

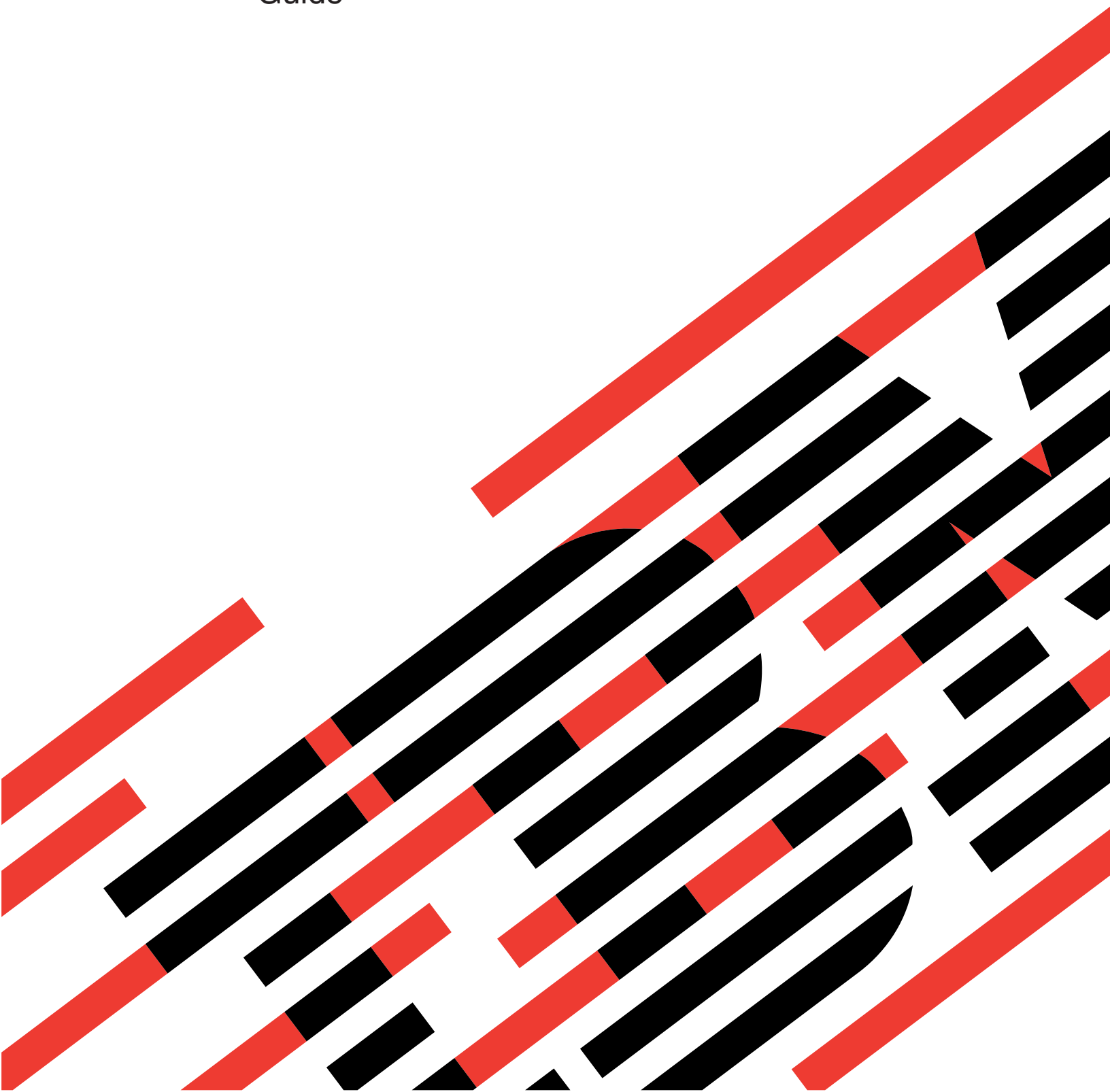


@server

xSeries 226

Type 8488 and 8648

Hardware Maintenance Manual and Troubleshooting  
Guide







@server

xSeries 226

Type 8488 and 8648

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Guide

**Notes**

- Before using this information and the product it supports, read the general information in Appendix B, "Safety information," on page 141, and Appendix C, "Notices," on page 175.
- **The most recent version of this document is available at <http://www.ibm.com/pc/support>.**

**Sixth Edition (September 2005)**

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## About this document

This document contains basic configuration information, diagnostic information, error codes, error messages, service information, and a symptom-to-FRU index for the IBM® @server™ xSeries® 226 Type 8488 and 8648 server.

**Important:** The field replaceable unit (FRU) procedures in this document are intended for trained servicers who are familiar with IBM products. Customer replacement units (CRUs) can be replaced by the customer. See Chapter 7, “Parts listing Type 8488 and 8648,” on page 129, to determine if the component being replaced is a FRU or a CRU. Before servicing an IBM product, be sure to read Appendix B, “Safety information,” on page 141.

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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.

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

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

安裝本產品之前，請先閱讀「安全資訊」。

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.

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

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

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

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

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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/>.

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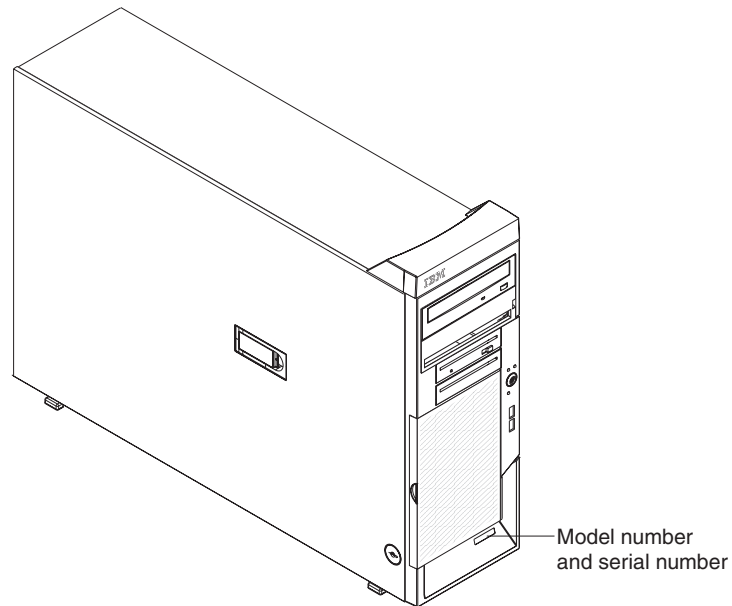
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## Chapter 1. Introduction

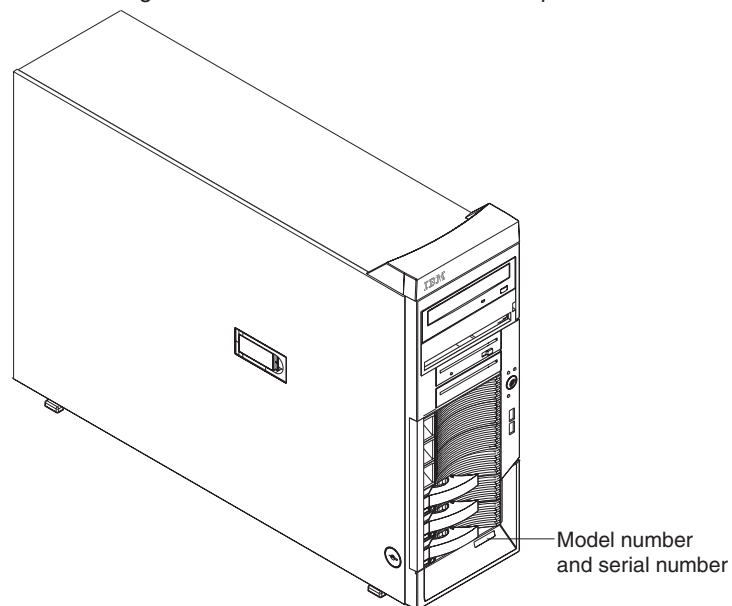
This document contains basic configuration information, diagnostic information, error codes, error messages, service information, and a symptom-to-FRU index for the IBM eServer xSeries 226 Type 8488 and 8648 server.

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

The following illustration shows the simple-swap model.



The following illustration shows the SCSI hot-swap model.



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## Related documentation

This *Hardware Maintenance Manual and Troubleshooting Guide* is provided in Portable Document Format (PDF). It contains information to help a user solve problems or to provide helpful information to a service technician. The following documents also come with the server:

- *User's Guide*

This document is in PDF on the IBM *xSeries® Documentation CD*. It contains general information about the server.

- *Installation Guide*

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

- *Option Installation Guide*

This document is in PDF on the IBM *xSeries Documentation CD*. It contains information that customers can use to install options in the server.

- *Safety Information*

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

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

The server might have features that are not described in the documentation that was received with the server. The documentation might be updated occasionally to include information about those features, or technical updates might be available to provide additional information that is not included in the server documentation. These updates are available from the IBM Web site at <http://www.ibm.com/pc/support/>.

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## Notices and statements used in this document

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

The following notices and statements are used in this document:

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



## Features and specifications

The following information is a summary of the features and specifications of the server. Depending on the server model, some features might not be available, or some specifications might not apply. You can use the Configuration/Setup Utility program in the server to determine the type and speed of the microprocessors in the server.

Table 1. Features and specifications

<p><b>Microprocessor:</b></p> <ul style="list-style-type: none"> <li>• Supports up to two Intel™ Xeon microprocessors</li> <li>• 1 MB Level-2 cache</li> <li>• 800 MHz front-side bus (FSB)</li> </ul> <p><b>Memory:</b></p> <ul style="list-style-type: none"> <li>• Minimum: 512 MB</li> <li>• Maximum: 8 GB</li> <li>• Type: PC2-3200 double-data-rate 2 (DDR2) registered</li> <li>• Connectors: six dual inline memory module (DIMM) connectors</li> </ul> <p><b>Drives standard:</b></p> <ul style="list-style-type: none"> <li>• Diskette: 1.44 MB (two mode)</li> <li>• CD-ROM: IDE</li> </ul> <p><b>Expansion bays:</b></p> <ul style="list-style-type: none"> <li>• Four or six hard disk drive bays, depending on the model: <ul style="list-style-type: none"> <li>– Six open hot-swap, slim-high, 3.5-inch SCSI drive bays (SCSI models)</li> <li>– Four slim-high, 3.5-inch Serial ATA (SATA) drive bays (SATA models)</li> </ul> </li> <li>• Two half-high 5.25-inch bays (CD-ROM drive installed in one bay)</li> <li>• One slim-high 3.5-inch removable-media or hard disk drive bay (diskette drive installed)</li> </ul> <p><b>PCI and PCI-X expansion slots:</b></p> <ul style="list-style-type: none"> <li>• Two PCI 33 MHz/32-bit</li> <li>• Two PCI-X 100 MHz/64-bit</li> <li>• One PCI-X 133 MHz/64-bit</li> <li>• One PCI Express x16</li> </ul> <p><b>Video:</b></p> <p>ATI Radeon 7000-M video controller with 16 MB SDRAM video memory on the system board.</p> <p><b>Cooling:</b></p> <p>Three speed-controlled fans</p>	<p><b>Integrated functions:</b></p> <ul style="list-style-type: none"> <li>• Support for IBM Remote Supervisor Adapter II</li> <li>• Broadcom 5721 10/100/1000 Ethernet controller with RJ-45 Ethernet port</li> <li>• Two serial ports</li> <li>• One parallel port</li> <li>• Integrated RAID capability: <ul style="list-style-type: none"> <li>– SCSI models: SCSI controller with RAID capabilities and two Ultra320 SCSI ports (one internal, one optional external)</li> <li>– SATA models: Dual-port Serial ATA controller with RAID capabilities</li> </ul> </li> <li>• Four Universal Serial Bus (USB) v2.0 ports (two on front and two on rear of enclosure)</li> <li>• Keyboard port</li> <li>• Mouse port</li> <li>• ATA-100 dual-channel IDE controller</li> <li>• ATI Radeon 7000-M video <ul style="list-style-type: none"> <li>– Compatible with SVGA and VGA</li> <li>– 16 MB video memory</li> </ul> </li> </ul> <p><b>Diagnostic LEDs:</b></p> <ul style="list-style-type: none"> <li>• Fans</li> <li>• Memory</li> <li>• Microprocessors</li> <li>• Hot-swap power supplies (some models)</li> </ul> <p><b>Power supplies:</b></p> <ul style="list-style-type: none"> <li>• Two (some models) 514-watt output (115-230 V ac) hot-swap power supplies. Two power supplies provide redundant power.</li> <li>• One (some models) 530-watt output (115-230 V ac) non-hot-swap power supply.</li> </ul> <p><b>Size:</b></p> <ul style="list-style-type: none"> <li>• Height: 440 mm (18.4 in.)</li> <li>• Depth: 643 mm (25.3 in.)</li> <li>• Width: 217 mm (8.5 in.)</li> <li>• Weight: 20 kg (44 lb) to 25.8 kg (57 lb) depending upon configuration</li> </ul>	<p><b>Electrical input:</b></p> <ul style="list-style-type: none"> <li>• Sine-wave input (50 or 60 Hz) required</li> <li>• Input voltage and frequency ranges automatically selected</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: 0.18 kVA (all models)</li> <li>– Maximum: <ul style="list-style-type: none"> <li>- 0.86 kVA (non-redundant power supply models)</li> <li>- 0.72 kVA (redundant power supply models)</li> </ul> </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: 597 Btu/hour (175 watts)</li> <li>• Maximum configuration: <ul style="list-style-type: none"> <li>– 2780 Btu/hour (815 watts) (non-redundant power supply models)</li> <li>– 2337 Btu/hour (685 watts) (redundant power supply models)</li> </ul> </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)</li> <li>Altitude: 0 to 2134 m (7000 ft)</li> <li>– Server off: -40° to +60°C (-40° to 140°F)</li> <li>Maximum altitude: 2133 m (7000 ft)</li> </ul> </li> <li>• Humidity (operating and storage): 8% to 80%</li> </ul> <p><b>Acoustical noise emissions:</b></p> <ul style="list-style-type: none"> <li>• Non-redundant: Sound power, idle: 5.2 bel maximum Sound power, operating: 5.3 bel maximum</li> <li>• Redundant: Sound power, idle: 5.9 bel maximum Sound power, operating: 6.0 bel maximum</li> </ul>
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**Note:** Power consumption and heat output vary depending on the number and type of optional features installed and the power-management optional features in use.

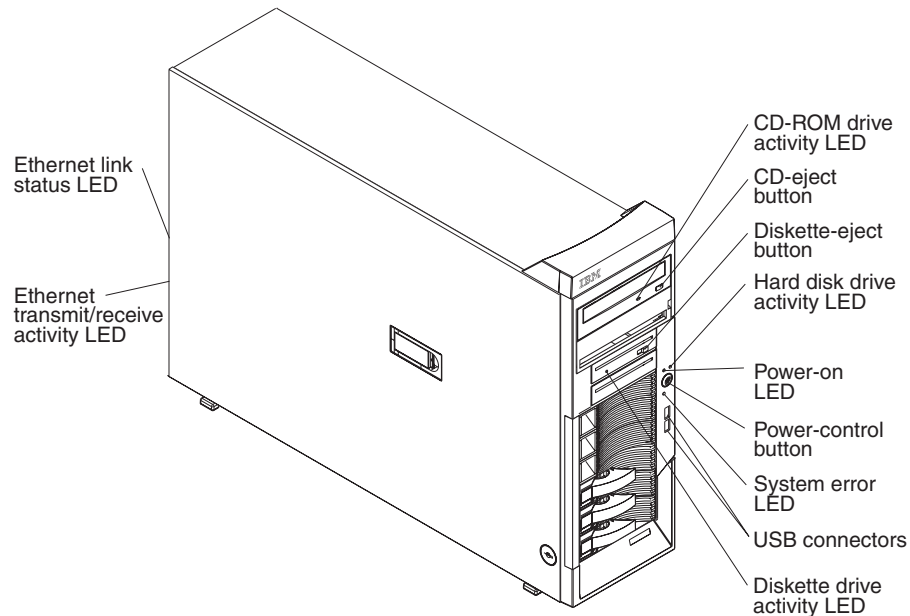
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## Server controls, connectors, LEDs, and power

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

### Front view

The following illustration shows the controls and LEDs on the front of the server.



#### **CD-ROM drive activity LED**

When this LED is lit, it indicates that the CD-ROM drive is in use.

#### **CD-eject button**

Press this button to release a CD from the CD-ROM drive.

#### **Diskette-eject button**

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

#### **Hard disk drive activity LED**

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

#### **Power-on LED**

When this LED is lit and not flashing, it indicates that the server is turned on. When this LED is flashing, it indicates that the server is off and still connected to an ac power source.

#### **Power-control button**

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

#### **System-error LED**

When this amber LED is lit, it indicates that a system error has occurred. An LED on the system board might also be lit to help isolate the error (see "System board error LEDs" on page 17).

#### **Diskette drive activity LED**

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

#### **USB connectors**

Connect USB devices to these connectors.

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

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

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

On SCSI hot-swap server models, each hot-swap hard disk drive has an amber status LED. If the status LED for a drive is lit continuously, it indicates that the individual drive is faulty. The interpretation of a flashing status LED depends on the SCSI controller that is connected to the hot-swap drive, as follows:

When the drive is connected to an optional ServeRAID™ adapter, a slowly flashing (one flash per second) status LED indicates that the drive is being rebuilt. When the LED is flashing rapidly (three flashes per second), it indicates that the controller on the adapter is identifying the drive.

**Ethernet transmit/receive activity LED**

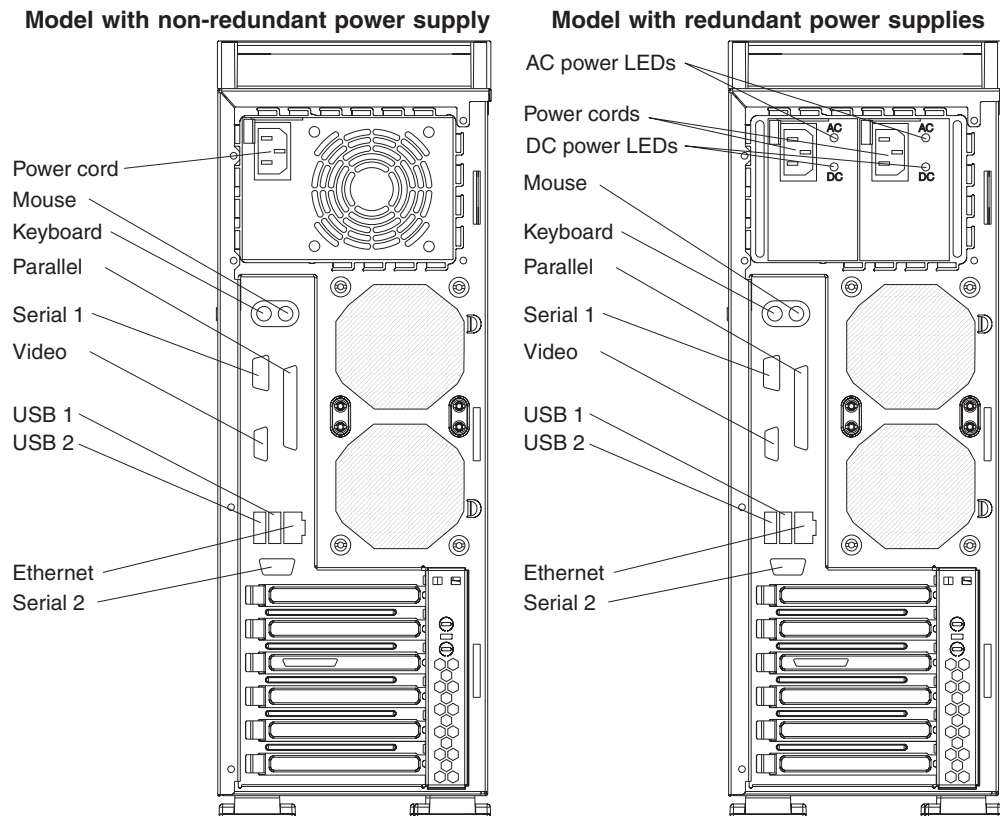
This LED is on the Ethernet connector. When this LED is lit, it indicates that there is activity between the server and the network.

**Ethernet link status LED**

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

**Rear view**

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



**Power-cord connector**

Connect the power cord to this connector.

**AC LED**

On the SCSI hot-swap server models that have redundant power supplies, when this light is lit the power supply has ac voltage applied.

**DC LED**

On the SCSI hot-swap server models that have redundant power supplies, when this light is lit the power supply is turned on and operating.

**Mouse connector**

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

**Keyboard connector**

Connect a PS/2 keyboard to this connector.

**Parallel connector**

Connect a parallel device to this connector.

**Video connector**

Connect a monitor to this connector.

**Serial 1 connector**

Connect a 9-pin serial device to this connector.

**USB 1 connector**

Connect a USB device to this connector.

**USB 2 connector**

Connect a USB device to this connector.

**Ethernet connector**

Use this connector to connect the server to a network.

**Serial 2 connector**

Connect a 9-pin serial device to this connector.

If you have an optional Remote Supervisor Adapter II (systems-management adapter) installed in PCI slot 2, the adapter has additional connectors and LEDs. See the *Option Installation Guide* for more information about these connectors and LEDs. In addition, if you install the optional Remote Supervisor Adapter II, you must disconnect the video cable from the server external video connector and connect it to the optional Remote Supervisor Adapter II.

---

## Server power features

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

**Note:** When the server is connected to an ac power source, the power supply fan turns on and remains on to provide cooling to the power supply.

## Turning on the server

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

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

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

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

## Turning off the server

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

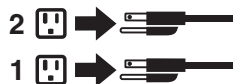
Some operating systems require an orderly shutdown before you turn off the server. See the operating-system documentation for information about shutting down the operating system.

### Statement 5



#### CAUTION:

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



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

- You can turn off the server from the operating system, if the operating system supports this feature. After an orderly shutdown of the operating system, the server will be turned off automatically.
- You can press the power-control button to start an orderly shutdown of the operating system and turn off the server, if the operating system supports this feature.

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

---

## Chapter 2. Configuring the server

Detailed information about configuring the server is in the IBM xSeries *User's Guide* on the IBM *Documentation CD*.

The latest information about these programs and the most recent device-driver files are available at <http://www.ibm.com/pc/support>.

The following configuration programs and capabilities come with the server:

- **Configuration/Setup Utility program**

The Configuration/Setup Utility program is part of the basic input/output system (BIOS) code in the server. Use it to configure serial port assignments, change interrupt request (IRQ) settings, change the startup-device sequence, set the date and time, and set passwords.

- **IBM ServerGuide Setup and Installation CD**

The ServerGuide program provides software-setup tools and installation tools that are designed for the server.

- **Boot Menu program**

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

- **Ethernet controller configuration**

The Ethernet controller is integrated on the system board. You do not need to set any jumpers or configure the controller. However, you must install a device driver. For device drivers and information about configuring the Ethernet controller, see the *Broadcom NetXtreme Gigabit Ethernet Software CD* that comes with the server. For updated information about configuring the controller, go to <http://www.ibm.com/pc/support/>.

- **Adaptec® HostRAID™ configuration programs**

**Note:** The device drivers required to enable HostRAID must be downloaded from the IBM Web site at <http://www.ibm.com/pc/support>.

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

Use the Array Configuration Utility within the Adaptec RAID Configuration Utility programs to configure RAID for the integrated Serial ATA (SATA) controller and the devices that are attached to it.

- **SCSISelect Utility program (for SCSI RAID)**

Use the SCSI HostRAID feature of SCSISelect Utility program to configure RAID for the SCSI controller and the devices that are attached to it.

- **ServeRAID Manager**

ServeRAID Manager is available as a stand-alone program and as an IBM Director extension. If a ServeRAID adapter is installed in the server, use ServeRAID Manager to define and configure the disk-array subsystem *before* you install the operating system.

- **SCSISelect Utility program (some models)**

For general configuration, use the SCSISelect Utility program to configure devices that are attached to the SCSI controller.

---

## Starting the Configuration/Setup Utility program

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

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



---

## Chapter 3. Diagnostics

This chapter provides basic troubleshooting information to help solve some common problems that might occur with the 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 139 for more information.

---

### General checkout

Follow the checkout procedure for diagnosing hardware problems. Review the following information before performing the checkout procedure:

- Read Appendix B, “Safety information,” on page 141.
- The server diagnostic programs are stored on the IBM *Enhanced Diagnostics CD*. These programs provide the primary methods of testing the major components of the server. If you are not sure 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 correctly.
- When you run the diagnostic programs, a single problem might cause several error messages. If you receive several error messages, correct the cause of the first error message. The other error messages might not occur the next time you run the diagnostic programs.
- Before running the diagnostic programs, you must determine whether the failing server is part of a shared hard disk drive cluster (two or more servers sharing external storage devices). If you suspect that it is part of a cluster, you can run all diagnostic programs except the ones that test the storage unit (that is, a hard disk drive in the storage unit) or the storage adapter that is attached to the storage unit. The failing server might be part of a cluster if any of the following conditions is true:
  - The customer identifies the failing server as part of a cluster.
  - One or more external storage units are attached to the failing server and at least one of the attached storage units is also attached to another server or unidentifiable device.
  - One or more servers are located near the failing server.
- **Important:**
  1. For servers that are part of a shared hard disk drive cluster, run one test at a time. Do not run any suite of tests, such as “quick” or “normal” tests, because this could enable the hard disk drive diagnostic tests.
  2. If more than one error code is displayed, correct the first error. The other error codes might not occur the next time you run the diagnostic programs.
  3. If the server is suspended and a POST error code is displayed, see “POST error codes” on page 99.
  4. If the server is suspended and no error message is displayed, see “Error symptoms” on page 109 and “Undetermined problems” on page 127.
  5. For information about power-supply problems, see “Power checkout” on page 21.
  6. For intermittent problems, check the error log; see “Diagnostic programs, error codes, and messages” on page 14.

Complete the following steps to perform the checkout procedure:

**001 IS THE SERVER 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 SERVER 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 99.
7. Check the system-error log.

**Note:** The system-error log is available only with the Remote Supervisor Adapter II.

If an error was recorded by the server, see Chapter 6, "Symptom-to-FRU index," on page 97.

8. Start the diagnostic programs.
9. 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 97.

**YES.** Run the diagnostic programs (see "Diagnostic programs, error codes, and messages" on page 14).

If you receive an error, see Chapter 6, "Symptom-to-FRU index," on page 97.

If the diagnostic programs were completed successfully and you still suspect a problem, see "Undetermined problems" on page 127.

---

## Diagnostic tools overview

The following tools are available to help you diagnose and solve hardware-related problems:

- **POST error logs**

The power-on self-test (POST) generates beep codes and messages to indicate successful test completion or the detection of a problem.

The POST error log contains the three most recent error codes and messages that the server has generated during POST.

The system-error log contains all the error messages that were issued during POST.

**Note:** The system-error log is available only with the Remote Supervisor Adapter II.

See “POST error logs” for more information.

- **Diagnostic programs and error messages**

The server diagnostic programs are the primary method of testing the major components of the server (see “Diagnostic programs, error codes, and messages” on page 14).

- **System board error LEDs**

These LEDs can help to pinpoint the source of a hardware problem (see “System board error LEDs” on page 17).

- **Ethernet controller troubleshooting**

This section provides information about Ethernet problems (see “Troubleshooting the Ethernet controller” on page 21).

---

## 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 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 the operating system or application program appears.

If POST detects a problem, more than one beep sounds, an error message appears on the screen, or both (see “Beep symptoms” on page 97 and “POST error codes” on page 99).

**Note:** 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 that were issued during POST and all system status messages from the service processor.

**Note:** The system-error log is available only with the Remote Supervisor Adapter II.

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 “Starting the Configuration/Setup Utility program” on page 10).

## Viewing error logs from diagnostic programs

To view error logs from the diagnostic programs, complete the following steps:

1. Start the diagnostic programs (see “Starting the diagnostic programs” on page 15).
2. Select **Hardware Info** from the top of the diagnostic programs screen.
3. Select **System Error Log** from the list that appears; then, follow the instructions on the screen.

**Note:** The system-error log is available only with the Remote Supervisor Adapter II.

---

## Diagnostic programs, error codes, and messages

The server diagnostic programs are stored on the IBM *Enhanced Diagnostics CD*. These programs are the primary method of testing the major components of the 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.

Error codes that might be displayed are listed at “Diagnostic error codes” on page 104.

### Notes:

1. Depending on the server configuration, some of the error codes might not appear when you run the diagnostic programs.
2. If diagnostic error codes appear that are not listed in the tables, make sure that the server has the latest levels of BIOS, Remote Supervisor Adapter II, and ServeRAID code installed.

## Diagnostic text message format

The diagnostic text message format is as follows:

*result test\_specific\_string*

where:

**result** is one of the following results:

**Passed**

This test was completed without any errors.

**Failed**

This test discovered an error.

**User Aborted**

You stopped the test before it was completed.

**Not Applicable**

You attempted to test a device that is not present in the server.

**Aborted**

The test could not proceed because of the server configuration.

**Warning**

A hardware failure did not occur; the test could not be run because of some other problem (for example, there might be a configuration problem, the hardware is missing or is not being recognized, or there is a hardware problem that is not related to the hardware currently being tested).

*test\_specific\_string*

is an error code or other information about the error.

## Starting the diagnostic programs

Complete the following steps to start the diagnostic programs:

1. Turn off the server and any peripheral devices.
2. Turn on all attached devices; then, turn on the server.

**Notes:**

- a. 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 user password, to run the diagnostic programs.
- b. When you are diagnosing hard disk drives, select SCSI Fixed Disk Test for the most thorough test. Select Fixed Disk Test for any of the following situations:
  - You want to run a faster test.
  - The server contains RAID arrays.
  - The server contains SATA or IDE hard disk drives.

**Note:**

3. When the prompt Press F1 For Configuration/Setup is displayed, press the F1 key.
4. When the Configuration/Setup Utility menu appears, select **Start Options**.
5. From the **Start Options** menu, select **Startup Sequence**.
6. Note the device that is selected as the first startup device. Later, you must restore this setting.

7. Select **CD-ROM** as the first startup device.
8. Press Esc two times to return to the Configuration/Setup Utility menu.
9. Insert the IBM *Enhanced Diagnostics* CD in the CD-ROM drive.
10. Select **Save & Exit Setup** and follow the prompts. The diagnostics will load. Follow the instructions on the screen to run the diagnostics.
11. When the tests are completed, you can view the test log; see “Viewing the test log.”

If the diagnostic programs do not detect any hardware errors but the problem remains 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**. You can save the test log to a file on a diskette or to the hard disk.

**Important:** When you finish running the diagnostics and utilities, remove the CD from the CD-ROM drive and turn off the server. You must restore the first startup device to the original setting. Use steps 2 on page 15 through 8 of this procedure to do this.

The test-log data is maintained only while the diagnostic programs are active. When you exit from the diagnostic programs, the test log is cleared (saved test logs are not affected). To save the test log to a file on a diskette or to the hard disk 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.

**Note:** 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 14.

**Note:** The system-error log is available only in conjunction with the Remote Supervisor Adapter II.

---

## Small computer system interface messages

If you receive a SCSI error message, see “SCSI error codes” on page 118.

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

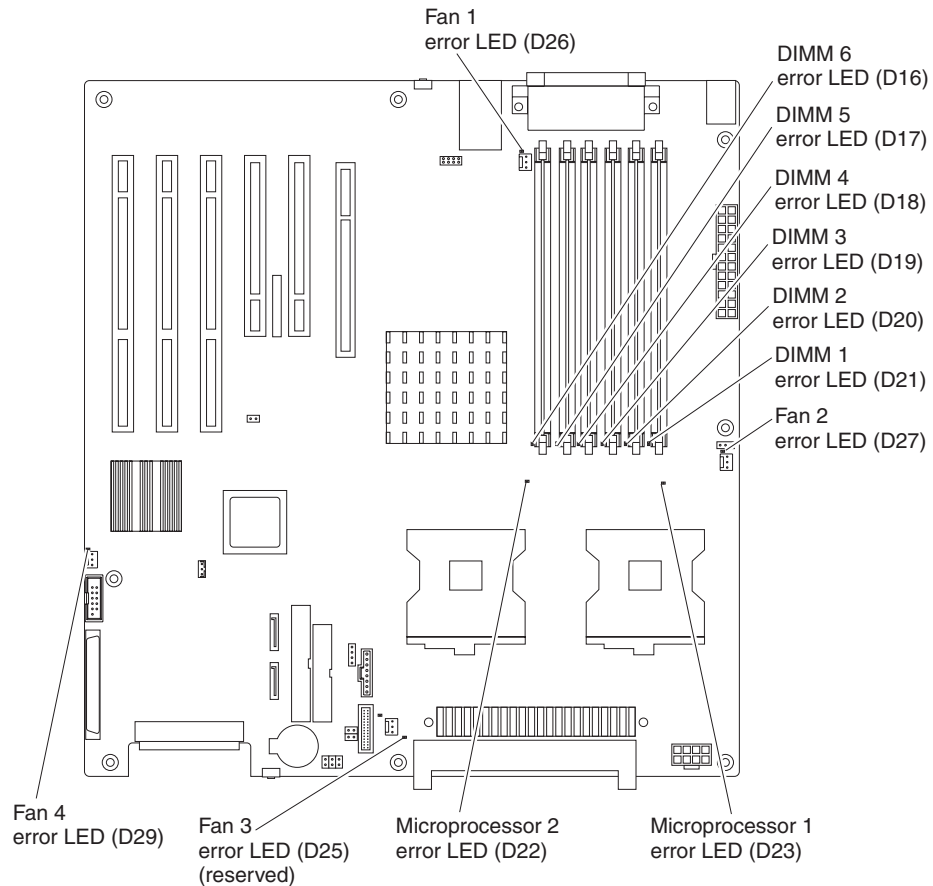
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## Diagnostic error LEDs

Error LEDs are located on the system board and on the hard disk drives.

### System board error LEDs

If the system-error LED on the front of the server is lit, there might also be lit LEDs on the system board. The following illustration shows the locations of the error LEDs on the system board.



If any of these LEDs is lit, it indicates a problem with the associated component. After a problem is corrected, its LED will not be lit the next time the server is restarted. If the LED remains lit after the server is restarted, the problem remains.

Complete the following steps to view the lit error LEDs:

1. Read Appendix B, “Safety information,” on page 141 and “Handling static-sensitive devices” on page 26.
2. Remove the side cover (see “Removing the side cover” on page 28).
3. Remove the support bracket (see “Removing and installing the support bracket” on page 32).
4. Open the microprocessor air baffle (see “Opening and closing the microprocessor air baffle” on page 33).
5. If any error LEDs are lit, complete the following steps:
  - a. Note which LEDs are lit.
  - b. Turn off the server and all attached devices.
  - c. Follow the instructions at “Diagnostic error LEDs” on page 109.

## Hard disk drive LEDs

If the amber hard disk drive status LED on the front of a hard disk drive is lit continuously, it indicates a problem; see “Diagnostic error LEDs” on page 109.

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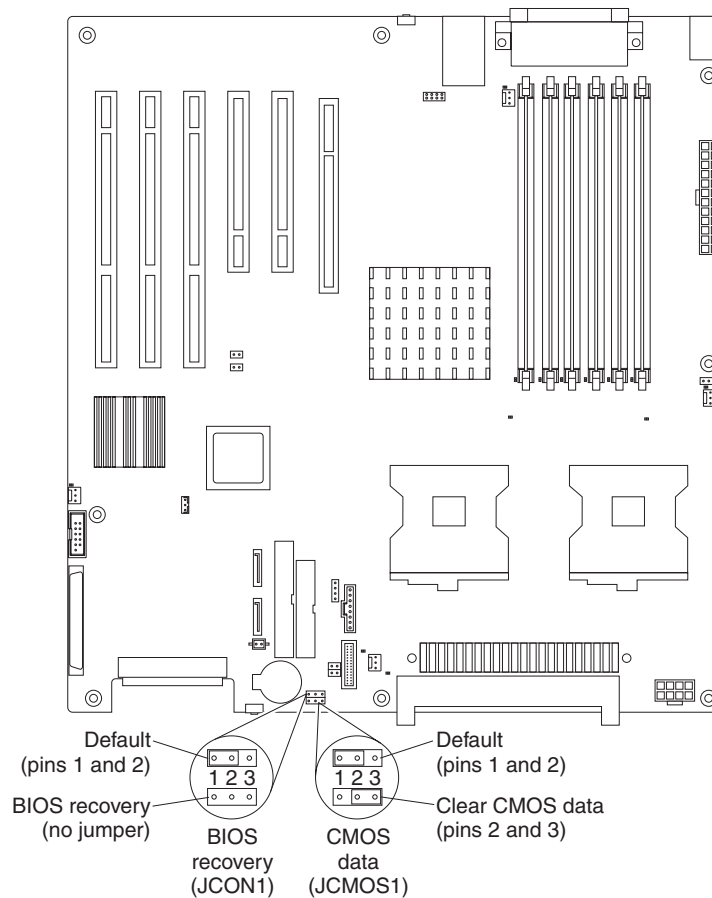
## Recovering from a POST/BIOS update failure

If power to the server is interrupted while POST/BIOS code is being updated (flash update), the server might not restart (reboot) correctly or might not display video (no video). If this happens, you will need a BIOS recovery diskette.

To create this diskette, download the BIOS recovery disk image from <http://www.ibm.com/pc/support> and follow the directions in the image’s included readme file.

Using the BIOS recovery diskette, complete the following steps to recover the BIOS code:

1. Read Appendix B, “Safety information,” on page 141.
2. Turn off the server and all attached devices.
3. Disconnect the power cord; then, disconnect all external cables.
4. Remove the side cover (see “Removing the side cover” on page 28).
5. Remove the frame-support bracket (see “Removing and installing the support bracket” on page 32).
6. Locate the boot block recovery jumper (JCON1) on the system board, removing any adapters that impede access to the jumper. The following illustration shows the location of the jumper on the system board.





7. Remove the boot block recovery jumper from pins 1 and 2 and set the jumper in a safe place.
8. Replace any adapters that were removed.
9. Replace the frame-support bracket (see “Removing and installing the support bracket” on page 32).
10. Replace the side cover (see “Removing the side cover” on page 28).
11. Connect the server to a power source, keyboard, monitor, and mouse.
12. If the diskette drive contains a diskette, remove it.
13. Insert into the diskette drive the BIOS recovery diskette that you have created from <http://www.ibm.com/pc/support/>.
14. Turn on the server and the monitor.
15. After the update session is completed, turn off the server and monitor.
16. Remove the diskette from the diskette drive.
17. Disconnect all power cords and external cables; then, remove the side cover.
18. Remove the side cover.
19. Remove the frame-support bracket.
20. Remove any adapters that impede access to the jumper block.
21. Replace the boot block recovery jumper onto pins 1 and 2.
22. Replace any adapters that were removed.
23. Replace the frame-support bracket.
24. Reinstall the side cover.
25. Reconnect all external cables and power cords and turn on the peripheral devices.
26. Turn on the server to restart the operating system.

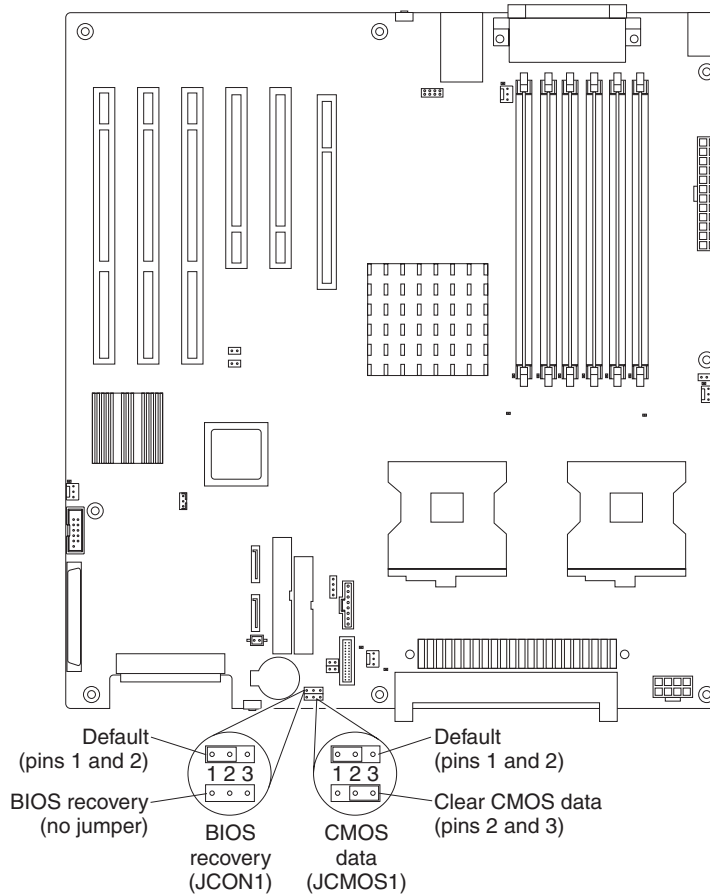
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## Erasing a lost or forgotten password (clearing CMOS)

This section applies to lost or forgotten passwords. For general information about passwords, see the *User's Guide* on the IBM *Documentation* CD.

Complete the following steps to set the CMOS recovery jumper and erase a forgotten password:

1. Read Appendix B, “Safety information,” on page 141 and “Handling static-sensitive devices” on page 26.
2. Turn off the server and all attached devices.
3. Disconnect the power cord, and disconnect all external cables.
4. Remove the side cover (see “Removing the side cover” on page 28).
5. Remove the support bracket (see “Removing and installing the support bracket” on page 32).
6. Locate the CMOS recovery jumper (JCMOS1) on the system board, removing any adapters or other components that impede access to the jumper. The following illustration shows the location of the jumper on the system board.



7. Move the CMOS recovery jumper from pins 1 and 2 to pins 2 and 3.
8. Wait 60 seconds; then, return the CMOS recovery jumper to pins 1 and 2.
9. Replace any adapters that were removed.
10. Replace the frame-support bracket (see "Removing and installing the support bracket" on page 32).
11. Replace the side cover (see "Replacing the side cover" on page 29).  
You can now start the server one time, without having to use the power-on password, and start the Configuration/Setup Utility program. You can either delete the old password or set a new power-on password. If you do not change or delete the password, the next time you start the server the original power-on password will be reinstated.
12. Connect the server to a power source, keyboard, monitor, and mouse.
13. Turn on the server. The Configuration/Setup Utility program starts.
14. Follow the instructions to erase the existing password or create a new password.
15. Select **Save Settings** and press Enter.

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## Updating Remote Supervisor Adapter II firmware

Information about updating the firmware of the Remote Supervisor Adapter II can be found in the *Remote Supervisor Adapter II User's Guide*.

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## 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.

Follow this general procedure for troubleshooting power problems:

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, a loose screw can cause 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 that is required to start the server (see “Minimum operating requirements” on page 117).
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, you must know the minimum configuration that is required for the server to start (see page 127).

---

## 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 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 rear of the server.

These LEDs indicate whether there is a problem with the connector, cable, or hub:

- The Ethernet transmit/receive activity LED, on the rear of the server, 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 the 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.  
The way the Ethernet controller is tested depends on which operating system you are using (see the Ethernet controller device driver readme files).

## Ethernet controller troubleshooting chart

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

Ethernet controller problem	FRU/actions
The server stops running when loading device drivers.	<p>The PCI BIOS interrupt settings are incorrect.</p> <ul style="list-style-type: none"> <li>• Determine whether the interrupt (IRQ) setting that is 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 that is available from the World Wide Web.</li> <li>• Reseat or replace the adapter.</li> </ul>
The Ethernet link status LED does not work.	<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>• Reseat or replace the adapter.</li> </ul>
The Ethernet transmit/receive activity LED does not work.	<ul style="list-style-type: none"> <li>• Make sure that you have installed the network device drivers.</li> <li>• The network might be idle. Try sending data from this server.</li> </ul>
Data is incorrect or sporadic.	<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.	<ul style="list-style-type: none"> <li>• Make sure that the cable is connected to the Ethernet controller.</li> <li>• Make sure that the PCI system BIOS code is current.</li> <li>• Reseat the adapter.</li> <li>• Determine whether the interrupt (IRQ) setting that is assigned to the Ethernet adapter is also assigned to another device in the system. Use the Configuration/Setup Utility program to determine whether 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 that is assigned to the Ethernet adapter or the other device.</p> <ul style="list-style-type: none"> <li>• Reseat or replace the adapter.</li> </ul>
The Ethernet controller stopped working without apparent cause.	<ul style="list-style-type: none"> <li>• Try a different connector on the hub.</li> <li>• Reinstall the device drivers. See the 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 available information concerning these messages is at the IBM Support Web site at <http://www.ibm.com/pc/support/>.



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## Chapter 4. Customer replacement units

This chapter provides basic instructions for installing hardware options in the server. These instructions are intended for users who are experienced with setting up IBM server hardware.

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### Installation guidelines

Before you begin installing options, read the following information:

- Read Appendix B, “Safety information,” on page 141, and the guidelines in “Handling static-sensitive devices” on page 26. This information will help you work safely with the server and options.
- Make sure that you have an adequate number of properly grounded electrical outlets for the server, monitor, and other devices.
- Back up all important data before you make changes to disk drives.
- Have a small flat-blade screwdriver available.
- You do not have to turn off the server to install or replace hot-swap drives or hot-plug Universal Serial Bus (USB) devices.
- Blue on a component indicates touch points, where you can grip the component to remove it from or install it in the server, open or close a latch, and so on.
- Orange on a component or orange label on or near a component indicates that the component can be hot-swapped, which means that if the server and operating system support hot-swap capability, you can remove or install the component while the server is running. (Orange can also indicate touch points on hot-swap components.) See the instructions for removing and installing a specific hot-swap component for any additional procedures that you might have to perform before you remove or install the component.
- When you need to access the inside of the server to install options, you might find it easier to lay the server on its side.
- For a list of supported options for the server, go to <http://www.ibm.com/pc/compat/>.

### System reliability guidelines

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

- Each of the drive bays has a drive or a filler panel and electromagnetic compatibility (EMC) shield installed.
- There is adequate space around the server to allow the server cooling system to work properly. Leave approximately 50 mm (2 in.) of open space around the front and rear of the server. Do not place objects in front of the fans. For proper cooling and airflow, replace the server cover before turning on the server. Operating the server for extended periods of time (more than 30 minutes) with the server cover removed might damage server components.
- You have followed the cabling instructions that come with optional adapters.
- You have replaced a failed fan as soon as possible.
- You have replaced a hot-swap drive within 2 minutes of its removal.
- You do not remove the air baffle when the server has power or is running. Operating the server without the air baffle might cause the microprocessor to overheat.
- Microprocessor socket 2 always contains either a microprocessor baffle or a microprocessor and heat sink.

## Handling static-sensitive devices

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

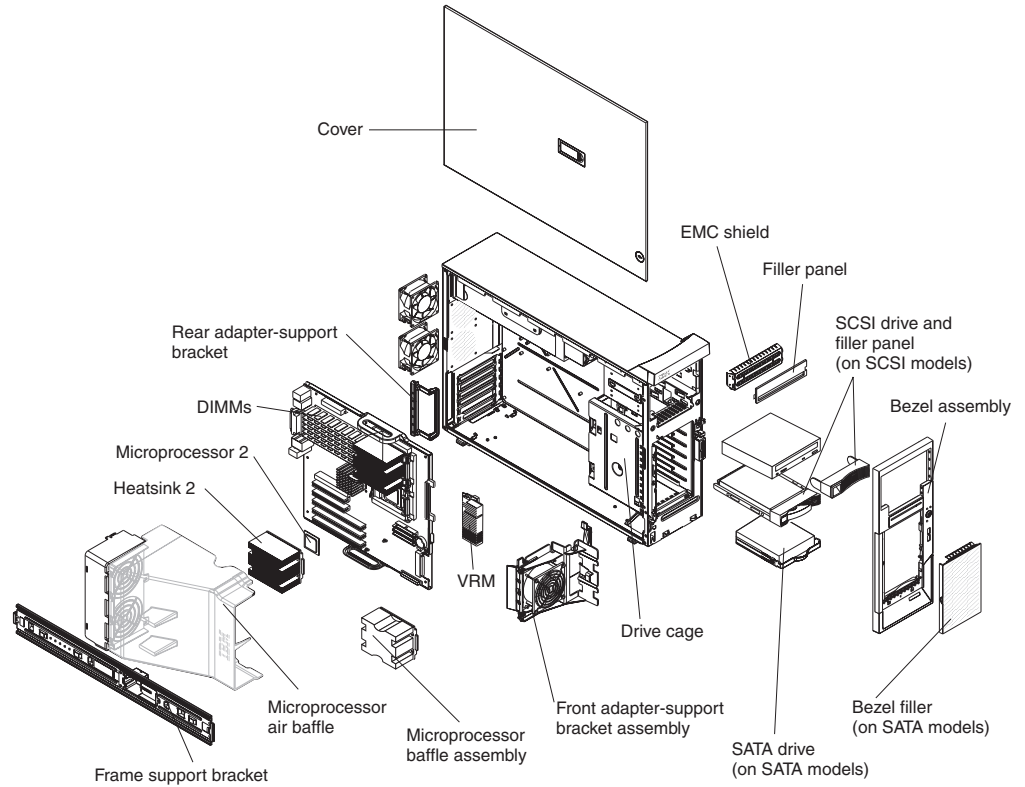
To reduce the possibility of electrostatic discharge, observe the following precautions:

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



# Major components of the xSeries 226 Type 8488 and 8648 server

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



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## Side cover

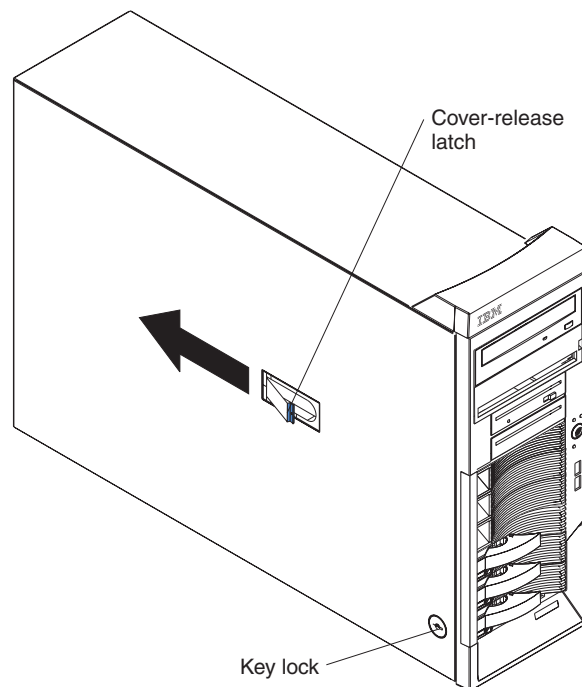
This section provides information about removing and installing the side cover.

### Removing the side cover

Complete the following steps to remove the server side cover:

1. Read Appendix B, “Safety information,” on page 141, and the “Installation guidelines” on page 25.
2. Turn off the server and all attached devices (see “Turning off the server” on page 7); then, disconnect all power cords and external cables.
3. Unlock the side cover; then, pull the cover-release latch away from the server and push the cover toward the rear of the server. Lift the side cover off the server and set it aside.

**Note:** It might be easier to lay the server on its side to perform this procedure.



To replace the side cover, see “Replacing the side cover” on page 29.

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

## Replacing the side cover

If you removed the support bracket or bezel, reinstall it before you replace the side cover (see “Removing and installing the support bracket” on page 32 and “Replacing the bezel” on page 31).

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

Complete the following steps to replace the side cover:

1. Before installing the cover, 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. Make sure that the cover-release latch is in the unlocked (opened) position.
3. Insert the tabs inside the cover into the slots on the server chassis.
4. Make sure that each tab on the side cover is in its corresponding slot.
5. Close the cover-release latch to secure the side cover in place.
6. Lock the side cover.

---

## Bezel

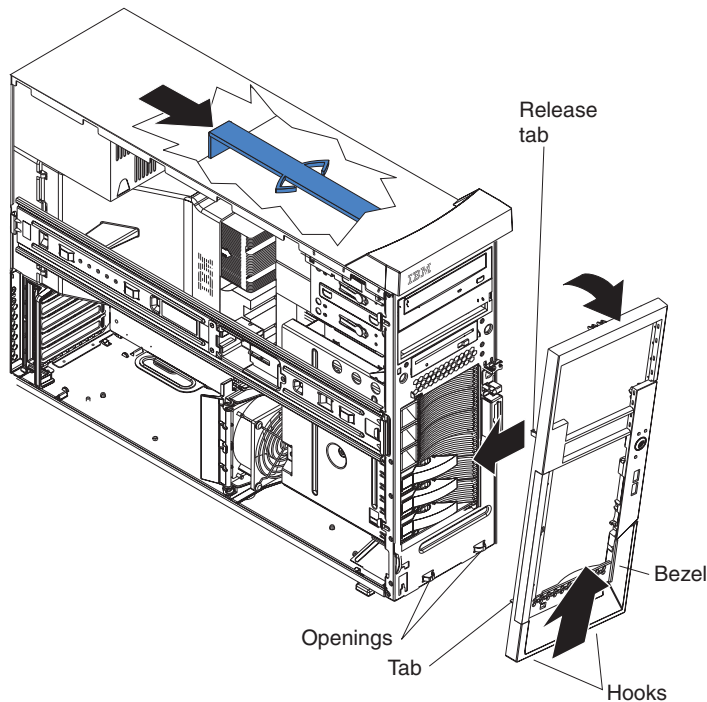
This section provides information about removing and installing the front bezel.

### Removing the bezel

When working with some devices, such as additional optical drives, you must first remove the bezel to access the device.

Complete the following steps to remove the bezel:

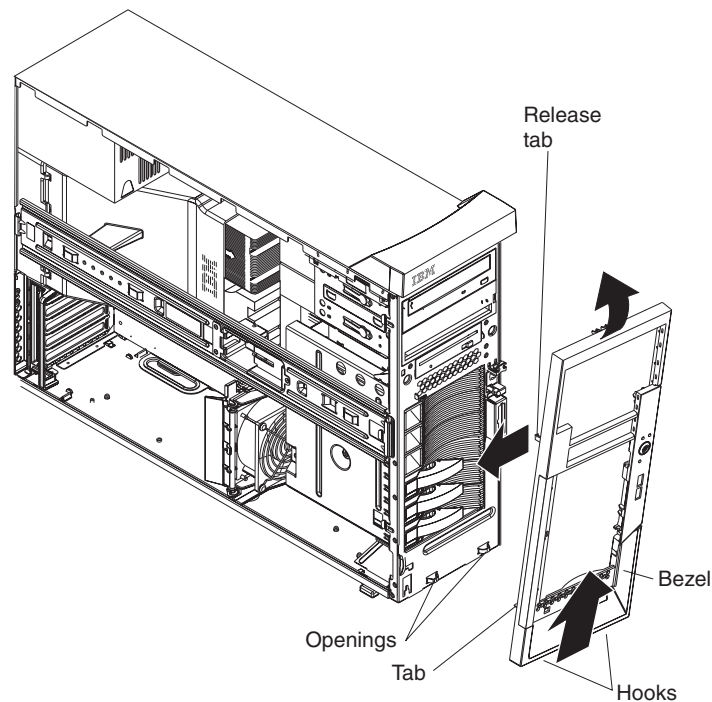
1. Unlock the side-cover lock.
2. Remove the side cover (see “Removing the side cover” on page 28).
3. For hot-swap hard disk drive models, slide the lock bar to the left.
4. Locate the bezel-release lever; then, press the bezel-release lever toward the front of the server.
5. Pull the top of the bezel away from the chassis; then, push the bezel down to disengage the bottom tabs.
6. Remove the bezel from the server and store the bezel in a safe place.



For instructions for replacing the bezel, see “Replacing the bezel” on page 31.

## Replacing the bezel

Complete the following steps to replace the bezel.



**Note:** For hot-swap hard disk drive models, make sure the side cover is unlocked; then, slide the lock bar on the bezel to the left (unlocked) before you begin.

1. Insert the tab on the left side of the bezel into the matching hole on the chassis left front.
2. Slide the bezel toward the bottom of the server until you can insert the two openings on the bottom rear of the bezel onto the matching hooks on the server chassis.
3. Push the top of the bezel toward the server until the two tabs at the top of the bezel snap into place.
4. For hot-swap hard disk drive models, slide the lock bar to the right. The hot-swap lock bar locks when you lock the side cover key lock.
5. Lock the side cover.

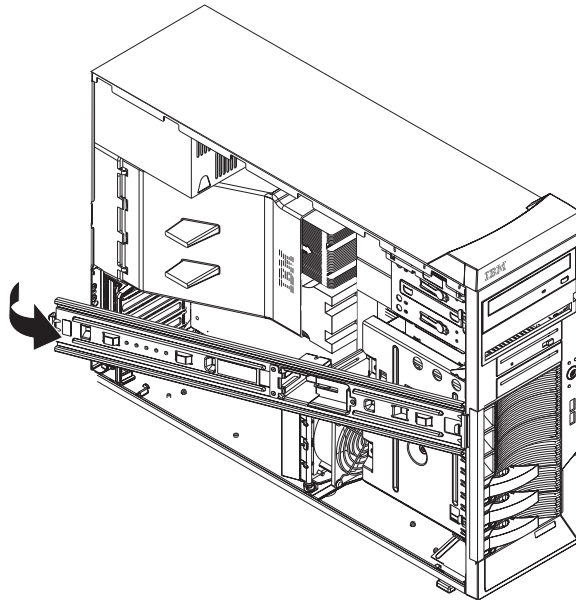
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## Removing and installing the support bracket

When working with some devices, such as hard disk drives, adapters, and memory modules, you must first remove the support bracket to access the device.

Complete the following steps to remove the support bracket:

1. Read Appendix B, “Safety information,” on page 141, and the “Installation guidelines” on page 25.
2. Remove the side cover (see “Removing the side cover” on page 28).
3. Pull out on the rear end of the support bracket at a 45° angle.
4. Disengage the front end of the support bracket from the server and set the bracket aside.



To reinstall the support bracket, reverse the previous steps.

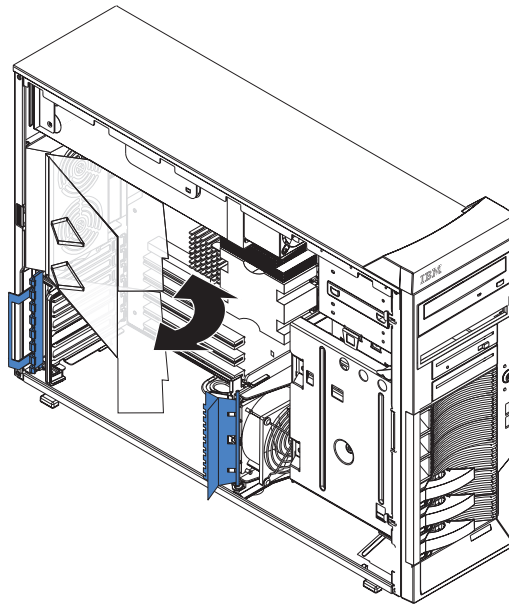
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## Opening and closing the microprocessor air baffle

When working with some devices, such as microprocessors and memory modules, you must first open the microprocessor air baffle to access the device.

Complete the following steps to open the microprocessor air baffle:

1. Read Appendix B, “Safety information,” on page 141, and the “Installation guidelines” on page 25.
2. Remove the side cover (see “Removing the side cover” on page 28).
3. Remove the support bracket (see “Removing and installing the support bracket” on page 32).
4. Grasp the end of the microprocessor air baffle near the front of the server and rotate it out of the server.



To completely remove the microprocessor air baffle, gently press the sides of the baffle at the chassis toward each other until the tabs at the rear of the baffle are free of the slots in the chassis. To replace the air baffle, gently press the sides of the baffle toward each other until you can insert the rear tabs into the slots in the rear of the chassis.

Complete the following steps to close the microprocessor air baffle:

1. Rotate the air baffle to the closed position, carefully guiding the top side of the air baffle between the cables, so that the cables cross in the notch of the air baffle side and are not pinched by the guide.
2. Press the air baffle gently but firmly into place.

## Installing a memory module

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

- The server comes with either two 256 MB or two 512 MB memory DIMMs installed in DIMM 1 and DIMM 2 memory connectors. The second pair of DIMMs must be installed in DIMM 3 and DIMM 4 memory connectors and the third pair in DIMM 5 and DIMM 6 memory connectors.
- DIMMs must be installed in matched pairs. The DIMMs in each pair must be the same size, speed, type, and technology as each other but do not have to match the other pairs. You can mix compatible DIMMs from various manufacturers.
- Install only 1.8 V, 184-pin, double-data-rate 2 (DDR2), PC2-3200, registered, synchronous dynamic random-access memory (SDRAM) with error correcting code (ECC), dual inline memory modules (DIMMs). These DIMMs must be compatible with the latest PC2-3200 SDRAM buffered DIMM specification. For a list of supported options for the server, go to <http://www.ibm.com/pc/>; then, select your country and navigate to the list of options for the server.
- The system board contains six DIMM connectors and supports two-way memory interleaving when the DIMMs are installed in pairs and functioning properly. If one DIMM in the pair fails, the server runs in single-channel mode (non-interleaving). A failed DIMM must be replaced as soon as possible; otherwise, the server will not start (boot).
- The DIMM-installation sequence is based on single-rank DIMMs, double-rank DIMMs, and mixing single-rank and double-rank DIMMs. *Single-rank* DIMMs are 256 MB, 512 MB, and 1 GB memory modules. *Double-rank* DIMMs are 2 GB memory modules. The following table lists the DIMM-installation sequence for the server maximum memory capacity using mixed single-rank and double-rank DIMMs.

### Notes:

1. Do not install four 2 GB double-rank DIMMs for the server maximum capacity (8 GB) configuration; the server does not support it.
2. You can install pairs of 256 MB, 512 MB, 1 GB, and 2 GB DIMMs in the server, but for the server maximum capacity you must use the DIMM-sequence in the table below.
3. You can install any combination of DIMM pairs in the server; however, you can install only two 2 GB double-rank DIMMs in the server, and they must go in DIMM connectors 1 and 2. Do not install 2 GB double-rank DIMMs in any connectors other than DIMM connectors 1 and 2.
4. If you order DIMMs from IBM, the variable *2R* in the description for the memory indicates that the DIMM is a double-rank 2 GB DIMM.

Table 2. Maximum memory capacity (8 GB) and installation sequence mixing single-rank and double-rank DIMMs

DIMM pair	DIMM connectors	DIMM size	Rank
First pair	1, 2	2 GB	Double-rank
Second pair	3, 4	1 GB	Single-rank
Third pair	5, 6	1 GB	Single-rank



- The DIMM options that are available for the server are 256 MB, 512 MB, 1 GB, and 2 GB memory modules. The server supports a minimum of 256 MB and a maximum of 8 GB (when using 2 GB double-rank DIMMs) of system memory.

**Important:** Although the server supports a maximum of 8 GB of system memory, some Microsoft® Windows® operating systems recognize and support only a lesser amount of system memory, as shown in the following table.

Windows operating system	Maximum memory supported
Windows Server 2003, Web Edition	2 GB
Windows Server 2003, Standard Edition	4 GB

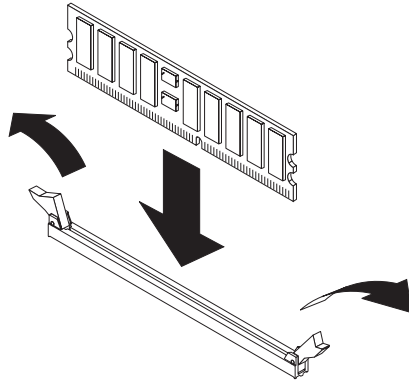
- The memory controller in the server provides Chipkill™ memory protection if the DIMMs are 1 GB or larger, or if the server is populated with 512 MB x4 DIMMs. Chipkill memory protection is a technology that protects the server from a single chip failure on a DIMM.
- The amount of usable memory is reduced depending on the system configuration. A certain amount of memory must be reserved for system resources. The BIOS displays the total amount of installed memory and the amount of configured memory.

Complete the following steps to install a DIMM:

1. Read Appendix B, “Safety information,” on page 141, and the “Installation guidelines” on page 25.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.
3. Remove the side cover (see “Removing the side cover” on page 28).
4. Remove the support bracket (see “Removing and installing the support bracket” on page 32).
5. Open the microprocessor air baffle (see “Opening and closing the microprocessor air baffle” on page 33).
6. Locate the DIMM connectors on the system board (see “System board option connectors” on page 85). Determine the connectors into which you will install the DIMMs.

7. Install the DIMMs in the sequence shown in the notes at the beginning of this section.

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



- a. Open the retaining clips and, if necessary, remove any existing DIMM.
  - b. Touch the static-protective package containing the DIMM to any unpainted metal surface on the server. Then, remove the new DIMM from the package.
  - c. Turn the DIMM so that the DIMM keys align correctly with the slot.
  - d. Insert the DIMM into the connector, pressing gently but firmly until the retaining clips close.
8. Insert the DIMM into the connector by aligning the edges of the DIMM with the slots at the ends of the DIMM connector. Firmly press the DIMM straight down into the connector by applying pressure on both ends of the DIMM simultaneously. The retaining clips snap into the locked position when the DIMM is firmly seated in the connector. If there is a gap between the DIMM and the retaining clips, the DIMM has not been correctly installed. Open the retaining clips, remove the DIMM, and then reinsert it.
  9. If you have other options to install or remove, do so now; otherwise, close the microprocessor air baffle (see “Opening and closing the microprocessor air baffle” on page 33), replace the support bracket (see “Removing and installing the support bracket” on page 32), and go to “Completing the installation” on page 60.

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## Installing a drive

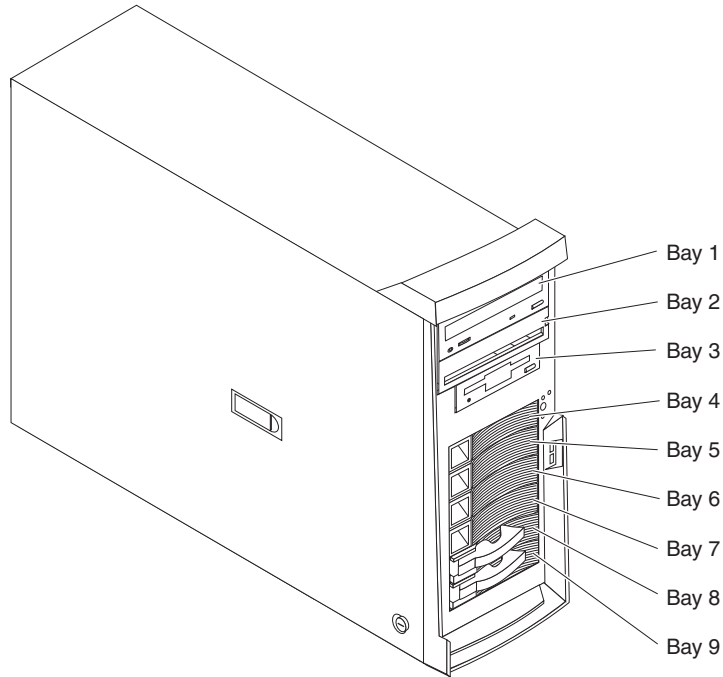
Depending on the server model, one or more of the following drives might be installed in the server:

- Diskette drive
- Hard disk drive
- CD-ROM drive

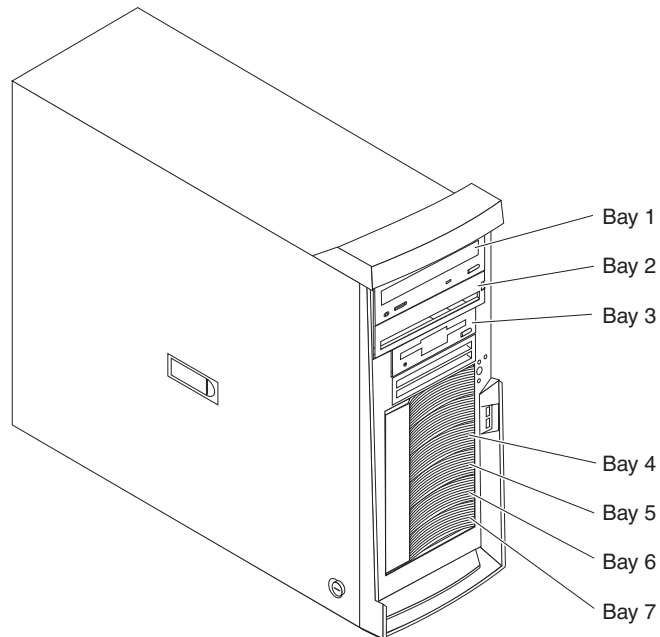
## Internal drive bays

The server comes with an IDE CD-ROM drive in bay 1 and a 3.5-in., 1.44 MB diskette drive in bay 3. Some server models come with six hot-swap hard disk drive bays; other server models come with four simple-swap hard disk drive bays and a hard disk drive installed in bay 7.

*Server with hot-swap hard disk drives*



*Server with simple-swap hard disk drives*



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

- Make sure that you have all the cables and other equipment that is specified in the documentation that comes with the drive.
- Check the instructions that come with the drive to see whether you must set any switches or jumpers on the drive. If you are installing a SCSI device, be sure to set the SCSI ID for that device.
- Diskette drives, tape drives, CD-ROM, CD-RW, and DVD drives are examples of removable-media drives. You can install removable-media drives in bays 1, 2, and 3 only.
- The integrated IDE controller in the server supports up to two IDE devices.
- You can install a 3.5-in. slim-high or 5.25-in. half-high removable-media drive, such as a tape backup drive, CD-RW drive, or DVD drive, in bay 2.
- The server supports only one diskette drive.
- To install a 3.5-in. drive in a 5.25-in. bay, you must use the 5.25-in. conversion kit. Contact IBM to order the conversion kit.
- The electromagnetic interference (EMI) integrity and cooling of the server are protected by having all bays and PCI slots covered or occupied. When you install a drive or PCI adapter, save the EMC shield and filler panel from the bay or the PCI adapter slot cover in the event you later remove the option.
- For a complete list of supported options for the server, go to <http://www.ibm.com/pc/support/>.

## Installing a drive in bay 2

Complete the following steps to install a drive in bay 2:

1. Read Appendix B, “Safety information,” on page 141, and the “Installation guidelines” on page 25.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.
3. Remove the side cover (see “Removing the side cover” on page 28).
4. Remove the support bracket (see “Removing and installing the support bracket” on page 32).
5. Remove the bezel (see “Removing the bezel” on page 30).
6. Use a screwdriver to pry the filler panel and EMC shield away from the server.

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

Statement 3



**CAUTION:**

When laser products (such as CD-ROMs, DVD-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.

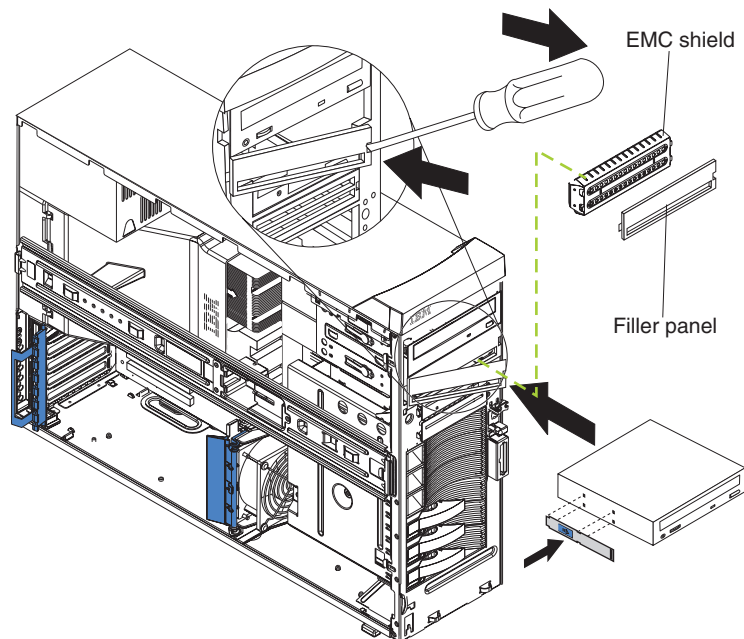
Class 1 Laser Product

Laser Klasse 1

Laser Klasse 1

Luokan 1 Laserlaite

Appareil À Laser de Classe 1



7. Touch the static-protective package containing 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.

8. Set any jumpers or switches on the drive according to the documentation that comes with the drive.

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

9. If you are installing a 3.5-in. drive in bay 2, attach the 5.25-in. conversion kit, which you can order from IBM, to the 3.5-in. drive.
10. Remove the large drive clip from the side of the drive cage for bays 1 through 3. Slide the drive clip toward the rear of the server; then, snap the drive clip into the screw holes on the side of the drive or conversion kit.
11. Slide the drive into the drive bay until it snaps in place.
12. Determine whether the drive is an IDE or SCSI device; then, connect one end of the applicable signal cable into the back of the drive and make sure that the other end of this cable is connected into the applicable IDE or SCSI connector on the system board.
  - If you are installing a SCSI removable-media drive, use the one-drop SCSI cable that comes with the drive and connect it to SCSI channel A (SCSI1). See “Power and signal cables for internal drives” on page 44 for additional information about cabling drives and “System board internal connectors” on page 86 for the location of IDE and SCSI connectors on the system board.
  - If there are open connectors on the cable connecting an existing IDE drive, you can use this cable to connect the new drive. The 4-connector SCSI cable that comes with non-hot-swap model servers cannot be used to connect a SCSI drive in bay 2.
13. Route the signal cable so that it does not block the airflow to the rear of the drives or over the microprocessor and memory.
14. If you have another drive to install or remove, do so now.
15. If you have other options to install or remove, do so now; otherwise, replace the support bracket (see “Removing and installing the support bracket” on page 32), replace the bezel (see “Replacing the bezel” on page 31), and then go to “Completing the installation” on page 60

## Installing a hot-swap SCSI hard disk drive in bay 4, 5, 6, 7, 8, or 9

Some server models support hot-swap hard disk drives. The SCSI ID for each hot-swap hard disk drive is printed on the hot-swap lock bar.

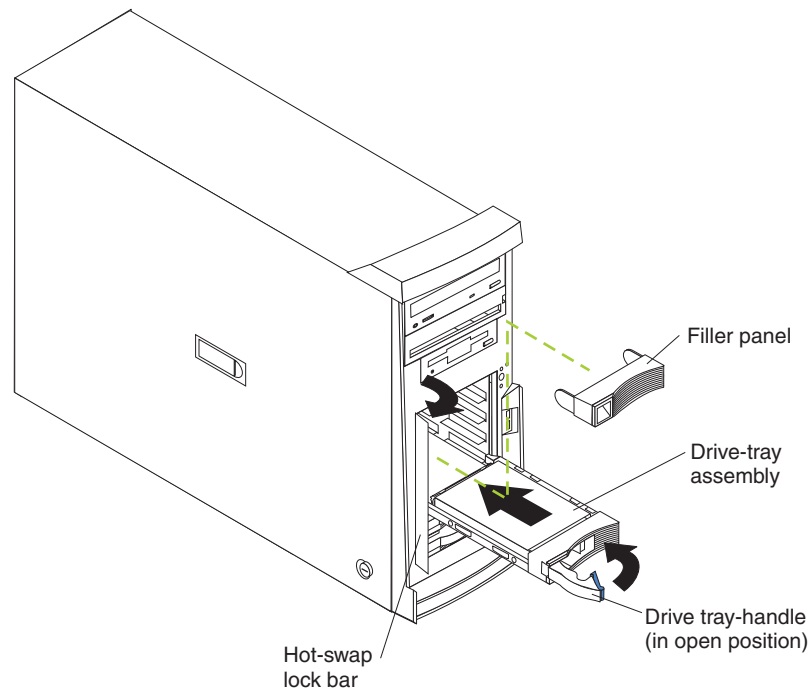
Before you install a hot-swap hard disk drive, read the following information:

- Inspect the drive tray for signs of damage.
- Make sure that the drive is correctly installed in the tray.
- To maintain proper system cooling, do not operate the server for more than 10 minutes without either a drive or a filler panel installed in each drive bay.
- All hot-swap drives in the server must have the same speed rating; if you mix speed ratings, all drives will operate at the speed of the slowest drive.
- You do not have to turn off the server to install hot-swap drives in the hot-swap drive bays.
- Set the drive jumpers either to disable auto-start or to delay startup, to prevent overtaxing the system power supply by all drives trying to spin up at once.
- Install hot-swap hard disk drives in this sequence: bay 9, bay 8, bay 7, bay 6, bay 5, and bay 4.
- If the server has an optional RAID adapter, see the documentation that comes with the adapter for instructions for installing a hard disk drive.

- Each hot-swap drive has two LEDs: the hard disk drive activity LED and the hard disk drive status LED. When the green hard disk drive activity LED is flashing, it indicates that the controller is accessing the hard disk drive. When the amber hard disk drive status LED is lit continuously, it indicates that the drive is faulty and must be replaced. When the amber hard disk drive status LED is flashing, it indicates that the drive is being rebuilt.

The server hot-swap bays are connected to a SCSI backplane. This backplane is the printed circuit board behind the bay. The backplane controls the SCSI IDs for the hot-swap drives.

The following illustration shows how to install a hot-swap hard disk drive.



Complete the following steps to install a hot-swap hard disk drive.

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

1. Read Appendix B, "Safety information," on page 141, and the "Installation guidelines" on page 25.
2. Unlock the side cover.
3. Slide the drive-bay lock bar to the left to access the drive bays.
4. 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 it away from the server.

5. Install the hard disk drive in the hot-swap bay:
  - a. Make sure that the tray handle is open (that is, perpendicular to the drive).
  - b. Align the drive assembly with the guide rails in the bay.
  - c. Gently push the drive assembly into the bay until the drive stops.
  - d. Push the tray handle to the closed (locked) position.
  - e. Check the hard disk drive status indicator to make sure that the hard disk drive is operating properly. (You might have to restart the server before the drive is recognized.) If the amber hard disk drive status LED for a drive is lit continuously, it indicates that the drive is faulty and must be replaced. If the green hard disk drive activity LED is flashing, it indicates that the drive is being accessed.

**Note:** If the server is configured for RAID operation using an optional ServeRAID adapter, you might have to reconfigure the disk arrays after installing hard disk drives. See the ServeRAID documentation on the IBM *ServeRAID Support* CD for additional information about RAID operation and complete instructions for using ServeRAID Manager.

6. If you are installing additional hot-swap hard disk drives, do so now; otherwise, replace the hot-swap lock bar.
7. If you have other options to install or remove, do so now; otherwise go to “Completing the installation” on page 60.

## SCSI IDs for hot-swap hard disk drives

The hot-swap-drive backplane controls the SCSI IDs for the internal hot-swap drive bays. The SCSI ID for each hot-swap hard disk drive is printed on the hot-swap lock bar. The following table lists the SCSI IDs for the hard disk drives and backplane that are connected to one channel in hot-swap hard disk drive models. In the typical configuration, the standard hard disk drives and backplane are connected to channel B.

Device	SCSI ID
Drive bay 9	0
Drive bay 8	1
Drive bay 7	2
Drive bay 6	3
Drive bay 5	4
Drive bay 4	5
Adaptec AIC 7902 controller	7
Hot-swap backplane	8



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

Some server models support simple-swap Serial ATA (SATA) hard disk drives, which are easily accessible from the front of the server. Drives are installed starting at the bottom, in bay 7. Additional drives are then installed in bays 6, 5, and 4.

Before you install a simple-swap SATA hard disk drive, read the following information:

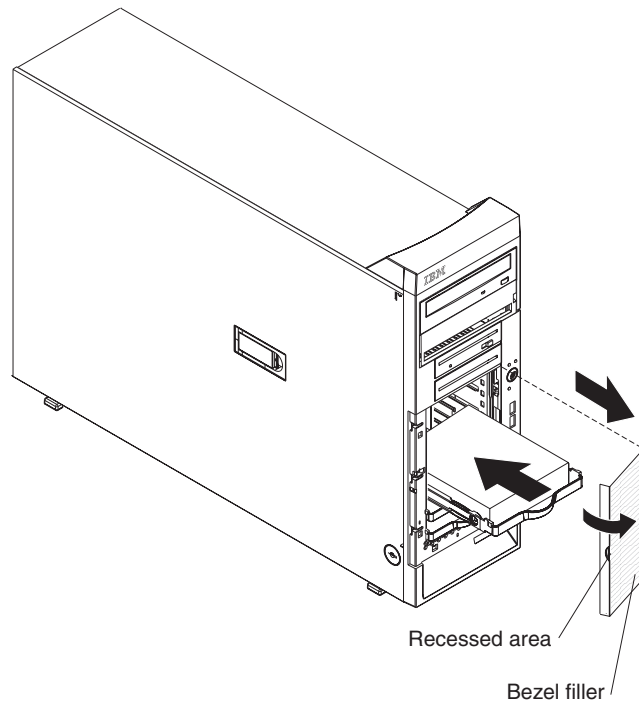
- Read the documentation that comes with the drive for cabling instructions.
- You can install two simple-swap SATA hard disk drives in the server.

**Note:** You can install a third and fourth SATA drive if you install an optional ServeRAID-7t S-ATA adapter in the server. The optional ServeRAID-7t S-ATA adapter comes with two cables that you can use to cable the third and fourth SATA drives. If you install the optional ServeRAID-7t S-ATA adapter, all four SATA drives must then be connected to the ServeRAID-7t S-ATA adapter instead of the system board. See “Installing an adapter” on page 51 and “Cabling an optional SATA adapter” on page 55, or see the the optional ServeRAID-7t S-ATA adapter documentation.

- Install simple-swap SATA hard disk drives in this sequence: bay 7, bay 6, bay 5, and bay 4.
- Bays 4, 5, 6, and 7 are simple-swap bays and do not require cabling.

Complete the following steps to install a simple-swap hard disk drive:

1. Read Appendix B, “Safety information,” on page 141, and the “Installation guidelines” on page 25.
2. Turn off the server and peripheral devices and disconnect all external cables and power cords.
3. Unlock the side cover (the bezel filler will not disengage from the server if the cover is locked).
4. Grasp the recessed area on the bezel filler and rotate the bezel filler outward until it disengages from the server.



5. Touch the static-protective package containing the drive to any unpainted metal surface on the server; then, remove the drive from the package and place it on a static-protective surface.
6. Align the drive assembly with the guide rails in the bay (the connector end of the drive goes in first); then, gently slide the drive assembly all the way into the drive bay until you hear a click.
7. If you have other options to install or remove, do so now. Otherwise, replace the bezel filler; then, see “Completing the installation” on page 60.

## Power and signal cables for internal drives

The server uses cables to connect parallel IDE, simple-swap Serial ATA, and SCSI devices to the power supply and to the system board (see “System board internal connectors” on page 86 for the location of system-board connectors). Review the following information before connecting power and signal cables to internal drives:

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

The following cables are provided:

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

The CD-ROM drive is attached to an ATA 100 signal cable. ATA 100 signal cables are color-coded. The blue connector is attached to the system board. The black connector is attached to the master IDE device. The gray middle connector is attached to the subordinate IDE device.
  - **Diskette drive:** The narrower signal cable has two connectors. One is attached to the diskette drive, and the other is connected to the connector (FDD1) on the system board.
  - **Serial ATA (SATA):** The narrower, black signal cable has two connectors. One is connected to a simple-swap Serial ATA drive, and the other is attached to the connector on the system board. Each simple-swap Serial ATA drive comes with a cable. If you install an additional simple-swap Serial ATA drive, you will need an additional cable.

If you install the optional ServeRAID-7t S-ATA controller to add a third and fourth SATA drive, all four SATA drives must then be connected to the ServeRAID-7t S-ATA controller instead of the system board. The optional ServeRAID-7t S-ATA controller comes with two cables that you can use to cable the third and fourth SATA drives. See the optional ServeRAID-7t S-ATA controller documentation for cabling instructions.
  - **SCSI:** A round SCSI cable connects the SCSI backplane to the SCSI channel B connector on the system board. The maximum cable length that supports Ultra320 SCSI hard disk drives is 61 cm (24 in.).

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## Installing an external SCSI connector

To install an external SCSI connector on the rear of the server, install an external SCSI interface option. For a list of supported external SCSI interface options for the server, go to <http://www.ibm.com/pc/compat/>.

The external SCSI interface option contains a SCSI cable with a connector at one end and another connector on the other end. Complete the following steps to install and route the SCSI cable in the server:

1. Turn off the server and all peripheral devices. Disconnect all power cords; then, disconnect all external signal cables from the server.
2. Remove the server cover (see “Removing the side cover” on page 28).
3. Remove the support bracket (see “Removing and installing the support bracket” on page 32).

4. Open the front adapter-support bracket and remove the rear adapter-retention bracket from the PCI-X slots (see “Installing an adapter” on page 51 for instructions). You might also have to remove longer adapters for access to the SCSI connectors on the system board.
5. Connect the SCSI signal cable end labeled “PLANAR” to the connector for SCSI channel B on the system board (see “System board internal connectors” on page 86 for the location of the SCSI channel B connector).
6. Route the SCSI cable to the adapter slot that has the special SCSI-knockout slot cover on the back of the server (see “Connecting the cables” on page 61 for an illustration of the SCSI-knockout slot cover, normally in PCI slot 3). Make sure the cable does not block the flow of air to the hard disk drives.

**Note:** You can move the special SCSI-knockout slot cover to a different slot if needed.

7. Remove the SCSI-connector knockout from the PCI-X slot cover; then, insert the external SCSI connector on the SCSI cable into the knockout opening and secure it with the attached screws.
8. Replace any adapters you removed in step 4. Close the front adapter-support bracket and replace the rear adapter-retention bracket.
9. Replace the support bracket (see “Removing and installing the support bracket” on page 32).
10. Replace the cover (see “Replacing the side cover” on page 29).
11. Reconnect the external cables and power cords. Turn on the attached devices, and turn on the server.
12. Use the SCSISelect program to configure SCSI channel B (see the *User's Guide* for information about using the SCSISelect program).

---

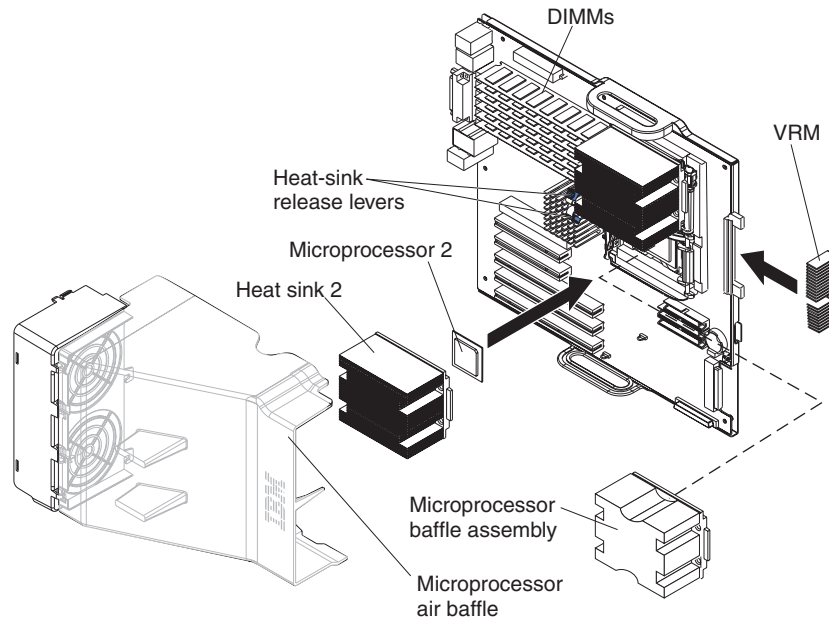
## Installing an additional microprocessor

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

- The server comes with one microprocessor and supports up to two microprocessors.
- Read the documentation that comes with the microprocessor to determine whether you must update the basic input/output system (BIOS) code in the server. To download the most current level of BIOS code for the server, go to <http://www.ibm.com/pc/support/>.
- (Optional) Obtain an SMP-capable operating system. For a list of supported operating systems, go to <http://www.ibm.com/pc/compat/>.
- The microprocessors must have the same cache size and type, and the same clock speed. Microprocessor internal and external clock frequencies must be identical. You can use the Configuration/Setup Utility program to determine the specific type of microprocessor that is in the server.
- Terminator cards are not required for empty microprocessor sockets. However, for airflow, an empty microprocessor socket must contain a microprocessor baffle.
- The microprocessor speeds are automatically set for this server; therefore, you do not have to set any microprocessor frequency-selection jumpers or switches.
- The system board contains an integrated voltage regulator for microprocessor 1; you must install a voltage regulator module (VRM) on the system board when you install microprocessor 2. The VRM comes in the microprocessor option kit.
- These instructions assume that you are installing microprocessor 2.

- If you must replace a microprocessor, see “Microprocessor and heat sink” on page 68.
- For additional illustrations of the system-board components, see “System board option connectors” on page 85.

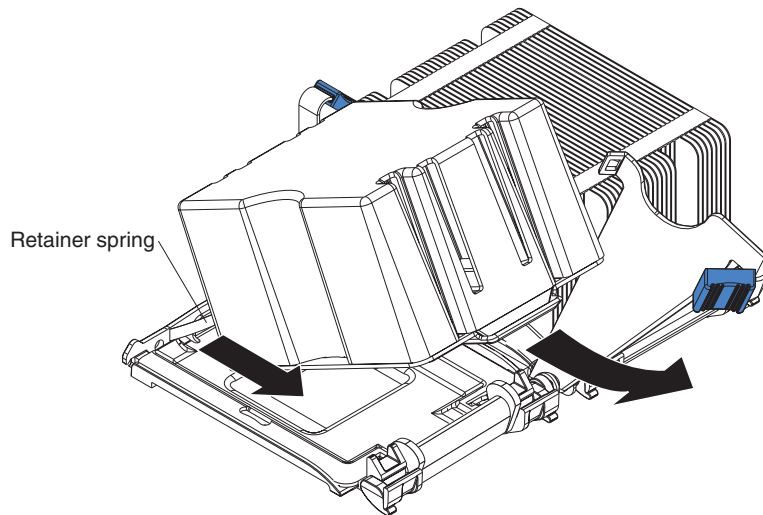
The following illustration shows how to install an additional microprocessor (microprocessor 2).



Complete the following steps to install a microprocessor:

1. Read Appendix B, “Safety information,” on page 141, and the “Installation guidelines” on page 25.
2. Turn off the server and all peripheral devices; then, disconnect all power cords and external cables from the server.
3. Remove the server cover (see “Removing the side cover” on page 28).
4. Remove the support bracket (see “Removing and installing the support bracket” on page 32).
5. Open the microprocessor air baffle (see “Opening and closing the microprocessor air baffle” on page 33).

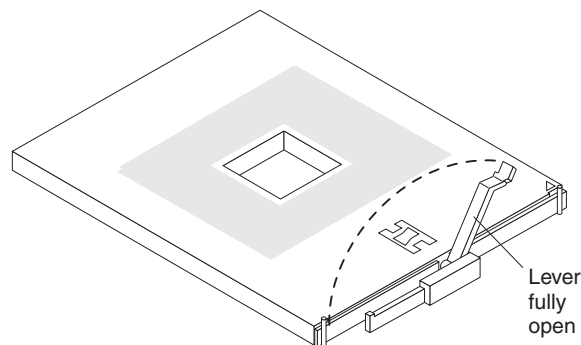
6. Remove the microprocessor baffle assembly from the second microprocessor socket.



- a. Press down on the blue touch point on the heat-sink release lever, then lift the lever up as far as it will go ( $135^\circ$ ) to release the baffle assembly.
- b. Grasp the front of the baffle assembly and tip it up toward the rear of the server while pulling the rear flange out of the heat-sink retention module; then, lift the baffle assembly up and out of the server.

**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 26.

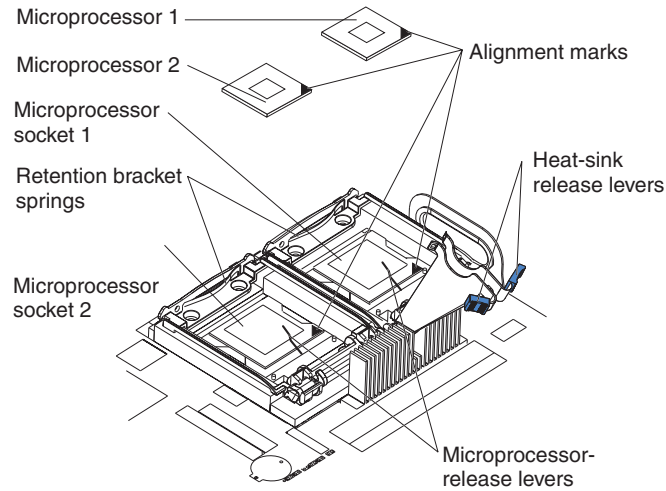
7. If the second microprocessor socket is covered with protective film or a label, peel and remove the film or label.
8. Install the microprocessor:
  - a. Touch the static-protective package containing the new microprocessor to any *unpainted* metal surface on the server; then, remove the microprocessor from the package.



- b. Pull out and lift up on the microprocessor-release lever until the lever reaches its maximum vertical position ( $135^\circ$ ) to unlock the microprocessor socket.

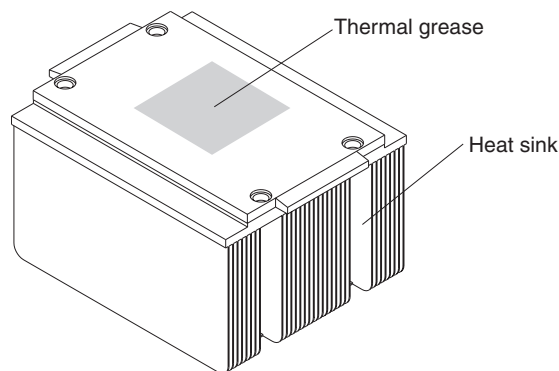
**Attention:**

- 1) Do not use excessive force when pressing the microprocessor into the socket.
- 2) Make sure that the microprocessor is oriented and aligned correctly with pin number 1 in the socket before you try to close the microprocessor-release lever. The following illustration shows the alignment marks for both microprocessors and sockets.

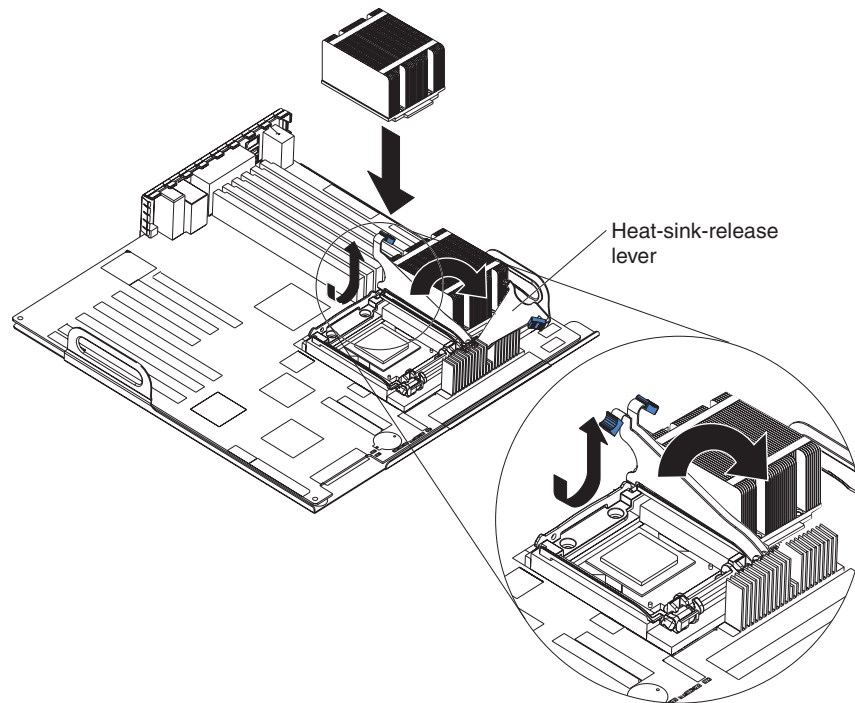


- c. Center the microprocessor over the microprocessor socket. Align the triangle on the corner of the microprocessor with the triangle on the corner of the socket and carefully press the microprocessor into the socket.
- d. Carefully close the microprocessor-release lever to secure the microprocessor in the socket.

**Attention:** Do not set the heat sink down after you remove the plastic cover and do not touch the thermal grease on the bottom of the heat sink. Touching the thermal grease will contaminate it. If the thermal grease on the heat sink becomes contaminated, it must be cleaned and replaced by a service technician.



9. Install the heat sink on the microprocessor.
  - a. Make sure that the heat-sink-release lever is in the fully open position (135°).
  - b. Orient the heat sink so that the thermal grease patch is nearer the rear of the server (directly above the microprocessor); then, remove the protective plastic cover from the bottom of the heat sink.



- c. Align the heat sink, grease side down, with the microprocessor and retention bracket.
- d. Slide the rear flange of the heat sink into the opening beneath the retention-bracket spring.
- e. With the heat sink on top of the microprocessor, press firmly on the heat sink so that it slips into the retention bracket.

**Note:** When the heat sink is seated correctly, the heat-sink-release lever starts to cam toward the rear of the server.

- f. Close the heat-sink-release lever by pressing it first down, then toward the microprocessor, then up until it hooks on the retention bracket. You might notice an audible snap as you rotate the lever, due to the spring force beneath the microprocessor; this is normal.
10. Insert the voltage regulator module (VRM) into the VRM connector (see the illustration on page 47).
    - a. Open the retaining clips on the VRM connector.
    - b. Touch the static-protective package containing the VRM to any unpainted metal surface on the server. Then, remove the new VRM from the package.

**Note:** The VRM support bracket is attached to the VRM.

- c. Align the VRM with the VRM connector.
  - d. Slide the VRM into the connector. The support bracket hooks into the chassis and the retaining clips snap into the locked position when the VRM is firmly seated in the connector.
11. If you have other options to install, do so now; otherwise, close the microprocessor air baffle (see “Opening and closing the microprocessor air baffle” on page 33), replace the frame-support bracket (see “Removing and installing the support bracket” on page 32), and go to “Completing the installation” on page 60.



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## Installing an adapter

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

- Locate the documentation that comes with the adapter and follow those instructions in addition to the instructions in this section. If you must change the switch setting or jumper settings on the adapter, follow the instructions that come with the adapter.
- Read the documentation that comes with the operating system.
- The server comes with three PCI slots and three PCI-X slots.

Slot number	Comments
Slot 1	<ul style="list-style-type: none"><li>• PCI Express x16</li><li>• Supports any PCI Express adapter that is in the ServerProven list (go to <a href="http://www.ibm.com/pc/compat/">http://www.ibm.com/pc/compat/</a> for the list of supported adapters)</li></ul>
Slot 2	<ul style="list-style-type: none"><li>• PCI 32-bit, 33 MHz, 5 V signalling</li><li>• Supports half-length PCI adapter</li><li>• Supports Remote Supervisor Adapter II</li></ul>
Slot 3	<ul style="list-style-type: none"><li>• PCI 32-bit, 33 MHz, 5 V signalling</li><li>• Supports full-length PCI adapter</li></ul>
Slot 4	<ul style="list-style-type: none"><li>• PCI-X 64-bit, 133 MHz, 3.3 V signalling</li><li>• Supports full-length PCI or PCI-X adapter</li></ul>
Slot 5	<ul style="list-style-type: none"><li>• PCI-X 64-bit, 100 MHz, 3.3 V signalling</li><li>• Supports ServeRAID 6i+ adapter</li><li>• Supports full-length PCI or PCI-X adapter</li></ul>
Slot 6	<ul style="list-style-type: none"><li>• PCI-X 64-bit, 100 MHz, 3.3 V signalling</li><li>• Supports full-length PCI or PCI-X adapter</li></ul>

- You can install any supported PCI Express adapter in slot 1. For a list of supported PCI Express adapters for the server, go to <http://www.ibm.com/pc/us/compat/>.
- You can install full-length adapters in PCI and PCI-X slots 3, 4, 5, and 6.
- You can install only 32-bit adapters in the 32-bit PCI slots 2 and 3, and 64-bit adapters in the 64-bit PCI-X slots 4, 5, and 6.
- The PCI bus configuration is as follows:
  - PCI slot 1 is on the PCI Express x16 bus.
  - The 32-bit PCI slots 2 and 3 and the integrated ATI Radeon 7000M video controller are on the 33 MHz PCI bus.
  - The 64-bit PCI-X slot 4 is on the 133 MHz PCI-X bus, channel B.
  - The 64-bit PCI-X slots 5 and 6 and the integrated Adaptec 7902 SCSI controller are on the 100 MHz PCI-X bus, channel A. If an optional ServeRAID 6i+ adapter is installed, it overrides the standard functionality of the integrated SCSI controller with RAID capabilities and forces PCI-X slots 5 and 6 to 66 MHz.
- The optional IBM Remote Supervisor Adapter II can be installed only in PCI slot 2. Use the ribbon cable that comes with this adapter to connect it to the Remote Supervisor Adapter II connector on the system board.
- If you install the optional IBM Remote Supervisor Adapter II, you must disconnect the video (monitor) cable from the server video connector and connect it to the optional Remote Supervisor Adapter II.
- The optional ServeRAID 6i+ adapter can be installed only in PCI-X slot 5.

- The server scans the PCI Express x16 expansion slot 1, PCI expansion slots 2 and 3, and PCI-X expansion slots 4 through 6 to assign system resources. Then, the server starts the PCI devices in the following order, if you have not changed the default startup sequence: PCI Express x16 expansion slot 1; system-board integrated drive electronics (IDE), Serial ATA (SATA), or SCSI devices (including the optional ServeRAID 6i+ adapter); and then PCI-X expansion slots 4 through 6.
- For a list of supported options for the server, go to <http://www.ibm.com/pc/support/>.

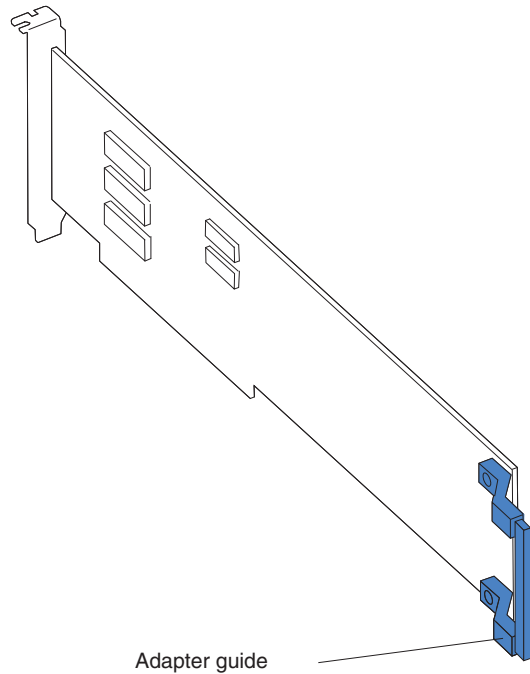
See “System board option connectors” on page 85 for the locations of expansion slots on the system board.

Complete the following steps to install an adapter:

1. Read Appendix B, “Safety information,” on page 141, and the “Installation guidelines” on page 25.
2. Turn off the server and peripheral devices; then, disconnect all external cables and power cords.
3. Remove the side cover (see “Removing the side cover” on page 28).
4. Follow the cabling instructions, if any, that come with the adapter. Route the adapter cables before you install the adapter.
5. Follow the instructions that come with the adapter to set jumpers or switches, if any.
6. Remove the frame-support bracket (see “Removing and installing the support bracket” on page 32).
7. Rotate the rear adapter-retention bracket to the open (unlocked) position and remove it from the server. Rotate the front adapter-support bracket to the open position. If you are installing a smaller adapter, remove only the rear adapter-retention bracket.
8. Remove the expansion-slot cover. From the rear of the server, press on the slot cover. Grasp it and pull it out of the expansion slot. Store it in a safe place for future use.

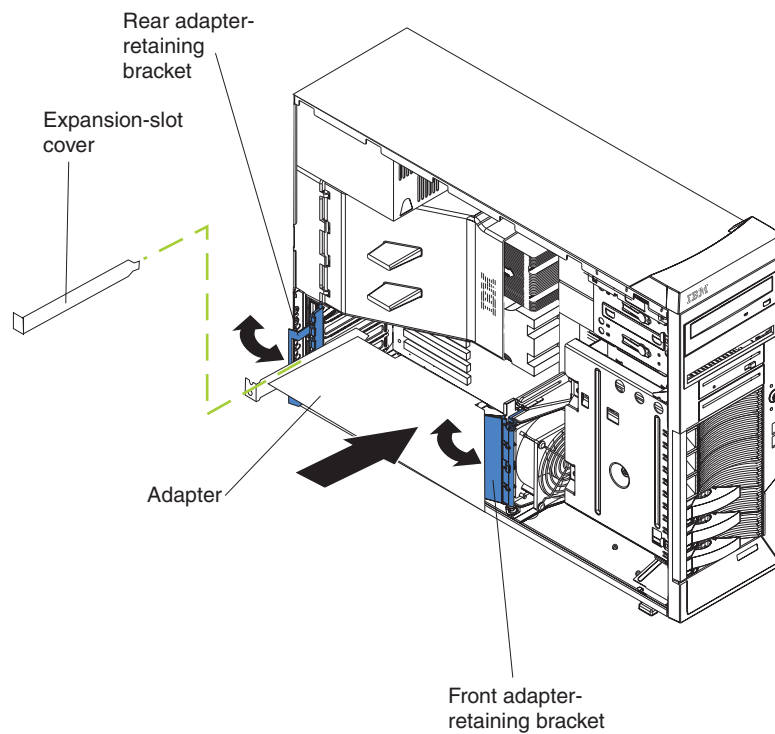
**Notes:**

- a. If you are installing an adapter into slot 3, move the expansion-slot cover with the SCSI knockout to a vacant adapter slot.
  - b. Expansion-slot covers must be installed on all vacant slots. This maintains the electronic emissions standards of the server and ensures proper ventilation of server components.
9. Touch the static-protective package containing the adapter to any unpainted metal surface on the server. Then, remove the adapter from the static-protective package. Avoid touching the components and gold-edge connectors on the adapter.
  10. If you are installing a full-length adapter, remove the blue adapter guide (if any) from the end of the adapter.



11. Carefully grasp the adapter by the top edge or upper corners, and align it with the expansion-slot guides; then, press the adapter *firmly* into the expansion slot. Move the adapter directly from the static-protective package to the expansion slot.

**Attention:** Make sure that the adapter is correctly seated in the expansion slot before you turn on the server. Incomplete installation of an adapter might damage the system board or the adapter.



12. Connect required cables to the adapter. Route cables so that they do not block the flow of air from the fans. If you are installing an optional SCSI adapter, see “Cabling an optional SCSI adapter” for additional information.
13. If you have other adapters to install or remove, do so now.
14. If you have installed a full-length adapter, rotate the front adapter-support bracket to the closed (locked) position.
15. Reinstall the rear adapter-retention bracket; then, rotate the bracket to the closed (locked) position.

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

16. If you have other options to install, do so now; otherwise, replace the frame-support bracket (see “Removing and installing the support bracket” on page 32) and go to “Completing the installation” on page 60.

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## Cabling an optional SCSI adapter

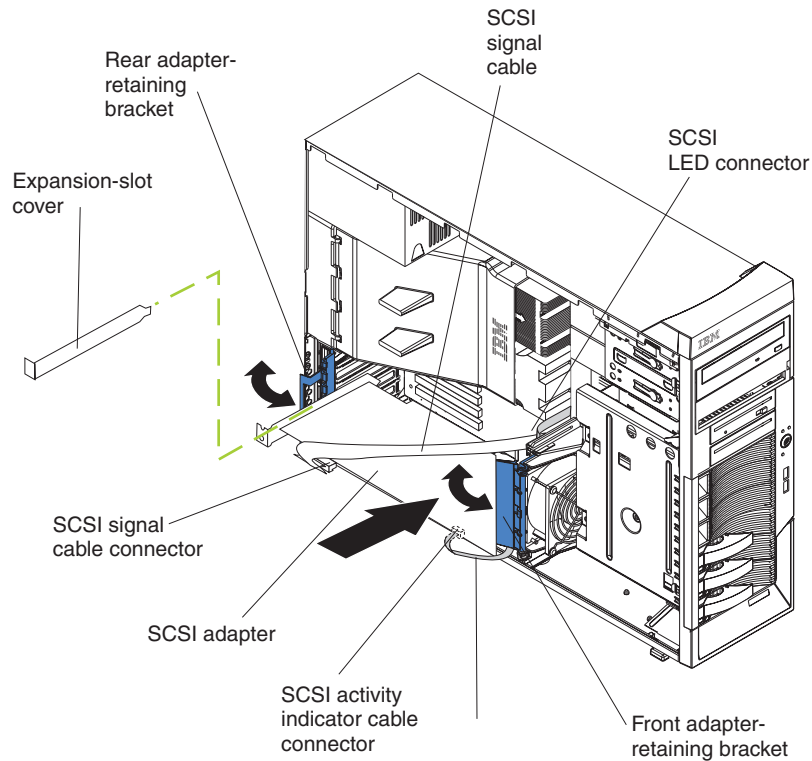
If the server model supports internal SCSI hard disk drives, you can install an optional SCSI adapter to control them. With a SCSI adapter installed, you can configure the internal hard disk drives into disk arrays that use higher levels of RAID functionality than the integrated SCSI controller. You can also cable a SCSI adapter to external hard disk drives. See the SCSI adapter option documentation for complete instructions for installing a SCSI adapter and for additional information about SCSI adapters.

### Notes:

1. This information in this section does not apply to the ServeRAID 6i+ adapter, which uses the integrated SCSI controller with RAID capabilities on the system board.
2. If the server model supports internal SATA hard disk drives, installing an optional SCSI adapter enables you to add external SCSI tape drives to the server. The information in this section does not apply to a SCSI adapter that will be used to add external SCSI tape drives.
3. An optional SCSI adapter or cable option is required to connect external SCSI devices.

Complete the following steps to cable an optional SCSI adapter:

1. Install the SCSI adapter (see “Installing an adapter” on page 51).
2. Connect the SCSI signal cable to the adapter and to one or more of the signal-cable connectors on the rear of the SCSI devices.
3. Connect the SCSI-activity-indicator cable to the adapter and to the SCSI LED connector (JSCSI) on the system board (see “System board internal connectors” on page 86).



4. Complete the installation of the optional SCSI adapter.

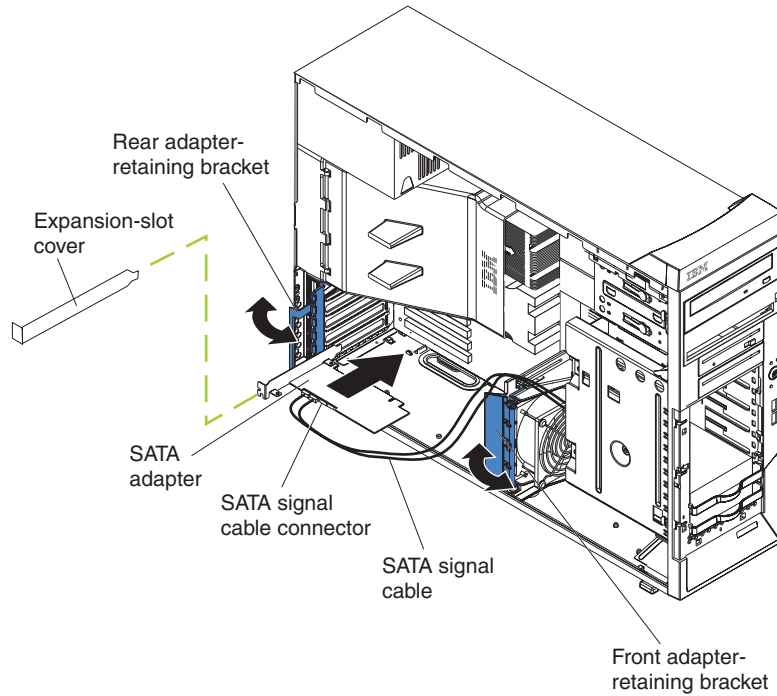
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## Cabling an optional SATA adapter

If the server model supports internal SATA hard disk drives, the integrated SATA controller supports only two hard disk drives. You can install an optional ServeRAID-7t S-ATA adapter in the server to support up to four SATA hard disk drives and to control them. With a ServeRAID-7t S-ATA adapter installed, you can configure the internal hard disk drives into disk arrays that use higher levels of RAID functionality than the integrated SATA controller. See the ServeRAID-7t S-ATA adapter option documentation for complete instructions for installing a SATA adapter in the server and for additional information about SATA adapters.

Complete the following steps to cable an optional SATA adapter:

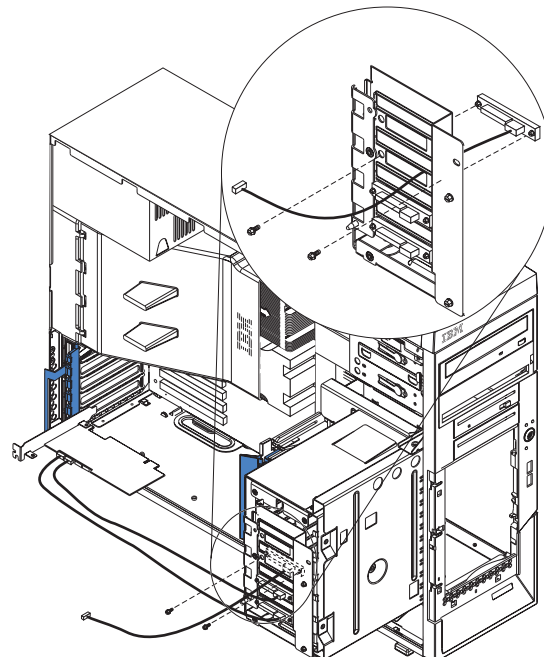
1. Install the SATA adapter (see “Installing an adapter” on page 51).
2. Disconnect the two SATA cables from the system board Serial ATA connectors and connect them to the SATA adapter. These are the signal cables for the SATA drives in bays 7 and 6 (see “System board internal connectors” on page 86).



3. Complete the followings steps to connect the SATA signal cables that come with the adapter to the SATA back panel on the hard disk drive cage.

**Note:** If you have placed the server on its side, adjust the instructions accordingly.

- a. Reach beneath the drive cage and push downward on the drive-cage-release latch; then, rotate the drive cage outward until the drive cage locks in the vertical position.
- b. Remove the two screws from the large connector on the SATA cable that comes with the ServerRAID-7t S-ATA adapter.



- c. Thread the large connector into the small back-panel opening on the rear of a bay; then, orient the connector so that the blue signal cable is toward the front or outside of the server (see the preceding illustration) and gently pull the connector into place.
  - d. Secure the connector with the two screws you removed in step 3b on page 56.
  - e. Connect the power-cable drop to the connector. The connectors are keyed and can be inserted only one way.
  - f. Repeat steps 3b on page 56 through 3e for the second SATA cable that comes with the ServeRAID-7t S-ATA adapter.
  - g. Press in on the drive-cage release tab and rotate the drive cage partially back into the server. Press the drive-cage release latch and rotate the drive cage the rest of the way back into the server, allowing the release latch to spring back into position.
  - h. Route the SATA cables through the upper slot in the front adapter-support-bracket assembly; then, connect the other end of the SATA cables to the ServeRAID-7t S-ATA adapter.
4. Complete the installation of the optional SATA adapter.

---

## 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 1-800-426-7378 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 the 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.

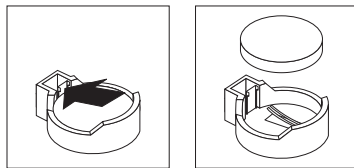
### *Do not:*

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

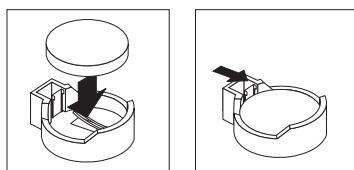
Dispose of the battery as required by local ordinances or regulations.

Complete the following steps to replace the battery:

1. Read Appendix B, “Safety information,” on page 141, and “Installation guidelines” on page 25.
2. Follow any special handling and installation instructions supplied with the replacement battery.
3. Turn off the server and all attached devices.
4. Disconnect all power cords; then, disconnect all external cables.
5. Remove the side cover (see “Removing the side cover” on page 28).
6. Remove the frame-support bracket (see “Removing and installing the support bracket” on page 32).
7. Remove any adapters that impede access to the battery.
8. Remove the battery:
  - a. Use a fingernail to press the top of the battery clip away from the battery. The battery pops up when released.
  - b. Use your thumb and index finger to lift the battery from the socket.



9. Insert the new battery:
  - a. Tilt the battery so that you can insert it into the socket on the side opposite the battery clip.
  - b. Press the battery down into the socket until it clicks into place. Make sure the battery clip holds the battery securely.





10. Replace the frame-support bracket (see “Removing and installing the support bracket” on page 32).
11. Replace the side cover (see “Replacing the side cover” on page 29).
12. Connect all external cables; then, connect the power cords.
13. Turn on the server.
14. Start the Configuration/Setup Utility program and set configuration parameters as needed (see “Starting the Configuration/Setup Utility program” on page 10).

---

## Replacing a hot-swap power supply

Some SCSI models of the server come with two hot-swap power supplies. You do not need to turn off the server to replace a hot-swap power supply, but you must replace only one power supply at a time.

If you install or remove a power supply, observe the following precautions.

### Statement 8



#### CAUTION:

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



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

### Statement 12



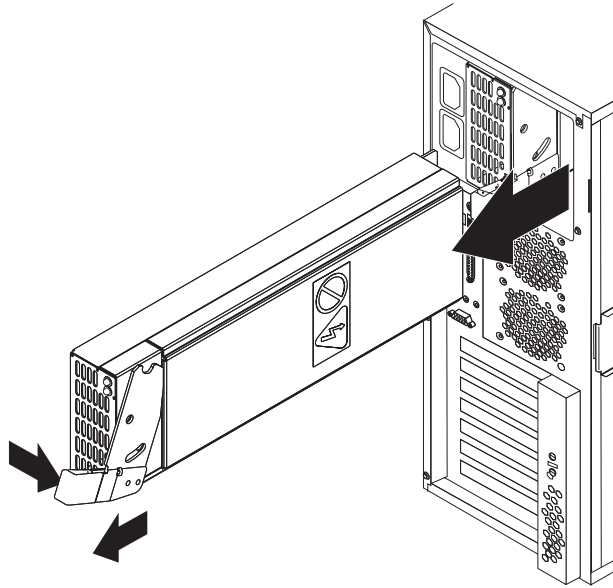
#### CAUTION:

The following label indicates a hot surface nearby.

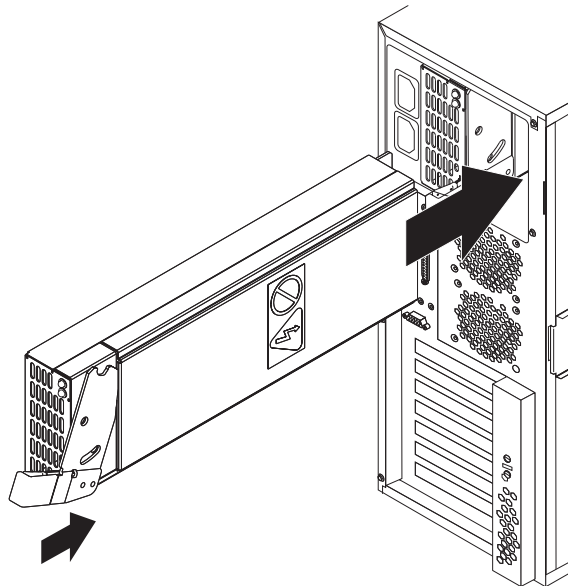


Complete the following steps to replace a hot-swap power supply:

1. Read Appendix B, “Safety information,” on page 141, and “Installation guidelines” on page 25.
2. Press the orange release lever on the selected power supply; then, pull the power supply out of the bay and set it aside.



3. Make sure the power-supply handle is in the open position; then, slide the power supply all the way into the chassis before placing the power-supply handle into the locked position.



4. If the server is not on, turn on the server.
5. 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.

---

## Completing the installation

To complete the installation, you must reinstall the bezel (see “Replacing the bezel” on page 31), reinstall the frame-support bracket (see “Removing and installing the support bracket” on page 32), reinstall the side cover (see “Replacing the side cover” on page 29), connect all the cables and, for certain options, run the Configuration/Setup Utility program.

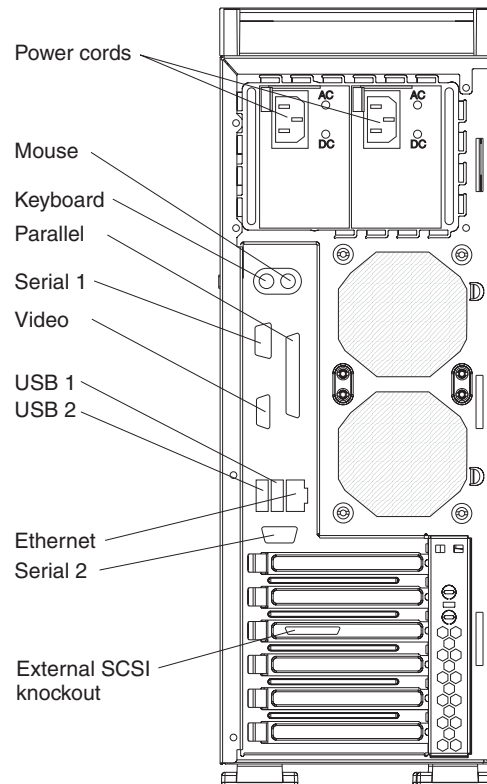
## Connecting the cables

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

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

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

**Note:** The power supply might be different on some models.



## Updating the server configuration

When you start the server for the first time after you add or remove an internal option or an external SCSI device, you might receive a message that the configuration has changed. The Configuration/Setup Utility program starts automatically so that you can save the new configuration settings. See the *User's Guide* for additional information.

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

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

---

## Connecting external options

If you install an optional SCSI adapter, you can attach external SCSI devices, such as a SCSI storage expansion enclosure, to the server.

**Note:** If the server model supports internal (simple-swap) SATA hard disk drives, installing an optional SCSI adapter enables you to add only external SCSI tape drives to the server.

Complete the following steps to attach an external device:

1. Review Appendix B, "Safety information," on page 141, "Installation guidelines" on page 25, and the documentation that comes with the option.
2. Turn off the server and all attached devices.
3. Follow the instructions that come with the option to prepare it for installation and to connect it to the server.

**Note:** If you are attaching an external SCSI device, see "Ultra320 SCSI connector" on page 65 for information about SCSI cabling and SCSI IDs.

---

## Installing the server in a rack

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

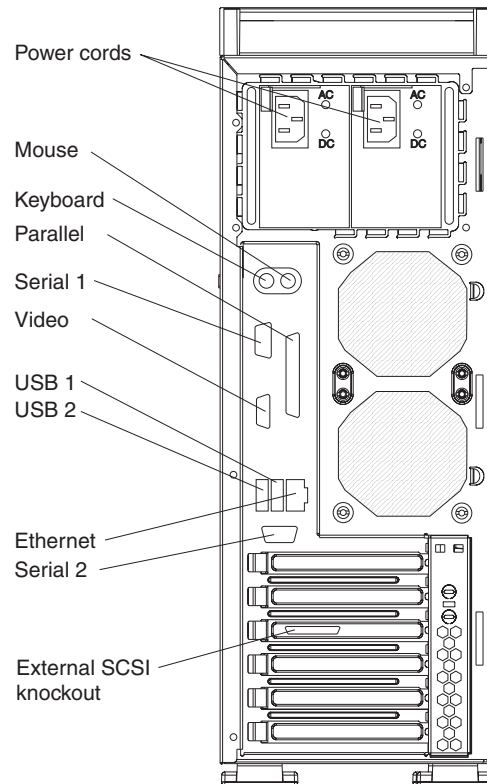
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## Input/output connectors

The server has the following input/output (I/O) connectors:

- One mouse
- One keyboard
- One parallel
- Two serial
- One video
- Four Universal Serial Bus (USB) V 2.0 (two on front and two on rear)
- One Ethernet (RJ-45)
- One Ultra320 SCSI (some models)

The following illustration shows the locations of these connectors.

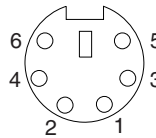


The following sections describe these connectors.

If you have an optional Remote Supervisor Adapter II (systems-management adapter) installed in PCI slot 2, the server also has an additional Ethernet connector, an additional serial connector, and an Advanced System Management (ASM) Interconnect connector. See the documentation that comes with the Remote Supervisor Adapter II for more information about the ASM Interconnect network. In addition, if you install the optional Remote Supervisor Adapter II, you must disconnect the video cable from the system board and connect it to the optional Remote Supervisor Adapter II.

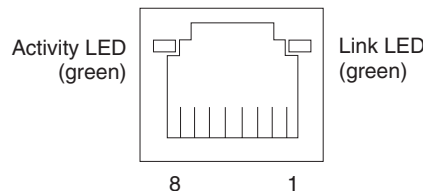
## Auxiliary-device (pointing-device) connector

Use this connector to connect a mouse or other pointing device. The following illustration shows an auxiliary-device connector.



## Ethernet (RJ-45) connector

The following illustration shows an Ethernet connector.

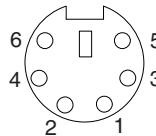


Connect a Category 3, 4, or 5 unshielded twisted-pair (UTP) cable to this connector. The 100BASE-TX and 1000BASE-T Fast Ethernet standards require Category 5 or higher cabling.

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

## Keyboard connector

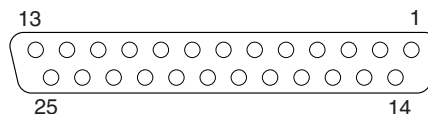
Use this connector to connect a PS/2 (non-USB) keyboard to the server. The following illustration shows a keyboard connector.



If you attach a keyboard to this connector, USB ports and devices are disabled during the power-on self-test (POST).

## Parallel connector

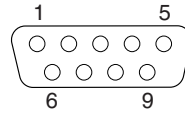
Use this connector to connect a parallel device. The following illustration shows a parallel connector.



The parallel connector supports three standard Institute of Electrical and Electronics Engineers (IEEE) 1284 modes of operation: Standard Parallel Port (SPP), Enhanced Parallel Port (EPP), and Extended Capability Port (ECP). If you configure the parallel port to operate in bidirectional mode, it supports the ECP and EPP modes of operation. To configure the parallel port, use the **Devices and I/O Ports** option in the Configuration/Setup Utility program (see "Starting the Configuration/Setup Utility program" on page 10). If you configure the parallel port to operate in bidirectional mode, use an IEEE 1284-compliant cable that does not exceed 3 meters (9.8 ft).

## Serial connectors

Use the serial connectors to connect serial devices. The following illustration shows a serial connector.



## Ultra320 SCSI connector

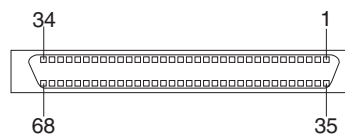
You can install up to four internal SCSI devices in some models of the server. These models come with one SCSI cable that is connected from the internal SCSI connector to the standard hot-swap-drive backplane. You can attach additional internal SCSI devices to the other internal SCSI connector, or you can use the connector to attach external SCSI devices. To connect external SCSI devices, remove the SCSI knockout from the rear of the server and secure the free end of an optional cable in the new opening.

If you want to attach external SCSI devices to the server without using the internal SCSI channel, you must install an optional SCSI adapter.

### Notes:

1. External SCSI devices connected to internal SCSI channel will operate asynchronously.
2. 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 an optional SCSI adapter” on page 54).

An optional external SCSI connector might be installed on the rear of the server. Use this connector to connect external SCSI devices. The following illustration shows a SCSI standard 68-pin, female D-shell SCSI connector.



The server has a dual-channel SCSI controller. This dual-channel controller supports two independent, Ultra320 SCSI channels that support up to 15 SCSI devices each. The SCSI connectors for the channels are on the system board. The controller has the following features:

- Double-transition clocking to achieve up to 320 MBps (megabytes per second) data-transfer rates
- Domain name validation to negotiate compatible data-transfer speeds with each device
- Cyclic-redundancy checking (CRC) to improve data reliability
- An active terminator for SCSI bus termination

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.

The hot-swap-drive backplane controls the SCSI IDs for the internal hot-swap drive bays. However, when you attach an external SCSI device to an optional SCSI adapter, you must set a unique ID for the device. See the information that comes with the device for instructions to set its SCSI ID.

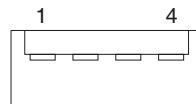
You can attach external SCSI devices using an optional SCSI adapter. To select and order the correct adapter for use with external devices, contact your IBM marketing representative or authorized reseller. When using an optional SCSI adapter, you must also connect the SCSI adapter to the SCSI LED connector on the system board to receive an indication of SCSI hard disk drive activity.

**Note:** On server models that support SATA hard disk drives, you can attach only an external SCSI tape drive to an optional SCSI adapter.

See “System board internal connectors” on page 86 for the location of the SCSI connectors. 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/>. Adhering to these standards will help to ensure that the server operates correctly.

## Universal Serial Bus connectors

Use a Universal Serial Bus (USB) 2.0 connector to connect a USB device. USB 2.0 technology transfers data at up to 480 Mb per second (Mbps) with a maximum of 127 devices and a maximum signal distance of 5 meters (16 ft) per segment (if the device that is attached to the server is a USB 2.0 device). If multiple USB devices are attached to the server, the USB hub must be 2.0; otherwise, all USB 2.0 devices will transfer data at 12 Mbps. Using Plug and Play technology, USB devices are configured automatically. The following illustration shows a USB connector.



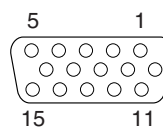
Use a 4-pin cable to connect a device to a USB connector. If you need to connect more USB devices than the server has USB connectors for, use a USB hub to connect additional devices.

If you connect a PS/2 (non-USB) keyboard to the keyboard connector, USB ports and devices are disabled during POST.

If you connect a USB keyboard that has a mouse port, the keyboard emulates a mouse, and you cannot disable the mouse settings in the Configuration/Setup Utility program.

## Video connector

Use the video connector to connect a monitor to the server. The connector is dark blue to help you identify it. The following illustration shows an industry-standard 15-pin analog video connector on the rear of the server.





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## Chapter 5. Field replaceable units

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The following information describes procedures for removing and installing certain components inside the system. Only a qualified service technician is authorized to replace the components described in this section.

**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 replaceable units” on page 131 to determine if the component being replaced is a customer replaceable unit (CRU) or a FRU.

**Note:** Before servicing this system, read “Installation guidelines” on page 25 and Appendix B, “Safety information,” on page 141.

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### Microprocessor air baffle

The microprocessor air baffle is held in place by two tabs that protrude through slots in the rear of the server. Complete the following steps to remove the microprocessor air baffle:

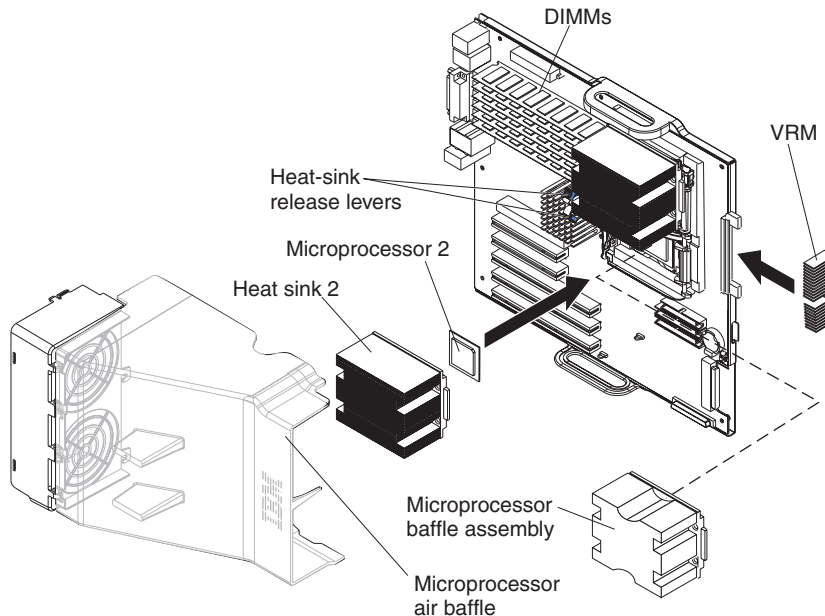
1. Open the microprocessor air baffle.
2. At the rear chassis wall, press the sides of the microprocessor air baffle toward each other and move the baffle toward the front of the server.
3. Lift the guide up and out of the server.

## Microprocessor and heat sink

### Before you begin:

- Read the “Installation guidelines” on page 25.
- Read Appendix B, “Safety information,” on page 141.
- Review the information in “System reliability guidelines” on page 25.

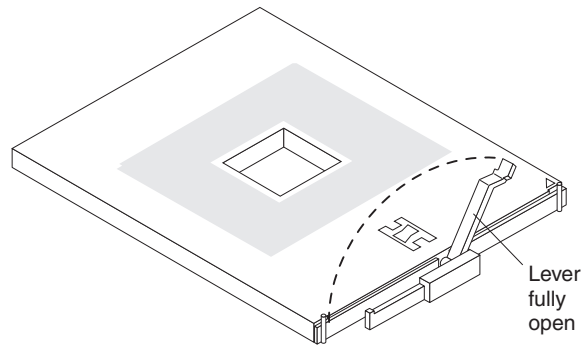
To remove the microprocessor and heat sink, complete the following steps.



1. Turn off the server and remove external cables.
2. Remove the side cover (see “Removing the side cover” on page 28).
3. Remove the frame-support bracket (see “Removing and installing the support bracket” on page 32).
4. Disconnect any cables that impede access to the microprocessor.
5. Remove the heat sink from the microprocessor:
  - a. Press the microprocessor-baffle release lever down, move it toward the other microprocessor, and lift it up to the open position.
  - b. Slide the heat-sink assembly toward the front of the server and tip the rear flange out of the heat-sink socket.
  - c. Lift the heat sink up and out of the server.

**Note:** It might be necessary to gently twist the heat sink to loosen it from the microprocessor.

**Important:** Be careful when handling the microprocessor and heat sink. If the thermal grease between the microprocessor and heat sink will be reused, do not contaminate it. If replacement thermal grease is provided with the replacement part, be sure to remove all traces of existing thermal grease from the remaining part before applying the new thermal grease.



6. Rotate the microprocessor socket lever arm upward to its maximum vertical position (135°), and lift the microprocessor up and out of the server.
7. To install a microprocessor, see “Installing an additional microprocessor” on page 46, beginning with step 8 on page 48.

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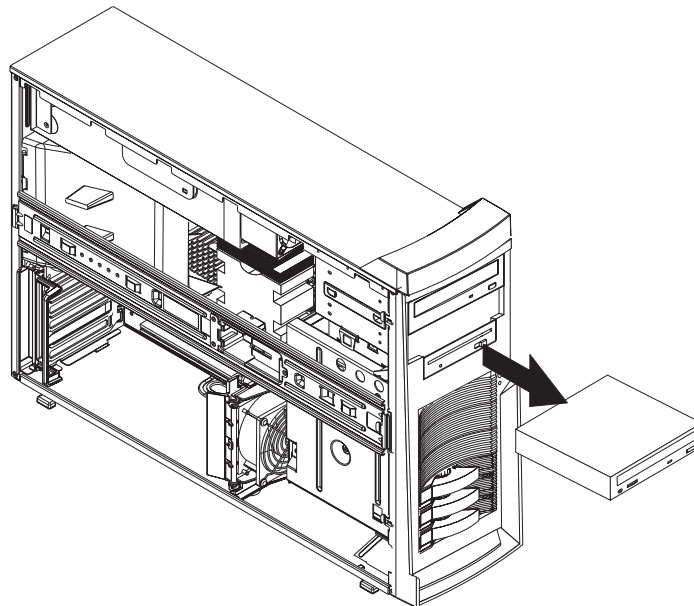
## CD-ROM drive

### Before you begin:

- Read Appendix B, “Safety information,” on page 141.
- Review the information in “System reliability guidelines” on page 25.

To remove the CD-ROM drive, complete the following steps:

1. Turn off the server, if it is on.
2. Disconnect the power cord from the power source and from the server; then, disconnect all external cables.
3. Remove the side cover (see “Removing the side cover” on page 28).
4. Remove the front bezel (see “Removing the bezel” on page 30).
5. Disconnect the CD-ROM drive connector and power cables from the rear of the drive.
6. Press the blue touch point on the raised area of the CD-ROM drive cage and gently slide the CD-ROM drive toward the front of the server.



7. Lift the CD-ROM drive out of the server.

For instructions for replacing the CD-ROM drive, see “Installing a drive in bay 2” on page 38.

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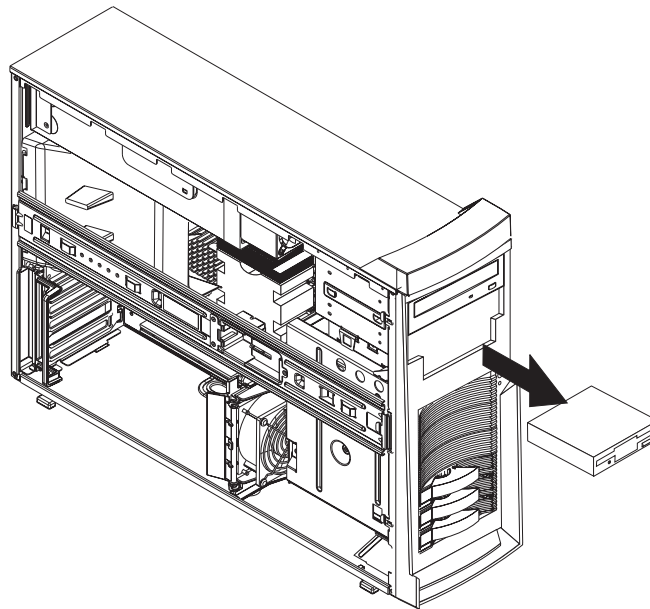
## Diskette drive

### Before you begin:

- Read Appendix B, “Safety information,” on page 141.
- Review the information in “System reliability guidelines” on page 25.

To remove the diskette drive, complete the following steps:

1. Turn off the server, if it is on.
2. Disconnect the power cord from the power source and from the server; then, disconnect all external cables.
3. Remove the side cover (see “Removing the side cover” on page 28).
4. Disconnect the cables from the rear of the drive.
5. Press the blue points on the side of the diskette drive cage.
6. Gently slide the diskette drive toward the front of the server and lift it out.



To replace the diskette drive, reverse the steps.

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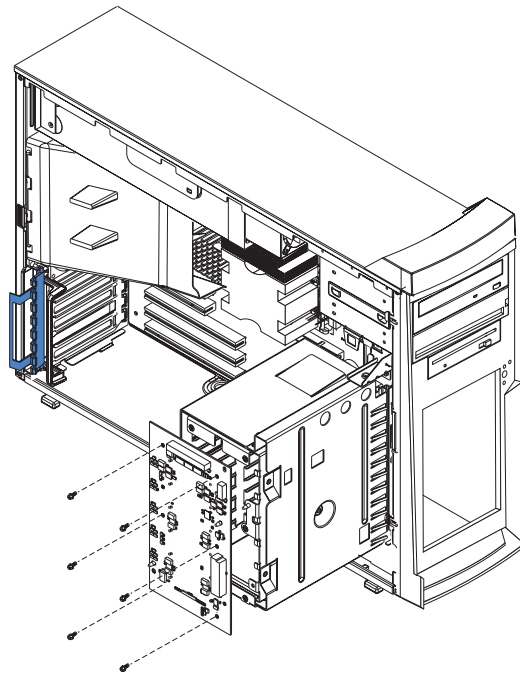
## SCSI backplane

### Before you begin:

- Read Appendix B, “Safety information,” on page 141.
- Review the information in “System reliability guidelines” on page 25.

remove the SCSI hot-swap backplane, complete the following steps:

1. Turn off the server, if it is on.
2. Disconnect the power cord from the power source and from the server; then, disconnect all external cables.
3. Remove the front bezel (see “Removing the bezel” on page 30).
4. Remove the side cover (see “Removing the side cover” on page 28).
5. Remove the frame-support bracket (see “Removing and installing the support bracket” on page 32).
6. Remove any hard disk drives or drive fillers from the drive bays.
7. Disconnect the cables from the backplane on the rear of the drive cage.
8. Press down on the drive cage release latch and swing the drive cage out.
9. Remove the screws that secure the backplane to the drive cage.



To replace the backplane, reverse the steps.

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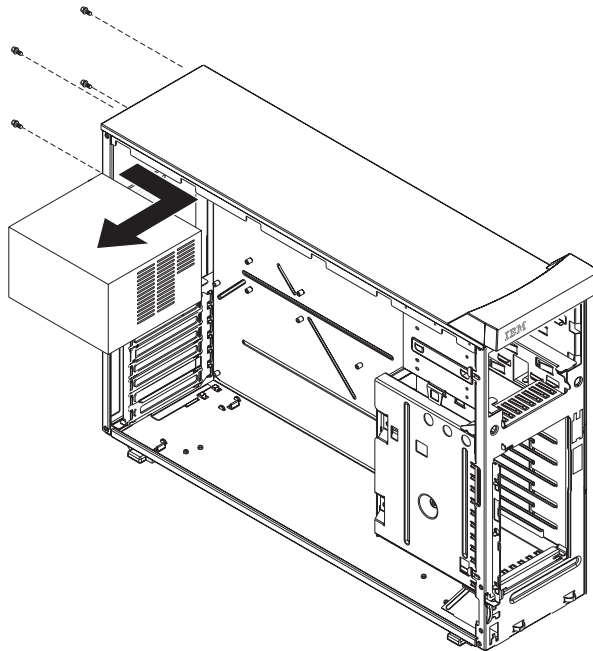
## Non-hot swap power supply

### Before you begin:

- Read Appendix B, “Safety information,” on page 141.
- Review the information in “System reliability guidelines” on page 25.

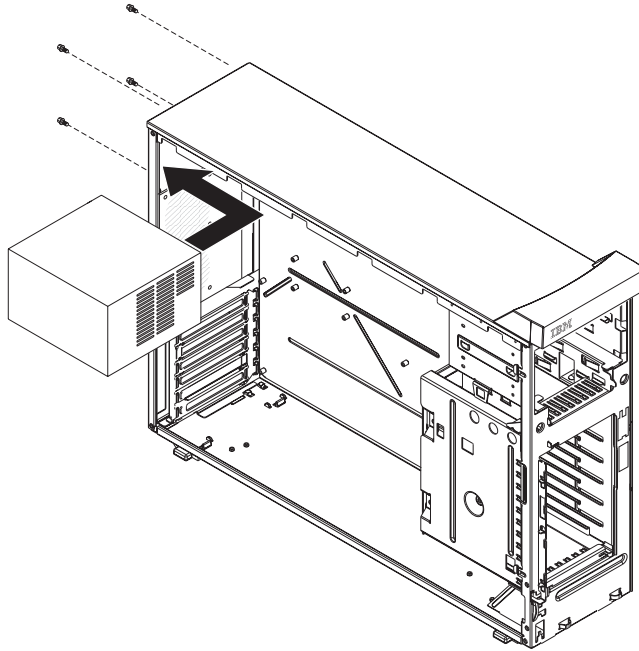
To remove the non-hot-swap power supply, complete the following steps:

1. Turn off the server, if it is on.
2. Disconnect the power cord from the power source and from the server; then, disconnect all external cables.
3. Remove the cover (see “Removing the side cover” on page 28).
4. Remove the frame-support bracket (see “Removing and installing the support bracket” on page 32).
5. Open the microprocessor air baffle.
6. Disconnect internal cables from the power supply to the system board and hard disk drive backplane or back panel.



7. Remove the screws from the rear of the server.
8. Gently move the power supply away from the chassis and lift it out of the server.

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



1. Align the tabs on the top of the power supply with the tab slots on the underside of the top rear of the chassis, and slide the power supply toward the rear of the chassis.
2. Secure the power supply to the rear of the chassis with the four screws.
3. Replace the microprocessor air baffle.



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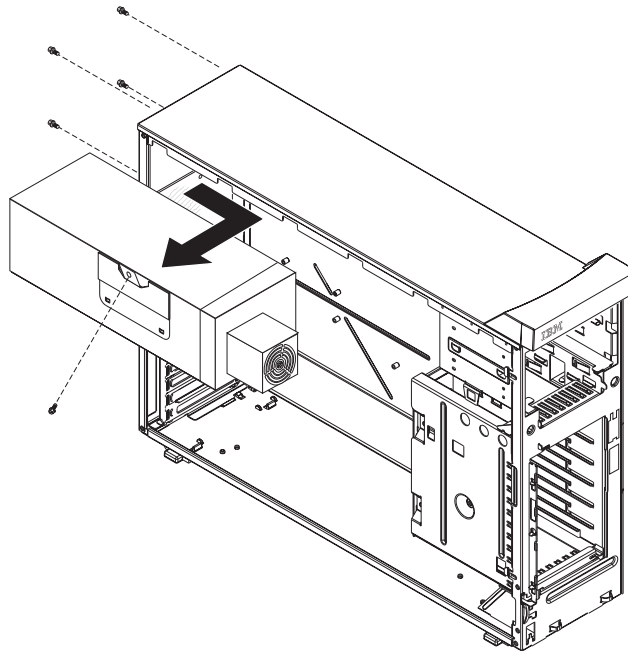
## Hot-swap power-supply cage

### Before you begin:

- Read Appendix B, “Safety information,” on page 141.
- Review the information in “System reliability guidelines” on page 25.

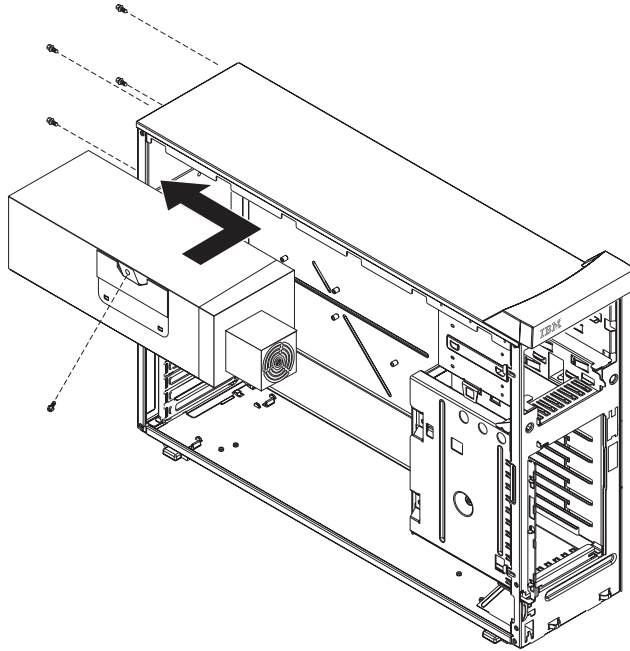
To remove the hot-swap power-supply cage, complete the following steps:

1. Turn off the server, if it is on.
2. Disconnect the power cord from the power source and from the server; then, disconnect all external cables.
3. Remove the hot-swap power supplies from the server.
4. Remove the cover (see “Removing the side cover” on page 28).
5. Remove the frame-support bracket (see “Removing and installing the support bracket” on page 32).
6. Remove the microprocessor air baffle.
7. Disconnect internal cables from the power supply to the system board and hard-disk-drive backplane.



8. Remove the screws from the rear of the server and the side of the hot-swap power-supply cage.
9. Gently move the power supply cage away from the chassis and lift it out of the server.

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



1. Align the tabs on the top of the power-supply cage with the tab slots on the underside of the top rear of the chassis, and slide the power-supply cage toward the rear of the chassis.
2. Secure the power-supply cage to the chassis with the four screws on the rear and the one screw on the side.
3. Replace the microprocessor air baffle.
4. Reinstall the hot-swap power supplies in the power-supply cage.

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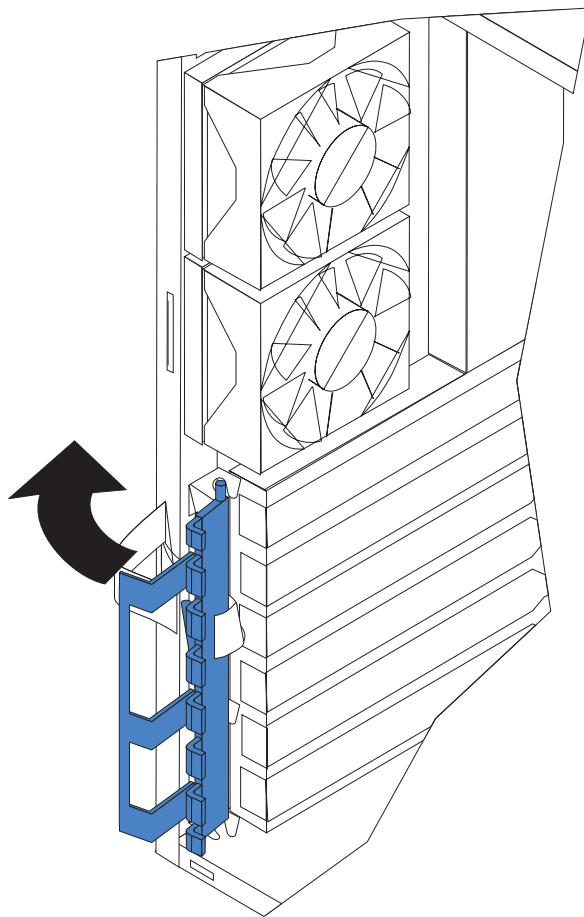
## Rear-adapter retainer

### Before you begin:

- Read Appendix B, “Safety information,” on page 141.
- Review the information in “System reliability guidelines” on page 25.

To remove the rear-adapter retainer, complete the following steps:

1. Turn off the server, if it is on.
2. Disconnect the power cord from the power source and from the server; then, disconnect all external cables.
3. Remove the side cover (see “Removing the side cover” on page 28).
4. Rotate the rear adapter retainer to the open position.
5. Grasp the rear adapter retainer, and gently slide the top and bottom tabs out of the notches.



To replace the rear adapter retainer, reverse the steps.

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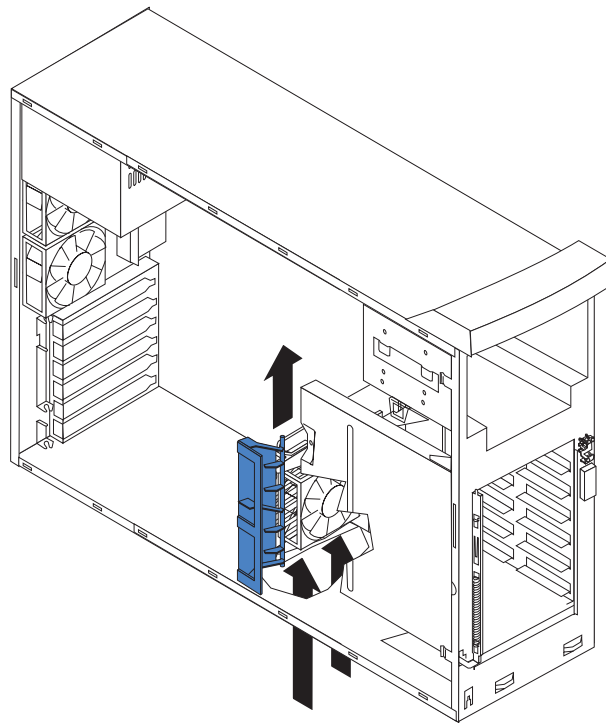
## Front fan

### Before you begin:

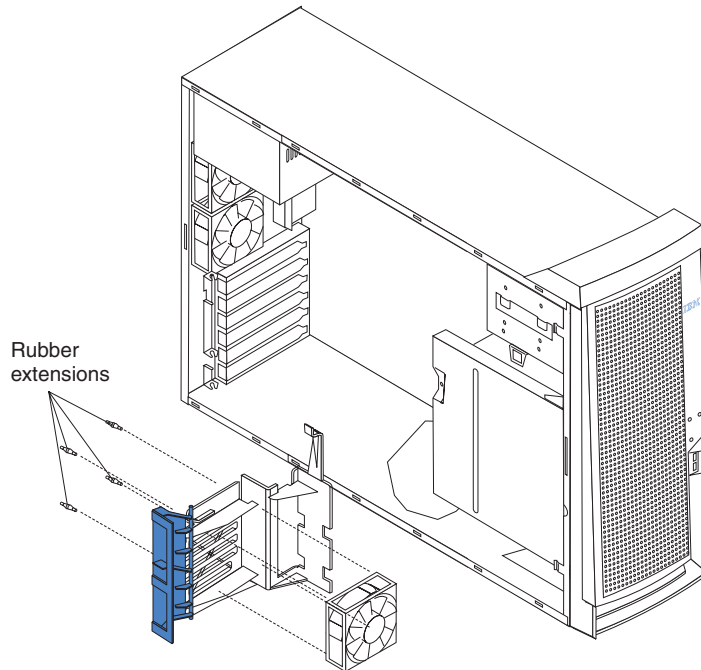
- Read Appendix B, “Safety information,” on page 141.
- Review the information in “System reliability guidelines” on page 25.

To remove the front fan, complete the following steps:

1. Turn off the server, if it is on.
2. Disconnect the power cord from the power source and from the server; then, disconnect all external cables.
3. Remove the cover (see “Removing the side cover” on page 28).
4. Remove the frame-support bracket (see “Removing and installing the support bracket” on page 32).
5. Remove the fan cable from the system board.
6. Disconnect any cables that run through the opening in the adapter-support bracket and fan housing (from the front area of the server to the system board).
7. Remove the adapter-support bracket and fan housing:
  - a. Lift the release lever for the adapter-support bracket and fan housing.
  - b. Slide the fan housing toward the top of the server until it is free of the tabs on the chassis.



8. Use side cutters to cut the four rubber extensions on the adapter-support bracket.



9. Gently pry the fan away from the adapter-support bracket and lift it up and out.

To install the new front fan assembly, complete the following steps:

1. Place the fan in position on the adapter-support bracket.
2. Guide the rubber extensions through the apertures.
3. Use needle-nosed pliers to pull the extensions through the apertures.
4. Reinstall the adapter-support bracket and fan housing:
  - a. Align the slots on the bottom of the adapter-support bracket with the tabs on the chassis.
  - b. Slide the adapter-support bracket and fan housing toward the bottom of the server until the bracket and housing are secure and the release lever clicks into place.
5. Reconnect the fan cable and the cables that run through the opening in the adapter-support bracket to the system board.
6. Replace the frame-support bracket.
7. Replace the side cover.

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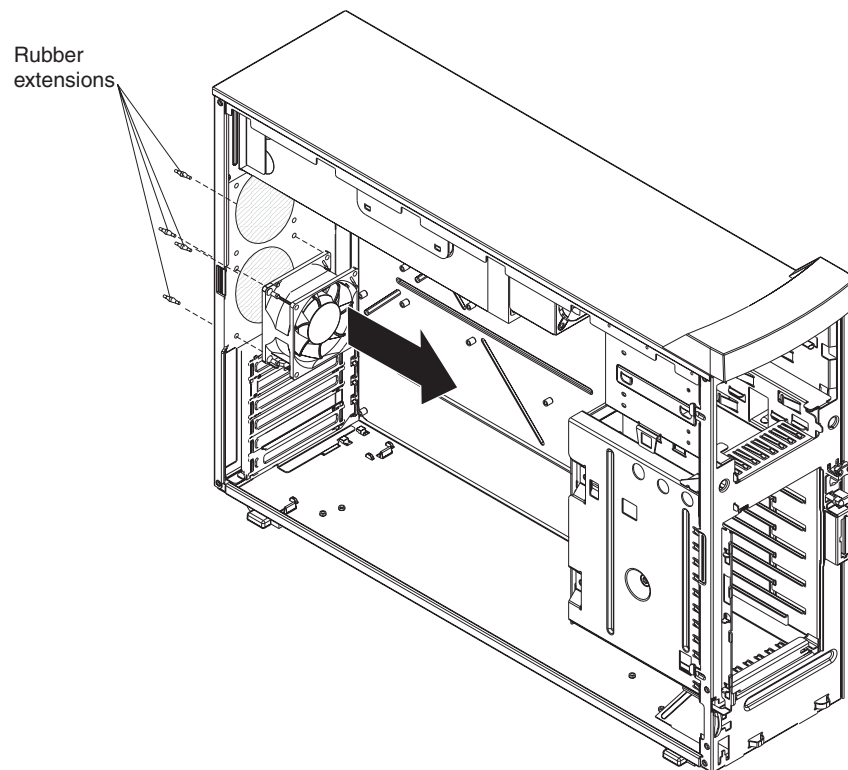
## Rear fans

### Before you begin:

- Read Appendix B, “Safety information,” on page 141.
- Review the information in “System reliability guidelines” on page 25.

To remove a rear fan, complete the following steps:

1. Turn off the server, if it is on.
2. Disconnect the power cord from the power source and from the server; then, disconnect all external cables.
3. Remove the side cover (see “Removing the side cover” on page 28).
4. Remove the frame-support bracket (see “Removing and installing the support bracket” on page 32).
5. Remove the microprocessor air baffle (see “Microprocessor air baffle” on page 67).
6. Remove the fan cable from the system board.
7. Use side cutters to sever the four rubber extensions on the outside of the server.
8. Gently pry the fan away from the server and lift it up and out.



To install the new rear fan assembly, complete the following steps:

1. Place the fan in position at the rear of the server.
2. Guide the rubber extensions through the apertures.
3. Use needle-nosed pliers to pull the extensions through the apertures.
4. Reconnect the cables.

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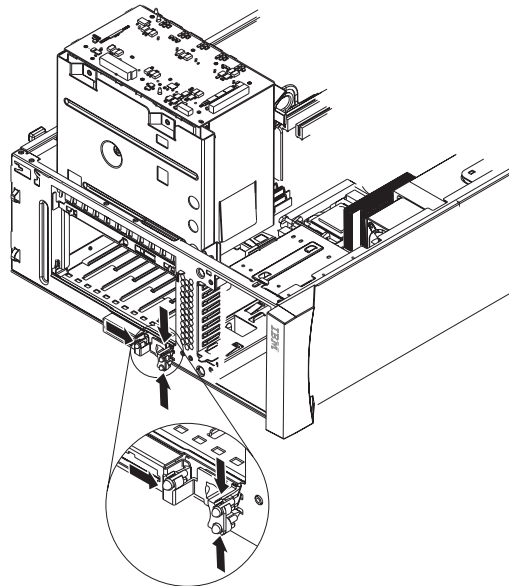
## Power/LED switch assembly

### Before you begin:

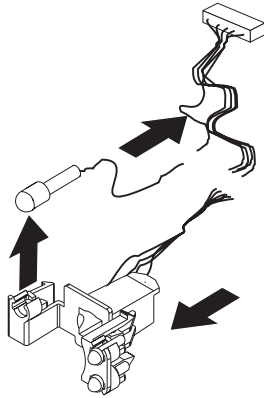
- Read the “Installation guidelines” on page 25.
- Read Appendix B, “Safety information,” on page 141.
- Review the information in “System reliability guidelines” on page 25.

To remove the power/LED switch assembly, complete the following steps:

1. Turn off the server, if it is on.
2. Disconnect the power cord from the power source and from the server; then, disconnect all external cables.
3. Lay the server on its side.
4. Remove the side cover (see “Removing the side cover” on page 28).
5. Remove the front bezel (see “Removing the bezel” on page 30).
6. On a SCSI model, remove all drives and filler panels from the drive cage; on a SATA model, remove the bezel filler.
7. Press the cage-release latch toward the bottom of the server, and rotate the drive cage outward until it locks in the vertical position, so that you can reach through to the other side of the power-switch and LED-panel cable.
8. To remove the power-switch and LED panel, from the outside of the server front press in on the tab on the left side of the panel; then, squeeze the top and bottom of the right side of the panel and carefully pull the panel away from the server.



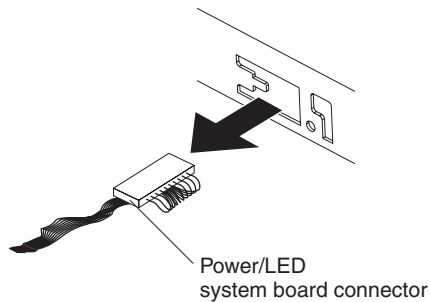
9. Press upward on the amber LED to remove it from the power-switch and LED panel bracket; then, thread the LED back into the server and out the same opening as the other power-switch and LED-panel wires.



10. Note where the power-switch and LED panel cable connects to the system board; then, carefully disconnect the cable from the system board.

**Notes:**

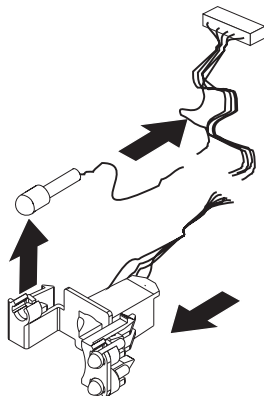
- a. You might have to remove the diskette, SCSI, and IDE cables to access the power switch and LED panel cable connector.
- b. See the system service label or “System board internal connectors” on page 86 for system board connector locations.



11. Fold the connector sideways onto the cable so that it will pass through the opening in the server; then, gently pull the power-switch and LED panel cable out of the server.

To replace the power/LED switch assembly, complete the following steps:

1. Fold the connector sideways onto the new cable so that it will pass through the opening in the server.
2. Thread the power/LED switch assembly and LED panel cable through the aperture in the chassis.





3. Press upward on the amber LED to remove it from the power-switch and LED-panel bracket; then, thread the LED back into the server and out the adjacent aperture. Reinsert the amber LED into the power-switch and LED-panel bracket.
4. From the outside front of the server, press in on the tab on the left side of the panel; then, squeeze the top and bottom of the right side of the panel and carefully push the panel into place in the aperture in the chassis.
5. Carefully route the cable, keeping it clear of the area the drive cage occupies when closed.
6. Connect the power-button and LED-panel cable to the front-panel connector on the system board (see “System board internal connectors” on page 86 for the location of the front-panel connector).
7. Press in on the drive-cage release tab, and rotate the drive cage back into the server.
8. Reconnect the cables to the drive cage backplane or back panel.
9. Replace the hard disk drives (see “Installing a hot-swap SCSI hard disk drive in bay 4, 5, 6, 7, 8, or 9” on page 40 or “Installing a simple-swap Serial ATA hard disk drive in bay 4, 5, 6, or 7” on page 43).
10. Replace the front bezel (see “Replacing the bezel” on page 31).
11. Install the side cover (see “Removing the side cover” on page 28).
12. Connect external cables and the power cable, and turn on the server.

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## Front USB connector assembly

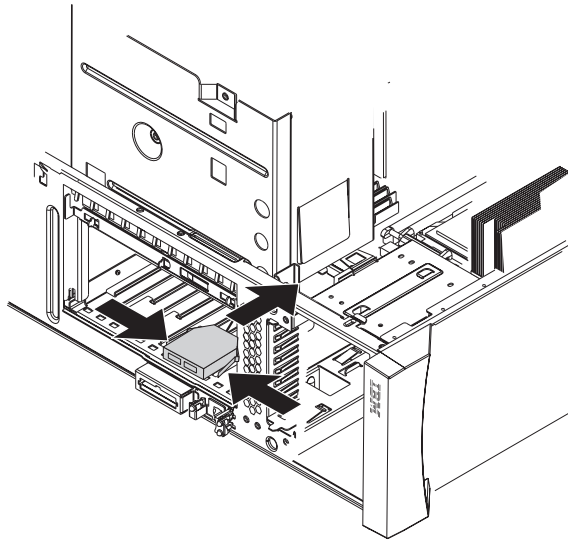
**Note:**

- Read “Installation guidelines” on page 25.
- Read the safety notices at Appendix B, “Safety information,” on page 141.
- Read “Handling static-sensitive devices” on page 26.

Complete the following steps to remove the front USB connector assembly:

1. Turn off the server and attached devices.
2. Disconnect the power cord from the power source and from the server; then, disconnect all external cables.
3. Remove the side cover (see “Removing the side cover” on page 28).
4. Remove the frame-support bracket (see “Removing and installing the support bracket” on page 32).
5. Remove the front bezel (see “Removing the bezel” on page 30).
6. On a SCSI model, remove all drives and filler panels from the drive cage; on a SATA model, remove the bezel filler.
7. Disconnect the cables from the backplane or back panel.
8. Press the cage-release latch toward the bottom of the server, and rotate the drive cage outward until it locks in the vertical position, so that you can reach through to the USB connector assembly.
9. Disconnect the front USB connector assembly cable from the system board.

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



10. From the inside of the chassis, place your fingers on the two tabs on the front USB connector assembly and squeeze them together to detach the assembly from the server; then, pull the assembly toward the inside of the chassis and remove it.

To install the front USB connector assembly, reverse the previous steps, routing the cable correctly and snapping the front USB connector assembly into place.

**Note:** When replacing the USB front connector assembly:

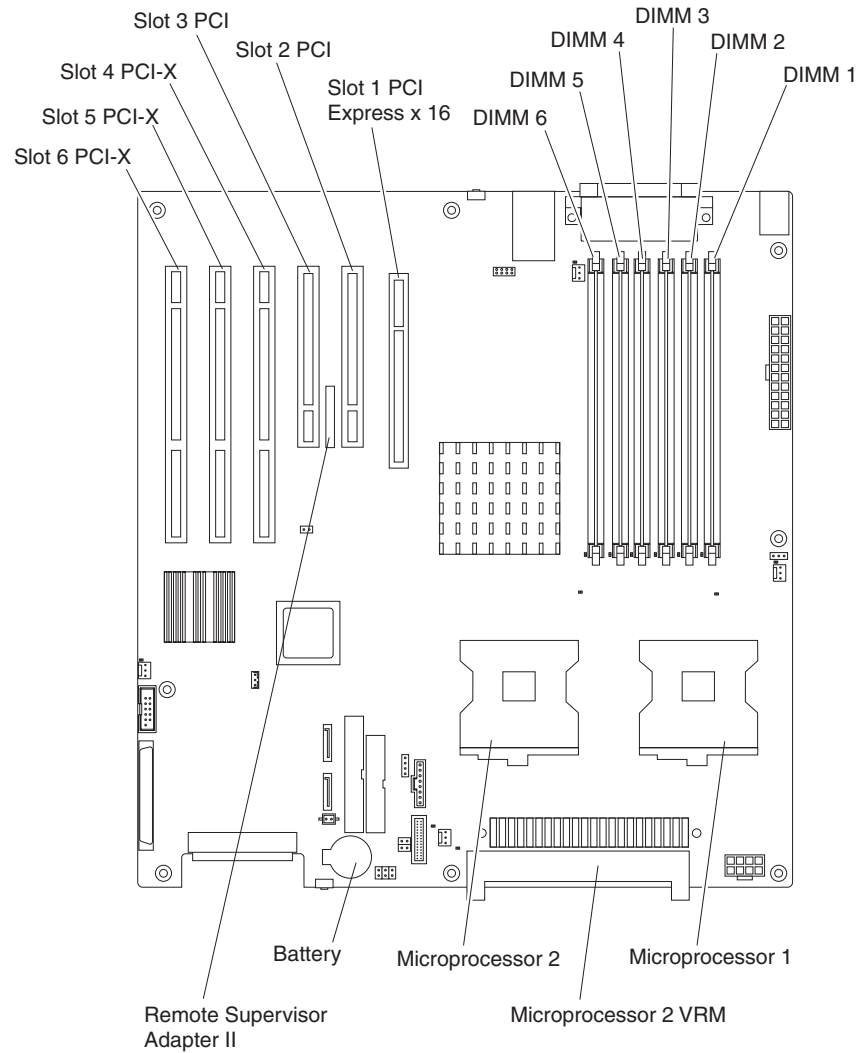
- Route the cable so that it does not impede movement of the drive cage.
- It might be helpful to use a flat-blade screwdriver from the outside to help snap the connector into place.

## System board

This section contains service information for the system board.

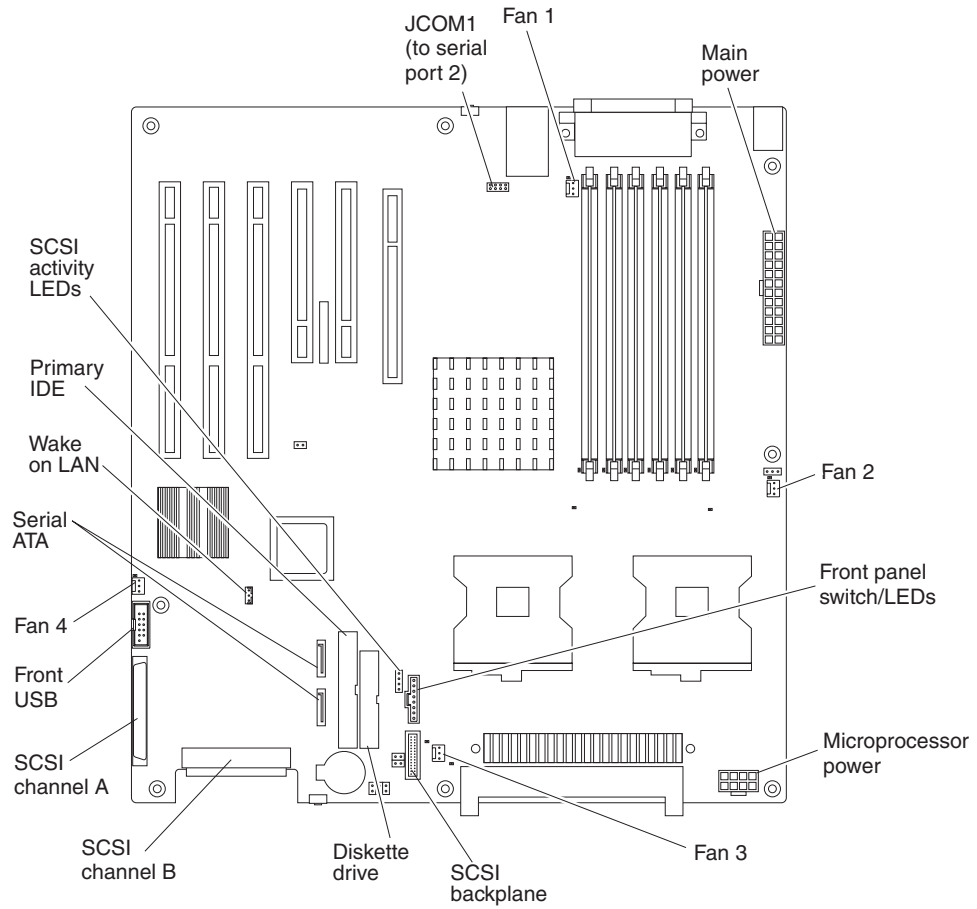
### System board option connectors

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



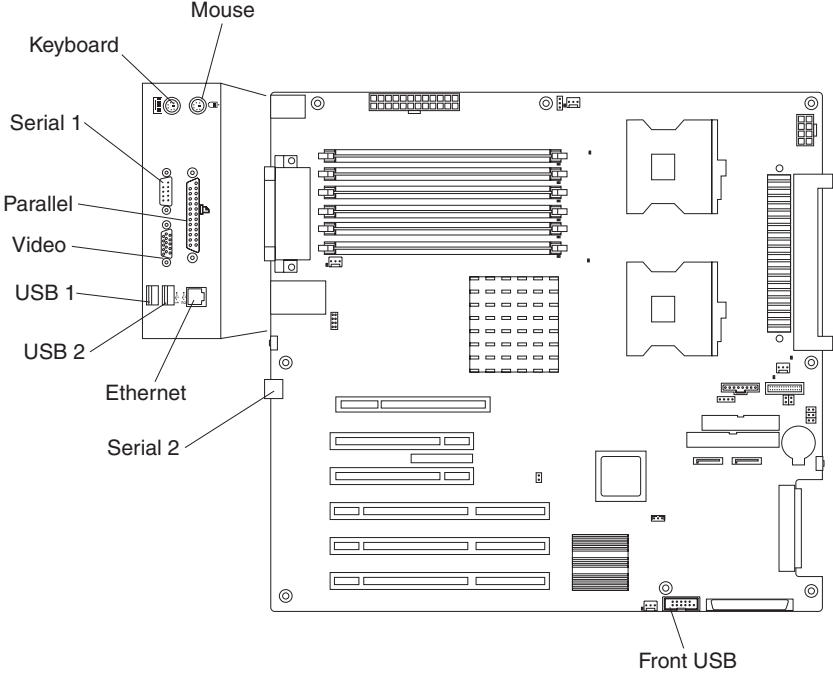
## System board internal connectors

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



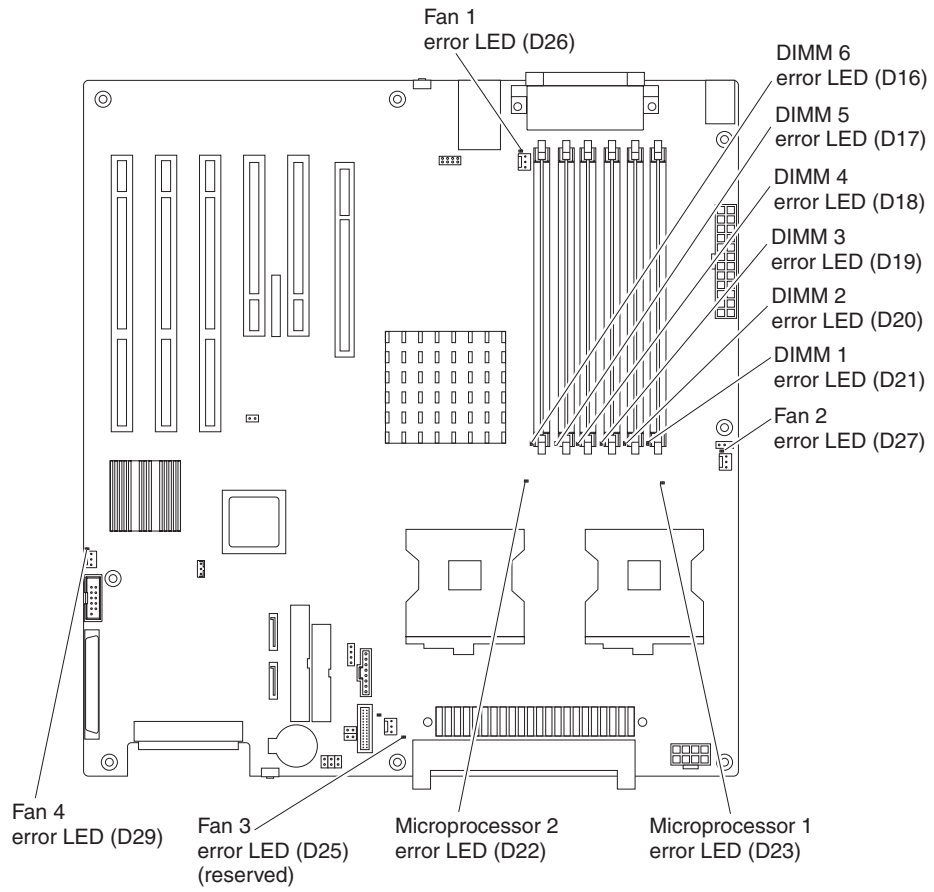
# System board external connectors

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



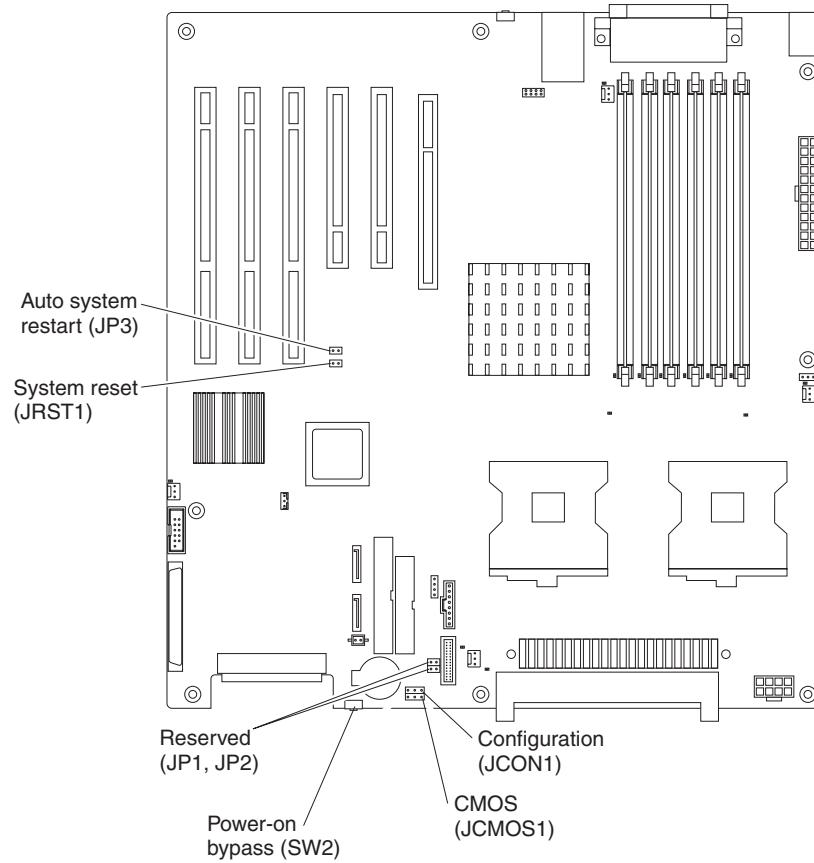
# System board error LEDs

The following illustration shows the LEDs on the system board.



# System board jumpers and switches

This section describes the jumpers and switches on the system board.



Jumper	Settings
Auto system restart (JP3) (device driver required for ASR functionality)	<ul style="list-style-type: none"> <li>Auto restart enabled (default) (no jumper)</li> <li>Auto restart disabled (with jumper)</li> </ul>
Configuration (JCON1)	<ul style="list-style-type: none"> <li>Normal (default) (jumper on pins 1 and 2)</li> <li>Configuration (jumper on pins 2 and 3)</li> <li>BIOS crisis recovery (no jumper)</li> </ul>
CMOS (JCMOS1)	<ul style="list-style-type: none"> <li>Keep CMOS data (default) (jumper on pins 1 and 2)</li> <li>Clear CMOS data (jumper on pins 2 and 3 with power cords removed from server)</li> </ul>
Power-on bypass (SW2)	<ul style="list-style-type: none"> <li>Press to bypass power-on button</li> </ul>
Reserved (JP1, JP2)	<ul style="list-style-type: none"> <li>No jumper (default)</li> </ul>
System reset (JRST1)	<ul style="list-style-type: none"> <li>Normal (default) (no jumper)</li> <li>Force system reset (debug only) (with jumper)</li> </ul>

## Removing the system board

### Before you begin:

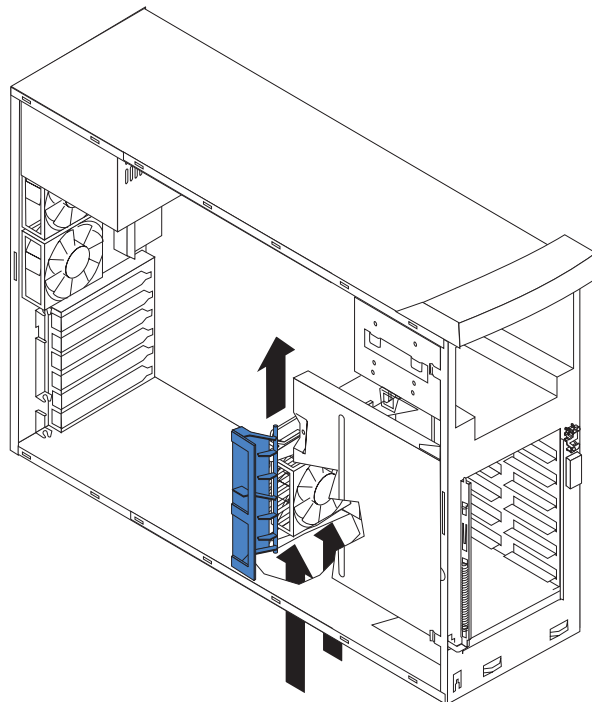
- Read Appendix B, “Safety information,” on page 141.
- Review the information in “System reliability guidelines” on page 25.

### Notes:

1. When replacing the system board, you must either update the server with the latest firmware or restore the pre-existing firmware that the customer provides on a diskette or CD image.
2. Removing the system board will be easier if the server is turned on its side.

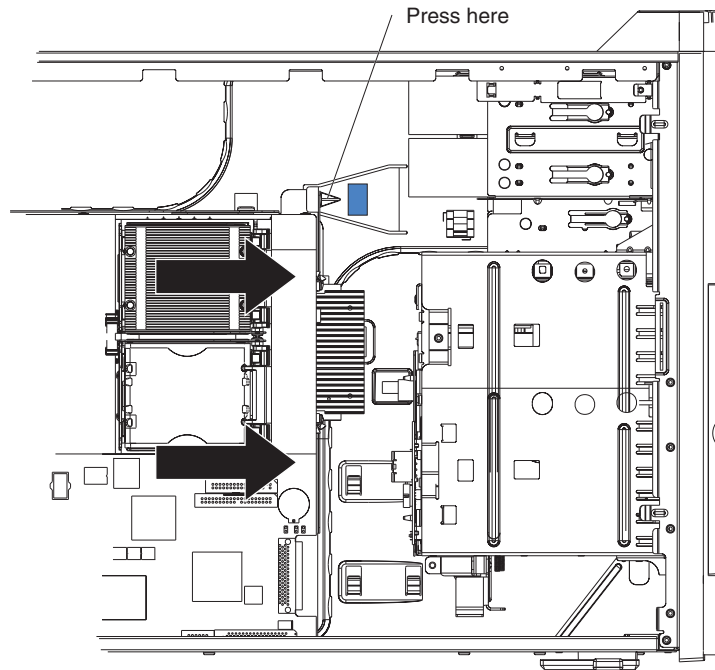
To remove the system board, complete the following steps:

1. Turn off the server, if it is on.
2. Disconnect the power cord from the power source and from the server; then, disconnect all external cables.
3. Remove the side cover (see “Removing the side cover” on page 28).
4. Remove the frame-support bracket (see “Removing and installing the support bracket” on page 32).
5. Remove the microprocessor air baffle (see “Microprocessor air baffle” on page 67).
6. Disconnect the cables.
7. Remove both adapter-retaining brackets and the adapters (see “Installing an adapter” on page 51).
8. Remove memory modules (see “Installing a memory module” on page 34).
9. Remove the microprocessors (see “Microprocessor and heat sink” on page 68).
10. Remove the VRM if one is installed (see “Installing an additional microprocessor” on page 46 for the location of the VRM).
11. Remove the front fan housing.





12. Move the latch that secures the system board to the chassis.



13. Lift the front of the system board to clear the locating pin; then, slide the board forward to clear the EMC shield.
14. Lift the system board out of the server chassis.

To replace the system board, reverse the steps.

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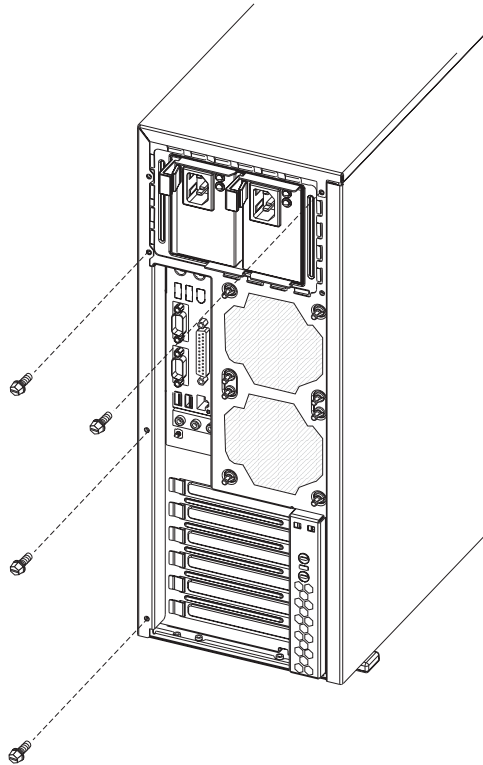
## Top/side cover

### Before you begin:

- Read Appendix B, “Safety information,” on page 141.
- Review the information in “System reliability guidelines” on page 25.

To remove the top/side cover, complete the following steps:

1. Turn off the server, if it is on.
2. Disconnect the power cord from the power source and from the server; then, disconnect all external cables.
3. Remove the side cover (see “Removing the side cover” on page 28).
4. Remove the front bezel (see “Removing the bezel” on page 30).
5. Remove the handle assembly (see “Handle assembly” on page 95).
6. Remove the four screws from the back of the server and put them in a safe place.
7. Using a screwdriver, gently pry the cover away from the server in the rear and slide the unit away from the server.



To replace the top/side cover, reverse the steps.

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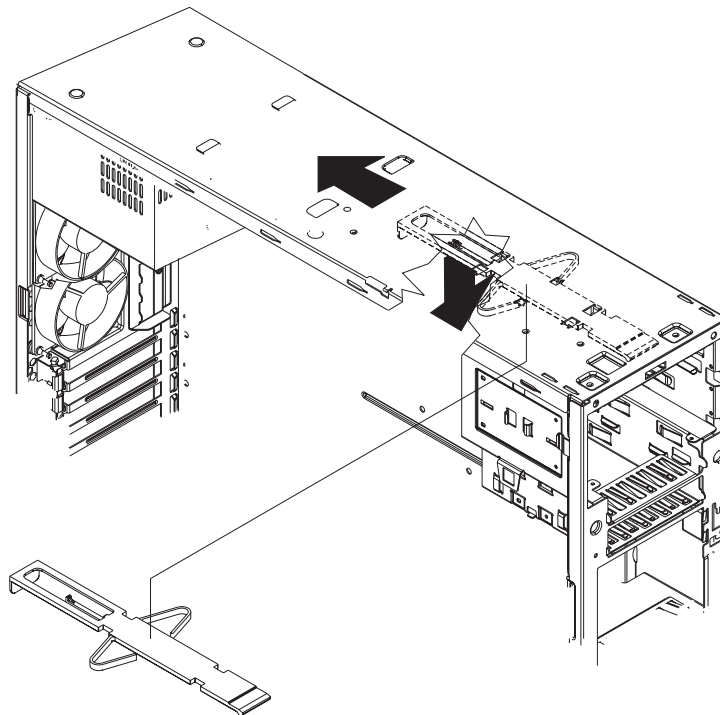
## Bezel-release latch

### Before you begin:

- Read Appendix B, “Safety information,” on page 141.
- Review the information in “System reliability guidelines” on page 25.

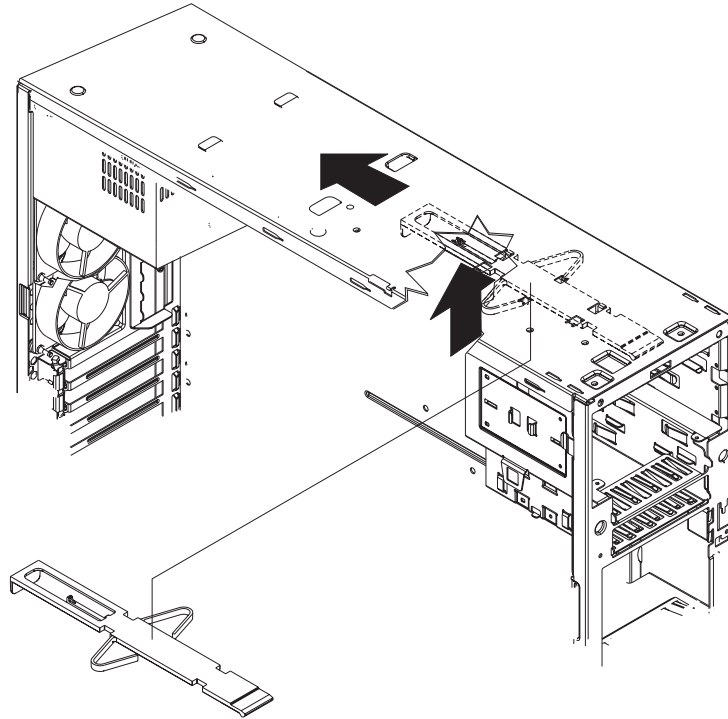
To remove the bezel-release latch, complete the following steps:

1. Turn off the server, if it is on.
2. Disconnect the power cord from the power source and from the server; then, disconnect all external cables.
3. Remove the side cover (see “Removing the side cover” on page 28).
4. Remove the front bezel (see “Removing the bezel” on page 30).
5. Remove the CD-ROM drive (see “CD-ROM drive” on page 70).
6. Pull down from inside the server to release the latch tab.
7. From the underside, grasp the bezel-release latch in the center, and gently pull it back and away from the server.



To replace the bezel-release latch, complete the following steps:

1. Align the bezel-release latch with the slots on the underside of the top of the chassis, and slide it into place.



2. Replace the CD-ROM drive (see “Installing a drive in bay 2” on page 38).
3. Replace the front bezel (see “Replacing the bezel” on page 31).
4. Replace the side cover (see “Replacing the side cover” on page 29).
5. Connect all external cables; then, connect the power cord, and reconnect the server to power.
6. Turn on the server.

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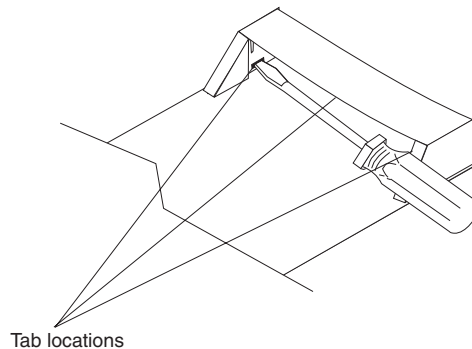
## Handle assembly

### Before you begin:

- Read Appendix B, “Safety information,” on page 141.
- Review the information in “System reliability guidelines” on page 25.

To remove the handle cap, complete the following steps:

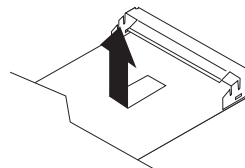
1. Turn off the server, if it is on.
2. Disconnect the power cord from the power source and from the server; then, disconnect all external cables.
3. Use a flathead screwdriver to gently press in and down on the tabs on the interior side wall of the handle.



4. Lift up on the handle cap to separate it from the handle support.
5. Turn the system back to the tower orientation; then, remove the top handle.
  - a. Carefully use a flat-blade screwdriver to push in the tabs inside the plastic cover on the top of the system; then, remove the plastic cover. Store the cover for possible future use.
  - b. Grasp the metal handle and slide it toward the rear of the server to remove it from the server. Store the metal handle for possible future use.

To remove the handle support, complete the following steps:

1. Turn off the server, if it is on.
2. Disconnect the power cord from the power source and from the server; then, disconnect all external cables.
3. Firmly grasp the handle support, and slide it away from the front bezel.
4. Lift up on the handle support to remove it from the slots in the top of the chassis.



To install the handle assembly, reverse the steps.



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## Chapter 6. Symptom-to-FRU index

This index supports xSeries 226 servers.

### Notes:

1. Check the configuration before you replace a CRU or FRU. Configuration problems can cause false errors and symptoms.
2. For IBM devices that are not supported by this index, see the documentation for that device.
3. Always start with “General checkout” on page 11.

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 server.

The first column of the two-column tables in this index lists error codes or messages, and the last column lists one or more suggested actions or FRUs to replace. Take the action (or replace the FRU) that is suggested first in the list, and then try the server again to see whether the problem has been corrected.

**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.

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### 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 server is functioning properly.

<b>Note:</b> See “System replaceable units” on page 131 to determine which components should be replaced by a field service technician.	
Beep/symptom	FRU/action
1-1-2 (Microprocessor register test failed.)	<ul style="list-style-type: none"><li>• <b>Microprocessor</b></li></ul>
1-1-3 (CMOS write/read test failed.)	<ol style="list-style-type: none"><li>1. <b>Battery</b></li><li>2. System board</li></ol>
1-1-4 (BIOS EEPROM checksum failed.)	<ol style="list-style-type: none"><li>1. <b>Recover BIOS</b></li><li>2. System board</li></ol>

**Note:** See “System replaceable units” on page 131 to determine which components should be replaced by a field service technician.

<b>Beep/symptom</b>	<b>FRU/action</b>
<b>1-2-1</b> (Programmable Interval Timer failed.)	• <b>System board</b>
<b>1-2-2</b> (DMA page register test failed.)	• <b>System board</b>
<b>1-2-3</b> (DMA page register write/read failed.)	• <b>System board</b>
<b>1-3-1</b> (First 64K RAM test failed.)	1. <b>DIMM</b> 2. Memory adapter
<b>2-1-1</b> (Secondary DMA register failed.)	• <b>System board</b>
<b>2-1-2</b> (Primary DMA register failed.)	• <b>System board</b>
<b>2-1-3</b> (Primary interrupt mask register failed.)	• <b>System board</b>
<b>2-1-4</b> (Secondary interrupt mask register failed)	• <b>System board</b>
<b>2-2-2</b> (Keyboard controller failed.)	1. <b>Keyboard</b> 2. System board
<b>2-2-3</b> (CMOS power failure and checksum check failed.)	1. <b>Battery</b> 2. System board
<b>2-4-1</b> (Video failed; system believed operable.)	• <b>System board</b>
<b>3-1-1</b> (Timer tick interrupt failed.)	• <b>System board</b>
<b>3-1-2</b> (Interval timer channel 2 failed.)	• <b>System board</b>
<b>3-1-3</b> (RAM test failed above address OFFFFH.)	1. <b>DIMM</b> 2. System board
<b>3-1-4</b> (Time-Of-Day clock failed.)	1. <b>Battery</b> 2. System board
<b>3-2-1</b> (Serial port failed.)	• <b>System board</b>
<b>3-2-2</b> (Parallel port failed.)	• <b>System board</b>
<b>3-2-3</b> (Math coprocessor test failed.)	1. <b>Optional microprocessor</b> 2. Microprocessor 3. System board



**Note:** See “System replaceable units” on page 131 to determine which components should be replaced by a field service technician.

Beep/symptom	FRU/action
<b>3-2-4</b> (Failure comparing CMOS memory size against actual.)	<ol style="list-style-type: none"> <li>1. DIMM</li> <li>2. Battery</li> <li>3. System board</li> </ol>
<b>3-3-1</b> (Memory size mismatch occurred.)	<ol style="list-style-type: none"> <li>1. DIMM</li> <li>2. Battery</li> <li>3. System board</li> </ol>
<b>3-3-2</b> (Critical SMBus error occurred, I2C error)	<ol style="list-style-type: none"> <li>1. <b>Disconnect the server power cord from outlet, wait 30 seconds, and retry.</b></li> <li>2. Microprocessor</li> <li>3. DIMMs</li> <li>4. SCSI backplane</li> <li>5. SCSI power cable</li> <li>6. System board</li> </ol>

## No-beep symptoms

**Note:** See “System replaceable units” on page 131 to determine which components should be replaced by a field service technician.

No-beep symptom	FRU/action
<b>No beep occurs during POST.</b>	<ul style="list-style-type: none"> <li>• System board</li> </ul>
<b>No beep, no video, and the system attention LED is off.</b>	<ul style="list-style-type: none"> <li>• System board</li> </ul>
<b>No beep, no video, and a system board error LED is on.</b>	<ul style="list-style-type: none"> <li>• See “System board error LEDs” on page 88.</li> </ul>
<b>BIST failed.</b>	<ul style="list-style-type: none"> <li>• Microprocessor</li> </ul>

## POST error codes

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

**Note:** See “System replaceable units” on page 131 to determine which components should be replaced by a field service technician.

Error code/symptom	FRU/action
<b>062</b> (Three consecutive boot failures using the default configuration.)	<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> <li>4. Microprocessor.</li> </ol>
<b>101, 102, 106</b> (Timer tick interrupt failure)	<ul style="list-style-type: none"> <li>• System board</li> </ul>
<b>102</b> (Timer 2 test failure)	<ul style="list-style-type: none"> <li>• System board</li> </ul>
<b>106</b> (Diskette controller error)	<ul style="list-style-type: none"> <li>• System board</li> </ul>

**Note:** See “System replaceable units” on page 131 to determine which components should be replaced by a field service technician.

<b>Error code/symptom</b>	<b>FRU/action</b>
<b>129</b> (Internal cache (L1) error)	<ol style="list-style-type: none"> <li>1. <b>Optional microprocessor</b></li> <li>2. Microprocessor</li> </ol>
<b>151</b> (Real time clock error)	<ol style="list-style-type: none"> <li>1. <b>Battery</b></li> <li>2. System board</li> </ol>
<b>161</b> (Real time clock battery 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>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. System board.</li> </ol>
<b>175</b> (EEPROM CRC #1 damaged.)	<ol style="list-style-type: none"> <li>1. <b>If Remote Supervisor Adapter II is installed, make sure that the latest firmware is installed.</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>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> (EEPROM CRC #2 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>189</b> (An attempt made to enter the system with invalid passwords)	<ol style="list-style-type: none"> <li>1. <b>Run the Configuration/Setup Utility program.</b></li> <li>2. System board.</li> </ol>
<b>196</b> (Microprocessor cache mismatch)	<ol style="list-style-type: none"> <li>1. <b>Make sure that microprocessors are of same type and speed.</b></li> <li>2. Microprocessor.</li> </ol>
<b>198</b> (Microprocessor speed mismatch)	<ol style="list-style-type: none"> <li>1. <b>Make sure that microprocessors are of same type and speed.</b></li> <li>2. Microprocessor.</li> </ol>
<b>199</b> (Microprocessors not in recommended configurations)	<ol style="list-style-type: none"> <li>1. <b>Make sure that microprocessors are of same type and speed.</b></li> <li>2. Microprocessor.</li> </ol>
<b>201</b> (Memory test error.)	<ol style="list-style-type: none"> <li>1. <b>DIMM</b></li> <li>2. System board</li> </ol>

**Note:** See “System replaceable units” on page 131 to determine which components should be replaced by a field service technician.

<b>Error code/symptom</b>	<b>FRU/action</b>
<b>229</b> (Internal cache (L2) error)	<ol style="list-style-type: none"> <li>1. <b>Microprocessor</b></li> <li>2. Optional microprocessor</li> </ol>
<b>289</b> (DIMM disabled by the user or system.)	<ol style="list-style-type: none"> <li>1. <b>Run the Configuration/Setup Utility program.</b></li> <li>2. DIMM.</li> <li>3. System board.</li> </ol>
<b>301</b> (Keyboard or keyboard controller error)	<ol style="list-style-type: none"> <li>1. <b>Keyboard</b></li> <li>2. System board</li> </ol>
<b>303</b> (Keyboard controller error)	<ol style="list-style-type: none"> <li>1. <b>Replace the PS/2 keyboard with a USB keyboard.</b></li> <li>2. System board.</li> </ol>
<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. Drive 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>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>962</b> (Parallel port configuration 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>1162</b> (Serial port configuration error)	<ul style="list-style-type: none"> <li>• <b>System board</b></li> </ul>
<b>11XX</b> (System board serial port 1 or 2 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>1601</b> (BIOS code update needed)	<ol style="list-style-type: none"> <li>1. <b>Download and install latest level of BIOS code.</b></li> <li>2. System board.</li> </ol>
<b>1602</b> (Cable for optional Remote Supervisor Adapter II 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 drive configuration error, IDE only.)	<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. System board.</li> </ol>
<b>178X</b> (Hard drive error, IDE only.)	<ol style="list-style-type: none"> <li>1. <b>Hard disk cables</b></li> <li>2. Hard disk adapter</li> <li>3. Hard disk drive</li> <li>4. System board</li> </ol>

**Note:** See “System replaceable units” on page 131 to determine which components should be replaced by a field service technician.

Error code/symptom	FRU/action
<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. Remove adapter.</li> </ol>
<b>1801</b> (No more ROM space available for PCI adapter.)	<ol style="list-style-type: none"> <li>1. <b>Run the Configuration/Setup Utility program.</b></li> <li>2. Remove adapter.</li> <li>3. Disable the adapter BIOS and run the Configuration/Setup Utility program.</li> </ol>
<b>1802</b> (Unavailable I/O address for PCI adapter)	<ol style="list-style-type: none"> <li>1. <b>Start the Configuration/Setup Utility program and make sure that I/O addresses for all adapters are set correctly.</b></li> <li>2. Adapter.</li> <li>3. System board.</li> </ol>
<b>1803</b> (Unavailable memory address for PCI adapter)	<ol style="list-style-type: none"> <li>1. <b>Start the Configuration/Setup Utility program and make sure that memory addresses for all other adapters are set correctly.</b></li> <li>2. Adapter.</li> <li>3. System board.</li> </ol>
<b>1804</b> (Unavailable memory address for PCI adapter)	<ol style="list-style-type: none"> <li>1. <b>Remove an adapter to make memory address space available.</b></li> <li>2. Disable adapter BIOS on adapter.</li> <li>3. Adapter.</li> <li>4. System board.</li> </ol>
<b>1805</b> (PCI ROM error occurred)	<ol style="list-style-type: none"> <li>1. <b>Remove all adapters and reinstall one at a time, restarting the server each time, until the failing adapter is determined; then, replace that adapter.</b></li> <li>2. System board.</li> </ol>
<b>1806</b> (PCI-to-PCI bridge error occurred)	<ol style="list-style-type: none"> <li>1. <b>Remove all adapters and reinstall one at a time, restarting the server each time, until the failing adapter is determined; then, replace that adapter.</b></li> <li>2. System board.</li> </ol>
<b>1807</b> (xxxxyyy PCI device unresponsive or disabled by user, where xxxx=PCI vendor ID and yyyy=PCI device ID)	<ol style="list-style-type: none"> <li>1. <b>Run the Configuration/Setup Utility program and make sure the device is enabled.</b></li> <li>2. Adapter.</li> <li>3. System board.</li> </ol>
<b>1808</b> (Unsupported PCI device is installed)	<ol style="list-style-type: none"> <li>1. <b>Remove all adapters and reinstall one at a time, restarting the server each time, until the failing adapter is determined; then, replace that adapter.</b></li> <li>2. 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>

**Note:** See “System replaceable units” on page 131 to determine which components should be replaced by a field service technician.

<b>Error code/symptom</b>	<b>FRU/action</b>
<b>2462</b> (Video configuration error)	<ol style="list-style-type: none"> <li>1. <b>Video adapter (if installed)</b></li> <li>2. System board.</li> </ol>
<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>00012000</b> (Machine check architecture error.)	<ol style="list-style-type: none"> <li>1. <b>Microprocessor</b></li> <li>2. System board.</li> </ol>
<b>00019502</b> (Microprocessor 1 failed)	<ol style="list-style-type: none"> <li>1. <b>Microprocessor</b></li> <li>2. System board</li> </ol>
<b>00019xxx</b> (Microprocessor x not functioning)	<ol style="list-style-type: none"> <li>1. <b>Verify microprocessor x is installed correctly.</b></li> <li>2. Microprocessor x.</li> <li>3. VRM, if installed.</li> <li>4. System board.</li> </ol>
<b>00151200</b> (Unrecoverable error, microprocessor x reported IERR)	<ol style="list-style-type: none"> <li>1. <b>Microprocessor x</b></li> <li>2. VRM</li> <li>3. System board</li> </ol>
<b>00180100</b> (No room for PCI option ROM)	<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>00180200</b> (No more I/O space available for PCI adapter.)	<ol style="list-style-type: none"> <li>1. <b>Run the Configuration/Setup Utility program.</b></li> <li>2. Adapter.</li> <li>3. System board.</li> </ol>
<b>00180300</b> (No more memory above 1MB for PCI adapter.)	<ol style="list-style-type: none"> <li>1. <b>Run the Configuration/Setup Utility program.</b></li> <li>2. Adapter.</li> <li>3. System board.</li> </ol>
<b>00180400</b> (No memory below 1 MB for PCI adapter.)	<ol style="list-style-type: none"> <li>1. <b>Run the Configuration/Setup Utility program.</b></li> <li>2. Adapter.</li> <li>3. System board.</li> </ol>
<b>00180500</b> (PCI option ROM checksum error.)	<ol style="list-style-type: none"> <li>1. <b>PCI adapter.</b></li> <li>2. System board.</li> </ol>
<b>00180600</b> (PCI device BIST failure. PCI bridge error.)	<ol style="list-style-type: none"> <li>1. <b>Run the Configuration/Setup Utility program.</b></li> <li>2. Adapter.</li> <li>3. System board.</li> </ol>
<b>00180700</b> (PCI device not responding.)	<ol style="list-style-type: none"> <li>1. <b>PCI adapter.</b></li> <li>2. System board.</li> </ol>

**Note:** See “System replaceable units” on page 131 to determine which components should be replaced by a field service technician.

Error code/symptom	FRU/action
<b>00180xxx</b> (PCI adapter has requested resources that are not available)	<ol style="list-style-type: none"> <li>1. <b>Reorder adapters in PCI slots.</b></li> <li>2. Verify that boot device is positioned early in the scan order so that it is executed by POST.</li> <li>3. Verify that all adapters are set correctly in Configuration/Setup Utility program, changing memory settings if necessary.</li> <li>4. Remove an adapter to make more memory available to the adapters.</li> <li>5. Disable adapter BIOS on adapter (see documentation provided with adapter).</li> <li>6. System board.</li> </ol>
<b>00181000</b> (General PCI error)	<ol style="list-style-type: none"> <li>1. <b>Adapter</b></li> <li>2. System board</li> </ol>
<b>012980xx</b> (Microprocessor 1 error)	<ol style="list-style-type: none"> <li>1. <b>Verify both microprocessors have same cache size and type and the same clock speed.</b></li> <li>2. Download and update the BIOS code.</li> <li>3. Microprocessor 1.</li> <li>4. System board.</li> </ol>
<b>012981xx</b> (Microprocessor 2 error)	<ol style="list-style-type: none"> <li>1. <b>Verify both microprocessors have same cache size and type and the same clock speed.</b></li> <li>2. Download and update the BIOS code.</li> <li>3. Microprocessor 2.</li> <li>4. System board.</li> </ol>
<b>I9990301</b> (Invalid boot record on hard disk)	<ol style="list-style-type: none"> <li>1. <b>Partition and format hard disk drive.</b></li> <li>2. Cable.</li> <li>3. Hard disk drive.</li> <li>4. Adapter/system board.</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>

## 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 abort the test.
- 197** Warning; a hardware failure might not have occurred.

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

Error code/symptom	FRU/action
<b>001-XXX-000</b> (Failed core tests)	• <b>System board</b>
<b>001-XXX-001</b> (Failed core tests)	• <b>System board</b>

Error code/symptom	FRU/action
<b>001-250-000</b> (Failed system board ECC)	• <b>System board</b>
<b>001-250-001</b> (Failed Processor Board ECC)	• <b>System board</b>
<b>001-292-000</b> (Core system: failed/CMOS checksum failed)	• <b>Load BIOS code defaults and rerun test.</b>
<b>005-XXX-000</b> (Failed Video test)	1. <b>Video adapter</b> 2. System board
<b>011-XXX-000</b> (Failed COM1 Serial Port test)	1. <b>Check loopback plug connected to externalized serial port.</b> 2. System board.
<b>011-XXX-001</b> (Failed COM2 Serial Port test)	1. <b>Check loopback plug connected to externalized serial port.</b> 2. Check cable from externalized port to system board. Should connect to serial port B on the system board (JCOM1). 3. System board.
<b>014-XXX-000</b> (Failed Parallel Port test)	• <b>System board</b>
<b>015-XXX-001</b> (USB interface not found, board damaged)	• <b>System board</b>
<b>015-XXX-198</b> (Remote Supervisor Adapter II installed) or (USB device connected during USB test)	1. <b>If Remote Supervisor Adapter II is installed as an option, remove it and rerun test.</b> <b>Note:</b> If Remote Supervisor Adapter II is present as a standard installation, do not remove it; the test cannot be run. 2. Remove USB devices and rerun test. 3. System board .
<b>020-XXX-000</b> (Failed PCI Interface test)	• <b>System board</b>
<b>030-XXX-000</b> (Failed Internal SCSI interface test)	• <b>System board</b>
<b>035-XXX-099</b> (No adapters were found)	• <b>If an adapter is installed re-check the connection.</b>
<b>035-XXX-S99</b> (Failed RAID test on PCI slot S, check System Error Log before replacing a FRU)	1. <b>RAID adapter</b> 2. SCSI backplane 3. Cable
<b>035-XXX-SNN</b> (Check System Error Log before replacing a FRU, NN = SCSI ID of failing fixed disk)	• <b>Hard disk with SCSI ID NN on RAID adapter in PCI slot S.</b>
<b>035-253-S99</b> (RAID adapter initialization failure)	1. <b>ServeRAID Adapter in slot S is not configured properly. Obtain the basic and extended configuration status and see the <i>ServeRAID Hardware Maintenance Manual</i> for more information.</b> 2. Cable. 3. SCSI backplane. 4. Adapter.
<b>089-XXX-001</b> (Failed Microprocessor test)	1. <b>Microprocessor 1</b> 2. System board
<b>089-XXX-002</b> (Failed Optional Microprocessor test)	1. <b>Microprocessor 2</b> 2. System board

Error code/symptom	FRU/action
<b>165-060-000</b> (Service Processor: RSA may be busy)	<ol style="list-style-type: none"> <li>1. <b>Rerun the diagnostic test.</b></li> <li>2. Fix other error conditions that might be keeping the Remote Supervisor Adapter II busy. Refer to the error log and diagnostic panel.</li> <li>3. Disconnect all server and option power cords from the server, wait 30 seconds, reconnect, and retry.</li> <li>4. System board.</li> </ol>
<b>165-198-000</b> (Service Processor: Aborted)	<ol style="list-style-type: none"> <li>1. <b>Rerun the diagnostic test.</b></li> <li>2. Fix other error conditions that might be keeping the Remote Supervisor Adapter II busy. Refer to the error log and diagnostic panel.</li> <li>3. Disconnect all server and option power cords from the server, wait 30 seconds, reconnect, and retry.</li> <li>4. System board.</li> </ol>
<b>165-201-000</b> (Service Processor: Failed)	<ol style="list-style-type: none"> <li>1. <b>Disconnect all server and option power cords from server, wait 30 seconds, reconnect, and retry.</b></li> <li>2. System board.</li> </ol>
<b>165-330-000</b> (Service Processor: Failed)	<ul style="list-style-type: none"> <li>• <b>Update to the latest ROM diagnostic level, and retry.</b></li> </ul>
<b>165-342-000</b> (Service Processor: Failed)	<ol style="list-style-type: none"> <li>1. <b>Make sure that the latest firmware levels for Remote Supervisor Adapter II and BIOS are installed.</b></li> <li>2. Disconnect all server and option power cords from server, wait 30 seconds, reconnect, and retry.</li> <li>3. System board.</li> </ol>
<b>166-198-000</b> System Management: Aborted (Unable to communicate with RSA. It may be busy. Run the test again.)	<ol style="list-style-type: none"> <li>1. <b>Run the diagnostic test again.</b></li> <li>2. Correct other error conditions and retry. These include other failed system-management tests and items that are logged in the system-error log of the optional Remote Supervisor Adapter II.</li> <li>3. Disconnect all server and option power cords from the server, wait 30 seconds, reconnect, and retry.</li> <li>4. Remote Supervisor Adapter II.</li> <li>5. System board.</li> </ol>
<b>166-201-001</b> System Management: Failed (I2C bus error(s). See SERVPROC and DIAGS entries in event log.)	<ol style="list-style-type: none"> <li>1. <b>Reseat the I2C cable between the Remote Supervisor Adapter II and the system board.</b></li> <li>2. Reseat DIMMs.</li> <li>3. DIMMs.</li> <li>4. System board.</li> </ol>
<b>166-250-000</b> System Management: Failed (I2C cable is disconnected. Reconnect I2C cable between Remote Supervisor Adapter and system board.)	<ol style="list-style-type: none"> <li>1. <b>Reseat the I2C cable between the Remote Supervisor Adapter II and the system board.</b></li> <li>2. Remote Supervisor Adapter II.</li> <li>3. System board.</li> </ol>
<b>166-260-000</b> System Management: Failed (Restart RSAError. After restarting, RSA communication was lost.)	<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 II.</li> <li>3. Remote Supervisor Adapter II.</li> </ol>



Error code/symptom	FRU/action
<b>166-342-000</b> System Management: Failed (RSA BIST indicate failed tests.)	<ol style="list-style-type: none"> <li><b>Make sure that the latest firmware levels for Remote Supervisor Adapter II and BIOS are installed.</b></li> <li>Disconnect all server and option power cords from the server, wait 30 seconds, reconnect, and retry.</li> <li>Remote Supervisor Adapter II.</li> </ol>
<b>180-XXX-000</b> (Diagnostics LED failure)	<ul style="list-style-type: none"> <li><b>Run diagnostic LED test for the failing LED.</b></li> </ul>
<b>180-XXX-001</b> (Failed Front LED panel test)	<ul style="list-style-type: none"> <li><b>Information LED panel</b></li> </ul>
<b>180-XXX-002</b> (Failed Diagnostics LED panel test)	<ul style="list-style-type: none"> <li><b>System board</b></li> </ul>
<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><b>SCSI backplane</b></li> <li>SCSI backplane cable</li> <li>System board</li> </ol>
<b>201-XXX-0NN</b> (Failed Memory test, see "Installing a memory module" on page 34)	<ol style="list-style-type: none"> <li><b>DIMM Location slots 1-6 where NN = DIMM location.</b> <b>Note:</b> NN 1=DIMM 1 NN 2=DIMM 2 NN 3=DIMM 3 NN 4=DIMM 4 NN 5=DIMM 5 NN 6=DIMM 6</li> <li>System board</li> </ol>
<b>202-XXX-001</b> (Failed System Cache test)	<ol style="list-style-type: none"> <li><b>Microprocessor 1</b></li> <li>System board</li> </ol>
<b>202-XXX-002</b> (Failed System Cache test)	<ol style="list-style-type: none"> <li><b>Microprocessor 2</b></li> <li>System board</li> </ol>
<b>206-XXX-000</b> (Failed Diskette Drive test)	<ol style="list-style-type: none"> <li><b>Rerun the test with another diskette.</b></li> <li>Diskette drive cables.</li> <li>Diskette drive.</li> <li>System board.</li> </ol>
<b>214-XXX-000</b> (Failed Diskette Drive test)	<ol style="list-style-type: none"> <li><b>Rerun the test with another diskette.</b></li> <li>Cable.</li> <li>Diskette drive.</li> <li>System board.</li> </ol>
<b>215-XXX-000</b> (Failed IDE CD-ROM test)	<ol style="list-style-type: none"> <li><b>Rerun the test with a different CD.</b></li> <li>CD-ROM drive cables.</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 the cable and termination.</b></li> <li>SCSI backplane.</li> <li>Hard disk drive.</li> <li>.</li> </ol>
<b>217-XXX-000</b> (Failed Fixed Disk test) <b>Note:</b> If RAID is configured, the fixed disk number refers to the RAID logical array.	<ol style="list-style-type: none"> <li><b>Fixed Disk 1</b></li> <li>System board</li> </ol>
<b>217-XXX-001</b> (Failed BIOS Fixed Disk test) <b>Note:</b> If RAID is configured, the fixed disk number refers to the RAID logical array.	<ol style="list-style-type: none"> <li><b>Fixed Disk 2</b></li> <li>System board</li> </ol>

Error code/symptom	FRU/action
<b>217-XXX-002</b> (Failed Fixed Disk test) <b>Note:</b> If RAID is configured, the fixed disk number refers to the RAID logical array.	<ol style="list-style-type: none"> <li>1. <b>Fixed Disk 3</b></li> <li>2. System board</li> </ol>
<b>217-XXX-003</b> (Failed Fixed Disk test) <b>Note:</b> If RAID is configured, the fixed disk number refers to the RAID logical array.	<ol style="list-style-type: none"> <li>1. <b>Fixed Disk 4</b></li> <li>2. System board</li> </ol>
<b>217-XXX-004</b> (Failed Fixed Disk test) <b>Note:</b> If RAID is configured, the fixed disk number refers to the RAID logical array.	<ol style="list-style-type: none"> <li>1. <b>Fixed Disk 5</b></li> <li>2. System board</li> </ol>
<b>217-XXX-005</b> (Failed Fixed Disk test) <b>Note:</b> If RAID is configured, the fixed disk number refers to the RAID logical array.	<ol style="list-style-type: none"> <li>1. <b>Fixed Disk 6</b></li> <li>2. System board</li> </ol>
<b>264-XXX-0NN</b> (Failed Tape Drive test)	<ol style="list-style-type: none"> <li>1. <b>Tape cartridge, if the user ran the Read/Write Tape Drive test (failure code of XXX = 256).</b></li> <li>2. SCSI or power cable connected to the tape drive with SCSI ID NN.</li> <li>3. Tape drive with SCSI ID NN. (See the help and service information appendix of the tape drive 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 and text in the PC Doctor error log for detailed information about each individual tape drive error.</b></li> </ul>
<b>301-XXX-000</b> (Failed Keyboard test)	<ol style="list-style-type: none"> <li>1. <b>Keyboard</b></li> <li>2. System board</li> </ol>
<b>405-XXX-000</b> (Failed Ethernet test on controller on the system board)	<ol style="list-style-type: none"> <li>1. <b>Make sure that Ethernet is not disabled in BIOS.</b></li> <li>2. System board.</li> </ol>
<b>405-XXX-A0N</b> (Failed Ethernet test on adapter in slot A)	<ol style="list-style-type: none"> <li>1. <b>For A=0, system board</b></li> <li>2. For A &gt;0, adapter in PCI slot A</li> </ol>
<b>415-XXX-000</b> (Failed Modem test)	<ol style="list-style-type: none"> <li>1. <b>Cable</b>  <b>Note:</b> Make sure that the modem is present and attached to the server.</li> <li>2. Modem</li> <li>3. System board</li> </ol>

## Diagnostic error LEDs

Lit LED	FRU/action
DIMM x (where x = DIMM 1-6; see “System board error LEDs” on page 88)	<ol style="list-style-type: none"> <li><b>DIMM x</b></li> <li>System board</li> </ol>
Microprocessor x (where x = 1-2; see “System board error LEDs” on page 88)	<ol style="list-style-type: none"> <li><b>Microprocessor x</b></li> <li>System board</li> </ol>
Fan x (where x = 1, 2, or 4; see “System board error LEDs” on page 88) <b>Note:</b> This feature is supported with optional Remote Supervisor Adapter II only.	<ol style="list-style-type: none"> <li><b>Fan x</b></li> <li>System board</li> </ol>
Hard disk drive x (where x = 0-5; see “SCSI IDs for hot-swap hard disk drives” on page 42) <b>Note:</b> LEDs are located on the front of the hot-swap hard disk drives.	<ol style="list-style-type: none"> <li><b>Hard disk drive x</b></li> <li>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, run the diagnostic programs to test the server.

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

1. Remove the software or device that you just added.
2. Run the diagnostic tests to determine whether the server is running correctly.
3. 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.

<b>Note:</b> See Chapter 7, “Parts listing Type 8488 and 8648,” on page 129 to determine which components are replaceable by the customer (CRU), and which components must be replaced by a field service technician (FRU).	
<b>CD-ROM drive</b>	
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.</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>CD-ROM drive.</li> </ol>
CD is not working properly.	<ol style="list-style-type: none"> <li><b>Clean the CD.</b></li> <li>Run CD-ROM diagnostics.</li> <li>CD-ROM drive.</li> </ol>

<b>Note:</b> See Chapter 7, "Parts listing Type 8488 and 8648," on page 129 to determine which components are replaceable by the customer (CRU), and which components must be replaced by a field service technician (FRU).	
<b>CD-ROM drive</b>	
<b>Symptom</b>	<b>FRU/action</b>
CD-ROM drive tray is not working. (The server must be powered on.)	<ol style="list-style-type: none"> <li>1. <b>Insert the end of a paper clip into the manual tray-release opening.</b></li> <li>2. Run CD-ROM diagnostics.</li> <li>3. CD-ROM drive.</li> </ol>

<b>Note:</b> See Chapter 7, "Parts listing Type 8488 and 8648," on page 129 to determine which components are replaceable by the customer (CRU), and which components must be replaced by a field service technician (FRU).	
<b>Diskette drive</b>	
<b>Symptom</b>	<b>FRU/action</b>
The diskette drive activity LED stays lit, or the server bypasses the diskette drive, or the diskette drive does not work.	<ol style="list-style-type: none"> <li>1. <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>2. To prevent diskette drive read/write errors, make sure that the distance between monitors and diskette drives is at least 76 mm (3 in.).</li> <li>3. Run diskette drive diagnostics.</li> <li>4. Cable.</li> <li>5. Diskette drive.</li> <li>6. System board.</li> </ol>

<b>Note:</b> See Chapter 7, "Parts listing Type 8488 and 8648," on page 129 to determine which components are replaceable by the customer (CRU), and which components must be replaced by a field service technician (FRU).	
<b>General</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 Chapter 7, "Parts listing Type 8488 and 8648," on page 129 to determine which components are replaceable by the customer (CRU), and which components must be replaced by a field service technician (FRU).	
<b>Hard disk drive</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>

**Note:** See Chapter 7, “Parts listing Type 8488 and 8648,” on page 129 to determine which components are replaceable by the customer (CRU), and which components must be replaced by a field service technician (FRU).

<b>Hard disk drive</b>	
<b>Symptom</b>	<b>FRU/action</b>
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>
A hard disk drive passes the diagnostic Fixed Disk Test but the problem remains.	<p>Run the diagnostic SCSI Fixed Disk Test (see “Running the on-board diagnostic programs” on page 57).</p> <p><b>Note:</b> This test is not available on servers that have RAID arrays or servers that have IDE or SATA hard disk drives.</p>

**Note:** See Chapter 7, “Parts listing Type 8488 and 8648,” on page 129 to determine which components are replaceable by the customer (CRU), and which components must be replaced by a field service technician (FRU).

<b>Intermittent</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>

**Note:** See Chapter 7, “Parts listing Type 8488 and 8648,” on page 129 to determine which components are replaceable by the customer (CRU), and which components must be replaced by a field service technician (FRU).

<b>Keyboard, mouse, or pointing-device</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 Chapter 7, “Parts listing Type 8488 and 8648,” on page 129 to determine which components are replaceable by the customer (CRU), and which components must be replaced by a field service technician (FRU).

<b>Memory</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. System board.</li> </ol>

**Note:** See Chapter 7, “Parts listing Type 8488 and 8648,” on page 129 to determine which components are replaceable by the customer (CRU), and which components must be replaced by a field service technician (FRU).

<b>Microprocessor</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 Chapter 7, “Parts listing Type 8488 and 8648,” on page 129 to determine which components are replaceable by the customer (CRU), and which components must be replaced by a field service technician (FRU).

<b>Monitor</b>	
<b>Symptom</b>	<b>FRU/action</b>
Monitor problems (general).	<p><b>Some IBM monitors have their own self-tests.</b> If you suspect a problem with the monitor, refer to the information that comes with the monitor for adjusting and testing instructions.</p> <ol style="list-style-type: none"> <li>1. Monitor.</li> <li>2. Run video diagnostics. If diagnostics pass, the problem may be a video driver.</li> <li>3. Display adapter / system board.</li> </ol>

**Note:** See Chapter 7, “Parts listing Type 8488 and 8648,” on page 129 to determine which components are replaceable by the customer (CRU), and which components must be replaced by a field service technician (FRU).

<b>Monitor</b>	
<b>Symptom</b>	<b>FRU/action</b>
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 connected to 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> <p><b>Important:</b> 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 <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> <p>If you have installed a Remote Supervisor Adapter II in the server, make sure that the video cable is connected to the Remote Supervisor Adapter II.</p> </li> <li>2. Make sure that damaged BIOS code is not affecting the video; see “Recovering from a POST/BIOS update failure” on page 18.</li> <li>3. 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>• <b>See “Undetermined problems” on page 127.</b></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>

**Note:** See Chapter 7, "Parts listing Type 8488 and 8648," on page 129 to determine which components are replaceable by the customer (CRU), and which components must be replaced by a field service technician (FRU).

<b>Monitor</b>	
<b>Symptom</b>	<b>FRU/action</b>
The screen is wavy, unreadable, rolling, distorted, or has screen jitter.	<ol style="list-style-type: none"> <li><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.   <b>Notes:</b> <ol style="list-style-type: none"> <li>To prevent diskette drive read/write errors, make sure that the distance between monitors and diskette drives is at least 76 mm (3 in.).</li> <li>Non-IBM monitor cables might cause unpredictable problems.</li> <li>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>Video adapter, if installed.</li> <li>System board.</li> </ol>
Wrong characters appear on the screen.	<ol style="list-style-type: none"> <li><b>If the wrong language is displayed, update the BIOS code with the correct language.</b></li> <li>Video adapter, if installed.</li> <li>System board.</li> </ol>
No video.	<b>Make sure that all cables are connected correctly and securely.</b> If you have installed a Remote Supervisor Adapter II in the server, make sure that the video cable is connected to the Remote Supervisor Adapter II.

**Note:** See Chapter 7, "Parts listing Type 8488 and 8648," on page 129 to determine which components are replaceable by the customer (CRU), and which components must be replaced by a field service technician (FRU).

<b>Option</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><b>Verify that:</b> <ul style="list-style-type: none"> <li>The option is designed for the server (see the ServerProven® list 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>Option you just installed.</li> </ol>



**Note:** See Chapter 7, “Parts listing Type 8488 and 8648,” on page 129 to determine which components are replaceable by the customer (CRU), and which components must be replaced by a field service technician (FRU).

<b>Option</b>	
<b>Symptom</b>	<b>FRU/action</b>
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 Chapter 7, “Parts listing Type 8488 and 8648,” on page 129 to determine which components are replaceable by the customer (CRU), and which components must be replaced by a field service technician (FRU).

<b>Power</b>	
<b>Symptom</b>	<b>FRU/action</b>
The power switch does not work and the reset button, if supported, does work.	<ol style="list-style-type: none"> <li>1. <b>Reseat the connector.</b></li> <li>2. Power switch card.</li> <li>3. System board.</li> </ol>
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 supported by the server, and that functional DIMMs are installed in slots 1 and 2.</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 microprocessors or VRMs are on, verify that:               <ol style="list-style-type: none"> <li>a. A VRM is installed if a second microprocessor is present.</li> <li>b. All microprocessors have the same speed.</li> </ol> </li> <li>3. Override front panel power button:               <ol style="list-style-type: none"> <li>a. Disconnect server power cords.</li> <li>b. Install a jumper on the force power-on jumper (J27).</li> <li>c. Reconnect power cords.</li> </ol> <p style="margin-left: 20px;">If server turns on:</p> <ol style="list-style-type: none"> <li>a. Service processor (baseboard management controller) error.</li> <li>b. Operator information card.</li> </ol> <p style="margin-left: 20px;">If server does not turn on:</p> <ul style="list-style-type: none"> <li>• System board</li> </ul> </li> </ol>

**Note:** See Chapter 7, “Parts listing Type 8488 and 8648,” on page 129 to determine which components are replaceable by the customer (CRU), and which components must be replaced by a field service technician (FRU).

<b>Power</b>	
<b>Symptom</b>	<b>FRU/action</b>
The server does not turn off.	<ol style="list-style-type: none"> <li>1. <b>Verify whether you are using an ACPI or non-ACPI operating system.</b> If you are using a non-ACPI operating system:               <ol style="list-style-type: none"> <li>a. Press Ctrl+Alt+Delete.</li> <li>b. Turn off the system by holding the power-control button for 4 seconds.</li> <li>c. If server fails during BIOS POST and power-control button does not work, remove the AC power cord.</li> </ol> </li> <li>2. If the problem remains or if you are using an ACPI-aware operating system, suspect the system board.</li> </ol>

**Note:** See Chapter 7, “Parts listing Type 8488 and 8648,” on page 129 to determine which components are replaceable by the customer (CRU), and which components must be replaced by a field service technician (FRU).

<b>Serial port</b>	
<b>Symptom</b>	<b>FRU/action</b>
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.	<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 63).</li> </ul> </li> <li>2. Failing serial device.</li> <li>3. Serial adapter, if installed.</li> <li>4. System board.</li> </ol>

**Note:** See Chapter 7, “Parts listing Type 8488 and 8648,” on page 129 to determine which components are replaceable by the customer (CRU), and which components must be replaced by a field service technician (FRU).

<b>ServerGuide Setup and Installation CD</b>	
<b>Symptom</b>	<b>FRU/action</b>
The <i>ServerGuide Setup and Installation</i> CD will not start.	<ul style="list-style-type: none"> <li>• <b>Verify that the server is supported and has a startable (bootable) CD-ROM drive.</b></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>• <b>Verify that there are no duplicate SCSI IDs or IRQ assignments.</b></li> <li>• Verify that the hard disk drive is connected properly.</li> </ul>
The operating system installation program continuously loops.	<ul style="list-style-type: none"> <li>• <b>Make more space available on the hard disk.</b></li> </ul>

<b>Note:</b> See Chapter 7, “Parts listing Type 8488 and 8648,” on page 129 to determine which components are replaceable by the customer (CRU), and which components must be replaced by a field service technician (FRU).	
<b>ServerGuide Setup and Installation CD</b>	
<b>Symptom</b>	<b>FRU/action</b>
The ServerGuide program will not start the operating-system CD.	<ul style="list-style-type: none"> <li>• <b>Verify that the operating-system CD you have is supported by the ServerGuide program.</b> See the <i>ServerGuide Setup and Installation</i> CD label for a list of supported operating system versions.</li> </ul>
The operating system cannot be installed; the option is not available.	<ul style="list-style-type: none"> <li>• <b>Verify that the operating system is supported on the server.</b> If the operating system 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.</li> </ul>

<b>Note:</b> See Chapter 7, “Parts listing Type 8488 and 8648,” on page 129 to determine which components are replaceable by the customer (CRU), and which components must be replaced by a field service technician (FRU).	
<b>Software</b>	
<b>Symptom</b>	<b>FRU/action</b>
Suspected software problem.	<ol style="list-style-type: none"> <li>1. <b>To determine if problems are caused by the software, verify that:</b> <ul style="list-style-type: none"> <li>• The 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 the server.</li> <li>• Other software works on the 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>2. If you have verified these items and the problem remains, contact the place of purchase.</li> </ol>

## Hot-swap 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 cage assembly, if installed.
- System board (press SW2 to bypass the power switch; see “System board jumpers and switches” on page 89).

<b>Note:</b> See “System replaceable units” on page 131 to determine which components should be replaced by a field service technician.			
<b>AC good LED</b>	<b>DC good LED</b>	<b>Description</b>	<b>FRU/action</b>
Off	Off	No power to system or ac problem.	<ol style="list-style-type: none"> <li>1. <b>Check ac power to the system.</b></li> <li>2. Power supply.</li> </ol>

**Note:** See “System replaceable units” on page 131 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>1. <b>Check system board cable connectors JPWR1 and JPWR2.</b> Press SW2 (see “System board jumpers and switches” on page 89) 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>a. Power switch assembly</li> <li>b. System board</li> </ol> </li> <li>2. 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>3. Power supply.</li> <li>4. Power cage assembly, if installed.</li> <li>5. System board.</li> </ol>
On	On	Power is working properly.	<b>N/A</b>

## Service processor error codes

When viewed in the system-error log, the Remote Supervisor Adapter II messages will appear as text descriptions. To determine a possible error condition for the Remote Supervisor Adapter II, see the system-error log (see “Viewing error logs from diagnostic programs” on page 14).

## 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>

## ServeRAID error codes

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

<b>Note:</b> See “System replaceable units” on page 131 to determine which components should be replaced by a field service technician.	
<b>Error code/symptom</b>	<b>FRU/action</b>
1xxx (Microcode checksum error)	1. ServeRAID controller
2xxx (Code DRAM error)	1. Install download jumpers, flash latest level BIOS and firmware for controller. Remove jumpers. 2. ServeRAID controller.
3000-31xx(Code DRAM error)	1. Install download jumpers, flash latest level BIOS and firmware for controller. Remove jumpers. 2. ServeRAID controller.
3200 (Code DRAM error)	1. Install download jumpers, flash latest level BIOS code and firmware for controller. Remove jumpers. 2. ServeRAID controller.
3300 (ServeRAID-5i only)	1. Install ServeRAID-5i controller in an extended PCI expansion slot. See the documentation that came with the server for more information.
3E20 (ServeRAID-5i only)	1. Remove the ServeRAID-5i controller from its slot and install it in the proper PCI option slot. 2. Verify that the ServeRAID-5i controller is supported in this server. 3. ServeRAID-5i controller. 4. System board.
3E2x	1. Reseat the ServeRAID controller. 2. Flash latest level of BIOS code and firmware for controller. 3. ServeRAID-5i controller. 4. Integrated RAID controller on serve).
4xxx thru 5xxx (Code DRAM error)	1. Install download jumpers, flash latest level BIOS code and firmware for controller; then, remove jumpers. 2. ServeRAID controller.
6xxx (Cache DRAM error) (ServeRAID-4H only)	1. Reseat daughter card. 2. Install download jumpers, flash latest level BIOS code and firmware for controller; then, remove jumpers. 3. ServeRAID controller.
7xxx thru 8xxx (Host/local PCI bus interface error)	1. Flash latest level of BIOS code and firmware for controller. 2. If ServeRAID-4x controller, replace controller. 3. If ServeRAID-5i controller, integrated RAID controller on the computer.

**Note:** See “System replaceable units” on page 131 to determine which components should be replaced by a field service technician.

Error code/symptom	FRU/action
9003	<ol style="list-style-type: none"> <li>1. Flash latest level of BIOS code and firmware for controller.</li> <li>2. Confirm that this controller is a supported option for this system.</li> <li>3. ServeRAID controller.</li> <li>4. Integrated RAID controller on the computer).</li> </ol>
9xxx thru BZxx (SCSI bus error caused by cables, termination, defective drives, etc.). Z refers to the specific channel or channels that cause the error.	<ol style="list-style-type: none"> <li>1. Follow indications at “POST (ISPR) error procedures” on page 121. Follow those instructions before continuing with the next steps listed in this index.</li> <li>2. SCSI cable.</li> <li>3. SCSI backplane.</li> <li>4. Hard disk drive.</li> <li>5. ServeRAID controller.</li> </ol>
EFFE (Firmware code corrupt or download jumpers are in place)	<ol style="list-style-type: none"> <li>1. Flash latest level BIOS and firmware for controller; then, remove jumpers.</li> <li>2. ServeRAID controller.</li> </ol>
FFFF or other code not listed	<ol style="list-style-type: none"> <li>1. Follow indications at “POST (ISPR) error procedures” on page 121.</li> <li>2. SCSI cable.</li> <li>3. SCSI backplane.</li> <li>4. Hard disk drive.</li> <li>5. ServeRAID controller.</li> </ol>

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## POST (ISPR) error procedures

Use the ISPR error procedures to help you solve ServeRAID problems. A complete list of error codes is listed at “ServeRAID error codes” on page 119.

**Note:** Where the ISPR error procedures refer to a SCSI backplane, see the chapter of this publication that concerns service replaceable units.

### EF10 (Default ISPR)

1. No ISPR error present.

### 9Zxx through BZxx (SCSI bus error caused by cables, termination, defective drives, or similar problem)

1. Isolate between SCSI subsystem and controller by disconnecting all SCSI cables from suspect card, and restart.

**Attention:** Do not press F5. Doing so changes the computer configuration.

If an ISPR error is still present, perform the following actions until the error is no longer present:

- a. Reseat the controller
- b. Replace the controller

#### Notes:

- a. SCSI channel cable details, if any, appear elsewhere in this publication.
  - b. The adapter/controller detects a configuration change. *Do not* select **Save Changes**. Instead, press F10 to bypass any options to this effect.
2. If ISPR error is **EF10** after disconnecting cables:
    - a. Identify which channel is causing the error by the second digit (Z) of the original ISPR code as indicated in the following table.

**Note:** ServeRAID-4H controllers have 4 channels; ServeRAID-4L and -4Lx controllers have only one channel; and ServeRAID-4M and -4Mx controllers have 2 channels. ServeRAID-5i and ServeRAID-6i controllers have no channels. The ServeRAID-5i and ServeRAID-6i use the channel connectors of the onboard integrated SCSI controller.

Table 3. SCSI identifier

SCSI Channel Code (z)	Descriptions
1	Channel 1
2	Channel 2
3	Channel 1 and 2
4	Channel 3
5	Channel 1 and 3
6	Channel 2 and 3
7	Channel 1, 2, and 3
8	Channel 4
9	Channel 1 and 4
A	Channel 2 and 4
B	Channel 1, 2, and 4
C	Channel 3 and 4

Table 3. SCSI identifier (continued)

SCSI Channel Code (z)	Descriptions
D	Channel 1, 3, and 4
E	Channel 2, 3, and 4
F	Channel 1, 2, 3, and 4

- b. Confirm that the channels identified from the error in step 2a on page 121 are the cause of the error by verifying that the error presents itself *only* when the offending channel is reconnected.
- c. Check termination of identified channel.

**Note:** SCSI channel termination details, if any, appear elsewhere in this publication.

- d. Check for proper backplane jumper configuration.

**Note:** SCSI channel jumper details, if any, appear elsewhere in this publication.

- e. Check for proper cabling configuration in systems that use hard disk drive status cables. Reconnect all cables removed in step 1 on page 121.
- f. Disconnect one drive at a time attached to the channel identified in step 2a on page 121; then, restart to determine which drive is causing the error.
- g. Replace SCSI cable.
- h. Replace SCSI backplane.

#### FFFF or other code not listed

1. Place download jumpers on the controller and try to flash the firmware code to the card.
2. Isolate between SCSI subsystem and controller by disconnecting all SCSI cables attached to the suspect card, and restart.

**Attention:** Do not press F5. Doing so changes the computer configuration. If ISPR code is **EF10** after disconnecting cables, follow these steps until the error is eliminated:

- a. Identify which channel is causing the error by reconnecting cables one at a time and restarting until the error returns.
- b. Check termination of identified channel in step 2a.

**Note:** SCSI channel termination details, if any, appear elsewhere in this publication.

- c. Disconnect one drive at a time attached to channel identified in step 2a and restart each time to determine which drive is causing the problem.
- d. Replace SCSI cable attached to channel identified in step 2a.
- e. Replace backplane attached to channel identified in step 2a.
3. If original ISPR code is still present after disconnecting all SCSI cables and restarting, perform the following actions until the error is no longer present:
  - Reseat the controller
  - Replace the controller



## Temperature error messages

<b>Note:</b> See “System replaceable units” on page 131 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 guidelines” on page 25.</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 guidelines” on page 25.</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 that the system is being properly cooled;</b> see “System reliability guidelines” on page 25.</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 guidelines” on page 25.</li> <li>2. 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 guidelines” on page 25.</li> <li>2. 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 guidelines” on page 25.</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 replaceable units” on page 131 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>	<ul style="list-style-type: none"> <li>• <b>Replace fan x.</b></li> </ul>

## Power error messages

**Note:** See “System replaceable units” on page 131 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 21.</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 21.</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 21.</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 cage assembly, if installed.</li> </ol>

## System shutdown

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

### Voltage-related system shutdown

**Note:** See “System replaceable units” on page 131 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>• <b>See “Power checkout” on page 21.</b></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. <b>Check the power-supply connectors.</b></li> <li>2. Power supply.</li> <li>3. Power cage assembly, if installed.</li> </ol>

<b>Note:</b> See “System replaceable units” on page 131 to determine which components should be replaced by a field service technician.	
Message	Action
<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. <b>Check the power-supply connectors.</b></li> <li>2. Power supply.</li> <li>3. Power cage assembly, if installed.</li> </ol>
<b>System shutoff due to VRM x over voltage</b>	<ul style="list-style-type: none"> <li>• <b>Replace VRM x.</b></li> </ul>
<b>System shutoff due to excessive (&lt; 240 VA) loading</b>	<ol style="list-style-type: none"> <li>1. <b>See “Power checkout” on page 21.</b></li> <li>2. Cycle ac on/off.</li> </ol>

## Temperature-related system shutdown

<b>Note:</b> See “System replaceable units” on page 131 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. <b>Ensure that the system is being properly cooled;</b> see “System reliability guidelines” on page 25.</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. <b>Ensure that the system is being properly cooled;</b> see “System reliability guidelines” on page 25.</li> <li>2. Replace microprocessor 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>• <b>Ambient temperature must be within normal operating specifications;</b> 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>• <b>Ensure that the system is being properly cooled;</b> see “System reliability guidelines” on page 25.</li> </ul>
<b>System shutoff due to high ambient temperature</b> (level-critical; high ambient 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 shutoff due to system board under temperature</b> (level-critical; system board is under 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>

## Hard disk drive checkout

<b>Note:</b> See “System replaceable units” on page 131 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>

## Host built-in self test (BIST)

**Note:** See “System replaceable units” on page 131 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. Replace the microprocessor.</li> </ol>

## Bus fault messages

**Note:** See “System replaceable units” on page 131 to determine which components should be replaced by a field service technician.

Bus fault messages	Message Action
<b>Failure reading 12C device.</b> Check devices on bus 0.	<ol style="list-style-type: none"> <li>1. <b>If installed, reseat the I2C cable between RSA2 and the RSA2 connector on the system board.</b></li> <li>2. DIMMs.</li> <li>3. System board.</li> </ol>
<b>Failure reading 12C device.</b> Check devices on bus 1.	<ol style="list-style-type: none"> <li>1. <b>Reseat the I2C cable between the operator information panel and system board.</b></li> <li>2. Operator information panel.</li> <li>3. System board.</li> </ol>
<b>Failure reading 12C device.</b> Check devices on bus 2.	<ol style="list-style-type: none"> <li>1. <b>Reseat the cable between system board and the power supply (power cage assembly, if installed) (JPWR1, JPWR2).</b></li> <li>2. Power cage assembly, if installed.</li> <li>3. Power supply.</li> <li>4. System board.</li> </ol>
<b>Failure reading 12C device.</b> Check devices on bus 3.	<ol style="list-style-type: none"> <li>1. <b>Reseat the cable between the SCSI backplane and connector on system board.</b></li> <li>2. SCSI 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.

Damaged data in CMOS memory or damaged BIOS code can cause undetermined problems. To reset the CMOS data, use the CMOS recovery jumper to override the power-on password and clear the CMOS memory; see “Erasing a lost or forgotten password (clearing CMOS)” on page 19. If you suspect that the BIOS code is damaged, see “Recovering from a POST/BIOS update failure” on page 18.

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 = 512 MB (2 banks of 256 MB DIMMs))

**Note:** Minimum operating requirements are:

- a. One power supply
  - b. Power cage assembly, if installed
  - c. System board
  - d. One microprocessor
  - e. Memory module (with a minimum of two 256 MB DIMMs)
4. Turn on the server. If the problem remains, suspect the following FRUs in the order listed:
    - Power supply
    - Power cage assembly, if installed
    - 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

Because of 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 message appears in the diagnostics log?
  - 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:

- Are the exact machine type and models
- Have the same BIOS level
- Have the same adapters/attachments in the same locations
- Have the same address jumpers/terminators/cabling
- Have the same software versions and levels
- Have the same diagnostics code (version)
- Have the same configuration options set in the system
- 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.

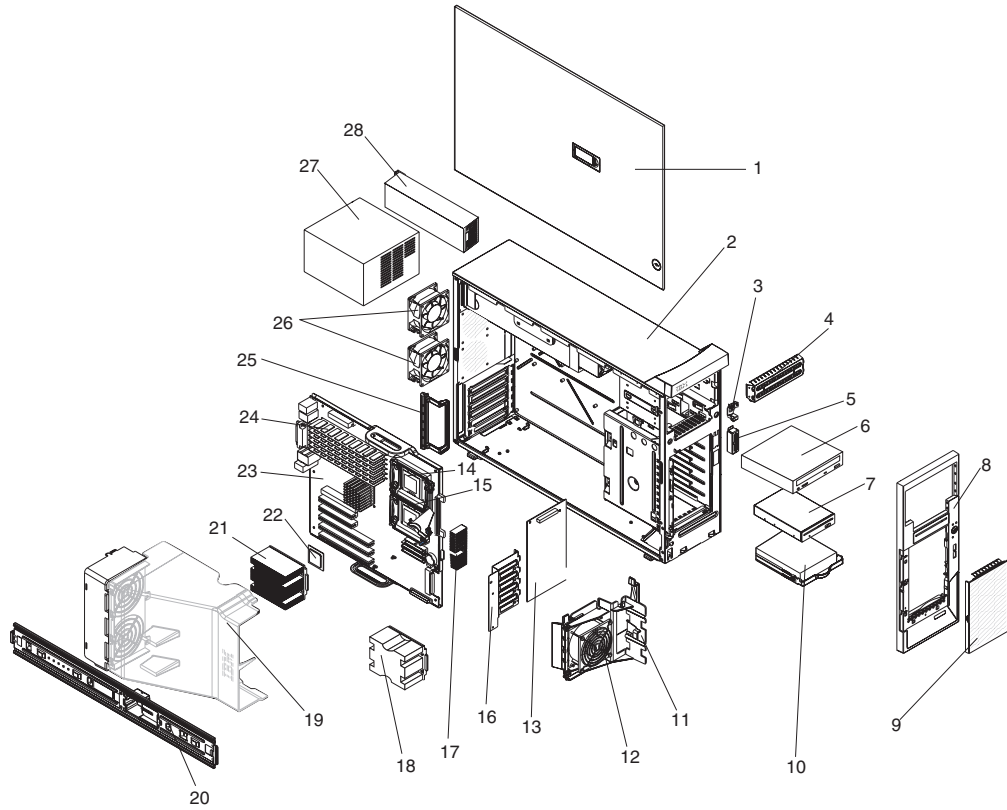
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## Chapter 7. Parts listing Type 8488 and 8648

This parts listing supports the xSeries 226, Type 8488 (models 00X, 0AX, 0BX, 10X, 1AX, 1BX, 20X, 2AX, 2BX, 40X, 4AX, 4BX, 50X, 5AX, 5BX, 60X, 6AX, 6BX) and Type 8648 (models 00X, 0AX, 0BX, 10X, 1AX, 1BX, 20X, 2AX, 2BX, 30X, 3AX, 3BX, 40X, 4AX, 4BX, 50X, 5AX, 5BX, 60X, 6AX, 6BX, 70X, 80X).

# System

The major components of the xSeries 226, Type 8488 and 8648 are shown in the following illustration.





## System replaceable units

**Note:**

- Field replaceable units (FRUs) must be serviced only by qualified field service technicians.
- Customer replaceable units (CRUs) can be replaced by the customer. Tier 1 CRUs and Tier 2 CRUs are described in the IBM “Statement of Limited Warranty” (at “Part 3 – Warranty Information”), which is in the *Installation Guide*.

Index	System xSeries 226, Type 8488 (models 00X, 0AX, 0BX, 10X, 1AX, 1BX, 20X, 2AX, 2BX, 40X, 4AX, 4BX, 50X, 5AX, 5BX, 60X, 6AX, 6BX) and Type 8648 (models 00X, 0AX, 0BX, 10X, 1AX, 1BX, 20X, 2AX, 2BX, 30X, 32X, 34X, 36X, 3AX, 3BX, 40X, 4AX, 4BX, 50X, 5AX, 5BX, 60X, 6AX, 6BX)	CRU No. (Tier 1)	CRU No. (Tier 2)	FRU No.
1	Door assembly, sliding (all models)	59P4825		
2	Cover, side/top (all models)			59P4824
3	Switch assembly, power/LED (all models)		90P0934	
4	EMC shield, 5.25 inch (all models)	32P8503		
5	USB 2.0 connector assembly (all models)		26K6096	
6	CD-ROM drive, 48x (primary) (all models)	71P7375		
6	CD-ROM drive, 48x (alternate) (all models)	71P7385		
6	CD-ROM drive, 48x (RoHs) (all models)	39M3511		
6	DVD drive (option)	39M3515		
7	Diskette drive (all models)	76H4091		
8	Bezel assembly (all models)	26K6090		
9	Filler assembly, SATA bezel (models 00X, 10X, 20X, 30X, 40X, 50X, 60X, 70X)	26K6102		
10	Hard disk drive, 80.0 SATA (models 10X, 20X, 30X, 40X, 50X, 60X)	71P7293		
10	Hard disk drive, 250GB SATA (model 70X)	73P8018		
10	Hard disk drive, 236.4GB SCSI (model 80X)	90P1321		
11	Card guide (all models)	26K6094		
12	Fan assembly, front, 92x38 (all models)		26K6082	
13	SCSI backplane (models 0AX, 0BX, 1AX, 1BX, 2AX, 2BX, 3AX, 3BX, 4AX, 4BX, 5AX, 5BX, 6AX, 6BX, 80X)		59P5159	
14	Retention module assembly, heat sink, left-hand lever (all models)			26K6066
15	Retention module assembly, heat sink, right-hand lever (all models)			26K6067
16	Back panel, SATA (models 00X, 10X, 20X, 30X, 40X, 50X, 60X, 70X)	26K6100		
17	VRM (option)	24R2702		
18	Heat sink assembly, dummy (all models)	26K6065		
19	Microprocessor air baffle 80mm (all models)	26K6070		
20	Support bracket (all models)	59P4831		
21	Heat sink (all models)			13N1625
22	Microprocessor, 880/2.8-1M (models 00X, 0AX, 0BX)			13N1618

Index	System xSeries 226, Type 8488 (models 00X, 0AX, 0BX, 10X, 1AX, 1BX, 20X, 2AX, 2BX, 40X, 4AX, 4BX, 50X, 5AX, 5BX, 60X, 6AX, 6BX) and Type 8648 (models 00X, 0AX, 0BX, 10X, 1AX, 1BX, 20X, 2AX, 2BX, 30X, 32X, 34X, 36X, 3AX, 3BX, 40X, 4AX, 4BX, 50X, 5AX, 5BX, 60X, 6AX, 6BX)	CRU No. (Tier 1)	CRU No. (Tier 2)	FRU No.
22	Microprocessor, 2.8 GHz (models 32X,34X,36X)			39R8151
22	Microprocessor, 880/3.0-1M (models 10X, 1AX, 1BX)			90P1033
22	Microprocessor, 800/3.0-2M (models 40X, 4AX, 4BX, 70X)			13M8293
22	Microprocessor, 880/3.2-1M (models 20X, 2AX, 2BX)			90P1210
22	Microprocessor, 800/3.2-2M (models 50X, 5AX, 5BX)			13M8294
22	Microprocessor, 880/3.4-1M (models 30X, 3AX, 3BX)			90P1227
22	Microprocessor, 800/3.4-2M (models 60X, 6AX, 6BX, 80X)			13M8295
23	System board (all models)			26K8597
24	Memory, 256 MB ECC (models 00X, 0AX, 0BX, 10X, 1AX, 1BX, 20X, 2AX, 2BX, 30X, 3AX, 3BX)	90P1123		
24	Memory, 512 MB ECC (models 40X, 4AX, 4BX, 50X, 5AX, 5BX, 60X, 6AX, 6BX, 70X, 80X)	13N1424		
25	Retainer, rear, I/O cards (all models)	59P4790		
26	Fan assembly, rear, 80x38 (all models)		26K6085	
27	Power supply, 530 watt (models 00X, 0AX, 10X, 1AX, 20X, 2AX, 30X, 3AX, 40X, 4AX, 50X, 5AX, 60X, 6AX, 70X, 80X)			24R2660
28	Power supply, 514 watt (models 0BX, 1BX, 2BX, 3BX, 4BX, 5BX, 6BX)	49P2167		
	Battery, 3.0v (all models)		33F8354	
	Bezel blanks kit (all models)	00N7082		
	Bezel release latch (all models)		59P4791	
	Button kit (all models)			19K4940
	Cable, CD audio (all models)		75H9219	
	Cable, diskette drive (all models)		03K9340	
	Cable, IDE (all models)		13N2466	
	Cable, interposer (models 0AX, 1AX, 2AX, 3AX, 4AX, 5AX, 6AX, 80X)		59P4792	
	Cable, SATA signal (models 00X, 10X, 20X, 30X, 40X, 50X, 60X, 70X)		26K6093	
	Cable, SCSI signal, 23.5 in. (models 0AX, 0BX, 1AX, 1BX, 2AX, 2BX, 3AX, 3BX, 4AX, 4BX, 5AX, 5BX, 6AX, 6BX, 80X)		73P6160	
	Cable, serial (all models)		02R2061	
	Cage assembly, hot-swap hard disk drive (all models)			26K6101
	Card, SATA 4-PT RAID (model 70X)	71P8650		
	Card, Sebring 2U/3U, with battery (option all models)	13N2195		
	Chassis, staked (all models)			26K6089
	Feet, system kit (models 0Bx, 1BX, 2BX, 3BX, 4BX, 5BX, 6BX)	26K7345		
	Feet, system kit (models 00X, 0AX, 10X, 1AX, 20X, 2AX, 30X, 3AX, 40X, 4AX, 50X, 5AX, 60X, 6AX)	13N2985		
	Filler panel, hard disk drive (models 0AX, 0BX, 1AX, 1BX, 2AX, 2BX, 3AX, 3BX, 4AX, 4BX, 5AX, 5BX, 6AX, 6BX, 80X)	06P6245		

Index	System xSeries 226, Type 8488 (models 00X, 0AX, 0BX, 10X, 1AX, 1BX, 20X, 2AX, 2BX, 40X, 4AX, 4BX, 50X, 5AX, 5BX, 60X, 6AX, 6BX) and Type 8648 (models 00X, 0AX, 0BX, 10X, 1AX, 1BX, 20X, 2AX, 2BX, 30X, 32X, 34X, 36X, 3AX, 3BX, 40X, 4AX, 4BX, 50X, 5AX, 5BX, 60X, 6AX, 6BX)	CRU No. (Tier 1)	CRU No. (Tier 2)	FRU No.
	Handle, cap (all models)		49P1968	
	Half-high combo drive (option)		26K5429	
	Handle, support (all models)		49P1969	
	Hardware kit (all models); contains: <ul style="list-style-type: none"> <li>• Cable clamp (3)</li> <li>• Clips, flat cable loop (2)</li> <li>• EMC clips (3)</li> <li>• Fan isolation mounts (8)</li> <li>• I/O shield (1)</li> <li>• I/O blank with VHDCI SCSI knockout (1)</li> <li>• I/O blanks (6)</li> <li>• Insulator, microprocessor springs (4)</li> <li>• Key holder (1)</li> <li>• Labels, blue touch point (4)</li> <li>• Pin grommets (4)</li> <li>• Screws, M3x3.8 (6)</li> <li>• Screws, M3x5 (8)</li> <li>• Screws, M3.5x10 (8)</li> <li>• Screws, M3.5x7 (8)</li> <li>• Screws, M3.5 thd forming (8)</li> <li>• Screws, M3 Phillips (8)</li> <li>• Spacers, system board (4)</li> </ul>		26K7305	
	Lock assembly (all models)			59P4822
	Lock bar, SCSI (models 0AX, 0BX, 1AX, 1BX, 2AX, 2BX, 3AX, 3BX, 4AX, 4BX, 5AX, 5BX, 6AX, 6BX)	26K6103		
	Mouse assembly (all models)	24P0383		
	Power cord (all models)	6952301		
	Power supply cage assembly, 514 watt (models 0BX, 1BX, 2BX, 3BX, 4BX, 5BX, 6BX)	24R2561		
	Recovery CD, multilingual (models 60X, 70X)	32R1062		
	SATA simple swap tray (models 00X, 10X, 20X, 30X, 40X, 50X, 60X, 70X)	73P8007		
	Service label (all models)	26K6104		

## Keyboards (CRUs)

Keyboard	CRU No.
Arabic (253)	89P9201
Belgian/French (120)	89P9202
Belgian/UK (120)	89P9203
Brazilian/Portuguese (275)	89P9204
Bulgarian (442)	89P9205
Chinese/US (467)	89P9206
Czech ABB	89P9207

<b>Keyboard</b>	<b>CRU No.</b>
Danish (159)	89P9208
Dutch (143)	89P9209
English, UK (166)	89P9237
English, US - EMEA (103P)	89P9238
English, US (103P)	89P9200
French (189)	89P9210
French Canadian (058)	89P9212
French Canadian (445)	89P9211
German (129)	89P9213
Greek (319)	89P9214
Hebrew (212)	89P9215
Hungarian (208)	89P9216
Icelandic (197)	89P9217
Italian (141)	89P9218
Italian (142)	89P9219
Japanese (194)	89P9220
Korean (413)	89P9221
Norwegian (155)	89P9223
Polish (214)	89P9224
Portuguese (163)	89P9225
Romanian (96)	89P9226
Russian (443)	89P9227
Russian/Cyrillic (441)	89P9228
Serbian/Cyrillic (118)	89P9229
Slavic (153)	89P9230
Spanish (172)	89P9231
Spanish, Latin American (171)	89P9222
Swedish/Finnish (153)	89P9232
Swiss, F/G (150)	89P9233
Thailand (191)	89P9234
Turkish (179)	89P9236
Turkish (440)	89P9235
Yugoslavian/Latin (234)	89P9239

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## Power cords (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>
02K0546	China
13F9940	Australia, Fiji, Kiribati, Nauru, New Zealand, Papua New Guinea
13F9979	Afghanistan, Albania, Algeria, Andorra, Angola, Armenia, Austria, Azerbaijan, Belarus, Belgium, Benin, Bosnia and Herzegovina, Bulgaria, Burkina Faso, Burundi, Cambodia, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Congo (Democratic Republic of), Congo (Republic of), Cote D'Ivoire (Ivory Coast), Croatia (Republic of), Czech Republic, Dahomey, Djibouti, Egypt, Equatorial Guinea, Eritrea, Estonia, Ethiopia, Finland, France, French Guyana, French Polynesia, Germany, Greece, Guadeloupe, Guinea, Guinea Bissau, Hungary, Iceland, Indonesia, Iran, Kazakhstan, Kyrgyzstan, Laos (People's Democratic Republic of), Latvia, Lebanon, Lithuania, Luxembourg, Macedonia (former Yugoslav Republic of), Madagascar, Mali, Martinique, Mauritania, Mauritius, Mayotte, Moldova (Republic of), Monaco, Mongolia, Morocco, Mozambique, Netherlands, New Caledonia, Niger, Norway, Poland, Portugal, Reunion, Romania, Russian Federation, Rwanda, Sao Tome and Principe, Saudi Arabia, Senegal, Serbia, Slovakia, Slovenia (Republic of), Somalia, Spain, Suriname, Sweden, Syrian Arab Republic, Tajikistan, Tahiti, Togo, Tunisia, Turkey, Turkmenistan, Ukraine, Upper Volta, Uzbekistan, Vanuatu, Vietnam, Wallis and Futuna, Yugoslavia (Federal Republic of), Zaire
13F9997	Denmark
14F0015	Bangladesh, Lesotho, Maceo, Maldives, Namibia, Nepal, Pakistan, Samoa, South Africa, Sri Lanka, Swaziland, Uganda
14F0033	Abu Dhabi, Bahrain, Botswana, Brunei Darussalam, Channel Islands, China (Hong Kong S.A.R.), Cyprus, Dominica, Gambia, Ghana, Grenada, Iraq, Ireland, Jordan, Kenya, Kuwait, Liberia, Malawi, Malaysia, Malta, Myanmar (Burma), Nigeria, Oman, Polynesia, Qatar, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Seychelles, Sierra Leone, Singapore, Sudan, Tanzania (United Republic of), Trinidad and Tobago, United Arab Emirates (Dubai), United Kingdom, Yemen, Zambia, Zimbabwe
14F0051	Liechtenstein, Switzerland
14F0069	Chile, Italy, Libyan Arab Jamahiriya
14F0087	Israel
1838574	Antigua and Barbuda, Aruba, Bahamas, Barbados, Belize, Bermuda, Bolivia, Brazil, Caicos Islands, Canada, Cayman Islands, Costa Rica, Colombia, Cuba, Dominican Republic, Ecuador, El Salvador, Guam, Guatemala, Haiti, Honduras, Jamaica, Japan, Mexico, Micronesia (Federal States of), Netherlands Antilles, Nicaragua, Panama, Peru, Philippines, Taiwan, United States of America, Venezuela
24P6858	Korea (Democratic People's Republic of), Korea (Republic of)
34G0232	Japan
36L8880	Argentina, Paraguay, Uruguay
49P2078	India
49P2110	Brazil

<b>IBM power cord part number</b>	<b>Used in these countries and regions</b>
6952300	Antigua and Barbuda, Aruba, Bahamas, Barbados, Belize, Bermuda, Bolivia, Caicos Islands, Canada, Cayman Islands, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Guam, Guatemala, Haiti, Honduras, Jamaica, Mexico, Micronesia (Federal States of), Netherlands Antilles, Nicaragua, Panama, Peru, Philippines, Saudi Arabia, Thailand, Taiwan, United States of America, Venezuela





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## 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.

---

### 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. Information about diagnostic tools is in the *Hardware Maintenance Manual and Troubleshooting Guide* on the IBM *xSeries Documentation* CD or in the *IntelliStation Hardware Maintenance Manual* at the IBM Support Web site.
- 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 or to submit a request for information.

You can solve many problems without outside assistance by following the troubleshooting procedures that IBM provides in the online help or in the 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.

---

### 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/>.

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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. In the U.S. and Canada, call 1-800-IBM-SERV (1-800-426-7378).

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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, or in the U.S. and Canada, call 1-800-IBM-SERV (1-800-426-7378).

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

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## Appendix B. Safety 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.

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.

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## 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.

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## Safety notices (multilingual translations)

The caution and danger safety notices in this section are provided in the following languages:

- English
- Brazilian/Portuguese
- Chinese
- French
- German
- Italian
- Japanese
- 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.



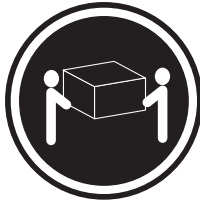
**DANGER**

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.



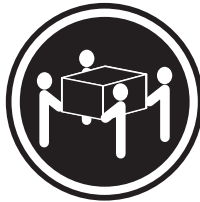
**Statement 4**



≥18 kg (39.7 lb)



≥32 kg (70.5 lb)



≥55 kg (121.2 lb)

**CAUTION:**  
Use safe practices when lifting.

**Statement 5**



**CAUTION:**

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



**Statement 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.

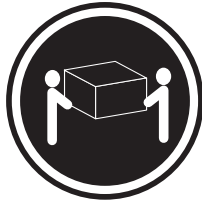


#### **PERIGO**

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.

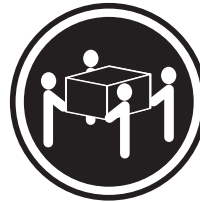
#### Instrução 4



≥18 kg (39.7 lb)



≥32 kg (70.5 lb)



≥55 kg (121.2 lb)

#### 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.



#### 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:

1. 关闭所有设备。
2. 首先将所有电缆连接至设备。
3. 将信号电缆连接至接口。
4. 将电源线连接至插座。

#### 断开连接时:

1. 关闭所有设备。
2. 首先从插座中拔出电源线。
3. 从接口上拔下信号电缆。

## 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：  
扔入或浸入水电  
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导致激光辐射的危险。



### 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)



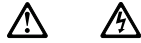
## 重要資訊：

**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
<ol style="list-style-type: none"><li>1. Mettez les unités hors tension.</li><li>2. Commencez par brancher tous les cordons sur les unités.</li><li>3. Branchez les câbles d'interface sur des connecteurs.</li><li>4. Branchez les cordons d'alimentation sur des prises.</li><li>5. Mettez les unités sous tension.</li></ol>	<ol style="list-style-type: none"><li>1. Mettez les unités hors tension.</li><li>2. Débranchez les cordons d'alimentation des prises.</li><li>3. Débranchez les câbles d'interface des connecteurs.</li><li>4. Débranchez tous les câbles des unités.</li></ol>

### 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.

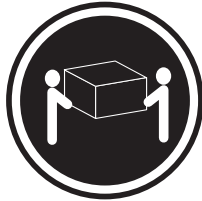


#### DANGER

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.

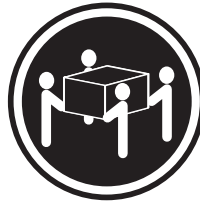
Notice n° 4



≥18 kg (39.7 lb)



≥32 kg (70.5 lb)



≥55 kg (121.2 lb)

**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.

Kabel anschließen:	Kabel lösen:
<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.



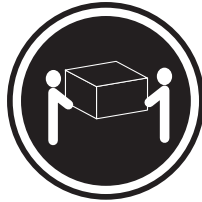
### VORSICHT

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.



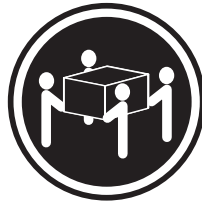
#### Hinweis 4



≥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.

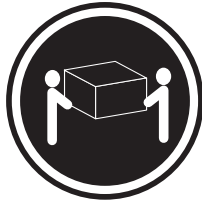


#### PERICOLO

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.



重要：

Netfinity Server ライブラリーにあるすべての注意および危険の記述は数字で始まります。この数字は、英語版の注意および危険の記述と翻訳された注意および危険の記述を相互参照するために使用します。

例えば、もし注意の記述が数字の1で始まっている場合は、その注意の翻訳は、記述1の下にあります。

手順を実施する前に、すべての注意:

・記述 1

## 危険

感電を防止するため、雷の発生時には、いかなるケーブルの取り付けまたは取り外しも行わないでください。また導入、保守、再構成などの作業も行わないでください。

感電を防止するため：

- 電源コードは正しく接地および配線が行われている電源に接続してください。
- 本製品が接続されるすべての装置もまた正しく配線された電源に接続されている必要があります。

できれば、信号ケーブルに取り付けまたは取り外しのときは片方の手のみで行うようにしてください。これにより、電位差がある二つの表面に触ることによる感電を防ぐことができます。

電源コード、電話ケーブル、通信ケーブルからの電流は身体に危険を及ぼします。設置、移動、または製品のカバーを開けたり装置を接続したりするときには、以下のようにケーブルの接続、取り外しを行ってください。

接続するには	取り外すには
1. すべての電源を切る	1. すべての電源を切る
2. まず、装置にすべてのケーブルを接続する。	2. まず、電源コンセントから電源コードを取り外す
3. 次に、通信ケーブルをコネクタに接続する	3. 次に、通信ケーブルをコネクタから取り外す。
4. その後、電源コンセントに電源コードを接続する	4. その後、装置からすべてのケーブルを取り外す
5. 装置の電源を入れる。	

・記述 2

## 注意

本製品には、システム・ボード上にリチウム電池が使用されています。電池の交換方法や取り扱いを誤ると、発熱、発火、破裂のおそれがあります。

電池の交換には、IBM部品番号33F8354の電池またはメーカー推奨の同等の電池を使用してください。

交換用電池の購入については、お買い求めの販売店または弊社の営業担当までお問い合わせください。

電池は幼児の手の届かない所に置いてください。

万一、幼児が電池を飲み込んだときは、直ちに医師に相談してください。

以下の行為は絶対に行わないでください。

- 水にぬらすこと
- 100度C以上の過熱や焼却
- 分解や充電
- ショート

電池を廃棄する場合、および保存する場合にはテープなどで絶縁してください。他の金属や電池と混ざると発火、破裂の原因となります。電池は地方自治体の条例、または規則に従って廃棄してください。ごみ廃棄場で処分されるごみの中に捨てないでください。

・記述 3

## ⚠ 注意

レーザー製品 (CD-ROM、DVD、または光ファイバー装置または送信器など) が組み込まれている場合は、下記に御注意ください。

- ここに記載されている制御方法、調整方法、または性能を超えて使用すると、危険な放射線を浴びる可能性があります。
- ドライブのカバーを開けると、危険な放射線を浴びる可能性があります。ドライブの内部に修理のために交換可能な部品はありません。カバーを開けないでください。

## ⚠ 危険

一部 CD-ROM ドライブは、Class 3A または Class 3B レーザーダイオードを使用しています。次の点に注意してください。

CD-ROMドライブのカバーを開けるとレーザーが放射されます。光線を見つめたり、光学器械を使って直接見たりしないでください。また直接光線を浴びないようにしてください。

・記述 4

## ⚠ 注意



18kg 以上



32kg 以上



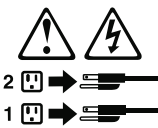
55kg 以上

装置を持ち上げる場合は、安全に持ち上げる方法に従ってください。

・記述 5

## ⚠ 注意 ⚡

サーバーの前面にある電源制御ボタンは、サーバーに供給された電流を遮断しません。サーバーには、複数の電源コードが接続されているかもしれません。サーバーから電流を完全に遮断するために、すべての電源コードが電源から取り外されていることを確認してください。



・記述 10

## ⚠ 注意

ラック・モデルのサーバーの上に 82 Kg 以上の物を置かないでください。



**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, 전황 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 신호 케이블을 한 손으로 연결하거나 끊으십시오.
- 화재, 수해 또는 구조상의 손상이 있을 경우 장비를 꺼지 마십시오.
- 설치 및 구성 프로시저에 다른 설명이 없는 한, 장치 덮개를 열기 전에 연결된 전원 코드, 원거리 통신 시스템, 네트워크 및 모뎀을 끊어 주십시오.
- 제품 또는 접속된 장치를 설치, 이동 및 덮개를 열 때 다음 설명에 따라 케이블을 연결하거나 끊도록 하십시오.

<p>연결하려면:</p> <ol style="list-style-type: none"> <li>1. 모든 스위치를 끕니다.</li> <li>2. 먼저 모든 케이블을 장치에 연결합니다.</li> <li>3. 신호 케이블을 커넥터에 연결합니다.</li> <li>4. 콘센트에 전원 코드를 연결합니다.</li> <li>5. 장치 스위치를 켭니다.</li> </ol>	<p>연결을 끊으려면:</p> <ol style="list-style-type: none"> <li>1. 모든 스위치를 끕니다.</li> <li>2. 먼저 콘센트에서 전원 코드를 뽑습니다.</li> <li>3. 신호 케이블을 커넥터에서 제거합니다.</li> <li>4. 장치에서 모든 케이블을 제거합니다.</li> </ol>
-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

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.

- 먼지거나 물에 닿지 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 있는 지 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 sent.al.
- 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.

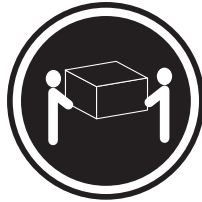


#### PELIGRO

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.

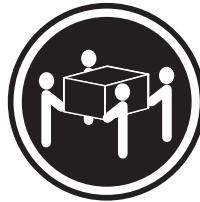
#### Declaración 4



≥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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e-business logo	Tivoli Enterprise
@server	Update Connector
FlashCopy	Wake on LAN
IBM	XA-32
IBM (logo)	XA-64
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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 1 000 000 bytes, and GB stands for approximately 1 000 000 000 bytes.

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

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

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

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Some software may differ from its retail version (if available), and may not include user manuals or all program functionality.

---

## Product recycling and disposal

This unit contains materials such as circuit boards, cables, electromagnetic compatibility gaskets, and connectors which may contain lead and copper/beryllium alloys that require special handling and disposal at end of life. Before this unit is disposed of, these materials must be removed and recycled or discarded according to applicable regulations. IBM offers product-return programs in several countries. Information on product recycling offerings can be found on IBM's Internet site at <http://www.ibm.com/ibm/environment/products/prp.shtml>.

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## Battery return program

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

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

In the Netherlands, the following applies.





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## Electronic emission notices

IBM @server xSeries 226 Type 8488 and 8648

### Federal Communications Commission (FCC) statement

**Note:** This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult an IBM authorized dealer or service representative for help.

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

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

Responsible party:

International Business Machines Corporation  
New Orchard Road  
Armonk, NY 10504  
Telephone: 1-919-543-2193



Tested To Comply  
With FCC Standards

FOR HOME OR OFFICE USE

## Industry Canada Class B emission compliance statement

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

## Avis de conformité à la réglementation d'Industrie Canada

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

## 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 B Information Technology Equipment according to CISPR 22/European Standard EN 55022. The limits for Class B equipment were derived for typical residential environments to provide reasonable protection against interference with licensed communication devices.

## Japanese Voluntary Control Council for Interference (VCCI) statement

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に基づくクラスB情報技術装置です。この装置は、家庭環境で使用することを目的としていますが、この装置がラジオやテレビジョン受信機に近接して使用されると、受信障害を引き起こすことがあります。  
取扱説明書に従って正しい取り扱いをして下さい。

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