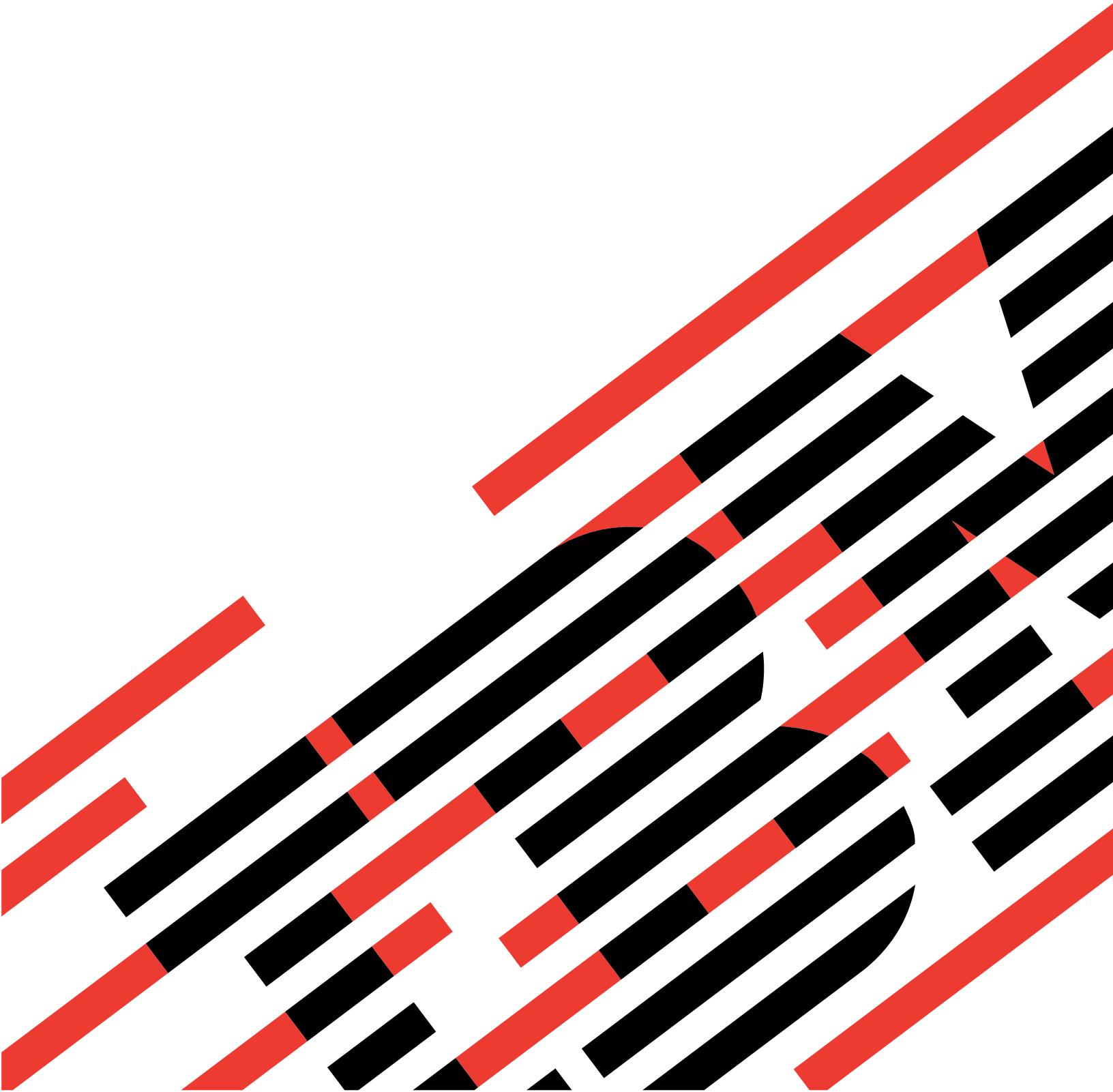


**IBM**

**e**server®

Hardware Maintenance Manual

xSeries 220 Type 8646





**IBM**

***e*server**

Hardware Maintenance Manual

xSeries 220 Type 8646

**Note:**

Before using this information and the product it supports, be sure to read the general information under "Notices" on page 145.

**First Edition (August, November 2001)**

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## About this manual

This manual contains diagnostic information, a Symptom-to-FRU index, service information, error codes, error messages, and configuration information for the xSeries 220.

**Important:** This manual is intended for trained servicers who are familiar with IBM PC Server products. Before servicing an IBM product, be sure to review "Safety information" on page 111.

---

## 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.

---

## 注意和危险声明 (简体中文)

重要事项：

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

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

在按说明执行任何操作前，请务必阅读所有注意和危险声明。

---

## 注意及危險聲明（中文）

重要資訊：

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

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

執行任何指示之前，請詳讀所有「注意」及「危險」的聲明。

Prenez connaissance de toutes les consignes de type Attention et

Danger avant de procéder aux opérations décrites par les instructions.

Lesen Sie alle Sicherheitshinweise, bevor Sie eine Anweisung ausführen.

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

### **주의 및 위험 경고문(한글)**

#### **중요:**

이 책에 나오는 모든 주의 및 위험 경고문은 번호로 시작됩니다.

이 번호는 *Safety Information* 책에 나오는 영문판 주의 및 위험 경고문과 한글판 주의 및 위험 경고문을 상호 참조하는데 사용됩니다.

예를 들어 주의 경고문이 번호 1로 시작되면 *Safety Information* 책에서 이 주의 경고문은 경고문 1번 아래에 나옵니다.

지시를 따라 수행하기 전에 먼저 모든 주의 및 위험 경고문을 읽도록 하십시오.

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

---

## **Online support**

Use the World Wide Web (WWW) to download Diagnostic, BIOS Flash, and Device Driver files.

File download address is:

<http://www.ibm.com/pc/support>

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## General checkout

The server diagnostic programs are stored in upgradable read-only memory (ROM) on the system board. These programs are the primary method of testing the major components of the server: The system board, Ethernet controller, video controller, RAM, keyboard, mouse (pointing device), diskette drive, serial ports, hard drives, and parallel port. You can also use them to test some external devices. See "Diagnostic programs and error messages" on page 12.

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

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

A failed system might be part of a shared DASD cluster (two or more systems sharing the same external storage device(s)). Prior to running diagnostics, verify that the failing system is not part of a shared DASD cluster.

A system might be part of a cluster if:

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

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

**Notes:**

1. For systems that are part of a shared DASD cluster, run one test at a time in looped mode. Do not run all tests in looped mode, as this could enable the DASD diagnostic tests.
2. If multiple error codes are displayed, diagnose the first error code displayed.
3. If the computer hangs with a POST error, go to the "Symptom-to-FRU index" on page 91.
4. If the computer hangs and no error is displayed, go to "Undetermined problems" on page 105.
5. Power supply problems, see "Power checkout" on page 15 and "Symptom-to-FRU index" on page 91.
6. Safety information, see "Safety information" on page 111.
7. For intermittent problems, check the error log; see "POST error messages" on page 12.

**1. IS THE SYSTEM PART OF A CLUSTER?**

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

**NO.** Go to step 2.

**2. IF THE SYSTEM IS NOT PART OF A CLUSTER:**

- Power-off the computer and all external devices.
- Check all cables and power cords.
- Set all display controls to the middle position.
- Power-on all external devices.
- Power-on the computer.
- Record any POST error messages displayed on the screen. If an error is displayed, look up the first error in the “POST error codes” on page 99.
- Check the diagnostic LED panel system error LED; if on, see “Front panel and system board LEDs” on page 17.
- Check the System Error Log. If an error was recorded by the system, see “Symptom-to-FRU index” on page 91.
- Start the Diagnostic Programs. See “Diagnostic programs and error messages” on page 12.
- Check for the following responses:
  - a. One beep.
  - b. Readable instructions or the Main Menu.

**3. DID YOU RECEIVE BOTH OF THE CORRECT RESPONSES?**

**NO.** Find the failure symptom in “Symptom-to-FRU index” on page 91.

**YES.** Run the Diagnostic programs. If necessary, refer to “Diagnostic programs and error messages” on page 12.

If you receive an error, go to “Symptom-to-FRU index” on page 91.

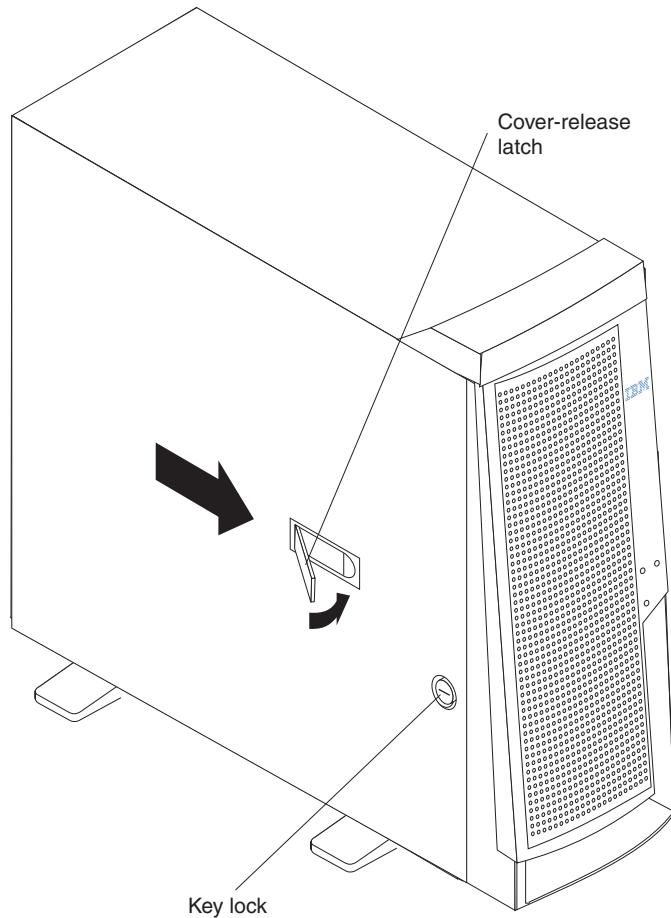
If the diagnostics completed successfully and you still suspect a problem, see “Undetermined problems” on page 105.

---

## General information

The IBM® xSeries 220 is an affordable solution for entry-level server applications. It is ideally suited for networking environments that require superior microprocessor performance, efficient memory management, flexibility, and large amounts of reliable data storage.

The IBM xSeries 220 server comes with a limited warranty and IBM Server Start Up Support. If you have access to the World Wide Web, you can obtain up-to-date information about the server model and other IBM server products at the following World Wide Web address: <http://www.ibm.com/eserver/xseries/>



---

## Features and specifications

This section provides a summary of the features and specifications of the xSeries 220 server.

### **Microprocessor:**

- Intel® Pentium® III microprocessor with MMX™ technology and SIMD extensions
- 256 or 512 KB ECC, Level-2 cache
- 133 MHz front-side bus (FSB)
- Support for up to two microprocessors

### **Memory:**

- Standard: 128 or 256 MB
- Maximum: 4 GB
- Type: 133 MHz, ECC, SDRAM, registered DIMMs
- Slots: 4 DIMM connectors, noninterleaved

### **Drives standard:**

- Diskette: 1.44 MB
- CD-ROM: 20x-48X IDE
- Supports hot-swap SCSI hard disk drives (some models)

### **Expansion bays:**

- Two 5.25-in. bays (one CD-ROM drive installed)
- Two 3.5-in. bays (one diskette drive installed)
- Three 3.5-in. slim bays available in drive cage (some models have a hard disk drive installed)

### **PCI expansion slots:**

- Three 33 MHz/64-bit
- Two 33 MHz/32-bit

### **Power supply:**

One 330 watt autosensing (115-230 V ac)

### **Video:**

- S3 video controller (integrated on system board)
- Compatible with SVGA and VGA
- 8 MB SDRAM video memory

### **Size**

- Height: 470 mm (18.5 in.)
- Depth: 508 mm (20 in.)
- Width: 165 mm (6.5 in.)
- Weight: approximately 19.5 kg (43 lb.) when fully configured or 15.9 kg (35 lb.) minimum

### **Integrated functions:**

- Ultra160 SCSI low voltage differential (LVD) controller
- One 10BASE-T/100BASE-TX Intel Ethernet controller on the system board with Wake on LAN® support
- Automatic BIOS Recovery (ABR)
- Automatic Server Restart (ASR)
- Two serial ports

- Parallel port
- Two Universal Serial Bus (USB) ports
- Keyboard port
- Mouse port
- IDE controller port
- Video port

**Acoustical noise emissions:**

- Sound power, idling: 5.1 bel maximum
- Sound power, operating: 5.5 bel maximum

**Environment:**

- Air temperature:
  - Server on: 10° to 35° C (50.0° to 95.0° F). Altitude: 0 to 914 m (2998.7 ft)
  - Server on: 10° to 32° C (50.0° to 89.6° F). Altitude: 914 m (2998.7 ft) to 2133 m (6998.0 ft)
  - Server off: 10° to 43° C (50.0° to 109.4° F). Maximum altitude: 2133 m (6998.0 ft)
- Humidity:
  - Server on: 8% to 80%
  - Server off: 8% to 80%

**Heat output:**

Approximate heat output in British thermal units (Btu) per hour

- Minimum configuration: 341 Btu (100 watts)
- Maximum configuration: 1604 Btu (470 watts)

**Electrical input:**

- Sine-wave input (50-60 Hz) required
- Input voltage low range:
  - Minimum: 100 V ac
  - Maximum: 127 V ac
- Input voltage high range:
  - Minimum: 200 V ac
  - Maximum: 240 V ac
- Input kilovolt-amperes (kVA), approximately:
  - Minimum: 0.08 kVA
  - Maximum: 0.52 kVA

## Server features

The design of the server takes advantage of advancements in symmetric multiprocessing (SMP), data storage, and memory management. The server combines:

- Impressive performance using an innovative approach to SMP  
The server supports up to two Pentium III microprocessors. The server comes with one microprocessor installed; you can install an additional microprocessor to enhance performance and provide SMP capability.
- Large system memory  
The memory bus in the server supports up to 4 GB of non-interleaved system memory. The memory controller provides error correcting code (ECC) support

for up to four industry-standard PC133, 3.3 V, 168-pin, 8-byte, registered, synchronous-dynamic-random access memory (SDRAM) dual inline memory modules (DIMMs).

- System-management capabilities

System-management software is included with the server to manage the functions of the server locally and remotely. Refer to the documentation that comes with the system-management software for more information.

- Integrated network environment support

The server comes with an Ethernet controller on the system board. This Ethernet controller supports the Wake on LAN function and has an interface for connecting to 10-Mbps or 100-Mbps networks. The server automatically selects between 10BASE-T and 100BASE-TX environments. The controller provides full-duplex (FDX) capability, which allows simultaneous transmission and reception of data on the Ethernet local area network (LAN).

- IBM ServerGuide™ CDs

The ServerGuide CDs that are included with the server provide programs to help you set up the server and install the network operating system (NOS). The ServerGuide program detects the hardware options that are installed, and provides the correct configuration programs and device drivers. In addition, the ServerGuide CDs include a variety of application programs for the server.

---

## Reliability, availability, and serviceability

Three of the most important considerations in server design are reliability, availability, and serviceability (RAS). The RAS factors help to ensure the integrity of the data that is stored on the server, the availability of the server when it is needed; and the ease with which problems can be diagnosed and repaired.

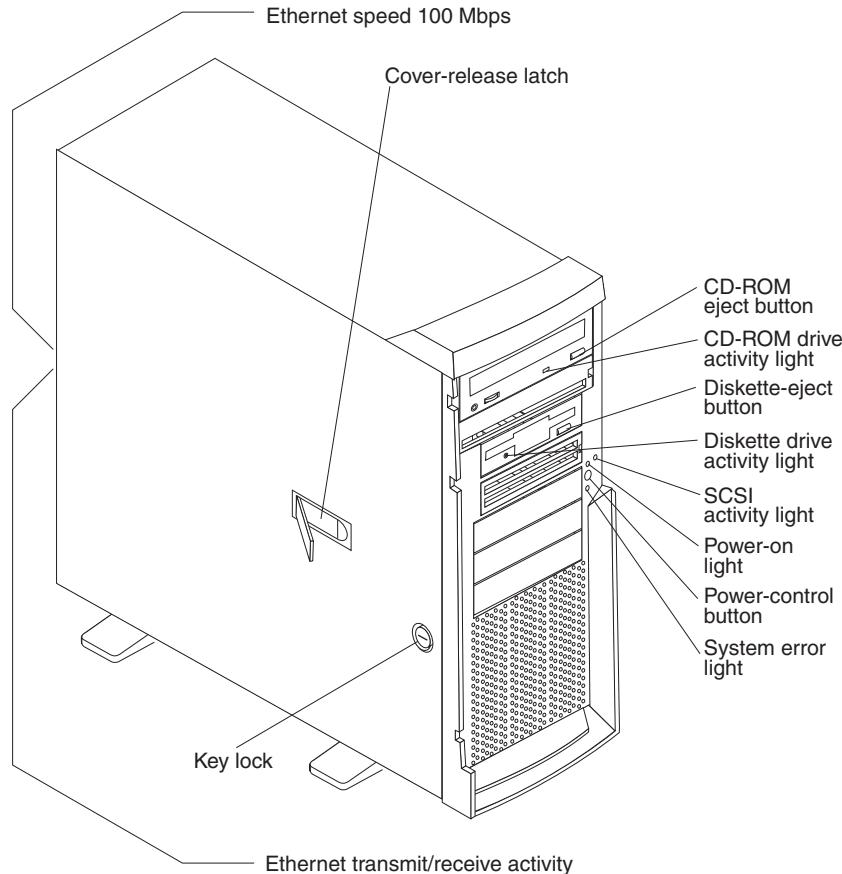
The following is an abbreviated list of the RAS features that e server supports:

- Automatic Server Restart (ASR) after a power failure or system hang
- Automatic BIOS Recovery (ABR) which enables the server to recover if the BIOS is defective or becomes corrupt
- Cyclic redundancy check (CRC) checking on the small computer system interface (SCSI) bus, the diskette interface, and the Universal Serial Bus (USB)
- Parity checking on the keyboard, serial, and memory interface
- Microprocessor Built In Self Test (BIST) with internal error checking
- Diagnostic light-emitting diodes (LEDs)
- Error checking and correcting (ECC) memory
- Error codes, messages, and logs
- Hard disk drive Predictive Failure Analysis (PFA)
- Menu-driven setup, system configuration, optional redundant array of independent disks (RAID) configuration, and diagnostic programs
- Optional IBM Remote Supervisor Adapter subsystem to provide control for remote system management
- Wake on LAN function through onboard Ethernet controller
- Power and temperature monitoring
- Power-on self-test (POST)
- Processor serial number access
- System error logging (POST)
- Upgradeable basic input/output system (BIOS) code and diagnostics

- Vital product data (VPD) on memory, system board, and hot-swap drive backplane

## Server controls and indicators

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



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

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

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

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

**SCSI activity light:** When this green light is flashing, the controller is accessing a SCSI device, for example, a hard disk drive.

**Note:** Hot-swap hard disk drives also have an activity light. This light is also known as the SCSI hard disk drive activity light.

If the server has a ServeRAID™ controller installed and this light flashes slowly (one flash per second), the drive is being rebuilt. When the light flashes rapidly (three flashes per second), the controller is identifying the drive.

**Power-on light:** When this green light is on, system power is present in the server.

**Power-control button:** Press this button to manually turn the server on or off.

**System error light:** When this amber light is on, it indicates that a system error has occurred. An amber error light on the interior of the server, adjacent to the faulty component, will also be on to further isolate the error. (For more information, see “Diagnostics” on page 11.)

**Cover-release latch:** Slide this lever to release the cover.

**Key lock:** Use the key that comes with your server to unlock the over.

## Turning on the server

Turning on the server refers to the act of plugging the power cord of your server into the power source and starting the operating system.

After you plug the power cord of your server into the power supply and an electrical outlet, the server can start in any of the following ways:

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

**Note:** After you plug the power cord of your server into an electrical outlet, wait approximately 20 seconds before pressing the power-control button. During this time, the system is initializing; therefore, the power-control button does not respond.

- If the server is turned on and a power failure occurs, the server will start automatically when power is restored.
- The Wake on LAN feature will turn on the server at the set time (when a Magic Packet is received), provided that all of the following conditions are met:
  - AC power is present.
  - The server is either off or shut down from an Advanced Configuration and Power Interface (ACPI) operating system.
  - The Wake on LAN feature is enabled in the Configuration/Setup Utility program.

### Notes:

1. For additional information on the Wake on LAN function, adapters, and cables, refer to the documentation that comes with the adapters.
2. See “Ethernet port” on page 74 for information on Ethernet controllers and adapters, and Wake on LAN PCI adapters.
- If the IBM Remote Supervisor Adapter is installed in your server, the Remote Supervisor Adapter can turn on the server.
- The server has an Automatic BIOS Recovery (ABR) feature which allows recovery from defective BIOS in some cases.
- The server provides Automatic Server Restart (ASR) logic that supports restarting the system when there is an operating system hang.

### Notes:

1. you can install a circular disk over the power-control button to prevent accidental manual power-off. The disk, known as the power-control button shield, comes with your server.
2. See “Choices available from the Configuration/Setup main menu” on page 30 for a description of the Configuration/Setup Utility program.
3. See “System board options connectors” on page 40 for connector locations.

## Turning off the server

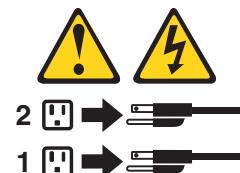
Turning off the server refers to the act of disconnecting the server from the power source.

### 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.



You can turn off the server in any of the following ways:

- You can press the power-control button on the top of the server. This starts an orderly shutdown of the operating system, if this feature is supported by your operating system.

**Note:** After turning off the server, wait at least five seconds before you press the power-control button to turn on the server again.

- You might need to press and hold the power-control button for more than four seconds to cause an immediate shutdown of the server and to force the power off. You can use this feature if the operating system stops functioning.
- You can disconnect the server power cords from the electrical outlets to shut off all power to the server.

**Note:** After disconnecting the power cords, wait approximately 15 seconds for your system to stop running. Watch for the power-on light to stop blinking.



---

# Diagnostics

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

If you cannot locate and correct the problem using the information in this section, refer to "Symptom-to-FRU index" on page 91 for more information.

---

## Diagnostic tools overview

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

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

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

- **Diagnostic programs and error messages**

The server diagnostic programs are stored in upgradable read-only memory (ROM) on the system board. These programs are the primary method of testing the major components of the server. See "Diagnostic programs and error messages" on page 12 for more information.

- **Diagnostic LEDs**

The server has light-emitting diodes (LEDs) to help you identify problems with server components. These LEDs are part of the diagnostics that are built into the server. See "Diagnostic LEDs" on page 17 for more information.

---

## POST

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 and an error message appears on the screen. See "POST beep codes" and "POST error messages" on page 12 for more information.

**Notes:**

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

## POST beep codes

Beep codes are sounded in a series of beeps. For example, a 1-2-4 beep code sounds like one beep, a pause, two consecutive beeps, another pause, and four more consecutive beeps.

- One beep indicates the successful completion of POST.
- More than one beep indicates that POST detected a problem. For more information, see “Beep symptoms” on page 91.

## POST error messages

POST error messages occur during startup when POST finds a problem with the hardware or detects a change in the hardware configuration. For a list of POST errors, see “POST error codes” on page 99.

## POST error log

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

To view the contents of the error logs, start the Configuration/Setup Utility program (see “Starting the Configuration/Setup Utility program” on page 29); then, select **Error Logs** from the main menu.

## Small computer system interface messages

The following table lists actions to take if you receive a SCSI error message.

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

You will get these messages only when running the SCSISelect Utility.

*Table 1. SCSI messages*

SCSI Messages	Description
All	<p>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</li> <li>• Duplicate SCSI IDs in the same SCSI chain</li> <li>• An improperly installed SCSI terminator</li> <li>• A defective SCSI terminator</li> <li>• An improperly installed cable</li> <li>• A defective cable</li> </ul> <p><b>Action:</b> Verify that:</p> <ul style="list-style-type: none"> <li>• The external SCSI devices are turned on. External SCSI devices must be turned on <i>before</i> the server.</li> <li>• The cables for all external SCSI devices are connected correctly.</li> <li>• The last device in each SCSI chain is terminated properly.</li> <li>• The SCSI devices are configured correctly.</li> </ul> <p>If the above items are correct, run the diagnostic programs to obtain additional information about the failing device.</p>

## Diagnostic programs and error messages

The server diagnostic programs are stored in upgradable read-only memory (ROM) on the system board. 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 necessarily intended to be used to identify a failing part. Troubleshooting and servicing of complex problems that are indicated by error messages should be performed by trained service personnel.

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

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

The error code format is as follows:

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

where:

**fff** is the three-digit function code that indicates the function being tested when the error occurred. For example, function code 089 is for the microprocessor.

**ttt** is the three-digit failure code that indicates the exact test failure that was encountered.

**iii** is the three-digit device ID.

**date** is the date that the diagnostic test was run and the error recorded.

**cc** is the check digit that is used to verify the validity of the information.

#### **text message**

is the diagnostic message that indicates the reason for the problem.

## **Text messages**

The diagnostic text message format is as follows:

Function Name: Result (test specific string)

where:

#### **Function Name**

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

**Result** can be one of the following:

#### **Passed**

This result occurs when the diagnostic test completes without any errors.

**Failed** This result occurs when the diagnostic test discovers an error.

#### **User Aborted**

This result occurs when you stop the diagnostic test before it is complete.

#### **Not Applicable**

This result occurs when you specify a diagnostic test for a device that is not present.

#### **Aborted**

This result occurs when the test could not proceed because of the system configuration.

#### **Warning**

This result occurs when a possible problem is reported during the diagnostic test, such as when a device that is to be tested is not installed.

#### **Test Specific String**

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

## **Starting the diagnostic programs**

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

To start the diagnostic programs:

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

#### **Notes:**

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

When the tests have completed, you can view the Test Log by selecting **Utility** from the top of the screen.

If the hardware checks out OK but the problem persists during normal server operations, a software error might be the cause. If you suspect a software problem, refer to the information that comes with the software package.

## **Viewing the test log**

The test log will not contain any information until after the diagnostic program has run.

**Note:** If you already are running the diagnostic programs, begin with step 3 .

To view the test log:

1. Turn on the server and watch the screen.  
If the server is on, shut down the operating system and restart the server.
2. When the message F2 for Diagnostics appears, press F2.  
If a power-on password is set, the server prompts you for it. Type in the appropriate password; then, press Enter.
3. When the Diagnostic Programs screen appears, select **Utility** from the top of the screen.
4. Select **View Test Log** from the list that appears; then, follow the instructions on the screen.

The system maintains the test-log data while the server is powered on. When you turn off the power to the server, the test log is cleared.

## Diagnostic error messages

For descriptions of the error messages that might appear when you run the diagnostic programs, see "Diagnostic error codes" on page 94. If diagnostic error messages appear that are not listed in those tables, make sure that the server has the latest levels of BIOS, ServeRAID, and diagnostics microcode installed.

---

## Power checkout

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

A general procedure for troubleshooting power problems is as follows:

1. Power off the system and disconnect the AC cord(s).
2. Check for loose cables in the power subsystem. Also check for short circuits, for instance if there is a loose screw causing a short circuit on a circuit board.
3. Remove adapters and disconnect the cables and power connectors to all internal and external devices until system is at minimum configuration required for power on (see "Minimum operating requirements" on page 106).
4. Reconnect the AC cord and power on the system. If the system powers up successfully, replace adapters and devices one at a time until the problem is isolated. If system does not power up from minimal configuration, replace FRUs of minimal configuration one at a time until the problem is isolated.

To use this method it is important to know the minimum configuration required for a system to power up (see page 106).

---

## Recovering BIOS

The flash memory of the server consists of a primary BIOS page and a backup BIOS page. The server has an Automatic BIOS Recovery (ABR) feature which allows recovery when the BIOS is damaged (e.g. BIOS is damaged when the server loses power during the flash update). When the ABR feature finds the primary BIOS damaged, circuitry switches to the backup BIOS and restarts the system. If the primary BIOS has become damaged, ABR will proceed and boot the backup BIOS and the system will function normally. However, the primary BIOS should be updated using a BIOS flash diskette as soon as possible. The flash diskette always

updates the primary BIOS. The backup BIOS can be updated by moving the primary BIOS to the backup BIOS page during the diskette flash update process. The ABR feature can be disabled with the jumper J20; this action is not normally required.

**Note:** You can obtain a BIOS flash diskette from one of the following sources:

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

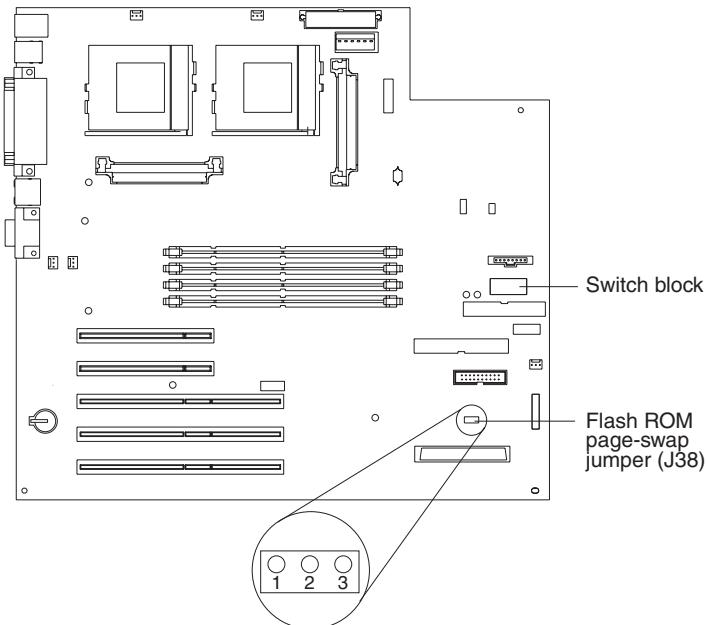
To recover the BIOS, do the following:

1. Shutdown the server
2. Insert the BIOS flash diskette into the diskette drive.
3. Restart the server. The system begins the power-on self-test (POST).
4. Follow the on-screen instructions to update the BIOS.
5. Restart the server when the flash update is complete.

Another jumper, J38, can be used to force the system to boot from the backup POST/BIOS (manually boot to backup BIOS). Normally this action is not required, but if the primary BIOS is damaged, and ABR is not functioning properly, the jumper can be moved for troubleshooting purposes. If jumper J38 is in the backup page position, the ABR feature is disabled, regardless of the jumper J20 position, and the system will boot from the backup BIOS page.

To manually boot to backup BIOS and recover primary BIOS:

1. Turn off the server and peripheral devices and disconnect power cords and all external cables; then, remove the cover.
2. Locate jumper J38 on the system board.



3. Move J38 to the "lo" setting (pins 1 and 2) to enable BIOS recovery mode (manual boot).
4. Reconnect the power cord.

5. Insert the BIOS flash diskette in the diskette drive.
6. Restart the server. The system begins the power-on self-test (POST).
7. Follow the on-screen instructions to update the BIOS.
8. Turn off the server and unplug the power cord when the flash update is complete.
9. Move jumper J38 to the "hi" setting (pins 2 and 3) to return to normal startup mode.
10. Re-connect the power cord and all external cables and re-install the cover.
11. Restart the server

## **Identifying problems using status LEDs**

The server has LEDs to help you identify problems with some server components. These LEDs are part of the diagnostics that are built into the server. Use the illuminated LEDs to identify the failing or incorrectly installed components.

### **Front panel and system board LEDs**

The system error LED is on the front panel inside the server. All of the remaining error LEDs are on the system board, adjacent to the failing components. See "Diagnostic LEDs" for information on identifying problems using these LEDs.

The meanings of these LEDs are as follows:

<b>CPU 1</b>	Microprocessor number 1 (connector U12) fault
<b>CPU 2</b>	Microprocessor number 2 (connector U11) fault
<b>Fan 1</b>	Fan number 1 (connector J10) failure (see note 1)
<b>Fan 2</b>	Fan number 2 (connector J18) failure (see note 1)
<b>Fan 3</b>	Fan number 3 (connector J3) failure (see note 1)
<b>Fan 4</b>	Fan number 4 (connector J2) failure (see note 1)
<b>DIMM 1</b>	DIMM number 1 (connector DIMM 1) fault
<b>DIMM 2</b>	DIMM number 2 (connector DIMM 2) fault
<b>DIMM 3</b>	DIMM number 3 (connector DIMM 3) fault
<b>DIMM 4</b>	DIMM number 4 (connector DIMM 4) fault
<b>VRM 1</b>	Microprocessor VRM number 1 (connector J42) fault (see note 1)
<b>VRM 2</b>	Microprocessor VRM number 2 (connector J12) fault (see note 1)

#### **Notes:**

1. The fan and VRM LEDs will illuminate only if the IBM Remote Supervisor Adapter is installed in the server.
2. The server does not support user-replaceable power supplies or fans.

## **Diagnostic LEDs**

You can use the diagnostic LEDs built into the server to quickly identify the type of system error that occurred. The server is designed so that LEDs remain illuminated when the server shuts down, as long as the power supply is operating properly. This feature helps you to isolate the problem if an error causes the server to shut down. To correct specific problems, see "Symptom-to-FRU index" on page 91.

*Table 2. Diagnostic LEDs*

System Error LED (on front panel)	System board LED	Cause	Action
On A system error was detected. Check to see which of the LEDs on the system board are on.	None	The system error log is 75% or more full or a Predictive Failure Analysis (PFA) alert was logged. This could also be caused by a Processor terminal problem.	Check the system error log and correct any problems. See “Choices available from the Configuration/Setup main menu” on page 30 for more information about clearing the error log. Disconnecting the server from all power sources for at least 20 seconds will turn off the system error LED. Check mounting of the processor sink fans.
On	DIMM1, DIMM2, DIMM3, or DIMM4	A memory error occurred.	<ol style="list-style-type: none"> <li>1. Check the DIMM error LEDs on the system board.</li> <li>2. Replace the DIMM indicated by the lit DIMM error LED.</li> </ol>
On	CPU1 or CPU2	One of the microprocessors has failed, or a microprocessor is installed incorrectly.	<ol style="list-style-type: none"> <li>1. Check the microprocessor error LEDs on the system board. If a microprocessor error LED is on for a microprocessor connector that has a terminator card installed instead of a microprocessor, the microprocessors are not installed in the correct order. See “Installing and removing a microprocessor” on page 61 for information about the correct order for installing microprocessors. Otherwise, continue with the next step.</li> <li>2. Turn off the server, reseat the microprocessor indicated by the lit microprocessor LED, and restart the server.</li> <li>3. If the problem persists, replace the microprocessor.</li> </ol>
On	Fan 1, Fan 2, Fan 3, or Fan 4	One of the fans has failed or is operating too slowly.	The LED on the failing fan will be lit. Replace the fan with the lit LED.

*Table 2. Diagnostic LEDs (continued)*

System Error LED (on front panel)	System board LED	Cause	Action
On	VRM1 or VRM2	One of the microprocessor VRMs has failed, or a microprocessor VRM is installed in the wrong connector.	<ol style="list-style-type: none"> <li>1. Check the microprocessor VRM error LEDs on the system board. If a microprocessor VRM error LED is on for a microprocessor VRM connector that has a terminator card installed instead of a microprocessor, the microprocessor VRMs are not installed in the correct order. See "Installing and removing a microprocessor" on page 61 for information about the correct order for installing microprocessor VRMs. Otherwise, continue with the next step.</li> <li>2. Turn off the server, reseat the microprocessor VRM indicated by the lit microprocessor VRM error LED, and restart the server.</li> <li>3. If the problem persists, replace the microprocessor VRM.</li> </ol>
Off	None	The diagnostic LEDs have not detected a system error.	None

## Replacing the battery

When replacing the battery you must replace it with a lithium battery of the same type, from the same manufacturer. To avoid possible danger read and follow the safety statement below.

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

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



**CAUTION:**

When replacing the 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.

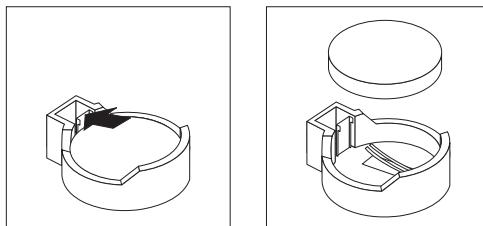
*Do not:*

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

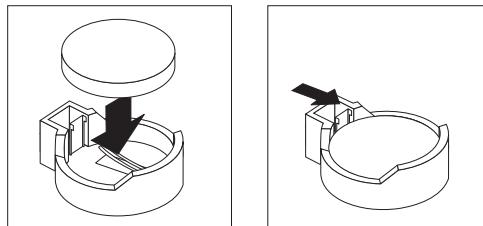
**Dispose of the battery as required by local ordinances or regulations.**

Do the following to replace the battery:

1. Read "System reliability considerations" on page 44, and follow any special handling and installation instructions supplied with the replacement battery.
2. Turn off the server and peripheral devices and disconnect power cords and all external cables; then, remove the server cover.
3. Do the following to remove the battery:
  - a. Use one fingernail to press the top of the battery clip away from the battery.
  - b. Use your thumb and index finger to lift the battery from the socket.
  - c. Ensure that the battery clip is touching the base of the battery socket by pressing gently on the clip.



4. Do the following to 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.



5. Reinstall the server cover and connect all device and signal cables, and then power cords.
6. Turn on the server.
7. Start the BIOS Setup Utility program and set configuration parameters.
  - Set the system date and time.
  - Set passwords if necessary.

- Save the configuration.

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## Temperature checkout

Proper cooling of the system is important for proper operation and system reliability. For a typical IBM xSeries server, you should make sure:

- Each of the drive bays has either a drive or a filler panel installed
- The cover is in place during normal operation
- There is at least 50 mm (2 inches) of ventilated space at the sides of the server and 100 mm (4 inches) at the rear of the server
- The cover is removed for no longer than 30 minutes while the server is operating
- A removed hot-swap drive is replaced within two minutes of removal
- Cables for optional adapters are routed according to the instructions provided with the adapters (ensure that cables are not restricting air flow)
- The fans are operating correctly and the air flow is good
- A failed fan is replaced within 48 hours

In addition, ensure that the environmental specifications for the system are met. See "Features and specifications" on page 4.

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## Diagnosing errors

To find solutions to problems that have definite symptoms, see "Error symptoms" on page 97.

If you cannot find the problem there, go to "Starting the diagnostic programs" on page 14 to test the server.

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

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

## Troubleshooting the Ethernet controller

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

### Network connection problems

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

- 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 persists, try a different cable.

If you set the Ethernet controller to operate at 100 Mbps, you must use Category 5 cabling.

If you directly connect two workstations (without a hub), or if you are not using a hub with X ports, use a crossover cable.

**Note:** To determine whether a hub has an X port, check the port label. If the label contains an X, the hub has an X port.

- Determine if the hub supports auto-negotiation. If not, try configuring the integrated Ethernet controller manually to match the speed and duplex mode of the hub.
- Check the LAN activity light on the rear of the server. The LAN activity light illuminates when the Ethernet controller sends or receives data over the Ethernet network. If the LAN activity light is off, make sure that the hub and network are operating and that the correct device drivers are loaded.
- Make sure that you are using the correct device drivers, supplied with your server.
- Check for operating system-specific causes for the problem.
- Make sure that the device drivers on the client and server are using the same protocol.
- Test the Ethernet controller.

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

### **Ethernet controller troubleshooting chart**

You can use the following troubleshooting chart to find solutions to 10/100 Mbps Ethernet controller problems that have definite symptoms.

*Table 3. Ethernet troubleshooting chart*

Ethernet controller problem	Suggested Action
The server stops running when loading device drivers.	<p>The PCI BIOS interrupt settings are incorrect.</p> <p>Check the following:</p> <ul style="list-style-type: none"> <li>• Determine if the interrupt (IRQ) setting assigned to the Ethernet controller is also assigned to another device in the Configuration/Setup Utility program.</li> </ul> <p>Although interrupt sharing is allowed for PCI devices, some devices do not function well when they share an interrupt with a dissimilar PCI device. Try changing the IRQ assigned to the Ethernet controller or the other device. For example, for NetWare Versions 3 and 4 it is recommended that disk controllers not share interrupts with LAN controllers.</p> <ul style="list-style-type: none"> <li>• Make sure that you are using the most recent device driver available from the World Wide Web.</li> <li>• Run the network diagnostic program.</li> </ul>
The LAN activity light does not light.	<p>Check the following:</p> <ul style="list-style-type: none"> <li>• Make sure that you have loaded the network device drivers.</li> <li>• The network might be idle. Try sending data from this workstation.</li> <li>• Run diagnostics on the LEDs.</li> <li>• The function of this LED can be changed by device driver load parameters. If necessary, remove any LED parameter settings when you load the device drivers.</li> </ul>
Data is incorrect or sporadic.	<p>Check the following:</p> <ul style="list-style-type: none"> <li>• Make sure that you are using Category 5 cabling when operating the server at 100 Mbps.</li> <li>• Make sure that the cables do not run close to noise-inducing sources like fluorescent lights.</li> </ul>

*Table 3. Ethernet troubleshooting chart (continued)*

Ethernet controller problem	Suggested Action
The Ethernet controller stopped working when another adapter was added to the server.	<p>Check the following:</p> <ul style="list-style-type: none"> <li>• Make sure that the cable is connected to the Ethernet controller.</li> <li>• Make sure that your PCI system BIOS is current.</li> <li>• Reseat the adapter.</li> <li>• Determine if the interrupt (IRQ) setting assigned to the Ethernet adapter is also assigned to another device in the 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 adapter or the other device.</p>
The Ethernet controller stopped working without apparent cause.	<p>Check the following:</p> <ul style="list-style-type: none"> <li>• Run diagnostics for the Ethernet controller.</li> <li>• Try a different connector on the hub.</li> <li>• Reinstall the device drivers. Refer to your operating-system documentation and to the ServerGuide information.</li> </ul>

## Ethernet controller messages

The integrated Ethernet controller might display messages from the following device drivers:

- Novell® NetWare® or IntraNetWare Server ODI
- NDIS Adapter for level 4.0 (Microsoft® Windows NT®)

### Novell NetWare or IntraNetWare server ODI driver teaming messages

This section provides explanations of the error messages for the Novell NetWare or IntraNetWare server ODI driver, and suggested actions to resolve each problem.

*Table 4. NetWare driver messages for the Ethernet controller*

Message	Description
Couldn't allocate resources	<p><b>Explanation:</b> An unknown error has occurred when trying to allocate needed resources for the AFT Module. <b>Action:</b></p> <ul style="list-style-type: none"> <li>• Check the server configuration. If the problem persists, contact your network supplier.</li> <li>• Verify that the Ethernet controller is enabled. If the Ethernet controller is enabled, run the diagnostic programs.</li> </ul>
AFT group for primary adapter in slot <i>nnn</i> already exists.	<p><b>Explanation:</b> An attempt was made to rebind an adapter already in an AFT group. <b>Action:</b> Check the AFT slot numbers for existing AFT teams. If the problem persists, contact your network supplier.</p>
Error locating DCT addresses in internal table. Make sure that you have loaded LAN drivers after loading AFT.NLM.	<p><b>Explanation:</b> The bind command was entered prior to loading the device driver. The device driver must be loaded after loading AFT.NLM but before any bind command can be issued. <b>Action:</b> Load the driver for the supported adapter and try loading the AFT module again. If the problem persists, contact your network supplier.</p>
Insufficient number of arguments specified.	<p><b>Explanation:</b> The appropriate or expected number of parameters was not entered in a command. <b>Action:</b> Check the parameters required for the given command. If the problem persists, contact your network supplier.</p>

*Table 4. NetWare driver messages for the Ethernet controller (continued)*

Message	Description
Duplicate slot numbers detected.	<b>Explanation:</b> An attempt has been made to bind the same slot number more than once. <b>Action:</b> Check the slot numbers entered during the bind. Adapter slot numbers must be valid and unique. If the problem persists, contact your network supplier.
'Xxx' is not supported for AFT team.	<b>Explanation:</b> A bind command has been issued for adapters not supported by AFT.NLM. <b>Action:</b> Make sure that you attempt to bind only adapters supported by AFT.NLM.
Primary and Secondary adapters do not match. AFT group is not created.	<b>Explanation:</b> A bind command was entered for an adapter team that is a combination of server and client adapters. An AFT team must be a grouping of the same classification of adapter. <b>Action:</b> Verify that all the adapters bound in a team are of the same classification.
Requested number of Secondary cards are not found.	<b>Explanation:</b> The number of adapters specified in the bind command could not be located. <b>Action:</b> Verify the numbers and slot locations of the adapters to be bound. If the problem persists, contact your network supplier.
Failed to create AFT group. Make sure that the drivers for supported adapters are loaded, primary adapter is bound to protocols, and secondary adapter is not bound to any protocols.	<b>Explanation:</b> Binding of protocol failed. Protocol is either not bound to any adapter or is bound to more than one adapter in the group. <b>Action:</b> Ensure that the protocol is bound to only adapter in an AFT team.
Error identifying slot numbers for the specified board names.	<b>Explanation:</b> The mapping between the board name entered and the slot number for an adapter could not be established. <b>Action:</b> Check the board name for the adapter before issuing the bind command. If the problem persists, contact your network supplier.
Can't unbind specified slot from AFT group. Make sure that the slot you specified is for the primary adapter in an AFT group.	<b>Explanation:</b> The number entered in the unbind command was not the primary adapter in an AFT group. <b>Action:</b> Reissue the unbind command and specify the slot number for the primary adapter.
LAN adapter at slot <i>nnnn</i> (Port 0x <i>aa</i> ) failed to reset. Check the state of the adapter.	<b>Explanation:</b> The adapter that you specified could not be initialized. <b>Action:</b> <ol style="list-style-type: none"> <li>1. Load the driver for the supported adapter.</li> <li>2. Check that the adapter is seated properly in the slot and try loading the AFT module again.</li> </ol> If the problem persists, contact your network supplier.
AFT is not supported on this version of NetWare <sup>®</sup> .	<b>Explanation:</b> The NetWare on your server is not a version supported by AFT. <b>Action:</b> Load and bind AFT only on supported versions of NetWare (currently version 4.11 and above).
Failed to allocate resources tags.	<b>Explanation:</b> An unknown error has occurred when trying to allocate needed resources for the AFT module. <b>Action:</b> Check Server Configuration. If the problem persists, contact your network supplier.
Please unload all LAN drivers before unloading AFT.NLM.	<b>Explanation:</b> An attempt was made to unload the AFT.NLM module before unloading the adapter driver. <b>Action:</b> Unload the adapter driver before unloading the AFT module.

## NDIS 4.0 (Microsoft® Windows NT®) driver messages

This section contains the error messages for the NDIS 4.0 drivers. The explanation and recommended action are included with each message.

*Table 5. NDIS (Windows NT or Windows® 2000) driver messages for the Ethernet controller*

Error code (hex)	Description
0x00	<b>Explanation:</b> The driver could not register the specified interrupt. <b>Action:</b> Using the Configuration/Setup Utility, make sure that a PCI interrupt is assigned to your Ethernet card, and that Ethernet is enabled.
0x01	<b>Explanation:</b> One of the PCI cards did not get the required resources. <b>Action:</b> Using the Configuration/Setup Utility, make sure that a PCI interrupt is assigned to your Ethernet card, and that Ethernet is enabled.
0x02	<b>Explanation:</b> Bad node address (multicast address). <b>Action:</b> Make sure the locally administered address is valid, if one is specified. The address can not be a multicast address.
0x03	<b>Explanation:</b> Failed self-test. <b>Action:</b> Make sure a cable is attached to the Ethernet connector.
0x0D	<b>Explanation:</b> Could not allocate enough memory for transmit queues. <b>Action:</b> <ol style="list-style-type: none"> <li>From the Windows NT desktop, select <b>Start -&gt; Control Panel -&gt; Networks -&gt; Adapters.</b></li> <li>Select your IBM Ethernet adapter from the list.</li> <li>Select <b>Properties -&gt; Advanced.</b></li> <li>Lower the resource values that apply to the transmit queue.</li> </ol>
0x0E	<b>Explanation:</b> Could not allocate enough memory for receive queue. <b>Action:</b> <ol style="list-style-type: none"> <li>From the Windows NT desktop, select <b>Start -&gt; Control Panel -&gt; Networks -&gt; Adapters.</b></li> <li>Select your IBM Ethernet adapter from the list.</li> <li>Select <b>Properties -&gt; Advanced.</b></li> <li>Lower the resource values that apply to the receive queue.</li> </ol>
0x0F	<b>Explanation:</b> Could not allocate enough memory for other structures. <b>Action:</b> <ol style="list-style-type: none"> <li>From the Windows NT desktop, select <b>Start -&gt; Control Panel -&gt; Networks -&gt; Adapters.</b></li> <li>Select your IBM Ethernet adapter from the list.</li> <li>Select <b>Properties -&gt; Advanced.</b></li> <li>Lower the value for the resource named in the message.</li> </ol>
0x10	<b>Explanation:</b> Did not find any Ethernet controllers. <b>Action:</b> Using the Configuration/Setup Utility, make sure that Ethernet is enabled.
0x11	<b>Explanation:</b> Multiple Ethernet controllers found, but none matched the required ID. <b>Action:</b> Using the Configuration/Setup Utility, make sure that Ethernet is enabled.
0x13	<b>Explanation:</b> Did not find any Ethernet controllers that matched the required subven/subdev. <b>Action:</b> Using the Configuration/Setup Utility, make sure that Ethernet is enabled.
0x16	<b>Explanation:</b> Single adapter found but multiple instances tried to load. <b>Action:</b> Using the Configuration/Setup Utility, make sure that Ethernet is enabled, and that the slot containing the IBM Netfinity 10/100 Ethernet Adapter or the IBM 10/100 EtherJet® PCI adapter is enabled.
0x17	<b>Explanation:</b> Slot parameter not specified in the registry. <b>Action:</b> Remove the adapter driver and reinstall it. If the problem persists, call for service.

### Ethernet teaming messages:

*Table 6. NDIS (Windows NT or Windows 2000) driver teaming messages for the Ethernet controller*

Event ID	Type	Description
01	Error	<b>Explanation:</b> Team Name and physical adapter name are the same. This is an invalid configuration. <b>Action:</b> Reconfigure the adapter team by double-clicking the PROSet icon in the control panel.
02	Error	<b>Explanation:</b> Unable to allocate required resources. <b>Action:</b> Free some memory resources and restart.
03	Error	<b>Explanation:</b> Unable to read required registry parameters. <b>Action:</b> Reconfigure the adapter team by double-clicking the PROSet icon in the control panel.
04	Error	<b>Explanation:</b> Unable to bind to physical adapter. <b>Action:</b> Reconfigure the adapter team by double-clicking the PROSet icon in the control panel.
05	Error	<b>Explanation:</b> Unable to initialize an adapter team. <b>Action:</b> Reconfigure the adapter team by double-clicking the PROSet icon in the control panel.
06	Informational	<b>Explanation:</b> Team <i>nn</i> . Primary adapter is initialized. <b>Action:</b> None.
07	Informational	<b>Explanation:</b> Team <i>nn</i> . Secondary adapter is initialized. <b>Action:</b> None.
08	Informational	<b>Explanation:</b> Team <i>nn</i> . Virtual adapter or Team is initialized. <b>Action:</b> None.
09	Informational	<b>Explanation:</b> Team <i>nn</i> . Primary adapter is switching over. <b>Action:</b> None.
10	Warning	<b>Explanation:</b> Team <i>nn</i> . Adapter link down. <b>Action:</b> Make sure the adapter is functioning properly.
11	Informational	<b>Explanation:</b> Team <i>nn</i> . Secondary adapter took over. <b>Action:</b> None.
12	Warning	<b>Explanation:</b> Team <i>nn</i> . Secondary adapter is deactivated from the Team. <b>Action:</b> Make sure the secondary adapter is functioning properly and that the adapter cable is securely connected to the LAN.
13	Informational	<b>Explanation:</b> Team <i>nn</i> . Secondary adapter has rejoined the Team. <b>Action:</b> None.
14	Informational	<b>Explanation:</b> Team <i>nn</i> . Secondary adapter link is up. <b>Action:</b> None.
15	Error	<b>Explanation:</b> Team <i>nn</i> . The last adapter has lost its link. Network connection has been lost. <b>Action:</b> Shut down the server and replace the adapters; then, restart the server to reestablish the connection.
16	Informational	<b>Explanation:</b> Team <i>nn</i> . An adapter has re-established the link. Network connection has been restored. <b>Action:</b> None.
17	Informational	<b>Explanation:</b> Team <i>nn</i> . Preferred primary adapter has been detected. <b>Action:</b> None.
18	Informational	<b>Explanation:</b> Team <i>nn</i> . Preferred secondary adapter has been detected. <b>Action:</b> None.

*Table 6. NDIS (Windows NT or Windows 2000) driver teaming messages for the Ethernet controller (continued)*

Event ID	Type	Description
19	Informational	<b>Explanation:</b> Team <i>nn</i> . Preferred primary adapter took over. <b>Action:</b> None.
20	Informational	<b>Explanation:</b> Team <i>nn</i> . Preferred secondary adapter took over. <b>Action:</b> None.
21	Warning	<b>Explanation:</b> Team <i>nn</i> . Primary adapter does not sense any Probes. Possible reason: partitioned Team. <b>Action:</b> Make sure the cables of the adapter team are connected to the same LAN segment. Reconfigure the team if necessary.



---

# Configuration

The following configuration programs are provided with the server:

- **Configuration/Setup Utility**

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

- **SCSISelect Utility**

With the built-in SCSISelect Utility program, you can configure the devices attached to the integrated SCSI controller. See “Using the SCSISelect utility program” on page 35 for more information.

- **PXE Boot Agent Utility**

The Preeboot eXecution Environment (PXE) Boot Agent Utility program is part of the BIOS code that comes with your server. You can use this program to change network startup (boot) protocols and startup (boot) order, to select operating system wake up support, and to set menu wait times. See “Using the PXE boot agent utility program” on page 37 for more information.

**Attention:** The network startup protocols and startup order are not supported on this product.

- **ServerGuide CDs**

The ServerGuide CDs include software setup and installation tools specifically designed for IBM xSeries servers. You can use these CDs during the initial installation of the server to configure the server hardware and simplify the network operating system installation. The ServerGuide CDs also contain a collection of application programs, which you can install after the server is up and running.

- **ServeRAID programs**

The ServeRAID programs come with the optional ServeRAID adapters. If the server has a ServeRAID adapter installed, you must use the ServeRAID configuration program to define and configure the disk-array subsystem *before* you install the operating system. Refer to the ServeRAID documentation provided on the *IBM xSeries Documentation CD*.

---

## Using the Configuration/Setup Utility program

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

### Starting the Configuration/Setup Utility program

To start the Configuration/Setup Utility program, do the following:

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

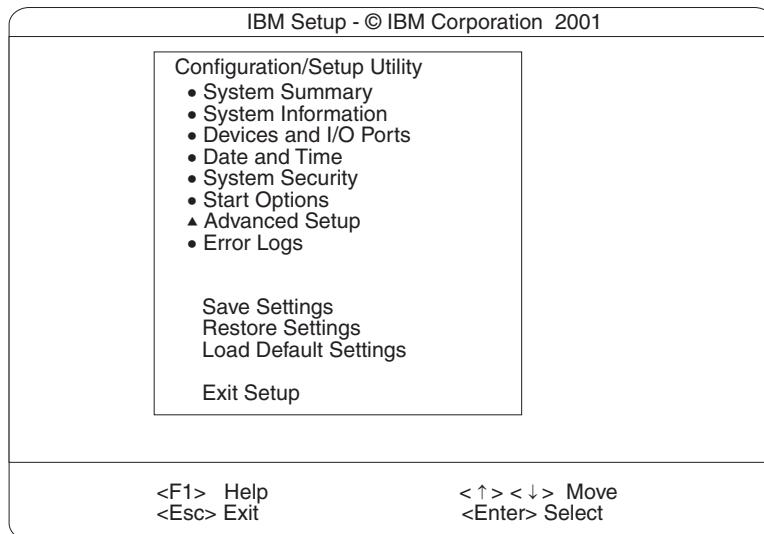
**Notes:**

- a. You can set an administrator password through the Configuration/Setup Utility program only if the optional system management adapter is installed in your server.

- b. If you have set both levels of passwords (user and administrator), you must type the administrator password to access the full Configuration/Setup Utility menu.
- 3. Follow the instructions that appear on the screen.

## Choices available from the Configuration/Setup main menu

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



### Notes:

1. You can press F1 to display help information for a selected menu item.
2. The choices on some menus might differ slightly from the ones that are described in this book, depending on the BIOS version in the server.

Descriptions of the choices that are available from the main menu are as follows:

- **System Summary**

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

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

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

- **System Information**

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

- **Product Data**

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

- **Devices and I/O Ports**

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

- **Date and Time**

Select this choice to set the system date and time.

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

- **System Security**

Select this choice to set passwords. This choice appears only on the full Configuration/Setup Utility main menu.

You can implement two levels of password protection:

- **Power-on Password**

Select this choice to set or change a power-on password. See "Using passwords" on page 33 for more information.

- **Administrator Password**

**Note:** This choice is available on the Configuration/Setup Utility menu only if the optional system management adapter is installed in your server.

Select this choice to set or change an administrator password.

**Attention:** If an administrator password is set and then forgotten, it cannot be overridden or removed. You must replace the system board.

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

See "Using passwords" on page 33 for more information.

- **Start Options**

Select this choice to view or change the start options. Start options take effect when you start your server.

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

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

If you have the appropriate Wake on LAN software installed and enabled in the server, the server uses the alternative startup sequence instead of the primary startup sequence. The default for Wake on LAN is Disabled.

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

You can enable a virus-detection test that checks for changes in the master boot record at startup. You also can select to run POST in the enhanced mode or the quick mode.

- **Advanced Setup**

Select this choice to change values for advanced hardware features, such as cache control, and PCI configuration.

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

- **Processor Serial Number Access**

Select this choice to specify whether the microprocessor serial number in the microprocessor is readable.

- **System Partition Visibility**

Select this choice to specify whether the System Partition is visible. To make the System Partition visible, set this value to **Visible**. To make the System Partition invisible, set this value to **Hidden**. See the ServerGuide CDs provided with the server for additional information on the System Partition.

- **Core Chipset Control**

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

- **Cache Control**

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

- **Memory Settings**

Select this choice to manually disable or enable a bank of memory.

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

**Note:** If a memory error is detected during normal operation, System Management Interrupt (SMI) can disable the memory.

- **PCI Bus Control**

**Note:** If the IBM Remote Supervisor Adapter is installed in your server, this feature is disabled; in this case, the **PCI Bus Control** choice is not available on the Configuration/Setup Utility menu.

Select this choice to assign IRQs and program the master latency timer.

- **PCI Slot/Device Information**

**Note:** This choice is available on the Configuration/Setup Utility menu only if the IBM Remote Supervisor Adapter is installed in your server.

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

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

After making changes, select:

- **Save and exit the PCI Utility** to save the changes and return to the Advanced Setup choice.
- **Exit the PCI Utility without saving changes** to discard the changes, retain the current settings, and return to the Advanced Setup choice.

- **Error Log**

Select this choice to view or clear error logs.

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

**Note:** If you have a Remote Supervisor Adapter installed, you can select and view the **System Error Log**.

- **Save Settings**

Select this choice to save the customized settings.

- **Restore Settings**

Select this choice to discard the changes and retain the current settings.

- **Load Default Settings**

Select this choice to discard the changes and restore the factory settings.

- **Exit Setup**

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

## Using passwords

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

### Power-on password

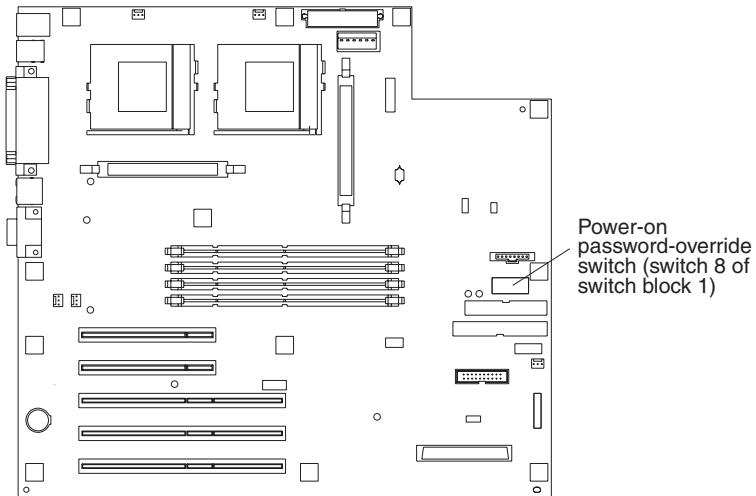
Select this choice to set a power-on password.

You can use any combination of up to seven characters (A–Z, a–z, and 0–9) for your power-on password. Keep a record of your password in a secure place. If you forget the power-on password, you can regain access to the server through one of the following methods:

- If an administrator password has been set, enter the administrator password at the power-on prompt. (If necessary, see “Administrator password” on page 34 for details.) Start the Configuration/Setup Utility program and change the power-on password.
- Start the Configuration/Setup Utility program, and change the power-on password.
- Change the position of the password-override switch as described in “Setting the password-override switch”.
- Remove the battery and then reinstall the battery.

**Setting the password-override switch:** The following illustration shows the location of the password-override switch (switch 8, which is the switch farthest to

the right, on switch block 1) on the system board.



To set the password-override switch, do the following:

1. Review the information in "System reliability considerations" on page 44.
2. Turn off the server and peripheral devices and disconnect power cords and then all external cables; then, remove the cover. See "Removing the side cover" on page 45.
3. Change the setting of the password-override switch (switch 8 on switch block 1 on the system board) to the opposite side of the switch. This bypasses the power-on password.
4. Install the server cover (see "Installing the cover" on page 65) and connect all external cables and power cords.
5. Restart the server.

**Notes:**

1. If you want the server to ask for a password when you turn it on, you can start the Configuration/Setup Utility program and set the power-on password.
2. Changing the position of the password-override switch does not affect the administrator password check if an administrator password has been set.

## **Administrator password**

**Note:** This choice is available on the Configuration/Setup Utility menu only if the IBM Remote Supervisor Adapter is installed in your server.

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

**Attention:** If an administrator password is set and then forgotten, it cannot be overridden or removed. You must replace the system board.

The following table provides a summary of the password features.

*Table 7. Power-on and administrator password features*

Type of password	Results
Power-on password	<ul style="list-style-type: none"><li>Enter the password to complete the system startup.</li><li>All choices are available on the Configuration/Setup Utility main menu.</li></ul>
Administrator password	<ul style="list-style-type: none"><li>No password is required to start the system.</li><li>Enter the password to access the Configuration/Setup Utility program.</li><li>All choices are available on the Configuration/Setup Utility main menu.</li></ul>
Administrator <i>and</i> power-on password	<ul style="list-style-type: none"><li>You can enter either password to complete the system startup.</li><li>The administrator password provides access to all choices on the Configuration/Setup Utility main menu. You can set, change, or delete both the administrator and power-on passwords, and allow a power-on password to be changed by the user.</li><li>The power-on password provides access to a limited set of choices on the Configuration/Setup Utility main menu. This limited access might include changing or deleting the power-on password.</li></ul>

---

## Using the SCSISelect utility program

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

- View the default SCSI IDs
- Locate and correct configuration conflicts

The following sections provide instructions for starting the SCSISelect utility and descriptions of the menu choices that are available.

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

## Starting the SCSISelect utility program

Complete the following steps to start the SCSISelect utility program:

- Turn on the server.
- When the <<< Press <CTRL><A> for SCSISelect Utility! >>> prompt appears, press Ctrl+A.
- When the Would you like to configure the host adapter or run the SCSI disk utility? question appears, make your selection and press Enter.
- Use the arrow keys to select a choice from the menu:
  - Press Esc to return to the previous menu.
  - Press the F5 key to switch between color and monochrome modes (if your monitor permits).
- Follow the instructions on the screen to change the settings of the selected items; then, press Enter.

## Choices available from the SCSISelect menu

The following choices appear on the SCSISelect Utility menu:

- **Configure/View Host Adapter Settings**

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

You can view or change the following controller settings:

- **Host Adapter SCSI ID**

Select this choice to view the SCSI controller ID, which is usually 7.

- **SCSI Parity Checking**

Select this choice to view the assigned value of *Enabled*.

- **Host Adapter SCSI Termination**

Select this choice to view the assigned value of *Enabled*.

- **Boot Device Options**

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

- **SCSI Device Configuration**

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

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

- The transfer rate for Ultra 160 LVD devices is 160.0 MBps.
- The transfer rate for Ultra2 SCSI LVD devices is 80.0 MBps.
- The transfer rate for Fast SCSI devices is 20.0 MBps.

- **Advanced Configuration Options**

Select this choice to view or change the settings for advanced configuration options. These options include enabling support for large hard disk drives and support for drives with UltraSCSI speeds.

- **SCSI Disk Utilities**

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

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

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

## Using the PXE boot agent utility program

The PXE boot agent is a built-in, menu-driven configuration utility program that you can use to:

- Select whether or not to display setup prompt
- Set menu wait times
- Select OS wake up support

**Attention:** The network startup protocols and startup order options are not supported on this product.

The following sections provide instructions for starting the PXE Boot Agent Utility program and descriptions of the menu choices that are available.

### Starting the PXE boot agent utility program

The following sections provide the instructions needed to start the PXE Boot Agent Utility and descriptions of the available menu choices.

To start the PXE Boot Agent Utility program, do the following:

1. Turn on the server.
2. When the <Initializing Intel (R) Boot Agent version X.X.XX PXE 2.0 Build XXX (WfM 2.0) prompt appears, press Ctrl+S.

**Note:** By default, you will have two seconds after the prompt appears on the screen to press Ctrl+S.
3. Use the arrow keys or press Enter to select a choice from the menu:
  - Press Esc to return to the previous menu.
  - Press the F4 key to exit.
4. Follow the instructions on the screen to change the settings of the selected items; then, press Enter.

### Choices available from the PXE boot agent menu

The following choices appear on the PXE Boot Agent Utility menu:

- **Network Boot Protocol**

PXE is the default value for this menu item.

**Note:** Do not change this value. There are no other network boot protocols supported.

- **Boot Order**

Select this choice to change the order in which boot devices are queried.

- Try local drives first, then network (Default)
- Try network only
- Try local drives only
- Try network first, then local drives

**Note:** This option is not available on this product. To change the boot order use the Configuration/Setup utility. See "Using the Configuration/Setup Utility program" on page 29 for more information.

- **Show setup prompt**

Select this choice to either display the PXE setup prompt or disable it. Disable is the default setting.

When this choice is enabled, **Press Ctrl+S to enter the setup menu** will appear on the screen under the initializing prompt.

- **Setup time wait menu**

Select this choice to set the amount of time (in seconds) that the system will pause during initialization for a Ctrl+S input.

- 2 seconds (Default)
- 3 seconds
- 5 seconds
- 8 seconds

- **Legacy OS wake up support**

Select this choice to enable or disable the operating system wake up support.

- Disabled (Default)
- Enabled

**Note:**

1. Use the default setting for the Advanced Configuration and Power Interface (ACPI) aware operating systems, such as Microsoft Windows 2000 or Windows NT.
2. If your server is running a non-ACPI operating system, you must set the selection to Enable to use the Wake on LAN support.
3. When using a non-ACPI operating system, do not send a wake up packet to the server while it is turned on. If a wake up packet has been sent while the server is on, you must turn off the server.

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## Installing options

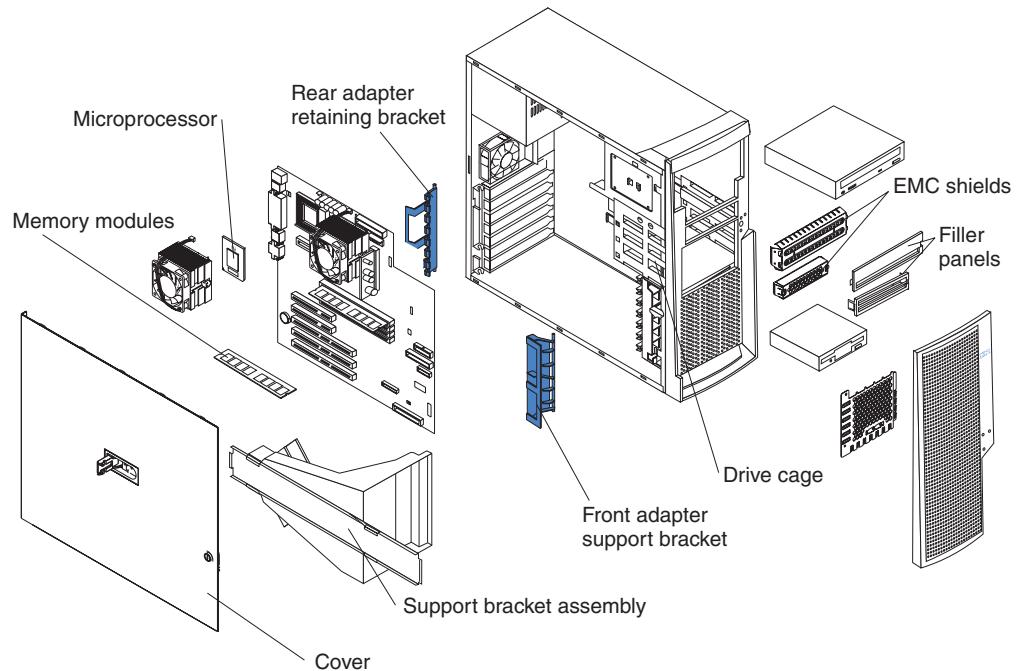
This chapter provides instructions to help you add options to the server. Some option-removal instructions are provided, in case you need to remove one option to install another. For a list of supported options for the server, see the ServerProven® list at:

<http://www.ibm.com/pc/compat/>

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## Major components of the xSeries 220 server

**Note:** The illustrations in this document might differ slightly from your hardware. The following illustration shows the locations of major components in the server.

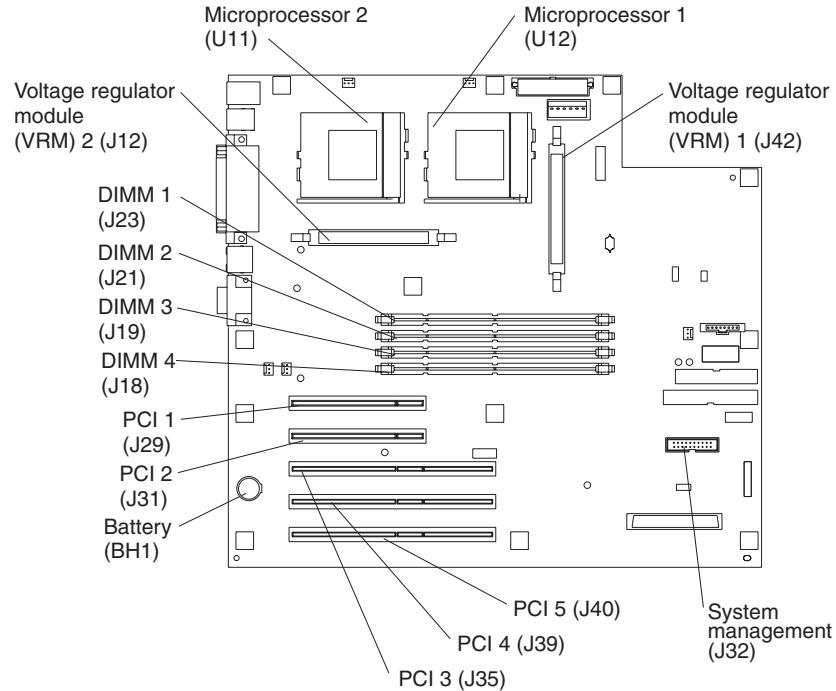


## System board

The illustrations in the following sections show the components on the system board.

### System board options connectors

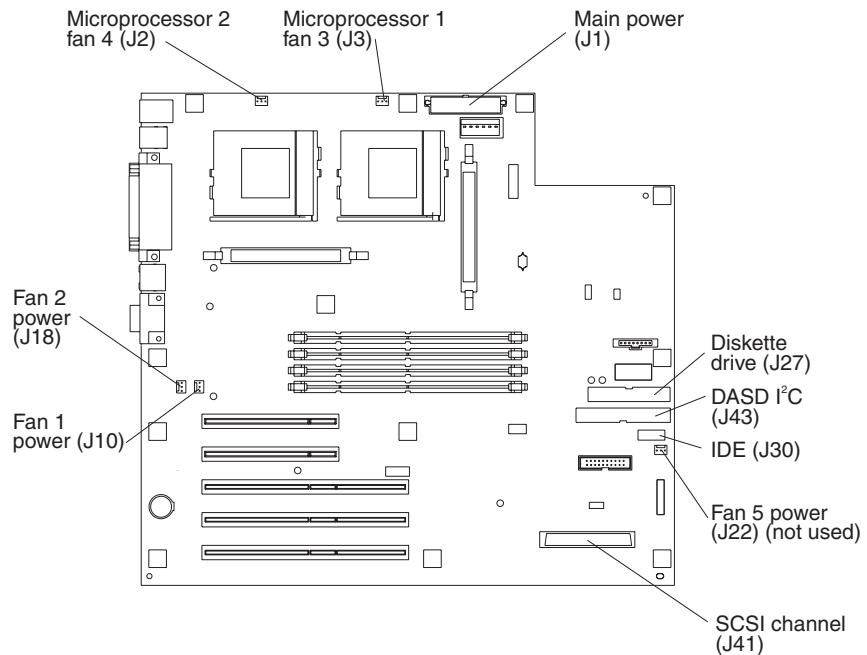
The following illustration identifies system-board connectors for user-installable options.



**Note:** If the server and operating system support system-management functions and, if the IBM Remote Supervisor Adapter is installed in your server, the system-management connector (J32) is dedicated for use by the Remote Supervisor Adapter.

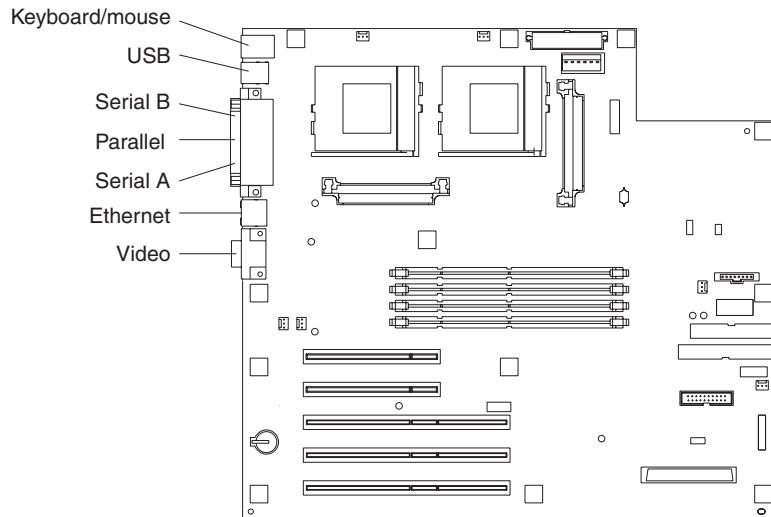
## System board internal cable connectors

The following illustration identifies system-board connectors for internal cables.



## System board external port connectors

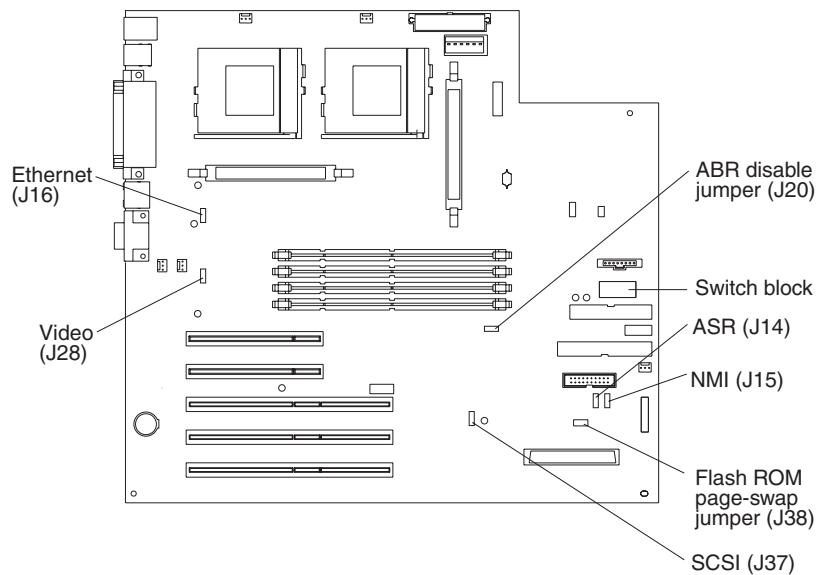
The following illustration identifies system-board connectors for external devices.



**Note:** For information on adding external SCSI devices to the server, see "SCSI cabling requirements" on page 72.

## System board jumpers and switches

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



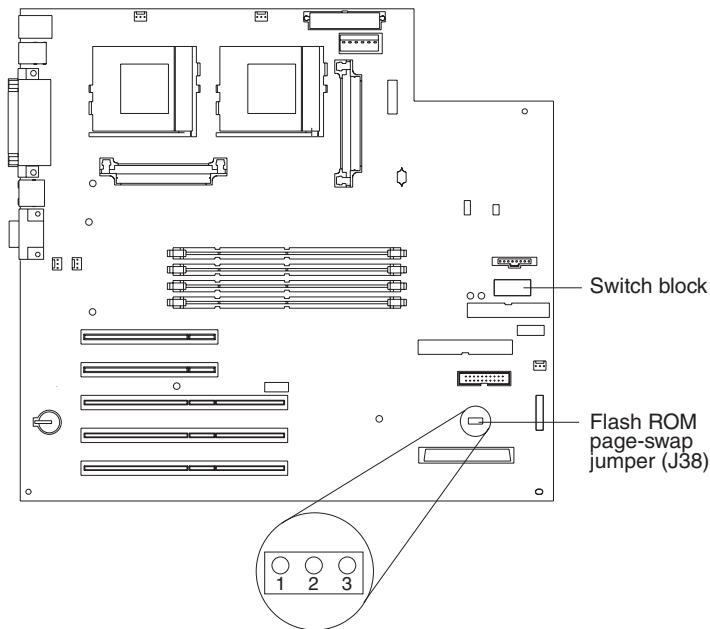
### System board jumper blocks

Any jumper blocks on the system board that are not shown in the illustration are reserved. For normal operation of the system, the default jumpers shown in the following table should be installed. To disable the functions listed in the table, install a jumper (Except for J38).

*Table 8. Jumper descriptions*

Jumper	Description	Default
J14	Automatic Server Restart (ASR)	No jumper
J15	Forces an NMI signal	No jumper
J16	On-board Ethernet controller	No jumper
J20	Automatic BIOS Recovery (ABR)	No jumper
J28	On-board Video controller	No jumper
J33	Reserved	
J37	On-board SCSI controller	No jumper
J38	Flash ROM page jumper	Jumper pins 2 and 3

## Flash ROM Page Jumper



Flash ROM page jumper (J38) determines whether primary or secondary (backup) POST/BIOS code is used by the system to start up. The default setting for J38 is a jumper between pins 2 and 3 (primary POST/BIOS). For backup POST/BIOS, place a jumper between pins 1 and 2 of J38. Normally this action is not required, but if the primary BIOS is damaged, and ABR is not functioning properly, the jumper can be moved for troubleshooting purposes. Changing the jumper position after system power-on is not permitted; it may cause unpredictable problems.

**Note:** The BIOS Flash Update Utility always updates the primary BIOS.

## Automatic BIOS Recovery (ABR) Jumper

The default setting for J20 is no jumper. If it is necessary to disable ABR during trouble shooting, install a jumper on J20.

## Automatic Server Restart (ASR)

To enable Automatic Server Restart, a special device driver must be loaded. This device driver enables the ASR watch-dog timer and then periodically resets it (within 5 minutes). If not reset, the ASR watch-dog timer will expire and boot the system. The watch-dog timer will re-arm itself after being reset. To disable the ASR hardware, a jumper must be installed between pins 1 and 2 of J14. The default is no jumper installed (ASR enabled).

## System board switch block

The switch block contains microswitches 1 through 8. As pictured in this illustration, switch 8 is at the right of the switch block, and switch 1 is at the left.

The following table describes the function for each switch. The default setting is Off for all switches in the switch block.

*Table 9. Switches 1 through 8*

Switch number	Switch description	Default
8	Power-on password-override switch.  When toggled to the side that is opposite the default position, bypasses the power-on password, if one is set.	Off
7	Reserved.	Off
6	Reserved.	Off
5	Force power on.	Off
4	Reserved.	Off
3	Reserved.	Off
2	Reserved.	Off
1	Reserved.	Off

---

## Before you begin

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

- Become familiar with the safety and handling guidelines specified under “Safety information” on page 111, and read the safety statements in “Safety notices (multi-lingual translations)” on page 115. These guidelines will help you work safely while working with the server or options.
- Make sure that you have an adequate number of properly grounded electrical outlets for the server, monitor, and any other options that you intend to install.
- Back up all important data before you make changes to disk drives.
- Have a small, flat-blade screwdriver available.
- For a list of supported options for the server, refer to <http://www.ibm.com/pc/compat> on the World Wide Web.

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## System reliability considerations

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

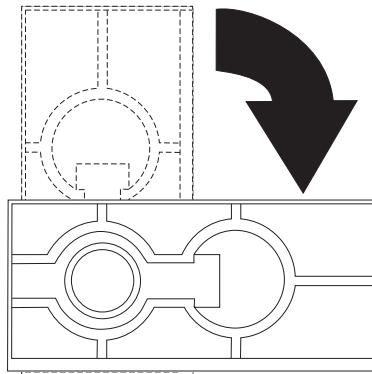
- Each of the drive bays has either a drive or a filler panel installed.
- The cover is in place during normal operations.
- There is space around the server to allow the server cooling system to work properly. Leave about 127 mm (5 in.) of space around the front and rear of the server.
- Cables for optional adapters are routed according to the instructions provided with the adapters.
- A failed fan is replaced within one hour.

---

## Rotating the stabilizing feet

The feet attached to the bottom cover rotate 90 degrees to provide additional stability for the server.

Place the server in an upright position; then, rotate the feet a quarter turn away from the server. Carefully position the server on its feet.

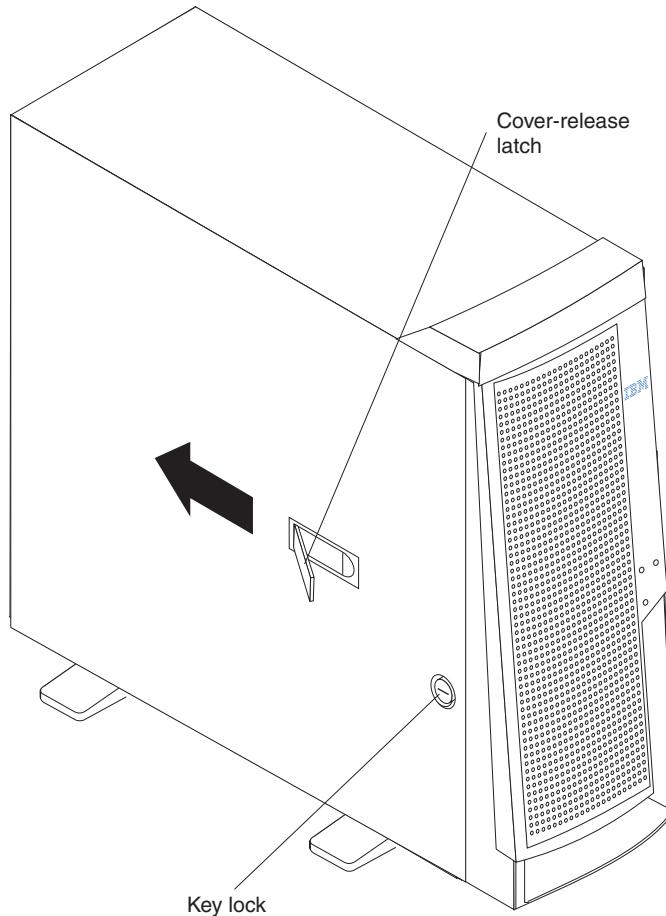


When you need to access the inside of the server to install options, you might find it easier to place the server on its side, so that the system board is facing you. If you do so, rotate the feet in towards the server, so that they do not break off due to the weight of the server.

## Removing the side cover

The following information describes how to remove the side cover.

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



To remove the side cover from the server, do the following:

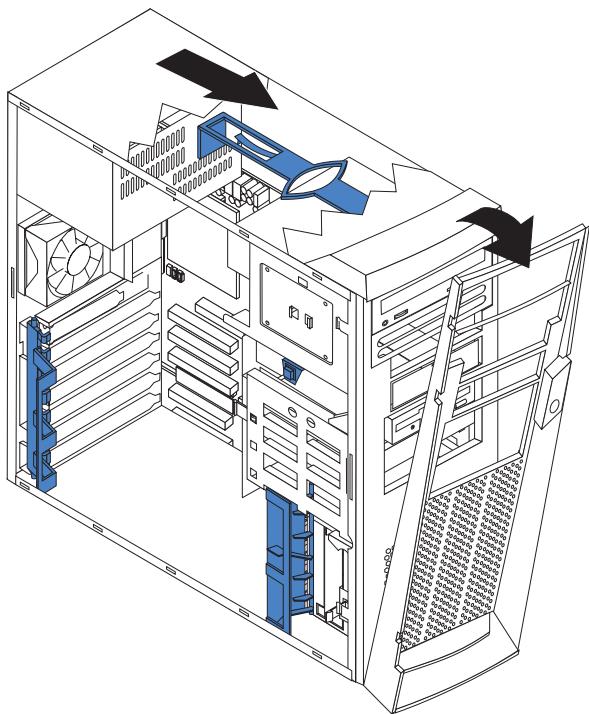
1. Review the information in “System reliability considerations” on page 44.
2. Turn off the server and all attached devices and disconnect power cords and then all external cables.
3. If necessary, unlock the server cover.
4. Pull out on the cover-release latch near the rear of the server cover; then, slide the cover toward the rear of the server and remove it.  
**Attention:** For proper cooling and airflow, replace the cover before turning on the server. Operating the server for extended periods of time (over 30 minutes) with the cover removed might damage server components.
5. For a tower model, rotate the stabilizing feet on the bottom of the server, and place the server on its side to install or remove components.

---

## Removing the bezel

The following illustration shows how to remove the bezel from the server.

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

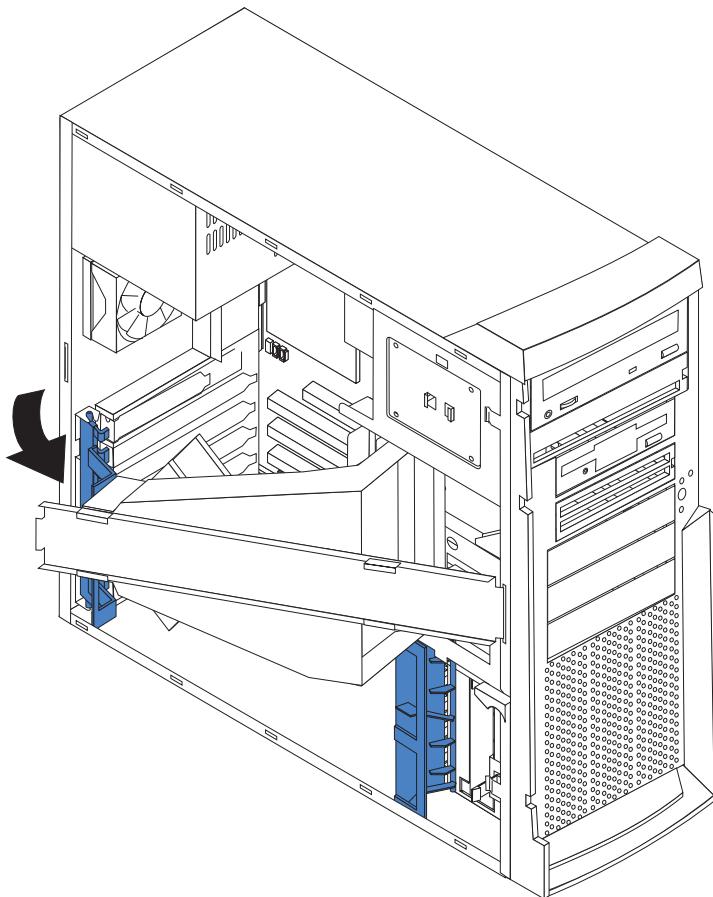


Do the following to remove the bezel:

1. Review the information in “System reliability considerations” on page 44.
2. Turn off the server and peripheral devices and disconnect all power cords and then all external cables.
3. Remove the side cover (see “Removing the side cover” on page 45).
4. Press the bezel-release latch at the top of the server to disconnect the top of the bezel from the server.
5. Release the two tabs at the top edge of the bezel and pull the top of the bezel slightly away from the server.
6. Pull the bezel up to release the two tabs at the bottom edge of the bezel. Store the bezel in a safe place.

## Removing the support bracket assembly

When working with some options such as hard disk drives and microprocessors, you must first remove the support bracket assembly to access the location of the option. The support bracket assembly consists of a support bracket, an air baffle, and a fan.



Do the following to remove the support bracket assembly:

1. Review the information in “System reliability considerations” on page 44.
2. Turn off the server and peripheral devices and disconnect all power cords and then all external cables.
3. Remove the side cover (see “Removing the side cover” on page 45).
4. Disconnect the fan cable connector (J10) from the system board. (See “System board internal cable connectors” on page 41 for connector locations.)

**Note:** Remember to reconnect this cable after you reinstall the support bracket assembly.

5. Carefully pull up on the end of the support bracket assembly that is closer to the rear of the server; then, rotate and lift the support bracket assembly out of the server.
6. Store the support bracket assembly in a safe place.

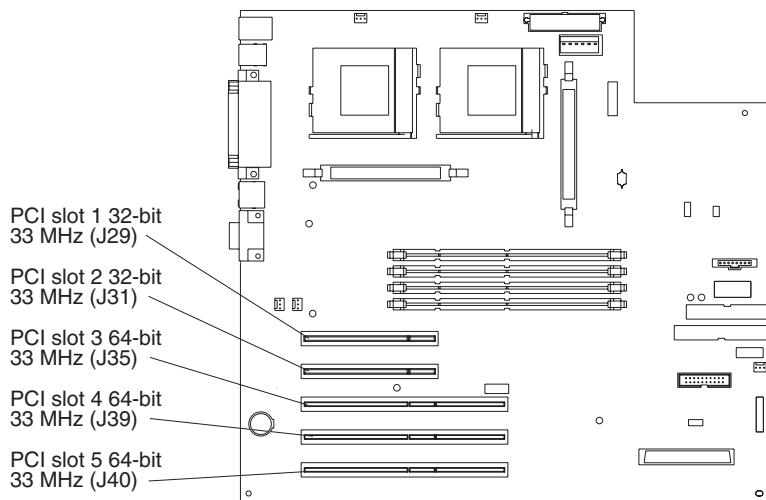
## Working with adapters

You can install up to five peripheral component interconnect (PCI) adapters in the PCI slots on the system board of the server. See the xSeries 220 ServerProven list at <http://www.ibm.com/pc/compat/> for a list of PCI adapters that the server supports.

The server comes with an integrated video controller, which is a component on the system board. When you install a video adapter, the server BIOS automatically disables the integrated video controller.

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

The following illustration shows the location of the 33 MHz PCI slots on the system board.



## Adapter considerations

Before you install adapters, review the following:

- Locate the documentation that comes with the adapter and follow those instructions in addition to the instructions given in this chapter. If you need to change switch or jumper settings on your adapter, follow the instructions that come with the adapter.
- You can install full-length adapters in all PCI slots.
- You can install a 32-bit adapter in any of the PCI slots, but you might want to install it in a 32-bit slot and use the 64-bit slots for 64-bit adapters.
- The server supports 5.0 V and universal PCI adapters; it does not support 3.3 V adapters.
- The server uses a rotational interrupt technique to configure PCI adapters. Because of this technique, you can install a variety of PCI adapters that currently do not support sharing of PCI interrupts.
- The server has two PCI buses. PCI slots 1 and 2 are on PCI bus A and PCI slots 3, 4, and 5 are on PCI bus B.

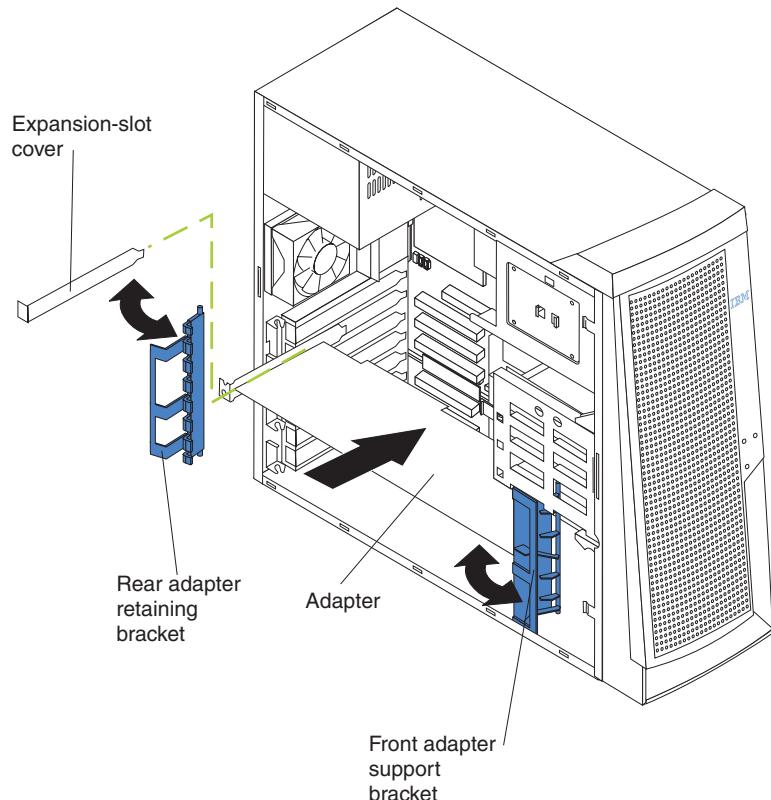
**Note:** PCI bus A is sometimes referred to as bus 0; PCI bus B is sometimes referred to as bus 1.

The system scans PCI slots 1 through 5 to assign system resources; then the

system starts (boots) the PCI devices in the following order: PCI slots 1 and 2, system board SCSI devices, and then PCI slots 3 through 5.

- If you plan to use the IBM Remote Supervisor Adapter in the server, you must install the IBM Remote Supervisor Adapter in PCI slot 2. Only PCI slot 2 supports the IBM Remote Supervisor Adapter. For additional information on the IBM Remote Supervisor Adapter, refer to the documentation that comes with the adapter.

## Installing an adapter



**Attention:** When you handle static-sensitive devices, take precautions to avoid damage from static electricity. For details on handling these devices, see “Handling static-sensitive devices” on page 114.

To install an adapter, do the following:

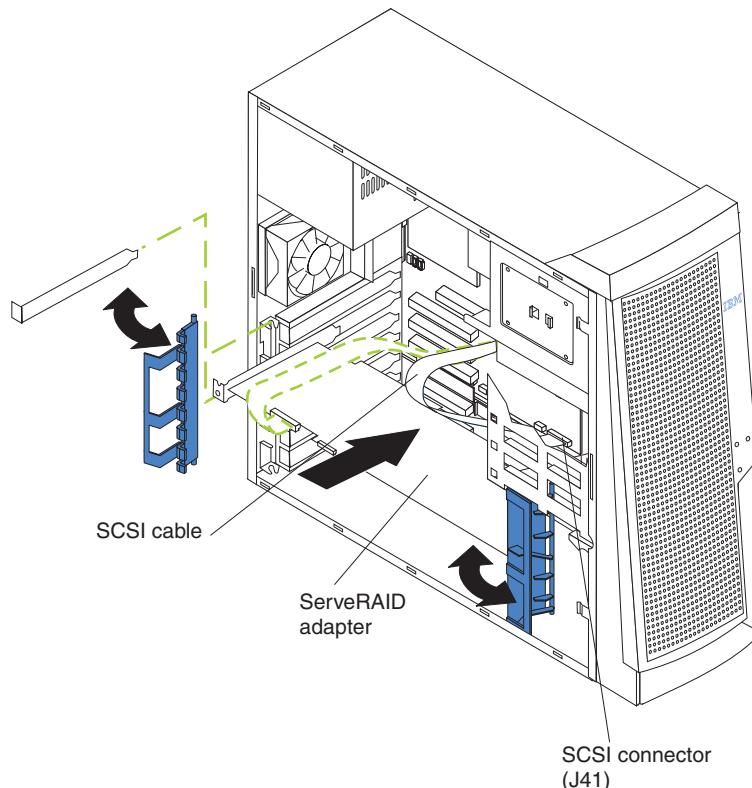
1. Review the safety precautions in “Safety information” on page 111 and the information in “Adapter considerations” on page 48.
2. Turn off the server and all attached devices, and disconnect all power cords and then all external cables; then, remove the side cover. See “Removing the side cover” on page 45 for details.
3. Carefully remove the support bracket assembly from the server (see “Removing the support bracket assembly” on page 47). Store the cover and the support bracket assembly in a safe place.
4. Determine which PCI slot you will use for the adapter.

**Note:** Check the instructions that come with the adapter for any requirements or restrictions.

5. Remove the rear adapter retaining bracket from the server. If you are installing a full-length adapter, rotate the front adapter support bracket to the open (unlocked) position.
6. Remove the expansion-slot cover. Store it in a safe place for future use.  
**Attention:** Expansion-slot covers must be installed on all vacant slots. This maintains the electronic emission characteristics of the system and ensures proper cooling of system components.
7. Refer to the documentation that comes with your adapter for any cabling instructions. It might be easier for you to route cables before you install the adapter.
8. Remove the adapter from the static-protective package.  
**Attention:** Avoid touching the components and gold-edge connectors on the adapter.
9. Place the adapter, component-side up, on a flat, static-protective surface.
10. Set any jumpers or switches as described by the adapter manufacturer.
11. Install the adapter:
  - a. Carefully grasp the adapter by its top edge or upper corners, and align it with the expansion slot on the system board.
  - b. Press the adapter *firmly* into the expansion slot.  
**Attention:** When you install an adapter in the server, be sure that it is completely and correctly seated in the system-board connector before you apply power. Incomplete insertion might cause damage to the system board or the adapter.
  - c. When the adapter is fully seated, release the front adapter support bracket by pushing inward on the latch. Make sure that the front adapter support bracket holds the adapter securely in place.
  - d. If you opened the front adapter support bracket, rotate it to the closed (locked) position; then, reinstall the rear adapter retaining bracket in the server.
12. Connect any needed cables to the adapter.  
**Attention:** Route cables so that they do not block the flow of air from the fans.

The following illustration shows how to reroute the SCSI cable. If you install a ServeRAID adapter and intend to use it with hot-swap, hard disk internal drives, remove the cable from the internal SCSI connector (J41) on the system board and connect it to the ServeRAID adapter.

**Note:** You can also install a ServeRAID adapter in non-hot-swap models; however, non-hot-swap models do not support hot-swap hard disk drives.



13. If you have other options to install or remove, do so now; otherwise, replace the support bracket assembly; then, go to “Installing the cover” on page 65.

## Installing internal drives

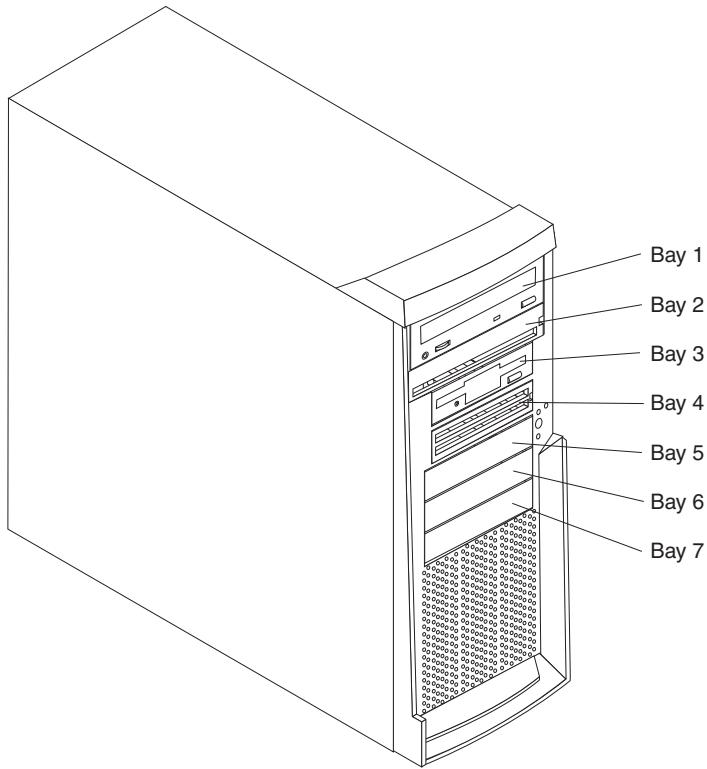
Different types of drives allow the system to read multiple types of media and store more data. Several types of drives are available, such as:

- Diskette (preinstalled)
- Hard disk (preinstalled on some models)
- CD-ROM (preinstalled)
- Tape

### Internal drive bays

Internal drives are installed in *bays*. The bays of the xSeries 220 are in the front of the server, as shown in the following illustration.

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



To remove or install a drive, you must turn off the server first, unless you are removing or installing a hot-swap hard disk drive. Diskette drives, tape drives, and CD-ROM drives are removable-media drives. You can install removable-media drives in bays 1, 2, 3, and 4. You can install SCSI hard disk drives in bays 4, 5, 6, and 7.

- The server comes with a 3.5-inch, 1.44 MB diskette drive in bay 3, an integrated drive electronics (IDE) CD-ROM drive in bay 1, and a hard disk drive in bay 7 (in some models).
- The xSeries 220 server supports five 3.5-inch drives; however, the server supports only one diskette drive.
- The diskette drive uses 1 MB and 2 MB diskettes. For optimum use, format 1 MB diskettes to 720 KB and format 2 MB diskettes to 1.44 MB.
- The xSeries 220 server supports two 5.25-inch drives and four SCSI hard disk drives. The server does not support IDE hard disk drives. Some models support hot-swap hard disk drives. Other models support only non-hot-swap hard disk drives. Refer to the documentation that comes with the server for additional information.

The server supports four 1-inch (26 mm) slim, 3.5-inch SCSI hard disk drives in the hard disk drive bays (4, 5, 6, and 7). You can install four non-hot-swap hard disk drives in the models that have the standard non-hot-swap drive cage. You can install three hot-swap hard disk drives and one non-hot-swap hard disk drive in the models that come with the hot-swap drive cage. Both the non-hot-swap and hot-swap drive cages hold a maximum of three hard disk drives. The drive cages comprise bays 5, 6, and 7.

- Bay 2 comes without a device installed. This bay is for a 5.25-inch, half-high, removable-media drive, such as a tape backup drive.
- Bay 4 is for a 3.5-inch, slim, removable-media drive or SCSI hard disk drive.

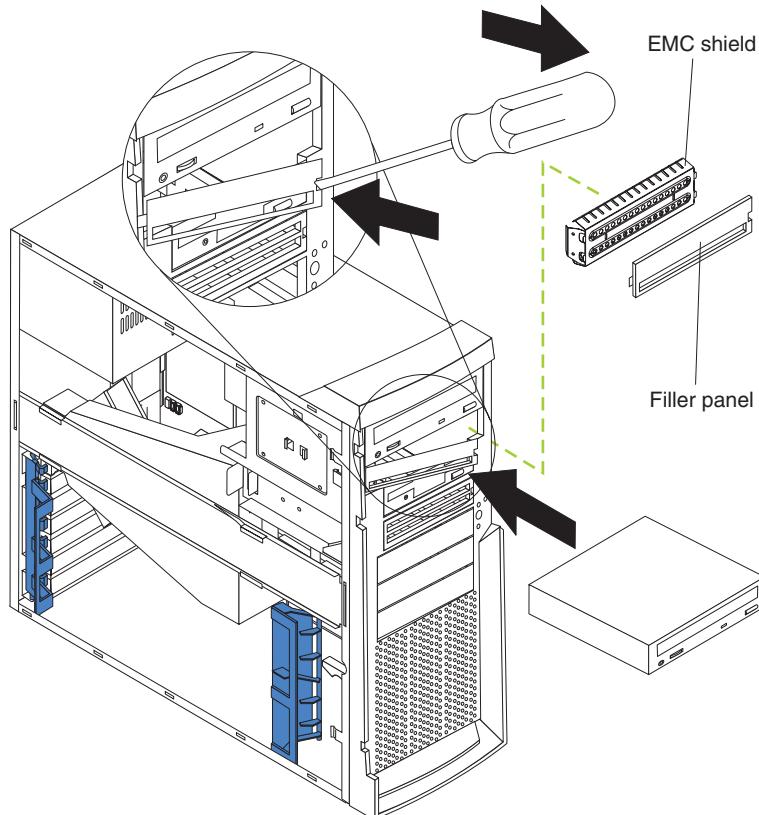
**Note:** The electromagnetic interference (EMI) integrity and cooling of the server are both protected by having bays 1 through 4 covered or occupied. When you install a drive, save the filler panel from the bay, in case you later remove the drive and do not replace it with another.

## Preinstallation steps (all bays)

Before you install drives in the server, verify that you have all the cables and any other equipment specified in the documentation that comes with the drive. You might also need to perform certain preinstallation activities. Some of the steps are required only during the initial installation of an option.

1. Read “Safety information” on page 111, “Handling static-sensitive devices” on page 114, and the documentation that comes with the drive.
2. Choose the bay in which you want to install the drive.
3. Check the instructions that come with the drive to see if you need to set any switches or jumpers on the drive.

## Installing a drive in bay 1, 2, 3, or 4



To install a drive in bay 1, 2, 3, or 4, do the following:

1. Read the information in “Preinstallation steps (all bays)”.
2. Turn off the server and all attached devices, disconnect all power cords and then all external cables; then, remove the side cover (see “Removing the side cover” on page 45 for details).
3. Insert a screwdriver into the slot on the right side of the filler panel, and remove the filler panel from the server.
4. Insert a screwdriver into the slots on the front of the electromagnetic compatibility (EMC) shield, and remove the EMC shield from the bay.

5. If the drive is a laser product, 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.

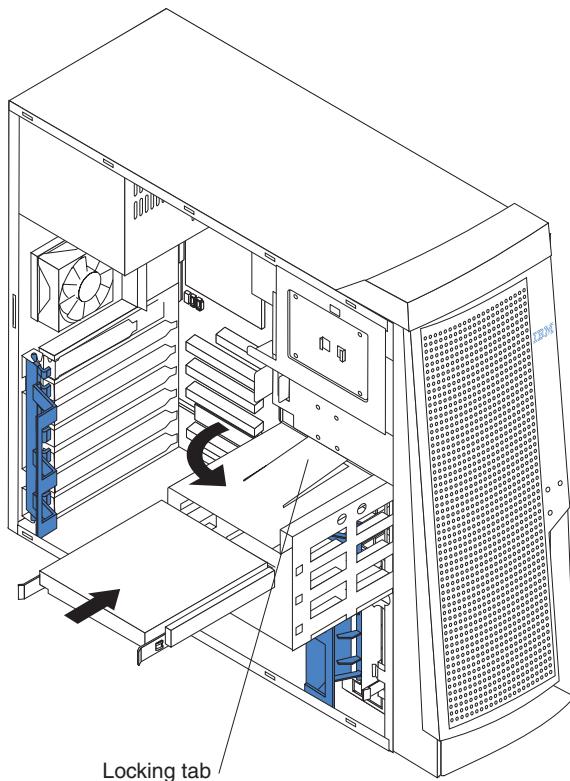
6. Touch the static-protective bag containing the drive to any unpainted metal surface on the server; then, remove the drive from the bag and place it on a static-protective surface.
7. Set any jumpers or switches on the drive according to the documentation that comes with the drive.
8. Push the drive into the bay. If your drive has electronic components exposed, pay particular attention to the angle at which you push the drive into the bay to prevent drive damage.
9. If the drive is an IDE device, plug one connector of the IDE cable into the back of the drive and the other end of the cable into the IDE connector (J30) on the system board.

If the drive is a SCSI device, plug one connector of the SCSI cable into the back of the drive and make sure that the other end of the cable is connected to the SCSI connector (J41) on the system board.

**Note:** Ensure that you route the SCSI cable so that it does not block the airflow to the rear of the drives or over the microprocessors.

10. Connect a power cable to the back of the drive. The connectors are keyed and can be inserted only one way.
11. If you are installing another drive, do so now. Otherwise, continue with the next step.
12. If you have other options to install or remove, do so now; otherwise, replace the cover (see "Installing the cover" on page 65 for details).

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



To install a non-hot-swap hard disk drive in bay 5, 6, or 7, do the following:

1. Read the information in "Preinstallation steps (all bays)" on page 53.
2. Turn off the server and all attached devices, disconnect all power cords and then all external cables; then, remove the cover (see "Removing the side cover" on page 45 for details).
3. Remove the support bracket assembly (see "Removing the support bracket assembly" on page 47).
4. Rotate the drive cage upward. If the server has a hard disk drive installed in the drive cage, disconnect the cables from the rear of the drive.
5. Remove the plastic bag that contains the drive rails and screws from inside the drive cage.
6. Install rails on each drive in the drive cage:
  - a. Pull the blue slide rails out of the plastic bag.
  - b. Install the screws on the sides of the drive.
  - c. Align the rails on the drive with the guide rails in the drive bay.
  - d. Push the drive into the bay until it clicks into place.
7. Reinstall the drive cage in the server. Rotate the drive cage downward until it snaps into place.
8. Connect the SCSI and power cables to the rear of the drives.

**Note:** Ensure that you route the SCSI cable so that it does not block the airflow to the rear of the drives or over the microprocessors.

9. If you have other options to install or remove, do so now; otherwise, replace the support bracket assembly; then go to "Installing the cover" on page 65.

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

If the server is a hot-swap model, it contains hardware that you can use to replace a failed hard disk drive without turning off the server. Therefore, you have the advantage of continuing to operate the system while a hard disk drive is removed or installed. These drives are known as *hot-swap* drives. If these drives are connected to an optional controller, such as a ServeRAID controller, that supports this function, and if one of these drives becomes defective, the ServeRAID controller can rebuild the data from that drive onto another hot-swap drive. Refer to the information that comes with the ServeRAID controller for details.

Each hot-swap drive has two indicator lights: the hard disk drive activity light and the hard disk drive status light. When the green hard disk drive activity light is flashing, the controller is accessing the hard disk drive. When this occurs, the SCSI activity light on the front of the server also illuminates. The SCSI activity light is illustrated and described in "Server controls and indicators" on page 7. If the amber hard disk drive status light for a drive is lit continuously, that individual drive is faulty and requires replacement. When the hard disk drive status light indicates a drive fault, you can replace a hot-swap drive without turning off the server.

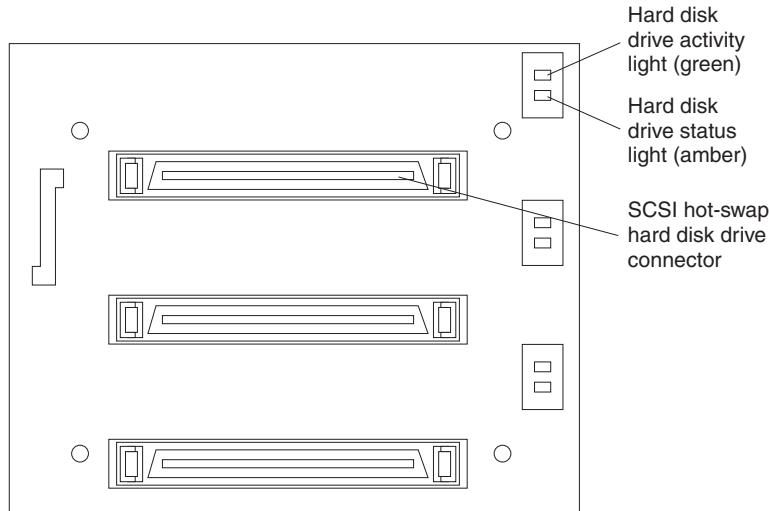
**Note:** The hard disk drive activity light is also known as the SCSI hard disk drive activity light.

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

The hot-swap bays connect 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.

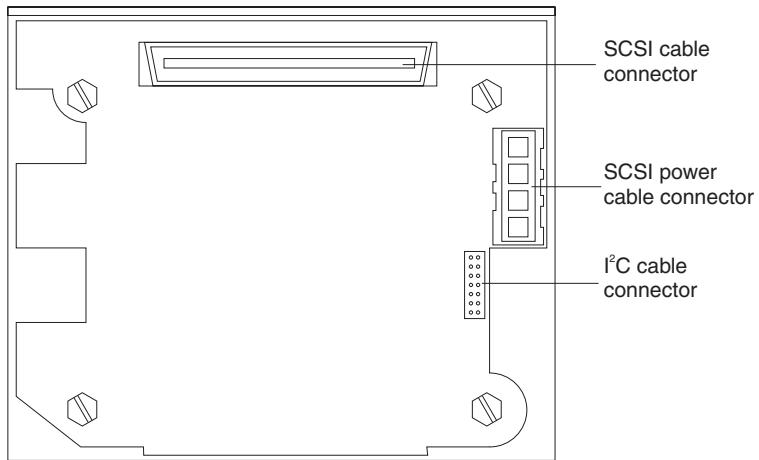
The following illustration shows the hot-swap-drive backplane component locations, as viewed from the front of the server.

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

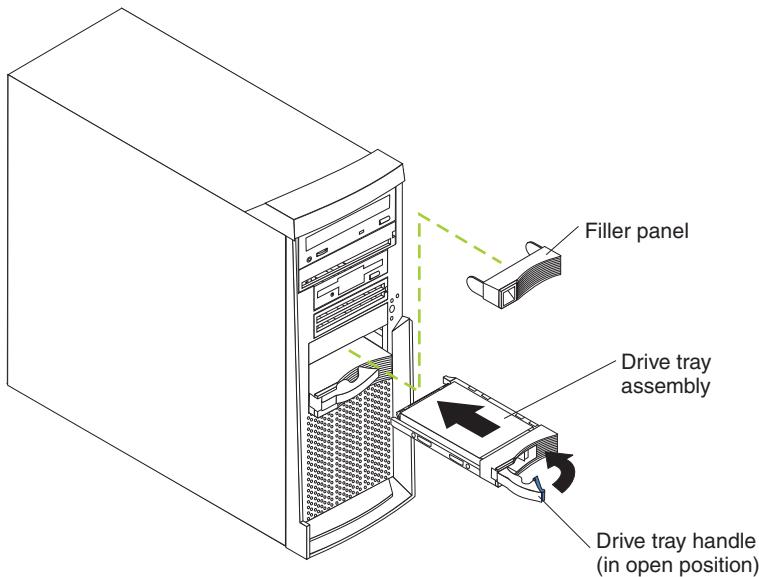


**Note:** The hard disk drive activity light and hard disk drive status light on the backplane match the hard disk drive activity light and hard disk drive status light on the hot-swap drive.

The following illustration shows the rear connectors on the hot-swap-drive backplane, as viewed from the rear of the server.



The following illustration shows how to install a hot-swap hard disk drive in the server. When you install hot-swap hard disk drives, install them in the following order: bay 7, bay 6, and bay 5.



**Attention:**

- When you handle static-sensitive devices, take precautions to avoid damage from static electricity. For details on handling these devices, see “Handling static-sensitive devices” on page 114.
- 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.

To install a hot-swap hard disk drive in bay 5, 6, or 7, do the following:

1. Review “System reliability considerations” on page 44.
2. Read the information in “Preinstallation steps (all bays)” on page 53.

**Note:** You do not have to turn off the server to install hot-swap hard disk drives in these bays.

3. 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.
  4. Install the hard disk drive in the hot-swap bay:
    - a. Ensure that the tray handle is open (that is, perpendicular to the drive).
    - b. Align the drive tray assembly with the guide rails in the bay.
    - c. Gently push the drive tray 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 light to verify that the hard disk drive is operating properly.If the amber hard disk drive status light for a drive is lit continuously, that individual drive is faulty and needs to be replaced. If the green hard disk drive activity light is flashing, the drive is being accessed.
- Note:** If the server has a ServeRAID controller, you might need to reconfigure the disk arrays after installing hard disk drives. Refer to the information that comes with the ServeRAID controller.
5. If you have other options to install or remove, do so now.

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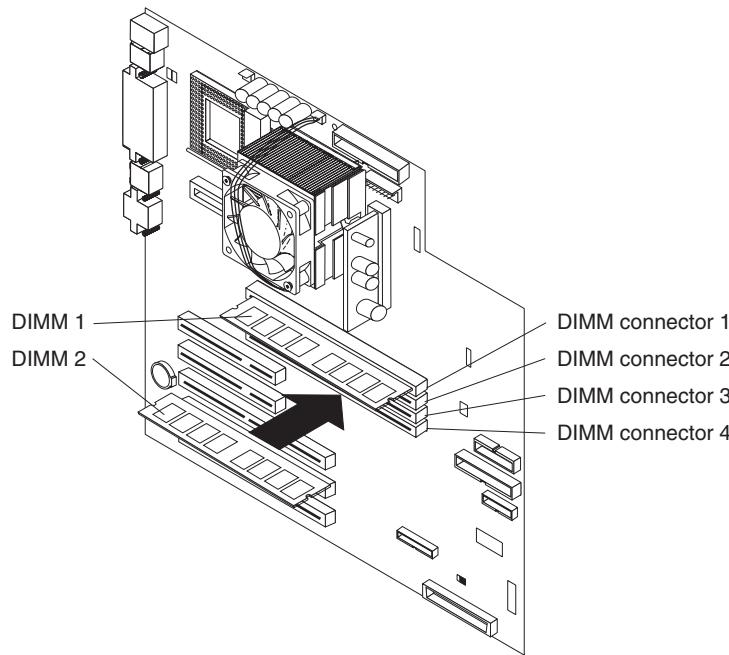
## Installing memory modules

Adding memory to the server is an easy way to make programs run faster. You can increase the amount of memory in the server by installing options called *memory-module kits*. Each kit contains one industry-standard, dual in-line memory module (DIMM). The server uses a non-interleaved memory configuration.

The server comes with a dual in-line memory module (DIMM) that is installed on the system board in DIMM slot 1 (labeled DIMM 1).

**Notes:**

1. When installing additional memory modules, install the second memory module in the connector labeled DIMM 2, the third in DIMM 3, and the fourth in DIMM 4. (See the following illustration for memory-connector locations.)
2. The xSeries 220 server supports 128 MB, 256 MB, 512 MB, and 1 GB DIMMs. These DIMMs can be installed in any memory slot. The server supports a minimum of 128 MB and a maximum of 4 GB of system memory. See the ServerProven list at <http://www.ibm.com/pc/compat/> for a list of memory modules for use with the server.
3. Installing or removing DIMMs changes the configuration information in the server. Therefore, after installing or removing a DIMM, you must save the new configuration information by using the Configuration/Setup Utility program. When you restart the server, the system displays a message indicating that the memory configuration has changed. Start the Configuration/Setup Utility program and select **Save Settings**. See “Configuration” on page 29 for more information.
4. The illustrations in this document might differ slightly from your hardware.

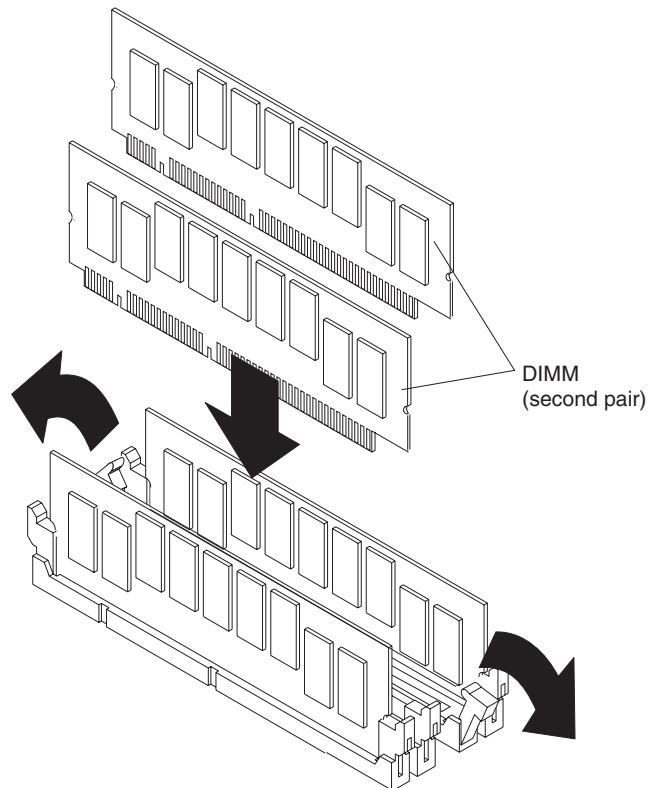


**Attention:** When you handle static-sensitive devices, take precautions to avoid damage from static electricity. For details on handling these devices, see "Handling static-sensitive devices" on page 114.

To install a DIMM, do the following:

1. Review the safety precautions in Statement 1 and Statement 5 in "Safety information" on page 111.
2. Review the information in "System reliability considerations" on page 44 and the documentation that comes with the option.
3. Turn off the server and all attached devices, disconnect all power cords and all external cables; then, remove the side cover (see "Removing the side cover" on page 45 for details).
4. Select the connector in which to install the DIMM.
5. Touch the static-protective package containing the DIMM to any unpainted metal surface on the server. Then, remove the DIMM from the package.  
**Attention:** To avoid breaking the retaining clips or damaging the DIMM connectors, handle the clips gently.
6. Install the DIMM:

- a. Open the retaining clips on the connector.



- b. Turn the DIMM so that the pins align correctly with the connector.
  - c. Firmly press the DIMM straight down into the connector by applying pressure on both ends of the DIMM simultaneously.
  - d. Make sure that the retaining clips are in the closed position. If a gap exists between the DIMM and the retaining clips, the DIMM has not been properly installed. In this case, open the retaining clips and remove the DIMM; then, reinsert the DIMM.
7. If you have other options to install or remove, do so now; otherwise, go to "Installing the cover" on page 65.

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

- If you installed additional memory, start the Configuration/Setup Utility program and select **Save Settings**.
- If you just replaced a failed DIMM, you must start the Configuration/Setup Utility program, select **Advanced Setup**, select **Memory Settings**, highlight the connector or bank of connectors that you want to enable, then select **Enable**.
- In some memory configurations, the 3-3-3 beep code might sound during POST followed by a blank screen. If this occurs, you must restart the server three times to force the system BIOS to reset the memory connector or bank of connectors from Disabled to Enabled.

---

## Installing and removing a microprocessor

The server comes with one microprocessor, which is installed on the system board. If you install an additional microprocessor kit, the server can operate as a symmetric multiprocessing (SMP) server. With SMP, certain operating systems and application programs can distribute the processing load between the microprocessors. This enhances performance for database and point-of-sale applications, integrated manufacturing solutions, and other applications.

### Notes:

1. Before you install a new microprocessor, review the documentation that comes with the microprocessor, so that you can determine whether you need to update the server basic input/output system (BIOS). The latest level of BIOS for the server is available through the World Wide Web.
2. Obtain an SMP-capable operating system (optional). For a list of supported operating systems, see <http://www.ibm.com/pc/compat/> on the World Wide Web.
3. The server comes with one microprocessor, which is installed in microprocessor connector (U12) (the microprocessor connector that is furthest from the power supply). This is the startup (boot) microprocessor. If you install a microprocessor in microprocessor connector (U11), that one becomes the startup microprocessor, and the microprocessor that is installed in microprocessor connector (U12) is the application microprocessor. You must also install a VRM when you install a microprocessor.
4. When you are installing a microprocessor, you must also install a fan sink and connect the fan-sink power cable to the system board.
5. The illustrations in this document might differ slightly from your server.
6. If necessary, see "System board options connectors" on page 40 for connector locations.

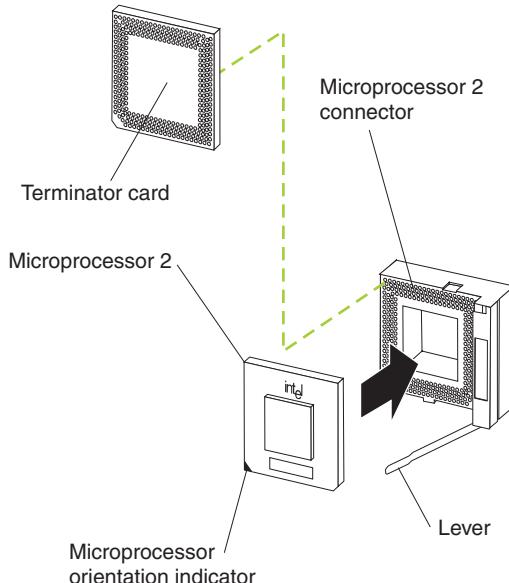
**Attention:**

- To avoid damage and ensure proper server operation when you install a new or additional microprocessor, use microprocessors that have the same cache size and type and the same clock speed. Microprocessor internal clock frequencies and external clock frequencies must be identical. See the ServerProven list at <http://www.ibm.com/pc/compat> for a list of microprocessors for use with the server.
- When you handle electrostatic discharge (ESD) sensitive devices, take precautions to avoid damage from static electricity. For details on handling these devices, see "Handling static-sensitive devices" on page 114.

## Installing a microprocessor

To install an additional microprocessor, do the following:

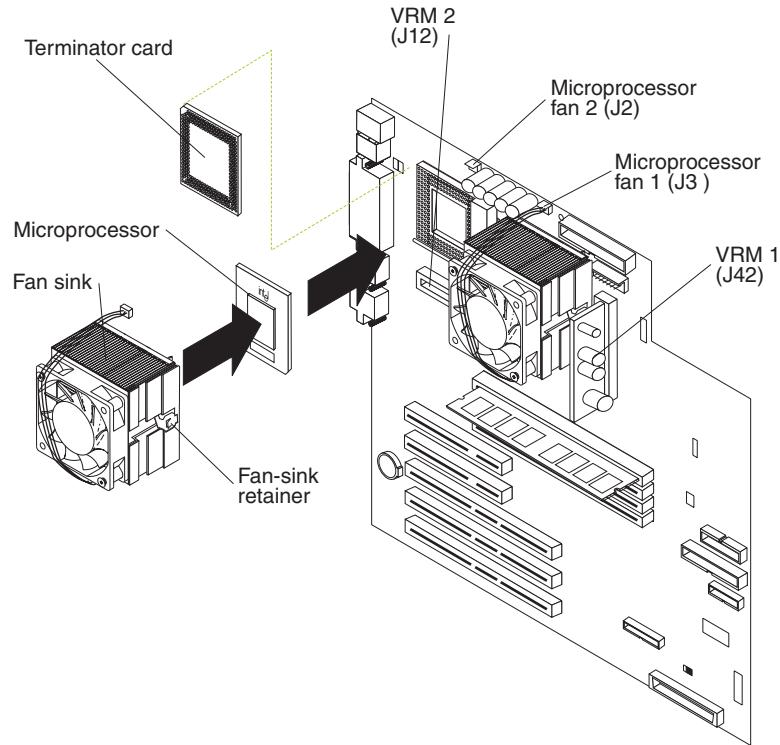
1. Review the safety precautions in Statement 1 and Statement 5 in "Safety information" on page 111.
2. Turn off the server and all attached devices, disconnect all power cords and then all external cables; then, remove the cover (see "Removing the side cover" on page 45 for details).
3. Carefully remove the support bracket assembly (see "Removing the support bracket assembly" on page 47). Store the cover and the support bracket assembly it in a safe place.
4. Lift the release lever and remove the terminator card from the microprocessor connector.
5. 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. Orient the microprocessor over the microprocessor connector, as shown in the following illustration. Carefully press the microprocessor into the connector.



**Attention:** To avoid bending the pins, do not use excessive force when pressing the microprocessor into the connector.

6. Push the release lever down to lock the microprocessor into place.

7. Install a fan sink onto the microprocessor and connect the fan-sink power cable to the system board by doing the following:



- Peel the plastic protective strip off the bottom of the fan sink. Make sure that the square of the thermal material is still on the bottom of the fan sink.
- Align and place the fan sink on top of the microprocessor.

**Note:** Set the fan sink into place. Make sure the fan sink guide rib fits between the processor and the processor socket.

- Align and place the fan-sink retainer (clip) over the fan sink.
  - Insert a small, flat-blade screwdriver into the tab on the fan sink.
  - Press down and in with the screwdriver handle to snap the fan-sink retainer into place in the slot on the microprocessor, over the fan sink.
  - Connect the built-in fan-sink power cable to the appropriate connector on the system board.
    - If you installed the microprocessor in connector (U11), connect the fan-sink power cable to connector (J2).
    - If you installed the microprocessor in connector (U12), connect the fan-sink power cable to connector (J3).
  - Place the terminator card in the static-protective package that the new microprocessor was shipped in, and store it in a safe place. You will need to install the terminator card again if you ever remove the microprocessor and do not replace it with another microprocessor.
  - Install the VRM that is included in the microprocessor kit.
- Attention:** Use of other VRMs might cause the server to overheat.
- Center the VRM over the appropriate VRM connector:

- 1) If you installed the microprocessor in connector (U11), press down on the latches on either side of connector (J12), and install the VRM in connector (J12).
  - 2) If you installed the microprocessor in connector (U12), press down on the latches on either side of connector (J42), and install the VRM in connector (J42).
- b. Make sure that the VRM is oriented and aligned correctly.
  - c. Press the VRM into the connector.
- Note:** If you remove the microprocessor later, remember to install the terminator card in the appropriate microprocessor connector and to remove the VRM from the appropriate VRM connector.
10. If you have other options to install or remove, do so now; otherwise, replace the support bracket assembly; then, go to "Installing the cover" on page 65.

## Removing a microprocessor

To remove a microprocessor, do the following:

**Note:** Do not use any tools when removing the microprocessor; however, you will need a small, flat-blade screwdriver to remove the fan-sink retainer (clip).

**Attention:** When you handle static-sensitive devices, take precautions to avoid damage from static electricity. For details on handling these devices, see "Handling static-sensitive devices" on page 114.

1. Review the safety precautions in Statement 1 and Statement 5 in "Safety information" on page 111.
2. Turn off the server and all attached devices, disconnect all power cords and then all external cables; then, remove the side cover (see "Removing the side cover" on page 45 for details).
3. Carefully remove the support bracket assembly from the server (see "Removing the support bracket assembly" on page 47). Store the cover and the support bracket assembly in a safe place.
4. Remove the fan-sink.
  - a. Press down on the clip to remove the fan-sink retainer from the fan sink.
  - b. Firmly grasp the fan sink and lift it off the microprocessor. Store the fan sink in a safe, clean place with the bottom side up. The thermal material on the fan sink must stay clean if you intend to reuse the fan sink in the future.
  - c. Disconnect the fan sink power cable from the appropriate connector on the system board:
    - If you are removing the microprocessor from connector (U11), disconnect the fan-sink power cable from connector (J2).
    - If you are removing the microprocessor from connector (U12), disconnect the fan-sink power cable from connector (J3).
5. Lift up the release lever and remove the microprocessor from the connector. Store the microprocessor in a static-protective bag for possible future use.
6. If you are installing a new microprocessor, go to "Installing a microprocessor" on page 62.
7. If you are not replacing the microprocessor:
  - a. Reinstall the terminator card in the empty microprocessor connector.
  - b. Press the release lever down to lock the terminator card into place.
  - c. Remove the VRM from the appropriate VRM connector:

- If you removed the microprocessor from connector (U11), press down on the latches on either side of connector (J12), and remove the VRM from connector (J12).
  - If you removed the microprocessor from connector (U12), press down on the latches on either side of connector (J42), and remove the VRM from connector (J42).
8. If you have other options to install or remove, do so now; otherwise, replace the support bracket assembly; then, go to “Installing the cover”.

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## Installing the bezel

Do the following to install the bezel:

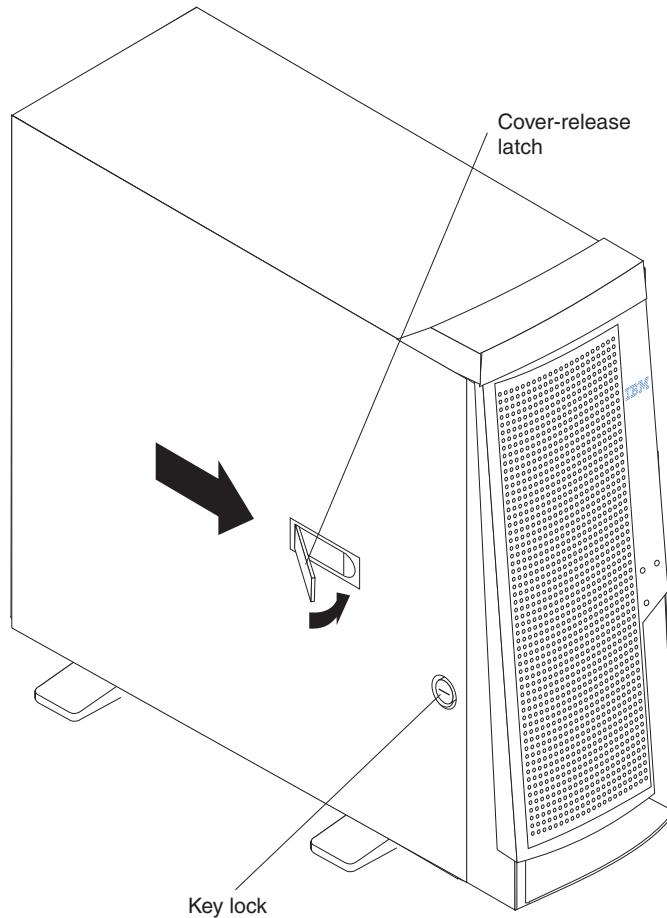
1. Insert the two tabs on the bottom of the bezel into the matching slots in the server chassis.
2. Push the top of the bezel toward the server until the two tabs at the top of the bezel snap into place.

---

## Installing the cover

The following information describes the cover installation procedure.

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



**Note:** If you removed the support bracket assembly after you removed the cover, reinstall it before you install the cover.

To install the server side cover:

1. Clear any cables that might impede the replacement of the cover.
2. Align the bottom tabs of the side cover with the matching slots in the server chassis; then, insert the tabs into the slots.
3. Close the cover-release latch to pull the cover forward and lock the cover in place.
4. Make sure that the stabilizing feet are rotated outward so that they properly support the server.
5. Reconnect the external cables and cords to the server; then, plug the power cords into electrical outlets.

---

## Connecting external options

You can attach a SCSI storage expansion enclosure to the server if you install an optional SCSI adapter in one of the five PCI adapter slots on the system board.

### Installation Procedure:

To attach an external device, do the following:

1. Read "System reliability considerations" on page 44 and the documentation that comes with your options.
2. Be sure the server and all attached devices are turned off.
3. Follow the instructions that come with the option to prepare it for installation and to connect it to the server.

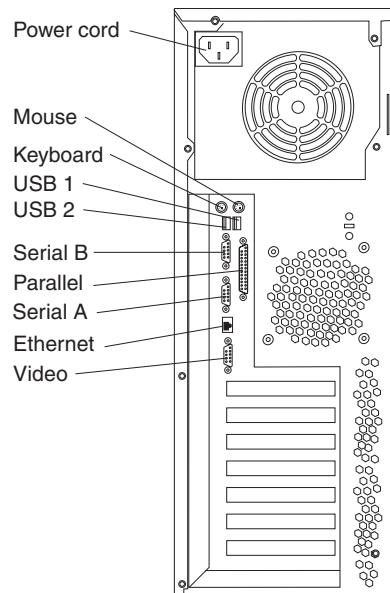
**Note:** If you are attaching a SCSI device, see "SCSI port" on page 72 for SCSI ID and cabling information.

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## I/O connector locations

The following illustration shows the input/output connectors (ports) on the rear of the server. The SCSI and system-management connectors are internal and located on the system board (see "System board internal cable connectors" on page 41 and "System board options connectors" on page 40, respectively for connector locations). For pin assignments and other details about these connectors, see

"Input/output ports".



## Input/output ports

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

- One parallel port
- One video port
- One keyboard port
- One auxiliary pointing-device (mouse) port
- Two serial ports
- Two Universal Serial Bus (USB) ports
- One Ethernet port
- One communication connector dedicated to the system management adapter

### Notes:

1. You can set an administrator password through the Configuration/Setup Utility program only if the optional system management adapter is installed in the server.
2. The **Devices and I/O Ports** choice appears only on the full Configuration/Setup Utility menu. If you have set both levels of passwords (user and administrator), you must type the administrator password to access the full Configuration/Setup Utility menu.

## Parallel port

The server has one parallel port. This port 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).

### Viewing or changing the port assignments

You can use the Configuration/Setup Utility program to configure the parallel port as bidirectional; that is, so that data can be both read from and written to a device. In bidirectional mode, the server supports the ECP and EPP modes.

To view or change the parallel-port assignment, do the following:

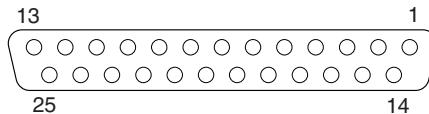
1. Restart the server and watch the monitor screen.
2. When the message Press F1 for Configuration/Setup appears, press F1.
3. From the main menu, select **Devices and I/O Ports**; then, press Enter.
4. Select the parallel port; then, use the arrow keys to advance through the available settings.

**Note:** When you configure the parallel port as bidirectional, use an IEEE 1284-compliant cable. The maximum length of the cable must not exceed 3 meters (9.8 feet).

5. Select **Save Settings**; then, select **Exit Setup** to exit from the Configuration/Setup Utility main menu.

### Parallel port connector

The following table shows the pin-number assignments for the 25-pin, female D-shell parallel-port connector on the system board.



*Table 10. Parallel-port connector pin-number assignments*

Pin	I/O	SPP/ECP Signal	EPP Signal
1	O	-STROBE	-WRITE
2	I/O	Data 0	Data 0
3	I/O	Data 1	Data 1
4	I/O	Data 2	Data 2
5	I/O	Data 3	Data 3
6	I/O	Data 4	Data 4
7	I/O	Data 5	Data 5
8	I/O	Data 6	Data 6
9	I/O	Data 7	Data 7
10	I	-ACK	-ACK
11	I	BUSY	-WAIT
12	I	PE (paper end)	PE (paper end)
13	I	SLCT (select)	SLCT (select)
14	O	-AUTO FD (feed)	-AUTO FD
15	I	-ERROR	-ERROR
16	O	-INIT	-INIT
17	O	-SLCT IN	-SLCT IN
18	-	Ground	Ground
19	-	Ground	Ground
20	-	Ground	Ground
21	-	Ground	Ground
22	-	Ground	Ground
23	-	Ground	Ground

*Table 10. Parallel-port connector pin-number assignments (continued)*

24	-	Ground	Ground
25	-	Ground	Ground

## Serial ports

The server has two standard serial (communication) ports: serial port A and serial port B.

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

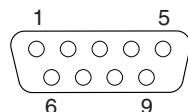
### Viewing or changing the serial-port assignments

To view or change the serial-port assignments, do the following:

1. Restart the server and watch the monitor screen.
2. When the message Press F1 for Configuration/Setup appears, press F1.
3. From the main menu, select **Devices and I/O Ports**; then, press Enter.
4. Select the serial port; then, use the arrow keys to advance through the available settings.
5. Select **Save Settings**; then, select **Exit Setup** to exit from the Configuration/Setup Utility main menu.

### Serial-port connectors

The following table shows the pin-number assignments for the 9-pin, male D-shell serial-port connectors on the system board. These pin-number assignments conform to the industry standard.



*Table 11. Serial-port connectors pin-number assignments*

Pin	Signal	Pin	Signal
1	Data carrier detect	6	Data set ready
2	Receive data	7	Request to send
3	Transmit data	8	Clear to send
4	Data terminal ready	9	Ring indicator
5	Signal ground		

## Universal Serial Bus ports

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

#### Notes:

1. If you attach a standard (non-USB) keyboard to the keyboard connector, the USB ports and devices will be disabled during the power-on self-test (POST).

2. If you install a USB keyboard that has a mouse port, the USB keyboard emulates a mouse, and you will not be able to disable the mouse settings in the Configuration/Setup Utility program.

### **USB cables and hubs**

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

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

### **USB-port connectors**

Each USB port has an external connector on the system board for attaching USB-compatible devices.

The following table shows the pin-number assignments for the USB-port connectors on the system board.

*Table 12. USB-port connector pin-number assignments*

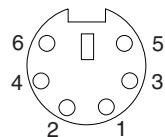
Pin	Signal
1	+5 V dc
2	-Data
3	+Data
4	Ground

### **Keyboard port**

There is one keyboard port on the system board.

**Note:** If you attach a standard (non-USB) keyboard to the keyboard connector, the USB ports and devices will be disabled during the power-on self-test (POST).

The following table shows the pin-number assignments for the keyboard connector on the system board.



*Table 13. Keyboard connector pin-number assignments*

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

## Auxiliary-device (pointing device) port

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

The following table shows the pin-number assignments for the auxiliary-device connector on the system board.

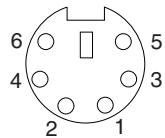


Table 14. Auxiliary-device connector pin-number assignments

Pin	Signal
1	Data
2	Reserved
3	Ground
4	+5 V dc
5	Clock
6	Reserved

## Video port

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

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

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

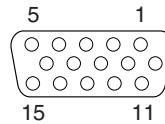


Table 15. Video-port connector pin-number assignments

Pin	Signal	Pin	Signal	Pin	Signal
1	Analog red	6	Red return	11	Not connected
2	Analog green or monochrome	7	Green return	12	DDC SDA
3	Analog blue	8	Blue return	13	Horizontal synchronization (Hsync)
4	Not connected	9	PIN	14	Vertical synchronization (Vsync)
5	Digital return	10	Digital return	15	DDC SCL

## SCSI port

The server has an integrated small computer system interface (SCSI) controller with an internal connector (J41) on the system board. This controller supports an Ultra160 SCSI internal channel. This channel supports up to 15 SCSI devices. In addition, this controller uses:

- Double-transition clocking to achieve high transfer rates
- Domain name validation to negotiate compatible data transfer speeds with each device
- Cyclic-redundancy checking (CRC), instead of the usual parity checking, to significantly improve data reliability
- An active terminator on the system board for SCSI bus termination

If you install a SCSI adapter in the server, you can use its SCSI connector to connect different types of small computer system interface (SCSI) devices.

**Note:** If you install a PCI redundant array of independent disks (RAID) adapter, you can move the SCSI cable from the system-board SCSI connector to an internal channel connector on the RAID adapter if you want to control the internal drives from the adapter.

## SCSI cabling requirements

A SCSI cable comes with the server so that you can connect internal SCSI devices to the SCSI controller on the system board. A SCSI cable comes with the models that have the hot-swap drive cage option. If you plan to attach external SCSI devices, you must install an optional SCSI adapter and order additional SCSI cables.

For information about the maximum length of SCSI cable between the terminated ends of the cable, refer to the American National Standards Institute (ANSI) SCSI standards. Adhering to these standards will help ensure that your server operates properly.

## Setting SCSI IDs

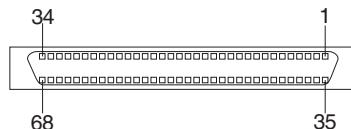
Each SCSI device that is connected to a SCSI controller or adapter must have a unique SCSI ID. This ID enables the SCSI controller or adapter to identify the device and ensure that different devices on the same SCSI channel do not attempt to transfer data simultaneously. SCSI devices that are connected to different SCSI channels can have duplicate SCSI IDs. SCSI IDs for hot-swap drives are automatically set by the hot-swap backplane. For hot-swap drives, bay 7 has ID 0, bay 6 has ID 1, bay 5 has ID 2. For non-hot-swap drives, refer to the information that comes with the drives for instructions to set their SCSI IDs.

## External SCSI devices

To install external SCSI devices, you must first install an optional SCSI PCI adapter. Refer to the information that is provided with the device for instructions to set its SCSI ID.

## SCSI connector pin-number assignments

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



*Table 16. 68-pin SCSI connector pin-number assignments*

Pin	Signal	Pin	Signal
1	+Data 12	35	-Data 12
2	+Data 13	36	-Data 13
3	+Data 14	37	-Data 14
4	+Data 15	38	-Data 15
5	+Data P1	39	-Data P1
6	+Data 0	40	-Data 0
7	+Data1	41	-Data 1
8	+Data 2	42	-Data 2
9	+Data 3	43	-Data 3
10	+Data 4	44	-Data 4
11	+Data 5	45	-Data 5
12	+Data 6	46	-Data 6
13	+Data 7	47	-Data 7
14	+Data P	48	-Data P
15	Ground	49	Ground
16	DIFFSENS	50	Ground
17	Term power	51	Term power
18	Term power	52	Term power
19	Reserved	53	Reserved
20	Ground	54	Ground
21	+Attention	55	-Attention
22	Ground	56	Ground
23	+Busy	57	-Busy
24	+Acknowledge	58	-Acknowledge
25	+Reset	59	-Reset
26	+Message	60	-Message
27	+Select	61	-Select
28	+Control/Data	62	-Control/Data
29	+Request	63	-Request
30	+Input/Output	64	-Input/Output
31	+Data 8	65	-Data 8
32	+Data 9	66	-Data9
33	+Data 10	67	-Data 10
34	+Data 11	68	-Data 11

## Ethernet port

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

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

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

### Configuring the Ethernet controller

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

The Ethernet controller is a PCI Plug and Play device. You do not need to set any jumpers or configure the controller for the operating system before you use the Ethernet controller. However, you must install a device driver to enable the operating system to address the Ethernet controller. The device drivers are provided on the ServerGuide CDs.

### Failover for redundant Ethernet

The IBM 10/100 Ethernet Adapter or the IBM 10/100 Etherjet® PCI family of adapters are optional redundant network interface cards (NIC adapters) that you can install in the server. If you install this NIC adapter and connect it to the same logical segment as the primary Ethernet controller, you can configure the server to support a *failover* function. You can configure either the integrated Ethernet controller or the NIC adapter as the primary Ethernet controller. In failover mode, if the primary Ethernet controller detects a link failure, all Ethernet traffic that is associated with it is switched to the redundant (secondary) controller. This switching occurs without any user intervention. When the primary link is restored to an operational state, the Ethernet traffic switches back to the primary Ethernet controller.

### High-performance Ethernet modes

The Ethernet controller supports optional modes, such as teaming, priority packets, and virtual LANs, which provide higher performance and throughput for the server.

**Teaming Mode:** The Ethernet controller provides options, called *teaming options*. These options increase throughput and fault tolerance when running with Windows NT 4.0 or NetWare 4.1x or later.

- **Adapter fault tolerance** (AFT) provides automatic redundancy for the adapter. If the primary adapter fails, the secondary adapter takes over. Adapter fault tolerance supports from two to four adapters per team.
- **Adaptive load balancing** (ALB) enables you to balance the transmission data flow among two to four adapters. ALB also includes the AFT option. You can use ALB with any 100BASE-TX switch.

- **Cisco Fast EtherChannel** (FEC) creates a team of two to four adapters to increase transmission and reception throughput. FEC also includes the AFT option. You can use FEC only with a switch that has FEC capability.

Teaming requires you to install at least one additional Ethernet adapter. For additional information about the teaming modes, refer to the documentation that comes with these additional adapters.

**Priority Packet Mode:** Priority Packet is a traffic-prioritization utility that you can use to set up filters to process high-priority traffic before normal traffic. You can send information from critical nodes or applications with an indicated priority. Because you set this priority at the host or entry point of the network, the network devices can base forwarding decisions on priority information that is defined in the packet.

Priority Packet information is available on the IBM Networking Web site at <http://www.ibm.com/networking/support>

Priority Packet prioritizes traffic based on priority filters. These are parameters that you assign to outgoing (transmit) packets. Using the Priority Filter Wizard, you can set up predefined or custom priority filters based on a node (MAC) address, Ethernet type, or by various properties of the protocol and port. Priority Packet provides two different methods for prioritizing traffic: IEEE 802.1p tagging and High Priority Queue.

IEEE 802.1p is a new IEEE standard for tagging, or adding additional bytes of information to packets with different priority levels. Packets are tagged with 4 additional bytes, which increase the packet size and indicate a priority level. When you send these packets out on the network, the higher priority packets are transferred first. Priority packet tagging (also known as Traffic Class Expediting) enables the adapter to work with other elements of the network (such as switches and routers) to deliver priority packets first. You can assign specific priority levels from 0 (low) to 7 (high).

You can assign values to packets based on their priority when you use the IEEE 802.1p standard for packet tagging. This method requires a network infrastructure that supports packet tagging. The routing devices that receive and transfer these packets on your network must support 802.1p for tagging to be effective.

After you set up the priority filter in Priority Packet, you must start IBMSet and select **802.1p/802.1Q Tagging** on the Advanced tab.

**Note:** IEEE 802.1p tagging increases the size of the packets that it tags. Some hubs and switches will not recognize the larger packets and will drop them. Check your hub or switch documentation to see if they support 802.1p. (You can configure the switch to strip the tags from the packets and send it on to the next destination as normal traffic.) If these devices do not support 802.1p or if you are not sure, use High Priority Queue (HPQ) to prioritize network traffic.

The requirements for effectively using IEEE 802.1p tagging are:

- The other devices receiving and routing 802.1p tagged packets must support 802.1p.
- The adapters on these devices must support 802.1p. The Ethernet controller in the xSeries 220 and all IBM 10/100 Ethernet Security Adapters support 802.1p.

- The adapter cannot be assigned to an adapter team.
- If you are setting up VLANs and packet tagging on the same adapter, 802.1p/802.1Q tagging must be enabled on the IBMSet Advanced tab.

If your network infrastructure devices do not support IEEE 802.1p or you are not sure, you can still define filters and send packets as high priority. While High Priority Queue (HPQ) does not provide the precise priority levels of 802.1p tagging, it does assign traffic as either high or low priority and sends high-priority packets first. Therefore, if there are multiple applications on a system that is sending packets, the packets from the application with a filter are sent out first. HPQ does not change network routing, nor does it add any information to the packets.

To assign HPQ, you can specify it using Priority Packet when you create or assign a filter.

To effectively use HPQ tagging, the adapter cannot be assigned to an adapter team.

**Virtual LAN Mode:** A virtual LAN (VLAN) is a logical grouping of network devices that are put together as a LAN, regardless of their physical grouping or collision domains. Using VLANs increases network performance and improves network security.

VLANs offer you the ability to group users and devices together into logical workgroups. This can simplify network administration when you are connecting clients to servers that are geographically dispersed across a building, campus, or enterprise network.

Normally, VLANs are configured at the switch, and any computer can be a member of one VLAN per installed network adapter. The Ethernet controller supersedes this by communicating directly with the switch, enabling multiple VLANs on a single network adapter (up to 64 VLANs).

To set up VLAN membership, the Ethernet controller must be attached to a switch that has VLAN capability. You also need to use Windows NT 4.0 or later, or Novell NetWare 4.1x or later.

**Notes:**

1. Windows NT versions prior to 4.0 do not support VLANs.
2. VLANs require NT 4.0 with Service Pack 3.0 and the NDIS driver hotfix from Microsoft.
3. In Windows NT, VLANs cannot be implemented on controllers that have been configured for teaming options. NetWare can support teaming options and VLANs on the same adapters.

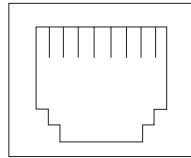
To join a VLAN from Windows NT 4.0:

1. Create a VLAN on the switch. Use the parameters that you assign there to join the VLAN from the server. Refer to your switch documentation for more information.
2. In the Control Panel window, double-click the **Network** icon.
3. On the Adapters tab, select the adapter that you want to be on the VLAN, and click **Properties**.
4. In IBMSet, click **Join VLAN**. Note that VLANs cannot be assigned to adapters that are already defined to have an adapter teaming option.

5. Type the VLAN ID and VLAN name. The VLAN ID must match the VLAN ID of the switch. The ID range is from 1 to 1000. The VLAN name is for information only and does not need to match the name on the switch.
6. Click **Join VLAN**. Repeat steps 3 on page 76 through 5 for each VLAN that you want the server to join. The VLANs that you add are listed on the Adapters tab.
7. Click **Close** and restart the computer.

## Ethernet port connector

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



*Table 17. Ethernet RJ-45 connector pin-number assignments*

Pin	Signal	Pin	Signal
1	+Transmit data	5	Not connected
2	-Transmit data	6	-Receive data
3	+Receive data	7	Not connected
4	Not connected	8	Not connected

---

## FRU information (service only)

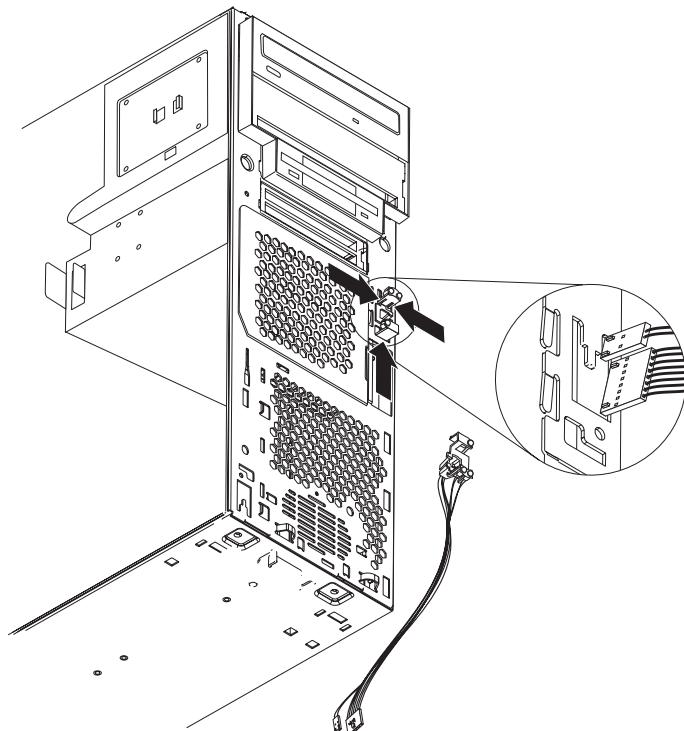
Field Replacement Units (FRUs) should be replaced by qualified service personnel only.

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### Button kit

#### Before you begin:

- Read “Safety information” on page 111.
- Review the information in “System reliability considerations” on page 44.



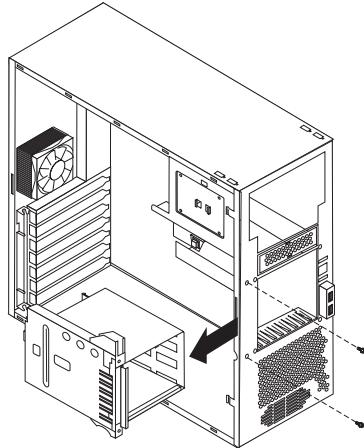
To remove the button kit, do the following:

1. Power-off the server, if it is on.
2. Unplug the server.
3. Remove the cover (see “Removing the side cover” on page 45).
4. Remove the front bezel (see “Removing the bezel” on page 46).
5. Remove the hot-swap hard disk drive (see “Hot-swap hard disk drive cage” on page 80).
6. Disconnect the cable of the button kit from the system board.
7. Place a screwdriver against the bottom release latch of the button kit and gently press upward and slide the latch through the aperture.
8. Gently pinch together the upper release latches and slide the latches through the aperture and remove the button kit.

## Hot-swap hard disk drive cage

### Before you begin:

- Read “Safety information” on page 111.
- Review the information in “System reliability considerations” on page 44.



**Note:** The illustration above may differ slightly from your server.

To remove the hot-swap hard disk drive, do the following:

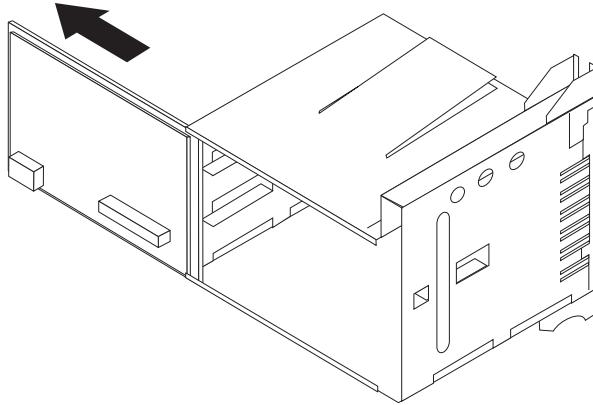
1. Power-off the server, if it is on.
2. Unplug the server.
3. Remove the front bezel (see “Removing the bezel” on page 46).
4. Remove the cover (see “Removing the side cover” on page 45).
5. Remove the support bracket (see “Removing the support bracket assembly” on page 47).
6. Remove any hard disk drives or drive fillers from the drives.
7. Disconnect the hard disk drive cables that connect to the system board.
8. Remove the screws from the front of the hard disk drive cage.
9. Move the cage slightly in and up until it is free of the chassis and lift it out of the server.

**Note:** Take care not to dislodge the memory when you remove the cage.

## Hot-swap backplane

### Before you begin:

- Read “Safety information” on page 111.
- Review the information in “System reliability considerations” on page 44.



**Note:** The illustration above may differ slightly from your server.

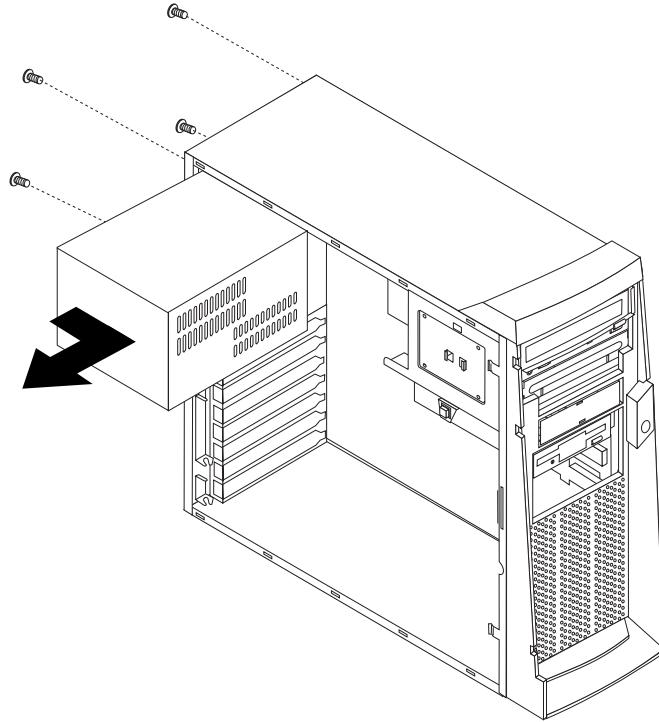
To remove the hot-swap backplane, do the following:

1. Power-off the server, if it is on.
2. Unplug the server.
3. Remove the front bezel (see “Removing the bezel” on page 46).
4. Remove the cover (see “Removing the side cover” on page 45).
5. Remove the support bracket (see “Removing the support bracket assembly” on page 47).
6. Remove any hard disk drives or drive fillers from the drives.
7. Disconnect the hard disk drive cables that connect to the system board.
8. Swing the cage out.
9. Slide the backplane out of the cage.

## Power supply

### Before you begin:

- Read “Safety information” on page 111.
- Review the information in “System reliability considerations” on page 44.



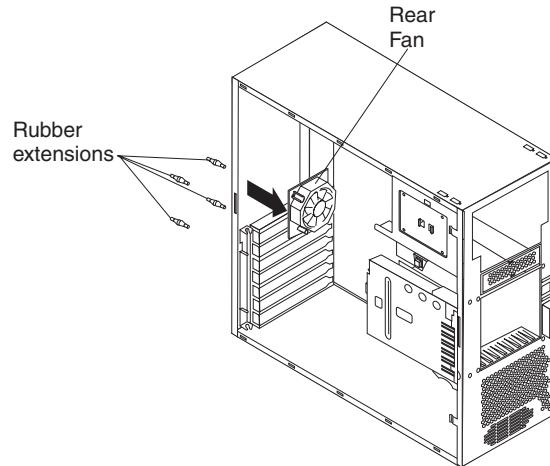
To remove the power supply, do the following:

1. Power-off the server, if it is on.
2. Unplug the server.
3. Remove the cover (see “Removing the side cover” on page 45).
4. Disconnect internal cables from the planar and drives.
5. Remove the screws from the rear of the server.
6. Gently move the power supply away from the chassis and lift it out of the server.

## Rear fan

### Before you begin:

- Read “Safety information” on page 111.
- Review the information in “System reliability considerations” on page 44.



To remove the rear fan, do the following:

1. Power-off the server, if it is on.
2. Unplug the server.
3. Remove the cover (see “Removing the side cover” on page 45).
4. Remove the support bracket (see “Removing the support bracket assembly” on page 47).
5. Remove the fan cable from the system board.
6. Use side cutters to sever the four rubber extensions on the outside of the server.
7. Gently pry the fan away from the server and lift it up and out.
8. To install the new fan assembly, place the fan in position at the rear of the server.
9. Guide the rubber extensions through the apertures.
10. Use needle-nosed pliers to pull the extensions through the apertures.
11. Reconnect cables.

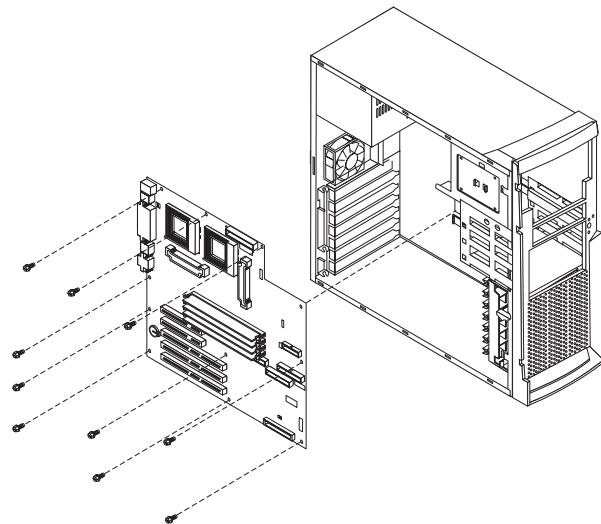
## System board

### Before you begin:

- Read “Safety information” on page 111.
- Review the information in “System reliability considerations” on page 44.

### Notes:

1. When replacing the system board, you must either update the system with the latest firmware or restore the pre-existing firmware that the customer provides on a diskette or CD image.
2. It is recommended that the server be placed on its left side before performing this service procedure. Rotate the feet in toward the server so they do not detach due to the weight of the server.



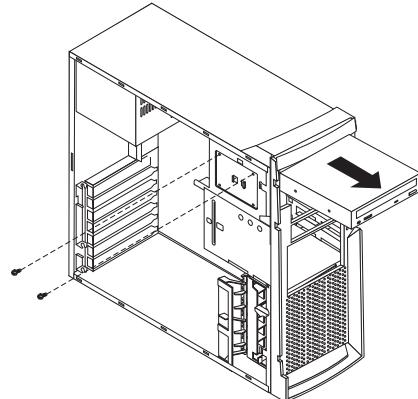
To remove the system board, do the following:

1. Power-off the server, if it is on.
2. Unplug the server.
3. Remove the cover (see “Removing the side cover” on page 45).
4. Remove the front bezel (see “Removing the bezel” on page 46).
5. Remove the support bracket (see “Removing the support bracket assembly” on page 47).
6. Disconnect the cables.
7. Remove the adapter cards and both adapter retaining brackets (see “Installing an adapter” on page 49).
8. Remove the hot-swap hard disk drive cage (see “Hot-swap hard disk drive cage” on page 80).
9. Remove memory modules (see “Installing memory modules” on page 58).
10. Remove microprocessors and/or terminator cards (see “Installing and removing a microprocessor” on page 61).
11. Remove screws and lift the system board out of the server.

## CD-ROM drive

### Before you begin:

- Read “Safety information” on page 111.
- Review the information in “System reliability considerations” on page 44.



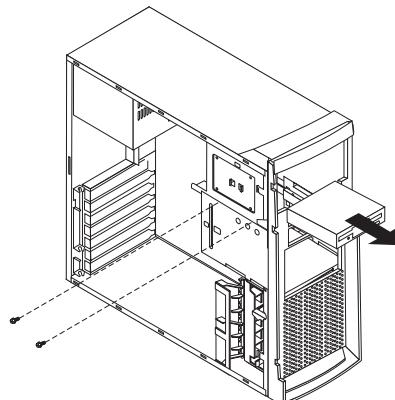
To remove the CD-ROM drive, do the following:

1. Power-off the server, if it is on.
2. Unplug the server.
3. Remove the cover (see “Removing the side cover” on page 45).
4. Disconnect the cables.
5. Remove the screws from the CD-ROM drive cage.
6. Gently slide the CD-ROM drive toward the front of the server and lift it out.

## Floppy disk drive

### Before you begin:

- Read “Safety information” on page 111.
- Review the information in “System reliability considerations” on page 44.



To remove the floppy disk drive, do the following:

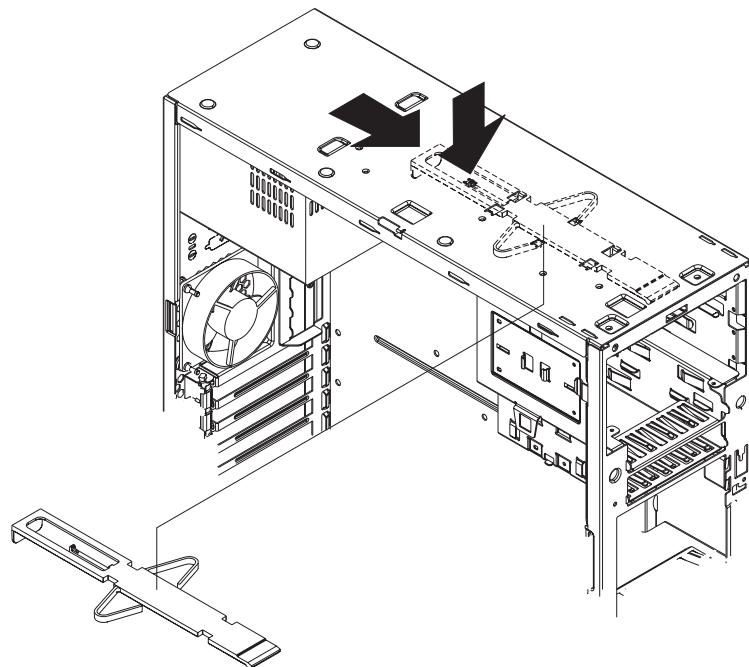
1. Power-off the server, if it is on.
2. Unplug the server.
3. Remove the cover (see “Removing the side cover” on page 45).
4. Disconnect the cables.
5. Remove the screws from the floppy disk drive cage.

6. Gently slide the floppy disk drive toward the front of the server and lift it out.

## Bezel release latch

### Before you begin:

- Read “Safety information” on page 111.
- Review the information in “System reliability considerations” on page 44.



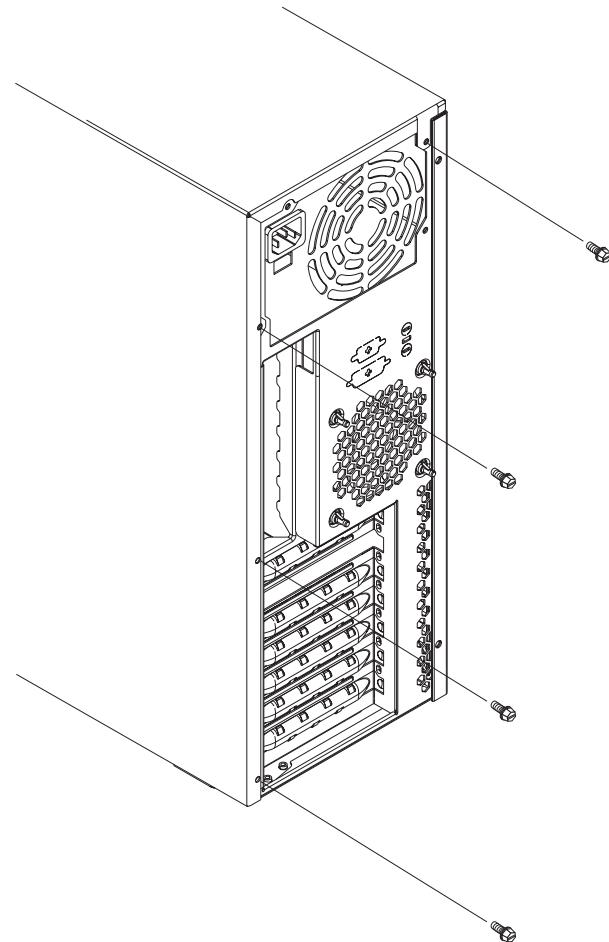
To remove the bezel release latch, do the following:

1. Power-off the server, if it is on.
2. Unplug the server.
3. Remove the cover (see “Removing the side cover” on page 45).
4. Remove the front bezel (see “Removing the bezel” on page 46).
5. Remove the handle assembly (see “Handle assembly” on page 88).
6. Remove the top/side cover (see “Top/side cover” on page 87).
7. Press down on the tab.
8. From the underside, grasp the bezel release latch in the center and gently pull it back and away from the server.

## Top/side cover

### Before you begin:

- Read “Safety information” on page 111.
- Review the information in “System reliability considerations” on page 44.



To remove the top/side cover, do the following:

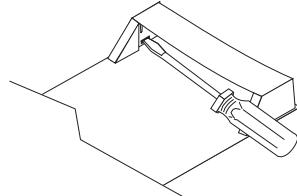
1. Power-off the server, if it is on.
2. Unplug the server.
3. Remove the cover (see “Removing the side cover” on page 45).
4. Remove the front bezel (see “Removing the bezel” on page 46).
5. Remove the handle assembly (see “Handle assembly” on page 88).
6. Remove the four screws from the back of the 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.

---

## Handle assembly

### Before you begin:

- Read “Safety information” on page 111.
- Review the information in “System reliability considerations” on page 44.



To remove the handle cap, do the following:

1. Power-off the server, if it is on.
2. Unplug the server.
3. Use a flathead screwdriver to gently press in and down on the tabs located on the interior side wall of the handle.
4. Lift up on the handle cap to separate it from the handle support.

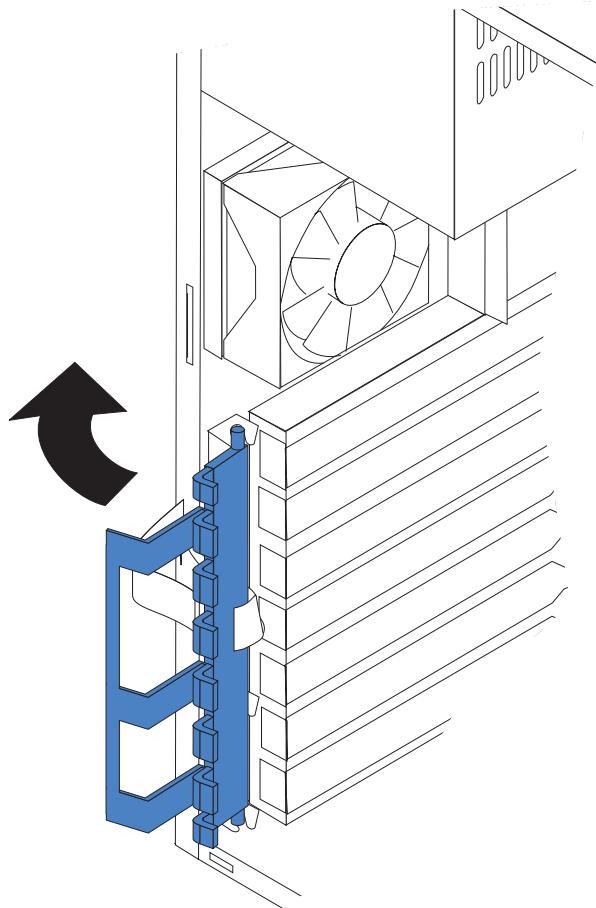
To remove the handle support, do the following:

1. Power-off the server, if it is on.
2. Unplug the server.
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.

## Adapter retainer

### Before you begin:

- Read “Safety information” on page 111.
- Review the information in “System reliability considerations” on page 44.



To remove the adapter retainer, do the following:

1. Power-off the server, if it is on.
2. Unplug the server.
3. Remove the side cover (see “Removing the side cover” on page 45).
4. Remove all adapter cards (see “Installing an adapter” on page 49).
5. Rotate the adapter retainer to the open position.
6. Grasp the adapter retainer and gently slide the top and bottom tabs out of the notches.



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# Symptom-to-FRU index

This index supports xSeries 220 servers.

**Notes:**

1. Check the configuration before you replace a FRU. Configuration problems can cause false errors and symptoms.
2. The default configuration can be loaded by starting the system and then pressing the reset button four times, waiting 15 seconds between each press. Once the configuration has reset to the default, it must be saved in Setup to be stored in CMOS.
3. For IBM devices not supported by index, refer to the manual for that device.
4. Always start with "General checkout" on page 1.

The Symptom-to-FRU lists symptoms, errors, and the possible causes. The most likely cause is listed first. Use this Symptom-to-FRU index to help you decide which FRUs to have available when servicing the computer. The POST BIOS displays POST error codes and messages on the screen.

---

## Beep symptoms

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

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

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

Beep/Symptom	FRU/Action
1-1-2 Microprocessor register test failed.	<ol style="list-style-type: none"><li>1. Processor</li><li>2. System board</li></ol>
1-1-3 (CMOS write/read test failed)	<ol style="list-style-type: none"><li>1. Battery</li><li>2. System Board</li></ol>
1-1-4 (BIOS EEPROM checksum failed)	<ol style="list-style-type: none"><li>1. Reflash BIOS</li><li>2. System Board</li></ol>
1-2-1 (Programmable Interval Timer failed)	<ol style="list-style-type: none"><li>1. System Board</li></ol>
1-2-2 (DMA initialization failed)	<ol style="list-style-type: none"><li>1. System Board</li></ol>

Beep/Symptom	FRU/Action
1-2-3 (DMA page register write/read test failed)	1. <b>System Board</b>
1-2-4 (RAM refresh verification failed)	1. <b>DIMM</b> 2. System Board
1-3-1 (1st 64K RAM test failed)	1. <b>DIMM</b> 2. System Board
1-3-2 (1st 64K RAM parity test failed)	1. <b>DIMM</b> 2. Processor 3. System Board
1-4-3 (Interrupt vector loading test failed)	1. <b>System Board</b>
2-1-1 (Secondary DMA register failed)	1. <b>System Board</b>
2-1-2 (Primary DMA register failed)	1. <b>System Board</b>
2-1-3(Primary interrupt mask register failed)	1. <b>System Board</b>
2-1-4 (Secondary interrupt mask register failed)	1. <b>System Board</b>
2-2-1 (Interrupt vector loading failed)	1. <b>System Board</b>
2-2-2 (Keyboard controller failed)	1. <b>System Board</b> 2. Keyboard
2-2-3 (CMOS power failure and checksum checks failed)	1. <b>Battery</b> 2. System board
2-2-4 (CMOS configuration info validation failed)	1. <b>Battery</b> 2. System board
2-3-1 (Screen initialization failed)	1. <b>Jumper on J28</b> 2. System Board
2-3-2 (Screen memory failed)	1. <b>System board</b>
2-3-3 (Screen retrace failed)	1. <b>System board</b>
2-3-4 (Search for video ROM failed)	1. <b>System board</b>
2-4-1 (Video failed; screen believed operable)	1. <b>System board</b>
3-1-1 (Timer tick interrupt failed)	1. <b>System Board</b>
3-1-2 (Interval timer channel 2 failed)	1. <b>System Board</b>

Beep/Symptom	FRU/Action
<b>3-1-3</b> (RAM test failed above address OFFFFH)	1. <b>DIMM</b> 2. Memory card 3. 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)	1. <b>System board</b>
<b>3-2-2</b> (Parallel port failed)	1. <b>System board</b>
<b>3-2-4</b> (Failure comparing CMOS memory size against actual)	1. <b>DIMM</b> 2. Battery 3. System board
<b>3-3-1</b> (Memory size mismatch occurred, see "Memory Settings" on page 32)	1. <b>DIMM</b> 2. System board 3. Battery
<b>3-3-2</b> (Critical SMBUS error occurred)	1. <b>Disconnect the server power cord from outlet, wait 30 seconds and retry.</b> 2. Unplug power, check for broken pins, and retry after reseating I2C cables between: a. system management adapter (PCI slot 2/J31) and planar (J32); b. DASD I2C on planar (J43) and DASD backplane 3. System Board 4. DIMMs 5. Power Supply 6. I2C Cable
<b>3-3-3</b> (No operational memory in system)	1. <b>Install or reseat the memory modules, then do a 3 boot reset.</b> (See "Using the Configuration/Setup Utility program" on page 29.) 2. DIMMs 3. System Board
<b>4-4-4</b> (I2C cable attached, system management adapter not functioning)	1. <b>Verify correct cable installation.</b> 2. Verify optional system management adapter is correctly installed in PCI slot 2. 3. System management adapter.
<b>Two Short Beeps</b> (Information only, the configuration has changed)	1. <b>Run Diagnostics</b> 2. Run Configuration/Setup
<b>Three Short Beeps</b>	1. <b>DIMM</b> 2. System Board
<b>One Continuous Beep</b>	1. <b>Processor</b> 2. Optional Processor (if installed) 3. System Board
<b>Repeating Short Beeps</b>	1. <b>Keyboard</b> 2. System Board
<b>One Long and One Short Beep</b>	1. <b>Video adapter (if present)</b> 2. System Board

Beep/Symptom	FRU/Action
One Long and Two Short Beeps	1. Video adapter (if present) 2. System Board
Two Long and Two Short Beeps	1. Video adapter

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## No beep symptoms

No Beep Symptom	FRU/Action
No beep and the system operates correctly.	1. System board
No Beeps occur after successfully completing POST	1. System board
No ac power	1. Check the power cord. 2. Power supply.
No beep and no video	1. See "Undetermined problems" on page 105

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## 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 This is a warning error and may not indicate a hardware failure.

For all error codes, replace/follow the FRU/Action indicated.

Error Code/Symptom	FRU/Action
001-XXX-000 (Failed core tests)	1. System Board
001-XXX-001 (Failed core tests)	1. System Board
001-250-000 (Failed System Board ECC)	1. System Board
001-250-001 (Failed System Board ECC)	1. System Board
005-XXX-000 (Failed Video test)	1. Video Adapter (if installed) 2. System Board
011-XXX-000 (Failed COM1 Serial Port test)	1. System Board
011-XXX-001 (Failed COM2 Serial Port test)	1. System Board
014-XXX-000 (Failed Parallel Port test)	1. System Board

Error Code/Symptom	FRU/Action
<b>015-XXX-001</b> (USB interface not found, board damaged)	1. <b>System Board</b>
<b>015-XXX-015</b> (Failed USB External Loopback test)	1. Make sure parallel port is not disabled 2. Re-run USB External Loopback test 3. <b>System Board</b>
<b>015-XXX-198</b> (USB device connected during USB test)	1. Remove USB devices from USB1 and USB2 2. Re-run test 3. <b>System Board</b>
<b>020-XXX-000</b> (Failed PCI Interface test)	1. <b>System Board</b>
<b>030-XXX-000</b> (Failed Internal SCSI interface test)	1. <b>System Board</b>
<b>030-XXX-00N</b> (Failed SCSI test on PCI slot N. Check system error log before replacing a FRU.)	1. <b>Adapter in Slot N</b>
<b>035-XXX-099</b>	1. <b>No adapters were found.</b> 2. If adapter is installed re-check connection.
<b>035-XXX-S99</b> (Failed RAID test on PCI slot S. S = number of failing PCI slot. Check System Error Log before replacing a FRU.)	1. <b>Adapter</b> 2. SCSI Backplane 3. Cable
<b>035-XXX-SNN</b> (Check System Error Log before replacing a FRU. S = number of failing PCI slot; NN = SCSI ID of failing fixed disk.)	1. <b>Fixed 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.</b> Obtain the basic and extended configuration status and refer to the ServeRAID Hardware Maintenance Manual for more information. 2. Cable 3. Adapter
<b>075-XXX-000</b> (Failed Power Supply test)	1. <b>Power Supply</b>
<b>089-XXX-001</b> (Failed Microprocessor test)	1. <b>Microprocessor</b>
<b>089-XXX-002</b> (Failed Optional Microprocessor test)	1. <b>Optional Microprocessor 2</b>
<b>166-198-000 System Management: Aborted</b>  (Unable to communicate with ASM adapter. It may be busy. Run the test again.)  (Communication with the ASM adapter has failed.)	1. Rerun the Diagnostic test 2. Disconnect all server and option power cords from server, wait 30 seconds, reconnect, and retry. 3. Advanced System Management adapter

Error Code/Symptom	FRU/Action
<b>166-201-000 System Management: Failed</b>  I2C Bus Error(s). See System Error/Event Log for details from both ASMPROC and DIAGS messages.)	<ol style="list-style-type: none"> <li>1. Disconnect all server and option power cords from server, wait 30 seconds, reconnect, and retry.</li> <li>2. Reseat I2C cables between:             <ol style="list-style-type: none"> <li>a. Advanced System Management adapter (in PCI slot 2/J31) and planar (J32)</li> <li>b. If installed, DASD I2C on planar (J43) and DASD backplane</li> </ol> </li> <li>3. Reseat Advanced System Management adapter (in PCI slot 2/J31).</li> <li>4. Advanced System Management adapter</li> <li>5. System Board</li> <li>6. I2C Cable(s)</li> </ol>
<b>166-250-000 System Management: Failed</b>  (I2C cable is disconnected. Reconnect I2C cable between ASM adapter and System Board.)	<ol style="list-style-type: none"> <li>1. Reseat I2C cables between Advanced System Management adapter (in PCI slot 2/J31) and planar (J32))</li> <li>2. I2C Cable(s)</li> </ol>
<b>166-260-000 System Management: Failed</b>  (Unable to restart Advanced System Management adapter.)  (Restart ASM Error. After restarting, ASM communication was lost. Unplug and cold boot to reset ASM.)	<ol style="list-style-type: none"> <li>1. Disconnect all server and option power cords from server, wait 30 seconds, reconnect, and retry</li> <li>2. Reseat Advanced System Management adapter (in PCI slot 2/J31)</li> <li>3. Advanced System Management adapter</li> </ol>
<b>166-342-000 System Management: Failed</b>  Advanced System Management BIST indicate failed tests.)	<ol style="list-style-type: none"> <li>1. Ensure latest firmware levels for ASM and BIOS</li> <li>2. Disconnect all server and option power cords from server, wait 30 seconds, reconnect, and retry</li> <li>3. Advanced System Management adapter</li> </ol>
<b>180-XXX-003</b> (Failed System Board LED test)	<ol style="list-style-type: none"> <li>1. <b>System Board</b></li> </ol>
<b>201-XXX-0NN</b> (Failed Memory test, see "Memory Settings" on page 32.) NN = DIMM location.	<ol style="list-style-type: none"> <li>1. <b>DIMM Location J1-J4</b></li> <li>2. Memory card</li> </ol>
<b>201-XXX-999</b> (Multiple DIMM failure, see error text.)	<ol style="list-style-type: none"> <li>1. <b>See error text for failing DIMMs</b></li> </ol>
<b>202-XXX-001</b> (Failed System Cache test)	<ol style="list-style-type: none"> <li>1. <b>Microprocessor CPU 1</b></li> </ol>
<b>202-XXX-002</b> (Failed System Cache test)	<ol style="list-style-type: none"> <li>1. <b>Microprocessor CPU 2</b></li> </ol>
<b>206-XXX-000</b> (Failed Diskette Drive test)	<ol style="list-style-type: none"> <li>1. <b>Cable</b></li> <li>2. Diskette Drive</li> <li>3. System Board</li> </ol>

Error Code/Symptom	FRU/Action
<b>215-XXX-000</b> (Failed IDE CD-ROM test)	<ol style="list-style-type: none"> <li><b>CD-ROM Drive Cables</b></li> <li>CD-ROM Drive</li> <li>System Board</li> </ol>
<b>217-XXX-000</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 1</b></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> </ol>
<b>217-XXX-002</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 3</b></li> </ol>
<b>217-198-XXX</b> (Could not establish drive parameters)	<ol style="list-style-type: none"> <li>Check cable and termination</li> <li>SCSI Backplane</li> <li>Fixed Disk</li> </ol>
<b>264-XXX-0NN</b> (NN = SCSI ID of failing Tape Drive)	<ol style="list-style-type: none"> <li><b>Tape Cartridge, if user executed the Read/Write Tape Drive test (XXX = 256)</b></li> <li>SCSI or power cable connected to the tape drive with SCSI ID NN</li> <li>Tape drive with SCSI ID NN – refer to Help and Service Information appendix of tape drive's User Guide.</li> <li>I/O Legacy Board or SCSI Controller – run SCSI Controller diagnostic to determine if SCSI bus is functioning properly.</li> </ol>
<b>264-XXX-999</b> (Errors on multiple tape drives, see error text for more info)	<ol style="list-style-type: none"> <li>See error messages/text in the PC Doctor error log for detailed information on each individual tape drive error.</li> </ol>
<b>301-XXX-000</b> (Failed Keyboard test)	<ol style="list-style-type: none"> <li><b>Keyboard</b></li> </ol>
<b>405-XXX-000</b> (Failed Ethernet test on controller on the System Board)	<ol style="list-style-type: none"> <li><b>Verify that Ethernet is not disabled in BIOS.</b></li> <li>System Board</li> </ol>
<b>405-XXX-00N</b> (Failed Ethernet test on adapter in PCI slot N)	<ol style="list-style-type: none"> <li><b>Adapter in PCI slot N.</b></li> <li>System Board</li> </ol>
<b>415-XXX-000</b> (Failed Modem test)	<ol style="list-style-type: none"> <li><b>Cable</b></li> <li>Modem</li> <li>System Board</li> </ol>

## Error symptoms

General	FRU/Action
<b>CD is not working properly.</b>	<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>

General	FRU/Action
<b>CD-ROM drive tray is not working.</b> (The server must be powered-on.)	<ol style="list-style-type: none"> <li>1. Insert the end of a paper clip into the manual tray-release opening.</li> <li>2. Run CD-ROM diagnostics.</li> <li>3. CD-ROM Drive</li> </ol>
<b>CD-ROM drive is not recognized.</b>	<ol style="list-style-type: none"> <li>1. Run Configuration/Setup, enable primary IDE channel.</li> <li>2. Check cables and jumpers.</li> <li>3. Check for correct device driver.</li> <li>4. Run CD-ROM diagnostics.</li> <li>5. CD-ROM drive</li> <li>6. System Board</li> </ol>
<b>Power switch does not work.</b>	<ol style="list-style-type: none"> <li>1. Verify that switch number 5 of switch block is Off.</li> <li>2. Power Switch Assembly</li> <li>3. System Board</li> </ol>
<b>CD-ROM drive cable is not plugged in.</b>	<ol style="list-style-type: none"> <li>1. Make sure CD-ROM drive cable is plugged in.</li> </ol>
<b>Diskette drive in-use light stays on, or the system bypasses the diskette drive, or the diskette drive does not work.</b>	<ol style="list-style-type: none"> <li>1. If there is a diskette in the drive, verify that:             <ol style="list-style-type: none"> <li>a. The diskette drive is enabled in the Configuration/Setup utility program.</li> <li>b. The diskette is good and not damaged. (Try another diskette if you have one.)</li> <li>c. The diskette is inserted correctly in the drive.</li> <li>d. The diskette contains the necessary files to start the server.</li> <li>e. The software program is OK.</li> <li>f. Cable is installed correctly (proper orientation)</li> </ol> </li> <li>2. Run Diskette Drive Diagnostics.</li> <li>3. Cable</li> <li>4. Diskette Drive</li> <li>5. System Board</li> </ol>
<b>Monitor problems (general).</b> Some IBM monitors have their own self-tests. If you suspect a problem with the monitor, refer to the information that comes with the monitor for adjusting and testing instructions.	<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>
<b>System Error and DIMM X LED on</b>	<ol style="list-style-type: none"> <li>1. Replace DIMM X</li> </ol>
<b>System Error and CPU X LED on</b>	<ol style="list-style-type: none"> <li>1. Replace CPU X</li> </ol>
<b>Fixed Disk diagnostic does not recognize drives.</b> Test shows fewer drives than actually installed.	Remove first drive that does not appear and rerun diagnostic. If the remaining drives show up, replace the removed drive.
<b>Fixed Disk diagnostic freezes when run</b>	Remove drive being tested at time of freeze and rerun the diagnostic. If diagnostic completes successfully, replace the removed.

Setup	Action
<i>Setup and Installation CD</i> won't start.	<ul style="list-style-type: none"> <li>Be sure the server is supported; all xSeries servers with a startable (bootable) CD-ROM drive are supported.</li> <li>If the startup (boot) sequence settings have been altered, be sure the CD-ROM is first in the boot sequence.</li> <li>If more than one CD-ROM drive is installed, be sure that only one drive is set as the primary drive. Start the CD from the primary drive.</li> </ul>
ServeRAID program cannot view all installed drives - or - cannot install NOS.	<ul style="list-style-type: none"> <li>Be sure there are no duplicate SCSI IDs or IRQ assignments.</li> <li>Be sure that the hard disk drive is connected properly.</li> </ul>
The <i>Operating System Installation</i> program continuously loops.	Free up more space on the hard disk.
ServerGuide won't start <i>your NOS CD</i> .	Be sure the NOS CD you have is supported by ServerGuide. See the <i>Setup and Installation CD</i> label for a list of NOS versions supported.
Can't install NOS - option is grayed out.	Either there is no logical drive defined (ServeRAID systems) or the ServerGuide system partition is not present. Run the setup and configuration program.

Setup	Action
<i>Setup and Installation CD</i> won't start.	<ul style="list-style-type: none"> <li>Be sure the server is supported; all xSeries servers with a startable (bootable) CD-ROM drive are supported.</li> <li>If the startup (boot) sequence settings have been altered, be sure the CD-ROM is first in the boot sequence.</li> <li>If more than one CD-ROM drive is installed, be sure that only one drive is set as the primary drive. Start the CD from the primary drive.</li> </ul>
ServeRAID program cannot view all installed drives - or - cannot install NOS.	<ul style="list-style-type: none"> <li>Be sure there are no duplicate SCSI IDs or IRQ assignments.</li> <li>Be sure that the hard disk drive is connected properly.</li> </ul>
The <i>Operating System Installation</i> program continuously loops.	Free up more space on the hard disk.
ServerGuide won't start <i>your NOS CD</i> .	Be sure the NOS CD you have is supported by ServerGuide. See the <i>Setup and Installation CD</i> label for a list of NOS versions supported.
Can't install NOS - option is grayed out.	Either there is no logical drive defined (ServeRAID systems) or the ServerGuide system partition is not present. Run the setup and configuration program.

TechConnect CD	Action
Can't start TechConnect CD.	Be sure you're starting the CD on a system with Microsoft Windows installed.
Can't view publications from TechConnect CD, or text is unreadable.	Be sure you have the Adobe reader installed (available from the TechConnect CD).

Diskette Factory CD	Action
Get "time out" or "Unknown host" errors	Be sure you have access to the Internet through FTP directly.

## POST error codes

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

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 Configuration/Setup</b></li> <li>2. Battery</li> <li>3. System Board</li> <li>4. Microprocessor</li> </ol>
<b>101, 102, 106</b> (System and microprocessor error)	<ol style="list-style-type: none"> <li>1. <b>System Board</b></li> </ol>
<b>111</b> (Channel check error)	<ol style="list-style-type: none"> <li>1. <b>Failing adapter</b></li> <li>2. DIMM</li> <li>3. System Board</li> </ol>
<b>114</b> (Adapter read-only memory error)	<ol style="list-style-type: none"> <li>1. <b>Failing adapter</b></li> <li>2. Run diagnostics</li> </ol>
<b>129</b> (Internal cache error)	<ol style="list-style-type: none"> <li>1. <b>Microprocessor</b></li> <li>2. Optional microprocessor (if installed)</li> </ol>
<b>151</b> (Real time clock error)	<ol style="list-style-type: none"> <li>1. <b>Run Diagnostics</b></li> <li>2. Battery</li> <li>3. System Board</li> </ol>
<b>161</b> (Real time clock battery error)	<ol style="list-style-type: none"> <li>1. <b>Run Configuration/Setup</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, <b>save the configuration</b> .	<ol style="list-style-type: none"> <li>1. <b>Run Configuration/Setup</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 Configuration/Setup</b></li> <li>2. Battery</li> <li>3. System Board</li> </ol>
<b>164</b> (Memory configuration changed, see "Memory Settings" on page 32.)	<ol style="list-style-type: none"> <li>1. <b>Run Configuration/Setup</b></li> <li>2. DIMM</li> <li>3. System Board</li> </ol>
<b>175</b> (Hardware error)	<ol style="list-style-type: none"> <li>1. <b>System Board</b></li> </ol>
<b>176, 177, 178</b> (Security hardware error)	<ol style="list-style-type: none"> <li>1. <b>Run Configuration/Setup</b></li> <li>2. System Board</li> <li>3. C2 Security Switch</li> </ol>
<b>184</b> (Power-on password corrupted)	<ol style="list-style-type: none"> <li>1. <b>Run Configuration/Setup</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 Configuration/Setup</b></li> <li>2. System Board</li> </ol>
<b>186</b> (Security hardware control logic failed)	<ol style="list-style-type: none"> <li>1. <b>Run Configuration/Setup</b></li> <li>2. System Board</li> </ol>

Error Code/Symptom	FRU/Action
<b>187</b> (VPD serial number not set.)	1. Set serial number in Setup 2. System Board
<b>188</b> (Bad EEPROM CRC #2)	1. Run Configuration/Setup 2. System Board
<b>189</b> (Three attempts were made to access the server with invalid passwords)	1. Run Configuration/Setup, enter the administrator password 2. System Board.
<b>201</b> (Memory test error, see "Memory Settings" on page 32.) If the server does not have the latest level of BIOS installed, update the BIOS to the latest level and run the diagnostic program again.	1. Run memory diagnostics. 2. DIMM 3. System Board
<b>229</b> (Cache error)	1. Microprocessor 2. Optional microprocessor (if installed)
<b>262</b> (DRAM parity configuration error)	1. Run Configuration/Setup 2. Battery 3. System Board
<b>289</b> (DIMM has been disabled by user or system, see "Memory Settings" on page 32.)	1. Run Configuration/Setup, if disabled by user 2. Disabled DIMM, if not disabled by user.
<b>301</b> (Keyboard or keyboard controller error)	1. Keyboard 2. System Board
<b>303</b> (Keyboard controller error)	1. System Board 2. Keyboard
<b>305</b>	
<b>602</b> (Invalid diskette boot record)	1. Diskette 2. Diskette Drive 3. Cable 4. System Board
<b>604</b> (Diskette drive error)	1. Run Configuration/Setup and Diagnostics 2. Diskette Drive 3. Drive Cable 4. System Board
<b>605</b> (Unlock failure)	1. Diskette Drive 2. Drive cable 3. System Board
<b>662</b> (Diskette drive configuration error)	1. Run Configuration/Setup and Diagnostics 2. Diskette Drive 3. Drive Cable 4. System Board

Error Code/Symptom	FRU/Action
<b>762</b> (Coprocessor configuration error)	<ol style="list-style-type: none"> <li><b>Run Configuration/Setup</b></li> <li>Battery</li> <li>Processor</li> </ol>
<b>962</b> (Parallel port error)	<ol style="list-style-type: none"> <li><b>Disconnect external cable on parallel port.</b></li> <li>Run Configuration/Setup</li> <li>System Board</li> </ol>
<b>998</b> (Automatic Restart or AC power restored)	<ol style="list-style-type: none"> <li><b>No action required</b></li> </ol>
<b>999</b> (System recovered from backup BIOS)	<ol style="list-style-type: none"> <li><b>Reflash BIOS</b></li> </ol>
<b>11XX</b> (System board serial port 1 or 2 error)	<ol style="list-style-type: none"> <li><b>Disconnect external cable on serial port.</b></li> <li>Run Configuration/Setup</li> <li>System Board</li> </ol>
<b>1162</b> (Serial port configuration conflict)	<ol style="list-style-type: none"> <li><b>Disconnect external cable on serial port</b></li> <li>Run Configuration/Setup</li> <li>System board</li> </ol>
<b>1301</b> (I2C cable to front panel not found)	<ol style="list-style-type: none"> <li><b>Cable</b></li> <li>Front panel</li> <li>Power Switch Assembly</li> <li>System Board</li> </ol>
<b>1302</b> (I2C cable from system board to power on and reset switches not found)	<ol style="list-style-type: none"> <li><b>Cable</b></li> <li>Power Switch Assembly</li> <li>System Board</li> </ol>
<b>1303</b> (I2C cable from system board to power backplane not found)	<ol style="list-style-type: none"> <li><b>Cable</b></li> <li>Power Backplane</li> <li>System Board</li> </ol>
<b>1304</b> (I2C cable to diagnostic LED board not found)	<ol style="list-style-type: none"> <li><b>Power Switch Assembly</b></li> <li>System Board</li> </ol>
<b>1762</b> (Fixed Disk Configuration error)	<ol style="list-style-type: none"> <li><b>Fixed Disk Drive</b></li> <li>Fixed Disk Cable</li> <li>Run Configuration/Setup</li> <li>Fixed Disk Adapter</li> <li>SCSI Backplane</li> <li>System Board</li> </ol>
<b>178x</b> (Fixed Disk error)	<ol style="list-style-type: none"> <li><b>Fixed Disk Cables</b></li> <li>Run Diagnostics</li> <li>Fixed Disk Adapter</li> <li>Fixed Disk Drive</li> <li>System Board</li> </ol>
<b>1800</b> (No more hardware interrupt available for PCI adapter)	<ol style="list-style-type: none"> <li>Run Configuration/Setup</li> <li>Failing Adapter</li> <li>System Board</li> </ol>

Error Code/Symptom	FRU/Action
<b>1962</b> (Drive does not contain a valid boot sector)	<ol style="list-style-type: none"> <li><b>Verify a bootable operating system is installed.</b></li> <li>If RAID system, refer to the Hardware Maintenance Manual for the specific RAID adapter.</li> <li>Run Diagnostics</li> <li>Hard Disk Drive</li> <li>Cable</li> <li>SCSI Backplane</li> <li>System Board</li> </ol>
<b>2400</b> (Video controller test failure)	<ol style="list-style-type: none"> <li><b>Video Adapter (if installed)</b></li> <li>System Board</li> </ol>
<b>2462</b> (Video memory configuration error)	<ol style="list-style-type: none"> <li><b>Video Adapter (if installed)</b></li> <li>System Board</li> </ol>
<b>5962</b> (IDE CD-ROM configuration error)	<ol style="list-style-type: none"> <li><b>Run Configuration/Setup</b></li> <li>CD-ROM Drive</li> <li>CD-ROM Power Cable</li> <li>IDE Cable</li> <li>System Board</li> <li>Battery</li> </ol>
<b>8603</b> (Pointing Device Error)	<ol style="list-style-type: none"> <li><b>Pointing Device</b></li> <li>System Board</li> </ol>
<b>00012000</b> (Processor machine check)	<ol style="list-style-type: none"> <li><b>Update BIOS</b></li> <li>VRM</li> <li>Replace microprocessor</li> </ol>
<b>00019501</b> (Microprocessor 1 is not functioning - check VRM and processor LEDs)	<ol style="list-style-type: none"> <li>Microprocessor 1</li> <li>VRM</li> <li>System Board</li> </ol>
<b>00019502</b> (Microprocessor 2 is not functioning - check VRM and processor LEDs)	<ol style="list-style-type: none"> <li>Microprocessor 2</li> <li>VRM</li> <li>System Board</li> </ol>
<b>00019701</b> (Microprocessor 1 failed BIST)	<ol style="list-style-type: none"> <li><b>Microprocessor 1</b></li> <li>System Board</li> </ol>
<b>00019702</b> (Microprocessor 2 failed BIST)	<ol style="list-style-type: none"> <li><b>Microprocessor 2</b></li> <li>System Board</li> </ol>

Error Code/Symptom	FRU/Action
<b>00180100</b> (A PCI adapter has requested memory resources that are not available.)	<ol style="list-style-type: none"> <li>1. If the PCI adapter that is requesting the memory resources is the start (boot) device, you might need to change the order of the adapters in the PCI slots. Memory is allocated to devices in the order that is specified in the Boot Priority option in the Start Options menu in the Configuration/Setup Utility. Ensure that the adapter is early in the boot priority so that it is allocating the necessary memory resources.</li> <li>2. Make sure that the PCI adapter and all other adapters are set correctly in the Configuration/Setup Utility program. If the memory resource settings are not correct, change the settings.</li> <li>3. If all memory resources are being used, you might need to remove an adapter to make memory resources available to the PCI adapter. Disabling the adapter BIOS on the adapter might correct the error. Refer to the documentation provided with the adapter.</li> </ol>
<b>00180200</b> (A PCI adapter has requested an I/O address that is not available, or the PCI adapter might be defective.)	<ol style="list-style-type: none"> <li>1. Make sure that the I/O address for the PCI adapter and all other programs are set correctly in the Configuration/Setup Utility program.</li> <li>2. If the I/O port resource settings are correct, the PCI adapter might be defective.</li> </ol>
<b>00180300</b> (A PCI adapter has requested a memory address that is not available, or the PCI adapter might be defective.)	<ol style="list-style-type: none"> <li>1. Make sure that the memory address for all other adapters are set correctly in the Configuration/Setup Utility program. If the memory resource settings are not correct, change the settings.</li> <li>2. If the memory settings are correct, the PCI adapter might be defective.</li> </ol>
<b>00180400</b> (A PCI adapter has requested a memory address that is not available.)	<ol style="list-style-type: none"> <li>1. If all memory addresses are being used, you might need to remove an adapter to make memory address space available for the PCI adapter. Disabling the adapter BIOS on the adapter might correct the error. Refer to the documentation provided with the adapter.</li> </ol>
<b>00180500</b> (A PCI adapter ROM error occurred.)	<ol style="list-style-type: none"> <li>1. Remove the PCI adapters. If you can start the server without the adapters, reinstall each adapter one at a time and restart after each is reinstalled. When an adapter fails, replace it.</li> </ol>
<b>00180600</b> (A PCI-to-PCI bridge error occurred. More than one PCI bus tried to access memory below 1 MB.)	<ol style="list-style-type: none"> <li>1. Remove the PCI adapter that has the PCI bridge. If you can start the server without the adapter, reinstall and restart the adapter. If the adapter fails, replace it.</li> </ol>
<b>00180700</b> (xxxxyyyy planar PCI device not responding (where xxxx is PCI vendor ID and yyyy is PCI device ID))	<ol style="list-style-type: none"> <li>1. Start the Configuration/Setup Utility program, select <b>Devices and I/O Ports</b>, and make sure that the device is enabled.</li> </ol>
<b>00180800</b> (Unsupported PCI device installed)	<ol style="list-style-type: none"> <li>1. Remove the PCI adapters. If you can start the server without the adapters, reinstall each adapter one at a time and restart after each one is reinstalled. If an adapter fails, replace it.</li> </ol>
<b>00181000</b> (PCI error)	<ol style="list-style-type: none"> <li>1. System Board</li> <li>2. PCI Card</li> </ol>
<b>01295085</b> (ECC checking hardware test error)	<ol style="list-style-type: none"> <li>1. <b>System Board</b></li> <li>2. Microprocessor</li> </ol>
<b>01298001</b> (No update data for microprocessor 1)	<ol style="list-style-type: none"> <li>1. <b>Ensure all microprocessors are the same stepping level and cache size.</b></li> <li>2. Microprocessor 1</li> </ol>
<b>01298002</b> (No update data for microprocessor 2)	<ol style="list-style-type: none"> <li>1. <b>Ensure all microprocessors are the same stepping level and cache size.</b></li> <li>2. Microprocessor 2</li> </ol>

Error Code/Symptom	FRU/Action
<b>01298101</b> (Bad update data for microprocessor 1)	1. Ensure all microprocessors are the same stepping level and cache size. 2. Microprocessor 1
<b>01298102</b> (Bad update data for microprocessor 2)	1. Ensure all microprocessors are the same stepping level and cache size. 2. Microprocessor 2
<b>01298200</b> (Microprocessor speed mismatch)	1. Ensure all microprocessors are the same speed.
<b>I9990301</b> (Fixed boot sector error)	1. Hard Disk Drive 2. If RAID system, RAID adapter. 3. SCSI Backplane 4. Cable 5. System Board
<b>I9990305</b> (Fixed boot sector error, no operating system installed)	1. Install operating system to hard disk drive.
<b>I9990650</b> (AC power has been restored)	1. Check cable 2. Check for interruption of power supply 3. Power Cable
Other numbers	Follow instructions on screen.

## System board LEDs

*Table 18. Processor board LEDs*

LED	Cause
Fan	1. Replace the fan assembly indicated by lit LED.
Memory	1. Replace the DIMM indicated by the lit DIMM error.
CPU	1. Turn off the server, reseat the microprocessor, and restart the server. 2. Replace the microprocessor.
VRM	1. Turn off the server, reseat the VRM indicated by the lit VRM error LED, and restart the server. 2. Replace the VRM

## ServeRAID

For ServeRAID error codes and procedures, refer to the Hardware Maintenance Manual for the particular RAID adapter in the system being serviced.

## Undetermined problems

You are here because the diagnostic tests did not identify the failure, the Devices List is incorrect, or the system is inoperative.

**Note:** A corrupt CMOS can cause undetermined problems.

If power problems are suspected:

1. Power-off the computer.
2. Recover BIOS
3. Be sure the system is cabled correctly.
4. Remove or disconnect the following (one at a time) until you find the failure (power-on the computer and reconfigure each time).
  - Any external devices
  - Surge suppressor device (on the computer)
  - Modem, printer, mouse, or non-IBM devices
  - Each adapter
  - Drives
  - Memory Modules (Minimum requirement = one 128 MB DIMM)

**Note:** Minimum operating requirements are:

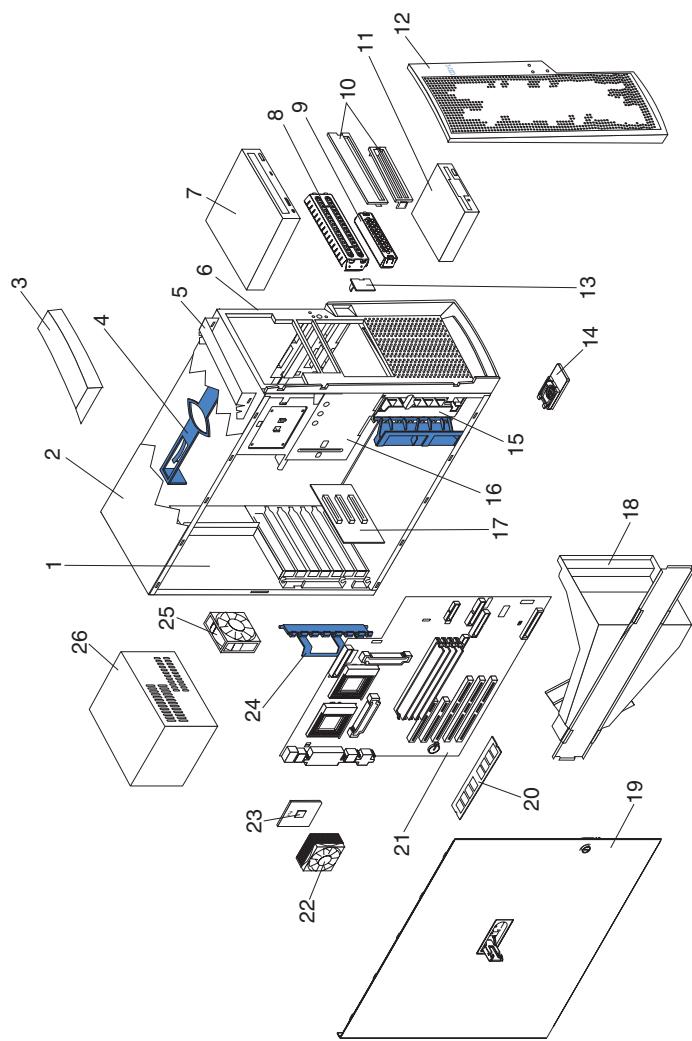
- a. 1 Power Supply
  - b. System Board
  - c. 1 Microprocessor
  - d. 1 Terminator Card in Slot 2
  - e. 1 Memory Module (minimum of 1 DIMM in slot labeled DIMM 1)
5. Power-on the computer. If the problem remains, suspect the following FRUs in the order listed:
    - Power Supply
    - System Board

**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, then the power supply.
2. If you suspect a networking problem and all the system tests pass, suspect a network cabling problem external to the system.

## Parts listing, Type 8646

This parts listing supports Type 8646, Models 21X, 22X, 2AX, 31X, 32X, 3AX, 41X, 42X, 4AX, 51X, 52X, 5AX.



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## System

Index	System (xSeries 220 - Type 8646) Models 21X, 22X, 2AX, 31X, 32X, 3AX, 41X, 42X, 4AX, 51X, 52X, 5AX	FRU No.
1	Chassis (All models)	06P5853
2	Cover, side/top (All models)	19K4957
3	Handle kit (All models)	19K4934
4	Bar release (All models)	19K4946
5	Support handle (All models)	19K4936
6	Front bezel door assembly (All models)	32P0954
7	LG CD-ROM (Primary) (All models)	24P3605
7	48X CD-ROM (Alternate) (All models)	19K1531
7	48X CD-ROM (Alternate) (All models)	19K1535
8	EMC shield, 5.25-in. bay (All models)	32P8503
9	EMC shield, 3.5-in. bay (All models)	32P8501
10	Bezel kit (Models 21X, 22X, 31X, 32X, 41X, 42X, 51X, 52X)	00N7082
11	Floppy disk drive (All models)	76H4091
12	Bezel door assembly (All models)	32P0957
13	USB blank bezel kit (All models)	19K4951
14	Feet (All models)	01N2196
15	Card guide assembly (All models)	19K4947
16	Cage assembly (non hot swap only) (All Models)	19K4931
16	Cage carrier assembly (hot swap only) (Models 2AX, 3AX, 4AX, 5AX)	32P8507
17	Backplane (hot swap only) (All models)	00N8953
18	92x38MM fan/duct assembly (All models)	32P8127
19	Door assembly (All models)	24P1752
20	Memory, 128MB RDIMM (Models 21X, 22X, 31X, 32X, 41X, 42X, 51X, 52X)	10K0019
20	Memory, 256MB RDIMM (optional) (Models 2AX, 3AX, 4AX, 5AX)	10K0021
20	Memory, 512MB RDIMM (optional) (All models)	10K0023
20	Memory, 1GB RDIMM (optional) (All models)	33L3327
21	Planar (All models)	48P9091
22	Fansink (All models)	22P4368
23	Processor, 133/1GHz-256K/L2, FC-PGA (Models 2AX, 21X, 22X)	25P2615
23	Processor, 133/1.13GHz-256K/L2, FC-PGA (Models 3AX, 31X, 32X)	25P2616
23	Processor, 133/1.26GHz-512K/L2, FC-PGA (Models 4AX, 41X, 42X)	25P2618
23	Processor, 133/1.4GHz-512K/L2, FC-PGA (Models 5AX, 51X, 52X)	48P7546
24	Retainer (All models)	19K4945
25	80MM fan assembly (All models)	22P4373
26	Power supply, 330W API-CR (All models)	00N7718
	Hard disk drive slim blank bezel (hot swap only) (Models 2AX, 3AX, 4AX, 5AX)	00N7259
	Duct extension (Models 21X, 22X, 31X, 32X, 41X, 42X, 51X, 52X)	32P0674
	EMC plate planar (All models)	32P8509
	Foot kit (All models)	12J4056
	Shield, planar EMC kit (All models)	06P5851
	Misc. hardware kit (All models)	09N5764
	Panel assembly (All models)	24P2621
	Button kit (All models)	19K4940
	Support bracket (All models)	19K4963
	Lock bar (All models)	24P1746
	Lock assembly (All models)	24P1751
	Hard disk drive rail (All models)	23P1328
	Service Label (All models)	32P0980
	Hot Swap EMC Plate (Models 21X, 22X, 31X, 32X, 41X, 42X, 51X, 52X)	32P8505
	Mouse assembly, Stealth Gray (All models)	24P0383
	Terminator (All models)	25P1866

<b>Index</b>	<b>System (xSeries 220 - Type 8646) Models 21X, 22X, 2AX, 31X, 32X, 3AX, 41X, 42X, 4AX, 51X, 52X, 5AX</b>	<b>FRU No.</b>
5V/12V VRM VER.8.5 (All models)	24P6893	
18.2GB, SCSI (Models 22X, 32X, 42X, 52X)	19K1485	
Battery (All models)	33F8354	
Power cord (All models)	93F2364	
Cable, SCSI 5-drop (non hot swap only) (Models 21X, 22X, 31X, 32X, 41X, 42X, 51X, 52X)	00N7110	
Cable, CD-ROM IDE (All models)	01K1483	
Cable, 2-drop (hot swap only) (Models 2AX, 3AX, 4AX, 5AX)	06P5849	
Cable, Hot-swap kit (Models 2AX, 3AX, 4AX, 5AX)	06P5850	
Cable, floppy 2x3 (All models)	76H4228	
<b>TOWER TO RACK CONVERSION KIT</b>		
Bezel, rack (optional) (All models)	00N7068	
Cover assembly (optional) (All models)	00N7070	
Slide assembly (optional) (All models)	00N7072	
Left EIA flange (optional) (All models)	00N7190	
Right EIA flange (optional) (All models)	00N7192	
Misc. parts (optional) (All models)	00N7193	
Rigid arm (optional) (All models)	00N7211	
Arm, cable management pivot bracket (optional) (All models)	00N7242	
Hinge pin (optional) (All models)	00N7244	
Arm, cable management (optional) (All models)	00N7245	
Rack kit (optional) (All models)	06P5852	

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## Keyboards

<b>Keyboard</b>	<b>FRU No.</b>
US English	37L2551
French Canadian	37L2552
LA Spanish	37L2553
Brazil/Portuguese	37L2554
Arabic	37L2555
Belgium/French	37L2556
Belgium/UK	37L2557
Bulgarian	37L2558
Czech	37L2559
Danish	37L2560
Dutch	37L2561
French	37L2562
German	37L2563
Greek	37L2564
Hebrew	37L2565
Hungarian	37L2566
Iceland	37L2567
Italy	37L2568
Norwegian	37L2569
Polish	37L2570
Portuguese	37L2571
Romanian	37L2572
Russian	37L2573
Serbian/Cyrillic	37L2574
Slovic	37L2575
Spanish	37L2576
Swedish/Finn	37L2577

<b>Keyboard</b>	<b>FRU No.</b>
Swiss, F/G	37L2578
Turkish	37L2579
Turkish	37L2580
UK English	37L2581
Yugosl/Lat	37L2582
US English-EMEA	37L2583
Japanese	37L2584
Chinese/US	37L2585
Thailand	37L2587
French Canadian	37L0913

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## Power cords

<b>Power cord</b>	<b>FRU No.</b>
China (PRC)	01K9851
Japan	01K9853
Thailand	12J5120
Israel	12J5122
Bangladesh, Burma, India, Pakistan, South Africa, Sri Lanka	12J5124
Chile, Ethiopia, Italy, Libya, Somalia	12J5126
Argentina, Australia, New Zealand, Papua New Guinea, Paraguay, Uruguay, Western Samoa	12J5128
Antigua, Bahrain, Brunei, Channel Islands, Cyprus, Dubai, Fiji, Ghana, Hong Kong, Iraq, Ireland, Kenya, Kuwait, Malawi, Malaysia, Malta, Nepal, Nigeria, Polynesia, Qatar, Sierra Leone, Singapore, Tanzania, Uganda, United Kingdom, Yemen, Zambia	12J5987
Afghanistan, Algeria, Andorra, Angola, Austria, Belgium, Benin, Bulgaria, Burkina Faso, Burundi, Cameroon, Central African Rep., Chad, Czech Republic, Egypt, Finland, France, French Guiana, Germany, Greece, Guinea, Hungary, Iceland, Indonesia, Iran, Ivory Coast, Jordan, Lebanon, Luxembourg, Macau, Malagasy, Mali, Martinique, Mauritania, Mauritius, Monaco, Morocco, Mozambique, Netherlands, New Caledonia, Niger, Norway, Poland, Portugal, Romania, Senegal, Slovakia, Spain, Sudan, Sweden, Syria, Togo, Tunisia, Turkey, former USSR, Vietnam, former Yugoslavia, Zaire, Zimbabwe	55H6643
Denmark, Switzerland, Liechtenstein	55H6646
Bahamas, Barbados, Bermuda, Bolivia, Brazil, Canada, Cayman Islands, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Korea (South), Liberia, Mexico, Netherlands Antilles, Nicaragua, Panama, Peru, Philippines, Saudi Arabia, Suriname, Taiwan, Trinidad (West Indies), Venezuela	76H4865
United States of America	6952301 (110) 1838574 (220) 36L8886 (220V/15A)

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## Related service information

**Note:** The service procedures are designed to help you isolate problems. They are written with the assumption that you have model-specific training on all computers, or that are familiar with the computers, functions, terminology, and service information provided in this manual.

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## Safety information

The following section contains the safety information that you need to be familiar with before servicing an IBM computer.

### General safety

Follow these rules to ensure general safety:

- Observe good housekeeping in the area of the machines during and after maintenance.
- When lifting any heavy object:
  1. Ensure you can stand safely without slipping.
  2. Distribute the weight of the object equally between your feet.
  3. Use a slow lifting force. Never move suddenly or twist when you attempt to lift.
  4. Lift by standing or by pushing up with your leg muscles; this action removes the strain from the muscles in your back. *Do not attempt to lift any objects that weigh more than 16 kg (35 lb) or objects that you think are too heavy for you.*
- Do not perform any action that causes hazards to the customer, or that makes the equipment unsafe.
- Before you start the machine, ensure that other service representatives and the customer's personnel are not in a hazardous position.
- Place removed covers and other parts in a safe place, away from all personnel, while you are servicing the machine.
- Keep your tool case away from walk areas so that other people will not trip over it.
- Do not wear loose clothing that can be trapped in the moving parts of a machine. Ensure that your sleeves are fastened or rolled up above your elbows. If your hair is long, fasten it.
- Insert the ends of your necktie or scarf inside clothing or fasten it with a nonconductive clip, approximately 8 centimeters (3 inches) from the end.
- Do not wear jewelry, chains, metal-frame eyeglasses, or metal fasteners for your clothing.

**Remember:** Metal objects are good electrical conductors.

- Wear safety glasses when you are: hammering, drilling soldering, cutting wire, attaching springs, using solvents, or working in any other conditions that might be hazardous to your eyes.
- After service, reinstall all safety shields, guards, labels, and ground wires. Replace any safety device that is worn or defective.
- Reinstall all covers correctly before returning the machine to the customer.

## Electrical safety



### CAUTION:

Electrical current from power, telephone, and communication cables can be hazardous. To avoid personal injury or equipment damage, disconnect the attached power cords, telecommunication systems, networks, and modems before you open the server covers, unless instructed otherwise in the installation and configuration procedures.

Observe the following rules when working on electrical equipment.

**Important:** Use only approved tools and test equipment. Some hand tools have handles covered with a soft material that does not insulate you when working with live electrical currents.

Many customers have, near their equipment, rubber floor mats that contain small conductive fibers to decrease electrostatic discharges. Do not use this type of mat to protect yourself from electrical shock.

- Find the room emergency power-off (EPO) switch, disconnecting switch, or electrical outlet. If an electrical accident occurs, you can then operate the switch or unplug the power cord quickly.
- Do not work alone under hazardous conditions or near equipment that has hazardous voltages.
- Disconnect all power before:
  - Performing a mechanical inspection
  - Working near power supplies
  - Removing or installing main units
- Before you start to work on the machine, unplug the power cord. If you cannot unplug it, ask the customer to power-off the wall box that supplies power to the machine and to lock the wall box in the off position.
- If you need to work on a machine that has exposed electrical circuits, observe the following precautions:
  - Ensure that another person, familiar with the power-off controls, is near you.  
**Remember:** Another person must be there to switch off the power, if necessary.
  - Use only one hand when working with powered-on electrical equipment; keep the other hand in your pocket or behind your back.  
**Remember:** There must be a complete circuit to cause electrical shock. By observing the above rule, you may prevent a current from passing through your body.
  - When using testers, set the controls correctly and use the approved probe leads and accessories for that tester.
  - Stand on suitable rubber mats (obtained locally, if necessary) to insulate you from grounds such as metal floor strips and machine frames.

Observe the special safety precautions when you work with very high voltages; these instructions are in the safety sections of maintenance information. Use extreme care when measuring high voltages.

- Regularly inspect and maintain your electrical hand tools for safe operational condition.
- Do not use worn or broken tools and testers.
- *Never assume* that power has been disconnected from a circuit. First, *check* that it has been powered-off.
- Always look carefully for possible hazards in your work area. Examples of these hazards are moist floors, nongrounded power extension cables, power surges, and missing safety grounds.
- Do not touch live electrical circuits with the reflective surface of a plastic dental mirror. The surface is conductive; such touching can cause personal injury and machine damage.
- Do not service the following parts with the power on when they are removed from their normal operating places in a machine:
  - Power supply units
  - Pumps
  - Blowers and fans
  - Motor generators

and similar units. (This practice ensures correct grounding of the units.)

- If an electrical accident occurs:
  - Use caution; do not become a victim yourself.
  - Switch off power.
  - Send another person to get medical aid.

## Safety inspection guide

The intent of this inspection guide is to assist you in identifying potentially unsafe conditions on these products. Each machine, as it was designed and built, had required safety items installed to protect users and service personnel from injury. This guide addresses only those items. However, good judgment should be used to identify potential safety hazards due to attachment of non-IBM features or options not covered by this inspection guide.

If any unsafe conditions are present, you must determine how serious the apparent hazard could be and whether you can continue without first correcting the problem.

Consider these conditions and the safety hazards they present:

- Electrical hazards, especially primary power (primary voltage on the frame can cause serious or fatal electrical shock).
- Explosive hazards, such as a damaged CRT face or bulging capacitor
- Mechanical hazards, such as loose or missing hardware

The guide consists of a series of steps presented in a checklist. Begin the checks with the power off, and the power cord disconnected.

Checklist:

1. Check exterior covers for damage (loose, broken, or sharp edges).
2. Power-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 static-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 machine, 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 listed below, to provide protection that meets the specific service requirement.

**Note:** The use of a grounding system is desirable but not required to protect against ESD damage.

- Attach the ESD ground clip to any frame ground, ground braid, or green-wire ground.
- Use an ESD common ground or reference point when working on a double-insulated or battery-operated system. You can use coax or connector-outside shells on these systems.
- Use the round ground-prong of the ac plug on ac-operated computers.

## Grounding requirements

Electrical grounding of the computer is required for operator safety and correct system function. Proper grounding of the electrical outlet can be verified by a certified electrician.

## Safety notices (multi-lingual translations)

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

- English
- Brazilian/Portuguese
- Chinese
- French
- German
- Italian
- Korean
- Spanish

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

For example, if a caution statement begins with a number 1, translations for that caution statement appear in this section under statement 1.

Be sure to read all caution and danger statements before performing any of the instructions.

- Statement 1



### DANGER

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

#### To avoid a shock hazard:

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

- Connect and disconnect cables as described in the following table when installing, moving, or opening covers on this product or attached devices.

To Connect	To Disconnect
<ol style="list-style-type: none"> <li>1. Turn everything OFF.</li> <li>2. First, attach all cables to devices.</li> <li>3. Attach signal cables to connectors.</li> <li>4. Attach power cords to outlet.</li> <li>5. Turn device ON.</li> </ol>	<ol style="list-style-type: none"> <li>1. Turn everything OFF.</li> <li>2. First, remove power cords from outlet.</li> <li>3. Remove signal cables from connectors.</li> <li>4. Remove all cables from devices.</li> </ol>

- Statement 2



**CAUTION:**

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

*Do not:*

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

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

- Statement 3



**CAUTION:**

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

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



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

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

- Statement 4



$\geq 18$  kg (37 lbs)



$\geq 32$  kg (70.5 lbs)



$\geq 55$  kg (121.2 lbs)

**CAUTION:**

Use safe practices when lifting.

- Statement 5



**CAUTION:**

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



- 2 →   
1 →

- 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 óptica, 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.

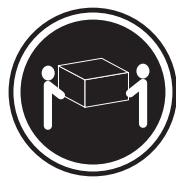
### PERIGO

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 ópticos, e evite exposição direta ao raio.

## Instrução 4

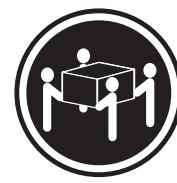




≥18 kg (37 lbs)



≥32 kg (70.5 lbs)



≥55 kg (121.2 lbs)

#### CUIDADO:

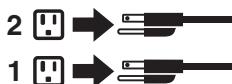
Ao levantar a máquina, faça-o com segurança.

Instrução 5



#### CUIDADO:

Os botões Liga/Desliga localizados no dispositivo e na fonte de alimentação não desligam a corrente elétrica fornecida ao dispositivo. O dispositivo também pode ter mais de um cabo de alimentação. Para remover toda a corrente elétrica do dispositivo, assegure que todos os cabos de alimentação estejam desconectados da fonte de energia elétrica.



#### CUIDADO:

Instrução 10



#### CUIDADO:



Não coloque nenhum objeto com peso superior a 82 kg (180 lbs.) sobre dispositivos montados em rack.

**重要:**

Server Library 中的所有提醒和危险条款前都有一个数字标识。该数字是用来交叉引用一个英文的提醒和危险条款及本部分中的与之对应的已翻译成其它文字的提醒和危险条款。

例如，如果一个提醒条款前的数字为 1，则本部分中相应的译文也带有标号 1。

在执行任何指示的操作之前，请确保您已经阅读了全部提醒和危险条款。

**声明 1****危险**

电源、电话和通信电缆中带有危险电流。

为避免电击：

雷电期间不要拆接电缆或安装、维修及重新配置本产品。

将所有电源线连接至正确布线并已安全接地的电源插座上。

将应与本产品连接的所有设备连接至正确布线的插座上。

尽量只使用单手拆接信号电缆。

有水、火及结构损坏迹象时，请勿打开任何设备。

除非在安装配置过程中有明确指示，否则，打开设备机盖前应先断开与电源线、远程通信系统、网络和调制解调器的所有连接。

安装、移动或打开本产品及其附带设备的机盖时，应按下表所述连接和断开电缆。

**连接时： 断开连接时：**

- |                  |                 |
|------------------|-----------------|
| 1. 关闭所有设备。       | 1. 关闭所有设备。      |
| 2. 首先将所有电缆连接至设备。 | 2. 首先从插座中拔出电源线。 |
| 3. 将信号电缆连接至接口。   | 3. 从接口上拔下信号电缆。  |
| 4. 将电源线连接至插座。    |                 |

## 声明 2



警告：

更换锂电池时，只能使用 IBM 产品号 33F8354 或者是厂商推荐的等同类型的电池。

如果系统模块中含有锂电池，则只能使用同一厂商制造的同一类型的模块进行更换。电池中含有锂。如果使用、拿放或处理不当，可能会发生爆炸。

请勿对电池进行下列操作：

扔入或浸入水  
加热超过 100 °C (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



$\geq 18 \text{ kg}$  (37 磅)



$\geq 32 \text{ kg}$  (70.5 磅)



$\geq 55 \text{ kg}$  (121.2 磅)

警告:

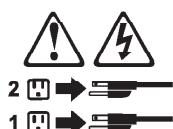
抬起时请采用安全操作方法。

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拔下热插拔风扇电缆。

#### 声明 10



警告:

机柜安装的设备上面不能放置重于 82kg (180 磅) 的物品。



> 82 kg (180 磅)

**声明 11**



**警告:**

下面的标签表明附近有锋利的边、角或接头。



**声明 12**



**警告:**

下面的标签表明附近有高热表面。



## 重要資訊：

**Server Library** 中所有「注意」及「危險」的聲明均以數字開始。此一數字是用來作為交互參考之用，英文「注意」或「危險」聲明可在本節中找到相同內容的「注意」或「危險」聲明的譯文。

例如，有一「危險」聲明以數字 1 開始，則該「危險」聲明的譯文將出現在本節的「聲明」1 中。

執行任何指示之前，請詳讀所有「注意」及「危險」的聲明。

聲明 1



### 危險

電源、電話及通信電纜上所產生的電流均有危險性。

#### 欲避免電擊危險：

- 在雷雨期間，請勿連接或切斷本產品上的任何電纜線，或安裝、維修及重新架構本產品。
- 請將電源線接至接線及接地正確的電源插座。
- 請將本產品隨附的設備連接至接線正確的插座。
- 僅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：	切斷：
1. 關閉所有開關。	1. 關閉所有開關。
2. 先將所有電纜線接上裝置。	2. 先自電源插座拔掉電源線。
3. 將信號電纜接上接頭。	3. 拔掉接頭上的所有信號電纜。
4. 再將電源線接上電源插座。	4. 再拔掉裝置上的所有電纜線。
5. 開啓裝置的電源。	5. 開啓裝置的電源。

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。

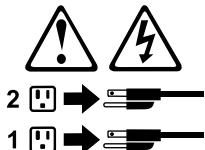
### 聲明 5



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.



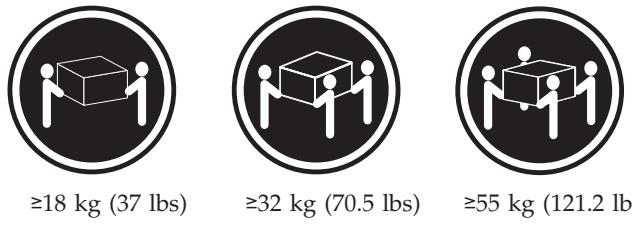
**DANGER**

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





**ATTENTION:**

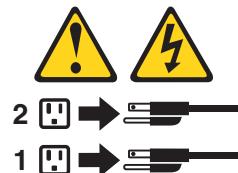
Faites-vous aider pour soulever ce produit.

Notice n° 5



**ATTENTION:**

**Le bouton de mise sous tension/hors tension de l'unité et l'interrupteur d'alimentation du bloc d'alimentation ne coupent pas l'arrivée de courant électrique à l'intérieur de la machine. Il se peut que votre unité dispose de plusieurs cordons d'alimentation. Pour isoler totalement l'unité du réseau électrique, débranchez tous les cordons d'alimentation des socles de prise de courant.**



Notice n° 10



**ATTENTION:**

Ne posez pas d'objet dont le poids dépasse 82 kg sur les unités montées en armoire.

## **Wichtig:**

Alle Sicherheitshinweise in dieser IBM documentation beginnen mit einer Nummer. Diese Nummer verweist auf einen englischen Sicherheitshinweis mit den übersetzten Versionen dieses Hinweises in diesem Abschnitt.

Wenn z. B. ein Sicherheitshinweis mit der Nummer 1 beginnt, so erscheint die Übersetzung für diesen Sicherheitshinweis in diesem Abschnitt unter dem Hinweis 1.

Lesen Sie alle Sicherheitshinweise, bevor Sie eine Anweisung ausführen.

### Hinweis 1



## **VORSICHT**

Elektrische Spannungen von Netz-, Telefon- und Datenübertragungsleitungen sind gefährlich.

Aus Sicherheitsgründen:

- Bei Gewitter an diesem Gerät keine Kabel anschließen oder lösen. Ferner keine Installations-, Wartungs- oder Rekonfigurationsarbeiten durchführen.
- Gerät nur an eine Schutzkontaktsteckdose mit ordnungsgemäß geerdetem Schutzkontakt anschließen.
- Alle angeschlossenen Geräte ebenfalls an Schutzkontaktsteckdosen mit ordnungsgemäß geerdetem Schutzkontakt anschließen.
- Signalkabel möglichst einhändig anschließen oder lösen.
- Keine Geräte einschalten, wenn die Gefahr einer Beschädigung durch Feuer, Wasser oder andere Einflüsse besteht.
- Die Verbindung zu den angeschlossenen Netzkabeln, Telekommunikationssystemen, Netzwerken und Modems ist vor dem öffnen des Gehäuses zu unterbrechen. Es sei denn, dies ist in den zugehörigen Installations- und Konfigurationsprozeduren anders angegeben.
- Nur nach den nachfolgend aufgeführten Anweisungen arbeiten, die für Installation, Transport oder öffnen von Gehäusen von Personal Computern oder angeschlossenen Einheiten gelten.

<b>Kabel anschließen:</b>	<b>Kabel lösen:</b>
<ol style="list-style-type: none"><li>1. Alle Geräte ausschalten und Netzstecker ziehen.</li><li>2. Zuerst alle Kabel an Einheiten anschließen.</li><li>3. Signalkabel an Anschlußbuchsen anschließen.</li><li>4. Netzstecker an Steckdose anschließen.</li><li>5. Gerät einschalten.</li></ol>	<ol style="list-style-type: none"><li>1. Alle Geräte ausschalten.</li><li>2. Zuerst Netzstecker von Steckdose lösen.</li><li>3. Signalkabel von Anschlußbuchsen lösen.</li><li>4. Alle Kabel von Einheiten lösen.</li></ol>

## Hinweis 2



### ACHTUNG:

Eine verbrauchte Batterie nur durch eine Batterie mit der IBM Teilenummer 33F8354 oder durch eine vom Hersteller empfohlene Batterie ersetzen. Wenn Ihr System ein Modul mit einer Lithium-Batterie enthält, ersetzen Sie es immer mit dem selben Modultyp vom selben Hersteller. Die Batterie enthält Lithium und kann bei unsachgemäßer Verwendung, Handhabung oder Entsorgung explodieren.

Die Batterie nicht:

- mit Wasser in Berührung bringen.
- über 100 °C erhitzen.
- reparieren oder zerlegen.

Die örtlichen Bestimmungen für die Entsorgung von Sondermüll beachten.

## Hinweis 3



### ACHTUNG:

Wenn ein Laserprodukt (z. B. CD-ROM-Laufwerke, DVD-Laufwerke, Einheiten mit Glasfaserkabeln oder Transmitter) installiert ist, beachten Sie folgendes.

- Das Entfernen der Abdeckungen des CD-ROM-Laufwerks kann zu gefährlicher Laserstrahlung führen. Es befinden sich keine Teile innerhalb des CD-ROM-Laufwerks, die vom Benutzer gewartet werden müssen. Die Verkleidung des CD-ROM-Laufwerks nicht öffnen.
- Steuer- und Einstellelemente sowie Verfahren nur entsprechend den Anweisungen im vorliegenden Handbuch einsetzen. Andernfalls kann gefährliche Laserstrahlung auftreten.



### VORSICHT

Manche CD-ROM-Laufwerke enthalten eine eingebaute Laserdiode der Klasse 3A oder 3B. Die nachfolgend aufgeführten Punkte beachten.

Laserstrahlung bei geöffneter Tür. Niemals direkt in den Laserstrahl sehen, nicht direkt mit optischen Instrumenten betrachten und den Strahlungsbereich meiden.

## Hinweis 4





≥18 kg



≥32 kg



≥55 kg

#### ACHTUNG:

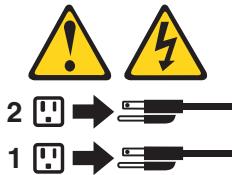
Beim Anheben der Maschine die vorgeschriebenen Sicherheitsbestimmungen beachten.

Hinweis 5



#### ACHTUNG:

Mit dem Betriebsspannungsschalter an der Vorderseite des Servers und dem Betriebsspannungsschalter am Netzteil wird die Stromversorgung für den Server nicht unterbrochen. Der Server könnte auch mehr als ein Netzkabel aufweisen. Um die gesamte Stromversorgung des Servers auszuschalten, muß sichergestellt werden, daß alle Netzkabel aus den Netzsteckdosen herausgezogen wurden.



Hinweis 10



#### ACHTUNG:



Keine Gegenstände, die mehr als 82 kg wiegen, auf Rack-Einheiten ablegen.

**Importante:**

Tutti gli avvisi di attenzione e di pericolo riportati nella pubblicazione IBM documentation iniziano con un numero. Questo numero viene utilizzato per confrontare avvisi di attenzione o di pericolo in inglese con le versioni tradotte riportate in questa sezione.

Ad esempio, se un avviso di attenzione inizia con il numero 1, la relativa versione tradotta è presente in questa sezione con la stessa numerazione.

Prima di eseguire una qualsiasi istruzione, accertarsi di leggere tutti gli avvisi di attenzione e di pericolo.

Avviso 1



**PERICOLO**

La corrente elettrica circolante nei cavi di alimentazione, del telefono e di segnale è pericolosa.

Per evitare il pericolo di scosse elettriche:

- Non collegare o scollegare i cavi, non effettuare l'installazione, la manutenzione o la riconfigurazione di questo prodotto durante i temporali.
- Collegare tutti i cavi di alimentazione ad una presa elettrica correttamente cablata e munita di terra di sicurezza.
- Collegare qualsiasi apparecchiatura collegata a questo prodotto ad una presa elettrica correttamente cablata e munita di terra di sicurezza.
- Quando possibile, collegare o scollegare i cavi di segnale con una sola mano.
- Non accendere qualsiasi apparecchiatura in presenza di fuoco, acqua o se sono presenti danni all'apparecchiatura stessa.
- Scollegare i cavi di alimentazione, i sistemi di telecomunicazioni, le reti e i modem prima di aprire i coperchi delle unità, se non diversamente indicato nelle procedure di installazione e configurazione.
- Collegare e scollegare i cavi come descritto nella seguente tabella quando si effettuano l'installazione, la rimozione o l'apertura dei coperchi di questo prodotto o delle unità collegate.

Per collegare:	Per scollegare:
<ol style="list-style-type: none"><li>1. SPEGNERE tutti i dispositivi.</li><li>2. Collegare prima tutti i cavi alle unità.</li><li>3. Collegare i cavi di segnale ai connettori.</li><li>4. Collegare i cavi di alimentazione alle prese elettriche.</li><li>5. ACCENDERE le unità.</li></ol>	<ol style="list-style-type: none"><li>1. SPEGNERE tutti i dispositivi.</li><li>2. Rimuovere prima i cavi di alimentazione dalle prese elettriche.</li><li>3. Rimuovere i cavi di segnale dai connettori.</li><li>4. Rimuovere tutti i cavi dalle unità.</li></ol>

## Avviso 2



### ATTENZIONE:

Quando si sostituisce la batteria al litio, utilizzare solo una batteria IBM con numero parte 33F8354 o batterie dello stesso tipo o di tipo equivalente consigliate dal produttore. Se il sistema di cui si dispone è provvisto di un modulo contenente una batteria al litio, sostituire tale batteria solo con un tipo di modulo uguale a quello fornito dal produttore. La batteria contiene litio e può esplodere se utilizzata, maneggiata o smaltita impropriamente.

Evitare di:

- Gettarla o immergerla in acqua
- Riscalarla 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:

Aprendo l'unità vengono emesse radiazioni laser. Non fissare il fascio, non guardarla direttamente con strumenti ottici ed evitare l'esposizione diretta al fascio.

## Avviso 4





#### **ATTENZIONE:**

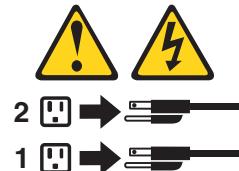
Durante il sollevamento della macchina seguire delle norme di sicurezza.

Avviso 5



#### **ATTENZIONE:**

Il pulsante del controllo dell'alimentazione situato sull'unità e l'interruttore di alimentazione posto sull'alimentatore non disattiva la corrente elettrica fornita all'unità. L'unità potrebbe disporre di più di un cavo di alimentazione. Per disattivare la corrente elettrica dall'unità, accertarsi che tutti i cavi di alimentazione siano scollegati dalla sorgente di alimentazione.



Avviso 10



#### **ATTENZIONE:**



Non poggiare oggetti che pesano più di 82 kg sulla parte superiore delle unità montate in rack.

## 중요:

본 Server Library에 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, 전화 및 통신 케이블로부터 출려 나오는 전류는 위험합니다.

전기 충격을 피하려면:

- 뇌우를 동반할 때는 케이블의 연결이나 췄수, 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.
- 가능한한 신호 케이블을 한 손으로 연결하거나 끊으십시오.
- 화재, 수해 또는 구조상의 손상이 있을 경우 장비를 켜지 마십시오.
- 설치 및 구성 프로시저에 다른 설명이 없는 한, 장치 덮개를 열기 전에 연결된 전원 코드, 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.

#### 연결하려면:

1. 모든 스위치를 끕니다.

2. 먼저 모든 케이블을 장치에 연결합니다.

3. 신호 케이블을 커넥터에 연결합니다.

4. 콘센트에 전원 코드를 연결합니다.

5. 장치 스위치를 켭니다.

#### 연결을 끊으려면:

1. 모든 스위치를 끕니다.

2. 먼저 콘센트에서 전원 코드를 뽑습니다.

3. 신호 케이블을 커넥터에서 제거합니다.

4. 장치에서 모든 케이블을 제거합니다.

### 경고문 2



#### 주의:

리튬 배터리를 교체할 때는 IBM 부품 번호 33F8354 또는 제조업체에서 권장하는 동등한 유형의 배터리를 사용하십시오. 시스템에 리튬 배터리를 갖고 있는 모듈이 있으면 동일한 제조업체에서 생산된 동일한 모듈 유형으로 교체하십시오. 배터리에 리튬이 있을 경우 세대로 사용, 처리 또는 처분하지 않으면 폭발할 수 있습니다.

다음을 주의하십시오.

- 던지거나 물에 담그지 않도록 하십시오.
- 100°C(212°F) 이상으로 가열하지 마십시오.
- 수리하거나 분해하지 마십시오.

지역 법령이나 규정의 요구에 따라 배터리를 처분하십시오.

### 경고문 3



주의:

레이저 제품(CD-ROMs, DVD 드라이브, 광 장치 또는 트랜스미터 등과 같은)이 설치되어 있을 경우 다음을 유의하십시오.

- 덮개를 제거하지 마십시오. 레이저 제품의 덮개를 제거했을 경우 위험한 레이저 광선에 노출될 수 있습니다. 이 장치 안에는 서비스를 받을 수 있는 부품이 없습니다.

- 여기에서 지정하지 않은 방식의 제어, 조절 또는 실행으로 인해 위험한 레이저 광선에 노출될 수 있습니다.



위험

일부 레이저 제품에는 클래서 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



$\geq 18 \text{ kg}$  (37 lbs)



$\geq 32 \text{ kg}$  (70.5 lbs)



$\geq 55 \text{ kg}$  (121.2 lbs)

주의:

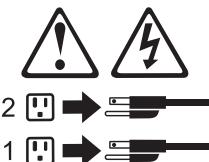
기계를 들 때는 안전하게 들어 올리십시오.

### 경고문 5



주의:

장치의 전원 버튼 및 전원 공급기의 전원 스위치는 장치에 공급되는 전류를 차단하지 않습니다. 장치에 둘 이상의 전원 코드가 연결되어 있을 수도 있습니다. 장치에서 모든 전류를 차단하려면 모든 전원 코드가 전원으로부터 차단되어 있는지 확인하십시오.



경고문 10



주의:  
서랍형 모델의 장치 상단에 82 kg(180 lbs.)이 넘는 물체를 옮겨  
놓지 마십시오.



>82 kg (180 lbs)

**Importante:**

Todas las declaraciones de precaución de esta IBM documentation empiezan con un número. Dicho número se emplea para establecer una referencia cruzada de una declaración de precaución o peligro en inglés con las versiones traducidas que de dichas declaraciones pueden encontrarse en esta sección.

Por ejemplo, si una declaración de peligro empieza con el número 1, las traducciones de esta declaración de precaución aparecen en esta sección bajo Declaración 1.

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

Declaración 1



**PELIGRO**

La corriente eléctrica de los cables telefónicos, de alimentación y de comunicaciones es perjudicial.

Para evitar una descarga eléctrica:

- No conecte ni desconecte ningún cable ni realice las operaciones de instalación, mantenimiento o reconfiguración de este producto durante una tormenta.
- Conecte cada cable de alimentación a una toma de alimentación eléctrica con conexión a tierra y cableado correctos.
- Conecte a tomas de alimentación con un cableado correcto cualquier equipo que vaya a estar conectado a este producto.
- Si es posible, utilice una sola mano cuando conecte o desconecte los cables de señal.
- No encienda nunca un equipo cuando haya riesgos de incendio, de inundación o de daños estructurales.
- Desconecte los cables de alimentación, sistemas de telecomunicaciones, redes y demás 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



$\geq 18$  kg



$\geq 32$  kg



$\geq 55$  kg

**PRECAUCIÓN:**

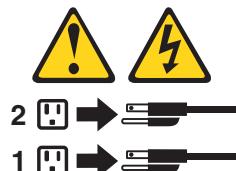
Tome medidas de seguridad al levantar el producto.

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.

---

## **Send us your comments!**

We want to know your opinion about this manual (part number 24P2925). Your input will help us to improve our publications.

Please photocopy this survey, complete it, and then fax it to **IBM HMM Survey** at **919-543-8167 (USA)**.

Name: \_\_\_\_\_

Phone number: \_\_\_\_\_

1. Do you like this manual?

Yes  No

\_\_\_\_\_

\_\_\_\_\_

2. What would you like to see added, changed, or deleted in this manual?

\_\_\_\_\_

\_\_\_\_\_

3. What is your service experience level?

Less than five years

More than five years

4. Which servers do you service most?

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**Thank you for your response!**

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## Problem determination tips

Due to the variety of hardware and software combinations that can be encountered, use the following information to assist you in problem determination. If possible, have this information available when requesting assistance from Service Support and Engineering functions.

- Machine type and model
- Processor or hard disk upgrades
- Failure symptom
  - Do diagnostics fail?
  - What, when, where, single, or multiple systems?
  - Is the failure repeatable?
  - Has this configuration ever worked?
  - If it has been working, what changes were made prior to it failing?
  - Is this the original reported failure?
- Reference/Diagnostics version
  - Type and version level
- Hardware configuration
  - Print (print screen) configuration currently in use
  - BIOS level
- Operating system software
  - Type and version level

**Note:** To eliminate confusion, identical systems are considered identical only if they:

1. Are the exact machine type and models
2. Have the same BIOS level
3. Have the same adapters/attachments in the same locations
4. Have the same address jumpers/terminators/cabling
5. Have the same software versions and levels
6. Have the same Reference/Diagnostics Diskette (version)
7. Have the same configuration options set in the system
8. Have the same setup for the operation system control files

Comparing the configuration and software set-up between "working and non-working" systems will often lead to problem resolution.

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Part Number: 24P2925

File Number:

(1P) P/N: 24P2925

