher cabling when operating the server at 100 Mbps or at 1000 Mbps.</li> <li>• Make sure that the cables do not run close to noise-inducing sources like fluorescent lights.</li> </ul>
The Ethernet controller stopped working when another adapter was added to the server.	<p>Check the following:</p> <ul style="list-style-type: none"> <li>• Make sure that the cable is connected to the Ethernet controller.</li> <li>• Make sure that your PCI system BIOS code is current.</li> <li>• Reseat the adapter.</li> <li>• Determine if the interrupt (IRQ) setting assigned to the Ethernet adapter is also assigned to another device in the system. Use the Configuration/Setup Utility program to determine if this is the case.</li> </ul> <p>Although interrupt sharing is allowed for PCI devices, some devices do not function well when they share an interrupt with a dissimilar PCI device. Try changing the IRQ assigned to the Ethernet adapter or the other device.</p> <ul style="list-style-type: none"> <li>• Reseat or replace the adapter.</li> </ul>



Table 5. Ethernet troubleshooting chart (continued)

Ethernet controller problem	FRU/actions
The Ethernet controller stopped working without apparent cause.	Check the following: <ul style="list-style-type: none"> <li>• Run diagnostics for the Ethernet controller.</li> <li>• Try a different connector on the hub.</li> <li>• Reinstall the device drivers. See your operating-system documentation and the ServerGuide information.</li> <li>• Reseat or replace the adapter.</li> </ul>

### Ethernet controller messages

The integrated Ethernet controller might display messages from certain device drivers. The latest information available concerning these messages will be made available at the IBM Support Web site at <http://www.ibm.com/pc/support>.

**Note:** See the documentation on the Broadcom NetXtreme Gigabit Ethernet Software CD that came with the server for information about configuring the Ethernet controller.

---

## Recovering the BIOS code

If your BIOS code has become damaged, such as from a power failure during a flash update, you can recover your BIOS code using the flash ROM page-swap jumper (J50) and a BIOS flash diskette.

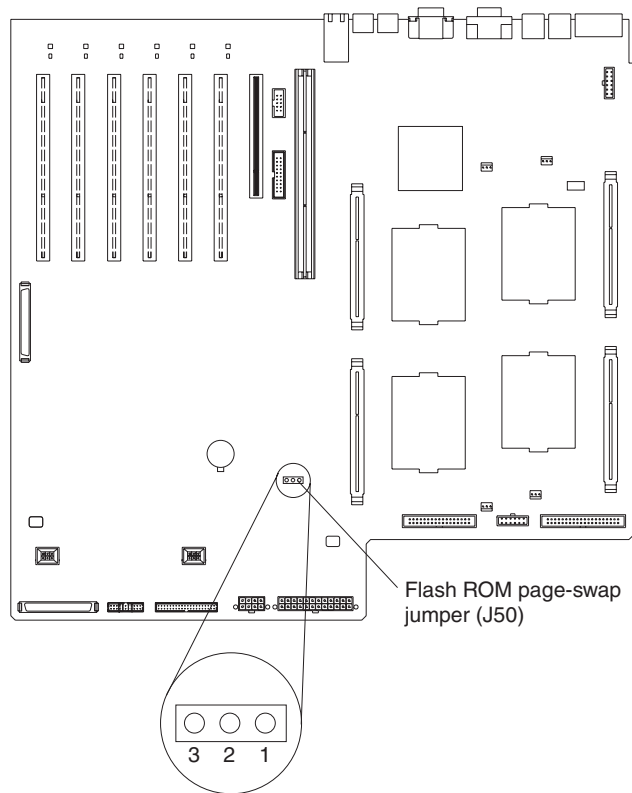
**Note:** Use one of the following methods to obtain a BIOS flash diskette:

- Use the ServerGuide program to make a BIOS flash diskette.
- Download a BIOS flash diskette from the World Wide Web. Go to <http://www.ibm.com/pc/support/>, click **IBM Server Support**, and make the selections for your server.
- Contact your IBM service representative.

The flash memory of your server consists of a primary page and a backup page. The J50 jumper controls which page is used to start the server. If the BIOS code in the primary page is damaged, you can use the backup page to start the server; then, start the BIOS flash diskette to restore the BIOS code to the primary page.

To recover the BIOS code, complete the following steps:

1. Turn off the server and peripheral devices and disconnect all power cords and external cables; then, remove the cover.
2. Locate jumper J50 (flash ROM page-swap) on the system board.



3. Move J50 to pins 2 and 3 to enable BIOS recovery mode.
4. Reconnect all external cables and power cords and turn on the peripheral devices.
5. Insert the BIOS flash diskette into the diskette drive.
6. Restart the server. The system begins the power-on self-test (POST).
7. Select **1 - Update POST/BIOS** from the menu that contains various flash (update) options.
8. When you are prompted whether you want to move the current POST/BIOS image to the backup ROM location, press N.  
**Attention:** If you press Y, the damaged BIOS will be copied into the secondary page.
9. When you are prompted whether you want to save the current code to a diskette, press N.
10. Select your language (0 through 5) and press Enter to accept your choice.
11. **Attention:** Do *not* restart the server at this time. Remove the flash diskette from the diskette drive.
12. Turn off the server.
13. Move J50 to pins 1 and 2 to return to normal startup mode.
14. Restart the server. The system starts up.

---

## Chapter 4. Customer replaceable units

Your server supports many optional devices. This chapter provides instructions to install, remove, and connect the optional devices that your server supports.

---

### Before you begin

Before you begin to install options in your server, read the following information:

- Become familiar with the safety and handling guidelines specified under “Handling static-sensitive devices” on page 42, and read the safety statements in “Safety information” on page 169.
- You do not need to turn off the server to install or replace hot-swap power supplies, hot-swap drives, hot-swap fans, Active™ PCI and Active PCI-X (hot-plug) adapters, or hot-plug Universal Serial Bus (USB) devices.
- The orange color on components and labels in your server identifies hot-swap or hot-plug component. You can install or remove hot-swap and hot-plug components while the system is running, provided that your system is configured to support this function.
- The blue color on components and labels identifies touch points where you can grip a component, move a latch, and so on.
- Make sure that you have an adequate number of properly grounded electrical outlets for your server, monitor, and any other options that you intend to install.
- Back up all important data before you make changes to disk drives.
- For a list of supported options for your server, go to <http://www.ibm.com/pc/us/compat/> on the World Wide Web.

### System reliability considerations

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

- Each of the drive bays has either a drive or a filler panel installed.
- Each of the fan bays has a fan installed.
- The first two power-supply bays have a power supply installed.
- There is at least 50 mm (2 inches) of ventilated space at the sides of the server and 150 mm (6 inches) at the rear of the server.
- The server cover is in place during normal operation.
- The server cover is removed for no longer than 30 minutes while the server is operating.
- A removed hot-swap drive is replaced within 2 minutes of removal.
- Cables for optional adapters are routed according to the instructions provided with the adapters.
- A failed fan is replaced as soon as possible.
- The air baffle is always installed in the server except when you are:
  - Checking the LEDs that are located under the air baffle
  - Installing, removing, disconnecting, or reconnecting the components that are located under the air baffle

### Working inside the server with the power on

Your server supports hot-plug, hot-add, and hot-swap devices and is designed to operate safely while turned on with the cover removed. Follow these guidelines when you work inside a server that is turned on:

- Avoid loose-fitting clothing on your forearms. Button long-sleeved shirts before working inside the server; do not wear cuff links while you are working inside the server.
- Do not allow your necktie or scarf to hang inside the server.
- Remove jewelry, such as bracelets, necklaces, rings, and loose-fitting wrist watches.
- Remove items from your shirt pocket (such as pens or pencils) that could fall into the server as you lean over it.
- Avoid dropping any metallic objects, such as paper clips, hair pins, or screws, into the server.

## Handling static-sensitive devices

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

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

- Limit your movement. Movement can cause static electricity to build up around you.
- Handle the device carefully, holding it by its edges or its frame.
- Do not touch solder joints, pins, or exposed printed circuitry.
- Do not leave the device where others can handle and possibly damage the device.
- While the device is still in its static-protective package, touch it to an unpainted metal part of the system unit 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 your server without setting it down. If it is necessary to set the device down, place it in its static-protective package. Do not place the device on your server cover or on a metal table.
- Take additional care when handling devices during cold weather because heating reduces indoor humidity and increases static electricity.

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## Major components of the xSeries 255 Type 8685 server

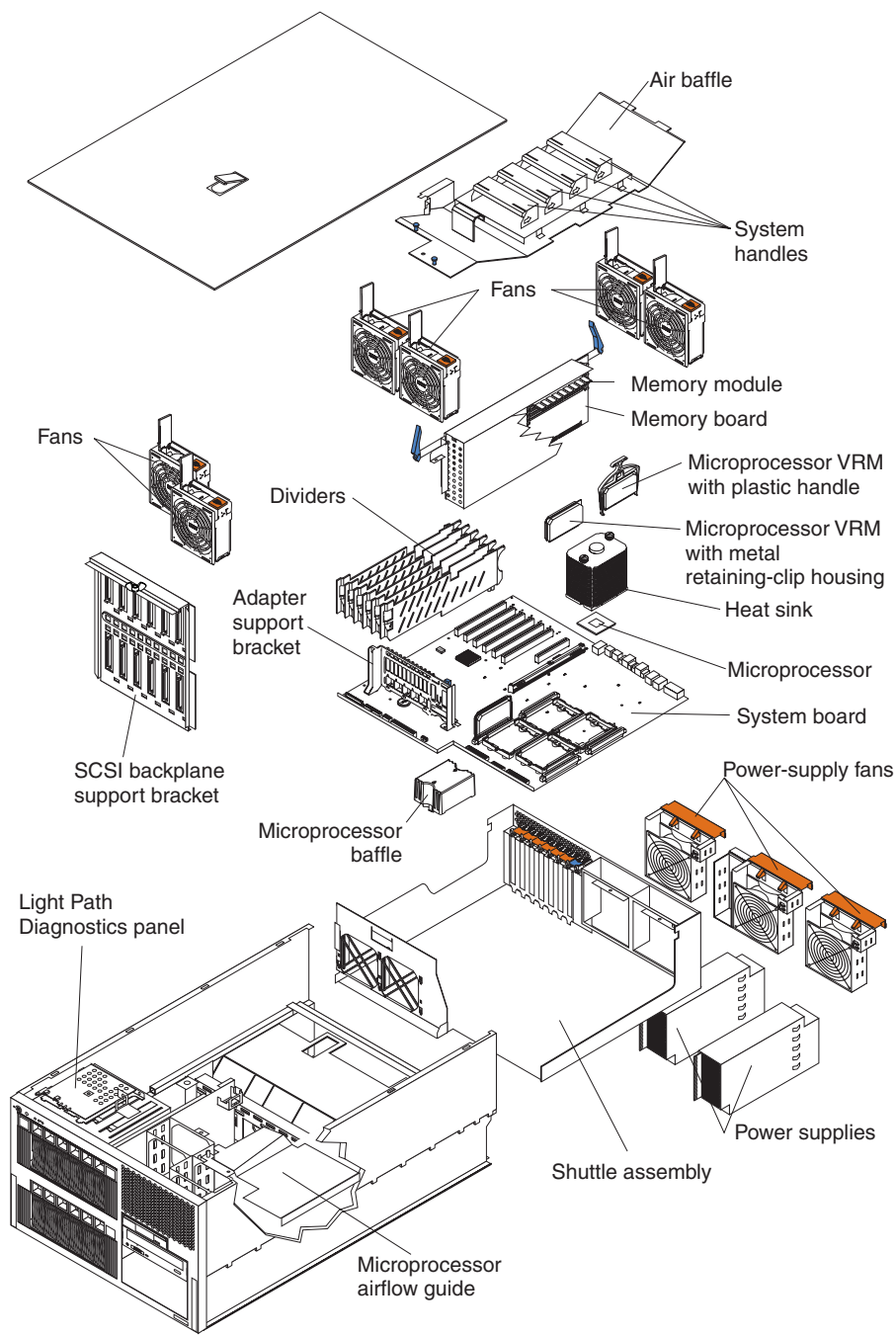
The orange color on components and labels in your server identifies hot-swap or hot-plug components. You can install or remove hot-swap or hot-plug components while the system is running, provided that your system is configured to support this function.

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

The following illustration shows the major components in your server.

**Notes:**

1. The illustrations in this document might differ slightly from your hardware.
2. The xSeries 255 server is also available as a floor-standing tower model that contains the same components as the rack model. The tower model also includes a door with a key lock on the front of the server and wheels on the bottom of the server for easier mobility.

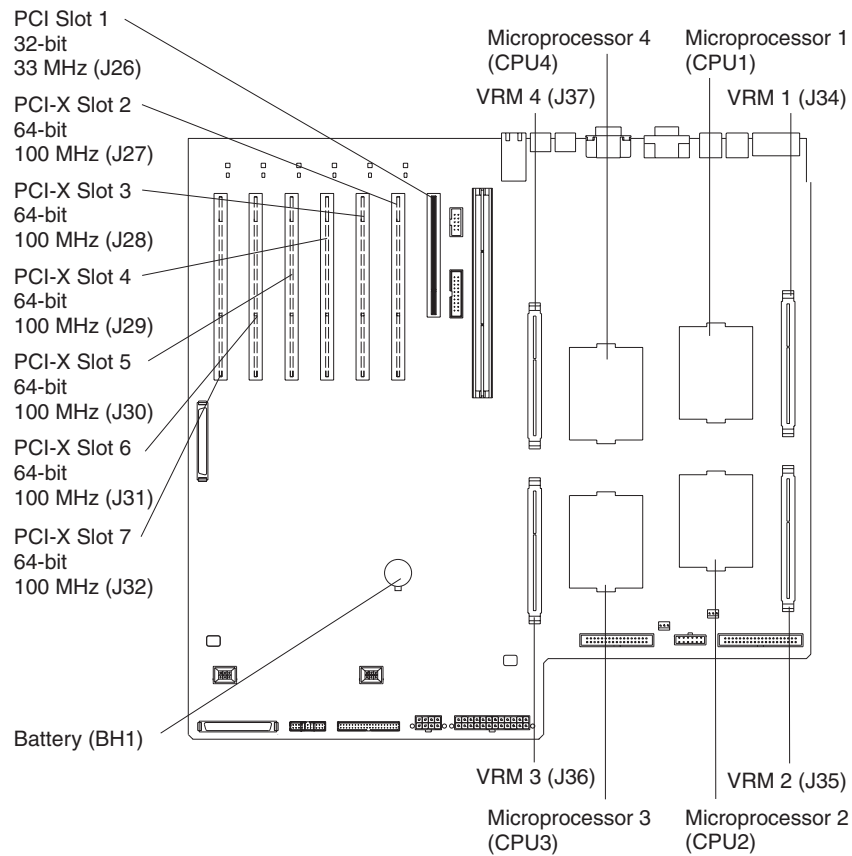


## System-board component locations

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

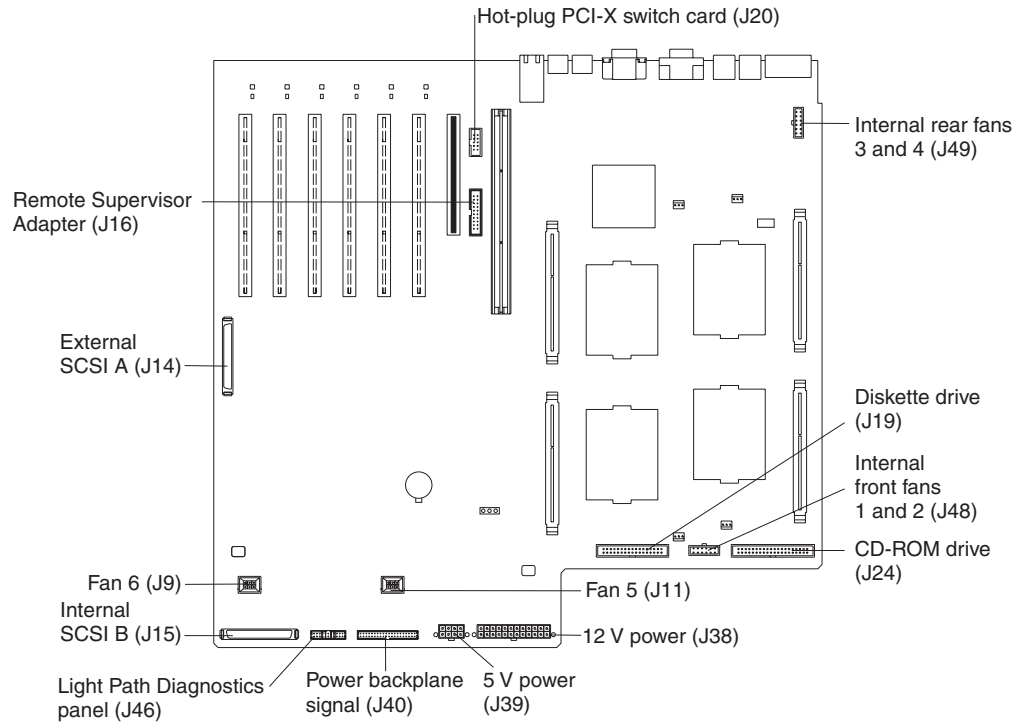
## System-board option connectors

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



## System-board internal cable connectors

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



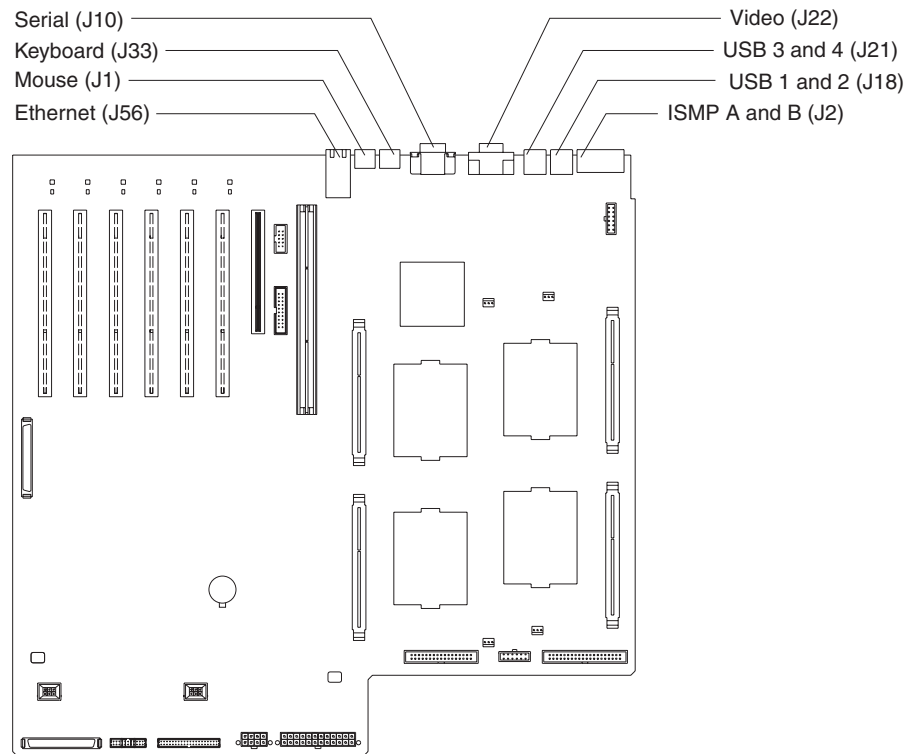
### Notes:

1. The internal center fans are connected directly into the system-board connectors. Cable connectors are not required.
2. A cable is attached to the hot-plug PCI-X switch card connector (J20) on the system board so that the hot-plug function will work properly for PCI-X slots 2 through 7. Do not disconnect this cable.

### Note:

## System-board external port connectors

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

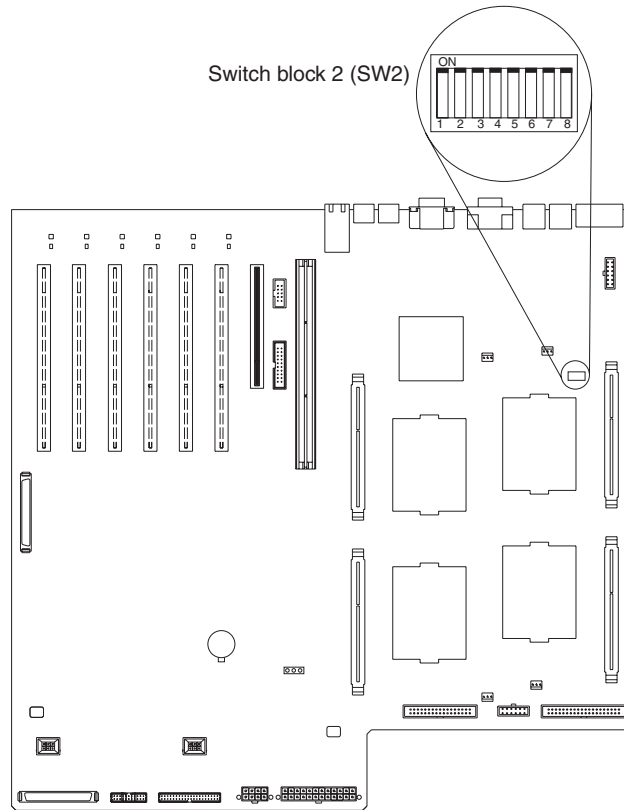


**Note:** ISMP ports (ISMP A and B) are used for the RS-485 interconnect network communications. These ports become inactive if you install an optional IBM Remote Supervisor Adapter in this server. If you install an optional IBM Remote Supervisor Adapter in this server, you must use the RJ-45 connector on the adapter for interconnect network communications.



## System-board switches and jumpers

The following illustration shows the location of the switch block (SW2) on the system board.



The following illustration shows the switches on the switch block (SW2).

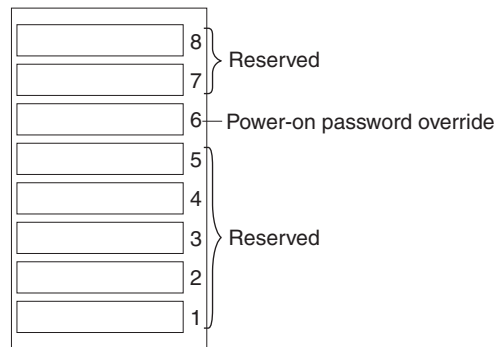
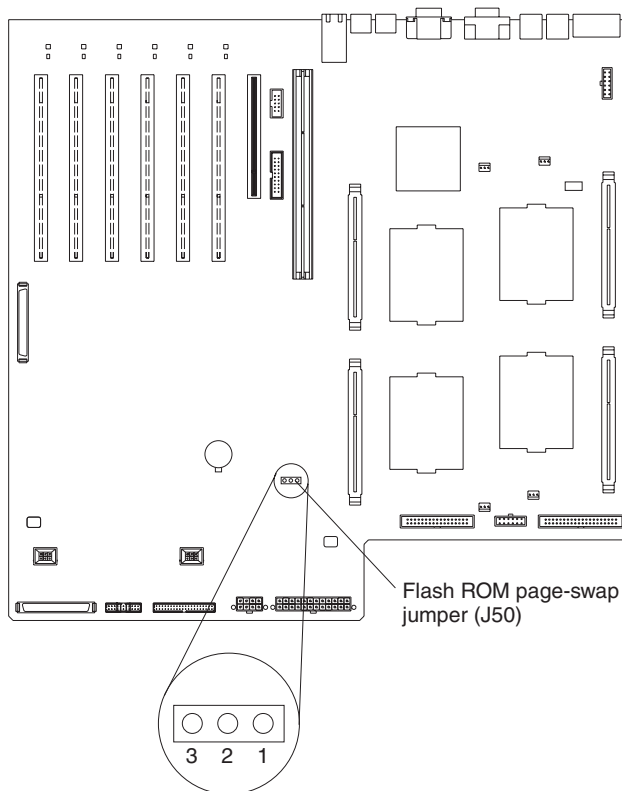


Table 6 describes the function of each switch on the switch block.

Table 6. Switches 1-8

Switch number	Default value	Switch description
7 to 8	Off	Reserved.
6	Off	<p>Power-on password override. Changing the position of this switch bypasses the power-on password check if the switch setting has been changed since the server was last powered on. You do not need to move the switch back to the default position after the password is overridden.</p> <p>Changing the position of this switch does not affect the administrator password check if an administrator password is set.</p> <p>See “Power-on password” on page 16 for additional information about the power-on password.</p>
1 to 5	Off	Reserved.

The following illustration shows the location of the flash ROM page-swap jumper (J50) on the system board. When this jumper is moved to the non-default position, it recovers the server BIOS code (see “Recovering the BIOS code” on page 39). The default position is pins 1 and 2.

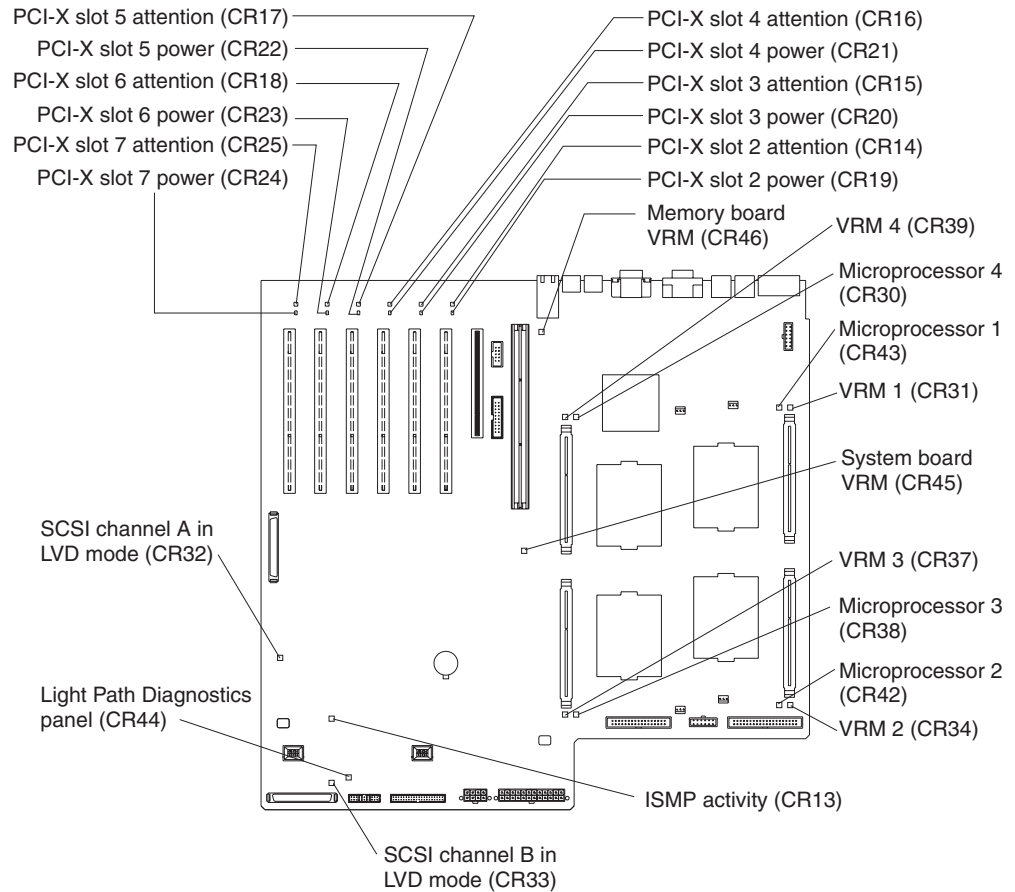


**Notes:**

1. Before changing any switch settings or moving any jumpers, turn off the server; then, disconnect all power cords and external cables.
2. Any system-board switch or jumper blocks that are not shown in the illustrations in this book are reserved.

## System-board LED locations

The following illustration shows the location of the LEDs on the system board. You might need to refer to this illustration when solving problems with the server.

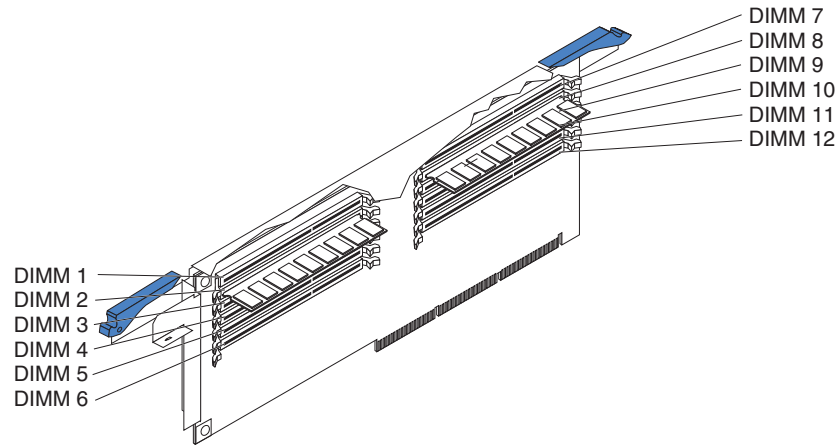


**Important:** The amber CR44 LED also illuminates if the cable interface from the system board to the Light Path Diagnostics panel is missing or incorrectly connected. Therefore, verify that the required cable is present and correctly connected before you replace the Light Path Diagnostics panel.

## Memory-board component locations

The following illustration shows the location of the dual inline memory module (DIMM) connectors on the memory board.

**Note:** The DIMM error LEDs (D1 through D12, not included in this illustration) are located on the Light Path Diagnostics panel (see “Light Path Diagnostics” on page 34).



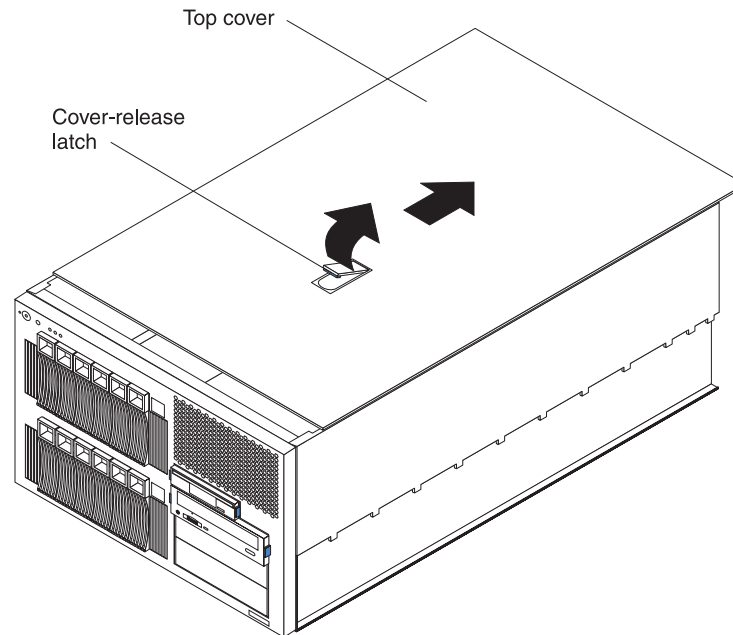
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## Removing the top cover and bezel

The following procedures show how to remove the top cover and bezel or door from your server.

### Removing the top cover (all models)

Complete the following steps to remove the server top cover.



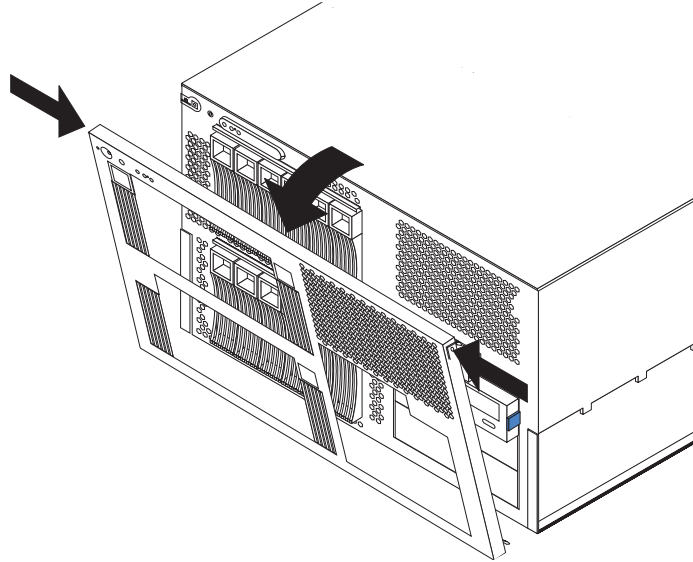
1. Review the information in “Before you begin” on page 41, “Handling static-sensitive devices” on page 42, and “Safety information” on page 169.
2. Lift the plastic cover-release latch near the edge of the top cover.
3. Slide the top cover slightly toward the rear of the server; the cover will stop after moving approximately 25 mm (1 inch). Lift the cover off the server, and set the cover aside.

**Attention:** To maintain proper cooling and airflow, install the server cover before turning on the server. Operating the server for extended periods of time (over 30 minutes) with the server cover removed might damage server components.

### Removing the bezel (rack model)

Before you can install any removable-media drives in a rack model server, you must first remove the bezel.

Complete the following steps to remove the rack model bezel.

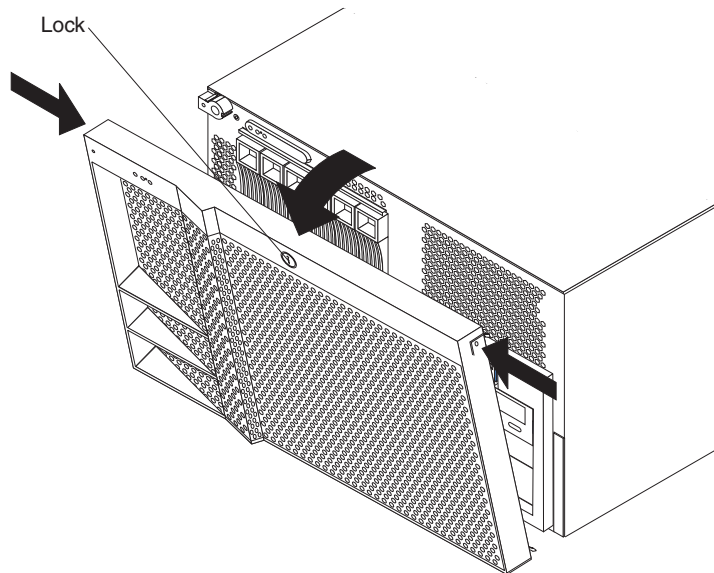


1. Review the information in “Before you begin” on page 41, “Handling static-sensitive devices” on page 42, and “Safety information” on page 169.
2. Press on the two release latches at the top edge of the bezel, and pull the top of the bezel slightly away from the server.
3. Lift the bezel to release the two tabs at the bottom edge of the bezel.
4. Store the bezel in a safe place.

## Removing the bezel (tower model)

Before you can access the controls on the front of a tower model server or install any internal drives in a tower model server, you must first remove the bezel.

Complete the following steps to remove the tower model bezel.



1. Unlock the bezel, if it has not already been unlocked.
2. Press on the two release latches at the top edge of the bezel, and pull the top of the bezel slightly away from the server.

3. Lift the bezel to release the two tabs at the bottom edge of the bezel.
4. Store the bezel in a safe place.

---

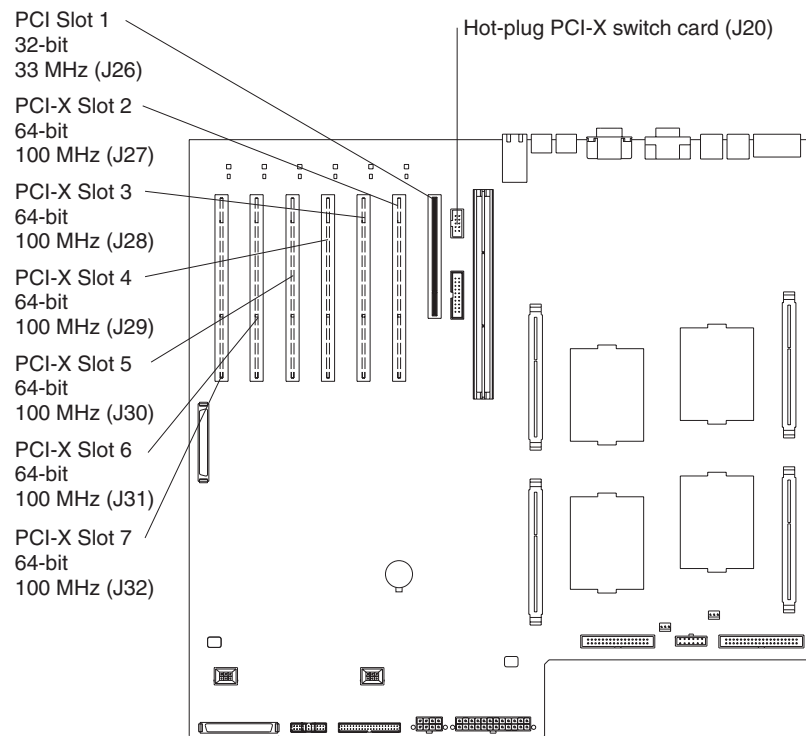
## Working with adapters

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

The following illustration shows the location of the PCI and PCI-X adapter expansion slots on the system board. Slots 2 through 7 are Active PCI-X slots. Active PCI and Active PCI-X slots are also called hot-plug PCI and PCI-X slots.

### Notes:

1. A cable is attached to the hot-plug PCI-X switch card connector (J20) on the system board so that the hot-plug function will work properly for PCI-X slots 2 through 7. Do not disconnect this cable.
2. See “Identifying problems using status LEDs” on page 32 for additional information about identifying problems through LEDs.



## Adapter considerations

Before you install an adapter, review the following:

- Read the documentation that comes with your operating system.
- Locate the documentation that comes with the adapter and follow those instructions in addition to the instructions in this chapter. If you need to change the switch or jumper settings on your adapter, follow the instructions that come with the adapter.
- You can install full-length adapters and non-hot-plug adapters in any expansion slot.

- The 32-bit slot supports 5.0 V and universal PCI and PCI-X adapters; this slot does not support 3.3 V adapters.
- The 64-bit slots support 3.3 V and universal PCI and PCI-X adapters; they do not support 5.0 V adapters.
- If you install an optional IBM Remote Supervisor Adapter in this server, you must install the adapter in PCI slot 1. However, you can install other compatible adapters in this slot.

If you install an optional IBM Remote Supervisor Adapter in the server, use the ribbon cable that comes with the adapter to connect the adapter to the system-management connector (J16) on the system board. The external power adapter that comes with the IBM Remote Supervisor Adapter is not required with this server.

- If you install an optional Integrated xSeries Adapter (IXA) in this server, you must install the adapter in PCI-X slot 2 and move the jumper on J57 to pins 2 and 3 (J57 is located between PCI slots 1 and 2). IXAs are wide and require two adjacent slots; therefore, if you install an IXA in the server, you cannot install an adapter in PCI-X slot 3. In addition, you must remove the divider between PCI-X slots 2 and 3 before you can install an IXA in the server. Go to <http://www.ibm.com/pc/us/compat/> on the World Wide Web for information about the IXAs that this server supports. See the documentation that comes with your IXA for additional information about IXAs.

**Attention:** Although an optional IXA can be installed only in slots 2 through 3, it is not a hot-plug adapter. See “Installing an adapter” on page 55 for instructions for installing a non-hot-plug adapter.

- The server might require additional power supplies if you install adapters that have electrical current requirements that exceed the installed power-supply capabilities.
- The PCI bus configuration is:
  - Non-hot-plug, 32-bit PCI slot 1 (on PCI bus A, 33 MHz, 5.0 V)  
PCI bus A also includes the video controller.
  - Hot-plug, 64-bit PCI-X slots 2 and 3 (on PCI bus B, 100 MHz, 3.3 V)  
PCI bus B also includes the Ethernet controller.
  - Hot-plug, 64-bit PCI-X slots 4 and 5 (on PCI bus C, 100 MHz, 3.3 V)
  - Hot-plug, 64-bit PCI-X slots 6 and 7 (on PCI bus D, 100 MHz, 3.3 V)
  - SCSI controller (on a separate PCI bus operating at 66 MHz).

If there is a PCI bus failure on the SCSI controller, the PCI-A error LED lights.

**Note:** The SCSI controller is on PCI bus 1; PCI bus B is often referred to as bus 2; PCI bus C is often referred to as bus 3; and PCI bus D is often referred to as bus 4. However, the bus numbers vary according to the adapters that are installed.

- If you install an adapter with a speed of less than 100 MHz, the speed of that PCI bus will be reduced to the speed of the slowest device on that bus.

To maintain an optimum speed for the Ethernet controller on PCI bus B (PCI-X slots 2 and 3), install the following types of adapters in PCI-X slots 4 through 7:

- Redundant array of independent disks (RAID) adapters
- 33 MHz or 66 MHz speed adapters
- PCI adapters
- To assign system resources, the system scans the PCI and PCI-X devices in the following order: PCI slot 1, PCI-X slots 4 through 7, system board SCSI devices,



and then PCI-X slots 2 and 3. Then, the system starts (boots) the PCI and PCI-X devices in this order, if you have not changed the default boot precedence.

**Note:** To change the boot precedence for PCI and PCI-X devices, you must disable the devices through the Configuration/Setup Utility program. Start the Configuration/Setup Utility program, and select **Start Options** from the main menu (see “Starting the Configuration/Setup Utility program” on page 11).

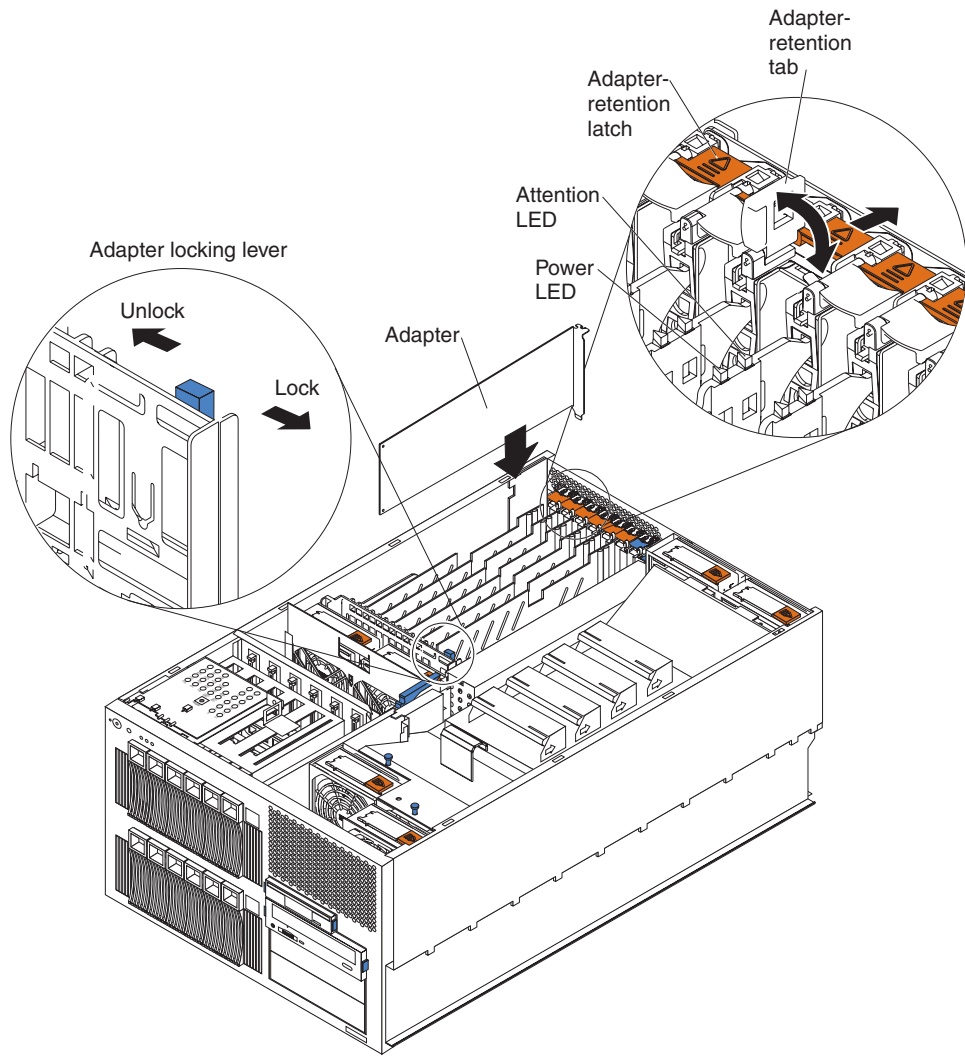
## Installing an adapter

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

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

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

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



Complete the following steps to install an adapter.

**Attention:** When you handle static-sensitive devices, take precautions to avoid damage from static electricity. For details about handling these devices, see “Handling static-sensitive devices” on page 42.

1. Review the information in “Before you begin” on page 41 and “Safety information” on page 169.
2. If you are installing a hot-plug adapter, continue with the next step.  
If you are installing a non-hot-plug adapter, you must turn off the server and peripheral devices and disconnect all power cords and external cables.
3. Remove the server cover (see “Removing the top cover and bezel” on page 51).
4. Select the slot in which you want to install the adapter.

**Note:** PCI-X slots 2 through 7 support hot-plug PCI and PCI-X adapters. If you are using the hot-add feature to install an adapter in PCI-X slot 2 or 3, you must install an adapter with a speed of 100 MHz or higher. This maintains an optimum speed for the Ethernet controller on PCI bus B (PCI-X slots 2 and 3).

5. If you are installing a non-hot-plug adapter, continue with the next step.  
If you are installing a hot-plug adapter or using the hot-add feature, disable the selected PCI-X slot from your operating system. (See the documentation that comes with your operating system for information about disabling a hot-plug PCI-X slot.) Disabling the PCI-X slot turns off the power-on LED for that PCI-X slot.

**Attention:** Make sure that the power-on LED for the hot-plug PCI slot is off before you continue with the next step.

6. Remove the expansion-slot cover:
  - a. Press the adapter-retention latch as indicated by the arrow to move the latch to the unlocked (open) position.
  - b. Lift the adapter-retention tab on the top of the expansion-slot cover; then, remove the expansion-slot cover from the server. Store it in a safe place for future use.

**Attention:** Expansion-slot covers must be installed on all empty slots. This maintains the electronic emissions characteristics of the system and ensures proper cooling of system components.

7. If you are installing a full-length adapter, move the adapter locking lever to the unlocked (open) position on the adapter-support bracket as indicated by the arrows. Otherwise, continue with the next step.
8. See the documentation that comes with your adapter for any cabling instructions. It might be easier for you to route cables before you install the adapter.
9. Touch the static-protective package that contains the adapter to any unpainted metal surface on the server; then, remove the adapter from the package.

**Attention:** Avoid touching the components and gold-edge connectors on the adapter. If you need to place the adapter down before installing it, place the adapter component side up, on a flat, static-protective surface.

10. Set any jumpers or switches on the adapter according to the documentation that comes with the adapter.

11. Install the adapter:
  - a. Carefully grasp the adapter by its top edge or upper corners, and align it with the expansion slot on the system board.
  - b. Press the adapter *firmly* into the expansion slot.

**Attention:** When you install an adapter in the server, be sure that it is completely and correctly seated in the system-board connector. Incomplete insertion might cause damage to the system board or the adapter.
  - c. Lower the adapter-retention tab over the top corner of the adapter. When the adapter-retention tab is completely closed, the adapter-retention latch snaps (locks) into place.
12. If you installed a full-length adapter, move the adapter locking lever to the locked (closed) position on the adapter-support bracket as indicated by the arrows.
13. Connect any needed cables to the adapter.
14. If you installed a non-hot-plug adapter, continue with the next step.

If you installed a hot-plug adapter or used the hot-add feature, enable the PCI-X slot from your operating system. (See the documentation that comes with your operating system for information about enabling a hot-plug PCI-X slot.) Make sure that the power-on LED for the hot-plug PCI-X slot comes on. If the power-on LED does not come on, see “Identifying problems using status LEDs” on page 32.
15. If you have other options to install or remove, do so now; otherwise, go to “Completing the installation” on page 106.

## Cabling a RAID or SCSI adapter

You can install an optional RAID or SCSI adapter in your server to control the internal hot-swap hard disk drives, for example, so that you can configure the internal hot-swap hard disk drives into disk arrays. The illustrations in this section show the cabling for internal hot-swap hard disk drives. You can also cable a RAID or SCSI adapter to external hard disk drives. See your RAID or SCSI adapter option documentation for complete instructions about installing a RAID or SCSI adapter in your server and for additional information about RAID or SCSI adapters.

Your server comes with one SCSI cable. One end of this cable is attached to the connector on the standard SCSI backplane, and the other end is attached to the internal SCSI channel connector (J15) on the system board.

The following procedures describe the single-channel cable routing that is necessary when you install a RAID or SCSI adapter. The illustrations in this section are examples. The cabling that you use for your server depends on your system configuration.

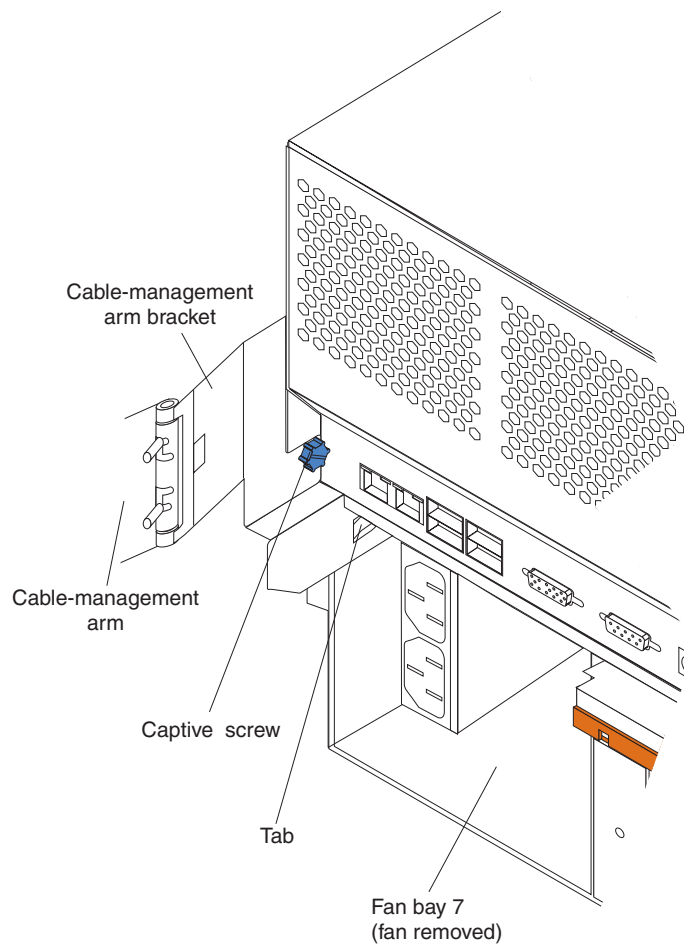
### Notes:

1. For details on connecting two SCSI channels, see “Working with the optional xSeries 6-Pack Hot-Swap Hard Drive Expansion Kit” on page 63.
2. See the documentation that comes with your adapter for any cabling instructions.
3. Cable identifiers are printed on the cables that come with your server and options. Use these identifiers to connect the cables to the correct connectors. For example, the hard disk drive cables are labeled “HDD option.”

## Cabling a single SCSI channel using the standard hot-swap drive SCSI backplane

Complete the following steps to cable a single SCSI channel on a RAID or SCSI adapter using the standard hot-swap drive SCSI backplane:

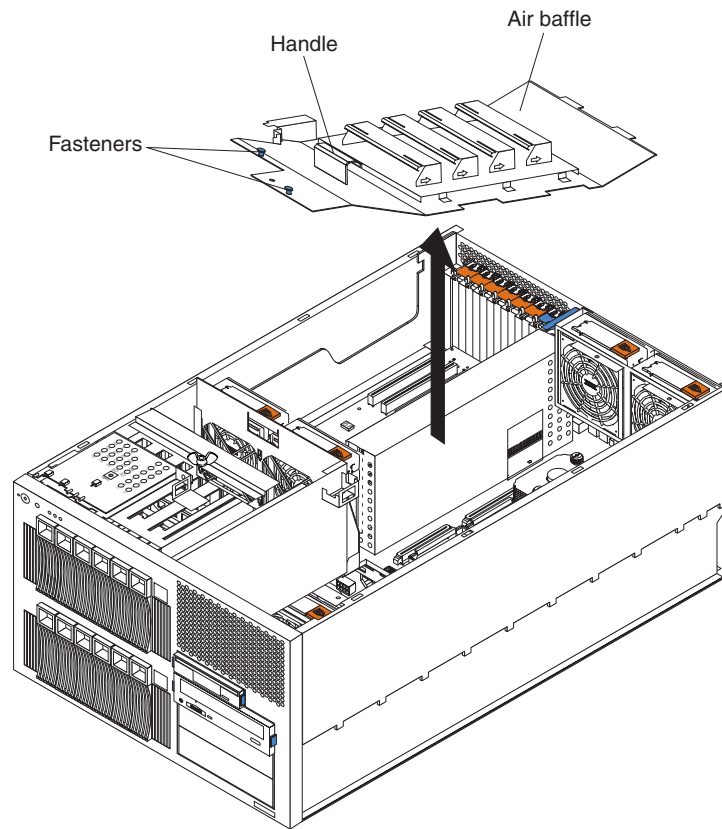
1. Review the information in “Before you begin” on page 41, “Handling static-sensitive devices” on page 42, and “Safety information” on page 169.
2. Turn off the server and peripheral devices and disconnect all power cords and external cables.
3. If your server is a tower model, continue with the next step.  
If your server is a rack model and you have already installed the server in a rack enclosure, you must disconnect the cable-management-arm bracket from the server.
  - a. Disconnect the cable-management-arm bracket from the server.



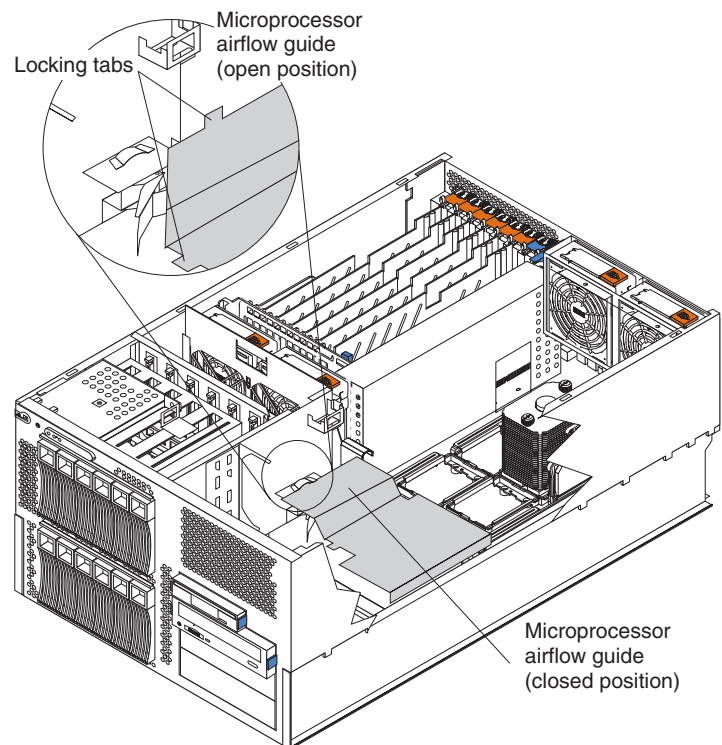
- 1) Loosen the captive screw on the cable-management-arm bracket.
- 2) Slide the tab on the cable-management-arm bracket out of the slot on the server; then, remove the bracket from the server.
- b. Slide the server out of the rack enclosure until it locks into place.
4. Remove the top cover (see “Removing the top cover (all models)” on page 51).
5. Remove the air baffle:
  - a. Pull out the two plastic fasteners on the front of the air baffle.

**Note:** Do not remove the fasteners from the air baffle.

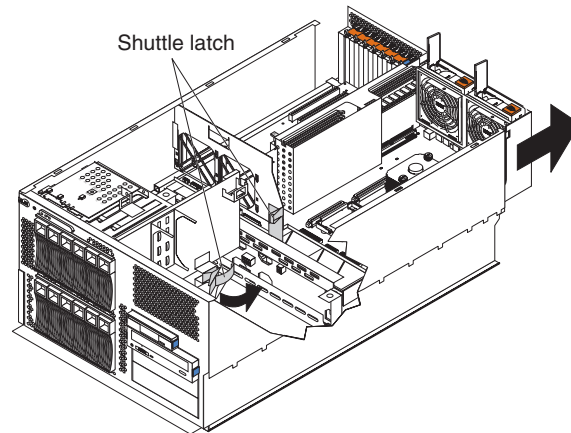
- b. Grasp the handle on the air baffle; then, lift the air baffle from the server.



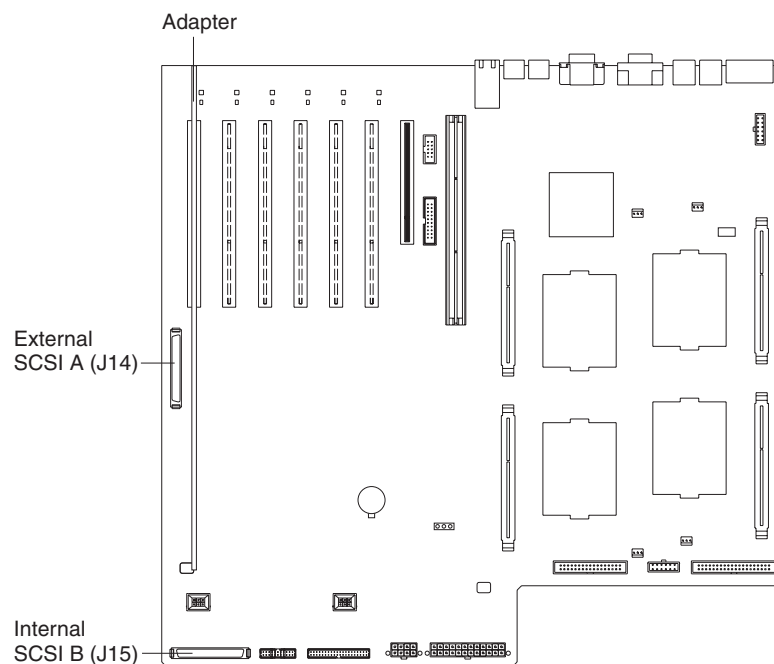
6. Open the microprocessor airflow guide located between the front fans and the microprocessors.



7. Unlock the metal-hinge latch that secures the shuttle assembly in place. Then, slide the shuttle assembly toward the rear of the server, approximately 10 cm (4 in.).



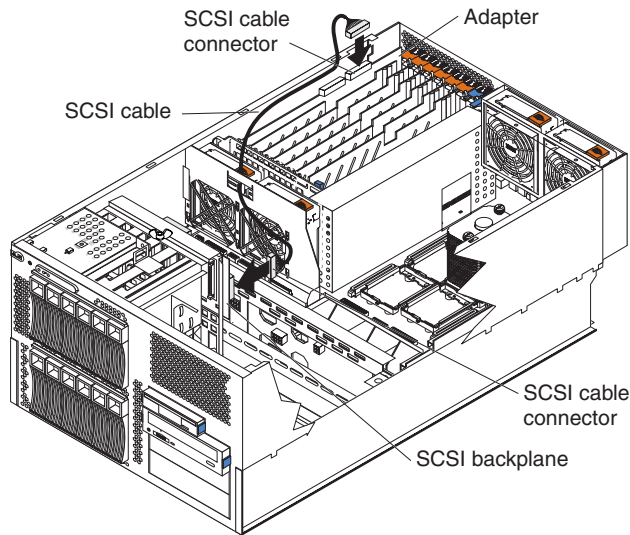
8. Disconnect the internal integrated drive electronics (IDE) signal cable from the IDE system-board connector. Disconnect the diskette-drive signal cable and front-fan signal cable from the corresponding system-board connectors. See “System-board internal cable connectors” on page 45 for cable locations.
9. If you have not yet installed a RAID or SCSI adapter, install it now. Otherwise, continue with the next step. See “Installing an adapter” on page 55 and the option documentation for additional information about installing a RAID or SCSI adapter in your server.
10. Disconnect the SCSI signal cable from the internal SCSI connector (J15) on the system board.



**Attention:** Do not block the ventilated space in front of the fan assembly.

11. Slide the shuttle assembly back into place and secure it by locking the metal-hinge latch.

12. Route the SCSI cable from the standard SCSI backplane through the opening in the adapter-support bracket to the internal channel connector on the RAID or SCSI adapter.

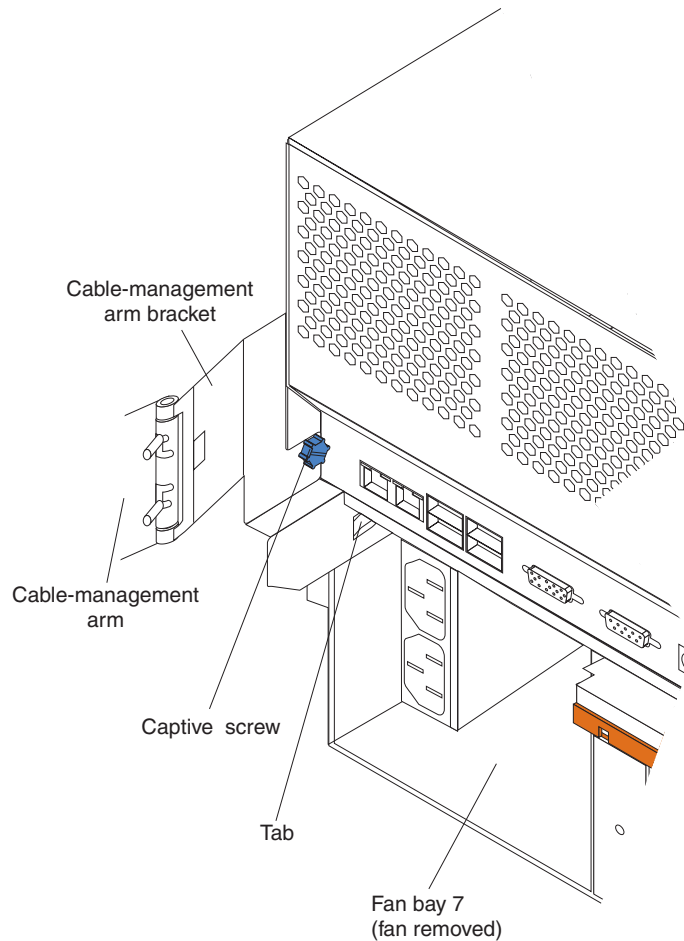


13. Reconnect the internal IDE signal cable to the IDE system-board connector. Reconnect the diskette-drive signal cable and front-fan signal cable to the corresponding system-board connectors. See “System-board internal cable connectors” on page 45 for cable locations.
14. Close the microprocessor airflow guide located between the front fans and the microprocessors. Insert the tabs into the corresponding slots.
15. Reinstall the air baffle:
  - a. Align and insert the two tabs on the rear of the air baffle into the corresponding slots on the rear of the server.
  - b. Align the hole on the front of the air baffle over the corresponding alignment pin on the chassis; then, lower the air baffle into place.

**Note:** The alignment pin is located near the plastic fastener behind fan 1.

  - c. Press firmly on the two plastic fasteners until they snap into place on the front of the air baffle. This secures the air baffle in the server.
16. If your server is a tower model, continue with the next step.  
If your server is a rack model and you have already installed the server in a rack enclosure, you must reconnect the cable-management-arm bracket to the server.
  - a. Slide the server into the rack.
  - b. Reattach the cable-management-arm bracket to the server.





- 1) Remove the fan from fan bay 7.
  - 2) Insert the tab on the cable-management-arm bracket into the corresponding slot on the server.
  - 3) Tighten the captive screw on the cable-management-arm bracket to the server.
  - 4) Reinstall the fan in fan bay 7.
17. If you have other options to install or remove, do so now; otherwise, go to “Completing the installation” on page 106.

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## Working with the optional xSeries 6-Pack Hot-Swap Hard Drive Expansion Kit

Your server contains hardware that enables you to replace a failed hard disk drive without turning off the server. Therefore, you have the advantage of continuing to operate your system while a hard disk drive is removed or installed. These drives are known as *hot-swap* drives. The hot-swap drives are attached to a hot-swap hard disk drive *backplane*. The backplane is a printed circuit board behind the drive bays. For more information about drive bays and drive installation, see “Installing internal drives” on page 73. The low voltage differential (LVD) SCSI hot-swap hard disk drive backplane supports a maximum of six slim-high, hot-swap hard disk drives.

If you install the optional 6-Pack hot-swap drive backplane, you can attach up to six additional drives. The optional xSeries 6-Pack Hot-Swap Hard Drive Expansion Kit contains a hot-swap hard disk drive backplane that you install below the standard hot-swap hard disk drive backplane. Your server supports a maximum of two hot-swap drive backplanes.

You can configure the channels on the two SCSI backplanes as follows:

- You can configure each SCSI channel (bus) independently. This is the only available (typical) backplane configuration. In this configuration:
  - The hard disk drives (bays 1 through 6) that are connected to the standard SCSI backplane are attached to channel B through the internal SCSI connector (J15) on the system board. This is the standard configuration. You can also attach the drives in bays 1 through 6 to an optional RAID or SCSI adapter, as described in this section.
  - The hard disk drives (bays 7 through 12) that are connected to the optional 6-Pack hot-swap drive backplane are attached to an optional RAID or SCSI adapter.

**Notes:**

1. To use the optional xSeries 6-Pack Hot-Swap Hard Drive Expansion Kit, you must install a RAID or SCSI adapter in your server. For more information about installing an adapter, see “Installing an adapter” on page 55.
2. The standard SCSI backplane is also known as the hot-swap hard disk drive backplane.
3. The SCSI backplane that comes with the optional xSeries 6-Pack Hot-Swap Hard Drive Expansion Kit is also known as the 6-Pack backplane.
4. When you install hard disk drives, they must have the same speed. If you install drives with different speeds, the server will operate at the slower speed. For a list of supported options for your server, go to <http://www.ibm.com/pc/us/compat/> on the World Wide Web.
5. Table 12 on page 113 lists the SCSI identifiers (IDs) for the standard SCSI backplane and hard disk drives. Table 13 on page 114 lists the SCSI IDs for the 6-Pack backplane and hard disk drives.
6. Cable identifiers are printed on the cables that come with your server and options. Use these identifiers to connect the cables to the correct connectors. For example, the hard disk drive cables are labeled “HDD option.”

## Installing the optional 6-Pack hot-swap drive backplane

**Note:** The optional xSeries 6-Pack Hot-Swap Hard Drive Expansion Kit might contain some components that you will not need for this procedure. For information about the contents of this option kit, see the documentation that comes with the option kit.

Complete the following steps to install the optional 6-Pack hot-swap drive backplane.

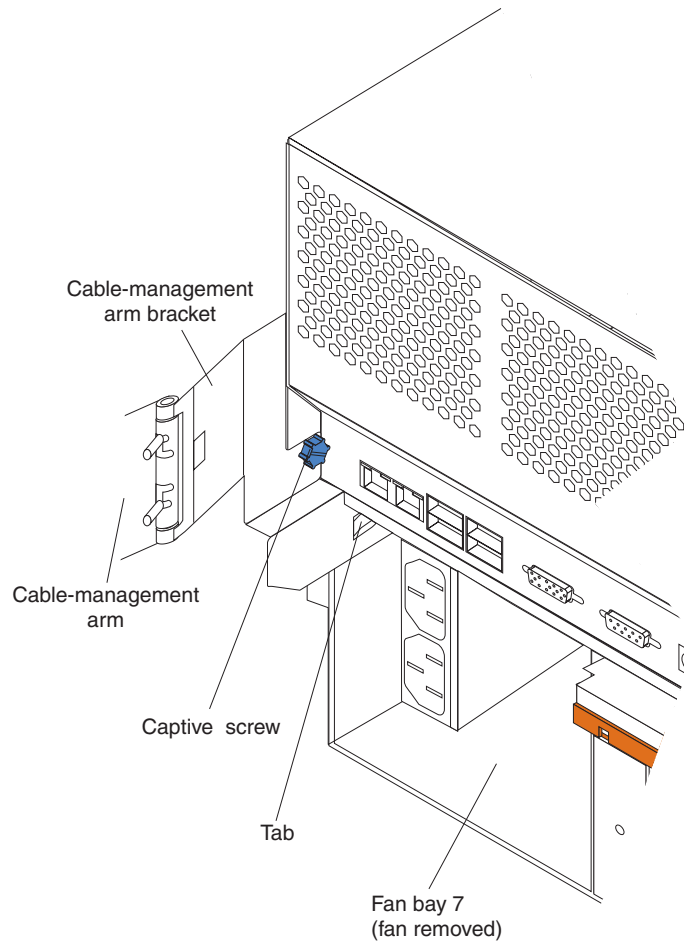
**Note:** The server does not support an optional SCSI repeater card or a single-channel configuration for the hard disk drives.

**Attention:** When you handle static-sensitive devices, take precautions to avoid damage from static electricity. For details about handling these devices, see “Handling static-sensitive devices” on page 42.

1. Review the information in “Before you begin” on page 41 and “Safety information” on page 169.
2. Turn off the server and peripheral devices and disconnect all power cords and external cables.
3. Disconnect all the hot-swap hard disk drives from the standard SCSI backplane; then, slide the drives forward, approximately 7.6 cm (3 in.).

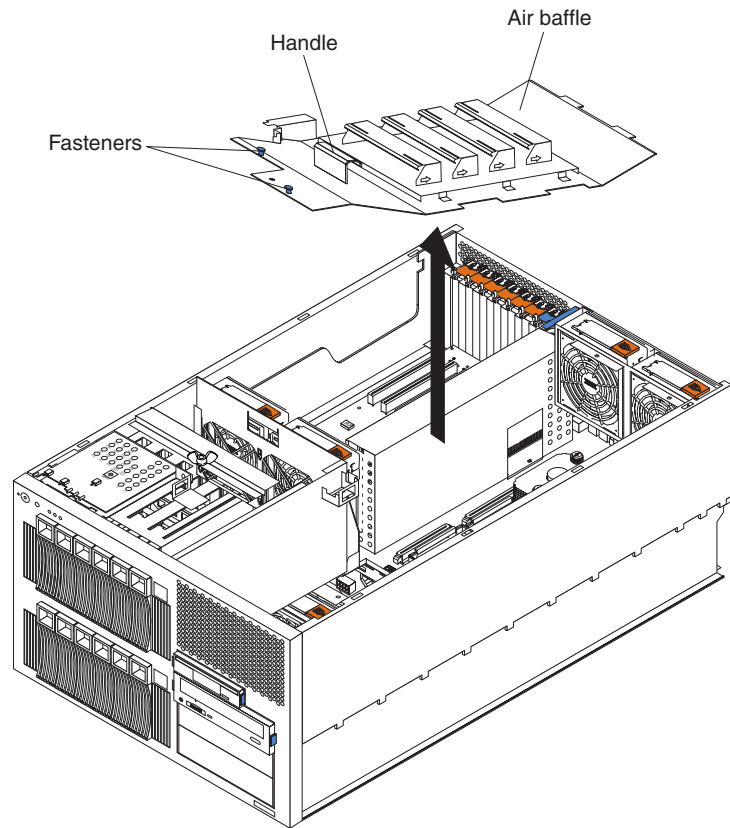
**Note:** It is not necessary to remove the drives from the server.

4. If your server is a tower model, continue with the next step.  
If your server is a rack model and you have already installed the server in a rack enclosure, you must disconnect the cable-management-arm bracket from the server.
  - a. Disconnect the cable-management-arm bracket from the server.

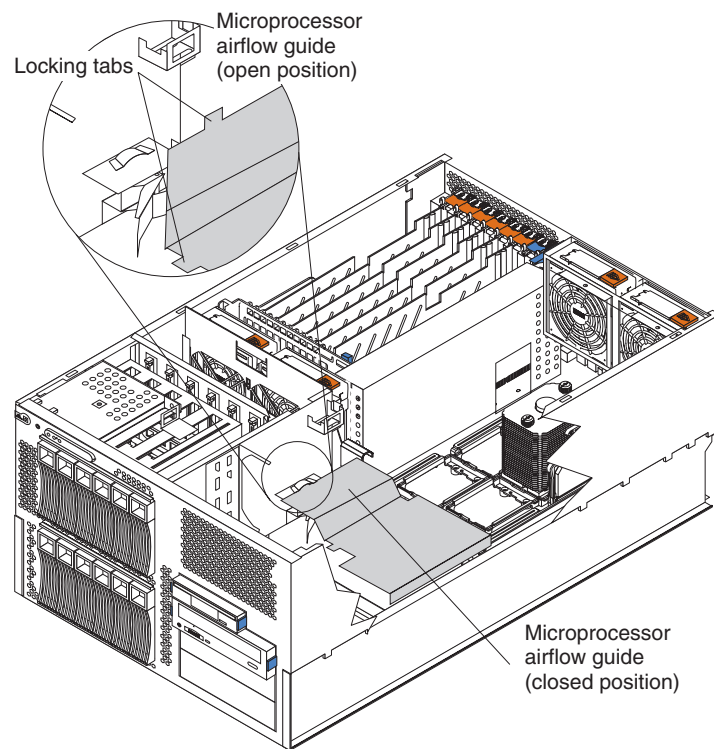


- 1) Loosen the captive screw on the cable-management-arm bracket.
- 2) Slide the tab on the cable-management-arm bracket out of the slot on the server; then, remove the bracket from the server.
  - b. Slide the server out of the rack enclosure until it locks into place.
5. Remove the top cover (see “Removing the top cover (all models)” on page 51).
6. Remove the air baffle:
  - a. Pull out the two plastic fasteners on the front of the air baffle.

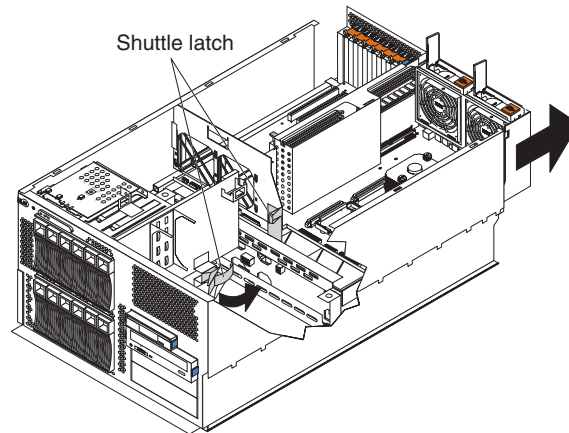
**Note:** Do not remove the fasteners from the air baffle.
  - b. Grasp the handle on the air baffle; then, lift the air baffle from the server.



7. Open the microprocessor airflow guide located between the front fans and the microprocessors.

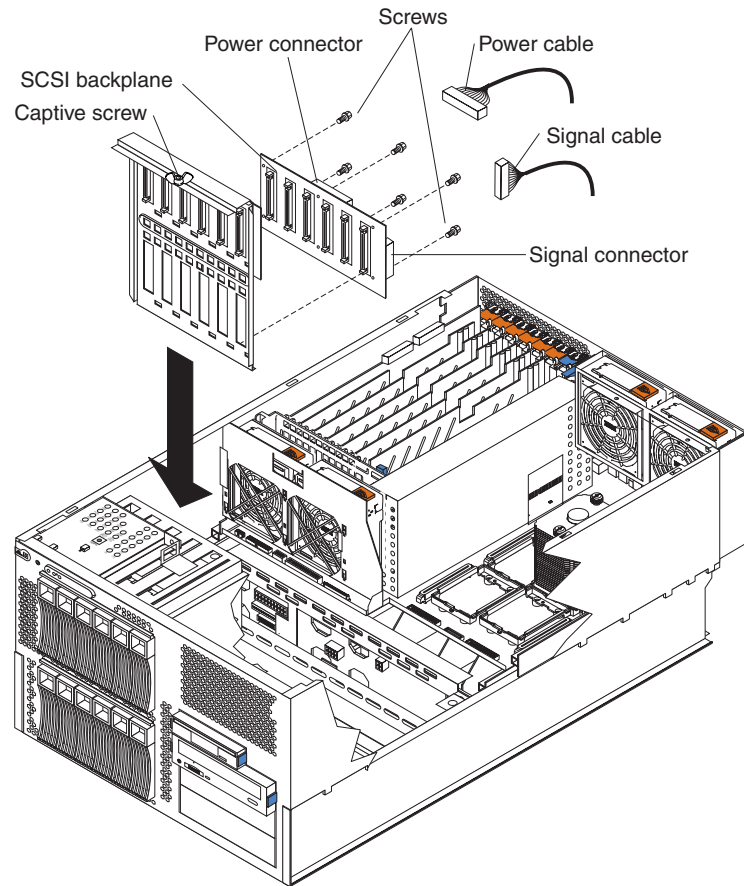


8. Unlock the metal-hinge latch that secures the shuttle assembly in place. Then, slide the shuttle assembly toward the rear of the server, approximately 10 cm (4 in.).



9. Disconnect the internal IDE signal cable from the IDE system-board connector. Disconnect the diskette-drive signal cable and front-fan signal cable from the corresponding system-board connectors. See “System-board internal cable connectors” on page 45 for cable locations.
10. Disconnect the internal cables from the front of the system board, near the center fans. See “System-board internal cable connectors” on page 45 for cable locations.
11. If you have not yet installed a RAID or SCSI adapter, install it now. Otherwise, continue with the next step. See “Installing an adapter” on page 55 and your RAID or SCSI adapter option documentation for additional information about installing a RAID or SCSI adapter in your server and connecting the SCSI cables to a RAID or SCSI adapter.
12. Disconnect the signal and power cables that are attached to the standard SCSI backplane.

13. Loosen the captive screw on top of the metal backplane support bracket by turning the screw counterclockwise. Lift the metal backplane support bracket from the server.

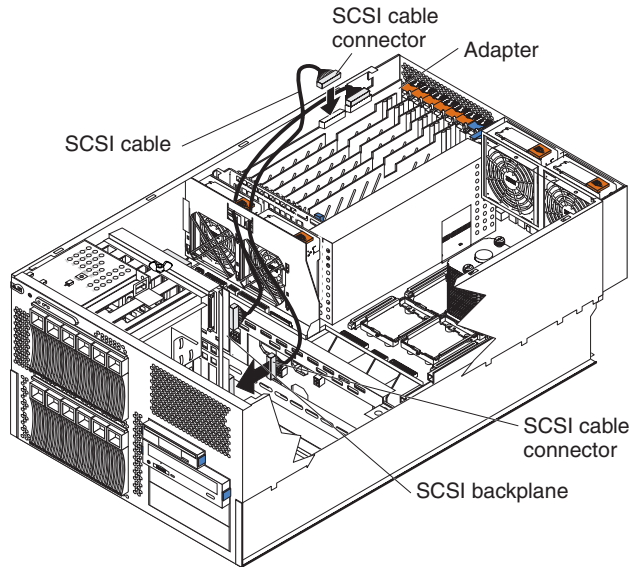


14. Touch the static-protective package that contains the optional SCSI backplane to any unpainted metal surface on the server; then, remove the SCSI backplane from the package and place it on a static-protective surface.
15. Locate the two alignment pins on the metal backplane support bracket. Attach the optional SCSI backplane to the lower drive cage slots on the backplane support bracket by matching the two alignment pins on the rear of the bracket with the corresponding holes on the SCSI backplane. Use the six screws that come with the option kit to secure the SCSI backplane to the backplane support bracket.
16. Reinstall the backplane support bracket in the server. Tighten the captive screw on top of the metal backplane support bracket by turning the screw clockwise until it snaps into place. This secures the backplane support bracket in the server.

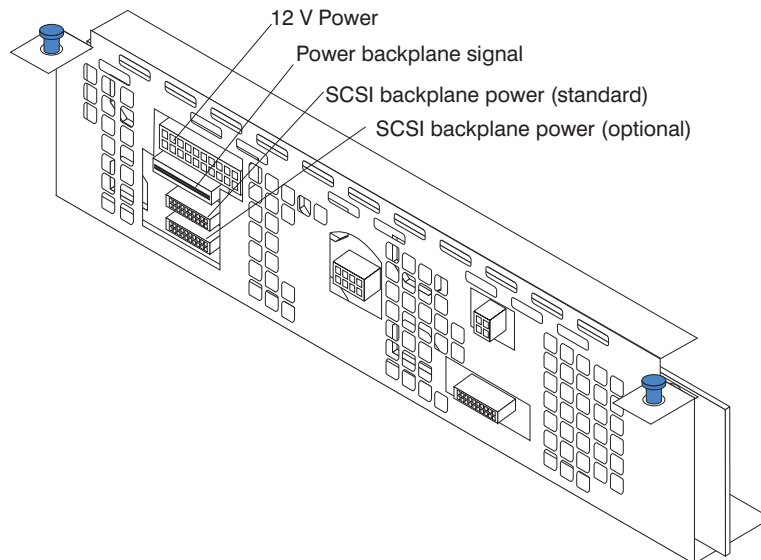
**Note:** Make sure that no cables are under the backplane support bracket.

17. Locate the SCSI signal cable that comes with this option kit.
  - a. Connect the end of the cable that is labeled “HDD backplane” to the new 6-Pack hot-swap drive backplane.
  - b. Route the SCSI signal cable through the opening in the adapter-support bracket. Do not connect the cable to the adapter at this time.

**Attention:** Do not block the ventilated space in front of the fan assembly.



18. Locate the power cable that comes with this option kit.
  - a. Remove the protective cover from the end of the cable and connect one end of the cable to the lower power backplane connector.



- b. Connect the other end of the cable (labeled “HDD2”) to the new 6-Pack hot-swap drive backplane.



19. Reconnect the SCSI signal cable and power cable to the standard SCSI backplane:
  - a. Make sure that one end of the power cable is still connected to the upper power backplane connector.
  - b. Connect the other end of the power cable (labeled “HDD1”) to the standard SCSI backplane.
  - c. Connect the end of the SCSI signal cable that is labeled “HDD backplane” to the standard SCSI backplane.
  - d. If you want to attach the upper drive cage (bays 1 through 6) to a RAID or SCSI adapter, route the SCSI signal cable through the opening in the adapter-support bracket. Do not connect the cable to the adapter at this time.

**Attention:** Do not block the ventilated space in front of the fan assembly. If you do not plan to attach the upper drive cage (bays 1 through 6) to a RAID or SCSI adapter, reconnect the SCSI signal cable to the internal SCSI connector (J15) on the system board.
20. Reconnect the internal cables, except for the IDE signal cable, diskette-drive signal cable, front-fan signal cable, and the cable that you disconnected from the internal SCSI connector (J15) on the system board.
21. Slide the shuttle assembly back into place and secure it by locking the metal-hinge latch.
22. Reconnect the internal IDE signal cable to the IDE system-board connector. Reconnect the diskette-drive signal cable and front-fan signal cable to the corresponding system-board connectors. See “System-board internal cable connectors” on page 45 for cable locations.
23. Close the microprocessor airflow guide located between the front fans and the microprocessors. Insert the tabs into the corresponding slots.
24. Reinstall the air baffle:
  - a. Align and insert the two tabs on the rear of the air baffle into the corresponding slots on the rear of the server.
  - b. Align the hole on the front of the air baffle over the corresponding alignment pin on the chassis; then, lower the air baffle into place.

**Note:** The alignment pin is located near the plastic fastener behind fan 1.
  - c. Press firmly on the two plastic fasteners until they snap into place on the front of the air baffle. This secures the air baffle in the server.
25. In step 17 on page 70, you connected one end of the optional SCSI signal cable to the new 6-Pack hot-swap drive backplane and routed the cable through the opening in the adapter-support bracket. Now complete the procedure by routing the optional SCSI signal cable to a dual-channel RAID or SCSI adapter and connecting the unattached end of the cable to an internal channel connector on the adapter (see “Cabling a RAID or SCSI adapter” on page 58).

**Attention:** Do not block the ventilated space in front of the fan assembly.
26. If you decided to attach the upper drive cage (bays 1 through 6) to a RAID or SCSI adapter in step 19, you must disconnect the SCSI signal cable from the internal SCSI connector (J15) on the system board (see “System-board internal cable connectors” on page 45 for the system-board connector locations). In step 19, you connected one end of the standard SCSI signal cable to the standard SCSI backplane and routed the cable through the opening in the adapter-support bracket. Now complete the procedure by routing the standard SCSI signal cable to the RAID or SCSI adapter and

connecting the unattached end of the cable to an internal channel connector on the adapter (see “Cabling a RAID or SCSI adapter” on page 58).

**Attention:** Do not block the ventilated space in front of the fan assembly.

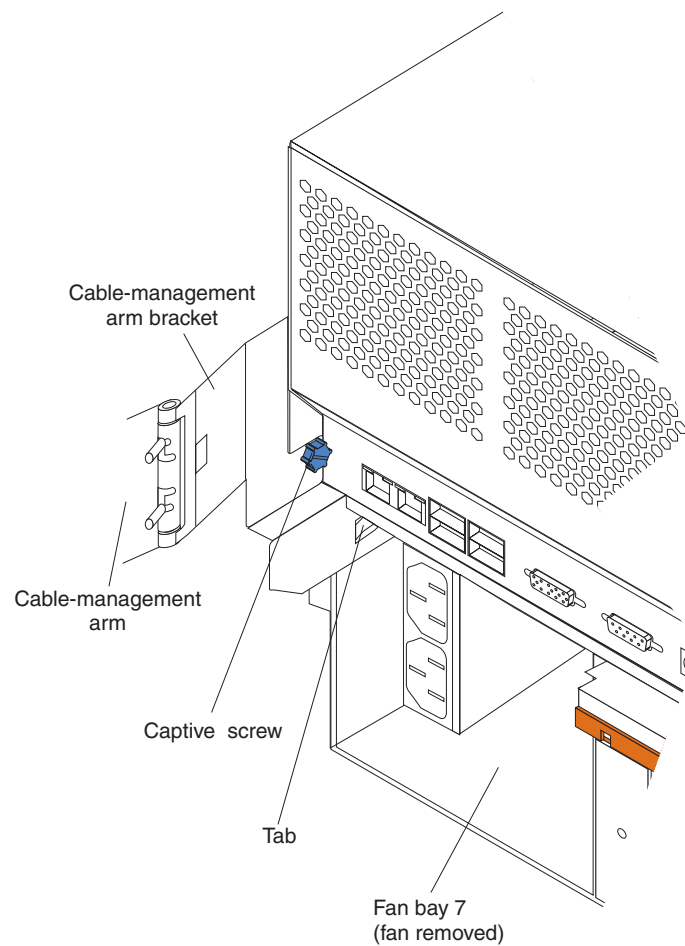
27. Slide the hot-swap hard disk drives back into bays 1 through 6 to reconnect the drives to the standard SCSI backplane.
28. Install additional internal hot-swap hard disk drives in bays 7 through 12 to connect the drives to the optional 6-Pack hot-swap drive backplane (see “Installing a hot-swap hard disk drive” on page 75).

**Note:** The optional 6-Pack hot-swap drive backplane sets the SCSI IDs for these hot-swap hard disk drives. See “Setting SCSI IDs” on page 113 for additional information.

29. If your server is a tower model, continue with the next step.

If your server is a rack model and you have already installed the server in a rack enclosure, you must reconnect the cable-management-arm bracket to the server.

- a. Slide the server into the rack.
- b. Reattach the cable-management-arm bracket to the server.



- 1) Remove the fan from fan bay 7.
- 2) Insert the tab on the cable-management-arm bracket into the corresponding slot on the server.

- 3) Tighten the captive screw on the cable-management-arm bracket to the server.
  - 4) Reinstall the fan in fan bay 7.
30. If you have other options to install or remove, do so now; otherwise, go to “Completing the installation” on page 106.

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## Installing internal drives

If you add different types of drives, your system can read multiple types of media and store more data. Several types of drives are available, such as:

- Diskette
- Hard disk
- CD-ROM
- Tape, including digital linear tape (DLT), super digital linear tape (SDLT), and linear tape-open (LTO)

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

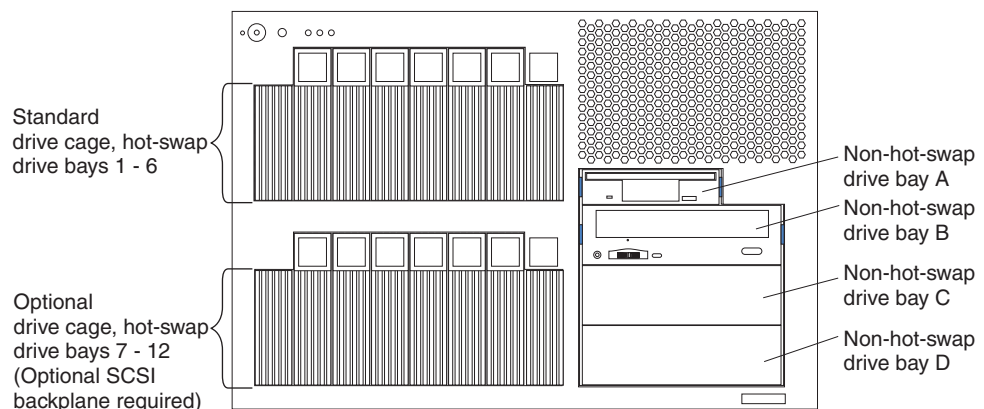
Your server contains hardware that enables you to replace a failed hard disk drive without turning off the server. Therefore, you have the advantage of continuing to operate your system while a hard disk drive is removed or installed. These drives are known as *hot-swap* drives.

Each hot-swap drive has two indicator lights (see “Server controls and indicators” on page 4). If the amber hard disk drive status light for a drive is lit continuously, that individual drive is faulty and requires replacement. When the hard disk drive status light indicates a drive fault, you can replace a hot-swap drive without turning off the server.

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

## Internal drive bays

Internal drives are installed in *bays*. The following illustration identifies the bays for the tower and rack models.



- Your server comes with one integrated drive electronics (IDE) CD-ROM drive and one 3.5-inch, 1.44 MB diskette drive.
- The CD-ROM drive bay (bay B, right front) supports 5.25-inch, half-high, removable-media drives. A CD-ROM drive comes preinstalled in the server.

- You cannot install hot-swap hard disk drives or non-hot-swap hard disk drives in the right-front bays (bays A through D). You can install hot-swap hard disk drives only in the hot-swap hard disk drive bays on the left-front side of the server.
- Your server supports a maximum of six standard 26 mm (1-inch) slim-high, 3.5-inch, hot-swap hard disk drives in the hot-swap bays. The standard hot-swap bays are bays 1 through 6, located in the standard (upper) drive cage.
- You can install six additional hot-swap hard disk drives in the server after you install the optional 6-Pack hot-swap backplane in the optional (lower) drive cage. The optional hot-swap bays are bays 7 through 12, located in the optional (lower) drive cage.
- The SCSI IDs for the hot-swap drives are printed on the bezel, immediately adjacent to the hot-swap drive bays. The IDs are:
  - 0 through 5 for bays 1 through 6
  - 10 through 15 for bays 7 through 12
- The server does not support half-high hot-swap drives.
- To minimize the possibility of damage to the hard disk drives when you are installing a hard disk drive in a rack model, install the rack model in the rack enclosure before installing the hard disk drives.
- You do not have to turn off the server to install hot-swap drives in the hot-swap drive bays. However, you must turn off the server when performing any steps that involve installing or removing cables.
- Before you install any internal drives in a tower model server, you must first remove the bezel (see “Removing the bezel (tower model)” on page 52). Before you install 5.25-inch removable-media drives in a rack model server, you must first remove the bezel (see “Removing the bezel (rack model)” on page 51).
- Your server supports one IDE device. You must first disconnect the IDE cable from the CD-ROM drive that comes with your server and remove the CD-ROM drive before you install another IDE device.

**Note:** Attach the black connector end of the IDE cable to the IDE device; attach the blue connector end of the IDE cable to the system board.

- For a list of supported IDE and SCSI options for your server, go to <http://www.ibm.com/pc/us/compat/> on the World Wide Web.

## Installing a hot-swap hard disk drive

Complete the following steps to install a drive in a hot-swap bay.

**Attention:** When you handle static-sensitive devices, take precautions to avoid damage from static electricity. For details about handling these devices, see “Handling static-sensitive devices” on page 42.

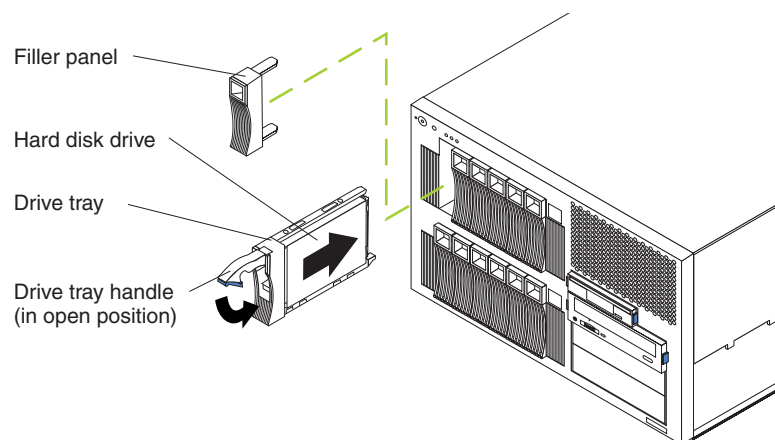
1. Review the information in “Before you begin” on page 41 and “Safety information” on page 169.
2. If you are installing drives in a tower model, remove the bezel (see “Removing the bezel (tower model)” on page 52).
3. Touch the static-protective package that contains the drive to any unpainted metal surface on the server; then, remove the drive from the package and place it on a static-protective surface.
4. Determine the bay into which you will install the drive.

**Note:** If you are installing a hard disk drive in one of the bays 7 through 12 (lower drive cage), you must first install an optional hot-swap SCSI backplane and a SCSI or RAID adapter. See “Working with the optional xSeries 6-Pack Hot-Swap Hard Drive Expansion Kit” on page 63 for complete detailed installation instructions.

5. Remove the filler panel from one of the empty hot-swap bays by inserting your finger into the depression at the left side of the filler panel and pulling the panel away from the server.

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

6. Install the hard disk drive in the hot-swap bay:
  - a. Ensure that the tray handle is open (that is, perpendicular to the drive).
  - b. Align the drive assembly with the guide rails in the bay.
  - c. Gently push the drive assembly into the bay until the drive stops.
  - d. Push the tray handle to the closed (locked) position.



- e. Check the hard disk drive status LED on the front of the drive to verify that the hard disk drive is operating properly.

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

**Note:** If your server has a RAID controller or adapter installed, you might need to reconfigure your disk arrays after installing hard disk drives. See your RAID adapter option documentation for complete instructions for installing a RAID adapter in your server and for additional information about RAID adapters.

7. Reinstall the bezel:
  - If you installed drives in a tower model, see “Installing the bezel (tower model)” on page 107.
  - If you installed drives in a rack model, see “Installing the bezel (rack model)” on page 108.

## Installing a 5.25-inch removable-media drive

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

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

A three-drop power cable and a one-drop IDE signal cable come with your server. Use these cables to connect the removable-media drives. If you plan to install SCSI devices in the removable-media drive bays, you must purchase a SCSI cable or use the cable that comes with your option. Consult your IBM marketing representative or reseller for additional information about the number and types of cables that your server configuration requires.

Before you install a SCSI device, such as a tape drive, you must install a RAID or SCSI adapter in your server and connect the standard hot-swap drive backplane to the RAID or SCSI adapter. Then, you can use a SCSI cable to connect the SCSI device to the internal SCSI connector (J15) on the system board. See “Installing an adapter” on page 55 for additional information.

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

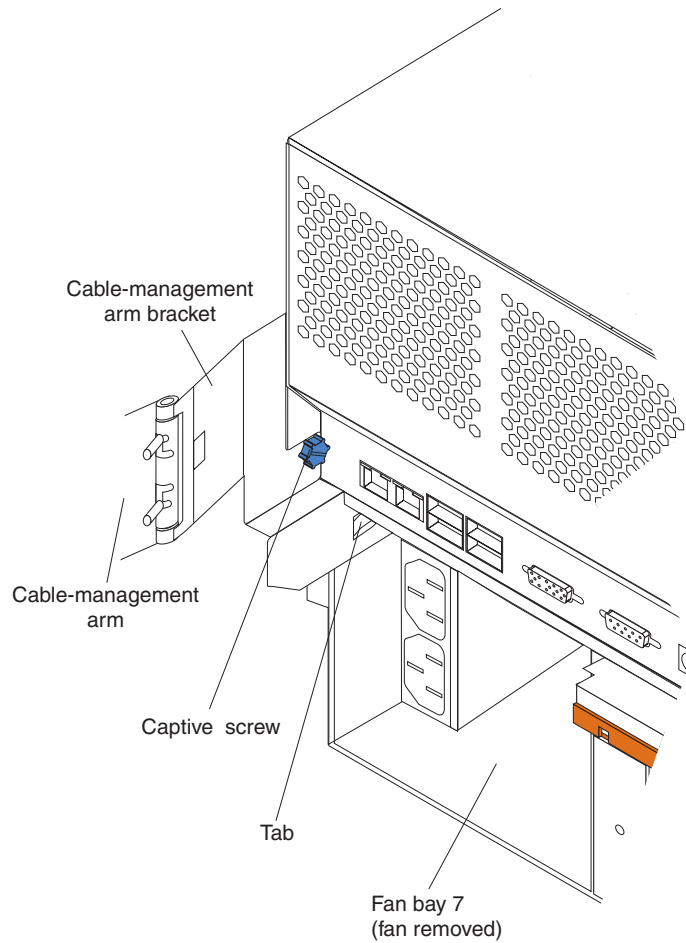
Complete the following steps to install a removable-media drive in bay C or D (see “Internal drive bays” on page 73 for the locations of the drive bays).

**Attention:** When you handle static-sensitive devices, take precautions to avoid damage from static electricity. For details about handling these devices, see “Handling static-sensitive devices” on page 42.

1. Review the information in “Before you begin” on page 41 and “Safety information” on page 169.
2. Turn off the server and peripheral devices and disconnect all power cords and external cables.
3. If your server is a tower model, continue with the next step.

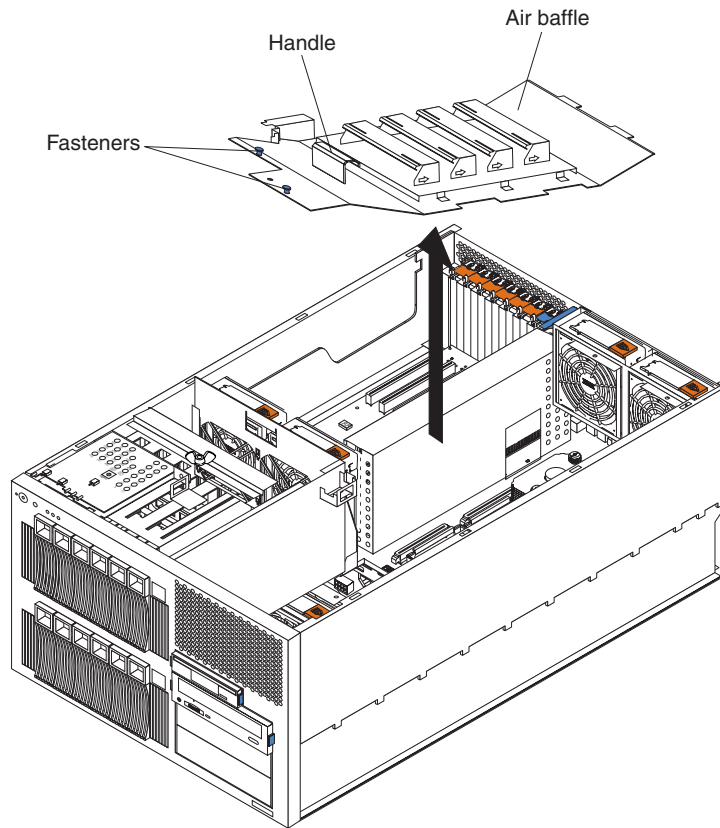
If your server is a rack model and you have already installed the server in a rack enclosure, you must disconnect the cable-management-arm bracket from the server.

  - a. Disconnect the cable-management arm -racket from the server.

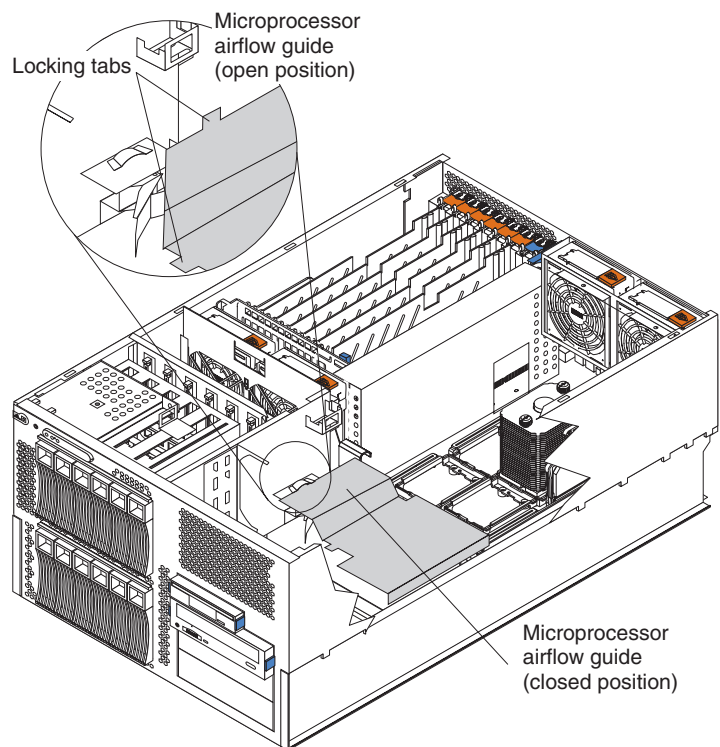


- 1) Loosen the captive screw on the cable-management-arm bracket.
- 2) Slide the tab on the cable-management-arm bracket out of the slot on the server; then, remove the bracket from the server.
  - b. Slide the server out of the rack enclosure until it locks into place.
4. Remove the top cover and bezel (see “Removing the top cover and bezel” on page 51).
5. Remove the air baffle:
  - a. Pull out the two plastic fasteners on the front of the air baffle.

**Note:** Do not remove the fasteners from the air baffle.
  - b. Grasp the handle on the air baffle; then, lift the air baffle from the server.

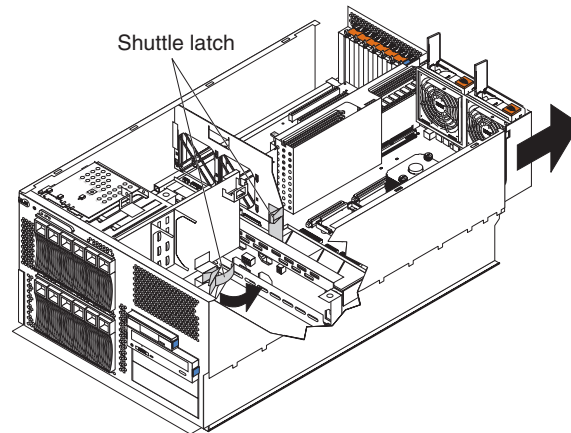


6. Open the microprocessor airflow guide located between the front fans and the microprocessors.

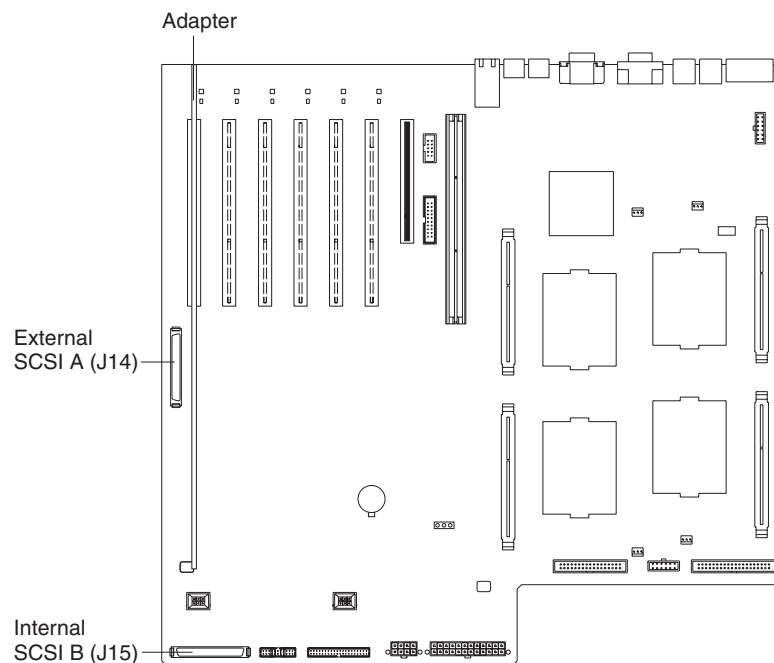




7. Unlock the metal-hinge latch that secures the shuttle assembly in place. Then, slide the shuttle assembly toward the rear of the server, approximately 10 cm (4 in.).



8. Disconnect the internal IDE signal cable from the IDE system-board connector. Disconnect the diskette-drive signal cable and front-fan signal cable from the corresponding system-board connectors. See “System-board internal cable connectors” on page 45 for cable locations.
9. If you have not yet installed a RAID or SCSI adapter, install it now. Otherwise, continue with the next step. See “Installing an adapter” on page 55 and your RAID or SCSI adapter option documentation for additional information about installing a RAID or SCSI adapter in your server and connecting the SCSI cables to a RAID or SCSI adapter.
10. Disconnect the SCSI signal cable from the internal SCSI connector (J15) on the system board.

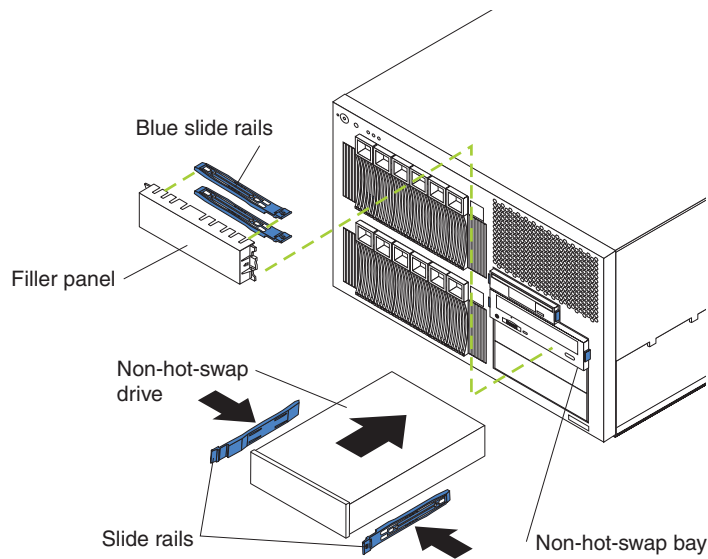


**Attention:** Do not block the ventilated space in front of the fan assembly.

11. Choose the bay in which you want to install the drive.
12. Remove the filler panel from the removable-media bay opening.

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

13. Touch the static-protective package that contains the drive to any unpainted metal surface on the server; then, remove the drive from the package and place it on a static-protective surface.
14. Set any jumpers or switches on the drive according to the documentation that comes with the drive.
15. Install the drive:  
See the following illustration when installing a 5.25-inch removable-media drive.



- Use the blue plastic slide rails that come with the server as described in this step, unless the drive comes with custom metal slide rails.
- If you are installing an SDLT drive, use the custom metal slide rails and screws that come with the option package. Follow the installation instructions that come with the option package; then, continue with step 15c.
- If you are installing a full-high DLT drive, use the custom metal slide rails and screws that are located inside the server, under the microprocessor airflow guide. See the illustration in step 6 on page 78 for the location of the microprocessor airflow guide.

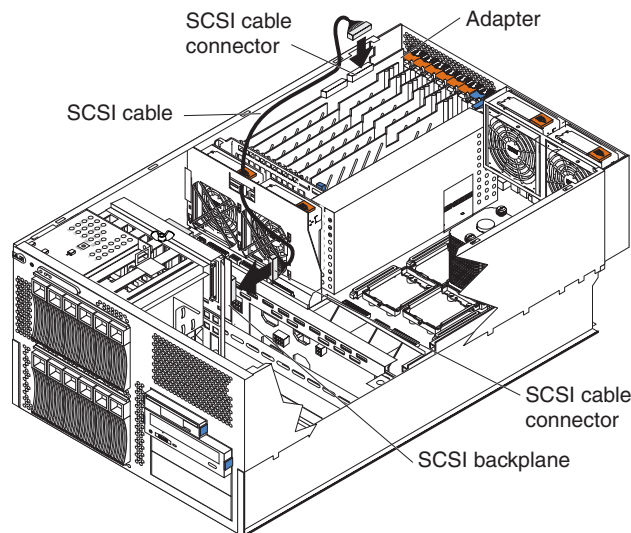
Follow the installation instructions that come with the option package; then, continue with step 15c.

- a. Remove the blue snap-on slide rails from inside the filler panel.
  - b. Clip the slide rails onto the sides of the drive.
  - c. Store the filler panel for later use.
  - d. Align the slide rails on the drive with the guide rails in the bay; then, slide the drive into the bay until it snaps into place.
16. Connect a compatible signal cable to the device that you just installed (see “System-board internal cable connectors” on page 45 for cable locations):
    - If you installed an IDE device, connect the black end of the IDE signal cable to the rear of the IDE device. Make sure that the blue end of the IDE signal cable is still connected to the system board.

- If you installed a SCSI device, install a SCSI signal cable by attaching one end of the cable to the rear of the SCSI device that you installed. Attach the other end of the cable to the internal SCSI connector (J15) on the system board.

**Important:** At this time, you must connect a RAID or SCSI adapter to the hard disk drives in the upper drive cage (see “Cabling a RAID or SCSI adapter” on page 58 for additional information).

17. Connect a power cable to the rear of the drive. A three-drop power cable for removable-media drives comes installed in your server. It is attached to the standard CD-ROM drive. The connectors are keyed and can be inserted only one way.
18. Reconnect the remaining internal cables (if any), except for the IDE signal cable, diskette-drive signal cable, front-fan signal cable, and the cable that you disconnected from the internal SCSI connector (J15) on the system board.
19. Slide the shuttle assembly back into place and secure it by locking the metal-hinge latch.
20. Route the standard SCSI signal cable from the standard SCSI backplane through the opening in the adapter-support bracket to the RAID or SCSI adapter. Connect the unattached end of the cable to an internal channel connector on the adapter (see “Cabling a RAID or SCSI adapter” on page 58).

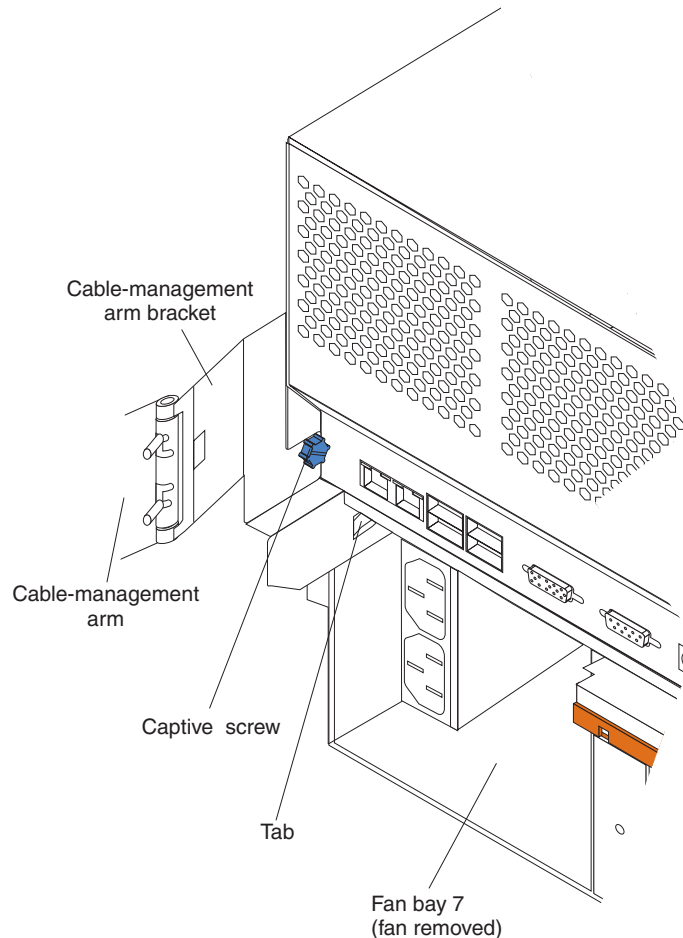


21. Reconnect the internal IDE signal cable to the IDE system-board connector. Reconnect the diskette-drive signal cable and front-fan signal cable to the corresponding system-board connectors. See “System-board internal cable connectors” on page 45 for cable locations.
22. Close the microprocessor airflow guide located between the front fans and the microprocessors. Insert the tabs into the corresponding slots.
23. Reinstall the air baffle:
  - a. Align and insert the two tabs on the rear of the air baffle into the corresponding slots on the rear of the server.
  - b. Align the hole on the front of the air baffle over the corresponding alignment pin on the chassis; then, lower the air baffle into place.

**Note:** The alignment pin is located near the plastic fastener behind fan 1.

- c. Press firmly on the two plastic fasteners until they snap into place on the front of the air baffle. This secures the air baffle in the server.

24. If your server is a tower model, continue with the next step.  
If your server is a rack model and you have already installed the server in a rack enclosure, you must reconnect the cable-management-arm bracket to the server.
- Slide the server into the rack.
  - Reattach the cable-management-arm bracket to the server.



- 1) Remove the fan from fan bay 7.
  - 2) Insert the tab on the cable-management-arm bracket into the corresponding slot on the server.
  - 3) Tighten the captive screw on the cable-management-arm bracket to the server.
  - 4) Reinstall the fan in fan bay 7.
25. If you have other options to install or remove, do so now; otherwise, go to “Completing the installation” on page 106.

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## Installing memory modules

Adding memory to your server is an easy way to make programs run faster. You can increase the amount of memory in your server by installing memory-module options. When you install memory, you must install a set of two or four matched dual inline memory modules (DIMMs).

Before you install memory, review the following:

**Notes:**

1. The DIMM options available for your server are 256 MB, 512 MB, and 1 GB. Your server supports a minimum of 512 MB and a maximum of 12 GB of system memory.
2. The amount of usable memory will be reduced depending on the system configuration. A certain amount of memory must be reserved below the amount of installed memory for system resources. The BIOS will display the amount of installed memory.
3. Your server comes with a minimum of two 256 MB DIMMs (for a total of 512 MB memory) installed in the DIMM 2 and DIMM 8 memory connectors (D2 and D8, respectively). You must have DIMMs installed in these connectors at all times.
4. When you install additional DIMMs, be sure to install them in pairs or quads and follow the DIMM installation sequence in the illustration in this section. A pair or quad is also known as a memory bank. See Table 7 on page 84 for the DIMM connectors in each pair or quad.
5. All the DIMMs in a single pair or quad must be the same size, speed, and type.
6. Multiple pairs or quads of DIMMs do not have to contain DIMMs of the same size, speed, and type, unless the Hot Spare Memory feature is enabled.
7. The memory board contains 12 DIMM connectors and supports two-way and four-way memory interleaving.

To use the four-way memory interleaving technology in your server, you must install DIMMs in all four connectors in each populated set.

8. Install only 2.5 V, 184-pin, 72-bit, 100 MHz, double-data-rate (DDR), PC1600, registered synchronous dynamic random-access memory (SDRAM) dual inline memory modules (DIMMs) with error correcting code (ECC). Only 100 MHz, 72-bit, registered, synchronous memory is supported for the 256 MB, 512 MB, and 1 GB DIMMs. These DIMMs must be compatible with the latest PC1600 SDRAM Registered DIMM specification. For a list of supported options for your server, go to <http://www.ibm.com/us/compat/> on the World Wide Web.
9. Installing or removing DIMMs changes the configuration information in the server. The Configuration/Setup Utility program automatically saves the new configuration information. When you restart the server, the system displays a message indicating that the memory configuration has changed (see “Starting the Configuration/Setup Utility program” on page 11).
10. Your server supports the Hot Spare Memory feature in the event of an active memory pair or quad of DIMM failure. This feature, when enabled, disables the failed memory from the system configuration and activates a Hot Spare Memory pair or quad of DIMMs to replace the failed pair or quad of DIMMs. Before you can enable this feature, you must also install at least one additional pair or quad of DIMMs as described in this book. To ensure proper server operation and to avoid disabling the Hot Spare Memory feature, all additional pairs or quads of DIMMs must be the same size, speed, and type as the failed pair or quad of DIMMs.

You can enable the Hot Spare Memory feature through the Configuration/Setup Utility program (see “Starting the Configuration/Setup Utility program” on page 11). After you enable the Hot Spare Memory feature, the Configuration/Setup Utility program assigns the Hot Spare Memory bank according to your server configuration. If your server has a two-way interleaved configuration, the Hot Spare Memory bank becomes the DIMMs in connectors D2 and D8. If your server has a four-way interleaved configuration, the Hot Spare Memory bank becomes the DIMMs in connectors D1, D2, D7, and D8.

When you install DIMMs, install them in the order listed in Table 7.

Table 7. DIMM installation order

Interleaving	Number of DIMMs	Install DIMMs in these connectors
Two-way	2	D2, D8 (standard)
Two-way	4	D2, D8 (standard) (Hot Spare memory bank for two-way interleaving) D4, D10
Two-way	6	D2, D8 (standard) (Hot Spare memory bank for two-way interleaving) D4, D10 D6, D12
Four-way	4	D2, D8, D1, D7
Four-way	8	D2, D8, D1, D7 (Hot Spare memory bank for four-way interleaving) D4, D10, D3, D9
Four-way	12	D2, D8, D1, D7 (Hot Spare memory bank for four-way interleaving) D4, D10, D3, D9 D6, D12, D5, D11

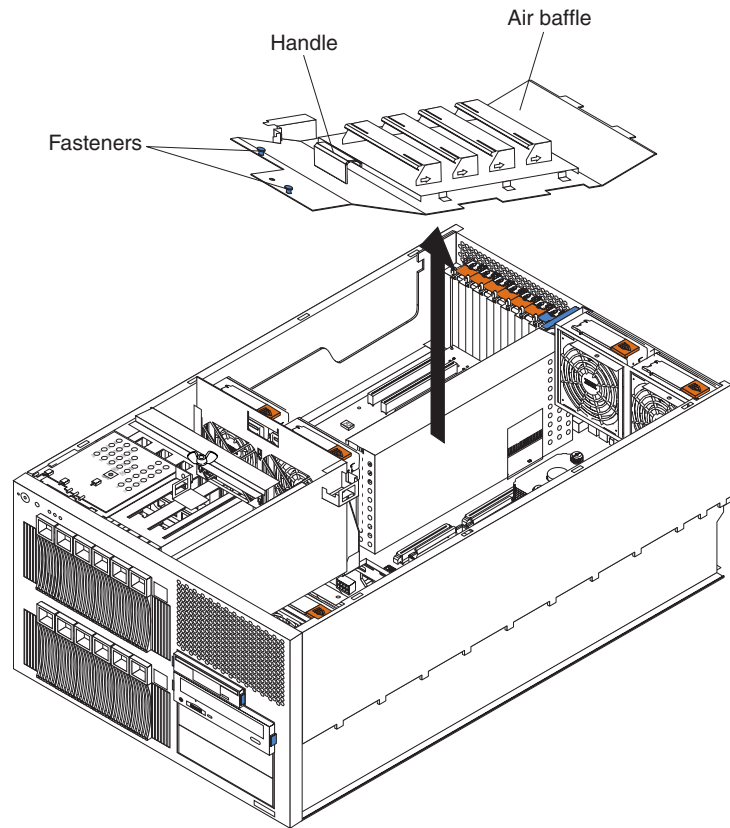
Complete the following steps to install a DIMM.

**Attention:** When you handle static-sensitive devices, take precautions to avoid damage from static electricity. For details about handling these devices, see “Handling static-sensitive devices” on page 42.

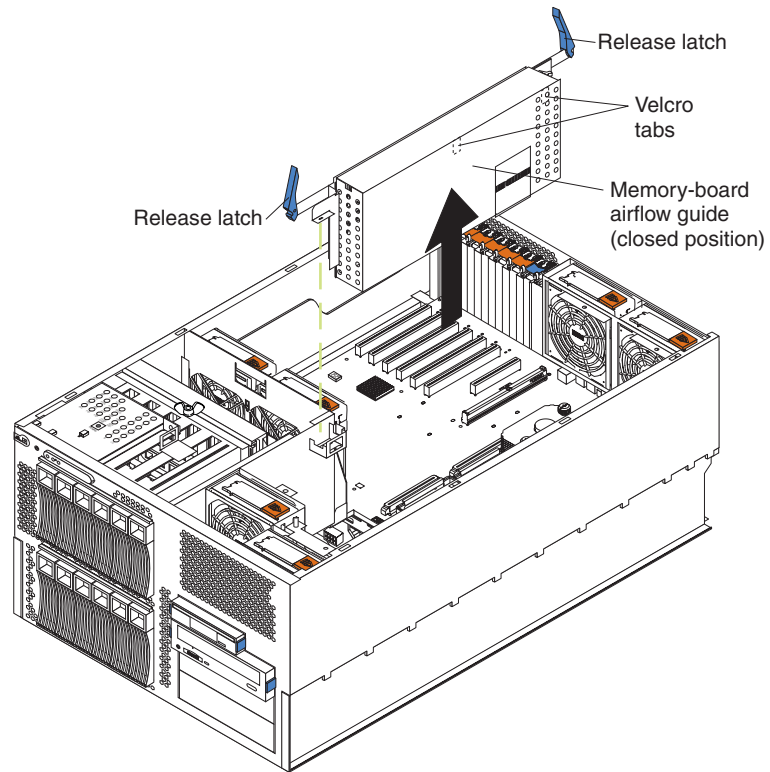
1. Review the information in “Before you begin” on page 41 and “Safety information” on page 169.
2. Turn off the server and disconnect all power cords and external cables; then, remove the server cover (see “Removing the top cover and bezel” on page 51).
3. Remove the air baffle:
  - a. Pull out the two plastic fasteners on the front of the air baffle.

**Note:** Do not remove the fasteners from the air baffle.

- b. Grasp the handle on the air baffle; then, lift the air baffle from the server.



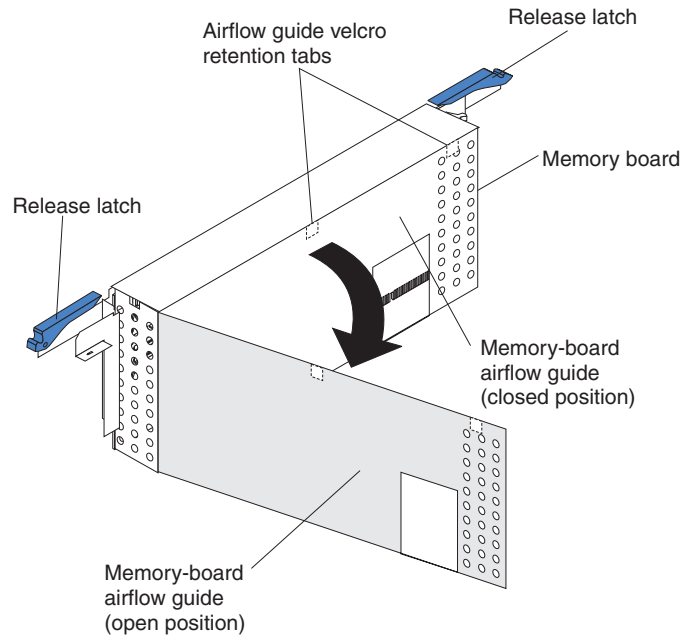
4. Remove the memory-board assembly:
  - a. Open the release latches located on both ends of the memory-board assembly.
  - b. Lift up on the memory-board assembly and remove it from the server.



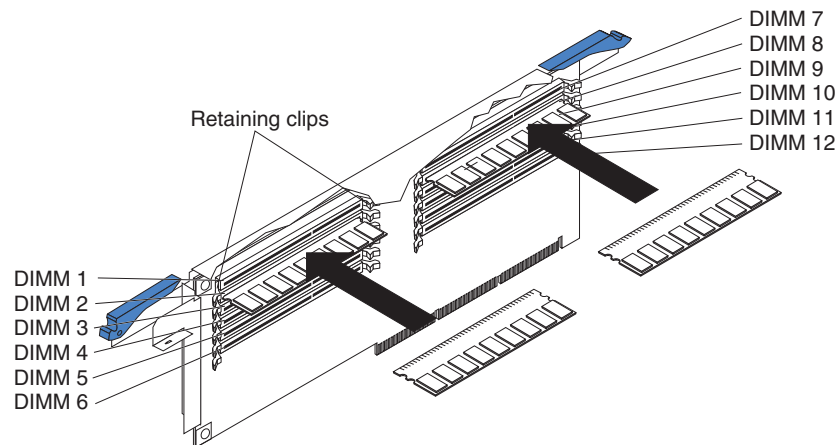
- c. Place the memory-board assembly on a static-protective surface.



- Open (to the unlocked position) the memory-board airflow guide away from the memory-board assembly.



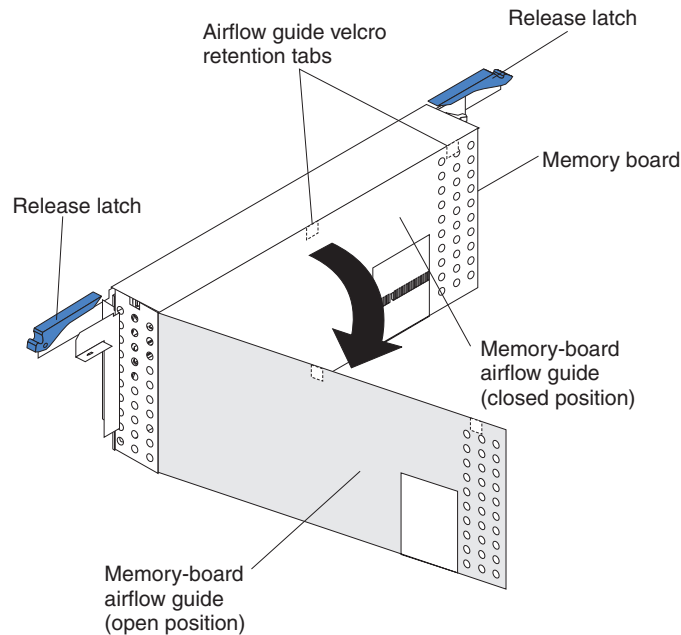
- Locate the DIMM connectors on the memory board. Determine the DIMM connectors into which you will install the DIMMs. For more information, see the notes at the beginning of this procedure.



- Open the retaining clips located on the ends of the DIMM connector, if necessary.
 

**Attention:** To avoid breaking the retaining clips or damaging the DIMM connectors, handle the clips gently.
- Touch the static-protective package that contains the DIMM option to any unpainted metal surface on the server. Then, remove the DIMM from the package.
- Turn the DIMM so that the DIMM keys align correctly with the connector. The DIMM can be inserted only one way.
- Insert the DIMM by pressing the DIMM straight into the connector. Be sure that the retaining clips snap into the closed positions.

11. Make sure that the retaining clips are in the closed position. If a gap exists between the DIMM and the retaining clips, the DIMM has not been properly installed. In this case, open the retaining clips and remove the DIMM; then, reinsert the DIMM.
12. Repeat steps 6 through 11 for each additional DIMM that you install.
13. Close the memory-board airflow guide and press the Velcro tabs together to secure the airflow guide to the memory-board assembly.



14. Reinstall the memory-board assembly:
  - a. Make sure that the release latches are in the open position before you install the memory-board assembly in the server.
  - b. Align the memory-board assembly into the card guides and over the memory-board connector.
  - c. Align the holes on each side of the memory-board bracket over the corresponding alignment pins on the chassis; then, slide the memory-board bracket over the alignment pins.
 

**Note:** The alignment pins are located near the release latches. The left alignment pin is located between the air baffle and the center internal fans. The right alignment pin is located between the air baffle and the rear internal fans and the adapter slots.
  - d. Close (to the locked position) the release latches to seat the memory board in the connector.
 

**Note:** To ensure proper server operation, make sure that the memory-board airflow guide is in the closed position.
  - e. Firmly press the memory-board assembly down into the connector until it snaps into place. This secures the memory board in the server.
15. Reinstall the air baffle:
  - a. Align and insert the two tabs on the rear of the air baffle into the corresponding slots on the rear of the server.
  - b. Align the hole on the front of the air baffle over the corresponding alignment pin on the chassis; then, lower the air baffle into place.

- Note:** The alignment pin is located near the plastic fastener behind fan 1.
- c. Press firmly on the two plastic fasteners until they snap into place on the front of the air baffle. This secures the air baffle in the server.
16. If you have other options to install or remove, do so now; otherwise, go to “Completing the installation” on page 106.

**Note:** When you restart the server, the system displays a message indicating that the memory configuration has changed.

- If you installed additional memory, the Configuration/Setup Utility program automatically saves the new configuration information.
- If you just replaced a failed DIMM, you must start the Configuration/Setup Utility program, select **Advanced Setup**, select **Memory Settings**, highlight the DIMM or pair or quad of DIMMs that you want to enable, and then select **Enable** (see “Starting the Configuration/Setup Utility program” on page 11).
- In some memory configurations, the 3-3-3 beep code might sound during POST followed by a blank display screen. If this occurs and the Boot Fail Count feature in the **Start Options** menu of the Configuration/Setup Utility program is set to **Enabled** (its default setting), you must restart the server three times to force the system BIOS to reset the DIMM or pair or quad of DIMMs from **Disabled** to **Enabled**.

If this procedure does not enable the DIMMs, either the memory board or at least one DIMM is improperly seated, or a memory component has failed. Verify that the memory board and all the DIMMs are properly seated. If the memory board or a DIMM is improperly seated, remove and correctly reinstall it. If all of these components are properly seated, check the memory-board VRM LED on the system board (see “System-board LED locations” on page 49 for the LED location). If the memory-board VRM LED is on or the problem remains, see “Diagnostic programs and error messages” on page 30.

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## Installing an additional microprocessor

Your server comes with one microprocessor installed on the system board. Your server supports up to four microprocessors. If you install at least one additional microprocessor, your server can operate as a symmetric multiprocessing (SMP) server. With SMP, certain operating systems and application programs can distribute the processing load among the microprocessors.

If you need to remove a microprocessor, see “Microprocessor removal” on page 119.

Before you begin:

- Review the information in “Before you begin” on page 41, “Handling static-sensitive devices” on page 42, and “Safety information” on page 169.
- Thoroughly review the documentation that comes with the microprocessor, so that you can determine whether you need to update the server BIOS code. The latest level of BIOS code for your server is available through the World Wide Web (see “Recovering the BIOS code” on page 39).
- (Optional) Obtain an SMP-capable operating system. For a list of supported operating systems, go to <http://www.ibm.com/pc/us/compat/> on the World Wide Web.

**Attention:** To avoid damage and ensure proper server operation when you install an additional microprocessor, use microprocessors that have the same cache size and type, and the same clock speed. Microprocessor internal and external clock frequencies must be identical.

For a list of microprocessors supported by your server, see the ServerProven® list at <http://www.ibm.com/pc/us/compat/> on the World Wide Web.

**Notes:**

1. To order additional microprocessor options, contact your IBM reseller or IBM marketing representative.
2. When you install an additional microprocessor, you must also install the voltage regulator module (VRM) that comes with the microprocessor in the corresponding VRM connector.  
A VRM metal retaining-clip housing comes installed in the empty microprocessor VRM connectors for microprocessors 3 and 4. When you install a VRM in connector 3 or 4, you must first remove the VRM metal retaining-clip housing from the appropriate VRM connector. You must also remove the metal retaining clip from the VRM metal retaining-clip housing when installing a VRM.
3. Your server comes with one microprocessor installed in microprocessor socket 1 (labeled CPU1) on the system board. The microprocessor in socket 1 is the startup (boot) microprocessor. If more than one microprocessor is installed, the microprocessor installed in the highest-numbered socket is the microprocessor from which the server will start. Therefore, the microprocessors installed in the lowest-numbered sockets are used as application microprocessors.
4. The microprocessor speed is automatically set for your server; therefore, you do not have to set any microprocessor-speed jumpers or switches.
5. The microprocessor sockets in this server contain built-in termination for the microprocessor bus; therefore, terminator cards are not required for empty microprocessor sockets. However, each empty microprocessor socket contains a protective, flat plastic cover that you must remove before you install a microprocessor in these sockets.
6. To ensure proper server operation, microprocessor socket 4 contains a plastic microprocessor baffle that resembles a heat sink. You must remove the microprocessor baffle when you install a microprocessor in socket 4. Otherwise, the microprocessor baffle must remain in place to ensure proper airflow in your server.

If you need to install additional microprocessors and VRMs, install them in the order listed in Table 8. The corresponding VRM connector is located adjacent to the microprocessor socket.

**Important:** If you do not install the microprocessors in the correct order, the server will not operate properly.

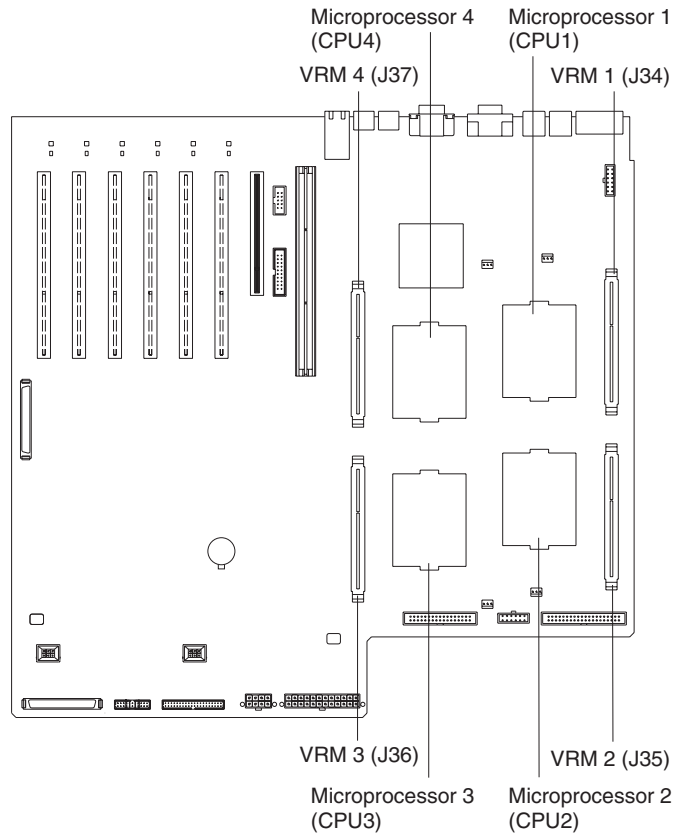
*Table 8. Microprocessor and VRM installation order*

Microprocessor number	Microprocessor socket label	VRM connector
1 (standard)	CPU1	J34 (standard, plastic retaining clip provided on VRM housing)
2	CPU2	J35 (plastic retaining clip provided on VRM housing)
3	CPU3	J36 (standard, metal retaining clip provided on VRM housing)

Table 8. Microprocessor and VRM installation order (continued)

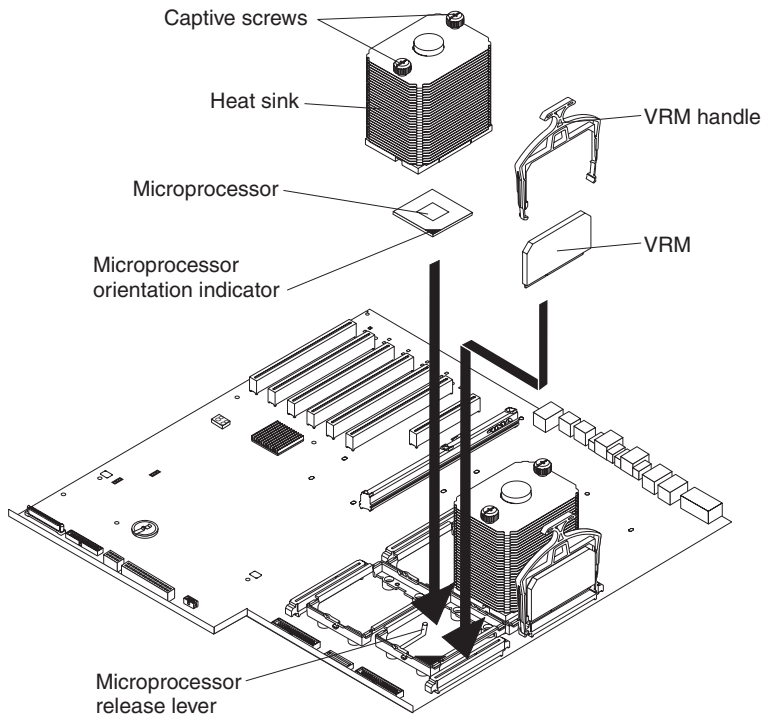
Microprocessor number	Microprocessor socket label	VRM connector
4	CPU4	J37 (standard, metal retaining clip provided on VRM housing)

The following illustration is a layout of the microprocessor socket locations and other microprocessor-related components on the system board.



**Note:** For additional illustrations of the system-board components, see “System-board option connectors” on page 44.

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



Complete the following steps to install an additional microprocessor.

**Attention:** When you handle static-sensitive devices, take precautions to avoid damage from static electricity. For details about handling these devices, see “Handling static-sensitive devices” on page 42.

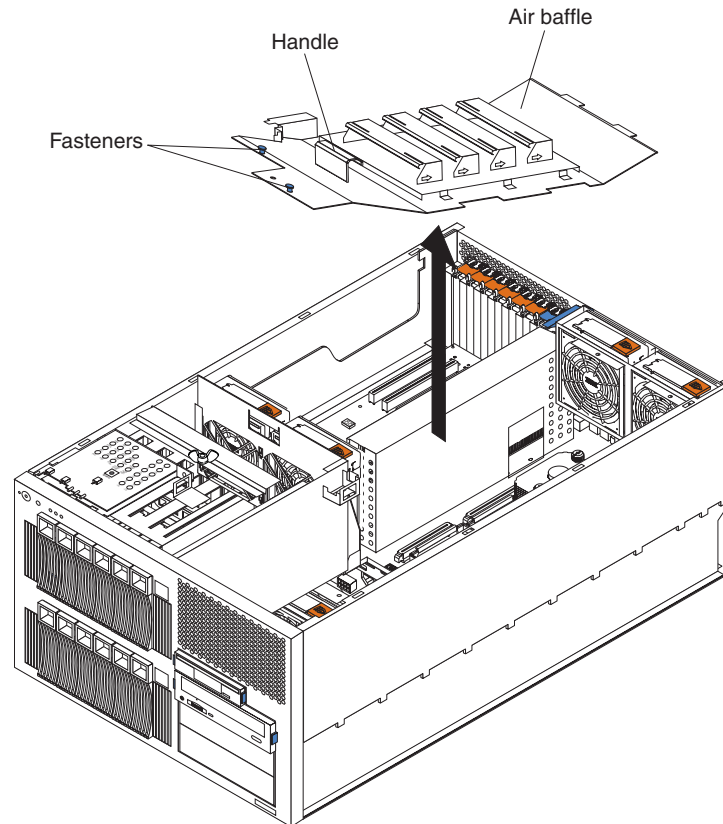
1. Review the information in “Before you begin” on page 41 and “Safety information” on page 169.
2. Turn off the server and disconnect all power cords and external cables; then, remove the server cover (see “Removing the top cover and bezel” on page 51).

3. Remove the air baffle:

- a. Pull out the two plastic fasteners on the front of the air baffle.

**Note:** Do not remove the fasteners from the air baffle.

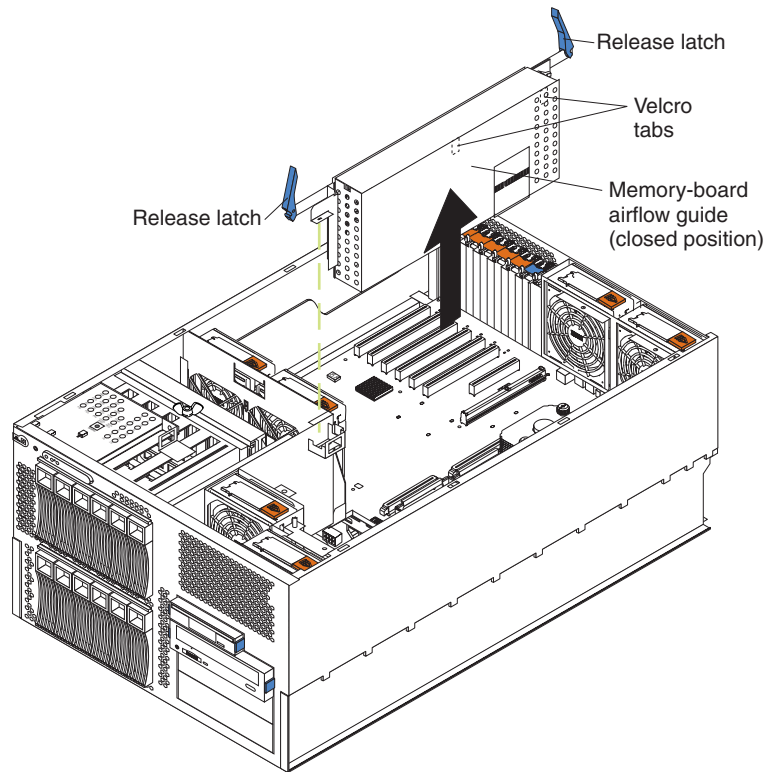
- b. Grasp the handle on the air baffle; then, lift the air baffle from the server.



4. Determine the socket where the microprocessor is to be installed.

5. Install a VRM in the corresponding VRM connector (see Table 8 on page 90 for locations):

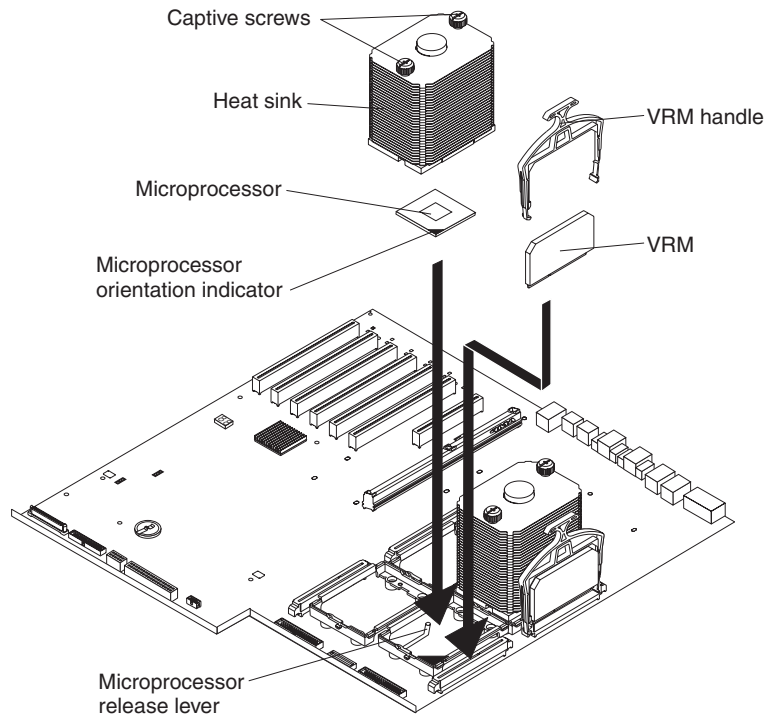
- a. If you are installing a VRM for microprocessor 3 or 4, remove the memory-board assembly:
  - 1) Open the release latches located on both ends of the memory-board assembly.
  - 2) Lift up on the memory-board assembly and remove it from the server.



- 3) Place the memory-board assembly on a static-protective surface.
  - b. Touch the static-protective package containing the new VRM to any *unpainted* metal surface on the server; then, remove the VRM from the package.
  - c. Attach the retainer clip to the VRM:
    - If you are installing a VRM for microprocessor 1 or 2, remove the plastic retainer clip from the package; then, attach the top of the plastic retainer clip to the top of the VRM.

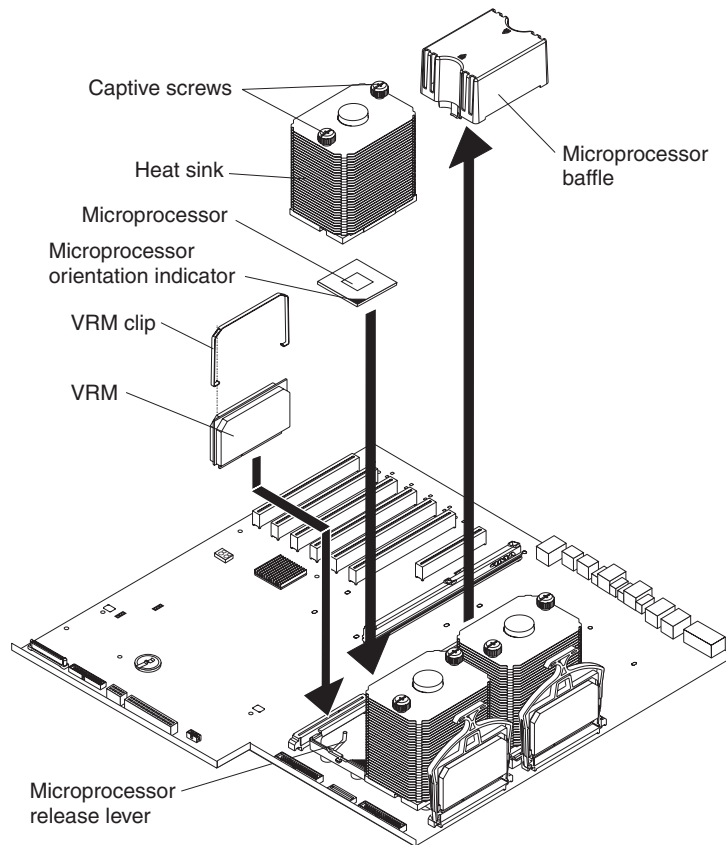
**Note:** Do not attach the plastic retainer clip to the VRM for microprocessor 3 or 4.





- If you are installing a VRM for microprocessor 3 or 4, remove the metal retainer clip from the corresponding VRM baffle. Then, remove the plastic VRM baffle from the appropriate VRM connector. Attach the top of the metal retainer clip to the top of the VRM.

**Note:** The locations of the microprocessor-release lever and microprocessor orientation indicator might vary depending on the location of the microprocessor socket.

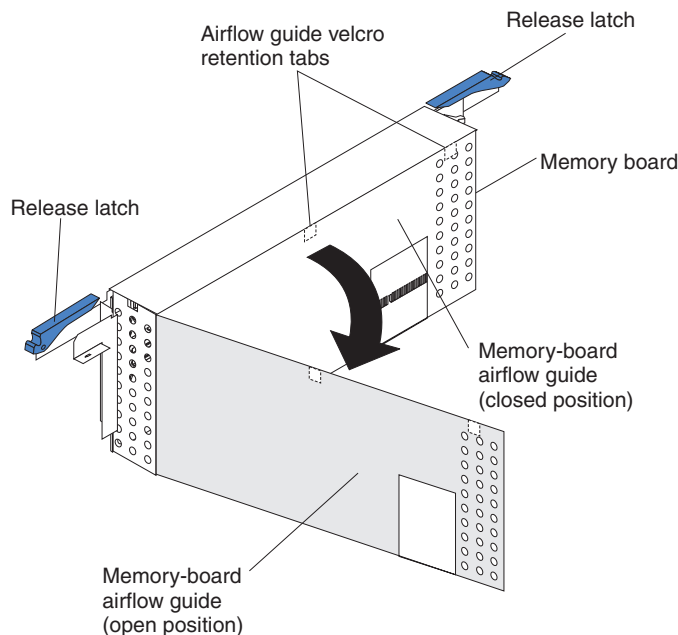


- d. Center the VRM over the connector. Make sure that the VRM is oriented and aligned correctly. The bottom edge of the VRM is keyed and can be inserted only one way.
  - e. Carefully but firmly push down the VRM to seat the VRM in the connector. Be sure that the bottom sides of the retainer clip snap into place on the sides of the connector.
6. Remove the flat, plastic cover from the empty microprocessor socket. If you are installing a microprocessor in socket 4, remove the plastic microprocessor baffle from socket 4. Store the plastic microprocessor baffle in a safe place. If you remove the microprocessor and heat sink from socket 4, you must reinstall the microprocessor baffle in that socket.
  7. Install the microprocessor:
    - a. Touch the static-protective package containing the new microprocessor to any *unpainted* metal surface on the server; then, remove the microprocessor from the package.
    - b. Pull out and lift up on the microprocessor-release lever to unlock the microprocessor socket.
 

**Note:** The locations of the microprocessor-release lever and microprocessor orientation indicator might vary depending on the location of the microprocessor socket.
    - c. Center the microprocessor over the microprocessor socket. Carefully press the microprocessor into the socket.

**Attention:**

- Do not use excessive force when pressing the microprocessor into the socket.
  - Make sure that the microprocessor is oriented and aligned correctly with pin number 1 in the socket before you try to close the lever.
- d. Carefully close the lever to secure the microprocessor in the socket.
8. If you installed a VRM for microprocessor 3 or 4, reinstall the memory-board assembly:



- a. Align the memory-board assembly into the card guides and over the memory-board connector.
- b. Align the holes on each side of the memory-board bracket over the corresponding alignment pins on the chassis; then, slide the memory-board bracket over the alignment pins.

**Note:** The alignment pins are located near the release latches. The left alignment pin is located between the air baffle and the center internal fans. The right alignment pin is located between the air baffle and the rear internal fans and the adapter slots.

- c. Close (to the locked position) the release latches to seat the memory board in the connector.

**Note:** To ensure proper server operation, make sure that the memory-board airflow guide is in the closed position.

- d. Firmly press the memory-board assembly down into the connector until it snaps into place. This secures the memory board in the server.
9. Install a heat sink on the microprocessor:
- a. Remove the plastic protective cover from the bottom of the heat sink. Do not touch the bottom of the heat sink or set the heat sink down after you remove the plastic cover. Make sure that the square of thermal material is still on the bottom of the heat sink; if not, the heat sink must be replaced.
- b. Align and place the heat sink on top of the microprocessor in the retention bracket. Press firmly on the heat sink.

- c. Secure the heat sink to the microprocessor. Alternate between the two captive screws in the heat sink while tightening them.

**Attention:** If you do not alternate the tightening the two captive screws, you might damage the microprocessor. Ensure that the screws are completely tightened; otherwise, the server will not function properly.

10. Reinstall the air baffle:
  - a. Align and insert the two tabs on the rear of the air baffle into the corresponding slots on the rear of the server.
  - b. Align the hole on the front of the air baffle over the corresponding alignment pin on the chassis; then, lower the air baffle into place.

**Note:** The alignment pin is located near the plastic fastener behind fan 1.

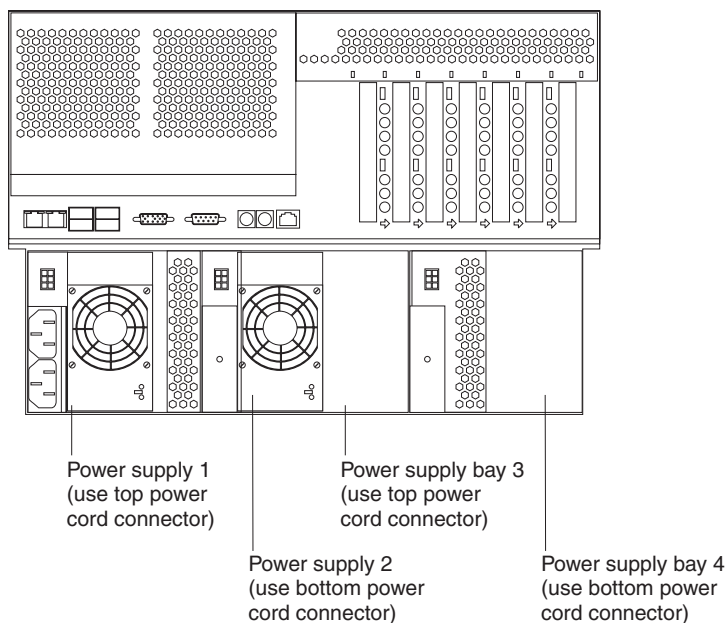
- c. Press firmly on the two plastic fasteners until they snap into place on the front of the air baffle. This secures the air baffle in the server.
11. If you have other options to install or remove, do so now; otherwise, go to “Completing the installation” on page 106.

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## Installing a hot-swap power supply

Your server comes with two hot-swap power supplies. These power supplies are located in power-supply bays 1 and 2. You can install two additional power supplies. Your server supports N+N line cords for power redundancy. For example, to ensure power redundancy for a full configuration, four power supplies must be installed in the server, and power cords must be connected to both power-cord outlets in power-supply bay 1.

**Note:** To show the location of the power-supply bays, the hot-swap fans are not included in this illustration.



Since the server comes with hot-swap power supplies in power-supply bays 1 and 2, you must plug a power cord into each power-cord connector in power-supply bay 1. Plug one end of each power cord into the corresponding connector on the back of the server; then, plug the other end of each power cord into a properly grounded electrical outlet. Power supplies 1 and 3 (PS1 and PS3, respectively) are connected

to the top power-cord connector in power-supply bay 1. Power supplies 2 and 4 (PS2 and PS4, respectively) are connected to the bottom power-cord connector in power-supply bay 1.

Before you continue with the power-supply installation procedure, review the following precautions:

**Notes:**

1. To ensure proper cooling and server operation, power-supply bays 1 and 2 must have a power supply installed at all times.
2. The external fans (fans 7 through 9) are located in front of the power supplies. During normal operation, each fan bay must have a fan installed for proper cooling. See “Replacing an external fan” on page 103 for an illustration of the external fan bays.

**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 6:**

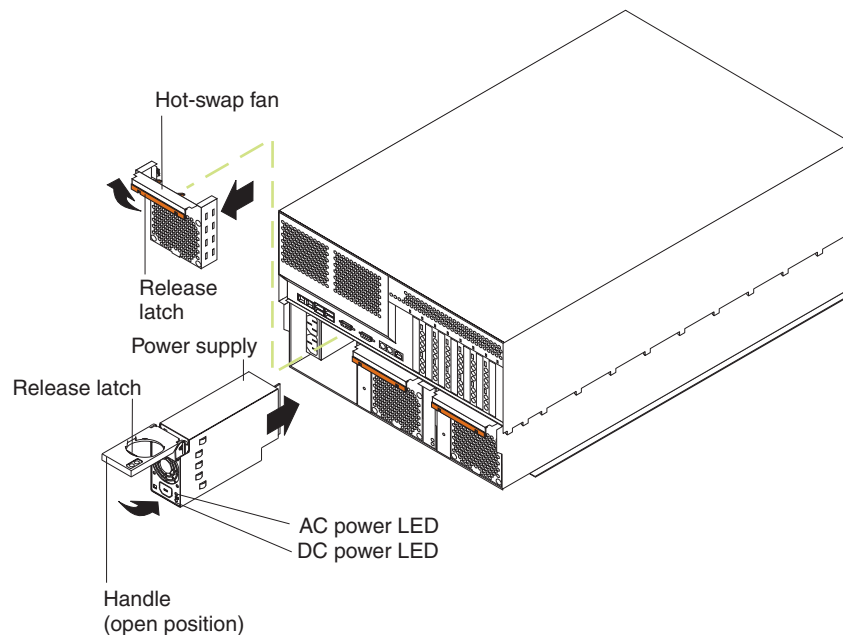


**CAUTION:**

If you install a strain-relief bracket option over the end of the power cord that is connected to the device, you must connect the other end of the power cord to an easily accessible power source.

Complete the following steps to install an additional power supply:

1. Review the information in “Before you begin” on page 41, “Handling static-sensitive devices” on page 42, and “Safety information” on page 169.
2. Select the power-supply bay in which you want to install the power supply.
3. Remove the fan assembly that covers the power-supply bay (see “Replacing a hot-swap fan”).
4. Move the handle on the power supply to the up (open) position.
5. Slide the power supply into the chassis, and lower (close) the handle.



6. Plug one end of each power cord into the corresponding connector on the back of the server; then, plug the other end of each power cord into a properly grounded electrical outlet. Power supplies 1 and 3 (PS1 and PS3, respectively) are connected to the top power-cord connector in power-supply bay 1. Power supplies 2 and 4 (PS2 and PS4, respectively) are connected to the bottom power-cord connector in power-supply bay 1.
7. If the server is not on, turn on the server.
8. Verify that the dc power LED and the ac power LED on the power supply are lit, indicating that the power supply is operating properly.
9. Reinstall the fan assembly in front of the power-supply bay.

---

## Replacing a hot-swap fan

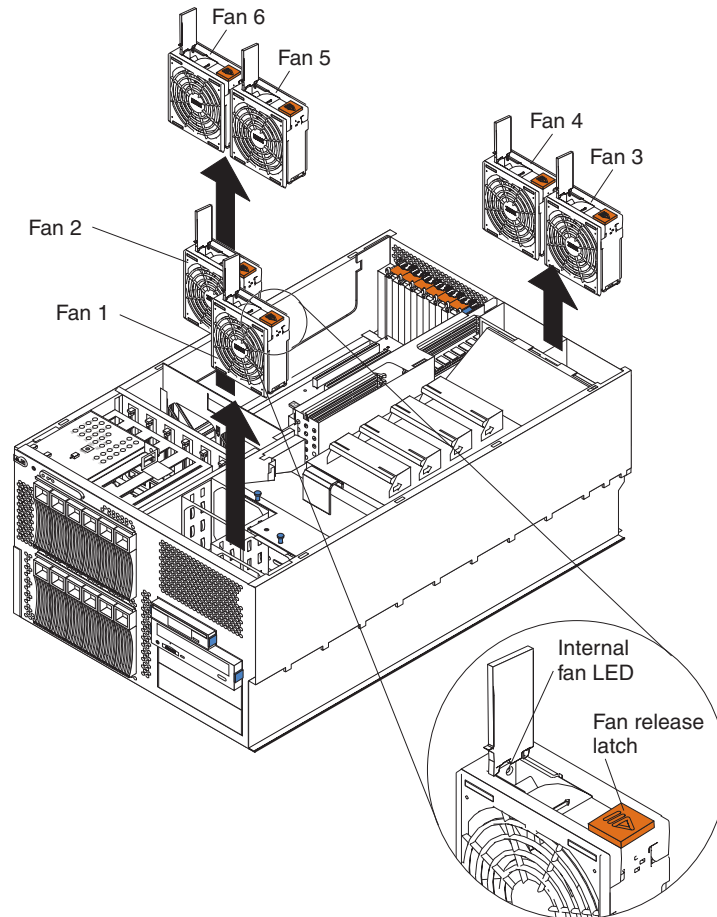
Your server comes with nine hot-swap fans: six internal and three external. The internal fans consist of the front, center, and top rear fans. The front fans (1 and 2) are located inside the server in front of the air baffle, the top rear fans (fans 3 and 4) are located inside the server at the rear of the air baffle, and the center fans (fans 5 and 6) are located inside the server near the adapters. The external fans (fans 7 through 9) are located on the outside of the server in front of the power supplies. When a fan has failed or is operating slowly, the amber LED illuminates on that fan. You do not need to turn off the power to the server to replace a hot-swap fan.

**Attention:** During normal operation, each fan bay must have a fan installed for proper cooling. If a fan fails, replace it as soon as possible to maintain and ensure proper cooling.

Complete the following steps to replace a hot-swap fan. The internal fans (front, center, and top rear) are installed differently from the external fans (bottom rear). This section contains separate instructions for each group of fans.

## Replacing an internal fan

If you are replacing one of the internal fans (fans 1 through 6):



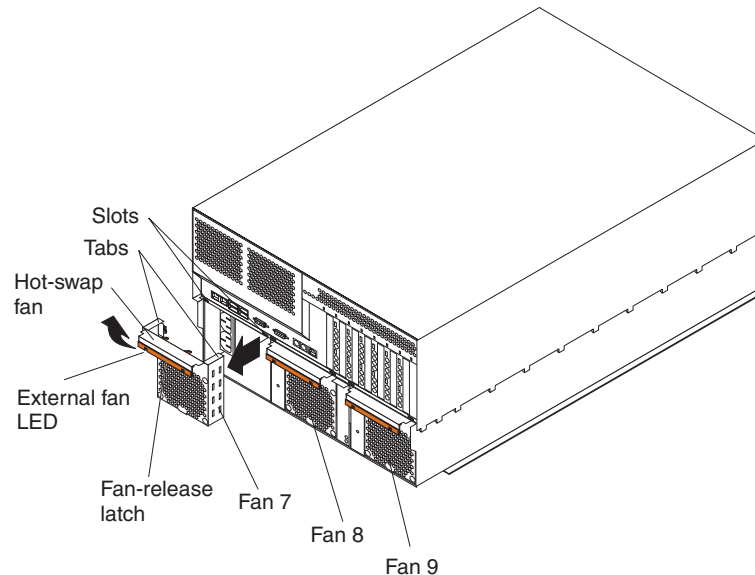


1. Remove the server cover (see “Removing the top cover and bezel” on page 51).  
**Attention:** To ensure proper system cooling, do not leave the top cover off the server for more than 30 minutes.
2. Press the fan-release latch in the direction indicated by the arrow on the latch. This moves the fan handle to the open position.
3. Grasp the fan handle and lift the fan out of the server.
4. Slide the replacement fan into the fan connector until it snaps into place.
5. Press the fan handle down until it snaps into place.
6. Reinstall the server cover (see “Installing the top cover and bezel” on page 107).

## Replacing an external fan

If you are replacing one of the three external fans (fans 7 through 9):

**Attention:** Fan bay 8 is a different size from fan bays 7 and 9; therefore, the fan assembly in bay 8 is not interchangeable with the fan assemblies in bays 7 and 9. Be sure to install the correct replacement fan assembly into the corresponding fan bay.



1. Firmly grasp the fan-release latch; then, press and hold the fan-release latch while pulling the fan assembly out of the server.
2. Align the tabs on the replacement fan assembly with the corresponding slots on the fan bay; then, slide the tabs into the slots.

---

## Replacing the battery

IBM has designed this product with your safety in mind. The lithium battery must be handled correctly to avoid possible danger. If you replace the battery, you must adhere to the following instructions.

**Note:** In the U. S., call 1-800-IBM-4333 for information about battery disposal.

If you replace the original lithium battery with a heavy-metal battery or a battery with heavy-metal components, be aware of the following environmental consideration. Batteries and accumulators that contain heavy metals must not be disposed of with

normal domestic waste. They will be taken back free of charge by the manufacturer, distributor, or representative, to be recycled or disposed of in a proper manner.

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

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

**Statement 2:**



**CAUTION:**

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

*Do not:*

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

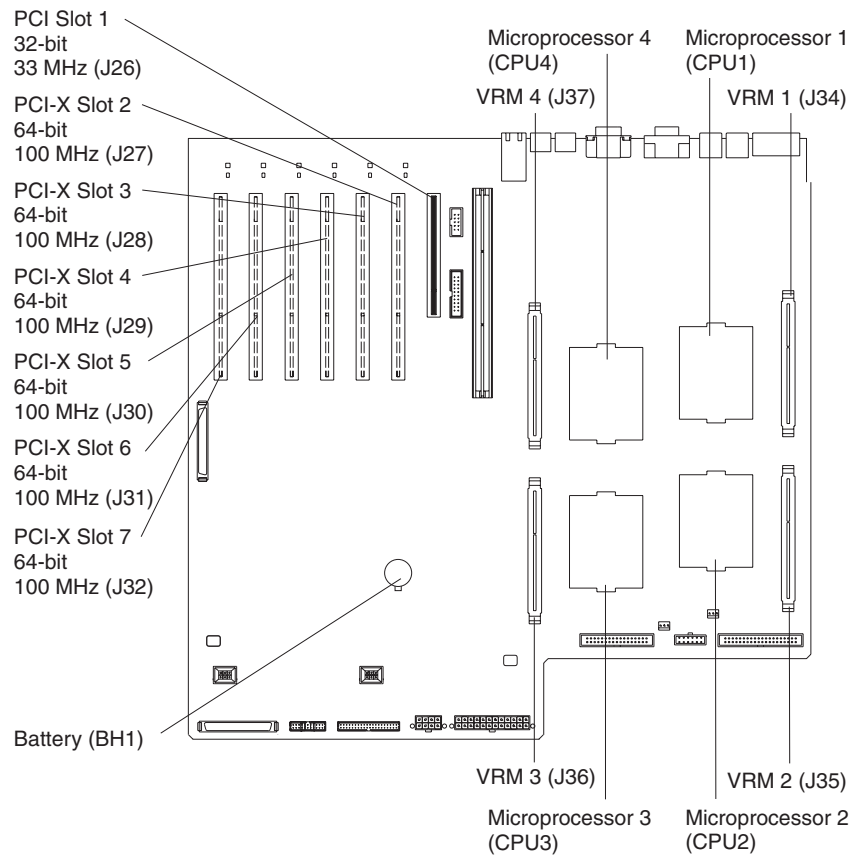
**Dispose of the battery as required by local ordinances or regulations.**

Complete the following steps to replace the battery:

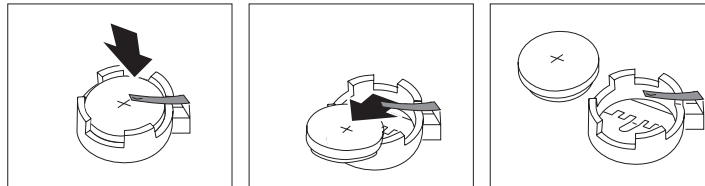
1. Review the information in “Before you begin” on page 41, “Handling static-sensitive devices” on page 42, and “Safety information” on page 169.
2. Follow any special handling and installation instructions supplied with the battery.
3. Turn off the server and all attached devices and disconnect all power cords and external cables; then, remove the server cover (see “Removing the top cover and bezel” on page 51).
4. Disconnect any internal cables as necessary, so that you can access the battery.
5. If the server does not contain any full-length adapters, continue with the next step.

If the server contains a full-length adapter in PCI-X slot 2 or 3, you must remove it. Move the adapter locking lever to the unlocked (open) position on the adapter-support bracket as indicated by the arrows. Then, remove the adapters. See “Working with adapters” on page 53 for additional information about adapters.

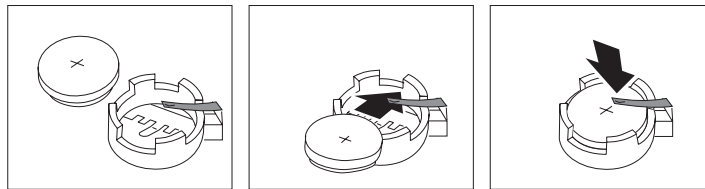
6. Locate the battery (connector BH1) on the system board.



7. Remove the battery:
  - a. Use one finger to slightly slide the battery toward the rear of the server away from the back of the server. The spring mechanism behind the battery will push it out toward you as you slide it toward the rear.
  - b. Use your thumb and index finger to pull the battery from under the battery clip.
  - c. Ensure that the battery clip is touching the base of the battery socket by pressing gently on the clip.



8. Insert the new battery:
  - a. Tilt the battery so that you can insert it into the front of the socket, under the battery clip.
  - b. As you slide it under the battery clip, press the battery down into the socket.



9. If you did not remove any full-length adapters, continue with the next step. If you removed any full-length adapters, you must reinstall the adapters. Move the adapter locking lever to the locked (closed) position on the adapter-support bracket. See “Working with adapters” on page 53 for additional information about adapters.
  10. Reconnect the internal cables that you disconnected.
  11. Reinstall the server cover (see “Installing the top cover and bezel” on page 107).
- Note:** You must wait approximately 20 seconds after you plug the power cord of your server into an electrical outlet before the power-control button becomes active.
12. Reconnect all power cords and external cables and power cords that you disconnected; then, turn on the server and all attached devices.
  13. Start the Configuration/Setup Utility program and set configuration parameters as needed (see “Starting the Configuration/Setup Utility program” on page 11).

---

## Completing the installation

To complete your installation, you must reinstall the server cover, reinstall the bezel, reconnect all the cables that you disconnected earlier and, for certain options, run the Configuration/Setup Utility program. Follow the instructions in this section.

**Attention:** To maintain proper cooling and airflow, install the server cover before turning on the server. Operating the server for extended periods of time (over 30 minutes) with the server cover removed might damage server components.

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

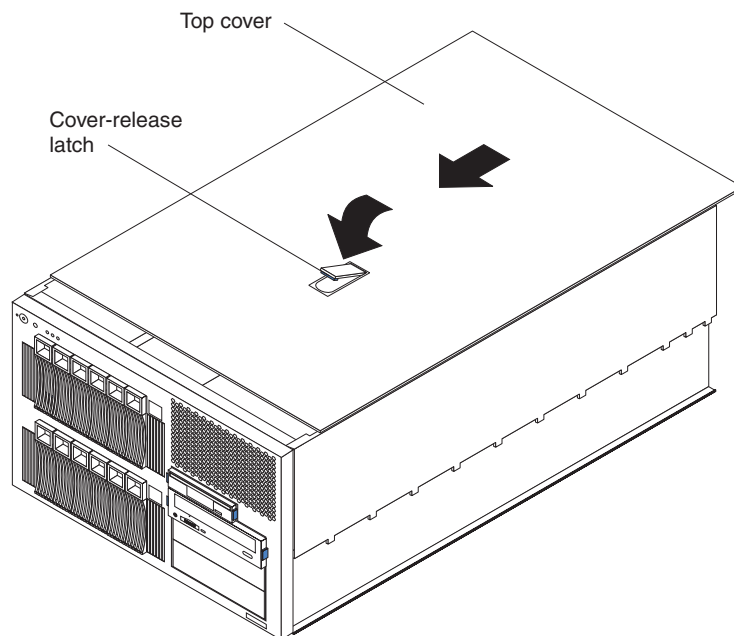
## Installing the top cover and bezel

Before you install the server top cover and bezel, review the information in “Before you begin” on page 41, “Handling static-sensitive devices” on page 42, and “Safety information” on page 169.

### Installing the top cover (all models)

Complete the following steps to install the server top cover:

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

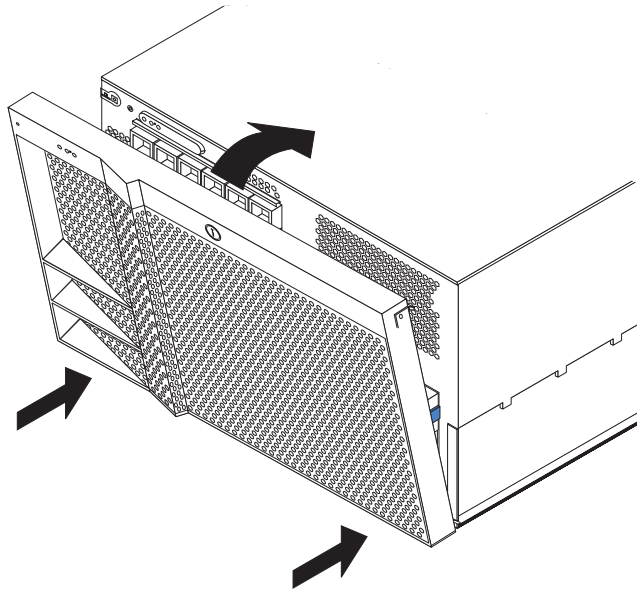


2. Move the cover-release latch to the open (up) position.
3. Insert the bottom tabs of the cover into the matching slots in the server chassis.
4. Close the cover-release latch to pull the cover forward and lock the cover in place.
5. If you disconnected any cables from the back of the server, reconnect the cables; then, plug the power cords into properly grounded electrical outlets.

**Note:** If necessary, see “Input/output connectors” on page 110 for connector locations.

### Installing the bezel (tower model)

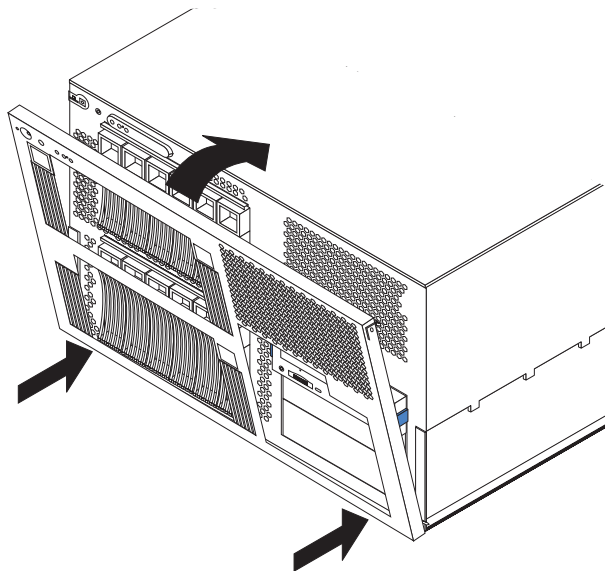
Complete the following steps to install the tower model bezel:



1. Insert the two tabs on the bottom of the bezel into the matching holes on the server chassis.
2. Push the top of the bezel toward the server until the two release latches at the top of the bezel snap into place.
3. Lock the bezel.

### **Installing the bezel (rack model)**

Complete the following steps to install the rack model bezel:



1. Insert the two tabs on the bottom of the bezel into the matching holes on the server chassis.
2. Push the top of the bezel toward the server until the two release latches at the top of the bezel snap into place.

## Updating your server configuration

When you start your server for the first time after you add or remove an internal option or an external SCSI device, you might see a message telling you that the configuration has changed. The Configuration/Setup Utility program automatically saves the new configuration information (see “Starting the Configuration/Setup Utility program” on page 11).

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

Your server comes with at least one microprocessor installed on the system board. If you have installed one or more additional microprocessors, your server can now operate as an SMP server. Therefore, you might need to upgrade your operating system to support SMP. See “Installing an additional microprocessor” on page 89 and your operating-system documentation for additional information.

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

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## Connecting external options

If you attach an external SCSI cable to the external SCSI connector (J14) on the system board, you can attach additional external options to the rear of your server. You can also use a SCSI storage expansion enclosure to attach additional external devices to your server. For a list of supported options for your server, go to <http://www.ibm.com/pc/us/compat/> on the World Wide Web.

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

Complete the following steps to attach an external device:

1. Review the information in “Before you begin” on page 41, “Handling static-sensitive devices” on page 42, and “Safety information” on page 169, and read the documentation that comes with your options.
2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.  
**Attention:** To ensure proper system cooling, do not leave the top cover off the server for more than 30 minutes.
3. Remove the server cover (see “Removing the top cover and bezel” on page 51).
4. Remove the knockout on the rear of the server.
5. Follow the instructions that come with the option to prepare it for installation and to connect it to the server.
6. Route one end of the optional external SCSI cable to the external SCSI A connector (J14) on the system board. Attach the other end of the cable to the knockout device connector.
7. Reinstall the server cover (see “Installing the top cover and bezel” on page 107).
8. Reconnect all the devices, cables and power cords that you disconnected; then, turn on the server and all attached devices.

## SCSI cabling requirements

For information about the maximum length of SCSI cable, see the American National Standards Institute (ANSI) SCSI standards on the ANSI Web site at <http://www.ansi.org/> on the World Wide Web. Adhering to these standards will help to ensure that your server operates properly.

When you attach a SCSI device to the external SCSI connector, you must set a unique ID for the device. See the information that is provided with the device for instructions to set its SCSI ID. See “Setting SCSI IDs” on page 113 for additional information about SCSI IDs.

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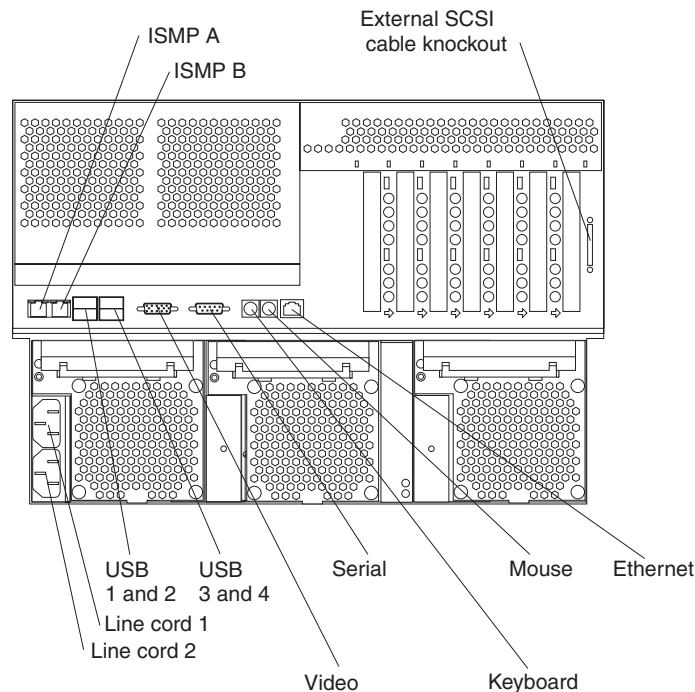
## Input/output connectors

This section provides information about the input/output (I/O) connectors on the rear of your server. These connectors include the following:

- One video port
- One keyboard port
- One auxiliary-device (pointing device) port
- One serial port
- Four Universal Serial Bus (USB) ports
- One Ethernet port
- Two ISMP (RS-485) ports

The server system board contains two Ultra160 SCSI connectors. See “System-board internal cable connectors” on page 45 for the SCSI connector locations.

The following illustration shows the I/O ports on the rear of your server.



### Notes:

1. The ISMP ports (ISMP A and B) are dedicated for use by the system-management subsystem. The ISMP ports are used for the RS-485



interconnect network communications. These ports become inactive if you install an optional IBM Remote Supervisor Adapter in this server. If you install an optional IBM Remote Supervisor Adapter in this server, you must use the RJ-45 connector on the adapter for interconnect network communications.

- For more information about line cords and power supplies, see “Installing a hot-swap power supply” on page 98.

## Video port

Your server comes with an integrated super video graphics array (SVGA) video controller. This controller is not removable, but you can disable it by installing a PCI video adapter.

**Note:** If you install a PCI video adapter, the server BIOS will automatically disable the integrated video controller.

The integrated video controller is located on PCI bus A (slot 1) on the system board. See “Adapter considerations” on page 53 for detailed information about the PCI buses in your server.

The following illustration shows the pin-number assignments for the 15-pin analog video connector on the rear of your server.

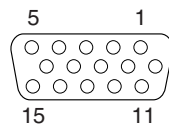


Table 9. Video-port connector pin-number assignments

Pin	Signal	Pin	Signal	Pin	Signal
1	Red	6	Ground	11	Not connected
2	Green or monochrome	7	Ground	12	DDC SDA
3	Blue	8	Ground	13	Horizontal synchronization (Hsync)
4	Not connected	9	+5 V dc	14	Vertical synchronization (Vsync)
5	Ground	10	Ground	15	DDC SDL

## Keyboard port

There is one keyboard port on the rear of your server.

**Note:** If you attach a standard (non-USB) keyboard to the keyboard port, the USB ports and devices will be disabled during the power-on self-test (POST). You might need to use the Configuration/Setup Utility to Enable keyboardless operation and prevent the POST error message 301 from being displayed during startup. For detailed information about this option and how to connect it to your server, refer to the documentation that comes with the option.

The following illustration shows the pin-number assignments for the keyboard port on the rear of your server.

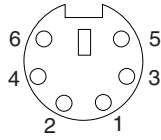


Table 10. Keyboard connector pin-number assignments

Pin	I/O	Signal
1	I/O	Data
2	N/A	Reserved
3	N/A	Ground
4	N/A	+5 V dc
5	I/O	Keyboard clock
6	N/A	Reserved

## Auxiliary-device (pointing device) port

The system board has one auxiliary-device port that supports a mouse or other pointing device.

The following illustration shows the pin-number assignments for the auxiliary-device port on the rear of your server.

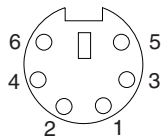


Table 11. Auxiliary-device connector pin-number assignments

Pin	Signal
1	Data
2	Not connected
3	Ground
4	+5 V dc
5	Clock
6	Not connected

## Ultra160 SCSI connectors

Your server has an integrated dual-channel Ultra160 small computer system interface (SCSI) controller. This controller supports two independent Ultra 160/m SCSI channels: one internal and one external. Each channel supports up to 15 SCSI devices. In addition, this controller uses:

- Double-transition clocking to achieve high transfer rates
- Domain-name validation to negotiate compatible data-transfer speeds with each device
- Cyclic redundancy checking (CRC), instead of parity checking, to significantly improve data reliability

- An active terminator on the system board for SCSI bus termination

See “Adapter considerations” on page 53 for detailed information about the PCI buses in your server.

The server comes with one SCSI cable. This cable connects the internal SCSI channel connector (J15) to the standard hot-swap-drive backplane. If you want to use the external LVD SCSI channel connector (J14) to connect external SCSI devices to the server, you must remove the knockout on the rear of the server and install an optional external SCSI cable.

**Note:** If you install a PCI RAID adapter to configure and manage the internal hot-swap drives, you must move the SCSI cable from the system-board SCSI connector to an internal channel connector on the RAID adapter. See “Cabling a RAID or SCSI adapter” on page 58 for additional information.

### Setting SCSI IDs

Each SCSI device that is connected to a SCSI controller must have a unique SCSI ID. This ID enables the SCSI controller to identify the device and ensure that different devices on the same SCSI channel do not attempt to transfer data simultaneously. SCSI devices that are connected to different SCSI channels can have duplicate SCSI IDs. SCSI IDs 6 and 7 are reserved for SCSI controllers. The default ID for the SCSI controller is 7. The hot-swap-drive backplane controls the SCSI IDs for the internal hot-swap drive bays. See “Working with the optional xSeries 6-Pack Hot-Swap Hard Drive Expansion Kit” on page 63 for instructions for installing the 6-Pack option, and “Installing internal drives” on page 73 for instructions for installing hard disk drives.

Table 12 lists the SCSI IDs for the standard backplane and the hard disk drives in bays 1 through 6; these devices are connected to the same SCSI channel. In the typical server configuration, the standard backplane and the hard disk drives in bays 1 through 6 are connected to channel B (internal SCSI connector J15 on the system board). Table 13 on page 114 lists the SCSI IDs for the optional backplane and the hard disk drives in bays 7 through 12; these devices are connected to the same SCSI channel. The optional backplane and the hard disk drives in bays 7 through 12 are connected to a channel on a RAID adapter (see “Cabling a RAID or SCSI adapter” on page 58). Note that in Table 12 and Table 13 on page 114, the hot-swap hard disk drive bay numbers are from left to right.

*Table 12. SCSI IDs for standard backplane, SCSI controller, and hot-swap drives in bays 1 through 6*

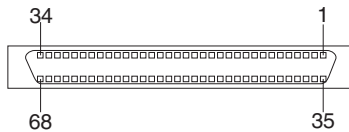
Device	SCSI ID
Drive bay 1	0
Drive bay 2	1
Drive bay 3	2
Drive bay 4	3
Drive bay 5	4
Drive bay 6	5
SCSI controller	6 or 7 (default)
Backplane	8

Table 13. SCSI IDs for optional backplane, SCSI controller, and hot-swap drives in bays 7 through 12

Device	SCSI ID
SCSI controller	6 or 7 (default)
Backplane	9
Drive bay 7	10
Drive bay 8	11
Drive bay 9	12
Drive bay 10	13
Drive bay 11	14
Drive bay 12	15

### SCSI port connectors

The following illustration shows the pin-number assignments for the 68-pin SCSI connectors.



## Serial ports

Your server has one standard serial port: serial port A. The operating system and the ISMP cannot use or share serial port A.

Some application programs require specific ports, and some modems function properly only at certain communication port addresses. You might need to use the Configuration/Setup Utility program to change communication port address assignments to prevent or resolve address conflicts.

### Viewing or changing the serial-port assignments

To view or change the serial-port assignments:

1. Restart the server and watch the monitor screen.
2. When the message Press F1 for Configuration/Setup appears, press F1.
3. From the main menu, select **Devices and I/O Ports**; then, press Enter.

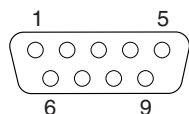
**Note:** The **Devices and I/O Ports** choice appears only on the full configuration menu. If you set two levels of passwords, you must type the administrator password to access the full configuration menu.

4. Select the serial port; then, use the arrow keys to advance through the available settings.
5. Select **Save Settings**; then, select **Exit Setup** to exit from the Configuration/Setup Utility main menu.

### Serial-port connectors

The following illustration shows the pin-number assignments for the 9-pin, male D-shell serial-port connector on the rear of your server. These pin-number

assignments conform to the industry standard.



## Universal Serial Bus ports

Your server has four Universal Serial Bus (USB) ports, which are configured automatically. USB is a serial interface standard for telephony and multimedia devices. It uses Plug and Play technology to determine the type of device that is attached to the connector.

### Notes:

1. If you attach a standard (non-USB) keyboard to the keyboard connector, the USB ports and devices will be disabled during the power-on self-test (POST).
2. If you install a USB keyboard that has a mouse port, the USB keyboard emulates a mouse, and you will not be able to disable the mouse settings in the Configuration/Setup Utility program.
3. Check to make sure that your NOS supports USB devices.
4. For additional information about USB devices, go to <http://www.usb.org/>.

### USB cables and hubs

You need a 4-pin cable to connect devices to USB 1, or USB 2, USB 3, or USB 4. If you plan to attach more than four USB devices, you must use a hub to connect the devices. The hub provides multiple connectors for attaching additional external USB devices.

USB technology provides up to 12 MBps speed with a maximum of 127 external devices and a maximum signal distance of five meters (16 ft) per segment.

**Note:** After installing a USB keyboard, you might need to use the Configuration/Setup Utility program (see “Starting the Configuration/Setup Utility program” on page 11) to Enable keyboardless operation and prevent the POST error message 301 from being displayed during startup.

### USB-port connectors

Each USB port has an external connector on the rear of the server for attaching USB compatible devices.

The following illustration shows the pin-number assignments for the USB ports on the rear of your server.

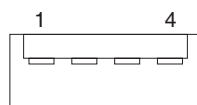


Table 14. USB-port connector pin-number assignments

Pin	Signal
1	VCC
2	-Data
3	+Data
4	Ground

## Gigabit Ethernet port

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

The integrated Ethernet controller is located on PCI bus B (slots 2 and 3) on the system board. See “Adapter considerations” on page 53 for detailed information about the PCI buses in your server.

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

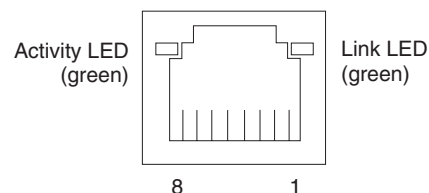
**Note:** The 100BASE-TX/1000BASE-T Fast Ethernet standard requires that the cabling in the network be Category 5 or higher.

The Ethernet (RJ-45) connector has two LEDs. The Ethernet link LED is on the right. When this green LED is on, there is an active connection on the Ethernet port. The Ethernet activity LED is on the left. When this amber LED is on, there is activity between the server and the network. These LEDs have the same functions as the Ethernet link LED and the Ethernet activity LED on the rear of the server (see “Server controls and indicators” on page 4).

For information on configuring the Gigabit Ethernet controller, see “Configuring the Gigabit Ethernet controller” on page 24 or the Broadcom NetXtreme Gigabit Ethernet Software CD that comes with the server.

### Ethernet port connector

The following illustration shows the pin-number assignments for the RJ-45 port. These assignments apply to the 10BASE-T, 100BASE-TX, and 1000BASE-T devices.



## Integrated system management processor (ISMP) interconnect ports

The integrated system management processor (ISMP) ports (ISMP A and B) use a dual RJ-45 connector to interconnect ISMPs of several servers through an optional Remote Supervisor Adapter.

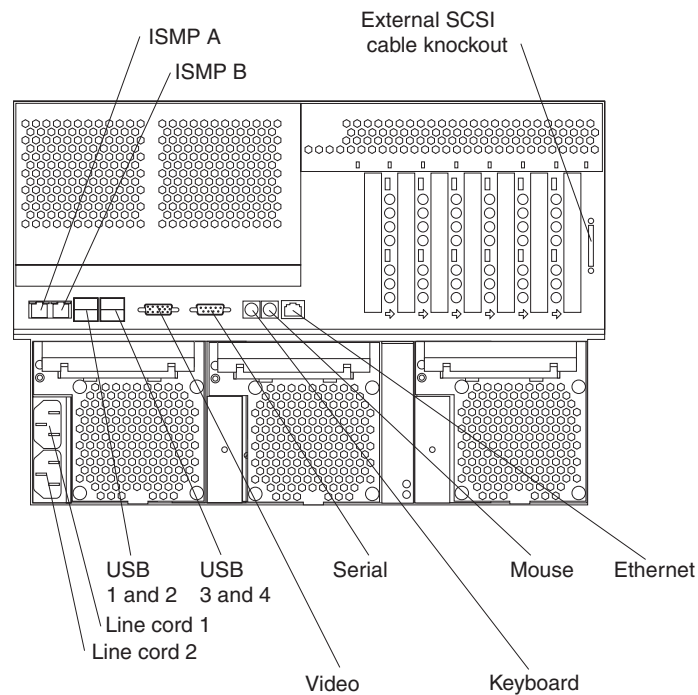
**Note:** ISMP ports (ISMP A and B) are used for the RS-485 interconnect network communications. These ports become inactive if you install an optional IBM Remote Supervisor Adapter in this server. If you install an optional IBM Remote Supervisor Adapter in this server, you must use the RJ-45 connector on the adapter for interconnect network communications.

## Cabling the server

### Notes:

1. You must turn off the server before connecting any cables to or disconnecting any cables from the server.
2. See the documentation that comes with your options for additional cabling instructions. It might be easier for you to route cables before you install certain options.
3. Cable identifiers are printed on the cables that come with your server and options. Use these identifiers to connect the cables to the correct connectors. For example, the hard disk drive cables are labeled "HDD option."

The following illustration shows the external cable connectors on the server. Detailed cabling instructions are provided on the *IBM xSeries Documentation CD* that comes with your server.







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## Chapter 5. Service replaceable units

This chapter describes the removal of server components.

**Important:** The field replaceable unit (FRU) procedures are intended for trained servicers who are familiar with IBM xSeries products. See the parts listing in “System” on page 162 to determine if the component being replaced is a customer replaceable unit (CRU) or a FRU.

---

### Microprocessor removal

Complete the following steps to remove a microprocessor.

**Note:**

- Read “Before you begin” on page 41.
  - Read the safety notices at “Safety information” on page 169.
  - Read “Handling electrostatic discharge-sensitive devices” on page 172.
1. Turn off the server and disconnect all power cords and external cables; then, remove the server cover (see “Removing the top cover and bezel” on page 51).
  2. Remove the air baffle:
    - a. Pull out the two plastic fasteners (also known as pop rivets) on the front of the air baffle.

**Note:** Do not remove the fasteners from the server.

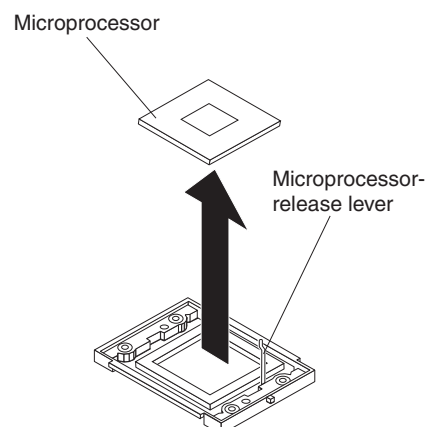
- b. Grasp the handle on the air baffle; then, lift the air baffle from the server.
3. Identify the microprocessor to be removed.

**Note:** If you are replacing a failed microprocessor, verify that you have selected the correct microprocessor for replacement. To do this, check the microprocessor LEDs on the system board to see which LED is on.

4. Remove the heat sink:
  - a. Loosen one captive screw fully; then, loosen the other captive screw.

**Attention:** Loosening one screw fully before loosening the other screw will help to break the thermal bond that adheres the heat sink to the microprocessor.

- b. Gently pull the heat sink off of the microprocessor.



5. Open the release lever of the microprocessor socket.
6. Pull the microprocessor out of the socket.

To install a microprocessor, see “Installing an additional microprocessor” on page 89.

**Attention:** If you are not installing a replacement microprocessor in socket 4, you must reinstall the microprocessor baffle in that socket.

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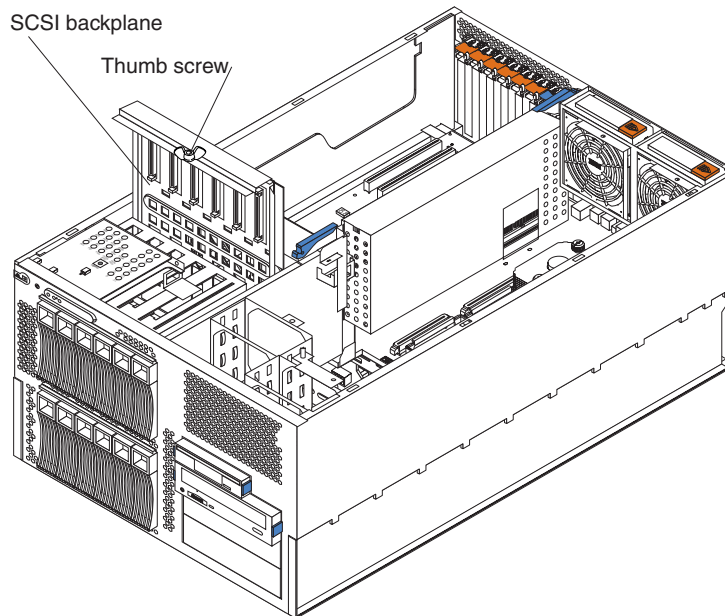
## SCSI backplane

Complete the following steps to remove the SCSI backplane.

**Note:**

- Read “Before you begin” on page 41.
  - Read the safety notices at “Safety information” on page 169.
  - Read “Handling electrostatic discharge-sensitive devices” on page 172.
1. Turn off the server.
  2. Disconnect all power cords and external cables from the back of the server.
  3. Remove the server cover (see “Removing the top cover (all models)” on page 51).
  4. Pull out the hard disk drives (see “Installing a hot-swap hard disk drive” on page 75).
  5. Disconnect the SCSI backplane cables from the system board (see “System-board internal cable connectors” on page 45).
  6. Move the shuttle back to allow easy access to the board.

**Note:** The illustrations in this document might differ slightly from your hardware.



7. Loosen the thumbscrew at the top of the SCSI backplane; then, lift the backplane out of the server.
8. Remove the six screws in the SCSI backplane and put them in a safe place; then, remove the backplane from the metal frame.

- To replace the SCSI backplane, reverse the previous steps.

**Note:** The two holes in the bottom of the SCSI backplane assembly fit over the two spindles on the floor of the chassis.

Complete the following steps to install a second SCSI backplane:

- Complete steps 1 on page 120 through 7 on page 120
- Secure the SCSI backplane to the chassis, below the original SCSI backplane, using the six screws provided with the backplane.
- Reinstall the SCSI backplane assembly in the chassis by sliding it into position, aligning the holes in the bottom of the backplane assembly with the two spindles on the floor of the chassis.
- Return the shuttle to its correct position.
- Reconnect the SCSI cable to the system board.

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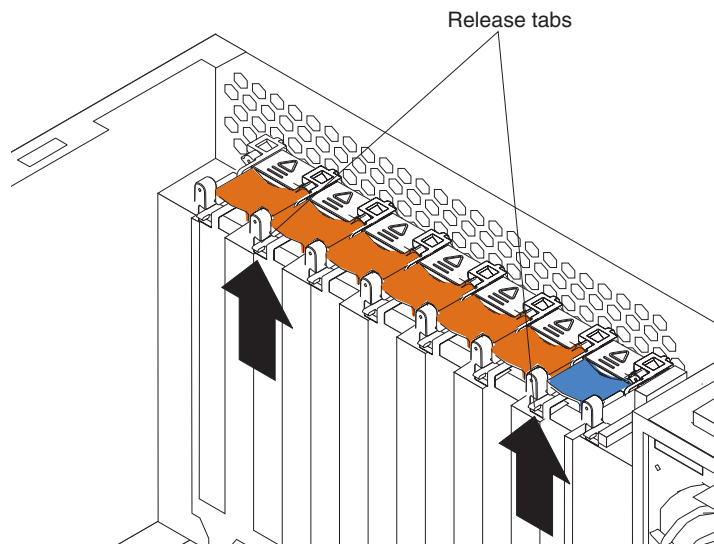
## Hot-swap board

Complete the following steps to remove the hot-swap board.

**Note:**

- Read “Before you begin” on page 41.
  - Read the safety notices at “Safety information” on page 169.
  - Read “Handling electrostatic discharge-sensitive devices” on page 172.
- Turn off the server.
  - Disconnect all power cords and external cables from the back of the server.
  - Remove the server cover (see “Removing the top cover (all models)” on page 51).
  - Remove all adapters and spacers, placing the adapters on a static-protective surface (see “Installing an adapter” on page 55).
  - Disconnect the hot-swap board cable from the system board (see “System-board internal cable connectors” on page 45).

**Note:** The illustrations in this document might differ slightly from your hardware.



6. Press the two tabs on the hot-swap board assembly and remove it from the chassis.
7. To replace the hot-swap board, line up the two tabs with the notches on the chassis and snap the assembly into place; then, connect the cable to the system board.

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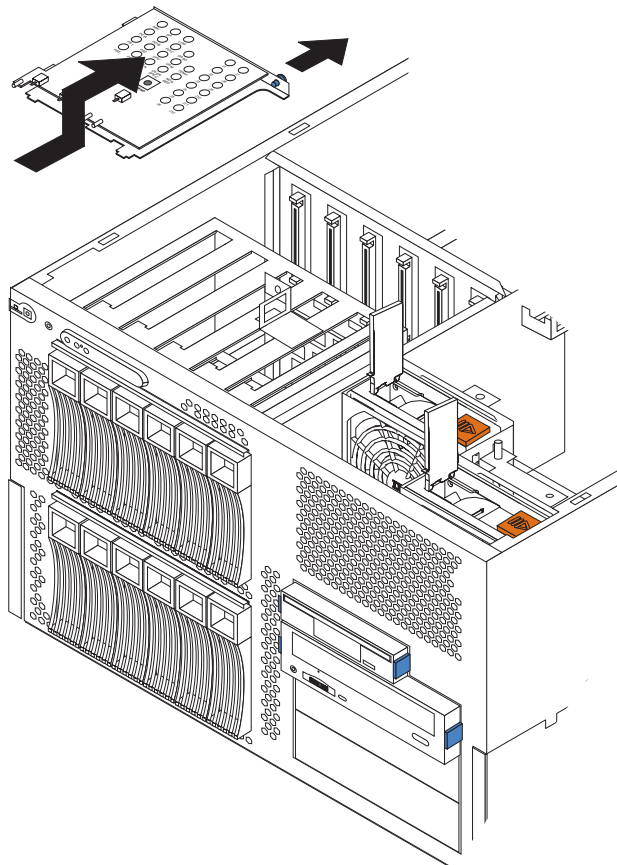
## Front-panel assembly

Complete the following steps to remove the front-panel assembly.

**Note:**

- Read “Before you begin” on page 41.
  - Read the safety notices at “Safety information” on page 169.
  - Read “Handling electrostatic discharge-sensitive devices” on page 172.
1. Turn off the server.
  2. Disconnect all power cords and external cables from the back of the server.
  3. Remove the server cover (see “Removing the top cover (all models)” on page 51).
  4. Disconnect the front-panel assembly cable from the system board (see “System-board internal cable connectors” on page 45).

**Note:** The illustrations in this document might differ slightly from your hardware.



5. Grasp the retention pin on the front-panel assembly and gently pull it up until the assembly releases.
6. Remove the assembly from the server.
7. To replace the front-panel assembly, reverse the previous steps.

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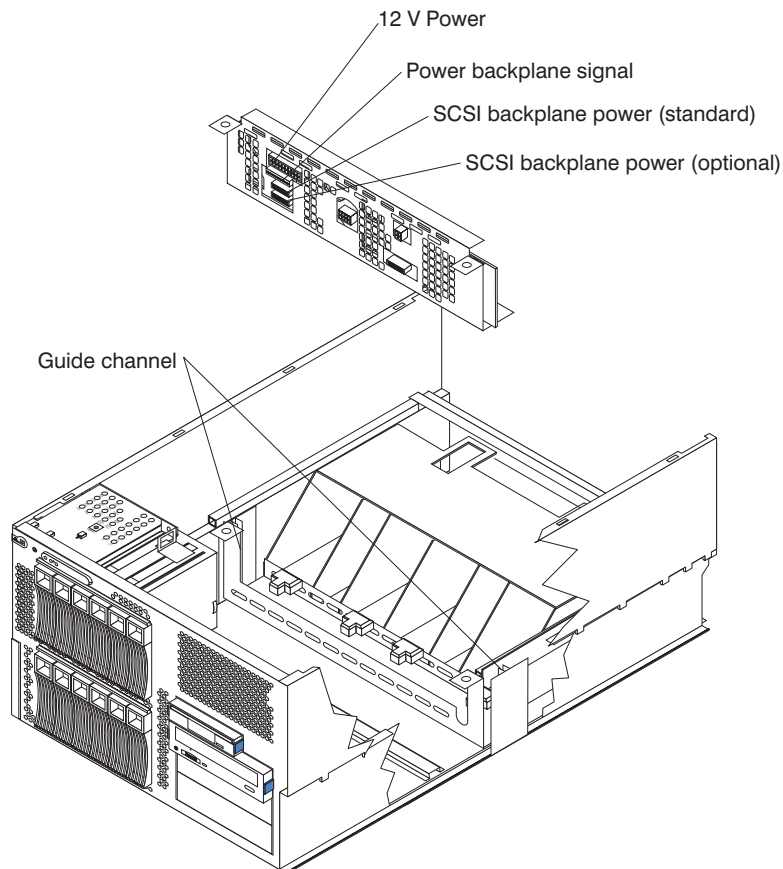
## Power backplane

Complete the following steps to remove the power backplane.

**Note:**

- Read “Before you begin” on page 41.
  - Read the safety notices at “Safety information” on page 169.
  - Read “Handling electrostatic discharge-sensitive devices” on page 172.
1. Turn off the server.
  2. Disconnect all power cords and external cables from the back of the server.
  3. Remove the server cover (see “Removing the top cover (all models)” on page 51).
  4. Remove the power supplies (see “Installing a hot-swap power supply” on page 98).
  5. Disconnect the cables that are attached to the power backplane.
  6. Unlock the shuttle latch (see the illustration at step 7 on page 79) and pull the shuttle back to expose the power backplane.

**Note:** The illustrations in this document might differ slightly from your hardware.



7. Pull the power backplane out of the chassis.

8. To install the power backplane, reverse the previous steps.

**Note:** When reinstalling the power backplane assembly, align the assembly with the tracks on the sides of the chassis and align the two holes at the top sides of the backplane over the pins.

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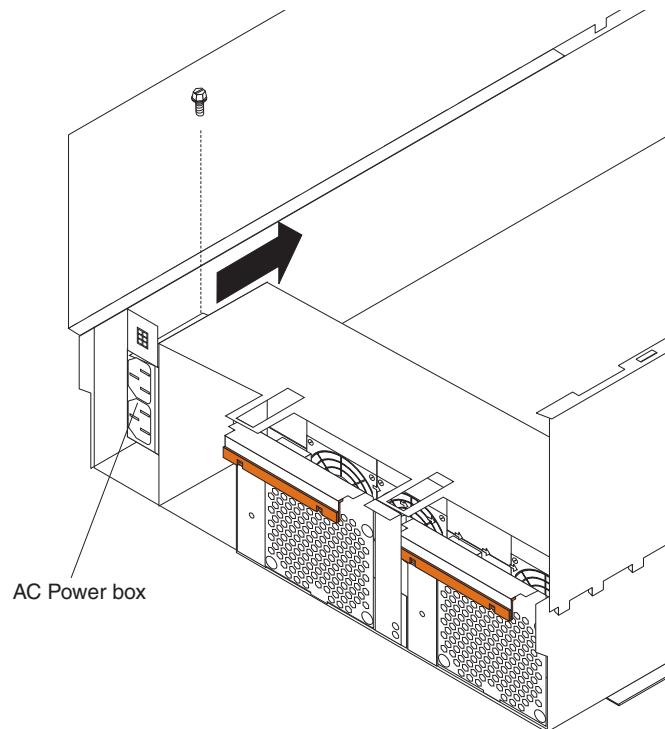
## AC power box

Complete the following steps to remove the ac power box .

**Note:**

- Read “Before you begin” on page 41.
  - Read the safety notices at “Safety information” on page 169.
  - Read “Handling electrostatic discharge-sensitive devices” on page 172.
1. Turn off the server.
  2. Disconnect all power cords and external cables from the back of the server.
  3. Remove the server cover (see “Removing the top cover (all models)” on page 51).
  4. Remove the power supplies (see “Installing a hot-swap power supply” on page 98).
  5. Remove the shuttle.

**Note:** The illustrations in this document might differ slightly from your hardware.



6. Remove the screw securing the power box to the chassis.
7. Slide the power box toward the front of the server until it comes away from the chassis.
8. Pull up on the four power plugs at the end of the power box cable until they are free of the chassis.

9. Remove the power box assembly from the server.
10. To install the AC power box, reverse the previous steps.

---

## System board and shuttle

**Note:** When replacing the system board, you must either update the system with the latest firmware or restore the pre-existing firmware that the customer provides on a diskette or CD image.

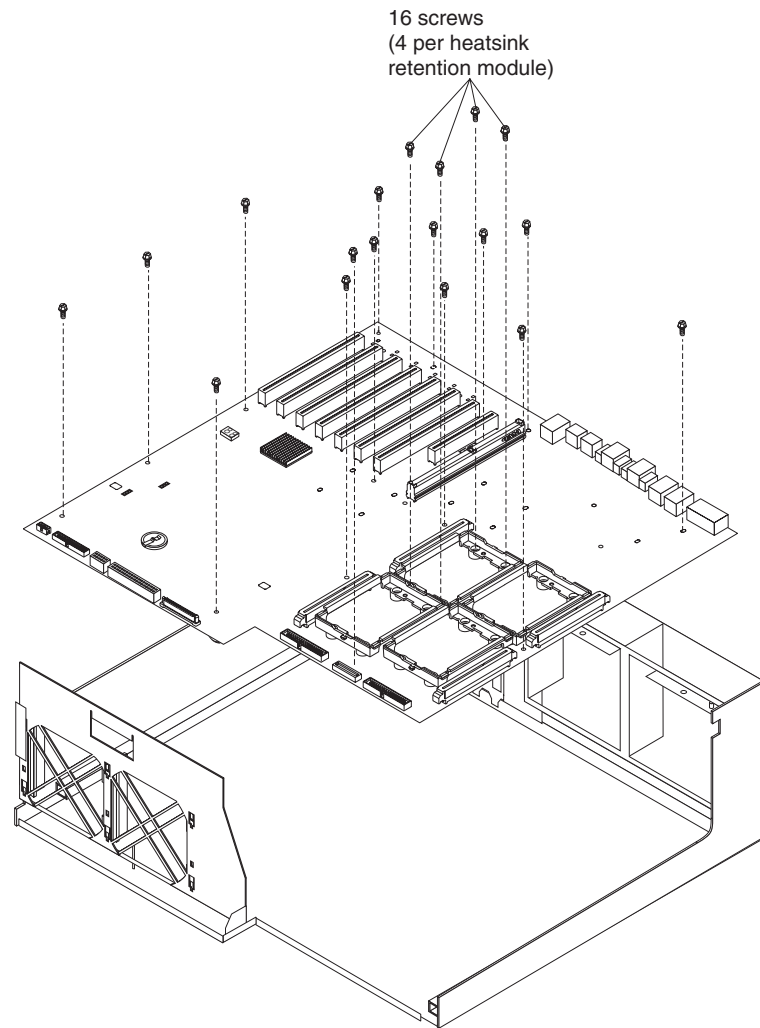
Complete the following steps to remove the system board or shuttle.

**Note:**

- Read “Before you begin” on page 41.
  - Read the safety notices at “Safety information” on page 169.
  - Read “Handling electrostatic discharge-sensitive devices” on page 172.
1. Turn off the server and any attached devices.
  2. Disconnect all power cords and external cables from the back of the server.
  3. Remove the cover (see “Removing the top cover (all models)” on page 51).
  4. Remove the air baffle:
    - a. Pull out the two plastic fasteners (also known as pop rivets) on the front of the air baffle.

**Note:** Do not remove the fasteners from the server.
    - b. Grasp the handle on the air baffle; then, lift the air baffle from the server.
  5. Remove all adapters and place them on a static-protective surface for reinstallation (see “Installing an adapter” on page 55).
  6. Remove all fans (see “Replacing a hot-swap fan” on page 101).
  7. Move the shuttle back to allow easy access to the system board.
  8. Remove the memory board assembly and place it on a static-protective surface for reinstallation (see “Installing memory modules” on page 82).
  9. Remove all microprocessors and VRMs (see “Microprocessor removal” on page 119) and place them on a static-protective surface for reinstallation.
  10. Disconnect all cables from the system board (see “System-board internal cable connectors” on page 45).

**Note:** The illustrations in this document might differ slightly from your hardware.



11. Remove the 16 screws that secure the system board to the shuttle at the heat sink retention modules, and put the screws and the modules in a safe place.
12. Remove the other 14 screws that secure the system board to the shuttle, and put the screws in a safe place.
13. Pull the system board carefully out of the shuttle.
14. If you are replacing the shuttle, continue with step 16 using the new shuttle with the existing system board.
15. If you are replacing the system board, continue with step 16 using the new system board with the existing shuttle.
16. Align the system board with the shuttle and replace the 30 screws that were removed in step 11 and step 12 above. Be sure to replace the heat sink retention modules that had been removed.  
**Attention:** Do not over-tighten the screws that secure the system board to the shuttle.
17. Slide the replacement shuttle, with its attached system board, in from the rear of the server and close the board locking latch.
18. Replace all components in the reverse order from which they were removed.



19. Replace the top cover and bezel (see “Installing the top cover and bezel” on page 107).



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## Chapter 6. Symptom-to-FRU index

This index supports xSeries 255 servers.

**Notes:**

1. Check the configuration before you replace a FRU. Configuration problems can cause false errors and symptoms.
2. For IBM devices not supported by this index, refer to the manual for that device.
3. Always start with “General checkout” on page 27.

The symptom-to-FRU index lists symptoms, errors, and the possible causes. The most likely cause is listed first. Use this symptom-to-FRU index to help you decide which FRUs to have available when servicing the computer.

The left-hand column of the tables in this index lists error codes or messages, and the right-hand column lists one or more suggested actions or FRUs to replace.

**Note:** In tables with more than two columns, multiple columns are required to describe the error symptoms.

Take the action (or replace the FRU) suggested first in the list of the right-hand column, then try the server again to see if the problem has been corrected before taking further action.

**Note:** Try reseating a suspected component or reconnecting a cable before replacing the component.

The POST BIOS code displays POST error codes and messages on the screen.

---

### Beep symptoms

Beep symptoms are short tones or a series of short tones separated by pauses (intervals without sound). See the examples in the following table.

Beeps	Description
1-2-3	<ul style="list-style-type: none"><li>• One beep</li><li>• A pause (or break)</li><li>• Two beeps</li><li>• A pause (or break)</li><li>• Three beeps</li></ul>
4	Four continuous beeps

One beep after successfully completing POST indicates the system is functioning properly.

<b>Note:</b> See “System” on page 162 to determine which components should be replaced by a field service technician.	
Beep/symptom	FRU/action
1-1-2 (Microprocessor register test failed)	<ol style="list-style-type: none"><li>1. <b>Optional microprocessor (if installed)</b></li><li>2. Microprocessor</li><li>3. System board</li></ol>

**Note:** See “System” on page 162 to determine which components should be replaced by a field service technician.

<b>Beep/symptom</b>	<b>FRU/action</b>
<b>1-1-3</b> (CMOS write/read test failed)	<ol style="list-style-type: none"> <li><b>Battery</b></li> <li>System board</li> </ol>
<b>1-1-4</b> (BIOS EEPROM checksum failed)	<ol style="list-style-type: none"> <li><b>Recover BIOS</b></li> <li>System board</li> </ol>
<b>1-2-1</b> (Programmable Interval Timer failed)	<ul style="list-style-type: none"> <li><b>System board</b></li> </ul>
<b>1-2-2</b> (DMA initialization failed)	<ul style="list-style-type: none"> <li><b>System board</b></li> </ul>
<b>1-2-3</b> (DMA page register write/read failed)	<ul style="list-style-type: none"> <li><b>System board</b></li> </ul>
<b>1-2-4</b> (RAM refresh verification failed)	<ol style="list-style-type: none"> <li><b>DIMM</b></li> <li>Memory card</li> <li>System board</li> </ol>
<b>1-3-1</b> (first 64K RAM test failed)	<ol style="list-style-type: none"> <li><b>DIMM</b></li> <li>Memory card</li> </ol>
<b>2-1-1</b> (Secondary DMA register failed)	<ul style="list-style-type: none"> <li><b>System board</b></li> </ul>
<b>2-1-2</b> (Primary DMA register failed)	<ul style="list-style-type: none"> <li><b>System board</b></li> </ul>
<b>2-1-3</b> (Primary interrupt mask register failed)	<ul style="list-style-type: none"> <li><b>System board</b></li> </ul>
<b>2-1-4</b> (Secondary interrupt mask register failed)	<ul style="list-style-type: none"> <li><b>System board</b></li> </ul>
<b>2-2-1</b> (Interrupt vector loading failed)	<ul style="list-style-type: none"> <li><b>System board</b></li> </ul>
<b>2-2-2</b> (Keyboard controller failed)	<ol style="list-style-type: none"> <li><b>System board</b></li> <li>Keyboard</li> </ol>
<b>2-2-3</b> (CMOS power failure and checksum checks failed)	<ol style="list-style-type: none"> <li><b>Battery</b></li> <li>System board</li> </ol>
<b>2-2-4</b> (CMOS configuration information validation failed)	<ol style="list-style-type: none"> <li><b>Battery</b></li> <li>System board</li> </ol>
<b>2-3-1</b> (Screen initialization failed)	<ul style="list-style-type: none"> <li><b>System board</b></li> </ul>
<b>2-3-2</b> (Screen memory failed)	<ul style="list-style-type: none"> <li><b>System board</b></li> </ul>
<b>2-3-3</b> (Screen retrace failed)	<ul style="list-style-type: none"> <li><b>System board</b></li> </ul>
<b>2-3-4</b> (Search for video ROM failed)	<ul style="list-style-type: none"> <li><b>System board</b></li> </ul>
<b>2-4-1</b> (Video failed; screen believed operable)	<ul style="list-style-type: none"> <li><b>System board</b></li> </ul>
<b>3-1-1</b> (Timer tick interrupt failed)	<ul style="list-style-type: none"> <li><b>System board</b></li> </ul>
<b>3-1-2</b> (Interval timer channel 2 failed)	<ul style="list-style-type: none"> <li><b>System board</b></li> </ul>
<b>3-1-3</b> (RAM test failed above address OFFFHH))	<ol style="list-style-type: none"> <li><b>DIMM</b></li> <li>Memory card</li> <li>System board</li> </ol>

**Note:** See “System” on page 162 to determine which components should be replaced by a field service technician.

Beep/symptom	FRU/action
<b>3-1-4</b> (Time-Of-Day clock failed)	<ol style="list-style-type: none"> <li><b>Battery</b></li> <li>System board</li> </ol>
<b>3-2-1</b> (Serial port failed)	<ul style="list-style-type: none"> <li><b>System board</b></li> </ul>
<b>3-2-2</b> (Parallel port failed)	<ul style="list-style-type: none"> <li><b>System board</b></li> </ul>
<b>3-2-3</b> (Math coprocessor test failed)	<ol style="list-style-type: none"> <li><b>Microprocessor</b></li> <li>System board</li> </ol>
<b>3-2-3</b> (Failure comparing CMOS memory size against actual)	<ol style="list-style-type: none"> <li><b>DIMM</b></li> <li>Battery</li> </ol>
<b>3-3-1</b> (Memory size mismatch occurred.)	<ol style="list-style-type: none"> <li><b>DIMM</b></li> <li>Battery</li> </ol>
<b>3-3-2</b> (Critical SMBUS error occurred)	<ol style="list-style-type: none"> <li><b>Disconnect the server power cords from the outlets, wait 30 seconds and retry.</b></li> <li>System board.</li> <li>DIMMs.</li> <li>DASD backplane.</li> <li>Power supply.</li> <li>Power backplane.</li> <li>I2C Cable.</li> </ol>
<b>3-3-3</b> (No operational memory in system)	<ol style="list-style-type: none"> <li><b>Install or reseat the memory modules, and then do a 3 boot reset.</b> (For more information on a 3 boot reset, see “Using the Configuration/Setup Utility program” on page 11.)</li> <li>DIMMs.</li> <li>Memory card.</li> <li>System board.</li> </ol>
<b>4-4-4</b> (Optional system management adapter not installed in slot 1 or not functioning correctly)	<ol style="list-style-type: none"> <li><b>Verify that the adapter is installed in slot 1.</b></li> <li>Adapter.</li> <li>System board.</li> </ol>
<b>Two short beeps</b> (Information only, the configuration has changed)	<ol style="list-style-type: none"> <li><b>Run Diagnostics.</b></li> <li>Run the Configuration/Setup Utility program.</li> </ol>
<b>Three short beeps</b>	<ol style="list-style-type: none"> <li><b>DIMM</b></li> <li>Memory card</li> <li>System board</li> </ol>
<b>One continuous beep</b>	<ol style="list-style-type: none"> <li><b>Microprocessor</b></li> <li>Optional microprocessor (if installed)</li> <li>System board</li> </ol>
<b>Repeating short beeps</b>	<ol style="list-style-type: none"> <li><b>Keyboard</b></li> <li>System board</li> </ol>
<b>One long and one short beep</b>	<ol style="list-style-type: none"> <li><b>Video adapter (if installed)</b></li> <li>System board</li> </ol>
<b>One long and two short beeps</b>	<ol style="list-style-type: none"> <li><b>Video adapter (if installed)</b></li> <li>System board</li> </ol>

<b>Note:</b> See “System” on page 162 to determine which components should be replaced by a field service technician.	
Beep/symptom	FRU/action
<b>One long and three short beeps</b>	<ol style="list-style-type: none"> <li>1. <b>Monitor</b></li> <li>2. Video adapter, if installed</li> <li>3. System board</li> </ol>
<b>Two long and two short beeps</b>	<ul style="list-style-type: none"> <li>• <b>Video adapter</b></li> </ul>

## No-beep symptoms

<b>Note:</b> See “System” on page 162 to determine which components should be replaced by a field service technician.	
No-beep symptom	FRU/action
<b>No beep and the system operates correctly.</b>	<ol style="list-style-type: none"> <li>1. <b>Check speaker cables.</b></li> <li>2. Speaker.</li> <li>3. System board.</li> </ol>
<b>No beeps occur after successfully completing POST</b> (the power-on status is disabled)	<ol style="list-style-type: none"> <li>1. <b>Run the Configuration/Setup Utility program, and set the Start Options Power-On Status to enable.</b></li> <li>2. Check the speaker connection.</li> <li>3. System board.</li> </ol>
<b>No ac power</b> (power supply ac LED is off)	<ol style="list-style-type: none"> <li>1. <b>Check the power cord.</b></li> <li>2. Power supply. (If two are installed, swap them to determine if one is defective.)</li> <li>3. Power backplane.</li> <li>4. Hot-swap power ac inlet box.</li> </ol>
<b>No beep and no video</b>	<ul style="list-style-type: none"> <li>• <b>See “Undetermined problems” on page 157.</b></li> </ul>
<b>System will not start</b> (power supply ac LED is on)	<ul style="list-style-type: none"> <li>• <b>See “Power-supply LED errors” on page 146.</b></li> </ul>

## Diagnostic panel system error LED

The system-error LED is lit when an error is detected. If the system-error LED is lit, remove the cover and check the diagnostic panel LEDs. The following table is a complete list of diagnostics panel LEDs followed by the FRU or action for correcting the problem. The information in the table is valid only when the system-error LED is lit.

### Notes:

1. If a diagnostics panel LED is lit and the information LED panel system-error LED is off, there is probably an LED problem. Run LED diagnostics.
2. To locate the LEDs on the system board, see “System-board LED locations” on page 49.
3. Check the System Error Log for additional information before replacing a FRU.
4. The DIMM error LEDs, microprocessor error LEDs, and VRM error LEDs turn off when the system is turned off.

**Note:** See “System” on page 162 to determine which components should be replaced by a field service technician.

Diagnostics panel LED	FRU/action
<b>NMI on</b>	<ol style="list-style-type: none"> <li>1. <b>If PCIx LED is also on, follow that action.</b></li> <li>2. If PCIx LED is not on, restart the server.</li> <li>3. Check the System Error Log.</li> </ol>
<b>ISMP on</b>	<ol style="list-style-type: none"> <li>1. <b>Unplug the server for 30 seconds, and then retry.</b></li> <li>2. Reflash or update firmware for ISMP, BIOS.</li> <li>3. System board.</li> </ol>
<b>LOG on</b>	<ol style="list-style-type: none"> <li>1. <b>System Error Log is 75% full; clear the log.</b></li> <li>2. PFA alert; check log for failure; clear PFA alert; remove ac power for at least 20 seconds, reconnect, then turn on the system.</li> <li>3. Run Light Path Diagnostics.</li> </ol>
<b>PCIA on</b>	<ol style="list-style-type: none"> <li>1. <b>Check System Error log.</b></li> <li>2. Remove all adapters and replace one at a time until failing adapter is identified.</li> <li>3. System board.</li> </ol>
<b>PCIB on</b>	<ol style="list-style-type: none"> <li>1. <b>Check System Error log.</b></li> <li>2. Remove all adapters and replace one at a time until failing adapter is identified.</li> <li>3. System board.</li> </ol>
<b>PCIC on</b>	<ol style="list-style-type: none"> <li>1. <b>Check System Error log.</b></li> <li>2. Remove all adapters and replace one at a time until failing adapter is identified.</li> <li>3. System board.</li> </ol>
<b>PCID on</b>	<ol style="list-style-type: none"> <li>1. <b>Check System Error log.</b></li> <li>2. Remove all adapters and replace one at a time until failing adapter is identified.</li> <li>3. System board.</li> </ol>
<b>DASD on</b> (The LED located next to the drive bay that the failing drive is installed in is lit. Check the amber drive LED for the failing hard drive.)	<ol style="list-style-type: none"> <li>1. <b>Be sure the fans are operating correctly and the airflow is good.</b></li> <li>2. If installed, reseal SCSI cables between SCSI backplane and the system board.</li> <li>3. Failing hard disk drive.</li> <li>4. SCSI backplane.</li> </ol>
<b>PS1 on</b>	<ol style="list-style-type: none"> <li>1. <b>Check the dc good LED on power supply 1. If it is off, replace power supply 1.</b></li> <li>2. Power backplane.</li> </ol>
<b>PS2 on</b>	<ol style="list-style-type: none"> <li>1. <b>Check the dc good LED on power supply 2. If it is off, replace power supply 2.</b></li> <li>2. Power backplane.</li> </ol>
<b>CPU on</b> (The LED next to the failing CPU is on.)	<ol style="list-style-type: none"> <li>1. <b>Run the Configuration/Setup Utility program</b> to verify that all CPUs have identical cache sizes and types, clock speeds and clock frequencies.</li> <li>2. Microprocessor.</li> <li>3. System board.</li> </ol>

**Note:** See “System” on page 162 to determine which components should be replaced by a field service technician.

Diagnostics panel LED	FRU/action
<b>VRM on</b> (Either the LED next to the failing VRM or other LEDs will be on.)	<ol style="list-style-type: none"> <li>1. <b>Voltage regulator module indicated by the lit VRM LED</b></li> <li>2. Microprocessor indicated by the microprocessor LED</li> <li>3. If memory board VRM LED (CR46) is on, memory board</li> <li>4. If system board VRM LED (CR45) is on, system board</li> </ol>
<b>TEMP on</b>	<ol style="list-style-type: none"> <li>1. <b>Ambient temperature must be within normal operating specifications. See “Features and specifications” on page 3.</b></li> <li>2. Ensure fans are operating correctly.</li> <li>3. Examine System Error Log.               <ol style="list-style-type: none"> <li>a. System over recommended temperature                   <ul style="list-style-type: none"> <li>• Information LED panel</li> </ul> </li> <li>b. DASD over recommended temperature (DASD LED also on)                   <ol style="list-style-type: none"> <li>1) Overheating hard drive</li> <li>2) DASD backplane</li> </ol> </li> <li>c. System over recommended temperature for CPU x (where x is 1 or 2) (CPU LED is also on)                   <ol style="list-style-type: none"> <li>1) CPU x</li> <li>2) System board</li> </ol> </li> </ol> </li> <li>4. If the CPU LED on the diagnostics panel is also lit, one of the microprocessors has caused the error.</li> </ol>
<b>PS3 on</b>	<ol style="list-style-type: none"> <li>1. <b>Check the dc good LED on power supply 3. If it is off, replace power supply 3.</b></li> <li>2. Power backplane, if installed.</li> </ol>
<b>PS4 on</b>	<ol style="list-style-type: none"> <li>1. <b>Check the dc good LED on power supply 4. If it is off, replace power supply 4.</b></li> <li>2. Power backplane, if installed.</li> </ol>
<b>FAN on</b>	<ol style="list-style-type: none"> <li>1. <b>Check individual fan LEDs.</b></li> <li>2. Replace respective fan.</li> <li>3. Fan cable.</li> <li>4. System board.</li> <li>5. Power backplane.</li> </ol>
<b>OVER SPEC on</b>	<ol style="list-style-type: none"> <li>1. <b>Add an additional power supply.</b></li> <li>2. Remove optional devices from the server.</li> </ol>
<b>NONREDUND on</b>	<ol style="list-style-type: none"> <li>1. <b>Check the PSx LEDs and replace any indicated power supply.</b></li> <li>2. Install an additional power supply or remove optional devices from the server.</li> </ol>
<b>MEMORY on</b> (The LED next to the failing DIMM is on.) <b>Note:</b> See “Memory errors” on page 36.	<ol style="list-style-type: none"> <li>1. <b>DIMM x</b></li> <li>2. Memory card</li> <li>3. Microprocessor</li> <li>4. System board</li> </ol>



## Diagnostic error codes

**Note:** In the following error codes, if xxx is 000, 195, or 197, do not replace a FRU. The description for these error codes are:

- 000** The test passed.
- 195** The Esc key was pressed to stop the test.
- 197** Warning; a hardware failure might not have occurred.

For all error codes, replace the FRU or take the action indicated.

<b>Note:</b> See "System" on page 162 to determine which components should be replaced by a field service technician.	
<b>Error code/symptom</b>	<b>FRU/action</b>
<b>001-xxx-000</b> (Failed core tests)	• <b>System board</b>
<b>001-xxx-001</b> (Failed core tests)	• <b>System board</b>
<b>001-250-000</b> (Failed system board ECC)	• <b>System board</b>
<b>001-250-001</b> (Failed system board ECC)	• <b>System board</b>
<b>005-xxx-000</b> (Failed video test)	• <b>System board</b>
<b>011-xxx-000</b> (Failed COM1 serial port test)	• <b>System board</b>
<b>011-xxx-001</b> (Failed COM2 serial port test)	• <b>System board</b>
<b>014-xxx-000</b> (Failed parallel port test)	• <b>System board</b>
<b>015-xxx-001</b> (USB interface not found, board damaged)	1. <b>System board</b>
<b>015-xxx-015</b> (Failed USB external loopback test)	1. <b>Make sure the parallel port is not disabled.</b> 2. Run the USB external loopback test again. 3. System board.
<b>015-xxx-198</b> (USB device connected during USB test)	1. <b>Remove USB devices from USB1 and USB2.</b> 2. Run the USB external loopback test again. 3. System board.
<b>020-xxx-000</b> (Failed PCI interface test)	• <b>System board</b>
<b>020-xxx-001</b> (Failed hot-swap slot 1 PCI latch test)	1. <b>PCI hot-swap latch assembly</b> 2. System board
<b>020-xxx-002</b> (Failed Hot-swap slot 2 PCI latch test)	1. <b>PCI hot-swap latch assembly</b> 2. System board
<b>020-xxx-003</b> (Failed hot-swap slot 3 PCI latch test)	1. <b>PCI hot-swap latch assembly</b> 2. System board
<b>020-xxx-004</b> (Failed hot-swap slot 4 PCI latch test)	1. <b>PCI hot-swap latch assembly</b> 2. System board
<b>030-xxx-000</b> (Failed internal SCSI interface test)	• <b>System board</b>
<b>035-xxx-099</b>	1. <b>No adapters were found.</b> 2. If adapter is installed re-check connection.

**Note:** See “System” on page 162 to determine which components should be replaced by a field service technician.

Error code/symptom	FRU/action
<b>035-xxx-S99</b> (Failed RAID test on PCI slot S. S = number of failing PCI slot. Check System Error Log before replacing a FRU.)	<ol style="list-style-type: none"> <li><b>Adapter</b></li> <li>SCSI backplane</li> <li>Cable</li> </ol>
<b>035-xxx-snn</b> (Check System Error Log before replacing a FRU. s = number of failing PCI slot, nn = SCSI ID of failing fixed disk.)	<ul style="list-style-type: none"> <li><b>Hard disk drive with SCSI ID nn on RAID adapter in PCI slot s.</b></li> </ul>
<b>035-253-S99</b> (RAID adapter initialization failure)	<ol style="list-style-type: none"> <li><b>ServeRAID adapter in slot s is not configured properly.</b> Obtain the basic and extended configuration status and see the <i>ServeRAID Hardware Maintenance Manual</i> for more information.</li> <li>Cable.</li> <li>SCSI backplane.</li> <li>Adapter.</li> </ol>
<b>075-xxx-000</b> (Failed power supply test)	<ul style="list-style-type: none"> <li><b>Power supply</b></li> </ul>
<b>089-xxx-001</b> (Failed microprocessor test)	<ol style="list-style-type: none"> <li><b>VRM 1 for microprocessor 1</b></li> <li>Microprocessor 1</li> </ol>
<b>089-xxx-002</b> (Failed optional microprocessor test)	<ol style="list-style-type: none"> <li><b>VRM 2</b> for optional microprocessor 2</li> <li>Optional microprocessor 2</li> </ol>
<b>089-xxx-003</b> (Failed optional microprocessor test)	<ol style="list-style-type: none"> <li><b>VRM 3</b> for optional microprocessor 3</li> <li>Optional microprocessor 3</li> </ol>
<b>089-xxx-004</b> (Failed optional microprocessor test)	<ol style="list-style-type: none"> <li><b>VRM 4</b> for optional microprocessor 4</li> <li>Optional microprocessor 4</li> </ol>
<b>166-198-000 System Management: Aborted</b> (Unable to communicate with ASM. It may be busy. Run the test again.)	<ol style="list-style-type: none"> <li><b>Run the diagnostic test again.</b></li> <li>Correct other error conditions and retry. These include other failed system management tests and items logged in the System Error Log of the optional Remote Supervisor Adapter.</li> <li>Disconnect all server and option power cords from the server, wait 30 seconds, reconnect, and retry.</li> <li>Remote Supervisor Adapter, if installed.</li> <li>System board.</li> </ol>
<b>166-201-001 System Management: Failed</b> (I2C bus error(s) See SERVPROC and DIAGS entries in event log.)	<ol style="list-style-type: none"> <li><b>If installed, reseal the I2C cable between the Remote Supervisor Adapter (in PCI slot 1/J26) and the system board (J16).</b></li> <li>Reseat memory DIMMs.</li> <li>Memory DIMMs.</li> <li>Memory card.</li> <li>System board.</li> </ol>
<b>166-201-002 System Management: Failed</b> (I2C bus error(s) See SERVPROC and DIAGS entries in event log.)	<ol style="list-style-type: none"> <li><b>Reseat I2C cable between the diagnostics panel and the system board (J46).</b></li> <li>Diagnostics panel.</li> <li>System board.</li> </ol>

**Note:** See “System” on page 162 to determine which components should be replaced by a field service technician.

Error code/symptom	FRU/action
<b>166-201-003 System Management: Failed</b> (I2C bus error(s) See SERVPROC and DIAGS entries in event log.)	<ol style="list-style-type: none"> <li>1. <b>Reseat cables between the system board and the power supply or power backplane.</b></li> <li>2. Power backplane.</li> <li>3. System board.</li> </ol>
<b>166-201-004 System Management: Failed</b> (I2C bus error(s) See SERVPROC and DIAGS entries in event log.)	<ol style="list-style-type: none"> <li>1. <b>DASD backplane</b></li> <li>2. System board</li> </ol>
<b>166-201-005 System Management: Failed</b> (I2C bus error(s) See SERVPROC and DIAGS entries in event log.)	<ol style="list-style-type: none"> <li>1. <b>Reseat Memory DIMMs.</b></li> <li>2. Reseat microprocessors.</li> <li>3. Memory DIMMs.</li> <li>4. Memory card.</li> <li>5. Microprocessors.</li> <li>6. System board.</li> </ol>
<b>166-250-000 System Management: Failed</b> (I2C cable is disconnected. Reconnect I2C cable between Remote Supervisor Adapter and system board.)	<ol style="list-style-type: none"> <li>1. <b>Reseat I2C cable between the Advanced System Management Adapter (in PCI slot 1/J26 and the system board (J16).</b></li> <li>2. I2C cables.</li> <li>3. Advanced System Management adapter.</li> <li>4. System board.</li> </ol>
<b>166-260-000 System Management: Failed</b> (Restart ASM Error. After restarting, ASM communication was lost. Unplug and cold boot to reset ASM.)	<ol style="list-style-type: none"> <li>1. <b>Disconnect all server and option power cords from the server, wait 30 seconds, reconnect, and retry.</b></li> <li>2. Reseat the Remote Supervisor Adapter (in PCI slot 1/J26).</li> <li>3. Remote Supervisor Adapter.</li> </ol>
<b>166-342-000 System Management: Failed</b> (ASM adapter BIST indicate failed tests.)	<ol style="list-style-type: none"> <li>1. <b>Ensure the latest firmware levels for Remote Supervisor Adapter and BIOS.</b></li> <li>2. Disconnect all server and option power cords from server, wait 30 seconds, reconnect, and retry.</li> <li>3. Remote Supervisor Adapter.</li> </ol>
<b>166-400-000 System Management: Failed</b> (ISMP self test result failed tests: x where x = Flash, RAM, or ROM.)	<ol style="list-style-type: none"> <li>1. <b>Reflash or update firmware for ISMP.</b></li> <li>2. System board.</li> </ol>
<b>180-xxx-000</b> (Diagnostics LED failure)	<ul style="list-style-type: none"> <li>• <b>Run diagnostics panel LED test for the failing LED.</b></li> </ul>
<b>180-xxx-001</b> (Failed front LED panel test)	<ol style="list-style-type: none"> <li>1. <b>Operator information panel</b></li> <li>2. System board</li> </ol>
<b>180-xxx-002</b> (Failed diagnostics LED panel test)	<ol style="list-style-type: none"> <li>1. <b>Diagnostics panel</b></li> <li>2. System board</li> </ol>
<b>180-361-003</b> (Failed fan LED test)	<ol style="list-style-type: none"> <li>1. <b>Fan(s)</b></li> <li>2. System board</li> </ol>
<b>180-xxx-003</b> (Failed system board LED test)	<ul style="list-style-type: none"> <li>• <b>System board</b></li> </ul>
<b>180-xxx-005</b> (Failed SCSI backplane LED test)	<ol style="list-style-type: none"> <li>1. <b>SCSI backplane</b></li> <li>2. SCSI backplane cable</li> <li>3. System board</li> </ol>

**Note:** See “System” on page 162 to determine which components should be replaced by a field service technician.

Error code/symptom	FRU/action
<b>201-xxx-0nn</b> (Failed memory test.)	<ol style="list-style-type: none"> <li><b>DIMM Location slots 1-12 where nn = DIMM location.</b> <b>Note:</b> nn 1=DIMM 1; 2=DIMM 2; 3=DIMM 3; 4=DIMM 4; 5=DIMM 5; 6=DIMM 6, 7=DIMM 7, 8=DIMM 8, 9=DIMM 9, 10=DIMM 10, 11=DIMM 11, 12=DIMM 12.</li> <li>Memory card</li> <li>System board</li> </ol>
<b>201-xxx-999</b> (Multiple DIMM failure, see error text)	<ol style="list-style-type: none"> <li><b>See error text for failing DIMMs.</b></li> <li>Memory card.</li> <li>System board.</li> </ol>
<b>202-xxx-001</b> (Failed system cache test)	<ol style="list-style-type: none"> <li><b>VRM 1</b></li> <li>Microprocessor 1</li> </ol>
<b>202-xxx-002</b> (Failed system cache test)	<ol style="list-style-type: none"> <li><b>VRM 2</b></li> <li>Microprocessor 2</li> </ol>
<b>202-xxx-003</b> (Failed system cache test)	<ol style="list-style-type: none"> <li><b>VRM 3</b></li> <li>Microprocessor 3</li> </ol>
<b>202-xxx-004</b> (Failed system cache test)	<ol style="list-style-type: none"> <li><b>VRM 4</b></li> <li>Microprocessor 4</li> </ol>
<b>206-xxx-000</b> (Failed diskette drive test)	<ol style="list-style-type: none"> <li><b>Cable</b></li> <li>Diskette drive</li> <li>System board</li> </ol>
<b>215-xxx-000</b> (Failed IDE CD-ROM drive test)	<ol style="list-style-type: none"> <li><b>CD-ROM drive cables</b></li> <li>CD-ROM drive</li> <li>System board</li> </ol>
<b>217-198-xxx</b> (Could not establish drive parameters)	<ol style="list-style-type: none"> <li><b>Check cable and termination.</b></li> <li>SCSI backplane.</li> <li>Hard disk.</li> </ol>
<b>217-xxx-000</b> (Failed BIOS hard disk test) <b>Note:</b> If RAID is configured, the hard disk number refers to the RAID logical array.	<ul style="list-style-type: none"> <li><b>Hard disk 1</b></li> </ul>
<b>217-xxx-001</b> (Failed BIOS hard disk test) <b>Note:</b> If RAID is configured, the hard disk number refers to the RAID logical array.	<ul style="list-style-type: none"> <li><b>Hard disk 2</b></li> </ul>
<b>217-xxx-002</b> (Failed BIOS hard disk test) <b>Note:</b> If RAID is configured, the hard disk number refers to the RAID logical array.	<ul style="list-style-type: none"> <li><b>Hard disk 3</b></li> </ul>
<b>217-xxx-003</b> (Failed BIOS hard disk test) <b>Note:</b> If RAID is configured, the hard disk number refers to the RAID logical array.	<ul style="list-style-type: none"> <li><b>Hard disk 4</b></li> </ul>
<b>217-xxx-004</b> (Failed BIOS hard disk test) <b>Note:</b> If RAID is configured, the hard disk number refers to the RAID logical array.	<ul style="list-style-type: none"> <li><b>Hard disk 5</b></li> </ul>
<b>217-xxx-005</b> (Failed BIOS hard disk test) <b>Note:</b> If RAID is configured, the hard disk number refers to the RAID logical array	<ul style="list-style-type: none"> <li><b>Hard disk 6</b></li> </ul>

<b>Note:</b> See “System” on page 162 to determine which components should be replaced by a field service technician.	
<b>Error code/symptom</b>	<b>FRU/action</b>
<b>264-xxx-0nn</b> (Failed tape drive test)	<ol style="list-style-type: none"> <li>1. <b>Tape cartridge, if user executed the Read/Write Tape Drive test (failure code of xxx = 256)</b></li> <li>2. SCSI or power cable connected to tape drive with SCSI ID <i>nn</i></li> <li>3. Tape drive with SCSI ID <i>nn</i> (refer to the Help and Service Information appendix of the tape drive’s User Guide)</li> <li>4. System board or SCSI controller (run SCSI controller diagnostic to determine if the SCSI bus is functioning properly)</li> </ol>
<b>264-xxx-999</b> (Errors on multiple tape drives, see error text for more info)	<ul style="list-style-type: none"> <li>• <b>See error messages/text in the PC Doctor error log for detailed information on each individual tape drive error.</b></li> </ul>
<b>301-xxx-000</b> (Failed keyboard test) <b>Note:</b> After installing a USB keyboard, you might need to use the Configuration/Setup Utility program to enable keyboardless operation and prevent the POST error message 301 from being displayed during startup.	<ul style="list-style-type: none"> <li>• <b>Keyboard</b></li> </ul>
<b>405-xxx-000</b> (Failed Ethernet test on controller on the system board)	<ol style="list-style-type: none"> <li>1. <b>Verify that Ethernet is not disabled in BIOS.</b></li> <li>2. System board.</li> </ol>
<b>405-xxx-00n</b> (Failed Ethernet test on adapter in PCI slot <i>n</i> )	<ol style="list-style-type: none"> <li>1. <b>Adapter in PCI slot <i>n</i></b></li> <li>2. System board</li> </ol>
<b>415-xxx-000</b> (Failed Modem test)	<ol style="list-style-type: none"> <li>1. <b>Cable.</b> <b>Note:</b> Ensure modem is present and attached to server.</li> <li>2. Modem.</li> <li>3. System board.</li> </ol>

## Error symptoms

You can use the error symptom table to find solutions to problems that have definite symptoms.

If you cannot find the problem in the error symptom charts, go to “Starting the diagnostic programs” on page 31 to test the server.

If you have just added new software or a new option and your server is not working, do the following before using the error symptom charts:

- Remove the software or device that you just added.
- Run the diagnostic tests to determine if your server is running correctly.
- Reinstall the new software or new device.

In the following table, if the entry in the FRU/action column is a suggested action, perform that action; if it is the name of a component, reseal the component and replace it if necessary. The most likely cause of the symptom is listed first.

**Note:** See "System" on page 162 to determine which components should be replaced by a field service technician.

#### CD-ROM drive problems

Symptom	FRU/action
CD-ROM drive is not recognized.	<ol style="list-style-type: none"><li><b>Verify that:</b><ul style="list-style-type: none"><li>The IDE channel to which the CD-ROM drive is attached (primary or secondary) is enabled in the Configuration/Setup Utility program. <b>Note:</b> On a server with a single IDE channel, only the primary channel can be used.</li><li>All cables and jumpers are installed correctly.</li><li>The correct device driver is installed for the CD-ROM drive.</li></ul></li><li>Run CD-ROM drive diagnostics.</li><li>Cable.</li><li>CD-ROM drive.</li><li>System board.</li></ol>

**Note:** See "System" on page 162 to determine which components should be replaced by a field service technician.

#### Diskette drive problems

Symptom	FRU/action
Diskette drive activity LED stays on, or the system bypasses the diskette drive.	<ol style="list-style-type: none"><li><b>If there is a diskette in the drive, verify that:</b><ul style="list-style-type: none"><li>The diskette drive is enabled in the Configuration/Setup utility program.</li><li>The diskette is good and not damaged. (Try another diskette if you have one.)</li><li>The diskette is inserted correctly in the drive.</li><li>The diskette contains the necessary files to start the server.</li><li>The software program is working properly.</li><li>The cable is installed correctly (in the proper orientation).</li></ul></li><li>Run diskette drive diagnostics.</li><li>Cable.</li><li>Diskette drive.</li><li>System board.</li></ol>

**Note:** See "System" on page 162 to determine which components should be replaced by a field service technician.

#### Expansion enclosure problems

Symptom	FRU/action
The SCSI expansion enclosure used to work but does not work now.	<ol style="list-style-type: none"><li><b>Verify that:</b><ul style="list-style-type: none"><li>The cables for all external SCSI options are connected correctly.</li><li>The last option in each SCSI chain, or the end of the SCSI cable, is terminated correctly.</li><li>Any external SCSI option is turned on. You must turn on an external SCSI option before turning on the server.</li></ul></li><li>For more information, see your SCSI expansion enclosure documentation.</li></ol>

<b>Note:</b> See “System” on page 162 to determine which components should be replaced by a field service technician.	
<b>Hard disk drive problems</b>	
<b>Symptom</b>	<b>FRU/action</b>
Not all drives are recognized by the hard disk drive diagnostic test (Fixed Disk test).	<ol style="list-style-type: none"> <li>1. <b>Remove the first drive not recognized and try the hard disk drive diagnostic test again.</b></li> <li>2. If the remaining drives are recognized, replace the drive you removed with a new one.</li> </ol>
System stops responding during hard disk drive diagnostic test.	<ol style="list-style-type: none"> <li>1. <b>Remove the hard disk drive being tested when the server stopped responding and try the diagnostic test again.</b></li> <li>2. If the hard disk drive diagnostic test runs successfully, replace the drive you removed with a new one.</li> </ol>

<b>Note:</b> See “System” on page 162 to determine which components should be replaced by a field service technician.	
<b>General problems</b>	
<b>Symptom</b>	<b>FRU/action</b>
Problems such as broken cover locks or indicator LEDs not working	<ul style="list-style-type: none"> <li>• <b>Broken CRU/FRU</b></li> </ul>

<b>Note:</b> See “System” on page 162 to determine which components should be replaced by a field service technician.	
<b>Intermittent problems</b>	
<b>Symptom</b>	<b>FRU/action</b>
A problem occurs only occasionally and is difficult to detect.	<ol style="list-style-type: none"> <li>1. <b>Verify that:</b> <ul style="list-style-type: none"> <li>• All cables and cords are connected securely to the rear of the server and attached options.</li> <li>• When the server is turned on, air is flowing from the rear of the server at the fan grill. If there is no airflow, the fan is not working. This causes the server to overheat and shut down.</li> <li>• Ensure that the SCSI bus and devices are configured correctly and that the last external device in each SCSI chain is terminated correctly.</li> </ul> </li> <li>2. Check the system error log.</li> </ol>

<b>Note:</b> See “System” on page 162 to determine which components should be replaced by a field service technician.	
<b>Keyboard, mouse, or pointing-device problems</b>	
<b>Symptom</b>	<b>FRU/action</b>
All or some keys on the keyboard do not work.	<ol style="list-style-type: none"> <li>1. <b>Verify that:</b> <ul style="list-style-type: none"> <li>• The keyboard cable is securely connected to the system, and the keyboard and mouse cables are not reversed.</li> <li>• The server and the monitor are turned on.</li> </ul> </li> <li>2. Keyboard.</li> <li>3. System board.</li> </ol>
The mouse or pointing device does not work.	<ol style="list-style-type: none"> <li>1. <b>Verify that:</b> <ul style="list-style-type: none"> <li>• The mouse or pointing-device cable is securely connected, and that the keyboard and mouse cables are not reversed.</li> <li>• The mouse device drivers are installed correctly.</li> </ul> </li> <li>2. Mouse or pointing device.</li> <li>3. System board.</li> </ol>

**Note:** See “System” on page 162 to determine which components should be replaced by a field service technician.

<b>Memory problems</b>	
<b>Symptom</b>	<b>FRU/action</b>
The amount of system memory displayed is less than the amount of physical memory installed.	<ol style="list-style-type: none"> <li>1. <b>Verify that:</b> <ul style="list-style-type: none"> <li>• The memory modules are seated properly.</li> <li>• You have installed the correct type of memory.</li> <li>• If you changed the memory, you updated the memory configuration with the Configuration/Setup Utility program.</li> <li>• All banks of memory on the DIMMs are enabled. The server might have automatically disabled a DIMM bank when it detected a problem or a DIMM bank could have been manually disabled.</li> </ul> </li> <li>2. Check POST error log for error message 289:           <ul style="list-style-type: none"> <li>• If the DIMM was disabled by a system-management interrupt (SMI), replace the DIMM.</li> <li>• If the DIMM was disabled by the user or by POST:               <ol style="list-style-type: none"> <li>a. Start the Configuration/Setup Utility program.</li> <li>b. Enable the DIMM.</li> <li>c. Save the configuration and restart the server.</li> </ol> </li> </ul> </li> <li>3. DIMM.</li> <li>4. Memory card.</li> <li>5. System board.</li> </ol>

**Note:** See “System” on page 162 to determine which components should be replaced by a field service technician.

<b>Microprocessor problems</b>	
<b>Symptom</b>	<b>FRU/action</b>
The server emits a continuous tone during POST. (The startup (boot) microprocessor is not working properly.)	<ol style="list-style-type: none"> <li>1. <b>Verify that the startup microprocessor is seated properly.</b></li> <li>2. Startup microprocessor.</li> </ol>

**Note:** See “System” on page 162 to determine which components should be replaced by a field service technician.

<b>Monitor problems</b>	
<b>Symptom</b>	<b>FRU/action</b>
Testing the monitor.	<ul style="list-style-type: none"> <li>• <b>See the information that comes with the monitor</b> for adjusting and testing instructions. (Some IBM monitors have their own self-tests.)</li> </ul>



**Note:** See “System” on page 162 to determine which components should be replaced by a field service technician.

**Monitor problems**

Symptom	FRU/action
The screen is blank.	<ol style="list-style-type: none"> <li>1. <b>Verify that:</b> <ul style="list-style-type: none"> <li>• The server power cord is plugged into the server and a working electrical outlet.</li> <li>• The monitor cables are connected properly.</li> <li>• The monitor is turned on and the Brightness and Contrast controls are adjusted correctly.</li> <li>• If the servers are C2T chained together, verify that:                             <ul style="list-style-type: none"> <li>– The C2T chain cables are securely connected to the servers.</li> <li>– The C2T breakout cable is connected properly.</li> <li>– A server that is turned on is selected.</li> </ul> </li> </ul> </li> </ol> <p><b>Important:</b> In some memory configurations, the 3-3-3 beep code (see “Beep symptoms” on page 129) might sound during POST followed by a blank display screen. If this occurs and the <b>Boot Fail Count</b> feature in the Start Options of the Configuration/Setup Utility program is set to <b>Enabled</b> (its default setting), you must restart the server three times to force the system BIOS to reset the CMOS values to the default configuration (memory connector or bank of connectors enabled).</p> <ol style="list-style-type: none"> <li>2. If you have verified these items and the screen remains blank, replace:             <ol style="list-style-type: none"> <li>a. Monitor</li> <li>b. Video adapter, if installed</li> <li>c. System board</li> </ol> </li> </ol>
Only the cursor appears.	<ul style="list-style-type: none"> <li>• See “Undetermined problems” on page 157.</li> </ul>
The monitor works when you turn on the server but goes blank when you start some application programs.	<ol style="list-style-type: none"> <li>1. <b>Verify that:</b> <ul style="list-style-type: none"> <li>• The application program is not setting a display mode higher than the capability of the monitor.</li> <li>• The primary monitor cable is connected to the C2T device breakout cable.</li> <li>• You installed the necessary device drivers for the applications.</li> </ul> </li> <li>2. If you have verified these items and the screen remains blank, replace the monitor.</li> </ol>
The screen is wavy, unreadable, rolling, distorted, or has screen jitter.	<ol style="list-style-type: none"> <li>1. <b>If the monitor self-tests show the monitor is working properly, consider the location of the monitor.</b> Magnetic fields around other devices (such as transformers, appliances, fluorescent lights, and other monitors) can cause screen jitter or wavy, unreadable, rolling, or distorted screen images. If this happens, turn off the monitor. (Moving a color monitor while it is turned on might cause screen discoloration.) Then move the device and the monitor at least 305 mm (12 in.) apart. Turn on the monitor.             <p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>a. To prevent diskette drive read/write errors, be sure the distance between monitors and diskette drives is at least 76 mm (3 in.).</li> <li>b. Non-IBM monitor cables might cause unpredictable problems.</li> <li>c. An enhanced monitor cable with additional shielding is available for the 9521 and 9527 monitors. For information about the enhanced monitor cable, contact your IBM reseller or IBM marketing representative.</li> </ol> </li> <li>2. Video adapter, if installed.</li> <li>3. System board.</li> </ol>

<b>Note:</b> See “System” on page 162 to determine which components should be replaced by a field service technician.	
<b>Monitor problems</b>	
<b>Symptom</b>	<b>FRU/action</b>
Wrong characters appear on the screen.	<ol style="list-style-type: none"> <li>1. If the wrong language is displayed, update the BIOS code with the correct language.</li> <li>2. Video adapter, if installed.</li> <li>3. System board.</li> </ol>

<b>Note:</b> See “System” on page 162 to determine which components should be replaced by a field service technician.	
<b>Option problems</b>	
<b>Symptom</b>	<b>FRU/action</b>
An IBM option that was just installed does not work.	<ol style="list-style-type: none"> <li>1. <b>Verify that:</b> <ul style="list-style-type: none"> <li>• The option is designed for the server (see the ServerProven list on the World Wide Web at <a href="http://www.ibm.com/pc/compat/">http://www.ibm.com/pc/compat/</a>).</li> <li>• You followed the installation instructions that came with the option.</li> <li>• The option is installed correctly.</li> <li>• You have not loosened any other installed options or cables.</li> <li>• You updated the configuration information in the Configuration/Setup Utility program. Whenever memory or an option is changed, you must update the configuration.</li> </ul> </li> <li>2. Option you just installed.</li> </ol>
An IBM option that used to work does not work now.	<ol style="list-style-type: none"> <li>1. <b>Verify that all of the option hardware and cable connections are secure.</b></li> <li>2. If the option comes with its own test instructions, use those instructions to test the option.</li> <li>3. If the failing option is a SCSI option, verify that: <ul style="list-style-type: none"> <li>• The cables for all external SCSI options are connected correctly.</li> <li>• The last option in each SCSI chain, or the end of the SCSI cable, is terminated correctly.</li> <li>• Any external SCSI option is turned on. You must turn on an external SCSI option before turning on the server.</li> </ul> </li> <li>4. Failing option.</li> </ol>

**Note:** See “System” on page 162 to determine which components should be replaced by a field service technician.

**Power problems**

Symptom	FRU/action
The server does not turn on.	<ol style="list-style-type: none"> <li>1. <b>Verify that:</b> <ul style="list-style-type: none"> <li>• The power cables are properly connected to the server.</li> <li>• The electrical outlet functions properly.</li> <li>• The type of memory installed is correct.</li> <li>• If you just installed an option, remove it, and restart the server. If the server now turns on, you might have installed more options than the power supply supports.</li> </ul> </li> <li>2. If LEDs for CPUs or VRMs are on, verify that:               <ol style="list-style-type: none"> <li>a. A VRM is populated for each microprocessor.</li> <li>b. All microprocessors have the same speed.</li> <li>c. Override front panel pushbutton by turning on switch 7 of SW2; if power comes on:                   <ol style="list-style-type: none"> <li>1) Service processor error.</li> <li>2) Power reset card.</li> </ol> </li> </ol> </li> <li>3. See “Undetermined problems” on page 157.</li> </ol>
The server does not turn off.	<ol style="list-style-type: none"> <li>1. <b>Press Ctrl+Alt+Delete.</b></li> <li>2. Turn off the system by holding the power-control button for 4 seconds.</li> <li>3. If server fails during BIOS POST and power-control button does not work, remove the AC power cord.</li> </ol>

**Note:** See “System” on page 162 to determine which components should be replaced by a field service technician.

**Serial port problems**

Symptom	FRU/action
The number of serial ports identified by the operating system is less than the number of serial ports installed.	<ol style="list-style-type: none"> <li>1. <b>Verify that:</b> <ul style="list-style-type: none"> <li>• Each port is assigned a unique address by the Configuration/Setup Utility program and none of the serial ports is disabled.</li> <li>• The serial-port adapter, if you installed one, is seated properly.</li> </ul> </li> <li>2. Failing serial port adapter.</li> </ol>
A serial device does not work. For more information about the serial port, see “Serial ports” on page 114.	<ol style="list-style-type: none"> <li>1. <b>Verify that:</b> <ul style="list-style-type: none"> <li>• The device is compatible with the server.</li> <li>• The serial port is enabled and is assigned a unique address.</li> <li>• The device is connected to the correct port (see “Input/output connectors” on page 110).</li> </ul> </li> <li>2. Failing serial device.</li> <li>3. Serial adapter, if installed.</li> <li>4. System board.</li> </ol>

**Note:** See “System” on page 162 to determine which components should be replaced by a field service technician.

**Software problem**

Symptom	FRU/action
Suspected software problem.	<ol style="list-style-type: none"> <li> <b>To determine if problems are caused by the software, verify that:</b> <ul style="list-style-type: none"> <li>Your server has the minimum memory needed to use the software. For memory requirements, see the information that comes with the software.                             <b>Note:</b> If you have just installed an adapter or memory, you might have a memory address conflict.</li> <li>The software is designed to operate on your server.</li> <li>Other software works on your server.</li> <li>The software that you are using works on another system.</li> </ul> <p>If you received any error messages when using the software program, see the information that comes with the software for a description of the messages and suggested solutions to the problem.</p> </li> <li>If you have verified these items and the problem remains, contact your place of purchase.</li> </ol>

**Note:** See “System” on page 162 to determine which components should be replaced by a field service technician.

**Universal Serial Bus (USB) port problems**

Symptom	FRU/action
A USB device does not work.	<ul style="list-style-type: none"> <li> <b>Verify that:</b> <ul style="list-style-type: none"> <li>You are not trying to use a USB device during POST if you have a standard (non-USB) keyboard attached to the keyboard port.                             <b>Note:</b> If a standard (non-USB) keyboard is attached to the keyboard port, the USB is disabled and no USB device will work during POST.</li> <li>The correct USB device driver is installed.</li> <li>Your operating system supports USB devices.</li> </ul> </li> </ul>

## Power-supply LED errors

Use the information in this section to solve power-supply problems.

**Note:** The minimum configuration required for the dc good light to be lit is:

- Power supply.
- Power backplane.
- System board (set switch 7 of SW2 to bypass the power switch; see “System-board switches and jumpers” on page 47.)

**Note:** See “System” on page 162 to determine which components should be replaced by a field service technician.

AC good LED	DC good LED	Description	FRU/action
Off	Off	No power to system or ac problem.	<ol style="list-style-type: none"> <li><b>Check ac power to the system.</b></li> <li>Power supply.</li> </ol>

**Note:** See “System” on page 162 to determine which components should be replaced by a field service technician.

AC good LED	DC good LED	Description	FRU/action
On	Off	Standby mode or dc problem.	<ol style="list-style-type: none"> <li><b>Check system board cable connectors J46 and J40.</b> Move switch 7 of SW 2 to bypass power control. If the dc good LED is lit, press Ctrl+Alt+Delete. Watch the screen for any POST errors. Check the System Error Log for any listed problems. If the system starts with no errors:               <ol style="list-style-type: none"> <li>Power switch assembly</li> <li>System board</li> </ol> </li> <li>Remove the adapters and disconnect the cables and power connectors to all internal and external devices. Turn on the system. If the dc good LED is lit, replace the adapters and devices one at a time until you isolate the problem.</li> <li>Power supply.</li> <li>Power backplane.</li> <li>System board.</li> </ol>
On	On	Power is working properly.	N/A

## POST error codes

In the following error codes, X can be any number or letter.

**Note:** See “System” on page 162 to determine which components should be replaced by a field service technician.

Error code/symptom	FRU/action
<b>062</b> (Three consecutive startup failures using the default configuration.)	<ol style="list-style-type: none"> <li><b>Run the Configuration/Setup Utility program.</b></li> <li>Battery.</li> <li>System board.</li> <li>Microprocessor.</li> </ol>
<b>101, 102</b> (System and processor error)	<ul style="list-style-type: none"> <li><b>System board</b></li> </ul>
<b>106</b> (System and processor error)	<ul style="list-style-type: none"> <li><b>System board</b></li> </ul>
<b>111</b> (Channel check error)	<ol style="list-style-type: none"> <li><b>DIMM</b></li> <li>Memory card</li> <li>System board</li> </ol>
<b>114</b> (Adapter read-only memory error)	<ol style="list-style-type: none"> <li><b>Failing adapter.</b></li> <li>Run diagnostics.</li> </ol>
<b>129</b> (Internal cache error)	<ol style="list-style-type: none"> <li><b>Microprocessor</b></li> <li>Optional microprocessor (if installed)</li> </ol>
<b>151</b> (Real time clock error)	<ol style="list-style-type: none"> <li><b>Run diagnostics.</b></li> <li>Battery.</li> <li>System board.</li> </ol>
<b>161</b> (Real time clock battery error)	<ol style="list-style-type: none"> <li><b>Run the Configuration/Setup Utility program.</b></li> <li>Battery.</li> <li>System board.</li> </ol>

**Note:** See “System” on page 162 to determine which components should be replaced by a field service technician.

Error code/symptom	FRU/action
<b>162</b> (Device configuration error) <b>Note:</b> Be sure to load the default settings and any additional desired settings; then, <i>save the configuration</i> .	<ol style="list-style-type: none"> <li>1. <b>Run the Configuration/Setup Utility program.</b></li> <li>2. Battery.</li> <li>3. Failing device.</li> <li>4. System board.</li> </ol>
<b>163</b> (Real-time clock error)	<ol style="list-style-type: none"> <li>1. <b>Run the Configuration/Setup Utility program.</b></li> <li>2. Battery.</li> <li>3. System board.</li> </ol>
<b>164</b> (Memory configuration changed.)	<ol style="list-style-type: none"> <li>1. <b>Run the Configuration/Setup Utility program.</b></li> <li>2. DIMM.</li> <li>3. Memory card.</li> <li>4. System board.</li> </ol>
<b>175</b> (Hardware error)	<ul style="list-style-type: none"> <li>• <b>System board</b></li> </ul>
<b>176</b> (Computer cover or cable cover was removed without a key being used)	<ol style="list-style-type: none"> <li>1. <b>Run the Configuration/Setup Utility program.</b></li> <li>2. System board.</li> </ol>
<b>177, 178</b> (Security hardware error)	<ol style="list-style-type: none"> <li>1. <b>Run the Configuration/Setup Utility program.</b></li> <li>2. System board.</li> </ol>
<b>184</b> (Power-on password damaged)	<ol style="list-style-type: none"> <li>1. <b>Run the Configuration/Setup Utility program.</b></li> <li>2. System board.</li> </ol>
<b>185</b> (Drive startup sequence information corrupted)	<ol style="list-style-type: none"> <li>1. <b>Run the Configuration/Setup Utility program.</b></li> <li>2. System board.</li> </ol>
<b>186</b> (Security hardware control logic failed)	<ol style="list-style-type: none"> <li>1. <b>Run the Configuration/Setup Utility program.</b></li> <li>2. System board.</li> </ol>
<b>187</b> (VPD serial number not set.)	<ol style="list-style-type: none"> <li>1. <b>Set serial number in the Configuration/Setup Utility program.</b></li> <li>2. System board.</li> </ol>
<b>188</b> (Bad EEPROM CRC #2)	<ol style="list-style-type: none"> <li>1. <b>Run the Configuration/Setup Utility program.</b></li> <li>2. System board.</li> </ol>
<b>189</b> (An attempt was made to access the server with invalid passwords)	<ol style="list-style-type: none"> <li>1. <b>Run the Configuration/Setup Utility program, and type the administrator password.</b></li> </ol>
<b>201</b> (Memory test error.) If the server does not have the latest level of BIOS installed, update the BIOS to the latest level and run the diagnostic program again.	<ol style="list-style-type: none"> <li>1. <b>DIMM</b></li> <li>2. Memory card</li> <li>3. System board</li> </ol>
<b>229</b> (Cache error)	<ol style="list-style-type: none"> <li>1. <b>Microprocessor</b></li> <li>2. Optional microprocessor (if installed)</li> </ol>
<b>262</b> (DRAM parity configuration error)	<ol style="list-style-type: none"> <li>1. <b>Run the Configuration/Setup Utility program.</b></li> <li>2. Battery.</li> <li>3. System board.</li> </ol>
<b>289</b> (DIMM disabled by POST or user)	<ol style="list-style-type: none"> <li>1. <b>Run the Configuration/Setup Utility program, if the DIMM was disabled by the user.</b></li> <li>2. Disabled DIMM, if not disabled by user.</li> </ol>

**Note:** See “System” on page 162 to determine which components should be replaced by a field service technician.

Error code/symptom	FRU/action
<b>301</b> (Keyboard or keyboard controller error) <b>Note:</b> After installing a USB keyboard, you might need to use the Configuration/Setup Utility to enable keyboardless operation and prevent the POST error message 301 from being displayed during startup.	<ol style="list-style-type: none"> <li>1. <b>Keyboard</b></li> <li>2. System board</li> </ol>
<b>303</b> (Keyboard controller error)	<ul style="list-style-type: none"> <li>• <b>System board</b></li> </ul>
<b>602</b> (Invalid diskette boot record)	<ol style="list-style-type: none"> <li>1. <b>Diskette</b></li> <li>2. Diskette drive</li> <li>3. Cable</li> <li>4. System board</li> </ol>
<b>604</b> (Diskette drive error)	<ol style="list-style-type: none"> <li>1. <b>Run the Configuration/Setup Utility program and diagnostics.</b></li> <li>2. Diskette drive.</li> <li>3. Drive cable.</li> <li>4. System board.</li> </ol>
<b>605</b> (Unlock failure)	<ol style="list-style-type: none"> <li>1. <b>Diskette drive</b></li> <li>2. Drive cable</li> <li>3. System board</li> </ol>
<b>662</b> (Diskette drive configuration error)	<ol style="list-style-type: none"> <li>1. <b>Run the Configuration/Setup Utility program and diagnostics.</b></li> <li>2. Diskette drive.</li> <li>3. Drive cable.</li> <li>4. System board.</li> </ol>
<b>762</b> (Coprocessor configuration error)	<ol style="list-style-type: none"> <li>1. <b>Run the Configuration/Setup Utility program.</b></li> <li>2. Battery.</li> <li>3. Microprocessor.</li> </ol>
<b>962</b> (Parallel port error)	<ol style="list-style-type: none"> <li>1. <b>Disconnect the external cable on the parallel port.</b></li> <li>2. Run the Configuration/Setup Utility program.</li> <li>3. System board.</li> </ol>
<b>11XX</b> (System board serial port 1 or 2 error)	<ol style="list-style-type: none"> <li>1. <b>Disconnect the external cable on the serial port.</b></li> <li>2. Run the Configuration/Setup Utility program.</li> <li>3. System board.</li> </ol>
<b>1301</b> (I <sup>2</sup> C cable to front panel not found)	<ol style="list-style-type: none"> <li>1. <b>Cable</b></li> <li>2. Front panel</li> <li>3. Power switch assembly</li> <li>4. System board</li> </ol>
<b>1302</b> (I <sup>2</sup> C cable from system board to power on and reset switches not found)	<ol style="list-style-type: none"> <li>1. <b>Cable</b></li> <li>2. Power switch assembly</li> <li>3. System board</li> </ol>
<b>1303</b> (I <sup>2</sup> C cable from system board to power backplane not found)	<ol style="list-style-type: none"> <li>1. <b>Cable</b></li> <li>2. Power backplane</li> <li>3. System board</li> </ol>

**Note:** See “System” on page 162 to determine which components should be replaced by a field service technician.

Error code/symptom	FRU/action
<b>1304</b> (I <sup>2</sup> C cable to diagnostic LED board not found)	<ol style="list-style-type: none"> <li>1. <b>Power switch assembly</b></li> <li>2. System board</li> </ol>
<p><b>1601</b> (The system is able to communicate to the system management processor, but the system management processor failed to respond at the start of POST.) Do the following before replacing a FRU:</p> <ol style="list-style-type: none"> <li>1. Remove the ac power to the server, wait 20 seconds; then, reconnect the ac power. Wait 30 seconds; then, turn on the server.</li> <li>2. Flash update the system management processor.</li> </ol>	<ol style="list-style-type: none"> <li>1. <b>Remote Supervisor Adapter, if installed</b></li> <li>2. System board</li> </ol>
<b>1602</b> (Cable for optional service processor adapter not installed)	<ul style="list-style-type: none"> <li>• <b>Disconnect all server and option power cords from server, wait 30 seconds, reconnect, and retry.</b></li> </ul>
<b>1762</b> (Hard disk configuration error)	<ol style="list-style-type: none"> <li>1. <b>Hard disk drive.</b></li> <li>2. Hard disk cables.</li> <li>3. Run the Configuration/Setup Utility program.</li> <li>4. Hard disk adapter.</li> <li>5. SCSI backplane.</li> <li>6. System board.</li> </ol>
<b>178X</b> (Fixed disk error)	<ol style="list-style-type: none"> <li>1. <b>Hard disk cables.</b></li> <li>2. Run diagnostics.</li> <li>3. Hard disk adapter.</li> <li>4. Hard disk drive.</li> <li>5. System board.</li> </ol>
<b>1800</b> (No more hardware interrupt available for PCI adapter)	<ol style="list-style-type: none"> <li>1. <b>Run the Configuration/Setup Utility program.</b></li> <li>2. Failing adapter.</li> <li>3. System board.</li> </ol>
<b>1962</b> (Drive does not contain a valid boot sector)	<ol style="list-style-type: none"> <li>1. <b>Verify that a startable operating system is installed.</b></li> <li>2. Run diagnostics.</li> <li>3. Hard disk drive.</li> <li>4. SCSI backplane.</li> <li>5. Cable.</li> <li>6. System board.</li> </ol>
<b>2400</b> (Video controller test failure)	<ol style="list-style-type: none"> <li>1. <b>Video adapter (if installed)</b></li> <li>2. System board</li> </ol>
<b>2462</b> (Video memory configuration error)	<ol style="list-style-type: none"> <li>1. <b>Video adapter (if installed)</b></li> <li>2. System board</li> </ol>



**Note:** See “System” on page 162 to determine which components should be replaced by a field service technician.

<b>Error code/symptom</b>	<b>FRU/action</b>
<b>5962</b> (IDE CD-ROM drive configuration error)	<ol style="list-style-type: none"> <li>1. <b>Run the Configuration/Setup Utility program.</b></li> <li>2. CD-ROM drive.</li> <li>3. CD-ROM power cable.</li> <li>4. IDE cable.</li> <li>5. System board.</li> <li>6. Battery.</li> </ol>
<b>8603</b> (Pointing-device error)	<ol style="list-style-type: none"> <li>1. <b>Pointing device</b></li> <li>2. System board</li> </ol>
<b>0001200</b> (Machine check architecture error)	<ol style="list-style-type: none"> <li>1. <b>Microprocessor 1</b></li> <li>2. Optional microprocessor 2</li> </ol>
<b>00012000</b> (Microprocessor machine check)	<ol style="list-style-type: none"> <li>1. <b>Microprocessor</b></li> <li>2. System board</li> </ol>
<b>00019501</b> (Microprocessor 1 is not functioning - check VRM and microprocessor LEDs)	<ol style="list-style-type: none"> <li>1. <b>VRM 1</b></li> <li>2. Microprocessor 1</li> <li>3. System board</li> </ol>
<b>00019502</b> (Microprocessor 2 is not functioning - check VRM and microprocessor LEDs)	<ol style="list-style-type: none"> <li>1. <b>VRM 2</b></li> <li>2. Microprocessor 2</li> <li>3. System board</li> </ol>
<b>00019503</b> (Microprocessor 3 is not functioning - check VRM and microprocessor LEDs)	<ol style="list-style-type: none"> <li>1. <b>VRM 3</b></li> <li>2. Microprocessor 3</li> <li>3. System board</li> </ol>
<b>00019504</b> (Microprocessor 4 is not functioning - check VRM and microprocessor LEDs)	<ol style="list-style-type: none"> <li>1. <b>VRM 4</b></li> <li>2. Microprocessor 4</li> <li>3. System board</li> </ol>
<b>00019701</b> (Microprocessor 1 failed)	<ol style="list-style-type: none"> <li>1. <b>Microprocessor 1</b></li> <li>2. System board</li> </ol>
<b>00019702</b> (Microprocessor 2 failed)	<ol style="list-style-type: none"> <li>1. <b>Microprocessor 2</b></li> <li>2. System board</li> </ol>
<b>00019703</b> (Microprocessor 3 failed)	<ol style="list-style-type: none"> <li>1. <b>Microprocessor 3</b></li> <li>2. System board</li> </ol>
<b>00019704</b> (Microprocessor 4 failed)	<ol style="list-style-type: none"> <li>1. <b>Microprocessor 4</b></li> <li>2. System board</li> </ol>
<b>00151700</b> (Hot Spare Memory copy started)	<ol style="list-style-type: none"> <li>1. <b>Run diagnostics.</b></li> <li>2. DIMM.</li> <li>3. Memory card.</li> </ol>
<b>00151710</b> (Hot Spare Memory copy completed)	<ol style="list-style-type: none"> <li>1. <b>Run diagnostics.</b></li> <li>2. DIMM.</li> <li>3. Memory card.</li> </ol>

**Note:** See “System” on page 162 to determine which components should be replaced by a field service technician.

Error code/symptom	FRU/action
<p><b>00180100</b> (A PCI adapter has requested memory resources that are not available.)</p>	<ol style="list-style-type: none"> <li>1. <b>Reorder the adapters in the PCI slots. It is important that your startup device is positioned early in the startup-device order so that it is assigned its required resources.</b></li> </ol> <p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>a. If a RAID and a SCSI adapter are installed and both adapters are set up to boot, try disabling the BIOS on the SCSI adapter to free up space in ROM.</li> <li>b. Other types of adapters could also use ROM space; it may be possible to disable the BIOS on these cards as well.</li> <li>c. BIOS can be disabled to free up ROM space for additional controllers if an onboard Adaptec controller or an Adaptec PCI card is present.</li> <li>d. Once a controller has been disabled, it will not be bootable.</li> </ol> <ol style="list-style-type: none"> <li>2. Ensure that the PCI adapter and all other adapters are set correctly in the Configuration/Setup Utility program Utility program. If the memory resource settings are not correct, change the settings.</li> <li>3. If all memory resources are being used, you might need to remove an adapter to make memory available to the PCI adapter. Disabling the BIOS code on the adapter might correct the error. (See the documentation provided with the adapter.)</li> </ol>
<p><b>00180200</b> (No more I/O space available for PCI adapter)</p>	<ol style="list-style-type: none"> <li>1. <b>Run the Configuration/Setup Utility program.</b></li> <li>2. Failing adapter.</li> <li>3. System board.</li> </ol>
<p><b>00180300</b> (No more memory (above 1MB for PCI adapter))</p>	<ol style="list-style-type: none"> <li>1. <b>Run the Configuration/Setup Utility program.</b></li> <li>2. Failing adapter.</li> <li>3. System board.</li> </ol>
<p><b>00180400</b> (No more memory (below 1MB for PCI adapter))</p>	<ol style="list-style-type: none"> <li>1. <b>Run the Configuration/Setup Utility program.</b></li> <li>2. Move the failing adapter to slot 1.</li> <li>3. Failing adapter.</li> <li>4. System board.</li> </ol>
<p><b>00180500</b> (PCI option ROM checksum error)</p>	<ol style="list-style-type: none"> <li>1. <b>Remove the failing PCI card.</b></li> <li>2. System board.</li> </ol>
<p><b>00180600</b> (PCI to PCI bridge error)</p>	<ol style="list-style-type: none"> <li>1. <b>Run the Configuration/Setup Utility program.</b></li> <li>2. Move the failing adapter to slot 1.</li> <li>3. Failing adapter.</li> <li>4. System board</li> </ol>
<p><b>00180700, 00180800</b> (General PCI error)</p>	<ol style="list-style-type: none"> <li>1. <b>System board</b></li> <li>2. PCI card</li> </ol>
<p><b>00181000</b> (PCI error)</p>	<ul style="list-style-type: none"> <li>• <b>Adapter</b></li> <li>• System board</li> </ul>
<p><b>01295085</b> (ECC checking hardware test error)</p>	<ol style="list-style-type: none"> <li>1. <b>System board</b></li> <li>2. Microprocessor</li> </ol>
<p><b>01298001</b> (System BIOS installed on this server does not support level of processor)</p>	<ol style="list-style-type: none"> <li>1. <b>Ensure all microprocessors have the same cache size.</b></li> <li>2. Microprocessor 1.</li> </ol>

<b>Note:</b> See “System” on page 162 to determine which components should be replaced by a field service technician.	
<b>Error code/symptom</b>	<b>FRU/action</b>
<b>01298002</b> (System BIOS installed on this server does not support level of processor)	<ol style="list-style-type: none"> <li>1. <b>Ensure all microprocessors have the same cache size.</b></li> <li>2. Microprocessor 2.</li> </ol>
<b>01298003</b> (System BIOS installed on this server does not support level of processor)	<ol style="list-style-type: none"> <li>1. <b>Ensure all microprocessors have the same cache size.</b></li> <li>2. Microprocessor 3.</li> </ol>
<b>01298004</b> (System BIOS installed on this server does not support level of processor)	<ol style="list-style-type: none"> <li>1. <b>Ensure all microprocessors have the same cache size.</b></li> <li>2. Microprocessor 4.</li> </ol>
<b>01298101</b> (System BIOS installed on this server does not support level of processor)	<ol style="list-style-type: none"> <li>1. <b>Ensure all microprocessors have the same cache size.</b></li> <li>2. Microprocessor 1.</li> </ol>
<b>01298102</b> (System BIOS installed on this server does not support level of processor)	<ol style="list-style-type: none"> <li>1. <b>Ensure all microprocessors have the same cache size.</b></li> <li>2. Microprocessor 2.</li> </ol>
<b>01298103</b> (System BIOS installed on this server does not support level of processor)	<ol style="list-style-type: none"> <li>1. <b>Ensure all microprocessors have the same cache size.</b></li> <li>2. Microprocessor 3.</li> </ol>
<b>01298104</b> (System BIOS installed on this server does not support level of processor)	<ol style="list-style-type: none"> <li>1. <b>Ensure all microprocessors have the same cache size.</b></li> <li>2. Microprocessor 4.</li> </ol>
<b>I9990301</b> (Hard disk sector error)	<ol style="list-style-type: none"> <li>1. <b>Hard disk drive</b></li> <li>2. SCSI backplane</li> <li>3. Cable</li> <li>4. System board</li> </ol>
<b>I9990305</b> (Hard disk sector error, no operating system installed)	<ol style="list-style-type: none"> <li>1. <b>Install an operating system on the hard disk.</b></li> </ol>
<b>I9990650</b> (AC power has been restored)	<ol style="list-style-type: none"> <li>1. <b>Check cable.</b></li> <li>2. Check for interruption of power.</li> <li>3. Power cable.</li> </ol>

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## Service processor error codes

Service processor error codes in the POST error log will appear in hexadecimal form (generally beginning with A2, A3, A4, A5, A6, A7, AD, AE, or E1). These error codes will appear in text format when viewed from the System Error Log through the diagnostic programs. To determine a possible error condition for the service processor, view the System Error Log from the diagnostic programs (see “Viewing error logs from diagnostic programs” on page 30).

## SCSI error codes

Error code	FRU/action
<p><b>All SCSI Errors</b> One or more of the following might be causing the problem:</p> <ul style="list-style-type: none"> <li>• A failing SCSI device (adapter, drive, controller)</li> <li>• An improper SCSI configuration or SCSI termination jumper setting</li> <li>• Duplicate SCSI IDs in the same SCSI chain</li> <li>• A missing or improperly installed SCSI terminator</li> <li>• A defective SCSI terminator</li> <li>• An improperly installed cable</li> <li>• A defective cable</li> </ul>	<ol style="list-style-type: none"> <li>1. <b>External SCSI devices must be turned on before you turn on the server.</b></li> <li>2. Make sure that the cables for all external SCSI devices are connected correctly.</li> <li>3. If you have attached an external SCSI device to the server, make sure the external SCSI termination is set to automatic.</li> <li>4. Make sure that the last device in each SCSI chain is terminated correctly.</li> <li>5. Make sure that the SCSI devices are configured correctly.</li> </ol>

## Temperature error messages

<b>Note:</b> See “System” on page 162 to determine which components should be replaced by a field service technician.	
Message	Action
<b>DASD Over Temperature</b> (level-critical; direct access storage device bay x was over temperature)	<ul style="list-style-type: none"> <li>• <b>Ensure that the system is being properly cooled;</b> see “System reliability considerations” on page 41.</li> </ul>
<b>DASD Over recommended Temperature (sensor x)</b> (level-warning; DASD bay x had over temperature condition)	<ul style="list-style-type: none"> <li>• <b>Ensure that the system is being properly cooled;</b> see “System reliability considerations” on page 41.</li> </ul>
<b>DASD under recommended temperature (sensor x)</b> (level-warning; direct access storage device bay x had under temperature condition)	<ul style="list-style-type: none"> <li>• <b>Ambient temperature must be within normal operating specifications;</b> see “Features and specifications” on page 3.</li> </ul>
<b>DASD Over Temperature</b> (level-critical; sensor for DASD1 reported temperature over recommended range)	<ul style="list-style-type: none"> <li>• <b>Ensure system is being properly cooled;</b> see “System reliability considerations” on page 41.</li> </ul>
<b>Power supply x Temperature Fault</b> (level-critical; power supply x had over temperature condition)	<ol style="list-style-type: none"> <li>1. <b>Ensure system is being properly cooled;</b> see “System reliability considerations” on page 41.</li> <li>2. Replace power supply x</li> </ol>
<b>System board is over recommended temperature</b> (level-warning; system board is over recommended temperature)	<ol style="list-style-type: none"> <li>1. <b>Ensure system is being properly cooled;</b> see “System reliability considerations” on page 41.</li> <li>2. Replace the system board.</li> </ol>
<b>System board is under recommended temperature</b> (level-warning; system board is under recommended temperature)	<ul style="list-style-type: none"> <li>• <b>Ambient temperature must be within normal operating specifications;</b> see “Features and specifications” on page 3.</li> </ul>
<b>System over temperature for CPU x</b> (level-warning; CPU x reporting over temperature condition)	<ul style="list-style-type: none"> <li>• <b>Ensure system is being properly cooled;</b> see “System reliability considerations” on page 41.</li> </ul>
<b>System under recommended CPU x temperature</b> (level-warning; system reporting under temperature condition for CPU x)	<ul style="list-style-type: none"> <li>• <b>Ambient temperature must be within normal operating specifications;</b> see “Features and specifications” on page 3.</li> </ul>

## Fan error messages

<b>Note:</b> See “System” on page 162 to determine which components should be replaced by a field service technician.	
Message	Action
<b>Fan x failure</b> (level-critical; fan x had a failure)	<ol style="list-style-type: none"> <li>1. <b>Check connections to fan x.</b></li> <li>2. Replace fan x.</li> </ol>
<b>Fan x fault</b> (level-critical; fan x beyond recommended RPM range)	<ol style="list-style-type: none"> <li>1. <b>Check connections to fan x.</b></li> <li>2. Replace fan x.</li> </ol>
<b>Fan x outside recommended speed action</b>	<ol style="list-style-type: none"> <li>1. <b>Replace fan x.</b></li> </ol>

## Power error messages

<b>Note:</b> See “System” on page 162 to determine which components should be replaced by a field service technician.	
Message	Action
<b>Power supply x current share fault</b> (level-critical; excessive current demand on power supply x)	<ul style="list-style-type: none"> <li>• <b>Replace power supply x.</b></li> </ul>
<b>Power supply x DC good fault</b> (level-critical; power good signal not detected for power supply x)	<ul style="list-style-type: none"> <li>• <b>Replace power supply x.</b></li> </ul>
<b>Power supply x temperature fault</b>	<ul style="list-style-type: none"> <li>• <b>Replace power supply x.</b></li> </ul>
<b>Power supply x removed</b>	<ul style="list-style-type: none"> <li>• <b>No action required - information only.</b></li> </ul>
<b>Power supply x fan fault</b> (level-critical; fan fault in power supply x)	<ul style="list-style-type: none"> <li>• <b>Replace power supply x.</b></li> </ul>
<b>Power supply x 12 V fault</b> (level-critical; overcurrent condition detected)	<ul style="list-style-type: none"> <li>• <b>See “Power checkout” on page 37.</b></li> </ul>
<b>Power supply x 3.3 V fault</b> (level-critical; 3.3 V power supply x had an error)	<ul style="list-style-type: none"> <li>• <b>See “Power checkout” on page 37.</b></li> </ul>
<b>Power supply x 5 V fault</b> (level-critical; 5 V power supply x had an error)	<ul style="list-style-type: none"> <li>• <b>See “Power checkout” on page 37.</b></li> </ul>
<b>System running non-redundant power</b> (level-noncritical; system does not have redundant power)	<ol style="list-style-type: none"> <li>1. <b>Add another power supply.</b></li> <li>2. Remove options from system.</li> <li>3. System can continue to operate without redundancy protection if steps 1 and 2 are not followed.</li> </ol>
<b>System under recommended voltage for x</b> (level-warning; indicated voltage supply under nominal value; value for x can be +12, -12, or +5)	<ol style="list-style-type: none"> <li>1. <b>Check connections to the power subsystem.</b></li> <li>2. Power supply.</li> <li>3. Power backplane.</li> </ol>

## System shutdown

Refer to the following tables when experiencing system shutdown related to voltage or temperature problems.

## Voltage related system shutdown

<b>Note:</b> See “System” on page 162 to determine which components should be replaced by a field service technician.	
Message	Action
<b>System shutoff due to x current over max value</b> (level-critical; system drawing too much current on voltage x bus)	<ul style="list-style-type: none"> <li>• See “Power checkout” on page 37.</li> </ul>
<b>System shutoff due to x V over voltage</b> (level-critical; system shutoff due to x supply over voltage)	<ol style="list-style-type: none"> <li>1. Check the power-supply connectors</li> <li>2. Power supply.</li> <li>3. Power backplane.</li> </ol>
<b>System shutoff due to x V under voltage</b> (level-critical system shutoff due to x supply under voltage)	<ol style="list-style-type: none"> <li>1. Check the power-supply connectors.</li> <li>2. Power supply.</li> <li>3. Power backplane.</li> </ol>
<b>System shutoff due to VRM x over voltage</b>	<ul style="list-style-type: none"> <li>• Replace VRM x.</li> </ul>
<b>System shutoff due to excessive (&lt; 240 VA) loading</b>	<ol style="list-style-type: none"> <li>1. See “Power checkout” on page 37.</li> <li>2. Cycle ac on/off.</li> </ol>

## Temperature related system shutdown

<b>Note:</b> See “System” on page 162 to determine which components should be replaced by a field service technician.	
Message	Action
<b>System shutoff due to board over temperature</b> (level-critical; board is over temperature)	<ol style="list-style-type: none"> <li>1. Ensure that the system is being properly cooled; see “System reliability considerations” on page 41”.</li> <li>2. Replace board.</li> </ol>
<b>System shutoff due to CPU x over temperature</b> (level-critical; CPU x is over temperature)	<ol style="list-style-type: none"> <li>1. Ensure that the system is being properly cooled; see “System reliability considerations” on page 41.</li> <li>2. Replace CPU x.</li> </ol>
<b>System shutoff due to CPU x under temperature</b> (level-critical; CPU x is under temperature)	<ul style="list-style-type: none"> <li>• Ambient temperature must be within normal operating specifications; see “Features and specifications” on page 3.</li> </ul>
<b>System shutoff due to DASD temperature (sensor x)</b> (level-critical; DASD area reported temperature outside recommended operating range)	<ul style="list-style-type: none"> <li>• Ensure that the system is being properly cooled; see “System reliability considerations” on page 41.</li> </ul>
<b>System shutoff due to high ambient temperature</b> (level-critical; high ambient temperature)	<ul style="list-style-type: none"> <li>• Ambient temperature must be within normal operating specifications; see “Features and specifications” on page 3.</li> </ul>
<b>System shutoff due to system board under temperature</b> (level-critical; system board is under temperature)	<ul style="list-style-type: none"> <li>• Ambient temperature must be within normal operating specifications; see “Features and specifications” on page 3.</li> </ul>

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## DASD checkout

**Note:** See “System” on page 162 to determine which components should be replaced by a field service technician.

Message	Action
<b>Hard drive x removal detected</b> (level-critical; hard drive x has been removed)	<ul style="list-style-type: none"><li>• <b>Information only, take action as appropriate.</b></li></ul>

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## Host built-in self test (BIST)

**Note:** See “System” on page 162 to determine which components should be replaced by a field service technician.

Message	Action
<b>Host fail</b> (level-informational; built-in self-test for the host failed)	<ol style="list-style-type: none"><li>1. <b>Reseat the microprocessor.</b></li><li>2. Reseat the VRM.</li><li>3. Replace the microprocessor.</li></ol>

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## Bus fault messages

**Note:** See “System” on page 162 to determine which components should be replaced by a field service technician.

Bus fault messages	Message Action
<b>Failure reading I2C device.</b> Check devices on bus 0.	<ol style="list-style-type: none"><li>1. <b>If installed, reseat the I2C cable between the Remote Supervisor Adapter (in PCI slot 1/J26) and the system board (J16).</b></li><li>2. Memory DIMMs.</li><li>3. Memory card.</li><li>4. System board.</li></ol>
<b>Failure reading I2C device.</b> Check devices on bus 1.	<ol style="list-style-type: none"><li>1. <b>Reseat the cable between the operator information panel and system board (J46).</b></li><li>2. Operator information panel.</li><li>3. System board.</li></ol>
<b>Failure reading I2C device.</b> Check devices on bus 2.	<ol style="list-style-type: none"><li>1. <b>Reseat the cable between the system board and the power supply (power backplane) (J40).</b></li><li>2. Power backplane.</li><li>3. Power supply.</li><li>4. System board.</li></ol>
<b>Failure reading I2C device.</b> Check devices on bus 3.	<ol style="list-style-type: none"><li>1. <b>Reseat the cable between the DASD backplane and connector (J15) of system board.</b></li><li>2. DASD backplane.</li><li>3. System board.</li></ol>
<b>Failure reading I2C device.</b> Check device on bus 4.	<ul style="list-style-type: none"><li>• <b>System board</b></li></ul>

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## Undetermined problems

Use the information in this section if the diagnostic tests did not identify the failure, the devices list is incorrect, or the system is inoperative.

**Notes:**

1. Damaged data in CMOS can cause undetermined problems.
2. Damaged data in BIOS code can cause undetermined problems.

Check the LEDs on all the power supplies. If the LEDs indicate the power supplies are working correctly, complete the following steps:

1. Turn off the server.
2. Be sure the server is cabled correctly.
3. Remove or disconnect the following devices (one at a time) until you find the failure (turn on the server and reconfigure each time):
  - Any external devices
  - Surge suppressor device (on the server)
  - Modem, printer, mouse, or non-IBM devices
  - Each adapter
  - Drives
  - Memory modules (minimum requirement = 256 MB (2 banks of 128 MB DIMMs))

**Note:** Minimum operating requirements are:

- a. One power supply
  - b. Power backplane
  - c. System board
  - d. One microprocessor and VRM
  - e. Memory module (with a minimum of two 128 MB DIMMs)
4. Turn on the server. If the problem remains, suspect the following FRUs in the order listed:
    - Power supply
    - Power backplane
    - System board

**Notes:**

1. If the problem goes away when you remove an adapter from the system and replacing that adapter does not correct the problem, suspect the system board.
2. If you suspect a networking problem and all the system tests pass, suspect a network cabling problem external to the system.

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## Problem determination tips

Due to the variety of hardware and software combinations that can be encountered, use the following information to assist you in problem determination. If possible, have this information available when requesting assistance from Service Support and Engineering functions.

- Machine type and model
- Microprocessor or hard disk upgrades
- Failure symptom
  - Do diagnostics fail?
  - What, when, where, single, or multiple systems?
  - Is the failure repeatable?
  - Has this configuration ever worked?
  - If it has been working, what changes were made prior to it failing?
  - Is this the original reported failure?
- Diagnostics version
  - Type and version level



- Hardware configuration
  - Print (print screen) configuration currently in use
  - BIOS level
- Operating system software
  - Type and version level

**Note:** To eliminate confusion, identical systems are considered identical only if they:

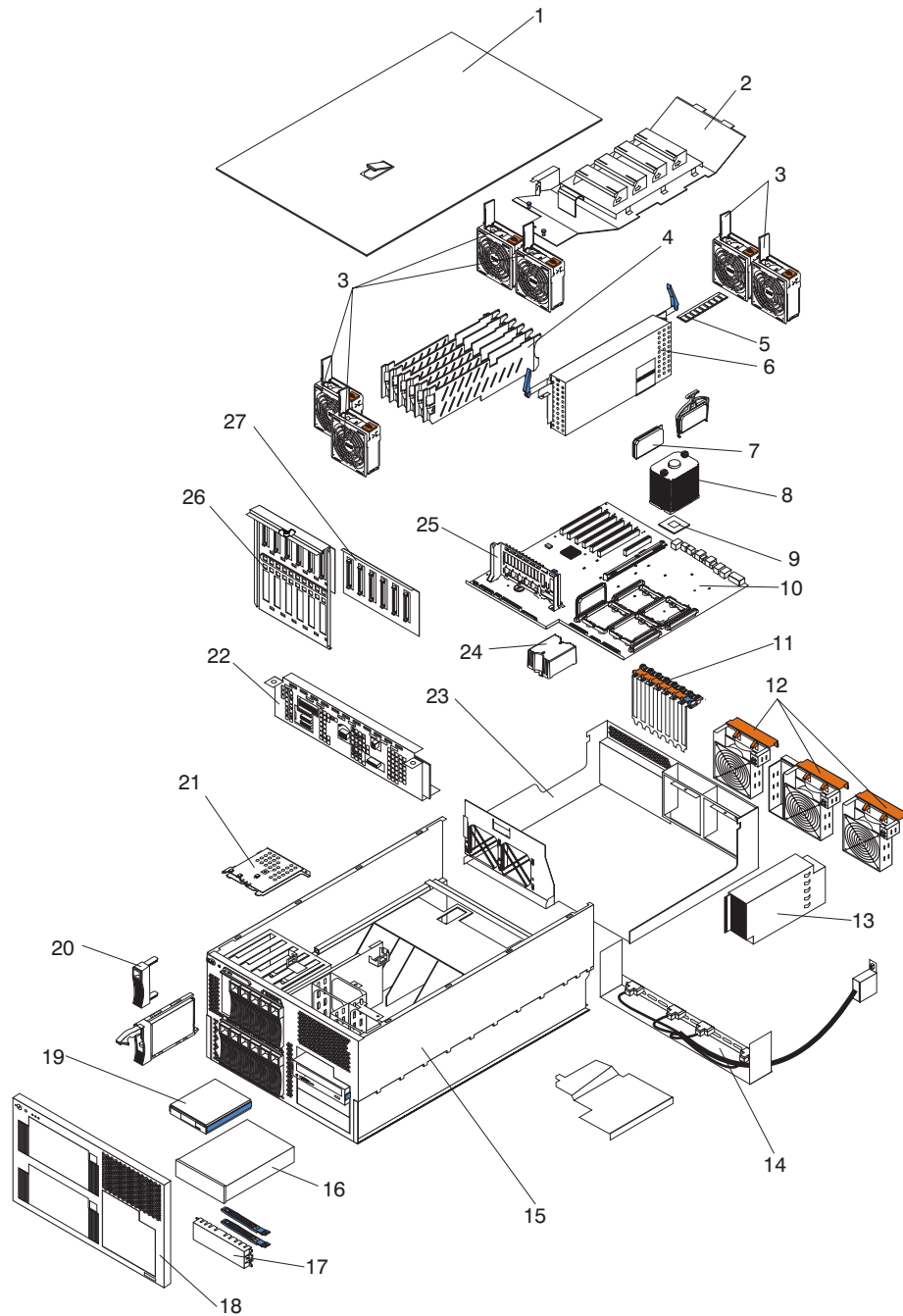
1. Are the exact machine type and models
2. Have the same BIOS level
3. Have the same adapters/attachments in the same locations
4. Have the same address jumpers/terminators/cabling
5. Have the same software versions and levels
6. Have the same diagnostics code (version)
7. Have the same configuration options set in the system
8. Have the same setup for the operation system control files

Comparing the configuration and software set-up between "working" and "non-working" systems will often lead to problem resolution.



## Chapter 7. Parts listing, xSeries 255

This parts listing supports the xSeries 255 (Type 8685), Models 1RX, 11X, 2RX, 21X, 3RX, 31X.



## System

**Note:** Field replaceable units (FRUs) should be serviced only by qualified field service technicians. Customer replaceable units can be replaced by the customer.

Index	System (xSeries 255, Type 8685, Models 1RX, 11X, 2RX,21X, 3RX, 31X)	FRU No.	CRU/FRU
1	Cover, top (all models)	32P1423	CRU
2	Baffle, air (all models)	32P1428	CRU
3	Fan, 92 mm (all models)	09N9474	CRU
4	Insulator (all models)	06P6356	CRU
5	Memory, 256 MB PC1600 ECC (models 1RX 11X), 4RX, 41X)	33L3282	CRU
5	Memory, 512 MB PC1600 ECC (models 2RX 21X 3RX 31X, 5RX, 51X,6RX, 61X)	33L3284	CRU
6	Card, memory (all models)	32P0836	FRU
7	VRM (models 1RX, 11X, 2RX, 21X, 3RX, 31X)	49P2073	CRU
7	VRM (models 4RX, 41X, 5RXR, 51X, 6RX, 61X)	49P2129	CRU
8	Heat sink (models 1RX, 11X, 2RX, 21X, 3RX, 31X)	48P9576	FRU
8	Heat sink (models 41X, 51X, 61X, 4RX, 5RX, 6RX)	59P6940	FRU
9	Microprocessor, 100/1.4-512 KB (models 1RX 11X)	49P2417	FRU
9	Microprocessor, 100/1.5-512 KB (models 2RX 21X)	49P2418	FRU
9	Microprocessor, 100/1.6-1 MB (models 3RX 31X)	24P6703	FRU
9	Microprocessor, 400/1.5 MB (models 4RX, 41X)	59P6941	FRU
9	Microprocessor, 400/1.9 MB (models 5RX, 51X)	59P6942	FRU
9	Microprocessor, 400/2.0 MB (models 6RX, 61X)	59P6949	FRU
10	System board (all models)	32P0835	FRU
11	Hot swap board (all models)	06P5577	FRU
12	Fan, lower with connector (all models)	32P1427	CRU
13	Power supply, 370 watt (all models)	24P6850	CRU
14	AC box/cable assembly (all models)	32P1421	FRU
15	Weldment, chassis 7 U (all models)	32P1418	FRU
16	Diskette drive, black (all models)	76H4091	CRU
17	Bezel, media blank 5.25" (all models)	00N6407	CRU
18	Bezel assembly, rack (models 1RX 2RX 3RX, 4RX, 5RX, 6RX)	24P6785	CRU
19	CD-ROM drive,48X, primary (all models)	33P3211	CRU
19	CD-ROM drive,48X, alternate (all models)	33P3203	CRU
19	CD-ROM drive,48X, alternate (all models)	33P3207	CRU
20	Filler, hard disk drive (all models)	06P6245	CRU
21	Front panel assembly card (all models)	32P0839	FRU
22	Power backplane assembly (all models)	32P0837	FRU
23	Weldment, shuttle (all models)	32P1419	FRU
24	Microprocessor air baffle (all models)	24P1284	CRU
25	Retainer, PCI hot plug adapter (all models)	06P6361	FRU
26	Support, DASD backplane (all models)	32P1420	FRU
27	Hard disk drive backplane assembly (all models)	32P0838	FRU
	VRM baffle (all models)	59P5152	CRU
	Media trim bezel (all models)	59P5155	FRU
	Power/reset switch button (models 11X 21X 31X)	59P5156	FRU
	Filler, cooling (all models)	32P1422	CRU
	Cable management arm, rack (models 1RX 2RX 3RX, 4RX, 5RX, 6RX)	32P1430	CRU
	Door assembly, tower bezel (models 11X 21X 31X, 41X, 51X, 61X)	32P1432	CRU
	Bracket, PCI I/O card (all models)	06P5580	FRU
	Bracket, tape backup holder (all models)	12J5681	CRU
	Bracket assembly, memory card (all models)	24P1019	FRU

Index	System (xSeries 255, Type 8685, Models 1RX, 11X, 2RX,21X, 3RX, 31X)	FRU No.	CRU/FRU
	VRM clip, plastic (all models)	31P6026	CRU
	VRM clip, metal (all models)	31P6025	CRU
	Slide assembly with bracket (models 1RX 2RX 3RX, 4RX, 5RX, 6RX)	32P1429	CRU
	Slide, CD-ROM drive (all models)	00N6412	CRU
	Slide, diskette disk drive (all models)	00N6413	CRU
	Flange assembly, EIA (models 1RX 2RX 3RX, 4RX, 5RX, 6RX)	32P1431	FRU
	Side cover hardware (models 11X 21X 31X, 41X, 51X, 61X)	32P1433	FRU
	Mouse assembly (models 11X 12X 21X 31X)	24P0383	CRU
	System service label (all models)	24P1033	CRU
	System board shield (all models)	24P1022	FRU
	Shipping bracket (models 1RX 2RX 3RX, 4RX, 5RX, 6RX)	24P1030	CRU
	Battery, 3.0 volt (8590) (all models)	33F8354	CRU
	Cable, HP switch card to system board (all models)	06P6375	FRU
	Cable, hard disk drive to power backplane (all models)	24P1054	FRU
	Cable, short hard disk drive (all models)	59P5151	FRU
	Cable, power backplane to system board, 2x12 (all models)	32P1438	FRU
	Cable, power backplane to system board, 2x4 (all models)	32P1439	FRU
	Cable, SCSI signal, backplane to RAID (all models)	02R0706	FRU
	Cable, backplane to system board (all models)	32P1440	FRU
	Cable, signal, diskette disk drive (all models)	32P1441	FRU
	Cable, system board to bulkhead SCSI (all models)	32P1443	FRU
	Cable, system board to fans (all models)	32P1444	FRU
	Cable, system board to fans (all models)	32P1445	FRU
	Cable, backplane to fans (all models)	32P1446	FRU
	Cable, system board to panel (all models)	32P1448	FRU
	Cord, 2.8 meter jumper (all models)	36L8886	CRU
	Cable, power (all models)	37L0132	FRU
	Cable, hard disk drive (all models)	37L4525	CRU
	Power cord (all models)	6952300	CRU

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## Keyboard CRUs

Keyboard	CRU No.
US English	37L2551
French Canadian	37L2552
LA Spanish	37L2553
Arabic	37L2555
Belgium/French	37L2556
Belgium/UK	37L2557
Bulgarian	37L2558
Czech	37L2559
Danish	37L2560
Dutch	37L2561
French	37L2562
German	37L2563
Greek	37L2564
Hebrew	37L2565
Hungarian	37L2566
Korean	02K0901
Iceland	37L2567
Italy	37L2568
Norwegian	37L2569

<b>Keyboard</b>	<b>CRU No.</b>
Polish	37L2570
Portuguese	37L2571
Romanian	37L2572
Russian	37L2573
Serbian/Cyrillic	37L2574
Slavic	37L2575
Spanish	37L2576
Swedish/Finn	37L2577
Swiss, French/German	37L2578
Turkish	37L2579
Turkish	37L2580
UK English	37L2581
Yugosl/Lat	37L2582
US English-EMEA	37L2583
Chinese/US	37L2585
Thailand	37L2587
French Canadian	37L0913

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## Power cord CRUs

For your safety, IBM provides a power cord with a grounded attachment plug to use with this IBM product. To avoid electrical shock, always use the power cord and plug with a properly grounded outlet.

IBM power cords used in the United States and Canada are listed by Underwriter's Laboratories (UL) and certified by the Canadian Standards Association (CSA).

For units intended to be operated at 115 volts: Use a UL-listed and CSA-certified cord set consisting of a minimum 18 AWG, Type SVT or SJT, three-conductor cord, a maximum of 15 feet in length and a parallel blade, grounding-type attachment plug rated 15 amperes, 125 volts.

For units intended to be operated at 230 volts (U.S. use): Use a UL-listed and CSA-certified cord set consisting of a minimum 18 AWG, Type SVT or SJT, three-conductor cord, a maximum of 15 feet in length and a tandem blade, grounding-type attachment plug rated 15 amperes, 250 volts.

For units intended to be operated at 230 volts (outside the U.S.): Use a cord set with a grounding-type attachment plug. The cord set should have the appropriate safety approvals for the country in which the equipment will be installed.

IBM power cords for a specific country or region are usually available only in that country or region.

<b>IBM power cord part number</b>	<b>Used in these countries and regions</b>
13F9940	Argentina, Australia, China (PRC), New Zealand, Papua New Guinea, Paraguay, Uruguay, Western Samoa

IBM power cord part number	Used in these countries and regions
13F9979	Afghanistan, Algeria, Andorra, Angola, Austria, Belgium, Benin, Bulgaria, Burkina Faso, Burundi, Cameroon, Central African Rep., Chad, China (Macau S.A.R.), Czech Republic, Egypt, Finland, France, French Guiana, Germany, Greece, Guinea, Hungary, Iceland, Indonesia, Iran, Ivory Coast, Jordan, Lebanon, Luxembourg, Malagasy, Mali, Martinique, Mauritania, Mauritius, Monaco, Morocco, Mozambique, Netherlands, New Caledonia, Niger, Norway, Poland, Portugal, Romania, Senegal, Slovakia, Spain, Sudan, Sweden, Syria, Togo, Tunisia, Turkey, former USSR, Vietnam, former Yugoslavia, Zaire, Zimbabwe
13F9997	Denmark
14F0015	Bangladesh, Burma, Pakistan, South Africa, Sri Lanka
14F0033	Antigua, Bahrain, Brunei, Channel Islands, China (Hong Kong S.A.R.), Cyprus, Dubai, Fiji, Ghana, India, Iraq, Ireland, Kenya, Kuwait, Malawi, Malaysia, Malta, Nepal, Nigeria, Polynesia, Qatar, Sierra Leone, Singapore, Tanzania, Uganda, United Kingdom, Yemen, Zambia
14F0051	Liechtenstein, Switzerland
14F0069	Chile, Ethiopia, Italy, Libya, Somalia
14F0087	Israel
1838574	Thailand
6952301	Bahamas, Barbados, Bermuda, Bolivia, Brazil, Canada, Cayman Islands, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Japan, Korea (South), Liberia, Mexico, Netherlands Antilles, Nicaragua, Panama, Peru, Philippines, Saudi Arabia, Suriname, Taiwan, Trinidad (West Indies), United States of America, Venezuela





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## 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 xSeries or IntelliStation® system, and whom to call for service, if it is necessary.

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### 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 is turned on.
- Use the troubleshooting information in your system documentation, and use the diagnostic tools that come with your system.
- Go to the IBM Support Web site at <http://www.ibm.com/pc/support/> to check for technical information, hints, tips, and new device drivers.
- Use an IBM discussion forum on the IBM Web site to ask questions.

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

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### Using the documentation

Information about your IBM xSeries or IntelliStation system and preinstalled software, if any, is available in the documentation that comes with your system. That documentation includes printed books, online books, 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/pc/support/> and follow the instructions. Also, you can order publications through the IBM Publications Ordering System at <http://www.elink.ibm.com/public/applications/publications/cgibin/pbi.cgi>.

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### 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 xSeries and IntelliStation products, services, and support. The address for IBM xSeries information is <http://www.ibm.com/eserver/xseries/>. The address for IBM IntelliStation information is <http://www.ibm.com/pc/intellistation/>.

You can find service information for your IBM products, including supported options, at <http://www.ibm.com/pc/support/>. If you click **Profile** from the support page, you can create a customized support page. The support page has many sources of information and ways for you to solve problems, including:

- Diagnosing problems, using the IBM Online Assistant
- Downloading the latest device drivers and updates for your products
- Viewing Frequently Asked Questions (FAQ)
- Viewing hints and tips to help you solve problems
- Participating in IBM discussion forums
- Setting up e-mail notification of technical updates about your products

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## Software service and support

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

For more information about Support Line and other IBM services, go to <http://www.ibm.com/services/>, or go to <http://www.ibm.com/planetwide/> for support telephone numbers.

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## Hardware service and support

You can receive hardware service through IBM Integrated Technology Services or through your IBM reseller, if your reseller is authorized by IBM to provide warranty service. Go to <http://www.ibm.com/planetwide/> for support telephone numbers.

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.

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## Appendix B. Related service information

**Note:** The service procedures are designed to help you isolate problems. They are written with the assumption that you have model-specific training on all computers, or that are familiar with the computers, functions, terminology, and service information provided in this manual.

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### Safety information

The following section contains the safety information that you need to be familiar with before servicing an IBM computer.

#### General safety

Follow these rules to ensure general safety:

- Observe good housekeeping in the area of the machines during and after maintenance.
- When lifting any heavy object:
  1. Ensure you can stand safely without slipping.
  2. Distribute the weight of the object equally between your feet.
  3. Use a slow lifting force. Never move suddenly or twist when you attempt to lift.
  4. Lift by standing or by pushing up with your leg muscles; this action removes the strain from the muscles in your back. *Do not attempt to lift any objects that weigh more than 16 kg (35 lb) or objects that you think are too heavy for you.*
- Do not perform any action that causes hazards to the customer, or that makes the equipment unsafe.
- Before you start the machine, ensure that other service representatives and the customer's personnel are not in a hazardous position.
- Place removed covers and other parts in a safe place, away from all personnel, while you are servicing the machine.
- Keep your tool case away from walk areas so that other people will not trip over it.
- Do not wear loose clothing that can be trapped in the moving parts of a machine. Ensure that your sleeves are fastened or rolled up above your elbows. If your hair is long, fasten it.
- Insert the ends of your necktie or scarf inside clothing or fasten it with a nonconductive clip, approximately 8 centimeters (3 inches) from the end.
- Do not wear jewelry, chains, metal-frame eyeglasses, or metal fasteners for your clothing.

**Remember:** Metal objects are good electrical conductors.
- Wear safety glasses when you are: hammering, drilling soldering, cutting wire, attaching springs, using solvents, or working in any other conditions that might be hazardous to your eyes.
- After service, reinstall all safety shields, guards, labels, and ground wires. Replace any safety device that is worn or defective.
- Reinstall all covers correctly before returning the machine to the customer.

## Electrical safety



### CAUTION:

**Electrical current from power, telephone, and communication cables can be hazardous. To avoid personal injury or equipment damage, disconnect the attached power cords, telecommunication systems, networks, and modems before you open the server covers, unless instructed otherwise in the installation and configuration procedures.**

Observe the following rules when working on electrical equipment.

**Important:** Use only approved tools and test equipment. Some hand tools have handles covered with a soft material that does not insulate you when working with live electrical currents.

Many customers have, near their equipment, rubber floor mats that contain small conductive fibers to decrease electrostatic discharges. Do not use this type of mat to protect yourself from electrical shock.

- Find the room emergency power-off (EPO) switch, disconnecting switch, or electrical outlet. If an electrical accident occurs, you can then operate the switch or unplug the power cord quickly.
- Do not work alone under hazardous conditions or near equipment that has hazardous voltages.
- Disconnect all power before:
  - Performing a mechanical inspection
  - Working near power supplies
  - Removing or installing main units
- Before you start to work on the machine, unplug the power cord. If you cannot unplug it, ask the customer to power-off the wall box that supplies power to the machine and to lock the wall box in the off position.
- If you need to work on a machine that has exposed electrical circuits, observe the following precautions:
  - Ensure that another person, familiar with the power-off controls, is near you.  
**Remember:** Another person must be there to switch off the power, if necessary.
  - Use only one hand when working with powered-on electrical equipment; keep the other hand in your pocket or behind your back.  
**Remember:** There must be a complete circuit to cause electrical shock. By observing the above rule, you may prevent a current from passing through your body.
  - When using testers, set the controls correctly and use the approved probe leads and accessories for that tester.
  - Stand on suitable rubber mats (obtained locally, if necessary) to insulate you from grounds such as metal floor strips and machine frames.

Observe the special safety precautions when you work with very high voltages; these instructions are in the safety sections of maintenance information. Use extreme care when measuring high voltages.

- Regularly inspect and maintain your electrical hand tools for safe operational condition.
  - Do not use worn or broken tools and testers.
  - *Never assume* that power has been disconnected from a circuit. First, *check* that it has been powered-off.
  - Always look carefully for possible hazards in your work area. Examples of these hazards are moist floors, nongrounded power extension cables, power surges, and missing safety grounds.
  - Do not touch live electrical circuits with the reflective surface of a plastic dental mirror. The surface is conductive; such touching can cause personal injury and machine damage.
  - Do not service the following parts with the power on when they are removed from their normal operating places in a machine:
    - Power supply units
    - Pumps
    - Blowers and fans
    - Motor generators
- and similar units. (This practice ensures correct grounding of the units.)
- If an electrical accident occurs:
    - Use caution; do not become a victim yourself.
    - Switch off power.
    - Send another person to get medical aid.

## Safety inspection guide

The intent of this inspection guide is to assist you in identifying potentially unsafe conditions on these products. Each machine, as it was designed and built, had required safety items installed to protect users and service personnel from injury. This guide addresses only those items. However, good judgment should be used to identify potential safety hazards due to attachment of non-IBM features or options not covered by this inspection guide.

If any unsafe conditions are present, you must determine how serious the apparent hazard could be and whether you can continue without first correcting the problem.

Consider these conditions and the safety hazards they present:

- Electrical hazards, especially primary power (primary voltage on the frame can cause serious or fatal electrical shock).
- Explosive hazards, such as a damaged CRT face or bulging capacitor
- Mechanical hazards, such as loose or missing hardware

The guide consists of a series of steps presented in a checklist. Begin the checks with the power off, and the power cord disconnected.

Checklist:

1. Check exterior covers for damage (loose, broken, or sharp edges).
2. Turn off the computer. Disconnect the power cord.
3. Check the power cord for:

- a. A third-wire ground connector in good condition. Use a meter to measure third-wire ground continuity for 0.1 ohm or less between the external ground pin and frame ground.
  - b. The power cord should be the appropriate type as specified in the parts listings.
  - c. Insulation must not be frayed or worn.
4. Remove the cover.
  5. Check for any obvious non-IBM alterations. Use good judgment as to the safety of any non-IBM alterations.
  6. Check inside the unit for any obvious unsafe conditions, such as metal filings, contamination, water or other liquids, or signs of fire or smoke damage.
  7. Check for worn, frayed, or pinched cables.
  8. Check that the power-supply cover fasteners (screws or rivets) have not been removed or tampered with.

## Handling electrostatic discharge-sensitive devices

Any computer part containing transistors or integrated circuits (ICs) should be considered sensitive to electrostatic discharge (ESD). ESD damage can occur when there is a difference in charge between objects. Protect against ESD damage by equalizing the charge so that the server, the part, the work mat, and the person handling the part are all at the same charge.

### Notes:

1. Use product-specific ESD procedures when they exceed the requirements noted here.
2. Make sure that the ESD-protective devices you use have been certified (ISO 9000) as fully effective.

When handling ESD-sensitive parts:

- Keep the parts in protective packages until they are inserted into the product.
- Avoid contact with other people.
- Wear a grounded wrist strap against your skin to eliminate static on your body.
- Prevent the part from touching your clothing. Most clothing is insulative and retains a charge even when you are wearing a wrist strap.
- Use the black side of a grounded work mat to provide a static-free work surface. The mat is especially useful when handling ESD-sensitive devices.
- Select a grounding system, such as those in the following list, to provide protection that meets the specific service requirement.

**Note:** The use of a grounding system is desirable but not required to protect against ESD damage.

- Attach the ESD ground clip to any frame ground, ground braid, or green-wire ground.
- Use an ESD common ground or reference point when working on a double-insulated or battery-operated system. You can use coax or connector-outside shells on these systems.
- Use the round ground-prong of the ac plug on ac-operated computers.

## Grounding requirements

Electrical grounding of the computer is required for operator safety and correct system function. Proper grounding of the electrical outlet can be verified by a certified electrician.

## Safety notices (multi-lingual translations)

The caution and danger safety notices in this section are provided in the following languages:

- English
- Brazilian/Portuguese
- Chinese
- French
- German
- Italian
- Korean
- Spanish

**Important:** All caution and danger statements in this IBM 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 this section.

For example, if a caution statement begins with a number 1, translations for that caution statement appear in this section under statement 1.

Be sure to read all caution and danger statements before performing any of the instructions.

- 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
<ol style="list-style-type: none"> <li>1. Turn everything OFF.</li> <li>2. First, attach all cables to devices.</li> <li>3. Attach signal cables to connectors.</li> <li>4. Attach power cords to outlet.</li> <li>5. Turn device ON.</li> </ol>	<ol style="list-style-type: none"> <li>1. Turn everything OFF.</li> <li>2. First, remove power cords from outlet.</li> <li>3. Remove signal cables from connectors.</li> <li>4. Remove all cables from devices.</li> </ol>

- 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-ROM drives, fiber optic devices, or transmitters) are installed, note the following:

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

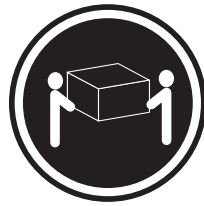


**DANGER:** Some laser products contain an embedded Class 3A or Class 3B laser diode. Note the following:

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

- Statement 4





≥18 kg (37 lbs)



≥32 kg (70.5 lbs)



≥55 kg (121.2 lbs)

**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 10

**CAUTION:**

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



## Importante:

Todas as instruções de cuidado e perigo da IBM documentation começam com um número. Este número é utilizado para fazer referência cruzada de uma instrução de cuidado ou perigo no idioma inglês com as versões traduzidas das instruções de cuidado ou perigo encontradas nesta seção.

Por exemplo, se uma instrução de cuidado é iniciada com o número 1, as traduções para aquela instrução de cuidado aparecem nesta seção sob a instrução 1.

Certifique-se de ler todas as instruções de cuidado e perigo antes de executar qualquer operação.

### Instrução 1



## PERIGO

A corrente elétrica proveniente de cabos de alimentação, de telefone e de comunicações é perigosa.

Para evitar risco de choque:

- Não conecte ou desconecte cabos e não realize instalação, manutenção ou reconfiguração deste produto durante uma tempestade com raios.
- Conecte todos os cabos de alimentação a tomadas elétricas corretamente instaladas e aterradas.
- Conecte todos os equipamentos ao qual esse produto será conectado a tomadas corretamente instaladas.
- Sempre que possível, utilize apenas uma das mãos para conectar ou desconectar cabos de sinal.
- Nunca ligue qualquer equipamento quando existir evidência de danos por fogo, água ou na estrutura.
- Desconecte cabos de alimentação, sistemas de telecomunicação, redes e modems antes de abrir as tampas dos dispositivos, a menos que especificado de maneira diferente nos procedimentos de instalação e configuração.
- Conecte e desconecte cabos conforme descrito na seguinte tabela, ao instalar ou movimentar este produto ou os dispositivos conectados, ou ao abrir suas tampas.

Para Conectar:	Para Desconectar:
<ol style="list-style-type: none"><li>1. DESLIGUE Tudo.</li><li>2. Primeiramente, conecte todos os cabos aos dispositivos.</li><li>3. Conecte os cabos de sinal aos conectores.</li><li>4. Conecte os cabos de alimentação às tomadas.</li><li>5. LIGUE os dispositivos.</li></ol>	<ol style="list-style-type: none"><li>1. DESLIGUE Tudo.</li><li>2. Primeiramente, remova os cabos de alimentação das tomadas.</li><li>3. Remova os cabos de sinal dos conectores.</li><li>4. Remova todos os cabos dos dispositivos.</li></ol>

### Instrução 2



#### **CUIDADO:**

Ao substituir a bateria de lítio, utilize apenas uma bateria IBM, Número de Peça 33F8354 ou uma bateria de tipo equivalente, recomendada pelo fabricante. Se o seu sistema possui um módulo com uma bateria de lítio, substitua-o apenas pelo mesmo tipo de módulo, do mesmo fabricante. A bateria contém lítio e pode explodir se não for utilizada, manuseada e descartada de maneira correta.

Não:

- Jogue ou coloque na água
- Aqueça a mais de 100°C (212°F)
- Conserte nem desmonte

Para descartar a bateria, entre em contato com a área de atendimento a clientes IBM, pelo telefone (011) 889-8986, para obter informações sobre como enviar a bateria pelo correio para a IBM.

### Instrução 3



#### **PRECAUCIÓN:**

Quando produtos a laser (unidades de CD-ROM, unidades de DVD, dispositivos de fibra ótica, transmissores, etc.) estiverem instalados, observe o seguinte:

- Não remova as tampas. A remoção das tampas de um produto a laser pode resultar em exposição prejudicial à radiação de laser. Nenhuma peça localizada no interior do dispositivo pode ser consertada.
- A utilização de controles ou ajustes ou a execução de procedimentos diferentes dos especificados aqui pode resultar em exposição prejudicial à radiação.

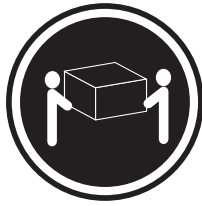
#### **PERIGO**

Alguns produtos a laser contêm um diodo laser da Classe 3A ou Classe 3B embutido. Observe o seguinte:

Radiação de laser quando aberto. Não olhe diretamente para o raio a olho nu ou com instrumentos óticos, e evite exposição direta ao raio.

### Instrução 4

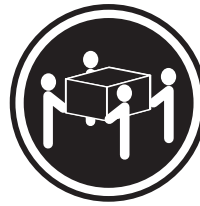




≥18 kg (37 lbs)



≥32 kg (70.5 lbs)



≥55 kg (121.2 lbs)

**CUIDADO:**

Ao levantar a máquina, faça-o com segurança.

Instrução 5



**CUIDADO:**

Os botões Liga/Desliga localizados no dispositivo e na fonte de alimentação não desligam a corrente elétrica fornecida ao dispositivo. O dispositivo também pode ter mais de um cabo de alimentação. Para remover toda a corrente elétrica do dispositivo, assegure que todos os cabos de alimentação estejam desconectados da fonte de energia elétrica.



**CUIDADO:**

Instrução 10



**CUIDADO:**



Não coloque nenhum objeto com peso superior a 82 kg (180 lbs.) sobre dispositivos montados em rack.

## 重要:

Server Library 中的所有提醒和危险条款前都有一个数字标识。该数字是用来交叉引用一个英文的提醒和危险条款及本部分中的与之对应的已翻译成其它文字的提醒和危险条款。

例如, 如果一个提醒条款前的数字为 1, 则本部分中相应的译文也带有标号 1。

在执行任何指示的操作之前, 请确保您已经阅读了全部提醒和危险条款。

### 声明 1



#### 危险

电源、电话和通信电缆中带有危险电流。  
为避免电击:  
雷电期间不要拆接电缆或安装、维修及重新配置本产品。  
将所有电源线连接至正确布线并已安全接地的电源插座上。  
将与本产品连接的所有设备连接至正确布线的插座上。  
尽量只使用单手拆接信号电缆。  
有水、火及结构损坏迹象时, 请勿打开任何设备。  
除非在安装配置过程中有明确指示, 否则, 打开设备机盖前应先断开与电源线、远程通信系统、网络和调制解调器的所有连接。  
安装、移动或打开本产品及其附带设备的机盖时, 应按下表所述连接和断开电缆。

连接时:	断开连接时:
1. 关闭所有设备。	1. 关闭所有设备。
2. 首先将所有电缆连接至设备。	2. 首先从插座中拔出电源线。
3. 将信号电缆连接至接口。	3. 从接口上拔下信号电缆。
4. 将电源线连接至插座。	

## 声明 2



### 警告:

更换锂电池时，只能使用 IBM 产品号 33F8354 或者是厂商推荐的等同类型的电池。

如果系统模块中含有锂电池，则只能使用同一厂商制造的同一类型的模块进行更换。电池中含有锂。如果使用、拿放或处理不当，可能会发生爆炸。

请勿对电池进行下列操作：  
扔入或浸入水中  
加热超过 100 (212 F)  
进行修理或分解  
请按本地法规要求处理电池。

## 声明 3



### 警告:

安装激光产品（如 CD-ROM、DVD 驱动器、光纤设备或送话器）时，应注意以下事项：

不要拆除外盖。拆除激光产品的外盖可能会导致激光辐射的危险，本设备中没有用户可维修的部件。

非此处指定的其它控制、调整或与性能有关的操作都有可能致激光辐射的危险。



### 危险

某些激光产品中包含内嵌的 3A 级或 3B 级激光二极管。请注意以下事项。

打开时会产生激光辐射。不要直视光束，不要使用光学仪器直接观看光束，避免直接暴露于光束之下。

声明 4



≥18 kg (37 磅)



≥32 kg (70.5 磅)



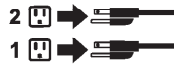
≥55 kg (121.2 磅)

警告：  
抬起时请采用安全操作方法。

声明 5



警告：  
使用设备上的电源控制按钮和电源上的开关都不能断开本设备上的电流。另外，本设备可能带有多条电源线。如要断开设备上的所有电流，请确保所有电源线均已与电源断开连接。



声明 6



警告：  
如果在电源线连接设备的一端安装了固定松紧夹，则必须将电源线的另一端连接至使用方便的电源。

声明 7



警告:

如果设备带有外门，则在移动或抬起设备前应将其拆除或固定以避免造成人员伤害。外门支撑不了设备的重量。

声明 8



警告:

不要拆除电源外盖或贴有下列标签的任何部件。



贴有此标签的组件内部存在高电压、高电流的危险。这些组件中没有用户可维修的部件。如果怀疑其中的部件存在问题，应与服务技术人员联系。

声明 9



警告:

为避免人员伤害，拆除设备上的风扇前应拨下热插拔风扇电缆。

声明 10



警告:

机柜安装的设备上面不能放置重于 82kg (180 磅) 的物品。



> 82 kg (180 磅)



声明 11



警告:

下面的标签表明附近有锋利的边、角或接头。



声明 12



警告:

下面的标签表明附近有高热表面。



## 重要資訊：

**Server Library** 中所有「注意」及「危險」的聲明均以數字開始。此一數字是用來作為交互參考之用，英文「注意」或「危險」聲明可在本節中找到相同內容的「注意」或「危險」聲明的譯文。

例如，有一「危險」聲明以數字 1 開始，則該「危險」聲明的譯文將出現在本節的「聲明」1 中。

執行任何指示之前，請詳讀所有「注意」及「危險」的聲明。

### 聲明 1



#### 危險

電源、電話及通信電纜上所產生的電流均有危險性。

#### 欲避免電擊危險：

- 在雷雨期間，請勿連接或切斷本產品上的任何電纜線，或安裝、維修及重新架構本產品。
- 請將電源線接至接線及接地正確的電源插座。
- 請將本產品隨附的設備連接至接線正確的插座。
- 儘可能使用單手來連接或切斷信號電纜線。
- 當設備有火燒或泡水的痕跡，或有結構性損害時，請勿開啓該設備的電源。
- 在安裝及架構之時，若非非常熟悉，在開啓裝置蓋子之前，請切斷電源線、電信系統、網路及數據機。
- 在安裝、移動本產品或附加裝置，或開啓其蓋子時，請依照下表中「連接」及「切斷」電纜線的步驟執行。

#### 連接：

1. 關閉所有開關。
2. 先將所有電纜線接上裝置。
3. 將信號電纜接上接頭。
4. 再將電源線接上電源插座。
5. 開啓裝置的電源。

#### 切斷：

1. 關閉所有開關。
2. 先自電源插座拔掉電源線。
3. 拔掉接頭上的所有信號電纜。
4. 再拔掉裝置上的所有電纜線。

### 聲明 2



#### 注意：

更換鋰電池時，只可使用 IBM 零件編號 33F8354 的電池，或製造商建議之相當類型的電池。若系統中具有包含鋰電池的模組，在更換此模組時，請使用相同廠商製造的相同模組類型。如未正確使用、處理或丟棄含有鋰的電池時，可能會引發爆炸。

#### 請勿將電池：

- 丟入或浸入水中
- 加熱超過 100 °C (212 °F)
- 修理或拆開

請遵照當地法令規章處理廢棄電池。

### 聲明 3



注意：

安裝雷射產品(如 CD-ROM、DVD 光碟機、光纖裝置或發射器)時，請注意下列事項：

- 請勿移開蓋子。移開雷射產品的蓋子，您可能會暴露於危險的雷射輻射之下。裝置中沒有需要維修的組件。
- 不依此處所指示的控制、調整或處理步驟，您可能會暴露於危險的輻射之下。



危險

有些雷射產品含有內嵌式 Class 3A 或 Class 3B 雷射二極體。請注意下列事項：

開啓時會產生雷射輻射。請勿凝視光束，不要使用光學儀器直接觀察，且應避免直接暴露在光束下。

### 聲明 4



≥ 18 公斤 (37 磅) ≥ 32 公斤 (70.5 磅) ≥ 55 公斤 (121.2 磅)

注意：

抬起裝置時，請注意安全措施。

### 聲明 5



注意：

裝置上的電源控制按鈕及電源供應器上的電源開關均無法關閉裝置上的電流。

本裝置可能有一條以上的電源線。如要移除裝置上的所有電流，請確認所有電源線已與電源分離。



聲明 10



注意：

請勿將任何重量超過 82 公斤 (180 磅) 的物品置於已安裝機架的裝置上方。



>82 公斤 (180 磅)

## Important:

Toutes les consignes Attention et Danger indiquées dans la bibliothèque IBM documentation sont précédées d'un numéro. Ce dernier permet de mettre en correspondance la consigne en anglais avec ses versions traduites dans la présente section.

Par exemple, si une consigne de type Attention est précédée du chiffre 1, ses traductions sont également précédées du chiffre 1 dans la présente section.

Prenez connaissance de toutes les consignes de type Attention et Danger avant de procéder aux opérations décrites par les instructions.

Notice n° 1



## DANGER

Le courant électrique passant dans les câbles de communication, ou les cordons téléphoniques et d'alimentation peut être dangereux.

Pour éviter tout risque de choc électrique:

- Ne manipulez aucun câble et n'effectuez aucune opération d'installation, d'entretien ou de reconfiguration de ce produit au cours d'un orage.
- Branchez tous les cordons d'alimentation sur un socle de prise de courant correctement câblé et mis à la terre.
- Branchez sur des socles de prise de courant correctement câblés tout équipement connecté à ce produit.
- Lorsque cela est possible, n'utilisez qu'une seule main pour connecter ou déconnecter les câbles d'interface.
- Ne mettez jamais un équipement sous tension en cas d'incendie ou d'inondation, ou en présence de dommages matériels.
- Avant de retirer les carters de l'unité, mettez celle-ci hors tension et déconnectez ses cordons d'alimentation, ainsi que les câbles qui la relient aux réseaux, aux systèmes de télécommunication et aux modems (sauf instruction contraire mentionnée dans les procédures d'installation et de configuration).
- Lorsque vous installez ou que vous déplacez le présent produit ou des périphériques qui lui sont raccordés, reportez-vous aux instructions ci-dessous pour connecter et déconnecter les différents cordons.

Connexion	Déconnexion
1. Mettez les unités hors tension.	1. Mettez les unités hors tension.
2. Commencez par brancher tous les cordons sur les unités.	2. Débranchez les cordons d'alimentation des prises.
3. Branchez les câbles d'interface sur des connecteurs.	3. Débranchez les câbles d'interface des connecteurs.
4. Branchez les cordons d'alimentation sur des prises.	4. Débranchez tous les câbles des unités.
5. Mettez les unités sous tension.	



Notice n° 2

**ATTENTION:**

Remplacez la pile au lithium usagée par une pile de référence identique exclusivement - voir la référence IBM - ou par une pile équivalente recommandée par le fabricant. Si votre système est doté d'un module contenant une pile au lithium, vous devez le remplacer uniquement par un module identique, produit par le même fabricant. La pile contient du lithium et présente donc un risque d'explosion en cas de mauvaise manipulation ou utilisation.

- Ne la jetez pas à l'eau.
- Ne l'exposez pas à une température supérieure à 100 °C.
- Ne cherchez pas à la réparer ou à la démonter.

Pour la mise au rebut, reportez-vous à la réglementation en vigueur.



Notice n° 3

**ATTENTION:**

Si des produits laser sont installés (tels que des unités de CD-ROM ou de DVD, des périphériques contenant des fibres optiques ou des émetteurs-récepteurs), prenez connaissance des informations suivantes:

- N'ouvrez pas ces produits pour éviter une exposition directe au rayon laser. Vous ne pouvez effectuer aucune opération de maintenance à l'intérieur.
- Pour éviter tout risque d'exposition au rayon laser, respectez les consignes de réglage et d'utilisation des commandes, ainsi que les procédures décrites dans le présent document.



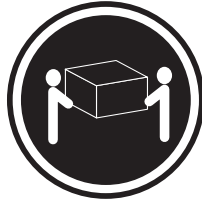
**DANGER**

Certains produits laser contiennent une diode laser de classe 3A ou 3B. Prenez connaissance des informations suivantes:

Rayonnement laser lorsque le carter est ouvert. évitez de regarder fixement le faisceau ou de l'observer à l'aide d'instruments optiques. évitez une exposition directe au rayon.

Notice n° 4





≥18 kg (37 lbs)



≥32 kg (70.5 lbs)



≥55 kg (121.2 lbs)

**ATTENTION:**

Faites-vous aider pour soulever ce produit.

Notice n° 5



**ATTENTION:**

**Le bouton de mise sous tension/hors tension de l'unité et l'interrupteur d'alimentation du bloc d'alimentation ne coupent pas l'arrivée de courant électrique à l'intérieur de la machine. Il se peut que votre unité dispose de plusieurs cordons d'alimentation. Pour isoler totalement l'unité du réseau électrique, débranchez tous les cordons d'alimentation des socles de prise de courant.**



Notice n° 10



**ATTENTION:**

Ne posez pas d'objet dont le poids dépasse 82 kg sur les unités montées en armoire.

## Wichtig:

Alle Sicherheitshinweise in dieser IBM documentation beginnen mit einer Nummer. Diese Nummer verweist auf einen englischen Sicherheitshinweis mit den übersetzten Versionen dieses Hinweises in diesem Abschnitt.

Wenn z. B. ein Sicherheitshinweis mit der Nummer 1 beginnt, so erscheint die Übersetzung für diesen Sicherheitshinweis in diesem Abschnitt unter dem Hinweis 1.

Lesen Sie alle Sicherheitshinweise, bevor Sie eine Anweisung ausführen.

Hinweis 1



## VORSICHT

Elektrische Spannungen von Netz-, Telefon- und Datenübertragungsleitungen sind gefährlich.

Aus Sicherheitsgründen:

- Bei Gewitter an diesem Gerät keine Kabel anschließen oder lösen. Ferner keine Installations-, Wartungs- oder Rekonfigurationsarbeiten durchführen.
- Gerät nur an eine Schutzkontaktsteckdose mit ordnungsgemäß geerdetem Schutzkontakt anschließen.
- Alle angeschlossenen Geräte ebenfalls an Schutzkontaktsteckdosen mit ordnungsgemäß geerdetem Schutzkontakt anschließen.
- Signalkabel möglichst einhändig anschließen oder lösen.
- Keine Geräte einschalten, wenn die Gefahr einer Beschädigung durch Feuer, Wasser oder andere Einflüsse besteht.
- Die Verbindung zu den angeschlossenen Netzkabeln, Telekommunikationssystemen, Netzwerken und Modems ist vor dem Öffnen des Gehäuses zu unterbrechen. Es sei denn, dies ist in den zugehörigen Installations- und Konfigurationsprozeduren anders angegeben.
- Nur nach den nachfolgend aufgeführten Anweisungen arbeiten, die für Installation, Transport oder Öffnen von Gehäusen von Personal Computern oder angeschlossenen Einheiten gelten.

<b>Kabel anschließen:</b>	<b>Kabel lösen:</b>
<ol style="list-style-type: none"><li>1. Alle Geräte ausschalten und Netzstecker ziehen.</li><li>2. Zuerst alle Kabel an Einheiten anschließen.</li><li>3. Signalkabel an Anschlußbuchsen anschließen.</li><li>4. Netzstecker an Steckdose anschließen.</li><li>5. Gerät einschalten.</li></ol>	<ol style="list-style-type: none"><li>1. Alle Geräte ausschalten.</li><li>2. Zuerst Netzstecker von Steckdose lösen.</li><li>3. Signalkabel von Anschlußbuchsen lösen.</li><li>4. Alle Kabel von Einheiten lösen.</li></ol>



#### Hinweis 2



#### **ACHTUNG:**

Eine verbrauchte Batterie nur durch eine Batterie mit der IBM Teilenummer 33F8354 oder durch eine vom Hersteller empfohlene Batterie ersetzen. Wenn Ihr System ein Modul mit einer Lithium-Batterie enthält, ersetzen Sie es immer mit dem selben Modultyp vom selben Hersteller. Die Batterie enthält Lithium und kann bei unsachgemäßer Verwendung, Handhabung oder Entsorgung explodieren.

Die Batterie nicht:

- mit Wasser in Berührung bringen.
- über 100 C erhitzen.
- reparieren oder zerlegen.

Die örtlichen Bestimmungen für die Entsorgung von Sondermüll beachten.

#### Hinweis 3



#### **ACHTUNG:**

Wenn ein Laserprodukt (z. B. CD-ROM-Laufwerke, DVD-Laufwerke, Einheiten mit Glasfaserkabeln oder Transmitter) installiert ist, beachten Sie folgendes.

- Das Entfernen der Abdeckungen des CD-ROM-Laufwerks kann zu gefährlicher Laserstrahlung führen. Es befinden sich keine Teile innerhalb des CD-ROM-Laufwerks, die vom Benutzer gewartet werden müssen. Die Verkleidung des CD-ROM-Laufwerks nicht öffnen.
- Steuer- und Einstellelemente sowie Verfahren nur entsprechend den Anweisungen im vorliegenden Handbuch einsetzen. Andernfalls kann gefährliche Laserstrahlung auftreten.



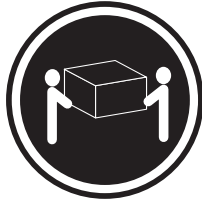
#### **VORSICHT**

Manche CD-ROM-Laufwerke enthalten eine eingebaute Laserdiode der Klasse 3A oder 3B. Die nachfolgend aufgeführten Punkte beachten.

Laserstrahlung bei geöffneter Tür. Niemals direkt in den Laserstrahl sehen, nicht direkt mit optischen Instrumenten betrachten und den Strahlungsbereich meiden.

#### Hinweis 4





≥18 kg



≥32 kg



≥55 kg

**ACHTUNG:**

Beim Anheben der Maschine die vorgeschriebenen Sicherheitsbestimmungen beachten.

Hinweis 5



**ACHTUNG:**

Mit dem Betriebsspannungsschalter an der Vorderseite des Servers und dem Betriebsspannungsschalter am Netzteil wird die Stromversorgung für den Server nicht unterbrochen. Der Server könnte auch mehr als ein Netzkabel aufweisen. Um die gesamte Stromversorgung des Servers auszuschalten, muß sichergestellt werden, daß alle Netzkabel aus den Netzsteckdosen herausgezogen wurden.



Hinweis 10



**ACHTUNG:**



Keine Gegenstände, die mehr als 82 kg wiegen, auf Rack-Einheiten ablegen.

## Importante:

Tutti gli avvisi di attenzione e di pericolo riportati nella pubblicazione IBM documentation iniziano con un numero. Questo numero viene utilizzato per confrontare avvisi di attenzione o di pericolo in inglese con le versioni tradotte riportate in questa sezione.

Ad esempio, se un avviso di attenzione inizia con il numero 1, la relativa versione tradotta è presente in questa sezione con la stessa numerazione.

Prima di eseguire una qualsiasi istruzione, accertarsi di leggere tutti gli avvisi di attenzione e di pericolo.

Avviso 1



## PERICOLO

La corrente elettrica circolante nei cavi di alimentazione, del telefono e di segnale è pericolosa.

Per evitare il pericolo di scosse elettriche:

- Non collegare o scollegare i cavi, non effettuare l'installazione, la manutenzione o la riconfigurazione di questo prodotto durante i temporali.
- Collegare tutti i cavi di alimentazione ad una presa elettrica correttamente cablata e munita di terra di sicurezza.
- Collegare qualsiasi apparecchiatura collegata a questo prodotto ad una presa elettrica correttamente cablata e munita di terra di sicurezza.
- Quando possibile, collegare o scollegare i cavi di segnale con una sola mano.
- Non accendere qualsiasi apparecchiatura in presenza di fuoco, acqua o se sono presenti danni all'apparecchiatura stessa.
- Scollegare i cavi di alimentazione, i sistemi di telecomunicazioni, le reti e i modem prima di aprire i coperchi delle unità, se non diversamente indicato nelle procedure di installazione e configurazione.
- Collegare e scollegare i cavi come descritto nella seguente tabella quando si effettuano l'installazione, la rimozione o l'apertura dei coperchi di questo prodotto o delle unità collegate.

Per collegare:	Per scollegare:
<ol style="list-style-type: none"><li>1. SPEGNERE tutti i dispositivi.</li><li>2. Collegare prima tutti i cavi alle unità.</li><li>3. Collegare i cavi di segnale ai connettori.</li><li>4. Collegare i cavi di alimentazione alle prese elettriche.</li><li>5. ACCENDERE le unità.</li></ol>	<ol style="list-style-type: none"><li>1. SPEGNERE tutti i dispositivi.</li><li>2. Rimuovere prima i cavi di alimentazione dalle prese elettriche.</li><li>3. Rimuovere i cavi di segnale dai connettori.</li><li>4. Rimuovere tutti i cavi dalle unità.</li></ol>

#### Avviso 2



#### **ATTENZIONE:**

Quando si sostituisce la batteria al litio, utilizzare solo una batteria IBM con numero parte 33F8354 o batterie dello stesso tipo o di tipo equivalente consigliate dal produttore. Se il sistema di cui si dispone è provvisto di un modulo contenente una batteria al litio, sostituire tale batteria solo con un tipo di modulo uguale a quello fornito dal produttore. La batteria contiene litio e può esplodere se utilizzata, maneggiata o smaltita impropriamente.

Evitare di:

- Gettarla o immergerla in acqua
- Riscaldarla ad una temperatura superiore ai 100°C
- Cercare di ripararla o smontarla

Smaltire secondo la normativa in vigore (D.Lgs 22 del 5/2/9) e successive disposizioni nazionali e locali.

#### Avviso 3



#### **ATTENZIONE:**

Quando si installano prodotti laser come, ad esempio, le unità DVD, CD-ROM, a fibre ottiche o trasmettitori, prestare attenzione a quanto segue:

- Non rimuovere i coperchi. L'apertura dei coperchi di prodotti laser può determinare l'esposizione a radiazioni laser pericolose. All'interno delle unità non vi sono parti su cui effettuare l'assistenza tecnica.
- L'utilizzo di controlli, regolazioni o l'esecuzione di procedure non descritti nel presente manuale possono provocare l'esposizione a radiazioni pericolose.



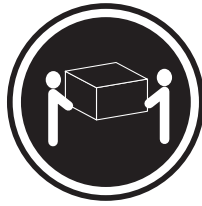
#### **PERICOLO**

Alcuni prodotti laser contengono all'interno un diodo laser di Classe 3A o Classe 3B. Prestare attenzione a quanto segue:

Aperto l'unità vengono emesse radiazioni laser. Non fissare il fascio, non guardarlo direttamente con strumenti ottici ed evitare l'esposizione diretta al fascio.

#### Avviso 4

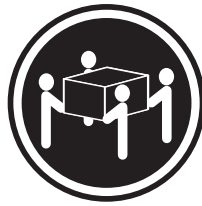




≥18 kg



≥32 kg



≥55 kg

**ATTENZIONE:**

Durante il sollevamento della macchina seguire delle norme di sicurezza.

Avviso 5



**ATTENZIONE:**

Il pulsante del controllo dell'alimentazione situato sull'unità e l'interruttore di alimentazione posto sull'alimentatore non disattiva la corrente elettrica fornita all'unità. L'unità potrebbe disporre di più di un cavo di alimentazione. Per disattivare la corrente elettrica dall'unità, accertarsi che tutti i cavi di alimentazione siano scollegati dalla sorgente di alimentazione.



Avviso 10



**ATTENZIONE:**



Non poggiare oggetti che pesano più di 82 kg sulla parte superiore delle unità montate in rack.

## 중요:

본 *Server Library*에 있는 모든 주의 및 위험 경고문은 번호로 시작합니다. 이 번호는 영문 주의 혹은 위험 경고문과 이 절에 나오는 번역된 버전의 주의 혹은 위험 경고문을 상호 참조하는 데 사용됩니다.

예를 들어, 주의 경고문이 번호 1로 시작하면, 번역된 해당 주의 경고문을 본 절의 경고문 1에서 찾아볼 수 있습니다.

모든 지시사항을 수행하기 전에 반드시 모든 주의 및 위험 경고문을 읽으십시오.

### 경고문 1



위험

전원, 전하 및 통신 케이블로부터 흘러 나오는 전류는 위험합니다.

전기 충격을 피하려면:

- 뇌우를 동반할 때는 케이블의 연결이나 철수, 이 제품의 설치, 유지보수 또는 재구성을 하지 마십시오.
- 모든 전원 코드를 적절히 배선 및 접지해야 합니다.
- 이 제품에 연결될 모든 장비를 적절하게 배선된 콘센트에 연결하십시오.
- 가능한 한 신호 케이블을 한 손으로 연결하거나 끊으십시오.
- 화재, 수해 또는 구조상의 손상이 있을 경우 장비를 켜지 마십시오.
- 설치 및 구성 프로시저에 다른 설명이 없는 한, 장치 덮개를 열기 전에 연결된 전원 코드, 원격 리 통신 시스템, 네트워크 및 모뎀을 끊어 주십시오.
- 제품 또는 접속된 장치를 설치, 이동 및 덮개를 열 때 다음 설명에 따라 케이블을 연결하거나 끊도록 하십시오.

연결하려면:

1. 모든 스위치를 끕니다.
2. 먼저 모든 케이블을 장치에 연결합니다.
3. 신호 케이블을 커넥터에 연결합니다.
4. 콘센트에 전원 코드를 연결합니다.
5. 장치 스위치를 켭니다.

연결을 끊으려면:

1. 모든 스위치를 끕니다.
2. 먼저 콘센트에서 전원 코드를 뽑습니다.
3. 신호 케이블을 커넥터에서 제거합니다.
4. 장치에서 모든 케이블을 제거합니다.

### 경고문 2



주의:

리튬 배터리를 교체할 때는 IBM 부품 번호 33F8354 또는 제조업체에서 권장하는 동등한 유형의 배터리를 사용하십시오. 시스템에 리튬 배터리를 갖고 있는 모듈이 있으면 동일한 제조업체에서 생산된 동일한 모듈 유형으로 교체하십시오. 배터리에 리튬이 있을 경우 제대로 사용, 처리 또는 처분하지 않으면 폭발할 수 있습니다.

다음은 주의하십시오.

- 던지거나 물에 담그지 않도록 하십시오.
- 100°C(212°F) 이상으로 가열하지 마십시오.
- 수리하거나 분해하지 마십시오.

지역 법령이나 규정의 요구에 따라 배터리를 처분하십시오.

경고문 3



주의:

레이저 제품(CD-ROMs, DVD 드라이브, 광 장치 또는 트랜스미터 등과 같은)이 설치되어 있을 경우 다음을 유의하십시오.

- 덮개를 제거하지 마십시오. 레이저 제품의 덮개를 제거했을 경우 위험한 레이저 광선에 노출될 수 있습니다. 이 장치 안에는 서비스를 받을 수 있는 부품이 없습니다.

- 여기에서 지정하지 않은 방식의 제어, 조절 또는 실행으로 인해 위험한 레이저 광선에 노출될 수 있습니다.



위험

일부 레이저 제품에는 클래스 3A 또는 클래스 3B 레이저 다이오드가 들어 있습니다. 다음을 주의하십시오.

열면 레이저 광선에 노출됩니다. 광선을 주시하거나 광학 기계를 직접 쳐다보지 않도록 하고 광선에 노출되지 않도록 하십시오.

경고문 4



≥18 kg (37 lbs)



≥ 32 kg (70.5 lbs)



≥ 55 kg (121.2 lbs)

주의:

기계를 들 때는 안전하게 들어 올리십시오.

경고문 5



주의:

장치의 전원 제어 버튼 및 전원 공급기의 전원 스위치는 장치에 공급되는 전류를 차단하지 않습니다. 장치에 둘 이상의 전원 코드가 연결되어 있을 수도 있습니다. 장치에서 모든 전류를 차단하려면 모든 전원 코드가 전원으로부터 차단되어 있는지 확인하십시오.



경고문 10



주의:

서랍형 모델의 장치 상단에 82 kg(180 lbs.)이 넘는 물체를 올려 놓지 마십시오.



>82 kg (180 lbs)



## Importante:

Todas las declaraciones de precaución de esta IBM documentation empiezan con un número. Dicho número se emplea para establecer una referencia cruzada de una declaración de precaución o peligro en inglés con las versiones traducidas que de dichas declaraciones pueden encontrarse en esta sección.

Por ejemplo, si una declaración de peligro empieza con el número 1, las traducciones de esta declaración de precaución aparecen en esta sección bajo Declaración 1.

Lea atentamente todas las declaraciones de precaución y peligro antes de llevar a cabo cualquier operación.

### Declaración 1



## PELIGRO

La corriente eléctrica de los cables telefónicos, de alimentación y de comunicaciones es perjudicial.

Para evitar una descarga eléctrica:

- No conecte ni desconecte ningún cable ni realice las operaciones de instalación, mantenimiento o reconfiguración de este producto durante una tormenta.
- Conecte cada cable de alimentación a una toma de alimentación eléctrica con conexión a tierra y cableado correctos.
- Conecte a tomas de alimentación con un cableado correcto cualquier equipo que vaya a estar conectado a este producto.
- Si es posible, utilice una sola mano cuando conecte o desconecte los cables de señal.
- No encienda nunca un equipo cuando haya riesgos de incendio, de inundación o de daños estructurales.
- Desconecte los cables de alimentación, sistemas de telecomunicaciones, redes y módems conectados antes de abrir las cubiertas del dispositivo a menos que se indique lo contrario en los procedimientos de instalación y configuración.
- Conecte y desconecte los cables tal como se describe en la tabla siguiente cuando desee realizar una operación de instalación, de traslado o de apertura de las cubiertas para este producto o para los dispositivos conectados.

Para la conexión	Para la desconexión
<ol style="list-style-type: none"><li>1. APÁGUELO todo.</li><li>2. En primer lugar, conecte los cables a los dispositivos.</li><li>3. Conecte los cables de señal a los conectores.</li><li>4. Conecte cada cable de alimentación a la toma de alimentación.</li><li>5. ENCIENDA el dispositivo.</li></ol>	<ol style="list-style-type: none"><li>1. APÁGUELO todo.</li><li>2. En primer lugar, retire cada cable de alimentación de la toma de alimentación.</li><li>3. Retire los cables de señal de los conectores.</li><li>4. Retire los cables de los dispositivos.</li></ol>

## Declaración 2



### **PRECAUCIÓN:**

Cuando desee sustituir la batería de litio, utilice únicamente el número de pieza 33F8354 de IBM o cualquier tipo de batería equivalente que recomiende el fabricante. Si el sistema tiene un módulo que contiene una batería de litio, sustitúyalo únicamente por el mismo tipo de módulo, que ha de estar creado por el mismo fabricante. La batería contiene litio y puede explotar si el usuario no la utiliza ni la maneja de forma adecuada o si no se desprende de la misma como corresponde.

No realice las acciones siguientes:

- Arrojarla al agua o sumergirla
- Calentarla a una temperatura que supere los 100°C (212°F)
- Repararla o desmontarla

Despréndase de la batería siguiendo los requisitos que exija el reglamento o la legislación local.

## Declaración 3



### **PRECAUCIÓN:**

Cuando instale productos láser (como, por ejemplo, CD-ROM, unidades DVD, dispositivos de fibra óptica o transmisores), tenga en cuenta las advertencias siguientes:

- No retire las cubiertas. Si retira las cubiertas del producto láser, puede quedar expuesto a radiación láser perjudicial. Dentro del dispositivo no existe ninguna pieza que requiera mantenimiento.
- El uso de controles o ajustes o la realización de procedimientos que no sean los que se han especificado aquí pueden dar como resultado una exposición perjudicial a las radiaciones.

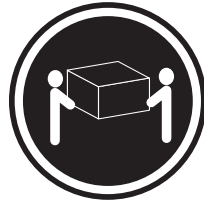


### **PELIGRO**

Algunos productos láser contienen un diodo de láser incorporado de Clase 3A o de Clase 3B. Tenga en cuenta la advertencia siguiente.

Cuando se abre, hay radiación láser. No mire fijamente el rayo ni lleve a cabo ningún examen directamente con instrumentos ópticos; evite la exposición directa al rayo.

#### Declaración 4



≥18 kg



≥32 kg



≥55 kg

#### PRECAUCIÓN:

Tome medidas de seguridad al levantar el producto.

#### Declaración 5



#### PRECAUCIÓN:

El botón de control de alimentación del dispositivo y el interruptor de alimentación de la fuente de alimentación no apagan la corriente eléctrica suministrada al dispositivo. Es posible también que el dispositivo tenga más de un cable de alimentación. Para eliminar la corriente eléctrica del dispositivo, asegúrese de desconectar todos los cables de alimentación de la fuente de alimentación.



#### Declaración 10



#### PRECAUCIÓN:



No coloque ningún objeto que pese más de 82 kg (180 libras) encima de los dispositivos montados en bastidor.



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## Appendix C. Notices

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## Important notes

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

CD-ROM 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 1000000 bytes, and GB stands for approximately 1000000000 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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### 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. 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 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.

## Taiwan electrical emission statement

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Part Number: 24P2936

(1P) P/N: 24P2936

