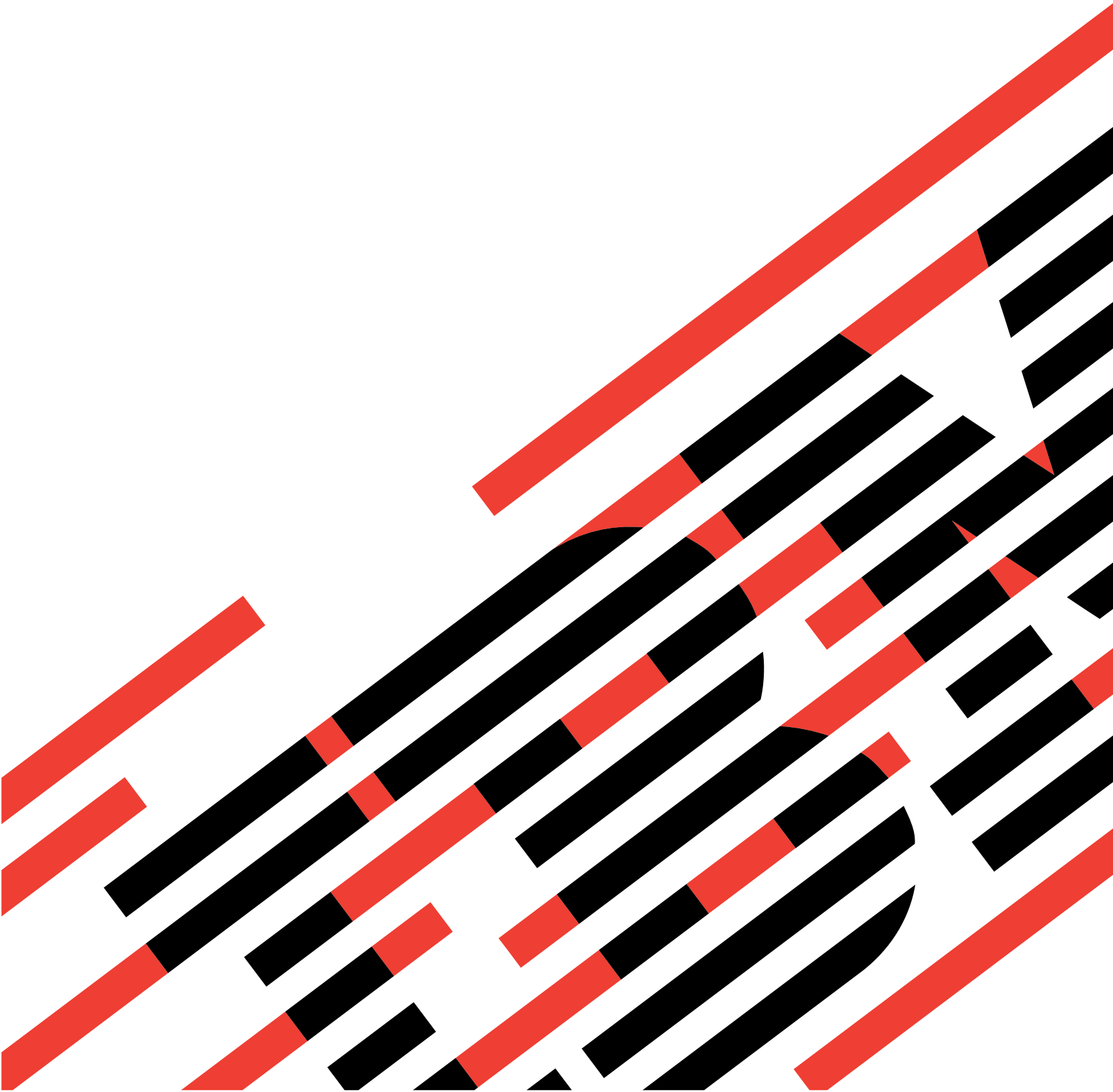
IBM

eserver

Hardware Maintenance Manual

xSeries 232, Type 8668



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Note

Before using this information and the product it supports, be sure to read the general information under “Notices” on page 167.

First Edition June 2001 (updated June 2002)

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About this manual

This manual contains diagnostic information, a Symptom-to-FRU index, service information, error codes, error messages, and configuration information for the IBM® @server xSeries 232.

Important: This manual is intended for trained servicers who are familiar with IBM PC Server products.

Important safety information

Be sure to read all caution and danger statements in this book before performing any of the instructions. See "Safety information" on page 133.

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

Contents

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 tools overview" on page 13.

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 "Error logs" on page 14.
4. If the computer hangs and no error is displayed, "Diagnostic programs and error messages" on page 15.
5. Power supply problems, "Power supply LED errors" on page 116.
6. For intermittent problems, check the error log; "Undetermined Problems" on page 126.

001 **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 **002** .

002 **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 "Error logs" on page 14.
- Check the information LED panel System Error LED; if on, see "Operator information panel" on page 11.
- Check the System Error Log. If an error was recorded by the system, see "Error logs" on page 14.
- Start the Diagnostic Programs. See "Starting the diagnostic programs" on page 16.
- Check for the following responses:
  1. One beep.
  2. Readable instructions or the Main Menu.

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

YES. Run the Diagnostic Programs. If necessary, refer to "Starting the diagnostic programs" on page 16.

NO. Find the failure symptom in "Symptom-to-FRU index" on page 107.

General information

The IBM @server xSeries 232 is a high-performance, symmetric multiprocessing (SMP) server. It is ideally suited for networking environments that require superior microprocessor performance, efficient memory management, flexibility, and reliable data storage.

The xSeries 232 contains several IBM X-Architecture™ technologies, which help increase server performance and reliability. For more information about X-Architecture features, refer to "What the IBM xSeries 232 offers" on page 5. You can obtain more information about the IBM X-Architecture technologies and features at http://www.pc.ibm.com/us/eserver/xseries/xarchitecture/index.html.

If you have access to the World Wide Web, you can obtain up-to-date information about the xSeries 232 model and other IBM server products at the following World Wide Web address:

`http://www.pc.ibm.com/eserver/xseries/`

The information label containing the serial number, machine type, model number, and agency marks for your server is located as follows:

Tower model On the bottom of the server, on the rear of the server, and on the front of the server below the bezel

Rack model On the side of the server, on the rear of the server, and on the front of the server below the bezel

Features and specifications

The following table provides a summary of the features and specifications for the xSeries 232 server.

Table 1. Features and specifications

Microprocessor:
- Intel® Pentium® III
- 256 or 512 KB Level-2 cache
- Supports up to two microprocessors

Memory:
- Maximum: 4 GB
- Type: ECC, SDRAM, PC133, registered DIMMs
- Slots: Four (two-way interleaved)

Drives standard:
- Diskette: 1.44 MB
- CD-ROM: 48X IDE

Expansion bays:
- Hot-swap: Six slim high
- Non-hot-swap: Three 5.25-inch (one used by CD-ROM drive)
- You can install a drive-bay expansion kit to convert two of the 5.25-inch bays so that they support three hot-swap drives

PCI expansion slots:
- One 33 MHz/32-bit
- Two 33 MHz/64-bit
- Two 66 MHz/64-bit

Power supplies:

Depending on model: one 385-watt nonredundant power supply; or two 250-watt (115-230 V ac) power supplies with a maximum of three 250-watt units for power-supply redundancy

Acoustical noise emissions:
- Sound power, idling: 6.6 bel maximum
- Sound power, operating: 6.8 bel maximum
- Sound pressure, operating: 53 dBa maximum

Video:
- S3 video controller
- Compatible with SVGA and VGA
- 8 MB video memory

Size (rack model 5U)
- Height: 217.2 mm (8.6 in.)
- Depth: 688 mm (27.1 in.)
- Width: 427.8 mm (16.8 in.)
- Weight: approximately 35.4 kg (78 lb) when fully configured

Size (tower model)
- Height: 439.8 mm (17.3 in.)
- Depth: 700 mm (27.6 in.)
- Width: 217.2 mm (8.6 in.)
- Weight: approximately 37.64 kg (83 lb) when fully configured

Integrated functions:
- Ultra160 SCSI controller
- One 10BASE-T/100BASE-TX/100BASE-FX, Intel Ethernet controller with alert on LAN™ and Wake on LAN® support
- Two serial ports
- Two Universal Serial Bus (USB) ports
- Keyboard port
- Mouse port
- Video port
- Integrated system management processor (ISMP) with two ISM (RS-485) RJ-45 connectors

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: 683 Btu (200 watts)
- Maximum configuration: 1877 Btu (550 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

Notices and statements in this book

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

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

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

What the IBM xSeries 232 offers

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

- IBM X-Architecture technology

  IBM X-Architecture leverages proven innovative IBM technologies to build the most powerful, and reliable Intel processor-based servers in the world.
- 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 data-storage and hot-swap capabilities

  All models of the server support up to six hot-swap hard disk drives. This *hot-swap* feature enables you to remove and replace hard disk drives without turning off the server.

  The addition of an optional digital linear tape drive (DLT) enables quick backup of large amounts of data.
- IBM integrated system management processor (ISMP)

  The integrated system management processor provides environmental monitoring for your server. When environmental conditions exceed thresholds or when system components fail, the ISMP lights the Light Path Diagnostics™ LEDs to indicate the location of the problem. Critical errors, as well as environmental and configuration information, are also included in the error log.

  If an optional Remote Supervisor Adapter is installed on the Advanced System Management (ASM) interconnect network, you can view the system health; update the ISMP code; power on, power off, and restart the server; view the error log; view the vital product data; and send alerts over the ASM interconnect network.
- Redundant power capabilities

Depending on model, the server comes with either one 385-watt nonredundant power supply, or two 250-watt power-supply units. The two power-supply units provide redundant power for many server configurations. For power loads above 250 watts, a third optional power supply can be installed to provide a full 500 watts of power.

The NON LED on the system board is lit when the power load is 250 watts or greater with two power supplies, or when the power load is 500 watts or greater with three power supplies.

- Large system memory

  The memory bus in your server supports up to 4 GB (GB equals approximately 1 000 000 000 bytes) of two-way 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).

- Integrated network environment support

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

- Redundant network interface card

  The addition of an optional, redundant network interface card (NIC) provides a failover capability to a redundant Ethernet connection. If a problem occurs with the primary Ethernet connection, all Ethernet traffic associated with this primary connection is automatically switched to the redundant NIC. This switching occurs without data loss and without user intervention.

- Optional PCI adapters

  The server uses peripheral component interconnect (PCI) bus architecture to provide compatibility with a wide range of existing hardware devices and software applications. The server supports up to five PCI adapters in the expansion slots.

Reliability, availability, and serviceability features

Three of the most important features in server design are reliability, availability, and serviceability (RAS). These factors help to ensure the integrity of the data stored on your server; that your server is available when you want to use it; and that should a failure occur, you can diagnose and repair the failure with minimal inconvenience.

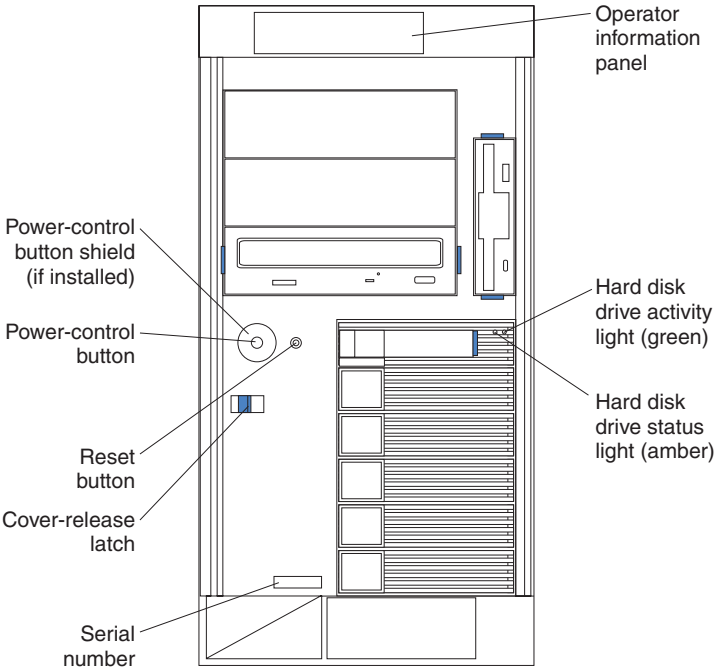
The following is an abbreviated list of the RAS features that your server supports:

- Menu-driven setup, system configuration, RAID configuration, and diagnostic programs
- Power-on self-test (POST)
- ROM-resident diagnostics
- Integrated system management processor (ISMP)
- Predictive failure alerts
- Remote system problem-determination support
- Power and temperature monitoring
- Microprocessor built-in self-test (BIST)
- Internal error signal monitoring
- Configuration checking

- CPU/VRM failure identification through Light Path Diagnostics technology and alerting
- Diagnostic support of ServeRAID™ adapters and Ethernet adapters
- Hot-swap drive bays
- Error codes and messages and system error logging
- Upgradable BIOS, diagnostics, and ISMP code
- Automatic restart after a power failure
- Parity checking on the SCSI bus
- Error checking and correcting (ECC) memory
- Redundant hot-swap power-supply option
- Redundant hot-swap cooling
- Redundant Ethernet capabilities (with optional adapter)
- Vital product data (VPD) on processor complex, system board, power backplane, SCSI backplane, and each power supply
- Operator information panel and group of diagnostic LEDs on the system board
- Remind button to temporarily turn off LEDs for nonvital alerts

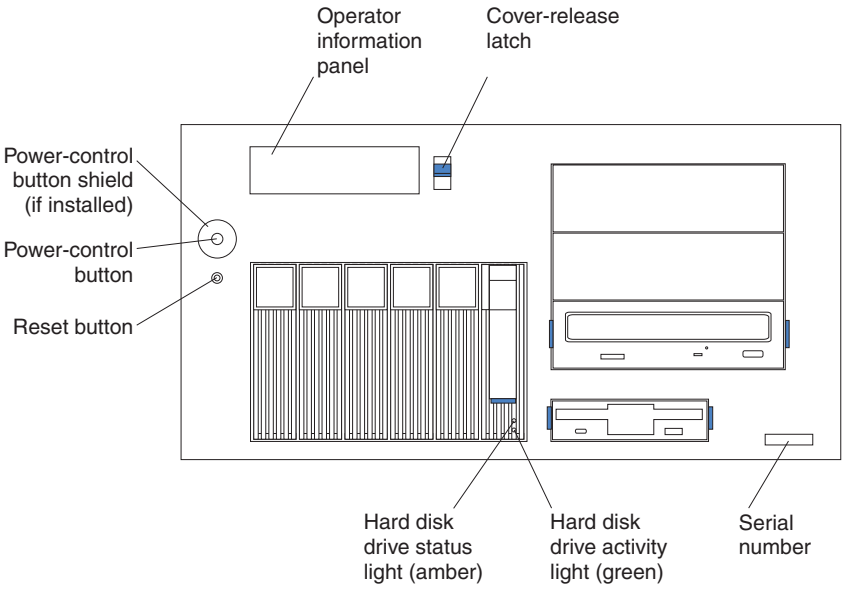
Server controls and indicators

The following illustrations show the controls and indicators on the front of the server.



Tower model

Rack model



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

Power-control button: Press this button to manually shut down and turn off the server.

Reset button: Press this button to reset the server and run the power-on self-test (POST). You might need to use a pen or the end of a straightened paper clip to press the button.

Operator information panel: The lights on this panel give status information for your server. See "Operator information panel" on page 11.

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

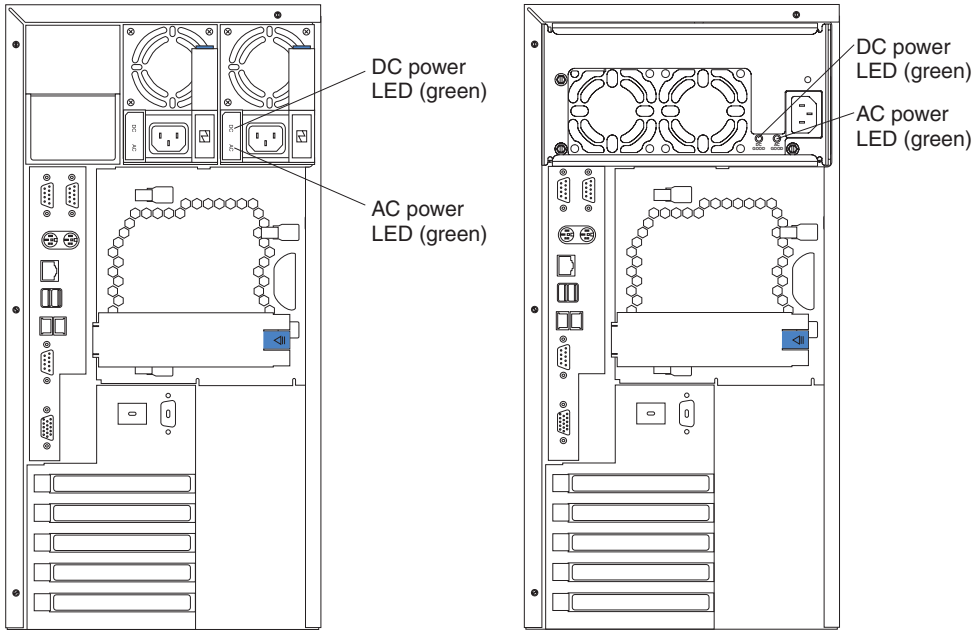
Serial number: This number uniquely identifies your server.

Hard disk drive status light: Each of the hot-swap drives has a hard disk drive status light. When this amber light is on continuously, the drive has failed.

If a ServeRAID adapter is installed and this amber 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.

Hard disk drive activity light: Each of the hot-swap drives has a hard disk drive light. When this green light is flashing, the controller is accessing the drive.

Rear view (tower shown)



Two 250-watt configuration

385-watt configuration

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

DC power light: This green light provides status information about the power supply. During typical operation, both the ac and dc Power lights are on.

Turning on the server

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

- You can press the power-control button on the front of the server to start the server.
- If the server is turned on, a power failure occurs, and unattended-start mode is enabled in the Configuration/Setup Utility program, the server will start automatically when power is restored.
- If ac power is present, the server is off, and the wake-up feature is enabled in the Configuration/Setup Utility program, the wake-up feature will turn on the server at the set time.
- If ac power is present, the system is off, and the Wake on LAN feature is enabled, the system can be turned on by a network wake-up frame from the onboard Intel Ethernet controller.
- If ac power is present, the system is off, and the system is connected to an ASM interconnect network, which contains at least one system with an optional Remote Supervisor Adapter installed, the system can be turned on from the Remote Supervisor Adapter user interface.
- If ac power is present, the system is off, and an optional Remote Supervisor Adapter is installed in the system, the system can be turned on from the Remote Supervisor Adapter user interface.

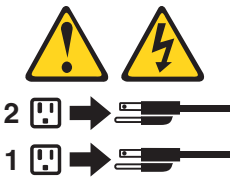
Turning off the server

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:

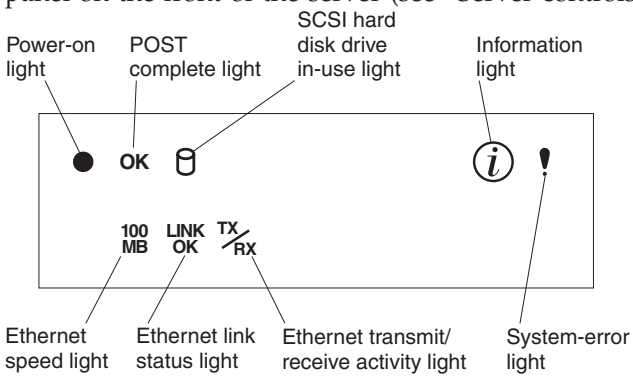
- You can press the power-control button on the front of the server. This starts an orderly shutdown of the operating system, if this feature is supported by your operating system.

  Note: After performing an orderly shutdown, wait at least 5 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 4 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.
- If the system was turned on by the wake-up feature or Wake on LAN feature, you can turn it off by either a software runtime utility or by the fail-safe, power-down counter.
- 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.
- If the system is connected to an ASM interconnect network which contains at least one system with a Remote Supervisor Adapter installed, the system can be turned off from the Remote Supervisor Adapter user interface.
- If a Remote Supervisor Adapter is installed in the system, the system can be turned off from the Remote Supervisor Adapter user interface.

Operator information panel

The following illustration shows the location of the lights on the operator information panel on the front of the server (see "Server controls and indicators" on page 7).



Power-on light: This green LED lights when system power is present in the server. When this light flashes, the server is in Standby mode (the system power supply is turned off and current is present). If this light is not on, the power cord is not connected, the power supply has failed, or this LED has failed.

POST complete light: This green LED lights when the server completes the power-on self-test (POST).

SCSI hard disk drive in-use light: This green LED lights when there is activity on a hard disk drive.

Information light: This amber LED lights when the information log contains information about certain conditions in your server that might affect performance. For example, the light will be on if your server has multiple power supplies and does not have redundant power. An LED on the diagnostic panel on the system board will also be on.

System-error light: This amber LED lights when a system error occurs. An LED on the diagnostic panel on the system board may also be on to further isolate the error. See "Identifying problems using status LEDs" on page 18.

Ethernet speed light: This green LED lights when the Ethernet LAN speed is 100 Mbps during typical operation, when the system is powered off the LED remains lit.

Ethernet link status light: This green LED lights when there is an active connection on the Ethernet port during typical operation, when the system is powered off the LED remains lit.

Ethernet transmit/receive activity light: This green LED lights when there is transmit or receive activity to or from the server.

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 107 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.

- **Light Path Diagnostics**

  The server has light-emitting diodes (LEDs) to help you identify problems with server components. These LEDs are part of the Light Path Diagnostics feature that is built into the server. By following the path of lights, you can quickly identify the type of system error. See “Identifying problems using status LEDs” on page 18 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 15 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, the first screen of your operating system or application program appears, and the System POST Complete (OK) light is illuminated on the operator information panel.

If POST detects a problem, more than one beep sounds and an error message appears on your screen. See “Beep Symptoms” on page 107 and “POST error codes” on page 117 for more information.

Notes:

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

Error logs

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

Note: It is possible during power-on that some system error log entries may contain a date of 01/01/1990 with a time of 00:00:00. These entries occur prior to the ISMP clock being initialized and may be ignored.

You can view the contents of the error logs from the Configuration/Setup Utility program or from the diagnostic programs.

Log viewing from Configuration/Setup

To view the contents of the error log from the Configuration/Setup Utility, start the Configuration/Setup Utility program; then, select **Error Logs** from the main menu. See "Starting the Configuration/Setup Utility program" on page 23 for more information.

Log viewing from diagnostic programs

To view the contents of the error log from the diagnostic programs, start the diagnostic programs; select **Hardware Info** from the top of the diagnostic programs screen; select **System Error Log** from the list that appears; then, follow the instructions on the screen. See "Starting the diagnostic programs" on page 16 for more information.

SCSI messages (some models)

If you receive a SCSI error message while using the SCSISelect Utility, use the following list to determine the possible cause of the error and what action to take.

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

One or more of the following might be causing the problem.

- A failing SCSI device (adapter or drive)
- An improper SCSI configuration
- Duplicate SCSI IDs in the same SCSI chain
- An improperly installed SCSI terminator
- A defective SCSI terminator
- An improperly installed cable
- A defective cable

To solve the problem, verify that:

- The external SCSI devices are turned on. External SCSI devices must be turned on *before* the server.
- The cables for all external SCSI devices are connected correctly.
- The last device in each SCSI chain is terminated properly.
- The SCSI devices are configured correctly.

If the above items are correct, run the diagnostic programs to obtain additional information about the failing device. If the error remains or recurs, call for service.

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 intended to be used to identify a failing part.

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 value 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 from the help information 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 the appropriate password; then, press Enter.
4. Select either **Extended** or **Basic** from the top of the screen.
5. When the Diagnostic Programs screen appears, select the test you want to run from the list that appears; then, follow the instructions on the screen.

   Notes:

   a. If the server stops during testing and you cannot continue, restart the server and try running the diagnostic programs again. If the problem remains, call for service.

   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 your server, you will not be able to navigate between test categories using the **Next Cat** and **Prev Cat** buttons. All other functions provided by mouse-selectable buttons are also available using the function keys.

   d. You can test the USB keyboard by using the regular keyboard test. The regular mouse test can test a USB mouse. Also, you can run the USB hub test only if there are no USB devices attached.

   e. You can view server configuration information (such as system configuration, memory contents, interrupt request (IRQ) use, direct memory access (DMA) use, device drivers, and so on) by selecting **Hardware Info** from the top of the screen.

If the diagnostic problems do not detect any hardware errors but the problem remains during typical 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

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

Notes:

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

Recovering BIOS code

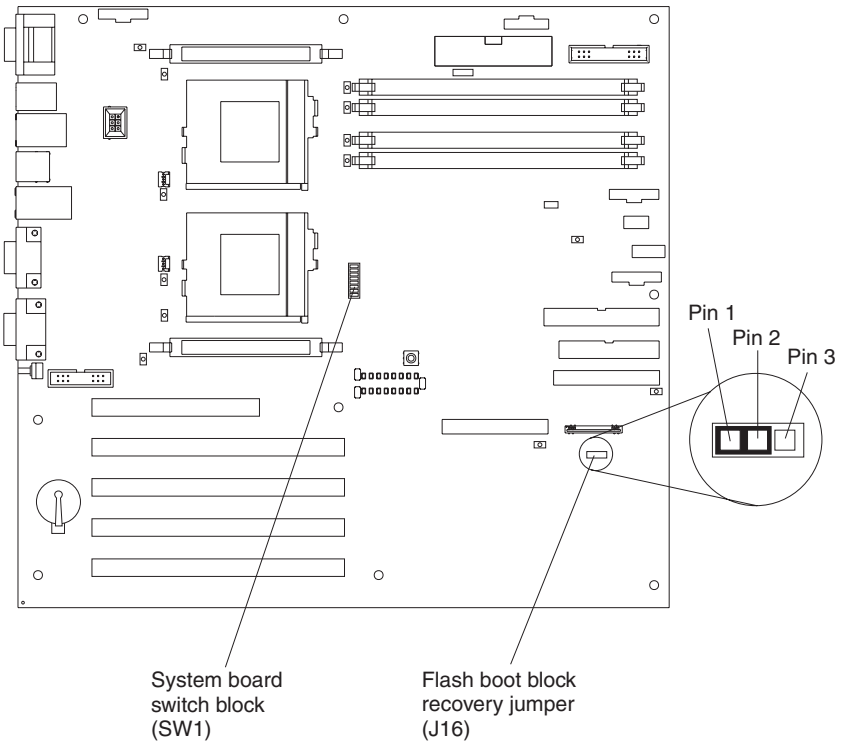
If the BIOS code has become damaged, such as from a power failure during a flash update, you can recover the BIOS using the flash boot block recovery jumper and a BIOS flash diskette.

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/, click **IBM Server Support**, and make the selections for your server.

The flash memory of your server contains a protected area that cannot be overwritten. The recovery boot block is a section of code in this protected area that enables the server to start up and to read a flash diskette. The flash utility recovers the system BIOS code from the BIOS recovery files on the diskette.

The following illustration shows the location of the flash boot block recovery jumper on the system board.



To recover the BIOS:

1. Turn off the server and peripheral devices and disconnect all external cables and power cords; then, remove the cover.
2. Locate the flash boot block recovery jumper block (J16) on the system board.
3. Move the jumper to pins 1 and 2 to enable BIOS recovery mode.
4. Insert the BIOS flash diskette into the diskette drive.
5. Restart the server.

   The Recovery Boot screen appears. A progress report, `Loading data from diskette` *xx*%, is displayed. When programming is underway, a further progress report, `Programming block` *n of 7 yy%*, is displayed. When the procedure completes, the message `Recovery complete, remove the diskette and return boot block switch to the off position before rebooting` is displayed.
6. Remove the flash diskette from the diskette drive.
7. Turn off the server.
8. Move the jumper on the boot-block jumper block to pins 2 and 3 to return to normal startup mode.
9. Restart the server.

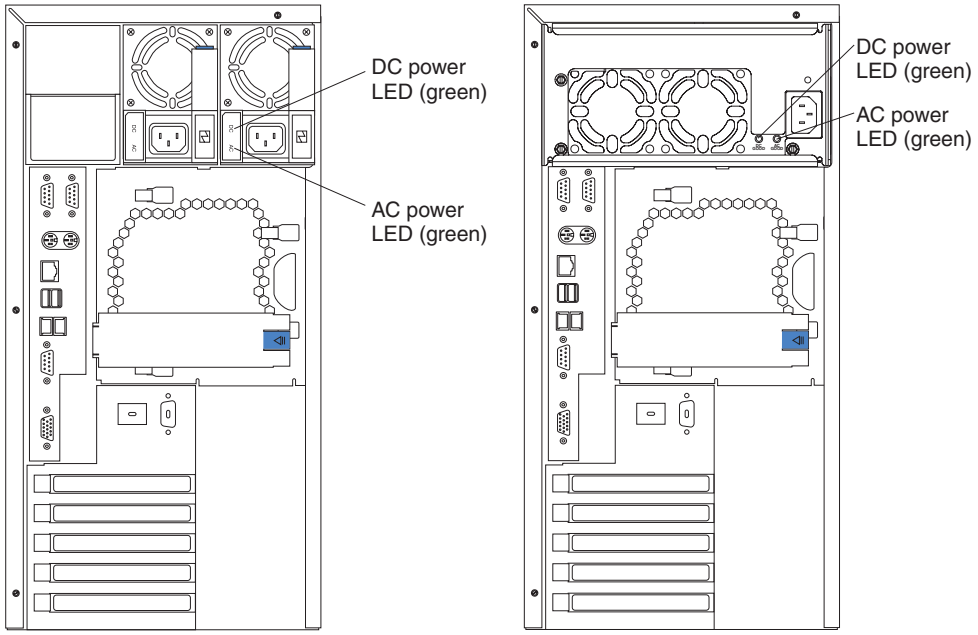
Identifying problems using status LEDs

If the System Error light in the operator information panel on the front of the server is on, one or more LEDs inside the server may be on. Use the Light Path Diagnostics feature to identify the type of error that occurred. See “Diagnostic tools overview” on page 13.

You can use the Light Path Diagnostics feature built into the server to quickly identify the type of system error that occurred. The server is designed so that any LEDs that are illuminated remain illuminated when the server shuts down as long as the ac power source is good and the power supplies can supply +5 V dc current to the server. This feature helps you isolate the problem if an error causes the server to shut down. See "Diagnostic tools overview" on page 13.

Power supply LEDs

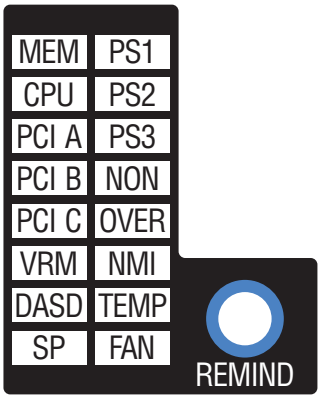
The ac and dc power LEDs on the power supply provide status information about the power supply.



For information about interpreting these lights, see "Power supply LED errors" on page 116.

Light Path Diagnostics panel

The following illustration shows the LEDs on the diagnostic panel on the system board. See "Diagnostic Panel LED" on page 109 for information on identifying problems using these LEDs.



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 system and reset the system date and time.

Statement 2

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

Do not:

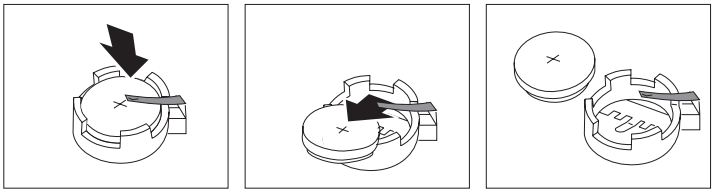
- **Throw or immerse into water.**
- **Heat to more than 100 C (212 F)**
- **Repair or disassemble**

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

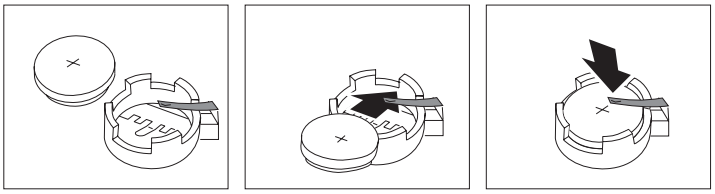
To replace the battery:

1. Read "Safety information" on page 133 and follow any special handling and installation instructions supplied with the replacement battery.
2. Turn off the server and peripheral devices and disconnect all external cables and power cords.
3. Remove the battery:
4.
   a. Use one finger to slightly slide the battery out from its socket. The spring mechanism will push the battery out toward you as you slide it from the socket.
   b. Use one finger to lift the battery clip over the battery.
   c. Use your thumb and index finger to pull the battery from under the battery clip.

d. Ensure that the battery clip is touching the base of the battery socket by pressing gently on the clip.



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



6. Reinstall the server cover and connect the cables.
7. Turn on the server.
8. Start the Configuration/Setup Utility program and set configuration parameters.
   - Set the system date and time.
   - Set the power-on password.
   - Reconfigure the server.

Configuration

The following configuration programs are provided with the server:

- **Configuration/Setup Utility**

  This program is part of the *basic input/output system* (BIOS) code that comes with your server. You can use this program to configure serial 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 28 for more information.

- **PXE Boot Agent Utility**

  The Preboot eXecution Environment (PXE) Boot Agent Utility program is part of the BIOS code that comes with your server. Depending on your server model, you can use this program to change network startup (boot) protocols and startup order, to select operating-system wake-up support, and to set menu wait times.

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

  See "Using the PXE Boot Agent Utility program" on page 29 for more information.

- **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 your server to configure the server hardware and simplify your network operating system installation. The ServerGuide CDs also contain a collection of application programs, which you can install after your server is up and running. See "Using the ServerGuide CDs" on page 31 for more detailed information.

- **ServeRAID programs**

  The ServeRAID programs come with the optional ServeRAID adapters and with server models that have a ServeRAID adapter preinstalled. If your server has a ServeRAID adapter installed, you must use the ServeRAID configuration program to define and configure your disk-array subsystem *before* you install your operating system. Refer to the ServeRAID documentation provided on the *IBM xSeries 232 Documentation* CD for more information.

Using the Configuration/Setup Utility program

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

Starting the Configuration/Setup Utility program

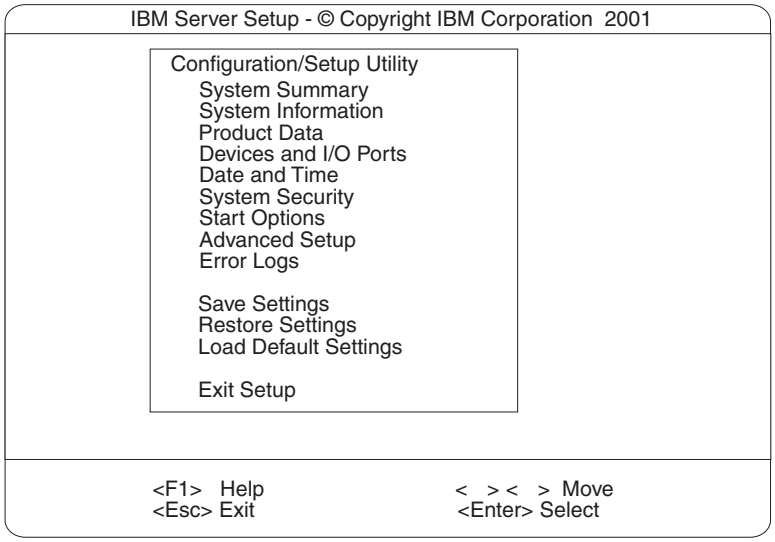
To start the Configuration/Setup Utility program:

1. Turn on the server and watch the monitor screen.

2. When the message `Press F1 for Configuration/Setup` appears, press F1.
3. Follow the instructions that appear on the screen.

Main menu of the Configuration/Setup Utility

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 menu choices might differ depending on the types of passwords set for your system and IBM system-management adapters, or in the version of BIOS code installed on your server.

Descriptions of the choices 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 installed.

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

- **Product Data**

  Select this choice to view system information, such as the machine type and model, the server serial number, the system Universally Unique Identifier (UUID) number, the integrated system management processor revision level, and the revision level or issue date of the BIOS code stored in the flash electrically erasable programmable ROM (EEPROM).

  Note: The server serial number is used as the name of the system on the ASM interconnect network for any remote alerts. For more information, refer to the system management adapter option documentation.

- **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 or change a power-on password.

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

  After you set a power-on password, you can enable the unattended-start mode. This locks the keyboard and mouse but allows the system to start the operating system. The keyboard and mouse remain locked until you type the correct password. See "Using passwords" on page 27 for more information.

- **Start Options**

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

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

  You can enable a virus-detection test that checks for changes in the master boot record at startup. You also can choose to run POST in the **Enhanced** mode or the **Quick** mode.

  – **Startup Sequence Options**

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

  – **Alert on LAN BIOS**

    You can enable Alert on LAN support with this option. The default setting for this menu item is **Disabled**.

- **Advanced Setup**

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

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

  – **Core Chipset Control**

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

    Attention: Do not make changes here unless directed to do so by an IBM authorized service representative.

  – **System Partition Visibility**

    Select this choice to choose whether the System Partition is visible or hidden.

  – **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 and use the arrow keys to highlight the bank that you want to enable; then, use the arrow keys to select **Enabled**.

– **CPU Options**

  Select this choice to set the system cache type for all microprocessors.

– **PCI BUS Control**

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

  After making changes, select:

  - **PCI MLT** to save the changes and return to the **Advanced Setup** menu.
  - **PCI Interrupt Routing** to ignore the changes, restore the previous settings, and return to the **Advanced Setup** menu.

– **Integrated System Management Processor Settings**

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

- **Error Logs**

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

  Note: System status messages available in the **System Error Log** in the Configuration/Setup Utility program are provided only for trained IBM service personnel.

- **Save Settings**

  Select this choice to save your customized settings.

- **Restore Settings**

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

- **Load Default Settings**

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

- **Exit Setup**

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

Additional Configuration/Setup Utility menu choices

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

- **System Information**

  Select this choice to display information about your server.

- **PCI Slot Information**

  Select this choice to view the properties of adapters installed in PCI slots.

- **Administrator Password**

  Select this choice to set or change the administrator password.

- **Remote Control Security Settings**

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

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

Using passwords

The **System Security** choice appears only on the full Configuration/Setup Utility menu. After you select this choice, you can implement the protection level for the power-on password. If you have an optional Remote Supervisor Adapter installed, you can also implement the Administrator password and the Remote Control password. For complete details about the optional Remote Supervisor Adapter, refer to the documentation that comes with the adapter.

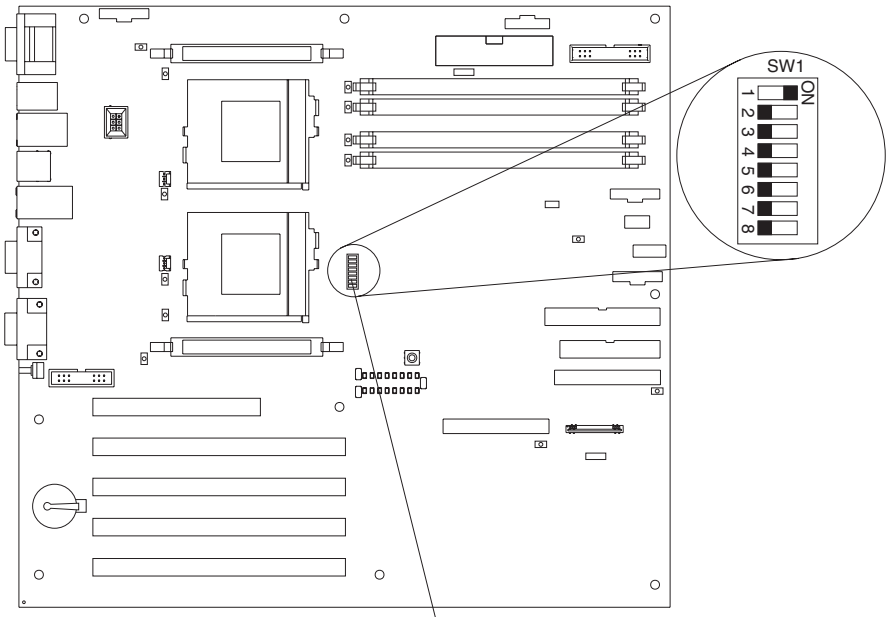
You can use any combination of up to seven characters (A–Z, a–z, and 0–9) for your power-on password. Keep a record of your password in a secure place. If you forget the power-on password, you can regain access to the server through one of the following methods:

- Change the position of the password override switch as described in "Setting the password override switch".
- Remove the battery and then install the battery.

Setting the password override switch

The following illustration shows the location of the password override switch, switch 6 of switch block 1, on the system board.

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



To set the password override switch:

1. Review the information in "Before you begin" on page 47 and "Safety information" on page 133.
2. Turn off the server and peripheral devices and disconnect all external cables and power cords; then, remove the cover. See "Removing the cover, door, and bezel" on page 48.
3. Change the setting of the password override switch (switch 6 on switch block 1 on the system board) to the opposite side of the switch.
4. Install the server cover and connect all external cables and power cords (see "Completing the installation" on page 82).

5. Turn on the server.

Note: You can now start the Configuration/Setup Utility program and set a power-on password. Restart the server; then, press the F1 key to enter the Setup utility. Select **System Security** and change or delete the power-on password. If the power-on password is not changed or deleted, the old password will be reinstated the next time you start the server.

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 the instructions for starting the SCSISelect Utility and descriptions of the menu choices available.

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

Starting the SCSISelect utility program

To start the SCSISelect utility program:

1. Turn on the server.
2. When the `<<< Press <CTRL><A> for SCSISelect¬ Utility! >>>` prompt appears, press Ctrl+A.
3. When prompted, select either channel A or channel B.
4. 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).
5. Follow the instructions on the screen to change the settings of the selected items; then, press Enter.

Choices available from the SCSISelect menu

The following choices appear on the SCSISelect Utility menu:

- **Configure/View Host Adapter Settings**

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

  You can view or change the following controller settings:

  – **Host Adapter SCSI ID**

    Select this choice to view the SCSI controller ID, normally 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 represents the transfer rate for Ultra SCSI devices:

- The transfer rate for Ultra3 SCSI LVD devices is 160.0 MBps.
- The transfer rate for Ultra2 SCSI LVD devices is 80.0 MBps.
- The transfer rate for Fast SCSI devices is 20.0 MBps.

– **Advanced Configuration Options**

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

- **SCSI Disk Utilities**

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

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

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

Using the PXE Boot Agent Utility program

The Preboot eXecution Environment (PXE) Boot Agent is a built-in, menu driven configuration utility program that you can use to:

- Select whether to display the setup prompt
- Set menu wait times
- Select operating system wake-up support

Note: 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, immediately 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.

  Note: This option is not supported on this product. To change the boot order, use the Configuration/Setup Utility program. See "Using the Configuration/Setup Utility program" on page 23 for more information.

- Show setup prompt

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

  When this choice is enabled. Press Ctrl+S to enter the setup menu appears 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 legacy operating-system wake-up support.

  – Disabled (default)
  – Enabled

Notes:

1. Use the default setting for Advanced Configuration and Power Interface (ACPI) aware operating systems, such as Microsoft® Windows® 2000 and Windows NT®.
2. If the server is running a non-ACPI operating system, you must set this selection to **Enabled** 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 and you are unable to turn the server off, see "Turning off the server" on page 10 for information.

Using the ServerGuide CDs

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

If a later version of the ServerGuide software is available, you can download a free image of the software, or you can purchase the ServerGuide CDs. To download the latest ServerGuide software, see the ServerGuide page on the IBM Support Web site at: http://www.ibm.com/pc/qtechinfo/MIGR-4ZKPPT.html

To purchase the latest ServerGuide CDs, see the ServerGuide Updates form that comes with your server library, or go to the ServerGuide fulfillment Web site at http://www.ibm.com/pc/coupon/.

The ServerGuide software has these features to make setup easier:

- An easy-to-use interface with online help
- Diskette-free setup, and configuration programs that are based on detected hardware
- Performance Optimizer program, which easily tunes your ServeRAID adapter settings for your server environment
- A system BIOS update program, which updates the BIOS code directly from the CD
- Device drivers that are provided for your server model and detected hardware
- NOS partition size and file-system type that are selectable during setup
- Powerful application programs and administration tools

Features at a glance

The following is a summary of ServerGuide features.

Note: Exact features and functions can vary with different versions of the ServerGuide software. To learn more about the version that you have, start the *Setup and Installation* CD and view the online Overview.

Setup and Installation CD	System Updates and Applications CD
Note: The ServerGuide program requires a supported IBM server with an *enabled* startable (bootable) CD-ROM drive. Not all features are supported on all models. • Sets system date and time. • Detects the ServeRAID adapter or controller and runs the ServeRAID configuration program. • Updates the licensed internal code (firmware) level without creating diskettes. • Checks the system BIOS code and microcode (firmware) levels of supported options to determine whether a later level is available from the CD. You can perform updates without the use of diskettes. • Provides the Performance Optimizer program to easily tune your ServeRAID adapter settings for your server environment. • Creates a System Partition on the default drive. You can run server-specific utility programs after setup. • Detects installed hardware options and provides updated device drivers for most adapters and devices. • Creates a *Setup Replication Diskette* for replicating setup selections for other servers of the same model. • Provides diskette-free installation for supported operating systems. • Provides a replicated installation path for multiple installations of supported operating systems. • Includes an online README file with links to tips for your hardware and NOS installation. **Note:** Installation requires your NOS CD.	• Creates diagnostic, RAID, device driver, and other support diskettes from the CD; or with an Internet connection, you can check for an update from a dedicated IBM file transfer protocol (FTP) server. • Installs some updates without requiring diskettes. Where applicable, you can run executable files directly from the CD or unzip files to any drive on your server or another server on your network. • Includes a vast library of fully tested device drivers for your server. • Includes a search function to help you locate updates by title or keywords. • Installs powerful applications directly from the CD. See the CD label for a current list of applications.

Setup and configuration overview

When you use the *Setup and Installation* CD, you do not need setup diskettes. You can use the CD to configure any supported IBM server model. The setup program checks your system BIOS, service processors, and other system hardware to determine if system updates are available. The setup program provides a list of tasks that are required to set up your server model. On RAID servers, you can run the ServeRAID Manager program to create logical drives.

Note: Exact features and functions can vary with different versions of the ServerGuide software.

When you start the *Setup and Installation* CD, the following happens:

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

Notes:

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

System Partition

The ServerGuide program creates a 50 MB System Partition on the default drive. The System Partition contains server-specific utility programs such as service processor disk operating system (DOS) utilities, system diagnostics, flash BIOS updates, and other programs.

Note: Programs in the System Partition vary by server model, and not all server models run utility programs from the System Partition. To determine which ones do, start the *Setup and Installation* CD and view the online Overview.

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

Typical NOS installation

You can use the ServerGuide program to shorten your installation time. The ServerGuide program provides the necessary device drivers, based on the hardware that you have and the NOS that you are installing. The following is a brief explanation of a typical ServerGuide NOS installation.

Note: Exact features and functions can vary with different versions of the ServerGuide software.

- After you have completed the setup process, the operating-system installation program starts. (You will need your copy of the NOS CD to complete the installation.)
- The ServerGuide program stores information about the server model, service processor, hard disk controllers, and network adapters. It then checks the CD for newer device drivers. This information is stored and then passed to the NOS installation program.
- With some NOS installations, you can create a *NOS Replication Diskette* for setting up additional servers. The diskette will contain the Internet protocol (IP) address, server name, and other selections.
- The ServerGuide program presents NOS partition options that are based on your NOS selection and the installed hard disk drives.
- If you are installing the NOS from diskette, the ServerGuide program displays the required diskettes that you must create and the optional diskettes that you might want to create. The diskettes that you can create are the device-driver diskettes for the installed adapters or controllers.

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

Setting up or updating multiple servers

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

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

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

You can create a NOS-replication diskette, which contains information that you need to complete multiple installations. This feature supports systems running some operating systems.

Installing your NOS without ServerGuide

If you have already configured the server hardware and you decide not to use the ServerGuide program to install your NOS, download the latest NOS installation instructions:

1. Go to http://www.ibm.com/pc/support.
2. Click **Servers**.
3. From the **Family** field, select your server model.
4. Click **OS installation**. The available installation instructions are displayed.

Additional programs included with ServerGuide

As a convenience, the ServerGuide program comes with additional software to assist you with the server installation.

A variety of powerful applications are included with the ServerGuide software. Offerings can vary with the different versions of the ServerGuide software. Check the application CD labels for a list of applications, or start the *Setup and Installation* CD and view the online Overview.

Installing options

This section provides instructions to add components to the server.

Major components of the xSeries 232 server

The exact configuration of the xSeries 232 server varies depending on model. The following illustrations show the locations of major components in the server.

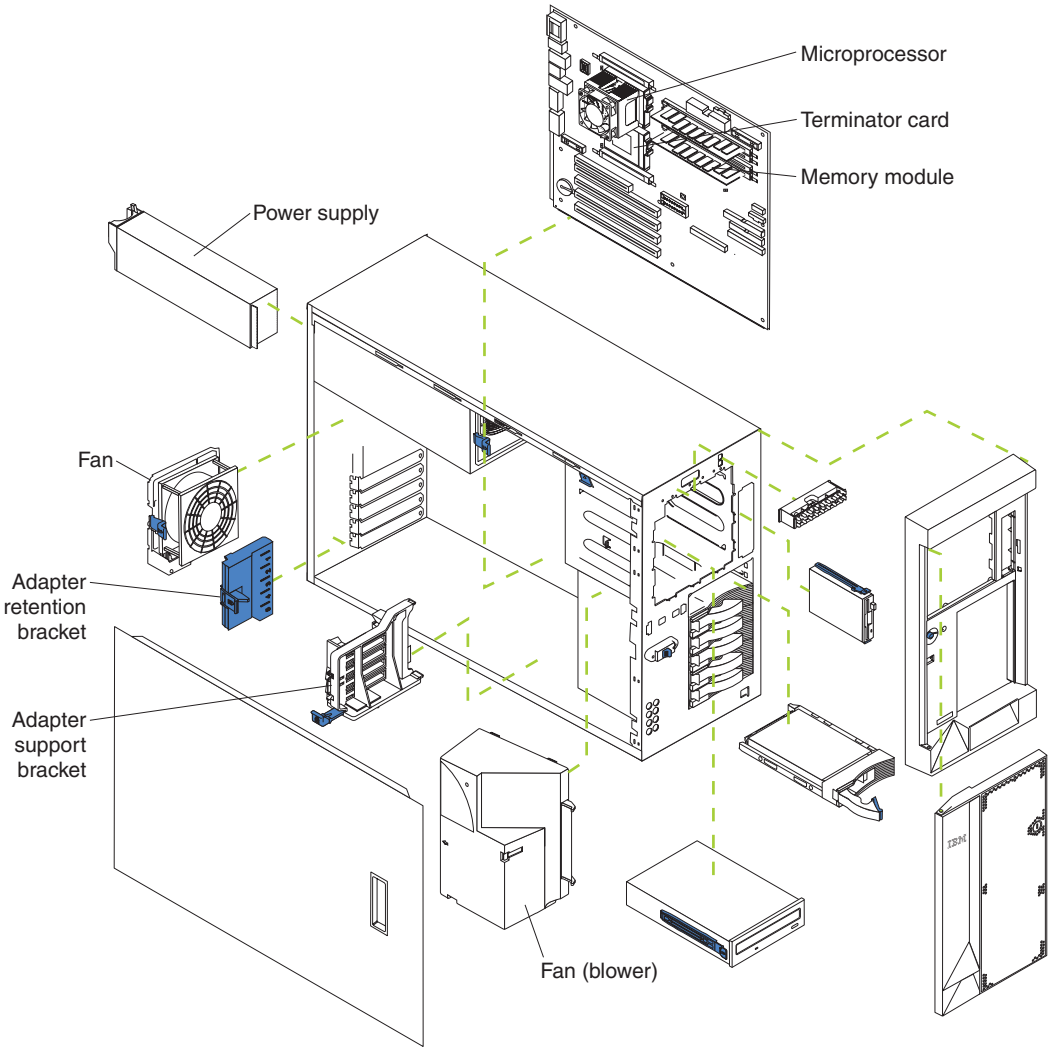
Note: The illustrations in this document might differ slightly from your hardware.

Components by model

The major components of the xSeries 232 server are shown in the following illustrations according to model.

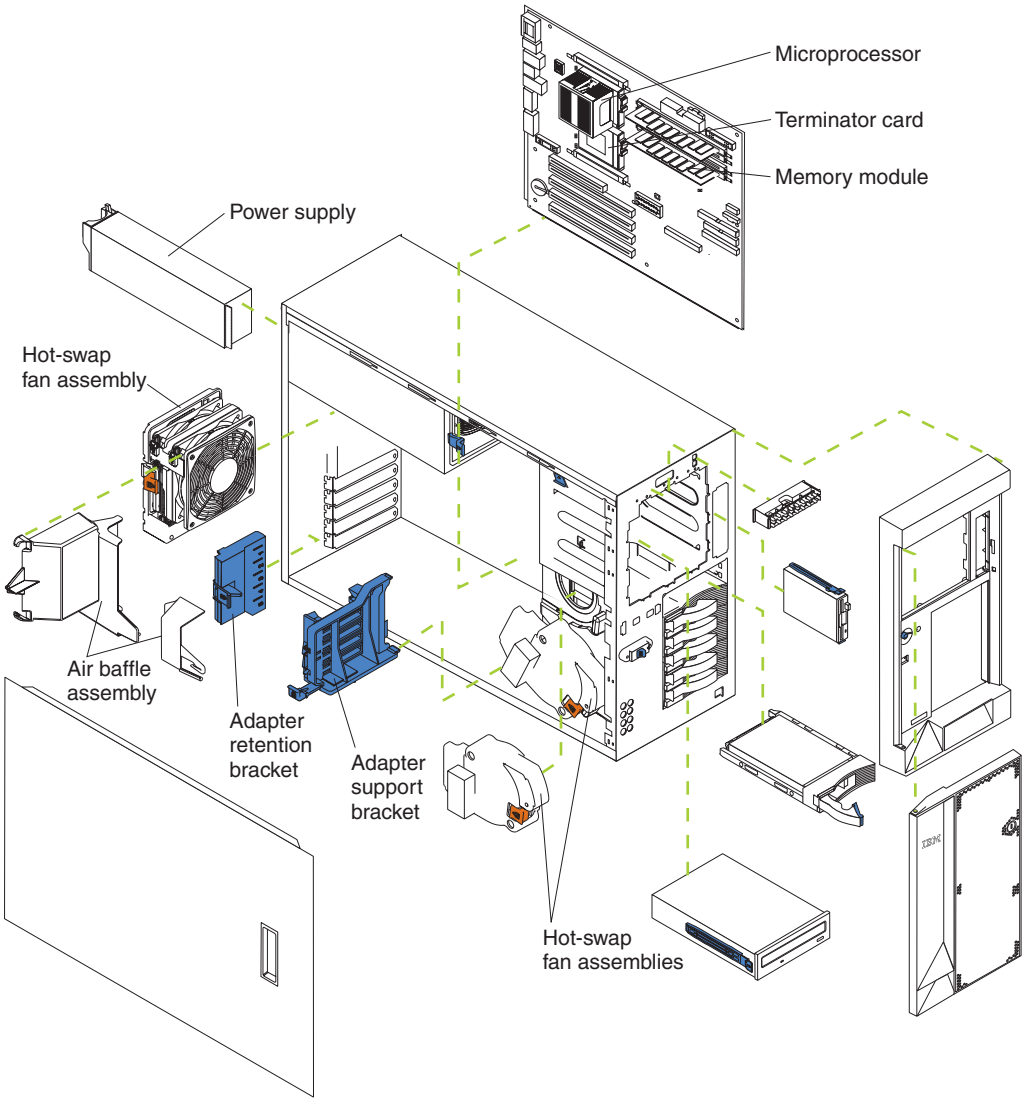
Models 11X, 13G, 1RX, 21X, 22X, 23G, 2RX, 2SX, 41X, 42X, 43G, 4RX, 4SX

The illustration that follows is an example of the configuration for the xSeries 232 server models that contain either one 385-watt nonredundant power supply, or up to three 250-watt redundant power supplies. On these models the fans are not hot-swappable, and the microprocessors utilizes fan sinks.



Models 24X, 2TX, 44X, 4TX, 54X, 5TX

Some models of the xSeries 232 server use a heat sink and contain several hot-swap fans. The power option for these models is that of 250-watt power supplies only.



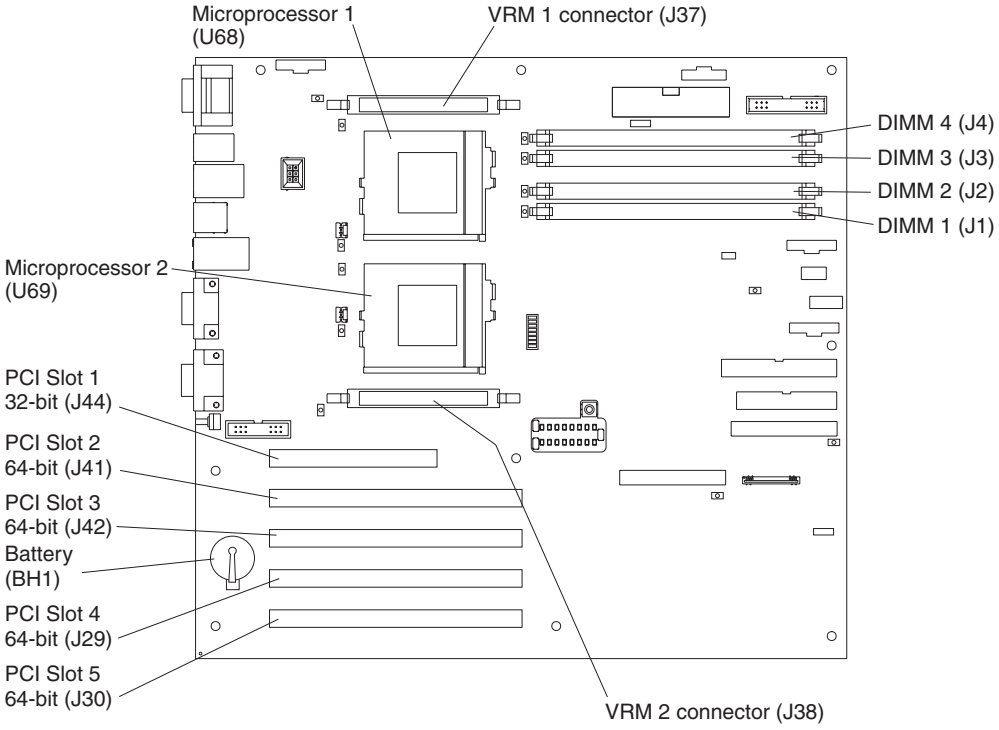
System board locations

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

System board option connectors

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

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

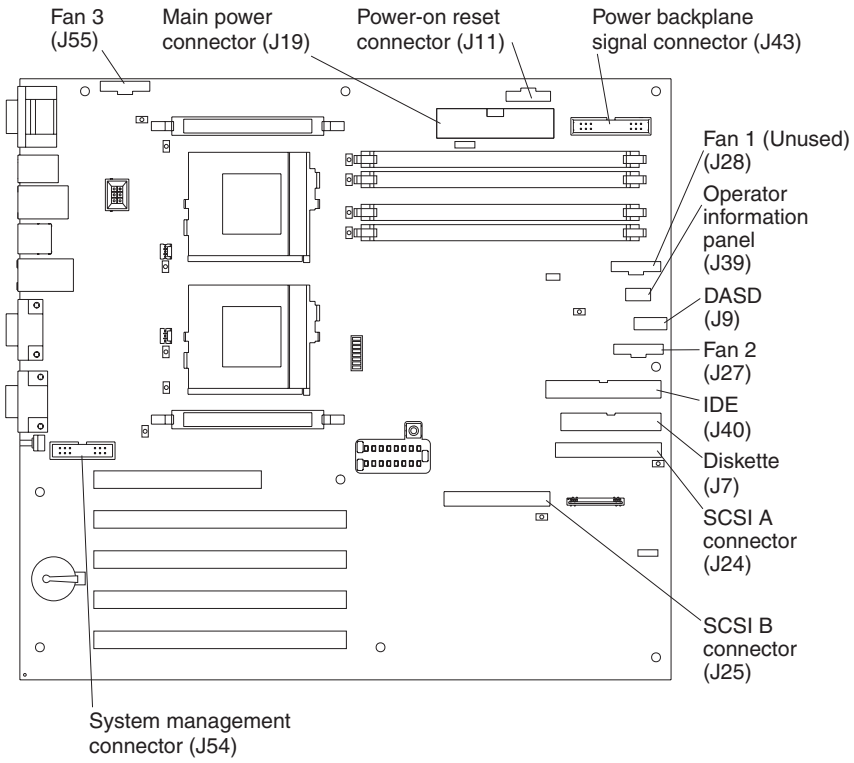


System board internal cable connectors

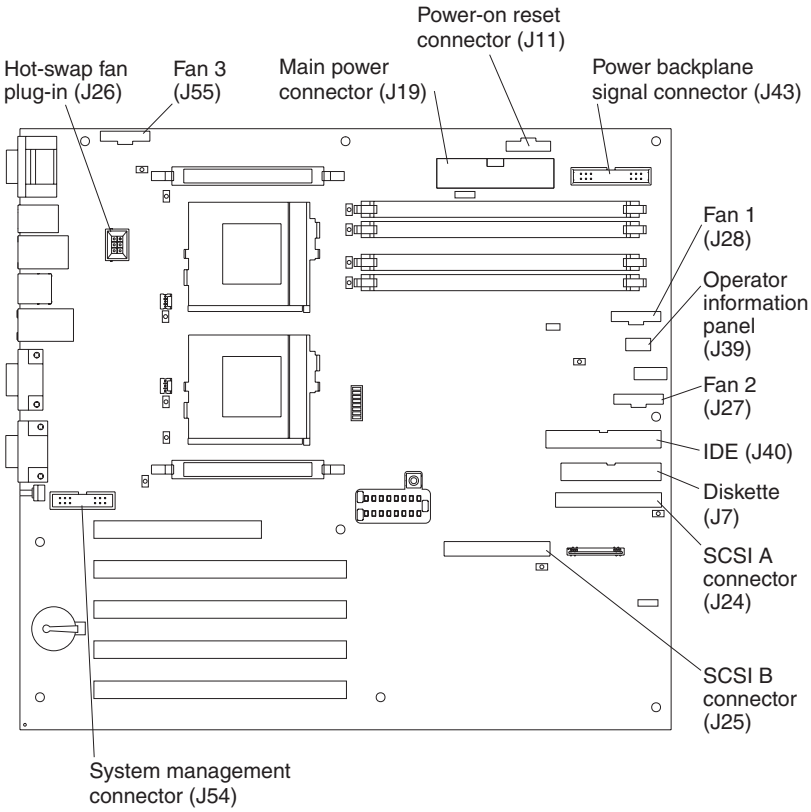
The following illustrations identify system board connectors for internal cables.

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

Models 11X, 13G, 1RX, 21X, 22X, 23G, 2RX, 2SX, 41X, 42X, 43G, 4RX, 4SX



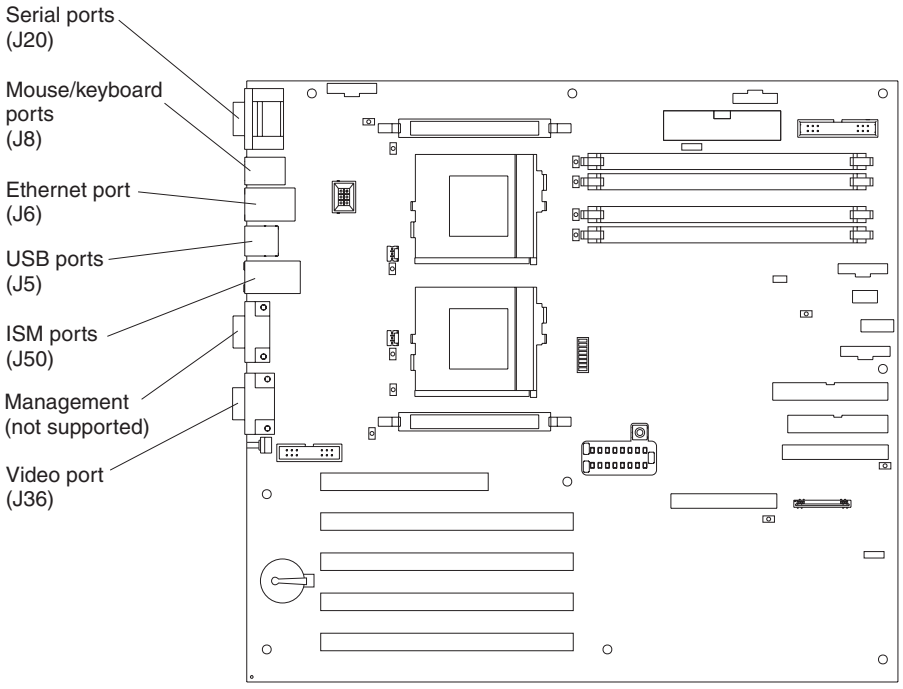
Models 24X, 2TX, 44X, 4TX, 54X, 5TX



System board external port connectors

The following illustrations identify system-board connectors for external devices.

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

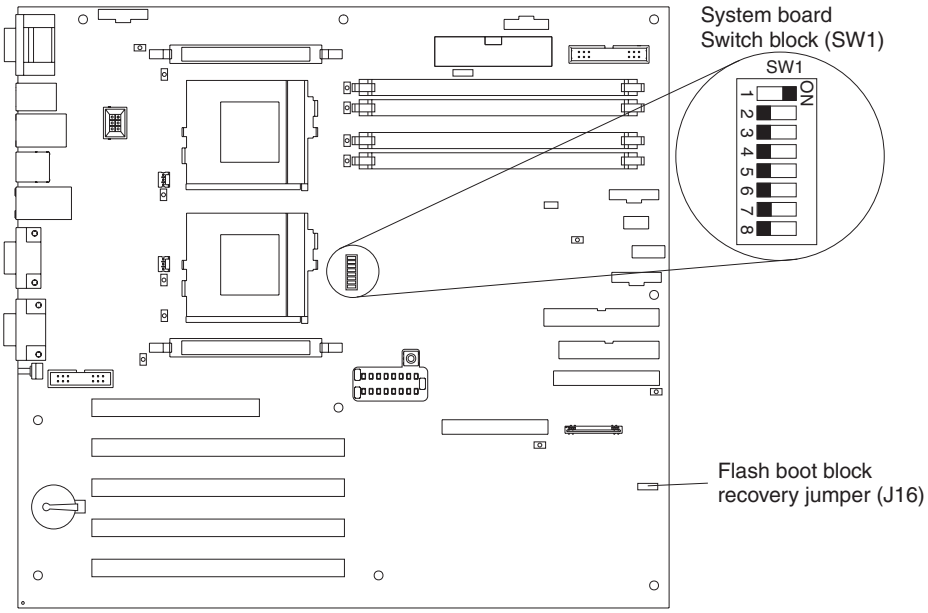


Note: ISM ports (ISM A and B) are used for the RS-485 interconnect network communications.

System board switches and jumpers

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

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



Note: Any jumper blocks on the system board that are not shown in the illustration are reserved.

Flash boot block recovery jumper

If the BIOS has become damaged, such as from a power failure during a flash update, you can recover the BIOS using the flash boot block recovery jumper and a BIOS flash diskette. See "Recovering BIOS code" on page 17 for information about the flash boot block jumper.

System board switch block

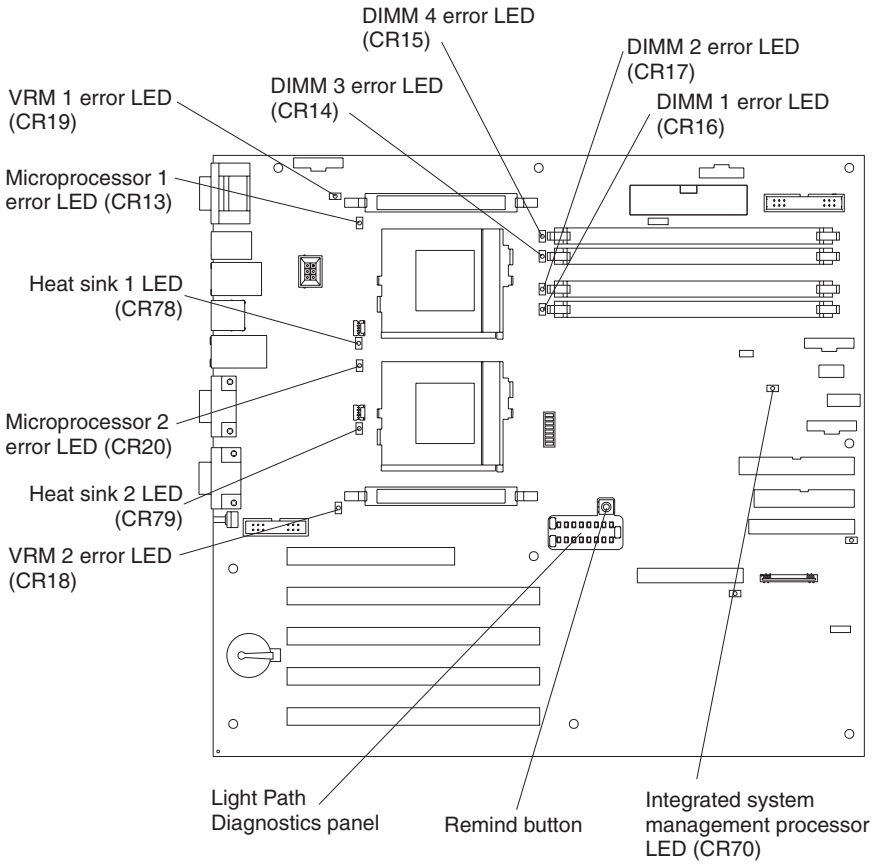
The switch block contains microswitches 1 through 8. As pictured in this illustration, switch 1 is at the top of the switch block, and switch 8 is at the bottom. The Off position for each switch is the side nearer the microprocessor socket.

Table 2. Switches 1-8

Switch number	Switch description
1-4	Reserved.
5	Clock frequency selection. The default setting is Off. When this switch is On, the host bus speed is 100 MHz. When this switch is Off, the host bus speed is 133 MHz. The switch should always be set to Off to optimize the system performance. Setting switch 5 to On greatly reduces system performance.
6	Password override. Toggling this switch allows one opportunity to enter the Setup Utility to change or delete the power-on password.
7	Reserved. The default setting is Off.
8	Power-on override. The default setting is Off (disabled). When On, overrides the power-on switch and forces power-on mode. The system will always start without the use of the power-on switch. **Note:** When power-on switch is set to the On position you cannot power off the server from the front panel.

System board LED locations

The following illustrations identify LEDs, diagnostic panels, and the Remind button on the system board. You might need to refer to this illustration when solving problems with the server.

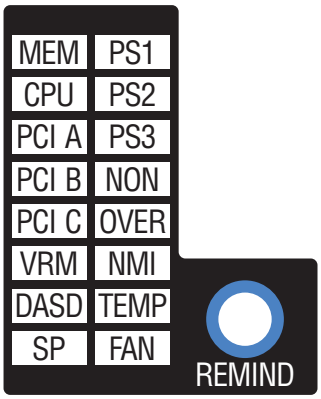


Notes:

1. The power-on LED located on the operator information panel is lit when system power is present in the server.
2. The illustrations in this document might differ slightly from your hardware.

Light Path Diagnostics panel

The Light Path Diagnostics LEDs are described in the following table. For more information, refer to "Diagnostic Panel LED" on page 109.



Diagnostic panel LED	Description
MEM	A memory failure occurred. This LED is turned on when any of the Light Path LED's located near the memory (DIMM) are turned on by the integrated system management processor.
CPU	A CPU failure occurred. This LED is turned on when either of the two Light Path LED's located near the appropriate CPU socket is turned on by the integrated system management processor.
PCI A	Error occurred on an adapter in PCI slot 1 or on one of the PCI devices integrated on the system board.
PCI B	Error occurred on an adapter in PCI slot 2 or 3 or on one of the PCI devices integrated on the system board.
PCI C	Error occurred on an adapter in PCI slot 4 or 5 or on one of the PCI devices integrated on the system board.
VRM	A VRM failure occurred. This LED is turned on by the hardware when either of the two Light Path LED's located near the appropriate VRM is turned on by the integrated system management processor.
DASD	System board or SCSI hot-swap hard disk drive failure, hard disk drive removed from either standard or optional expansion hot-swap bay DASD backplane, or hard disk drive temperature has exceeded maximum limit (in this case, the TEMP and System error LEDs will be lit).
SP	An error has been detected in the integrated system management processor.
PS1	Power supply 1 failure or removed.
PS2	Power supply 2 failure or removed.
PS3	Power supply 3 failure or removed.
NON	Server power supplies are no longer redundant (applicable only with redundant power feature).
OVER	Over specification. The system has exceeded the power capabilities (max. rating) of the installed power-supply units.
NMI	Nonmaskable interrupt occurred.
TEMP	System temperature exceeded maximum limit. Other LEDs will be on to identify the area of over temperature (such as CPUx, CPU, DASD LEDs).
FAN	Fan failure, or fan is operating slowly or has been removed. This LED is turned on when any of the Light Path LED's mounted directly on the fan assemblies or near the CPU sockets are turned on by the integrated system management processor.

Remind button

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

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

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

You can use the Remind button to delay server maintenance until a later time. Also, resetting the system-error light enables the LED to react to another error. If the LED is still solid from the first error, it will mask additional errors.

Integrated System Management Processor LED

The xSeries 232 server has an Integrated System Management Processor feature on the system board. The green Integrated System Management Processor LED flashes, indicating that the system temperature, fan speeds, voltage ranges, power supplies, power backplane, and DASD backplane are being monitored. If an error occurs in any of these areas, the Integrated System Management Processor turns on the respective error LED on the Light Path Diagnostics panel. If the Integrated System Management Processor LED remains on or off, or if it blinks significantly faster than approximately once per second, then an error has occurred. See ″SP LED″ at “Diagnostic Panel LED” on page 109.

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 “Handling electrostatic discharge-sensitive devices” on page 136, and read the safety statements on “Safety information” on page 133. These guidelines will help you work safely while working with the server or options.
- You do not need to turn off the server to install or replace hot-swap power supplies, or hot-swap drives.
- The orange color on components and labels in the server indicates hot-swap components. You can install or remove hot-swap components while the system is running, provided that the system is configured to support this function. For complete details about installing or removing a hot-swap component, see the information provided in this chapter.
- The blue color on components and labels identifies touch points where a component can be gripped, a latch moved, and so on.
- 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/us/compat on the World Wide Web.

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.
- Each of the power supply bays has either a power supply or a filler panel installed.
- The cover is in place during typical operations, or is removed for no longer than 30 minutes while the server is operating.

  Note: On the tower model only, the front door can be removed permanently without affecting system reliability.
- There is space around the server to enable the server cooling system to work properly.
  - On a tower model, leave approximately 127 mm (5 inches) of space around the front and rear of the server.
  - On a rack model, refer to the documentation that comes with the rack.
- 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.
- A failed fan must be replaced immediately.

Working inside a server with power on

The server is designed to operate safely while turned on with the cover removed, such as when you set the password-override switch. Follow these guidelines when you work inside a server that is turned on:

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

Installing components

The following sections describe how to access certain components inside the server.

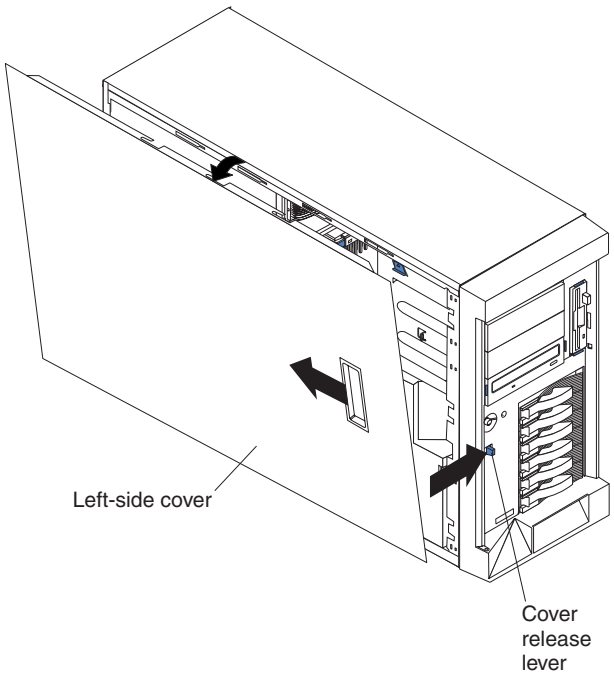
Removing the cover, door, and bezel

The following sections describe how to remove the cover, the door (for tower models), and the bezel.

Removing the left-side cover (tower model)

Notes:

1. To remove or install a hot-swap hard disk drive or hot-swap power supply, it is not necessary to remove the cover.
2. The illustrations in this document might differ slightly from your hardware.



To remove the left-side cover of the tower model:

1. Review the information in "Before you begin" on page 47.
2. If you are planning to install or remove any part other than a hot-swap hard disk drive or hot-swap power supply, turn off the server and all attached devices, and disconnect all external cables and power cords.

   Statement 1:

DANGER

Electrical current from power, telephone, and communication cables is hazardous. To avoid a shock hazard:

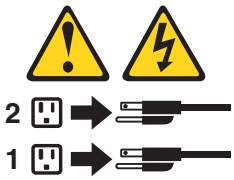
- **Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.**
- **Connect all power cords to a properly wired and grounded electrical outlet.**
- **Connect to properly wired outlets any equipment that will be attached 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:
a. Turn everything OFF.	a. Turn everything OFF.
b. First, attach all cables to devices.	b. First, remove power cords from outlet.
c. Attach signal cables to connectors.	c. Remove signal cables from connectors.
d. Attach power cords to outlet.	d. Remove all cables from devices.
e. Turn device ON.	

Statement 5:

CAUTION:

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

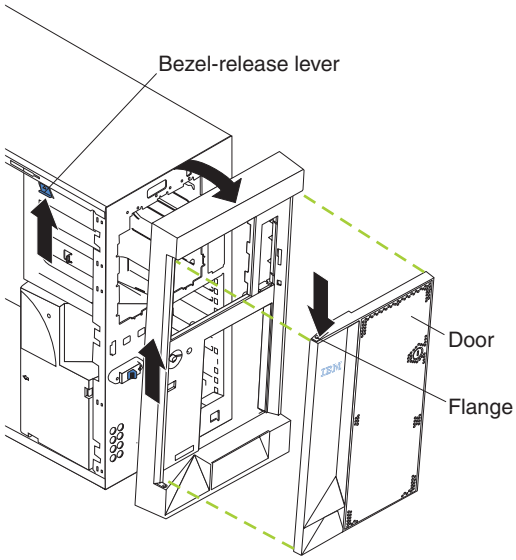


3. Slide the cover-release lever on the front of the server to release the cover; then, slide the cover toward the rear of the server approximately 25 mm (1 inch). Move the top edge of the cover out from the server; then, lift the cover off the server. Set the cover aside.

   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.

Removing the server door and bezel (tower model)

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



To remove the server door:

1. Unlock and open the server door.
2. Locate the flange on the top edge of the door.
3. Press down on the flange while pressing out on the door; then, lift the server door up and off the hinge. Set the door aside in a safe place.

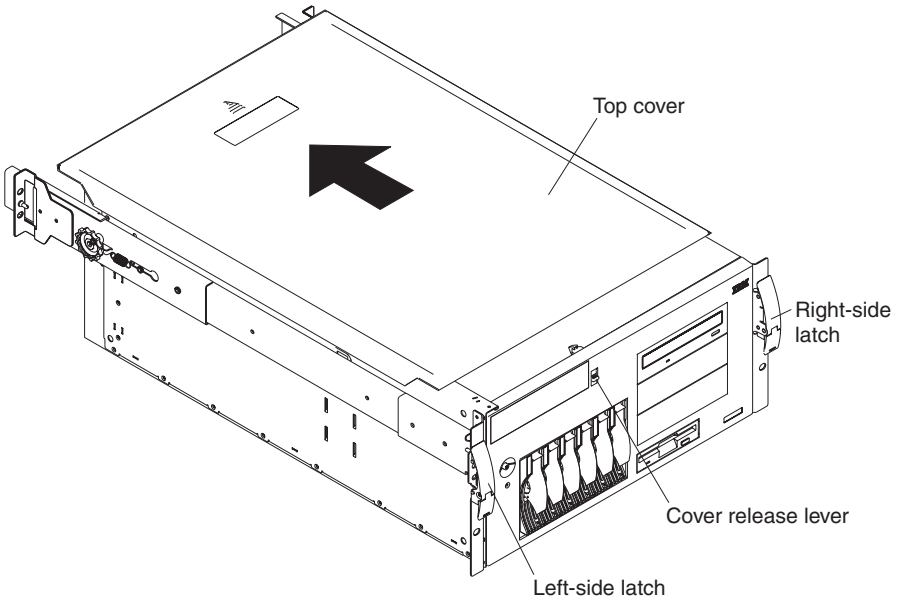
To remove the bezel:

1. If you have not done so already, remove the left-side cover. See "Removing the left-side cover (tower model)" on page 48 for details.
2. Push the blue bezel-release lever in the direction shown in the illustration.
3. Lift the bezel tabs out of the slots, and pull the bezel away from the server front. Store the bezel in a safe place.

Removing the cover (rack model)

Notes:

1. To remove or install a hot-swap hard disk drive or hot-swap power supply, it is not necessary to remove the cover.
2. The illustrations in this document might differ slightly from your hardware.



To remove the server top cover:

1. Review the information in "Before you begin" on page 47.
2. If you are planning to install or remove any part other than a hot-swap hard disk drive or hot-swap power supply, turn off the server and all attached devices and disconnect all external cables and power cords.

   Statement 1:

DANGER

Electrical current from power, telephone, and communication cables is hazardous. To avoid a shock hazard:

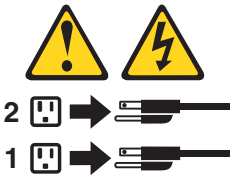
- **Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.**
- **Connect all power cords to a properly wired and grounded electrical outlet.**
- **Connect to properly wired outlets any equipment that will be attached 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:
a. Turn everything OFF.	a. Turn everything OFF.
b. First, attach all cables to devices.	b. First, remove power cords from outlet.
c. Attach signal cables to connectors.	c. Remove signal cables from connectors.
d. Attach power cords to outlet.	d. Remove all cables from devices.
e. Turn device ON.	

Statement 5:

CAUTION:

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



3. Release the left and right side latches and pull the server out of the rack enclosure until both slide rails lock.

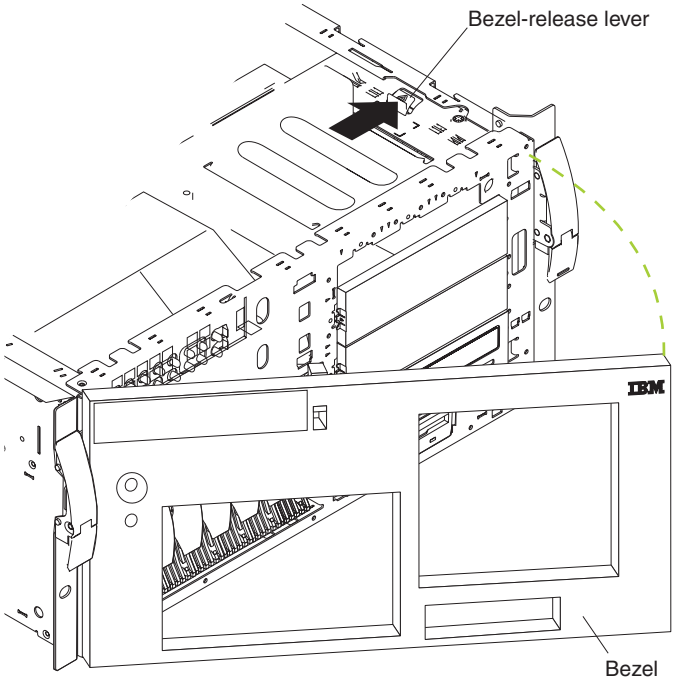
   Note: When the server is in the locked position, you can reach the cables on the back of the server.

4. Move the cover-release lever down while sliding the top cover toward the rear of the server approximately 25 mm (1 inch). Lift the cover off the server and set the cover aside.

   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.

Removing the bezel (rack model)

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



To remove the bezel:

1. If you have not done so already, remove the top cover. See "Removing the cover (rack model)" on page 51.
2. Move the blue bezel-release lever in the direction shown in the illustration.
3. Lift the bezel tabs out of the slots and pull the bezel away from the server front. Store the bezel in a safe place.

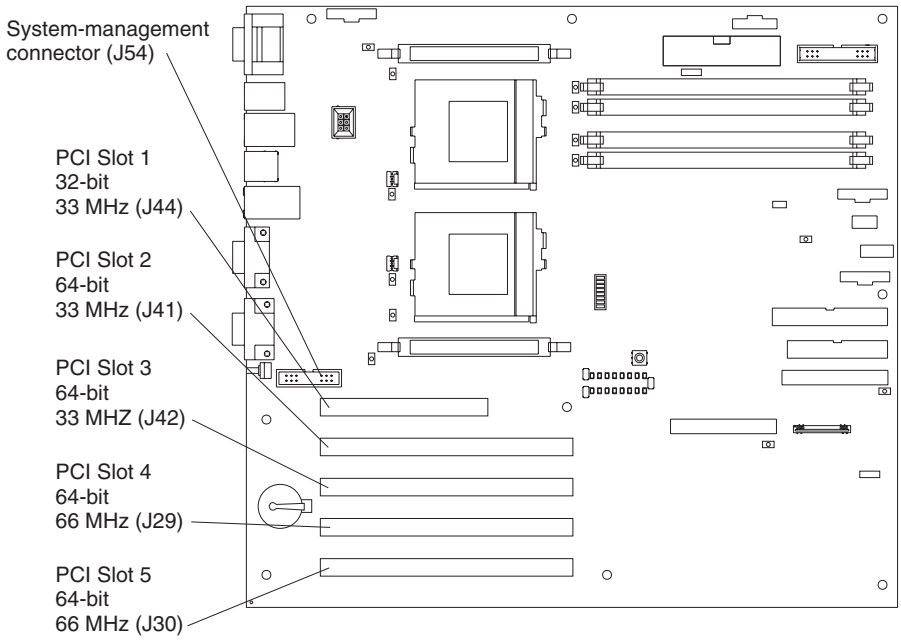
Working with adapters

You can install up to five peripheral component interconnect (PCI) adapters in the expansion connectors, called slots, on the system board.

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

The following illustration shows the location of the PCI expansion slots and system-management connector on the system board.

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



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 the switch or jumper settings on your adapter, follow the instructions that come with the adapter.
- You can install full-length adapters in all expansion slots.
- You can install a 32-bit adapter or device in any of the PCI slots.
- Your server supports 5.0 V signalling or universal PCI adapters in slots 1, 2, and 3; it supports 3.3 V signalling or universal PCI adapters in slots 4 and 5.

  Note: Some full-length adapters with attached daughterboards might interfere with SCSI channel B if installed in slot 1. Install this type of adapter in slot 2, 3, 4, or 5.
- You might require additional power supplies if you add adapters that have electrical current requirements that exceed the installed power-supply capabilities.
- Your server uses a rotational interrupt technique to configure PCI adapters. Therefore, you can install a variety of PCI adapters that currently do not support sharing of PCI interrupts.
- The optional IBM Remote Supervisor Adapter must be installed in PCI slot 1 only. Use the ribbon cable that comes with the adapter to connect the adapter to the system-management connector (J54) on the system board. The external power adapter that comes with the adapter is not required with this server.
- PCI slot 1 is on PCI bus A, PCI slots 2 and 3 are on PCI bus B, and PCI slots 4 and 5 are on PCI bus C.

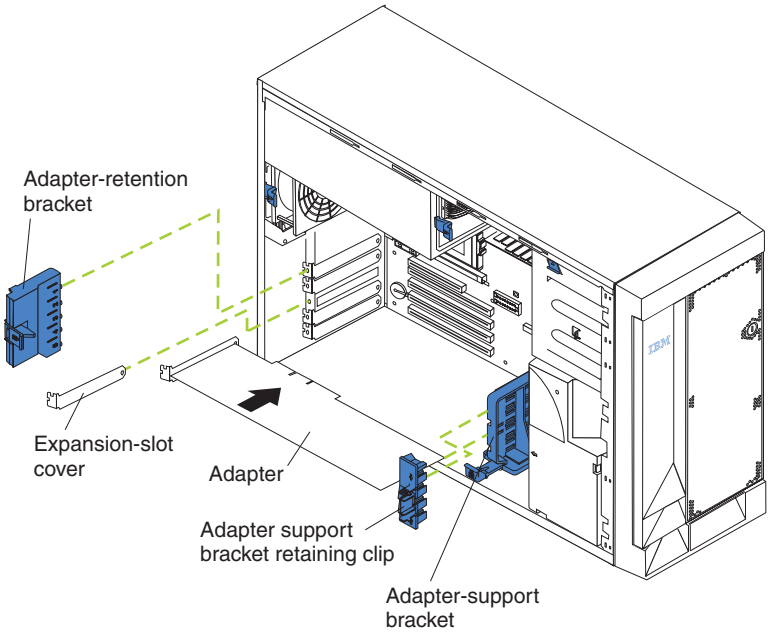
  Note: PCI bus A is often referred to as bus 0; PCI bus B is often referred to as bus 1; and PCI bus C is often referred to as bus 2.

- The system scans PCI slot 1, the system board Ethernet, PCI slots 2 through 5, and then the system board SCSI channels A and B, if you have not changed the boot precedence from the default.

  You can use the Configuration/Setup Utility program to change the boot precedence for your server. Select **Start Options** from the Configuration/Setup Utility program main menu.

Adapter installation

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



To install an adapter:

1. Review the information in "Before you begin" on page 47 and "Safety information" on page 133.
2. Turn off the server and peripheral devices and disconnect all external cables and power cords; then, remove the cover. See "Removing the cover, door, and bezel" on page 48 for details.
3. Determine which expansion slot you will use for the adapter.

   Note: Check the instructions that come with the adapter for any requirements or restrictions.
4. Remove the expansion-slot cover:
   a. Press the arrow on the adapter-retention bracket release tab and remove the bracket.
   b. Slide the expansion-slot cover out of the server. Store it in a safe place for future use.

   Attention: Expansion-slot covers must be installed in all vacant slots. This maintains the electronic emissions characteristics of the system and ensures proper cooling of system components.
5. Refer to the documentation that comes with the adapter for any cabling instructions. It might be easier for you to route any cables before you install the adapter.
6. Remove the adapter from the static-protective package.

Attention: Avoid touching the components and gold-edge connectors on the adapter.

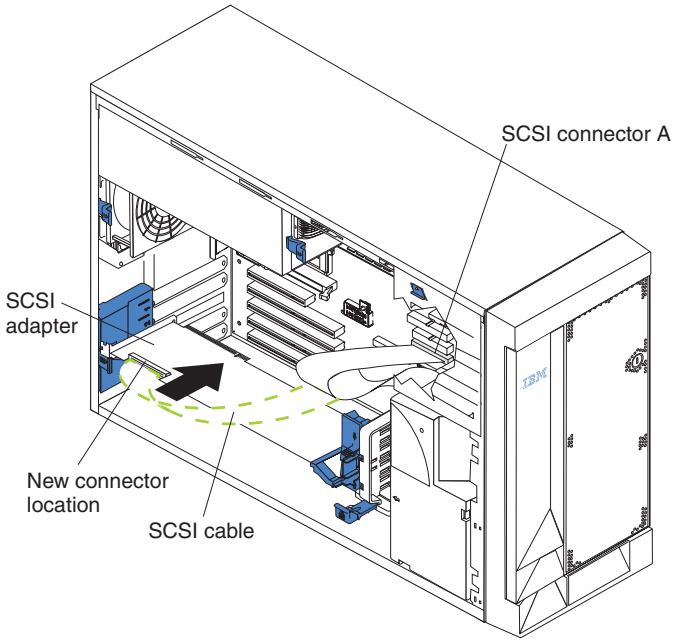
7. Place the adapter, component-side up, on a flat, static-protective surface.
8. Set any jumpers or switches as described by the adapter manufacturer.
9. Install the adapter:
   a. If you are installing a full-length adapter, remove the adapter support bracket retaining clip.
   b. Carefully grasp the adapter by its top edge or upper corners, and align it with the expansion slot on the system board.
   c. 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.
10. Replace the retaining clip on the adapter support bracket, if you removed it.
11. Align the bottom tabs of the adapter-retention bracket with the holes at the top of the expansion slots, and press the adapter-retention bracket into the holes until it clicks into the locked position.
12. Connect any needed cables to the adapter.

    Attention: Route cables so that the flow of air from the fans is not blocked. In addition, route any cables plugged into the PCI adapter under adjacent adapters so they are not pinched between the top of the adapter and the top cover.

    The following illustration shows the rerouting of the SCSI cable if you install a ServeRAID adapter (remove the cable from SCSI connector A (J24) on the system board and connect it to the ServeRAID adapter).

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



13. If you have other options to install or remove, do so now; otherwise, go to "Completing the installation" on page 82.

Internal drives

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

- Diskette (already installed)
- Hard disk
- CD-ROM (already installed)
- Tape, including digital linear tape

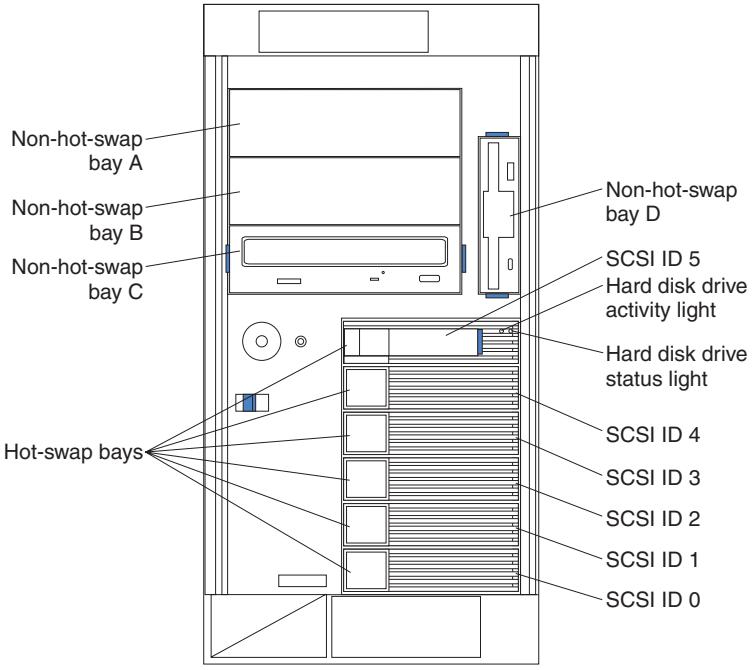
Note: The SCSI IDs for the slim-high and hot-swap drives are located on the bezel, immediately adjacent to the hot-swap drive bays.

Internal drive bays

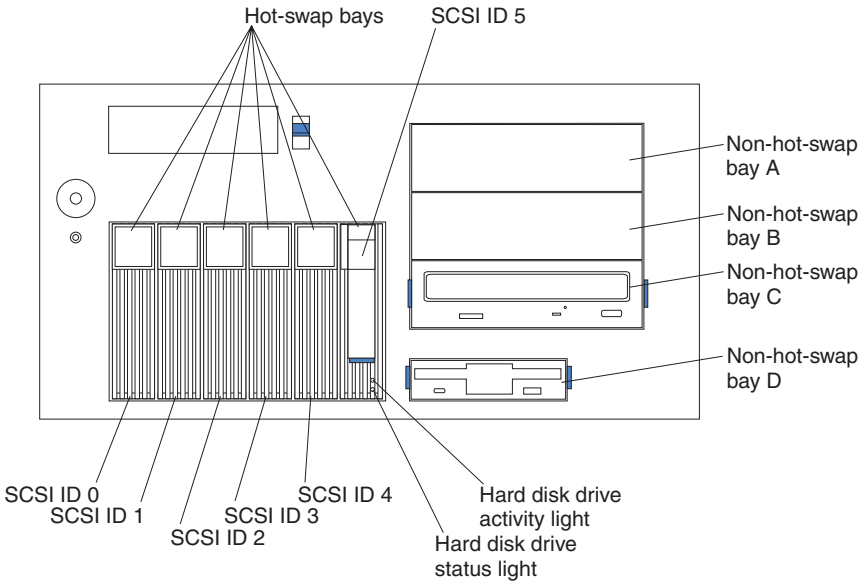
Internal drives are installed in *bays*. The bays of the xSeries 232 are in the front of the server, as shown in the following illustrations.

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

Tower model



Rack model



Hot-swap drives

Your server contains hardware that enables you to continue to operate your system while a hard disk drive is removed or installed. These drives are known as hot-swap drives.

Each hot-swap drive that you plan to install must have a hot-swap-drive tray attached. Hot-swap-drive trays come with the hot-swap drives.

- Your server supports six slim (1-inch) line, SCSI LVD, 3.5-inch hot-swap hard disk drives in the hot-swap bays.
- The hot-swap bays are connected to a SCSI *backplane*. This backplane is the printed circuit board behind the bay.
- The backplane controls the SCSI IDs for the hot-swap drives.

Non-hot-swap drives

Diskette drives, tape drives, and CD-ROM drives are non-hot-swap drives. To remove or install a non-hot-swap drive, you must turn off the server first. Non-hot-swap drives are installed in bays A, B, C, and D only.

- Your server comes with a preinstalled 3.5-inch, 1.44 MB diskette drive in bay D and a preinstalled IDE CD-ROM drive in bay C.
- The xSeries 232 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.
- Bays A and B come without devices installed. These bays are for 5.25-inch, half-high, removable-media drives, such as tape backup drives. You can combine bays A and B into a single full-high bay.
- If you are installing a SCSI device with a 50-pin connector in one of the empty non-hot-swap bays (bays A and B), you need a 68-pin to 50-pin converter. To order the converter, contact your IBM reseller or IBM marketing representative.

Note: The server electromagnetic interference (EMI) integrity and cooling are both protected by having bays A and B 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.

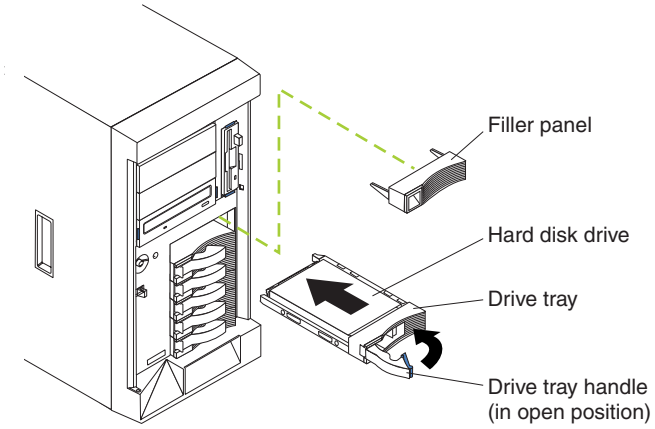
Preinstallation steps (all bays)

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 internal 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. Review the information in "Before you begin" on page 47, "Safety information" on page 133, 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.
4. To install the drive, go to "Hot-swap drive installation" or to "Non-hot-swap drives" on page 62, as appropriate.

Hot-swap drive installation

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



To install a drive in a hot-swap drive bay:

Attention:

- To maintain proper system cooling, do not operate the server for more than 2 minutes without either a drive or a filler panel installed in each bay.
- When you handle static-sensitive devices, take precautions to avoid damage from static electricity. For details on handling these devices, review "Handling electrostatic discharge-sensitive devices" on page 136.

1. If your server is a tower model, unlock and open the server door.

   Attention: To maintain proper system cooling, do not operate the server for more than 2 minutes without either a drive or a filler panel installed in each bay.
2. 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.
3. Install the hard disk drive in the hot-swap bay:
   a. Ensure the tray handle is open (that is, perpendicular to the drive).
   b. Align the rails on the drive assembly with the guide rails in the drive bay.
   c. Gently push the drive assembly into the bay until the drive connects to the backplane.
   d. Push the tray handle toward the closed position until it locks the drive in place.

4. Check the hard disk drive status indicators to verify that the hard disk drives are operating properly (see “Internal drive bays” on page 58 for the location of the status indicators).
   - If the amber light is on continuously, the drive has failed.
   - If you have a RAID adapter installed:
     - When the amber light flashes slowly (one flash per second), the drive is being rebuilt.
     - When the amber light flashes rapidly (three flashes per second), the controller is identifying the drive.
5. If your server is a tower model, close and lock the server door.

Note: If the server has a RAID adapter installed, refer to the information provided with the RAID adapter for information about adding a drive.

Hot-swap drive replacement

You do not have to turn off the server to remove or install the hot-swap drives.

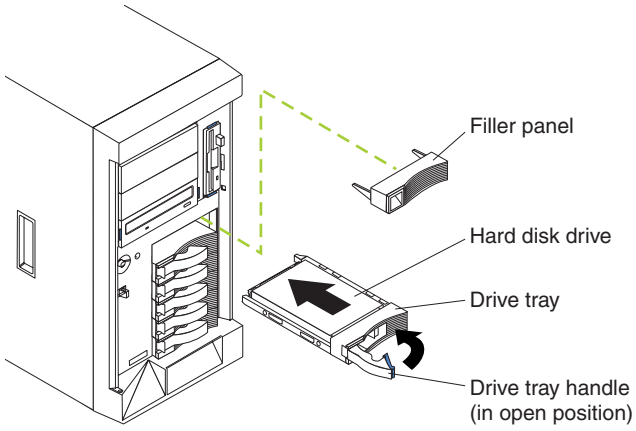
Attention:

1. Before you remove a hot-swap hard disk drive that is not defective, back up all important data.
2. To avoid damage to a hard disk drive, *do not* remove the drive from the hot-swap bay until it has had time to spin down (approximately 30 seconds). Handle the drive carefully.
3. Before you replace a hot-swap drive, make sure it is defective. If you partially or completely remove a good drive instead of a defective one, your server might lose data.

   This situation is especially relevant if your server has a RAID adapter installed and you assigned RAID level 1 or 5 to the logical drives in your disk array. The RAID adapter can rebuild the data that you need, provided that certain conditions are met. Refer to the information provided with the RAID adapter for further details.

Refer to the following illustration of the tower model while you perform the steps in this procedure.

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



To replace a drive in a hot-swap bay:

1. Before you begin, do the following:
   - Read the documentation that comes with your drive.

- If your server has a RAID adapter installed, review the information provided with the RAID adapter for information about replacing a drive.

2. If your server is a tower model, unlock and open the server door.

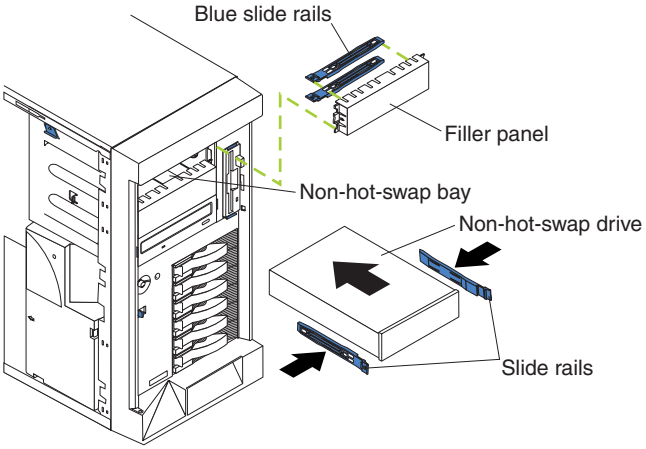
   Attention: To maintain proper system cooling, do not operate the server for more than 2 minutes without either a drive or a filler panel installed for each bay.

3. Locate the defective drive (look for an amber hard disk drive status light on the front of the drive).
4. Remove the defective hard disk drive. Move the handle on the drive to the open position (perpendicular to the drive), and pull the hot-swap drive assembly from the bay.
5. Install the hard disk drive in the hot-swap bay:
   a. Ensure the tray handle is open (that is, perpendicular to the drive).
   b. Align the rails on the drive assembly with the guide rails in the drive bay.
   c. Gently push the drive assembly into the bay until the drive connects to the backplane.
   d. Push the tray handle toward the closed position until it locks the drive in place.
6. Check the hard disk drive status indicators to verify that the hard disk drive is installed properly (see "Internal drive bays" on page 58 for the location of the status lights).
   - When the amber light is on continuously, the drive has failed.
   - If you have a RAID adapter installed:
     – When the amber light flashes slowly (one flash per second), the drive is being rebuilt.
     – When the amber light flashes rapidly (three flashes per second), the controller is identifying the drive.
7. If your server is a tower model, close and lock the server door.

Non-hot-swap drives

Notes:

1. The server electromagnetic interference (EMI) integrity and cooling are both protected by having the non-hot-swap bays covered or occupied. When you install a drive, save the filler panel from the bay, in case you later remove the drive and do not replace it with another.
2. The illustrations in this document might differ slightly from your hardware.



To install a non-hot-swap drive (5.25-inch, removable media) in one of the non-hot-swap bays:

1. Read the information in "Preinstallation steps (all bays)" on page 60.
2. Turn off the server and peripheral devices and then remove the cover and the bezel (see "Removing the cover, door, and bezel" on page 48 for details).
3. Remove the filler panel from the bay opening by pulling the filler panel away from the server. You do not need the filler panel when you have a drive installed in the bay.
4. If the drive that you are installing is a laser product, observe the following safety precaution.

   Statement 3:

   CAUTION:

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

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

   DANGER: Some laser products contain an embedded Class 3A or Class 3B laser diode. Note the following: Laser radiation when open. Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam.
5. Touch the static-protective package containing the drive to any unpainted metal surface on the server; then, remove the drive from the package and place it on a static-protective surface.
6. Set any jumpers or switches on the drive according to the documentation that comes with the drive.
7. Install rails on the drive.
   - If you are installing a standard-size drive:
     a. Pull the blue slide rails off the back of the filler panel.
     b. Clip the rails onto the sides of the drive.
   - If you are installing a digital linear tape (DLT) backup drive, use the metal slide rails and screws that come in the box that contains the server documentation.
8. Align the rails on the drive with the guide rails in the drive bay.
9. Push the drive into the bay until it clicks into place.
10. If the drive is an IDE device:
    a. Make sure the drive is not a hard disk drive.
    b. Plug a connector on the IDE cable into the back of the drive.

c. Make sure the other end of the IDE cable is plugged into the IDE connector on the system board.

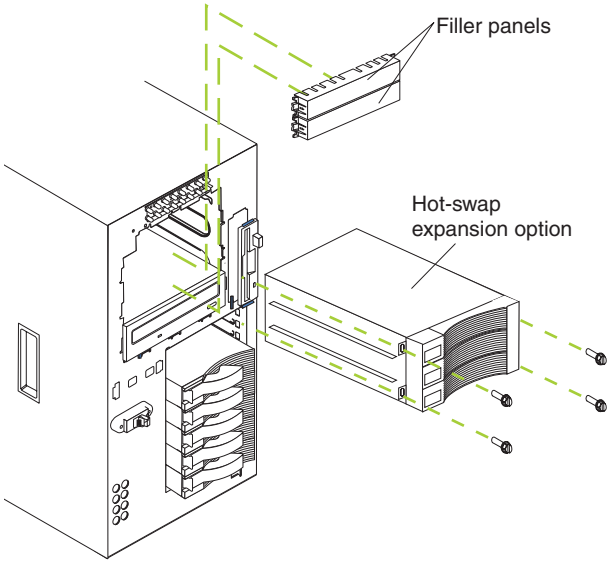
d. Go to step 12

11. If the drive is a SCSI device:
    a. Make sure the drive is not a hard disk drive.
    b. Connect one of the connectors on the SCSI cable to the back of the drive.
    c. Connect the other end of the SCSI cable to the SCSI channel B connector on the system board, or to an optional SCSI adapter, as appropriate. See "System board internal cable connectors" on page 41 for the location of the SCSI connectors. See also "Ultra160 SCSI ports" on page 93 for information about SCSI connections and devices.
12. Connect a power cable to the back of the device. Power cables for non-hot-swap drives come installed in your server. The connectors are keyed and can be inserted only one way.
13. If you are installing another non-hot-swap drive, do so at this time. Otherwise, continue with the next step.
14. If you have other options to install or remove, do so now; otherwise, replace the cover (see "Completing the installation" on page 82 for details).

Installing an xSeries 3-Pack Ultra160 Hot-Swap Expansion Kit

You can install an xSeries 3-Pack Ultra160 Hot-Swap Expansion Kit in your server to support three additional hot-swap hard disk drives.

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



To install an xSeries 3-Pack Ultra160 Hot-Swap Expansion Kit:

1. Review the information in "Before you begin" on page 47, "Safety information" on page 133, and "Handling electrostatic discharge-sensitive devices" on page 136.
2. Turn off the server and peripheral devices and disconnect all external cables and power cords; then, remove the cover and bezel. (See "Removing the cover, door, and bezel" on page 48.)
3. Release the side rails to remove the filler panels from the bays below the CD-ROM drive.
4. Refer to the documentation provided with the option to assemble the hot-swap expansion option.

5. Slide the hot-swap expansion option into the bays, and attach it to the server with the screws provided in the kit.
6. Refer to the documentation provided with the option to complete the installation of the option. (See “System board internal cable connectors” on page 41 for locations of the cable connectors on the system board.)
7. If you have other options to install or remove, do so now; otherwise, go to “Completing the installation” on page 82.

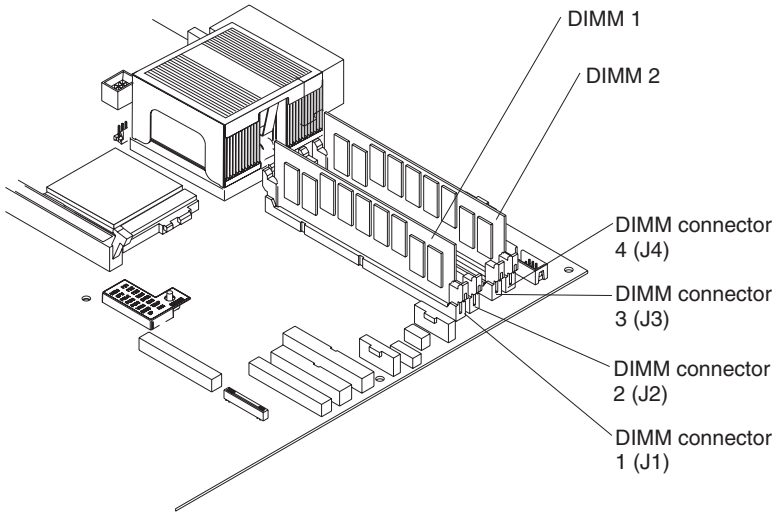
Memory modules

Adding memory to your server is an easy way to make programs run faster. You can increase the amount of memory in your server by installing options called *memory-module kits*. Each kit contains one industry-standard, dual inline memory module (DIMM). Your server supports a two-way interleaved memory configuration. You must install matched pairs of memory kits. The set in slots 1 and 4 do not need to be the same size as the set in slots 2 and 3.

Notes:

1. Your server comes with two DIMMs installed in DIMM connectors 1 and 4. Install additional DIMMs as instructed in the documentation that comes with your option.
2. Your xSeries 232 server supports 128 MB, 256 MB, 512 MB, and 1 GB DIMMs. You must install the DIMMs in pairs of the same size. Place pair 1 in slots 1 and 4 and pair 2 in slots 2 and 3. Refer to the ServerProven® list on the World Wide Web at http://www.ibm.com/pc/compat/ for information about memory modules for use with your 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 in 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.**

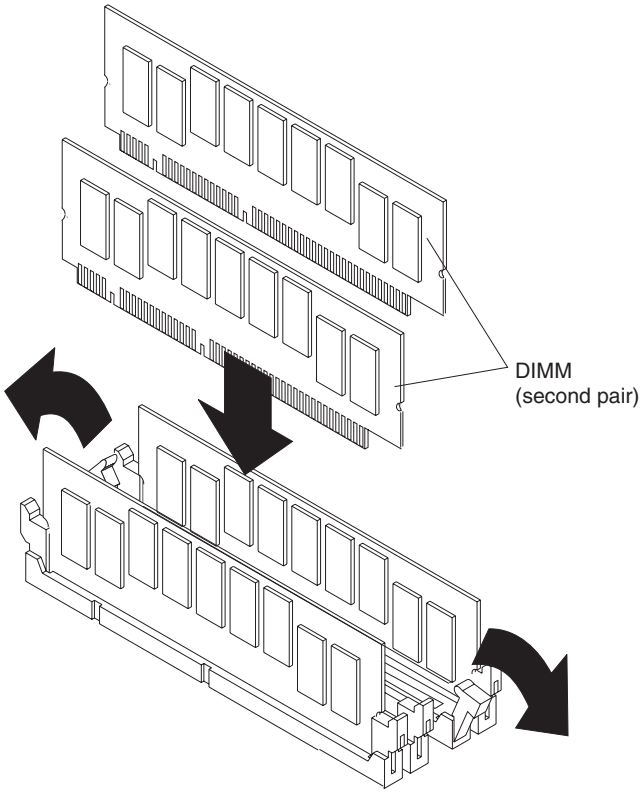
Note: The illustrations in this document might differ slightly from your hardware.



To install a DIMM:

1. Review the information listed in “Before you begin” on page 47, “Safety information” on page 133 and “Handling electrostatic discharge-sensitive devices” on page 136. Also review the documentation that comes with the option.
2. Turn off the server and peripheral devices and disconnect all external cables and power cords; then, remove the cover. (See the “Removing the cover, door, and bezel” on page 48.)
3. Touch the static-protective package containing the DIMM to any unpainted metal surface on the server. Then, remove the DIMM from the package. You must install memory in matched pairs: the first pair must be in slots 1 and 4, and the second pair must be in slots 2 and 3.

   Attention: To avoid breaking the retaining clips or damaging the DIMM connectors, handle the clips gently.
4. Install the DIMM:
   a. Turn the DIMM so that the pins and keys align correctly with the connector.



   b. Insert the DIMM into the connector by pressing on one edge of the DIMM and then on the other edge of the DIMM. Make sure to press the DIMM straight into the connector. Make sure that the retaining clips snap into the closed position.
   c. Make sure 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.
5. Repeat steps 3 through 4 for the second DIMM; then, continue with step 6.
6. If you have other options to install or remove, do so now; otherwise, go to “Completing the installation” on page 82.

Microprocessor kit installation

The server comes with one microprocessor installed on the system board. If you install an additional microprocessor, 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.

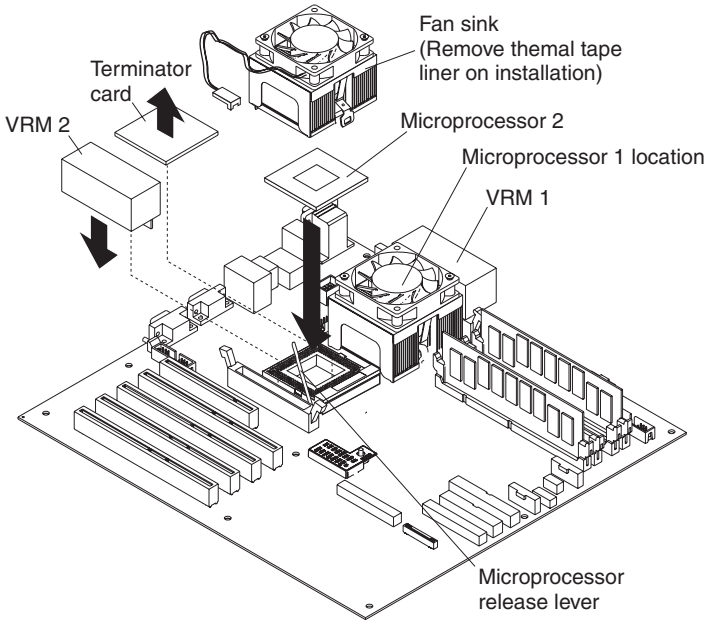
Notes:

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) code. The latest level of BIOS code 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 installed in the microprocessor connector (U68) that is closest to the power supply. This is the startup (boot) microprocessor. A microprocessor installed in connector U69 is microprocessor 2. If more than one microprocessor is installed, the microprocessor installed in microprocessor connector U69 is the startup processor, and the microprocessor installed in U68 is the application microprocessor.

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. See the ServerProven list at http://www.ibm.com/pc/compat/ for a list of microprocessors for use with the server.

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

Models 11X, 13G, 1RX, 21X, 22X, 23G, 2RX, 2SX, 41X, 42X, 43G, 4RX, 4SX: To install an additional microprocessor in models 11X, 13G, 1RX, 21X, 22X, 23G, 2RX, 2SX, 41X, 42X, 43G, 4RX, 4SX:



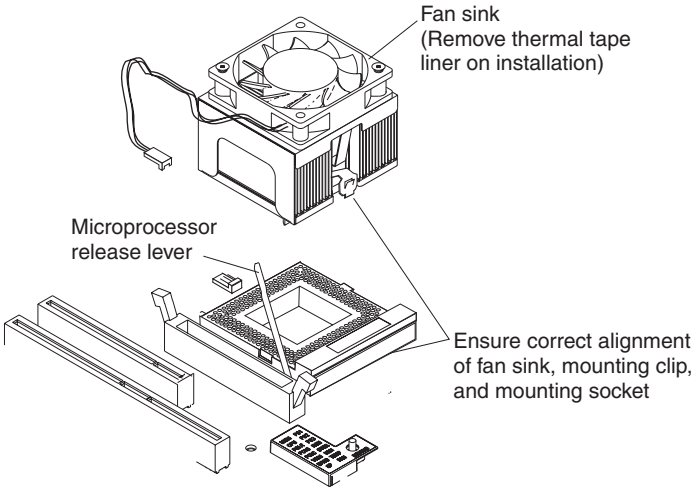
1. Review the safety precautions in "Before you begin" on page 47, "Safety information" on page 133 and "Handling electrostatic discharge-sensitive devices" on page 136.
2. Turn off the server and peripheral devices and disconnect all external cables and power cords; then remove the cover (see "Removing the cover, door, and bezel" on page 48 for details).
3. Remove the terminator card from the microprocessor connector. Store the terminator card in a safe place in the static-protective package that your new microprocessor comes in; you will need to install it again, if you ever remove the microprocessor and do not replace it.
4. 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. Line up the microprocessor pins over the microprocessor connector and carefully press the microprocessor into the connector.
   c. Press down and latch the release lever.

   Note: To remove a microprocessor, pull upward on the microprocessor release lever and then lift the microprocessor off of the connector.
5. Install the voltage regulator module (VRM) included in the microprocessor kit.

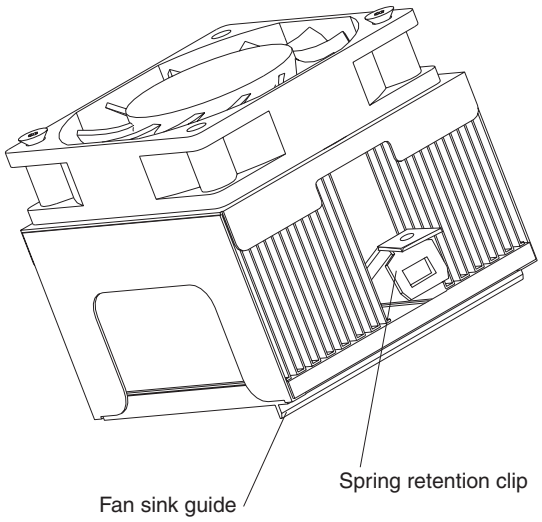
   Attention: When installing or replacing a VRM, use only a VRM specified for use with the xSeries 232 server. Use of other VRMs might cause the server to overheat.
   a. Center the VRM over the VRM connector. Make sure that the VRM is oriented and aligned correctly.

      Note: The VRM is keyed to be installed only one way.
   b. 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.
6. Remove the thermal tape liner from the underside of the fan sink and discard.
7. Set the fan sink into place.

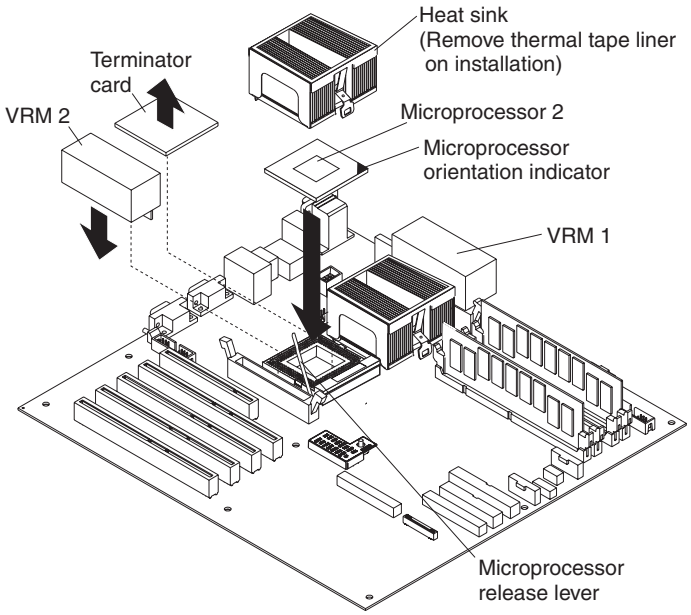


Make sure the fan sink guide fits between the processor and the processor socket.



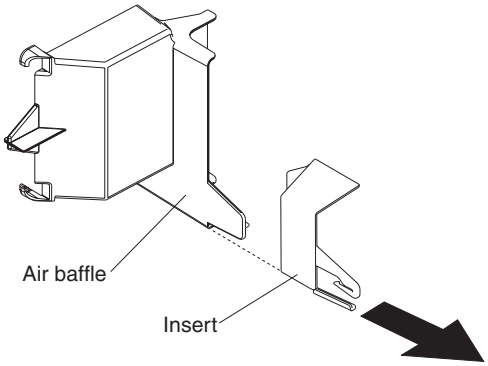
8. Press down and latch the spring retention clip on the back of the fan sink (the side facing the back of the server).
9. Press down and latch the spring retention clip on the front of the fan sink (the side facing the front of the server).
10. Plug the fan sink into the fan sink connector on the system board (J46). Make sure the cable is not in a position to interfere with the fan sink operation.
11. If you have other options to install or remove, do so now; otherwise, go to "Completing the installation" on page 82.

Models 24X, 2TX, 44X, 4TX, 54X, 5TX: To install an additional microprocessor in models 24X, 2TX, 44X, 4TX, 54X, 5TX:



1. Review the safety precautions in "Before you begin" on page 47, "Safety information" on page 133 and "Handling electrostatic discharge-sensitive devices" on page 136.

2. Turn off the server and peripheral devices and disconnect all external cables and power cords; then remove the cover (see "Removing the cover, door, and bezel" on page 48 for details).
3. Remove the air-baffle assembly from the fan assembly located on the rear of the server.



4. Remove the air-baffle insert from the air baffle assembly to accommodate the additional microprocessor. Store the air-baffle insert in a safe place for future use.

   Attention: If the server uses only one microprocessor, the air-baffle insert must remain clipped onto the air baffle assembly to ensure proper airflow over the microprocessor.
5. Pull out and lift up the release lever and remove the terminator card from the microprocessor connector. Store the terminator card in a safe place, such as the static-protective package that your new microprocessor comes in. You will need to install it again, if you ever remove the microprocessor and do not replace it.
6. 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. Line up the microprocessor pins over the microprocessor connector and carefully press the microprocessor into the connector.

      Note: Use the orientation indicator located on the microprocessor to properly align the microprocessor over the microprocessor connector, if available.
   c. Press down and latch the release lever.

      Note: To remove a microprocessor, pull upward on the microprocessor release lever and then lift the microprocessor off the connector.
7. Install the voltage regulator module (VRM) included in the microprocessor kit.

   Attention: When installing or replacing a VRM, use only a VRM specified for use with the xSeries 232 server. Use of other VRMs might cause your server to overheat.
   a. Center the VRM over the VRM connector. Make sure that the VRM is oriented and aligned correctly.
   b. Press the VRM into the connector.

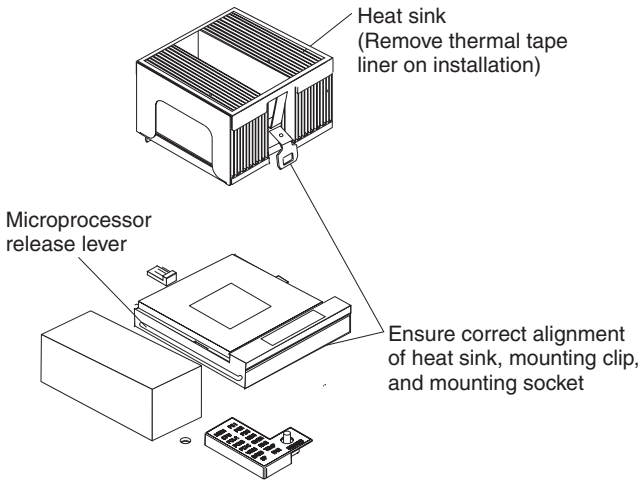
   Note: If you remove the microprocessor later, remember to install the terminator card in the appropriate microprocessor connector and remove the VRM.

8. Install the heat sink:

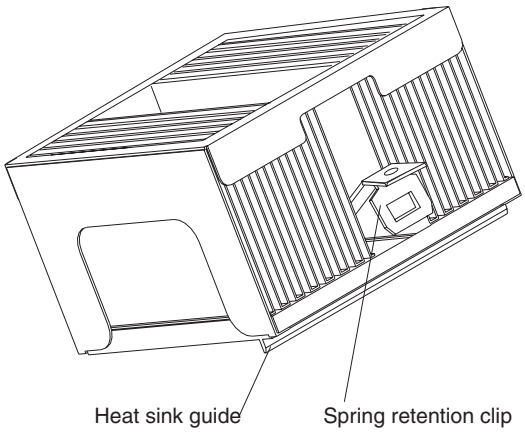
   Attention: You must install the same type of heat sink that comes shipped in your server.

   a. Remove the thermal tape liner from the underside of the heat sink and discard it.

   b. Align and place the heat sink on the top of the microprocessor.



   Make sure the heat-sink guide fits between the microprocessor and the microprocessor socket.



   c. Press down and latch the spring retention clip on the back of the heat sink (the side facing the back of the server).

   d. Press down and latch the spring retention clip on the front of the heat sink (the side facing the front of the server).

9. Reinstall the air-baffle assembly over the fan assembly located on the rear of the server and rest the baffle body over the microprocessors.

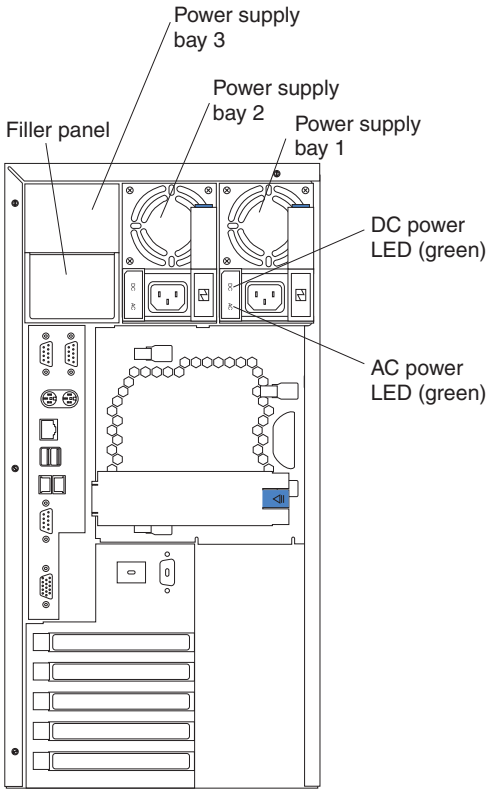
10. If you have other options to install or remove, do so now; otherwise, go to "Completing the installation" on page 82.

Power supplies

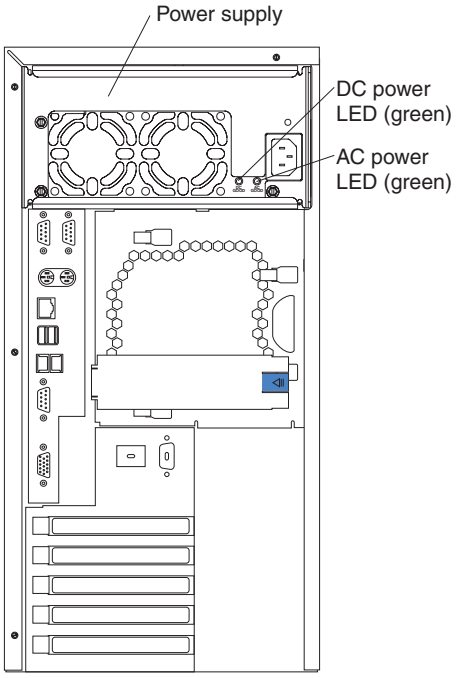
The server comes with one 385-watt power supply or two 250-watt power supplies. The 385-watt power-supply configuration can be upgraded with an optional backplane that will enable you to install up to a maximum of three 250-watt power supplies. This enables redundancy and will make the power

supplies hot-swappable. Each power supply has two status indicators; see the following illustration for information about the status indicators and power-supply bay locations.

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



Two 250-watt configuration



385-watt configuration

Filler panels

To maintain proper airflow, keep filler panels in place on empty power-supply bays as shown.

Power supply bay 1

Servers utilizing the 250-watt power supply configuration come with a power supply installed in this bay. LED PS1 on the system board diagnostic panel refers to this power supply. See "System board LED locations" on page 45 for more information about the diagnostic panel.

Power supply bay 2

Depending on model, the server may come with a power supply installed in this bay. LED PS2 on the system board diagnostic panel refers to this power supply. See "System board LED locations" on page 45 for more information about the diagnostic panel.

Power supply bay 3

If you install an optional power supply in this bay, LED PS3 on the system board diagnostic panel refers to this power supply. See "System board LED locations" on page 45 for more information about the diagnostic panel.

AC power LED

This light provides status information about the power supply. During typical operation, the ac power LED is on. See “Power supply LED errors” on page 116 for more information.

DC power LED

This light provides status information about the power supply. During typical operation, the dc power LED is on. See “Power supply LED errors” on page 116 for more information.

Statement 8:

CAUTION:

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

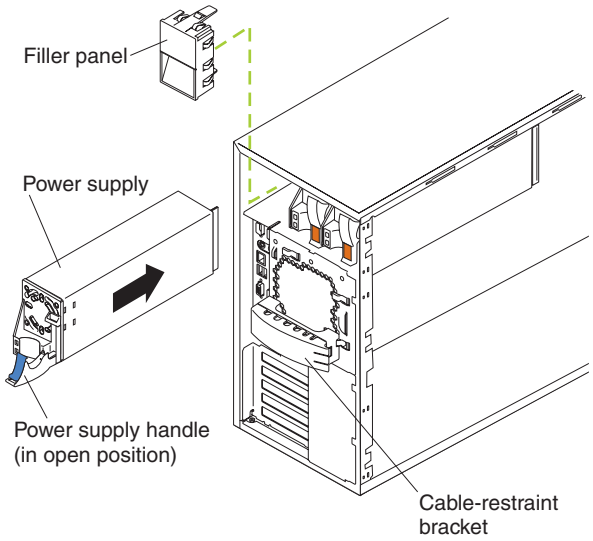
Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.

Hot-swap power supply installation

On models that use the 250-watt power supply configuration, you can add a third 250-watt power supply to ensure complete power redundancy. After you install a power supply, verify that the power-supply status indicators (ac power light and dc power light) are lit, indicating that the power supply is operating properly.

Notes:

1. You do not need to turn off the power to the server to install hot-swap power supplies.
2. The illustrations in this document might differ slightly from your hardware.



To install a hot-swap power supply:

1. Remove the filler panel from the empty power-supply bay by inserting your finger into the depression on the filler panel and pulling it away from the server. Save the filler panel in case you remove the power supply at a later time.

   Attention: During typical operation, each power-supply bay must have either a power supply or filler panel installed for proper cooling.
2. Install the power supply in the bay:
   a. Place the handle on the power supply in the open position (that is, perpendicular to the power supply) and slide the power supply into the chassis.
   b. Gently close the handle to seat the power supply in the bay.
3. Plug the power cord into the power cord connector located on the rear of the power supply.
4. Route the power cord through the cable-restraint bracket.
5. Plug the power cord into a properly grounded electrical outlet.
6. Verify that the dc power light and ac power light on the power supply are lit, indicating that the power supply is operating correctly.
7. If you have other options to install or remove, do so now.

Hot-swap power supply removal

If you have a hot-swap power-supply backplane and have installed power supplies, you normally have power redundancy and hot-swappability. However, if the load on your server requires the capacity of all installed power supplies, you do not have redundancy or hot-swappability and must turn off the server before removing any of your power supplies.

Important: If you do not have power redundancy, and you remove a power supply while the system is running, your system will immediately power off.

To remove a power supply:

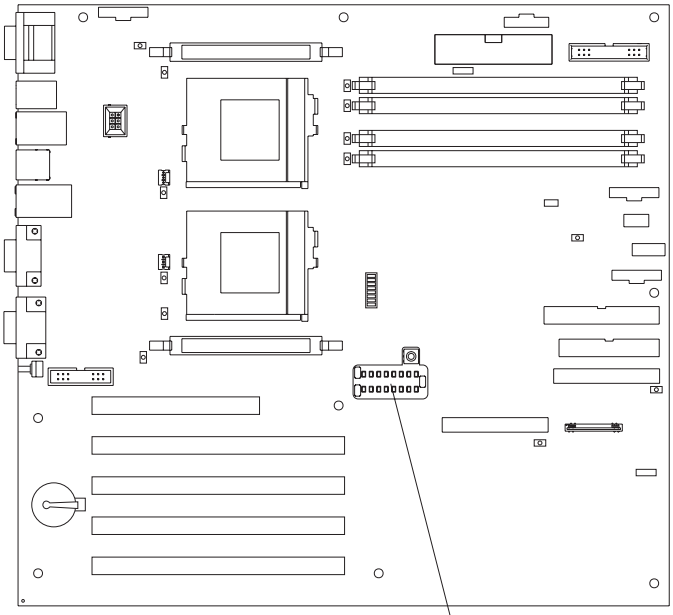
1. Check the Information light operation information panel on the front of the server. If on, check the NON (nonredundant) LED (CR24) on the diagnostic panel on the system board.

a. If the NON LED is lit, you do not have redundancy. *Turn off the server* and peripheral devices; then, continue with step 2.

   Note: The Information light on the operator information panel on the front of the server also will be on. See "Operator information panel" on page 11 for the location and contents of the operator information panel.

b. If you have more than one power supply installed and the NON LED is not lit, you have redundancy and do not need to turn off the server. Continue with step 2.

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



2. Unplug the power cord from the electrical outlet. Then, remove the other end of the power cord from the power supply.

   CAUTION:
   Be careful when you remove the power supply; the power supply might be too hot to handle comfortably.
   Statement 12

   CAUTION:
   The following label indicates a hot surface nearby.

3. Remove the power supply.
4. Install a replacement power supply.

5. Plug the power cord for the power supply into the power cord connector. Route the power cord through the cable-restraint bracket. Then, plug the other end of the cord into a properly grounded outlet.
6. If you turned off the server in step 1a on page 75, turn on the server and peripheral devices.
7. Verify that the ac power light and dc power light are lit, indicating that the power supply is operating correctly.

Power supply conversion from non-redundant to redundant

You can build a fault-tolerant power system by upgrading to a power-sharing backplane. The power-sharing backplane replaces the standard power backplane and allows you to use up to three 250-watt hot-swap power supplies for power sharing. You can maintain a redundant configuration with two power supplies, which allows the system to continue operation even if one power supply fails. Implementing a third power supply ensures redundancy even if one power supply fails. The backplane will alert you when redundancy is lost with the two or three power supplies configuration.

Removing the existing power supply: Use the following steps to remove the existing 385-watt power supply from the server:

1. Turn off the server and peripheral devices and disconnect all external cables and power cords; then remove the cover (see "Removing the cover, door, and bezel" on page 48 for details).

   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:
a. Turn everything OFF.	a. Turn everything OFF.
b. First, attach all cables to devices.	b. First, remove power cords from outlet.
c. Attach signal cables to connectors.	c. Remove signal cables from connectors.
d. Attach power cords to outlet.	d. Remove all cables from devices.
e. Turn device ON.	

Statement 4:

≥18 kg (39.7 lb)

≥32 kg (70.5 lb)

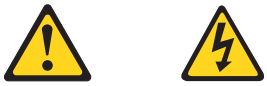
≥55 kg (121.2 lb)

CAUTION:

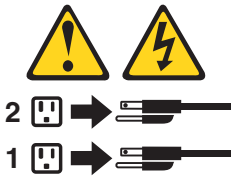
Use safe practices when lifting.

Statement 5:

CAUTION:



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



Statement 8:

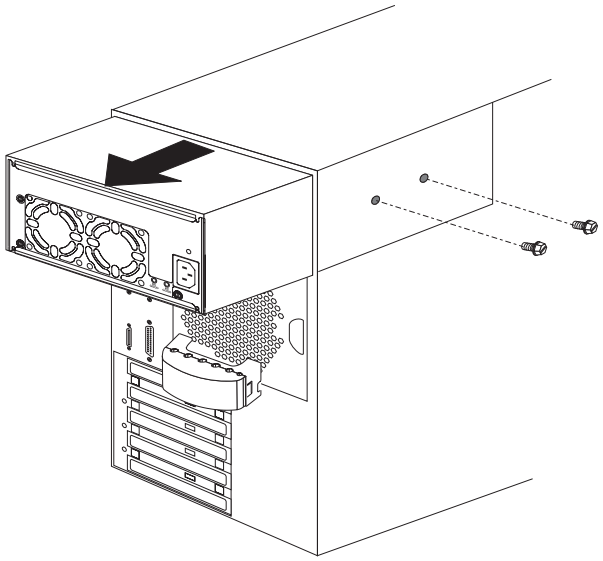
CAUTION:

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

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

2. Disconnect the internal power supply cables from the system board and media devices.

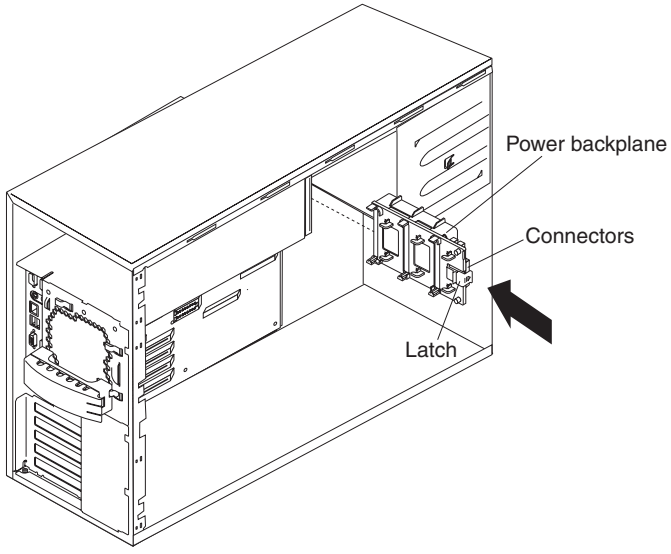
3. Remove the two screws that hold the power supply in the server, and carefully pull the 385-watt power supply and attached cables out from the server.



Installing the power backplane: Use the following steps to install the xSeries power backplane in the server:

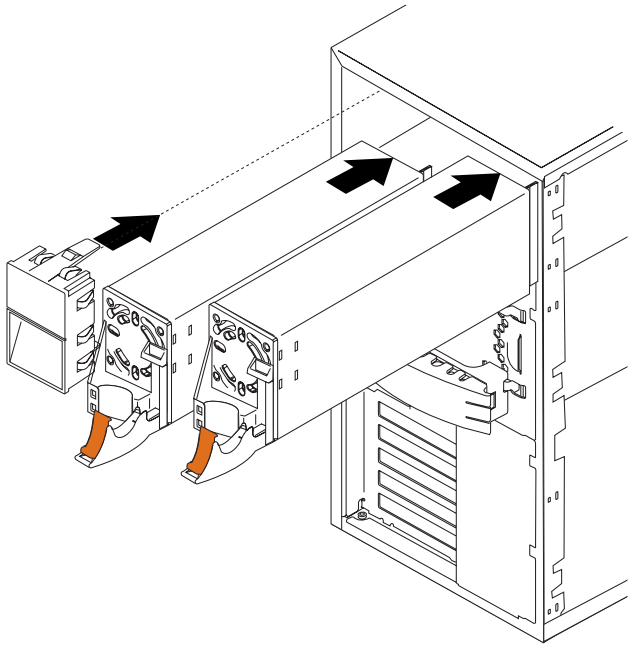
Note: This backplane supports up to three 250-watt power supplies.

1. Carefully slide the new power backplane into the server, behind the power cage. Fit the backplane into the back of the power cage and press it toward the back of the server until the latch snaps into place.



2. Connect the four cables.
   a. Connect the power cable to the power backplane and the hard disk drive backplane.
   b. Connect the power cable to the power backplane and the system board.
   c. Connect the signal cable to the power backplane and the system board.
   d. Connect the power cable to the power backplane and media devices.
3. Install at least two 250-watt hot-swap power supplies in the server. Put the first power supply in power bay 1 and the second power supply in power bay 2.

Note: Power supply Bay 1 is the right most bay from the rear.



4. If you install only two hot-swap power supplies, install a filler panel in power bay 3.
5. If you have other components to replace, do so now; otherwise, go to "Completing the installation" on page 82.
6. Connect power to the server and verify that it is working properly.

Fans

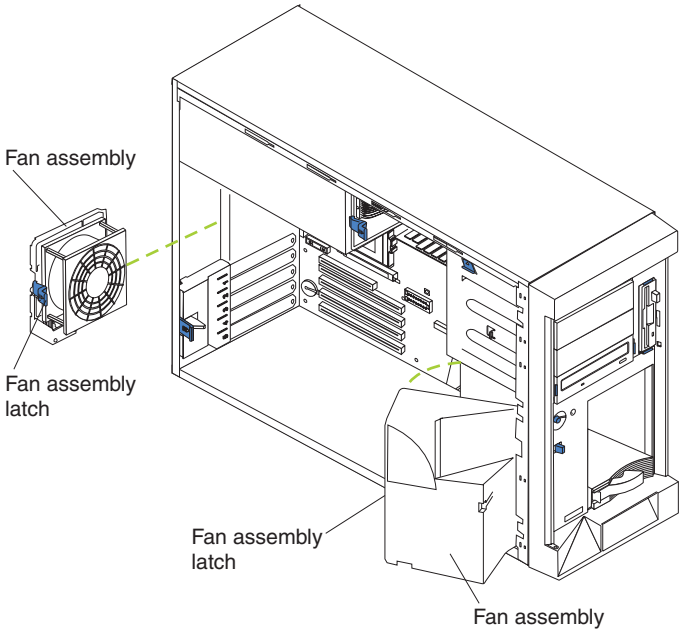
Some models of the server come with two fan assemblies. Other models come with three hot-swap fan assemblies. The following instructions describe replacement of fans for each of the two configurations.

Models 11X, 13G, 1RX, 21X, 22X, 23G, 2RX, 2SX, 41X, 42X, 43G, 4RX, 4SX: The instructions that follow are for servers that come with two fan assemblies.

Attention: Immediately replace a fan that has failed to help ensure proper cooling.

The following illustration shows the replacement of a fan assembly.

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



To replace the fan assembly:

1. Review the safety precautions in "Before you begin" on page 47 and "Safety information" on page 133.
2. Turn off the server and peripherals.
3. Remove the cover. See "Removing the cover, door, and bezel" on page 48 for details.
4. Determine which fan assembly to replace by checking the LED on each fan; a lit LED indicates the fan to replace.
5. Remove the fan assembly from the server:
   a. Disconnect the fan cable from the system board.
   b. Press the blue release latch for the fan, and pull the fan away from the server.
6. Slide the replacement fan assembly into the server until it clicks into place.
7. Connect the fan cable to the system board.
8. Verify that the FAN LED on the diagnostic panel is not lit. If the FAN LED is lit, reseat the fan.
9. If you have other options to install or remove, do so now; otherwise, go to "Completing the installation" on page 82.

Models 24X, 2TX, 44X, 4TX, 54X, 5TX: This configuration comes with three hot-swap fan assemblies.

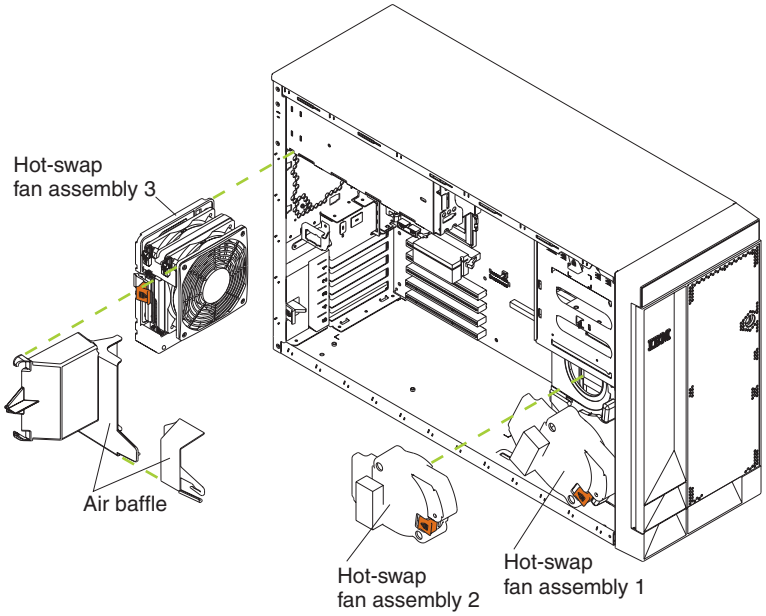
Attention: Immediately replace a fan that has failed to help ensure proper cooling.

The following illustrations show the replacement of a hot-swap fan assembly. Refer to these illustrations while performing the steps in this procedure.

Notes:

1. You do not need to turn off the power to the server to replace a hot-swap fan assembly.

2. The illustrations in this document might differ slightly from your hardware.



To replace the fan assembly:

1. Review the safety precautions in “Before you begin” on page 47 and “Safety information” on page 133.
2. Remove the cover. See “Removing the cover, door, and bezel” on page 48 for details.
3. Determine which fan assembly to replace by checking the LED on each fan; a lit LED indicates the fan to replace.
4. Remove the fan assembly.

   Attention: The air-baffle should not be removed from the system for more than 2 minutes to avoid microprocessor overheating.

   a. If you are removing fan assembly 1 or fan assembly 2, press the release latch to the unlocked position; then, remove the fan assembly from the server.

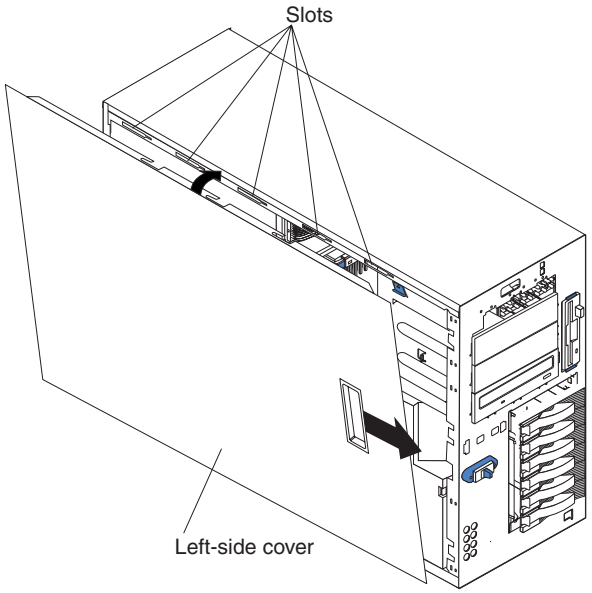
   b. If you are removing fan assembly 3, you must first lift and remove the air-baffle assembly from the server. Then, press the release latch to the unlocked position and remove the fan assembly from the server.
5. Slide the replacement fan assembly into the server until it clicks into place.
6. If you removed the air-baffle assembly, replace it now.
7. Verify that the FAN LED on the diagnostic panel is not lit. If the FAN LED is lit, reseat the fan.
8. If you have other options to install or remove, do so now; otherwise, go to “Completing the installation”.

Completing the installation

To complete the installation consists of replacing covers, doors and bezels that may have been removed, and then reconnecting external cables. The following sections describe how to replace covers, doors and bezels for the tower and rack models.

Installing the cover (tower)

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

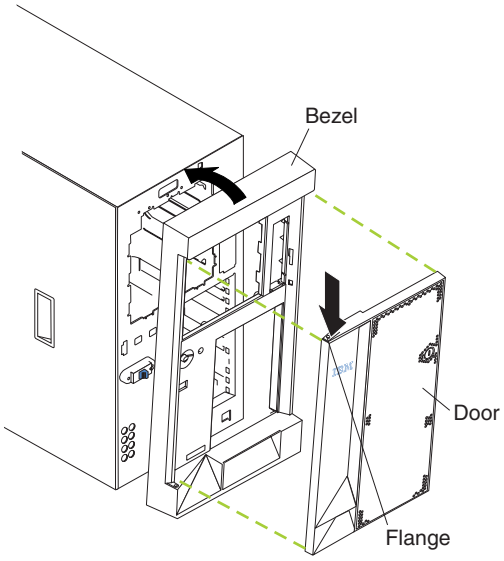


To install the server left-side cover:

1. Align the cover with the left side of the server, approximately 25 mm (1 inch) from the front of the server; place the bottom of the cover on the bottom rail of the chassis.
2. Insert the tabs at the top of the cover into the slots at the top of the server.
3. Hold the cover against the server, and slide the cover toward the front of the server until the cover clicks into place.

Installing the bezel and door (tower)

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



To install the bezel:

1. Place the tabs at the bottom edge of the bezel in the slots at the bottom front of the server.

2. Press the top of the bezel toward the server until it clicks into place.

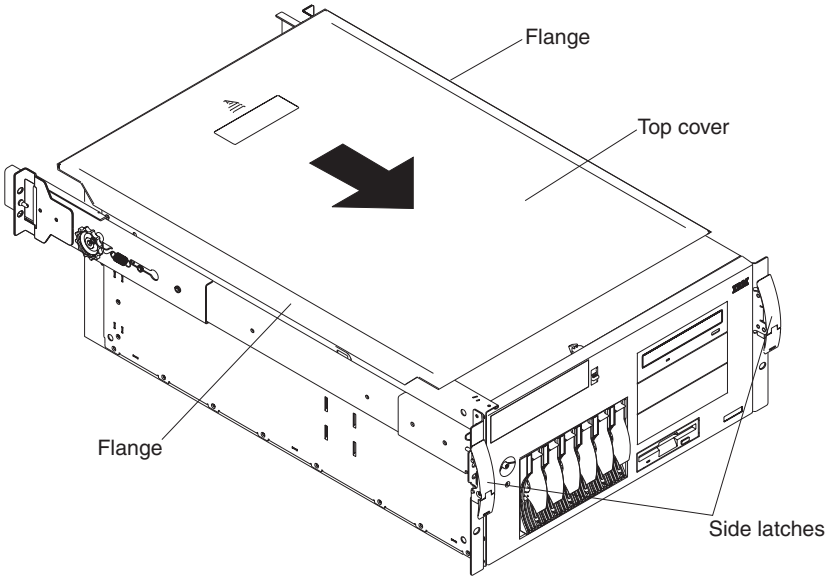
To install the server door:

1. Set the door on the bottom hinge.
2. Press the flange downward while pressing the top of the door toward the server, until the flange connects with the top hinge. Then, release the flange.
3. Close and lock the server door.

   Attention: Be sure to maintain a clearance of at least 127 mm (5 inches) on the front and rear of the server to allow for air circulation.

Installing the cover (rack)

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

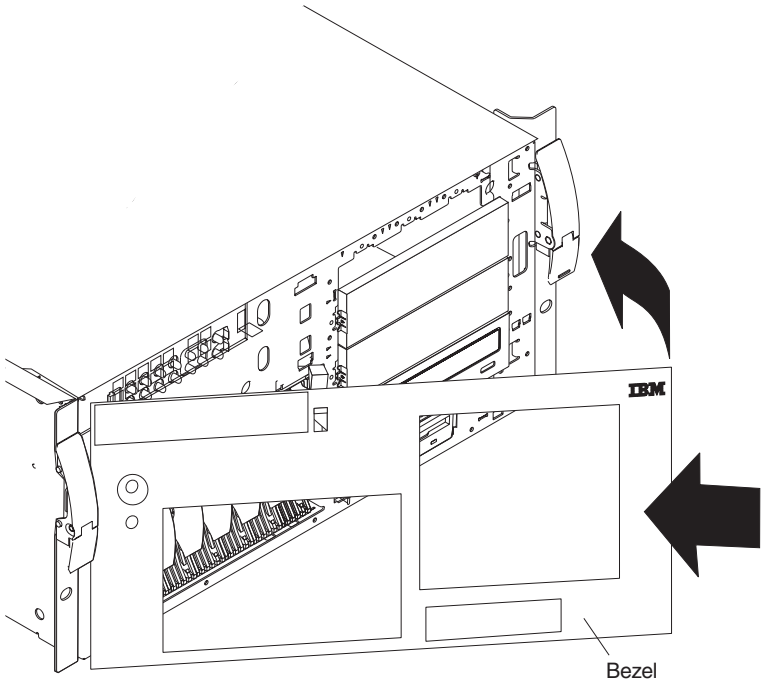


To install the server top cover:

1. Align the top cover with the top of the server, approximately 25 mm (1 inch) from the front of the server; the flanges on the left and right sides of the cover should be on the outside of the server chassis.
2. Hold the cover against the server, and slide the cover toward the front of the server until the cover clicks into place.

Installing the bezel (rack)

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



To install the bezel:

1. Place the tabs on the left side of the bezel in the slots at the left front of the server.
2. Press the right end of the bezel toward the server until the bezel clicks into place.

Connecting external options

If you install a SCSI adapter, you can attach a SCSI storage expansion enclosure to the server. You can attach additional external options to the input/output connectors on the rear of the server. See "Input/output ports" on page 86 for additional information.

To attach an external device:

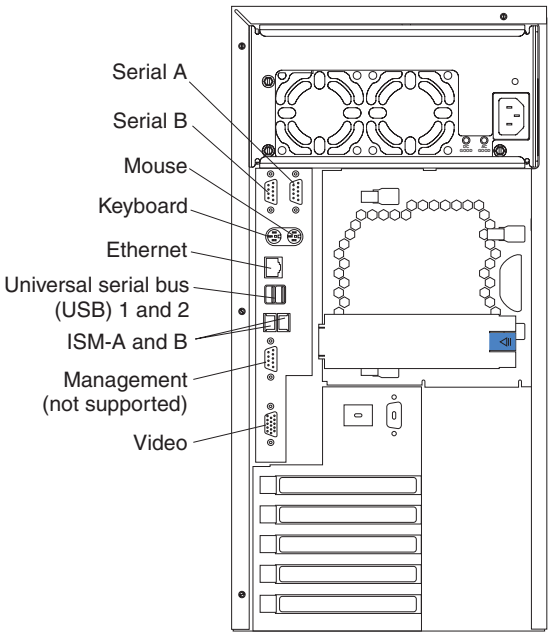
1. Read "Before you begin" on page 47 and the documentation that comes with the options.
2. Turn off the server and all attached devices.
3. Follow the instructions that come with the option to prepare it for installation and to connect it to the server.

   Note: If you are attaching a SCSI device, see "Ultra160 SCSI ports" on page 93 for SCSI ID and cabling information.

Input/output connector locations

The following illustration shows the input/output connectors (ports) on the rear of the server. For pin assignments and other details about these connectors, see "Input/output ports".

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



Note: The ISM ports are dedicated for use by the system-management subsystem.

Input/output ports

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

- One video port
- Two integrated system management (RS-485) ports
- One management port (not supported)
- Two Universal Serial Bus (USB) ports
- One Ethernet port
- One keyboard port
- One auxiliary pointing device (mouse) port
- Two serial ports
- Dual-channel Ultra160 ports (internal connectors only)

Video port

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

Note: If you install a PCI video adapter, the server BIOS code 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 your server.

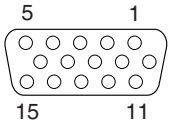


Table 3. Video-port connector pin-number assignments

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

System management ports

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

Note: ISM ports (ISM A and B) are used for the RS-485 interconnect network communications.

Refer to the Remote Supervisor Adapter option documentation for detailed information about the ASM interconnect network.

Universal Serial Bus ports

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

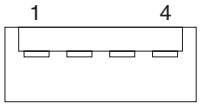
Notes:

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 Mbps speed with a maximum of 127 external devices and a maximum signal distance of 5 meters (16 ft) per segment.

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



The following table shows the pin-number assignments for the USB-port connectors on the rear of your server.

Table 4. USB-port connector pin-number assignments

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

Ethernet ports

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

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

Configuring the Ethernet controllers: When you connect your server to the network, the Ethernet controllers automatically detect the data-transfer rate (10 Mbps or 100 Mbps) on the network and then set the controllers to operate at the appropriate rate. In addition, if the Ethernet ports that your server is connected to support auto-negotiation, the Ethernet controllers will set the appropriate duplex state. That is, the Ethernet controllers 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 controllers support half-duplex (HDX) and full-duplex (FDX) modes at both speeds.

The Ethernet controllers are PCI Plug and Play devices. You do not need to set any jumpers or configure the controllers for your operating system before you use the Ethernet controllers. However, you must install a device driver to enable your operating system to address the Ethernet controllers. 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 (NICs) that you can install in your server. If you install this NIC 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 one of the integrated Ethernet controllers or the NIC as the primary Ethernet controller. In failover mode, if the primary Ethernet controller detects a link failure, all Ethernet traffic 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: Your Ethernet controllers support optional modes, such as teaming, priority packets, and virtual LANs, which provide higher performance and throughput for your server.

Teaming mode: Your Ethernet controllers provide 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 your 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 Ether Channel** (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 both integrated Ethernet controllers. 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 enables you 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 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 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 an 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 priorities when you use the IEEE 802.1p standard for packet tagging. This method requires a network infrastructure that supports packet tagging. The routing devices receiving and transferring 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 page.

Note: IEEE 802.1p tagging increases the size of the packets 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 your server, all IBM Netfinity 10/100 Ethernet Security Adapters, and IBM 10/100 Ethernet Server 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 page.

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 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, the adapter cannot be assigned to an adapter team.

Virtual LAN mode: A virtual LAN (VLAN) is a logical grouping of network devices 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 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. Your 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, your 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 Windows NT 4.0 with Service Pack 3.0 and the NDIS driver 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 you assign there to join the VLAN from the server. Refer to your switch documentation for more information.
2. Double-click the **Network** icon in the Control Panel window.
3. On the Adapters page, select the adapter 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 through 5 for each VLAN you want the server to join. The VLANs you add are listed on the Adapters page.
7. Click **Close** and restart the computer.

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

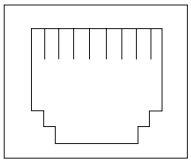


Table 5. Ethernet RJ-45 connector pin-number assignments.

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

Keyboard port

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

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 rear of the server.

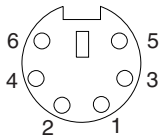


Table 6. Keyboard connector pin-number assignments

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

Auxiliary-device (pointing device) port

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

The following table shows the pin-number assignments for the auxiliary-device connector on the rear of the server.

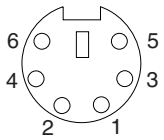


Table 7. Auxiliary-device connector pin-number assignments

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

Serial ports

Your server has two standard serial ports, Serial port A and Serial port B. The operating system can use both serial ports, Serial port A and Serial port B.

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

Viewing or changing the serial-port assignments: To view or change the serial-port assignments:

1. Restart the server and watch the monitor screen.

2. When the message `Press F1 for Configuration/Setup` appears, press F1.
3. From the main menu, click **Devices and I/O Ports**; then, press Enter.
4. Select the serial port; then, use the arrow keys to advance through the settings available.
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 rear of your server. These pin-number assignments conform to the industry standard.

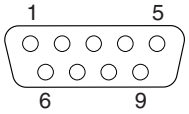


Table 8. Serial-port connectors pin-number assignments

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		

Ultra160 SCSI ports

Your server has an integrated dual-channel Ultra160 small computer system interface (SCSI) controller. This controller supports two independent Ultra 160/m SCSI channels, both internal. Each of these channels 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

A SCSI cable connects the SCSI channel A connector to the hot-swap drive backplane. If you obtain an additional SCSI cable, the SCSI channel B connector is available for connecting non-hot-swap SCSI drives in the 5.25-inch bays.

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

Note: If you install a PCI RAID adapter to configure and manage the internal hot-swap drives, you must move the SCSI cable from the system board SCSI channel A connector to an internal channel connector on the RAID adapter.

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

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 connected to a SCSI controller must have a unique SCSI ID. This ID enables the SCSI controller to identify the device and ensure that different devices on the same SCSI channel do not attempt to transfer data simultaneously. SCSI devices that are connected to different SCSI channels can have duplicate SCSI IDs.

The hot-swap-drive backplane controls the SCSI IDs for the internal hot-swap drive bays. However, when you attach SCSI devices to the external SCSI connector, you must set a unique ID for the device. 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.

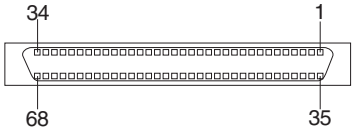


Table 9. 68-pin SCSI connector pin-number assignments

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

Table 9. 68-pin SCSI connector pin-number assignments (continued)

Pin	Signal	Pin	Signal
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

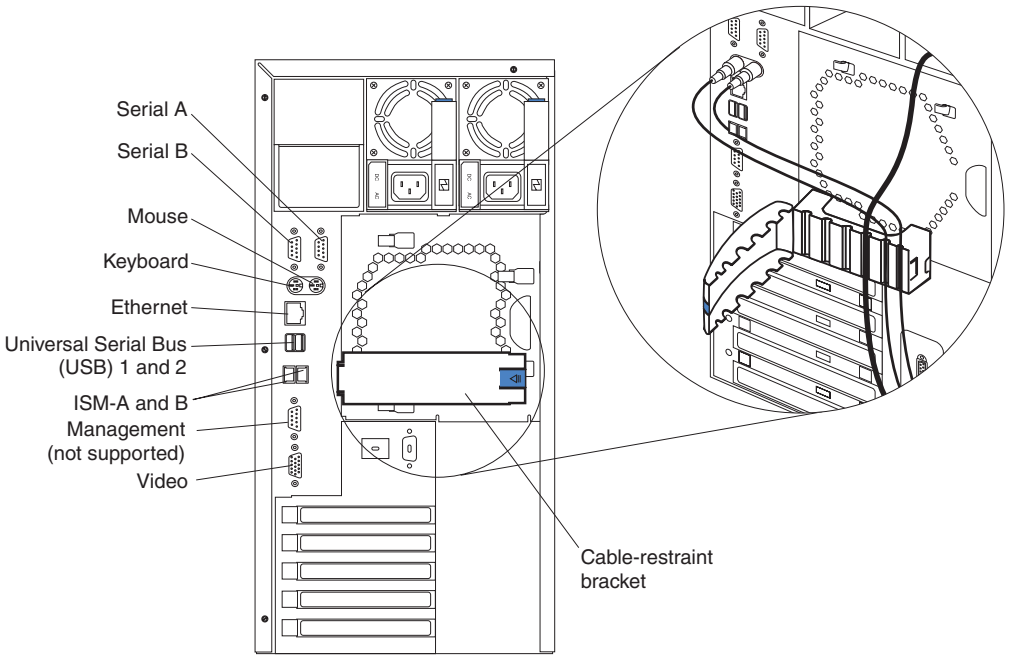
Cabling the server

When you cable the server, be sure to route the power cables and mouse and keyboard cables through the cable-restraint bracket on the rear of the server.

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

Cabling the tower model

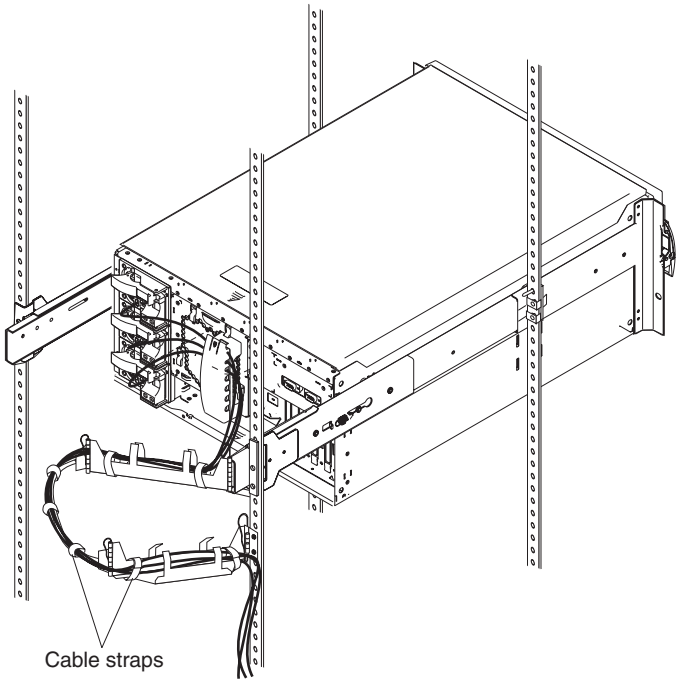
The following illustration shows how to route cables through the cable-restraint bracket on the rear of the tower model.



Note: ISM ports (ISM A and B) are used for the RS-485 interconnect network communications.

Cabling the rack model

The following illustration shows how to route cables through the cable-restraint bracket and the cable-management assembly located on the rear of the rack model.



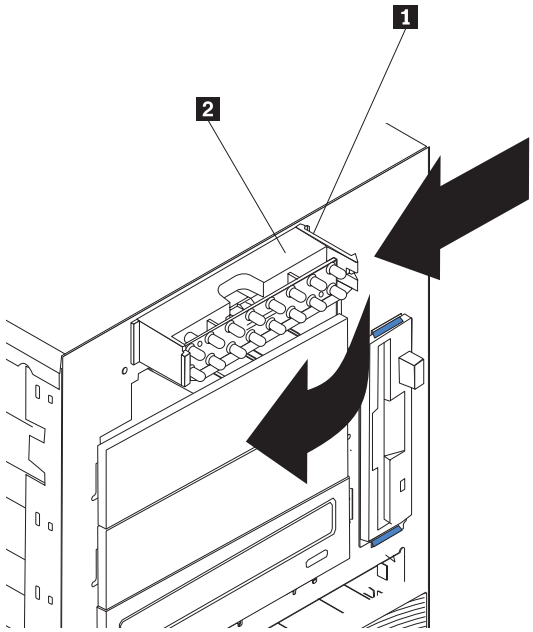
FRU information (service only)

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

Operator information bracket

Note:

- Read "Before you begin" on page 47.
- Be familiar with all safety information at "Safety information" on page 133.

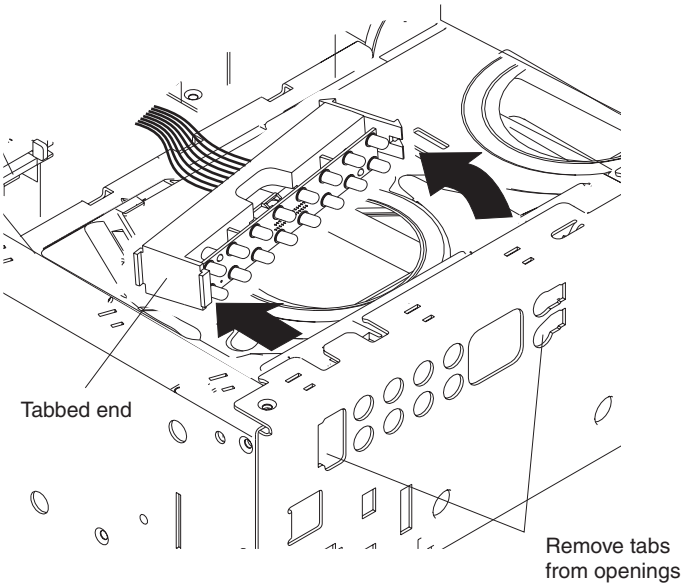


Tower model

1 Tab

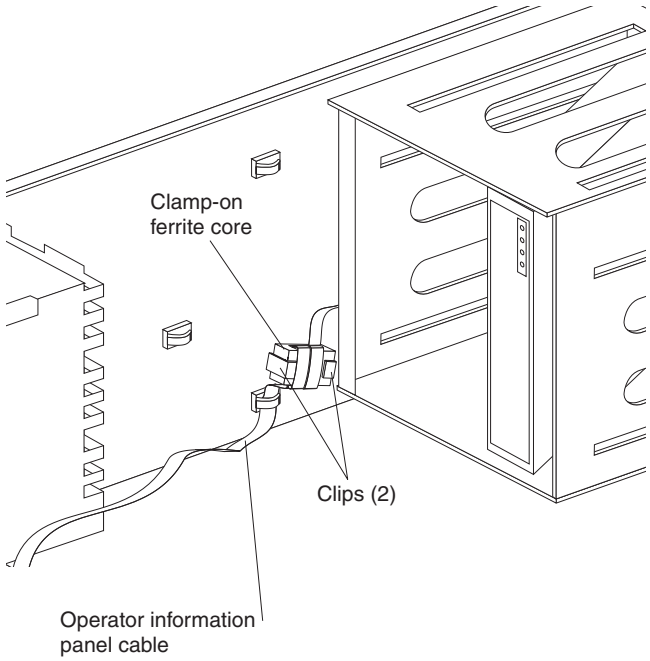
2 Bracket housing

Rack model



To remove the operator information panel, do the following:

1. Power off the server.
2. Disconnect all external cables.
3. Remove the cover and bezel. See "Removing the cover, door, and bezel" on page 48.
4. Disconnect the operator information panel cable from the planar.
5. Remove components that inhibit the removal of the panel as follows:
   - **Tower model:** Remove the clamp-on ferrite core from the operator information panel cable by removing the clips and unwinding the cable, paying attention to the manner in which the cable is wrapped around the ferrite core.



Attention: When replacing the ferrite core at installation of the replacement operator information panel, be sure that the cable makes three passes through the center of the ferrite core.

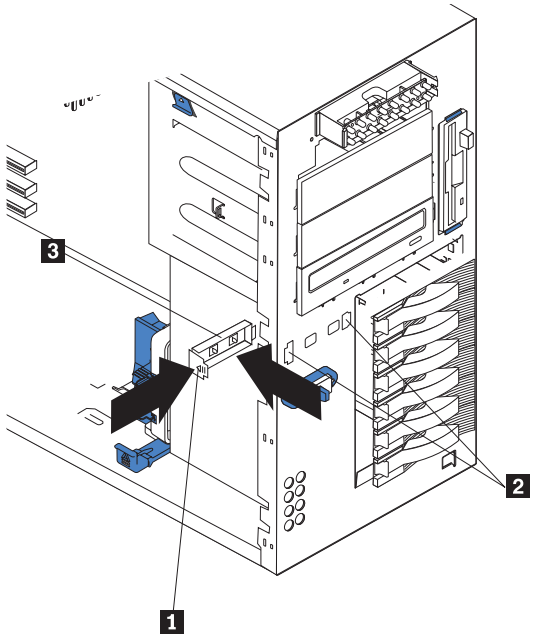
- **Rack model:** Remove the two blower fans, if present on your model; see "Fans" on page 80.

6. Press the arrow on the tab **1** to release the bracket.
7. Rotate the operator information panel **2** away from the front of the chassis to slide the card out of the slot.
   - For the tower model, the panel will come away from the chassis on the outside of the server.
   - For the rack model, the panel will come away from the chassis on the inside of the server.
8. To install the operator information panel, reverse the previous steps, taking care to route the cable so that it is out of the way, will not be pinched, and does not obstruct any vents. Be sure to tuck the cable into any cable clamps that are available for this purpose.

Power switch panel

Note:

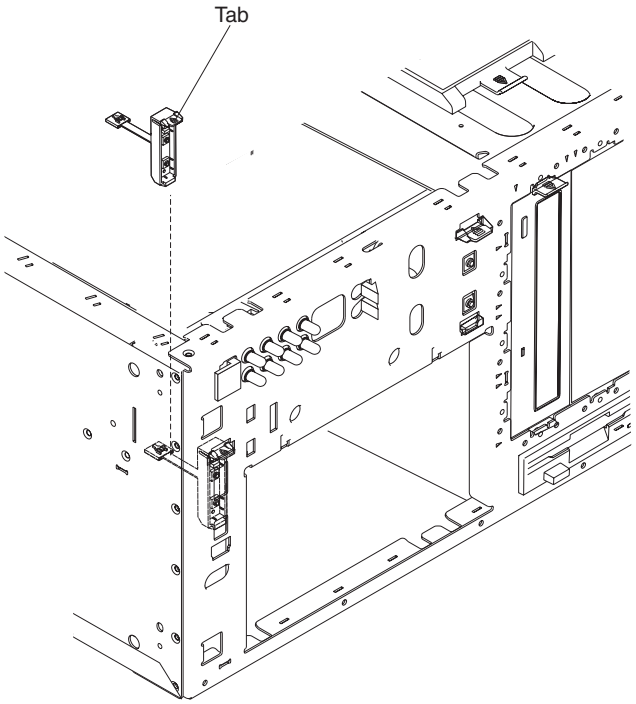
- Read "Before you begin" on page 47.
- Be familiar with all safety information at "Safety information" on page 133.



Tower model

1 Tab
2 Slots (2)
3 Power switch panel

Rack model



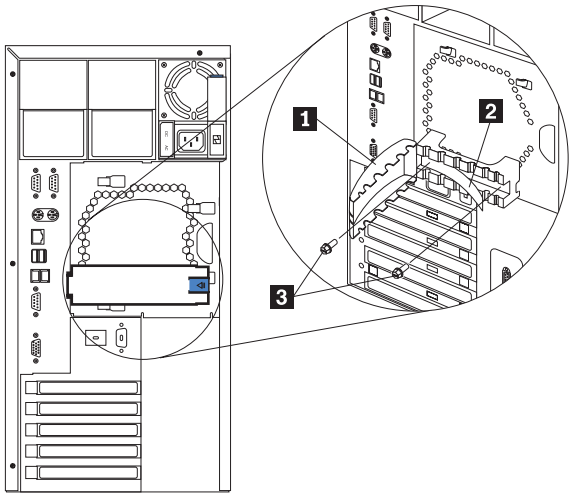
To remove the power switch panel:

1. Power off the server.
2. Disconnect external cables.
3. For the rack model, remove components that impede access to the power switch panel:
   a. Remove the top cover; see "Removing the cover, door, and bezel" on page 48. (The rack model illustration above shows the bezel removed also.)
   b. Remove the hard disk drives; see "Internal drives" on page 58.
   c. Remove the two blower fans, if present on your model; see "Fans" on page 80.
   d. Loosen the blower fan housing by pressing the two tabs (using a flat-bladed screwdriver if necessary) until the housing is loose. Pull the housing away from the chassis so that you can access the power switch panel.
4. Disconnect the power switch panel cable from the planar.
5. Press the arrow on the tab **1** to release.
6. Gently pull the power reset card **3** out of slots **2** to remove from the chassis.
7. Reverse the previous steps to install the replacement power switch card, taking care to route the cable so that it is out of the way, will not be pinched, and does not obstruct any vents. Be sure to tuck the cable into any cable clamps that are available for this purpose.

Rear cable bracket

Note:

- Read "Before you begin" on page 47.
- Be familiar with all safety information at "Safety information" on page 133.



1 Rear cable bracket

2 Information label

3 Screws (2)

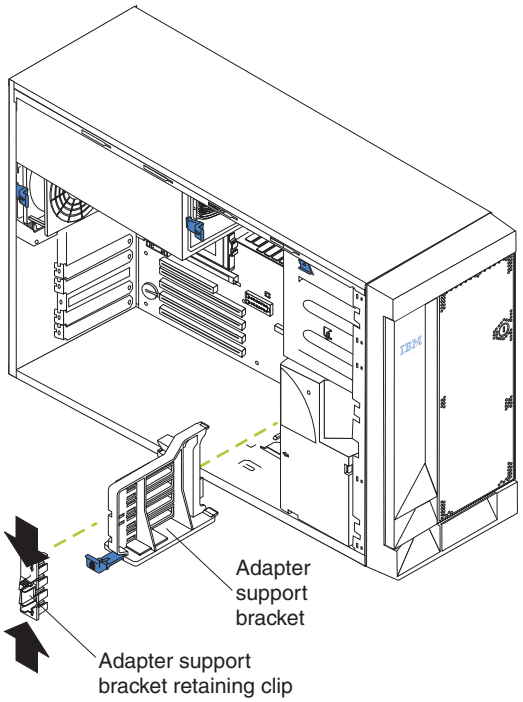
To remove the rear cable bracket:

1. Power off the server.
2. Disconnect external cables.
3. Press the arrow on the tab of the rear cable bracket **1** to release the bracket arm.
4. Carefully peel away the adhesive strip **2** .
5. Remove the screws **3** .
6. Gently pull the rear cable bracket **1** to remove.

PCI adapter card support assembly

Note:
- Read "Before you begin" on page 47.
- Be familiar with all safety information at "Safety information" on page 133.

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

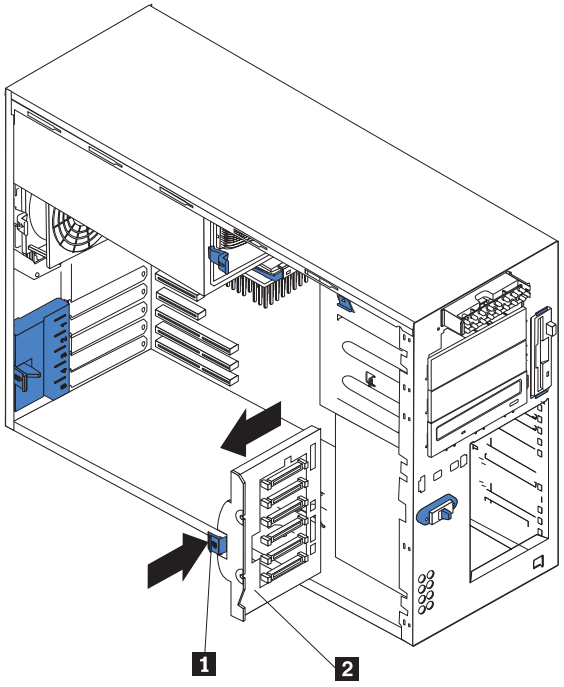


To remove the PCI adapter card support assembly:

1. Power off the server.
2. Disconnect all external cables from the server.
3. Remove the cover. See "Removing the cover, door, and bezel" on page 48.
4. Disconnect any adapter cables from the adapter.
5. Remove any installed adapters, noting the installed location of each; be sure to use the same location for each one upon reinstallation.
6. Press the arrows on the tab to release the Adapter support bracket retaining clip.
7. Carefully slide out the adapter support bracket to remove.

DASD backplane assembly

Note:
- Read "Before you begin" on page 47.
- Be familiar with all safety information at "Safety information" on page 133.



1 Tab

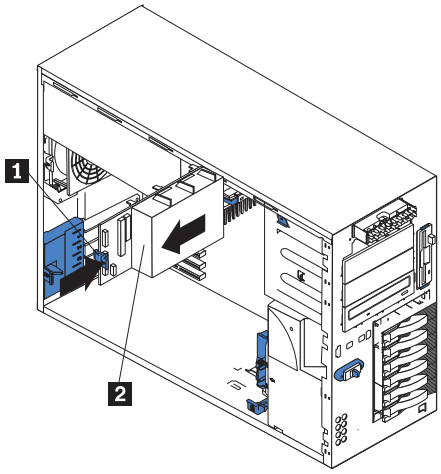
2 DASD backplane

To remove the DASD backplane assembly:

1. Power off the server.
2. Disconnect all external cables from the server.
3. Remove the cover. See "Removing the cover, door, and bezel" on page 48.
4. Disconnect the backplane cable from the backplane.
5. Remove the adapter support bracket retaining clip and adapter support bracket. See, "PCI adapter card support assembly" on page 102.
6. Remove screws (2) before sliding out the DASD backplane.
7. Press the arrow on the tabs 1 to release the backplane.
8. Carefully slide out the DASD backplane 2 to remove.

Power supply backplane

Note:
- Read "Before you begin" on page 47.
- Be familiar with all safety information at "Safety information" on page 133.



1 Tab

2 Power supply backplane

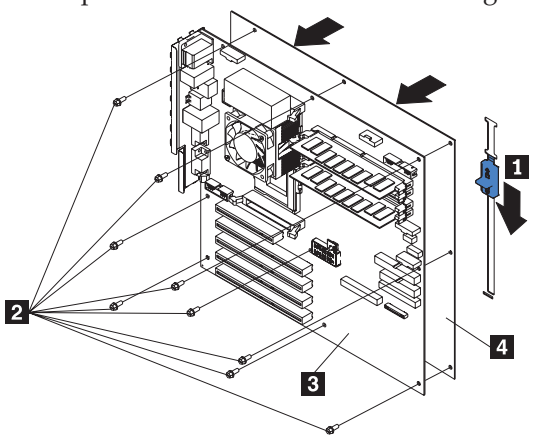
To remove the power supply backplane (250-watt power supply only):

1. Power off the server.
2. Disconnect all external cables from the server.
3. Remove the cover. See "Removing the cover, door, and bezel" on page 48.
4. Remove the Hot Swap Power Supply. See "Hot-swap power supply removal" on page 74.
5. Disconnect cables from the backplane.
6. Press the arrow on the tab 1 to release the backplane.
7. Slide out the power supply backplane 2 to remove.

System board

Note:
- Read "Before you begin" on page 47.
- Be familiar with all safety information at "Safety information" on page 133.

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



1 Latch

2 Screws (9)

3 System Board

4 System Board Tray

To remove the system board:

1. Power off the server.
2. Disconnect all external cables from the server.
3. Remove the cover. See "Removing the cover, door, and bezel" on page 48.
4. Remove the rear air flow fan. See "Fans" on page 80.
5. Disconnect the system board cables.
6. Remove any components on the system board that will have to be reinstalled on a replacement system board.
7. Slide latch 1 down
8. Remove system planar and tray from server.
9. Remove the screws (9) 2 .
10. Remove connector standoffs screws (8) from rear connectors (serial port (4) management port (2) and video port (2) screws).
11. Lift system board 3 off system board tray 4 .
12. To install a system board, reverse the previous steps.

Symptom-to-FRU index

This index supports xSeries 232 servers. 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	• One beep • A pause (or break) • Two beeps • A pause (or break) • Three Beeps
4	Four continuous beeps

Beep/Symptom	FRU/Action
1-1-2 (Processor register test failed)	1. **Optional Processor (if installed)** 2. Processor
1-1-3 (CMOS write/read test failed)	1. **Battery** 2. System Board
1-1-4 (BIOS ROM checksum failed)	1. **Recover BIOS** 2. System Board
1-2-1 (Programmable Interval Timer failed)	1. **System Board**
1-2-2 (DMA initialization failed)	1. **System Board**
1-2-3 (DMA page register write/read failed)	1. **System Board**
1-2-4 (RAM refresh verification failed)	1. **DIMM** 2. System Board
1-3-1 (1st 64K RAM test failed)	1. **DIMM**
1-3-2 (1st 64K RAM parity test failed)	1. **DIMM** 2. Processor 3. System Board
2-1-1 (Secondary DMA register failed)	1. **System Board**

Beep/Symptom	FRU/Action
2-1-2 (Primary DMA register failed)	1. **System Board**
2-1-3 (Primary interrupt mask register failed)	1. **System Board**
2-1-4 (Secondary interrupt mask register failed)	1. **System Board**
2-2-2 (Keyboard controller failed)	1. **System Board**
2-2-3 (CMOS power failure and checksum checks failed)	1. **Battery** 2. System Board
2-2-4 (CMOS configuration into validation failed)	1. **Battery** 2. System Board
2-3-1 (Screen initialization failed)	1. **System Board**
2-3-2 (Screen memory failed)	1. **System Board**
2-3-3 (Screen retrace failed)	1. **System Board**
2-3-4 (Search for video ROM failed)	1. **System Board**
2-4-1 (Search for video ROM failed)	1. **System Board**
3-1-1 (Timer tick interrupt failed)	1. **System Board**
3-1-2 (Interval timer channel 2 failed)	1. **System Board**
3-1-3 (RAM test failed above address OFFFFH)	1. **DIMM** 2. System Board
3-1-4 (Time-Of-Day clock failed)	1. **Battery** 2. System Board
3-2-1 (Serial port failed)	1. **System Board**
3-2-2 (Parallel port failed)	1. **System Board**
3-2-4 (Failure comparing CMOS memory size against actual)	1. **DIMM** 2. Battery
3-3-1 (Memory size mis-match occurred; see "Memory Settings" on "Memory modules" on page 65).	1. **DIMM** 2. Battery
3-3-2 (Critical SMBUS error occurred)	1. **Disconnect the server power cord from outlet, wait 30 seconds and retry.** 2. System Board 3. Processor/PCI Board 4. DIMMs 5. DASD Backplane 6. Power Supply 7. Power Supply Backplane 8. I2C Cable
3-3-3 (No operational memory in system)	1. **Install or reset the memory modules, then do a 3 boot reset.** See "Memory modules" on page 65 2. DIMMs 3. System Board

Beep/Symptom	FRU/Action
4-4-4 (Optional system management adapter not installed in slot 1 or not functioning correctly)	1. **Verify that adapter is installed in slot 1.** 2. Adapter 3. System Board
Two Short Beeps (Information only, the configuration has changed)	1. **Run Diagnostics** 2. Run Configuration/Setup
Three Short Beeps	1. **DIMM** 2. System Board
One Continuous Beep	1. **Processor** 2. Optional Processor (if installed) 3. System Board
Repeating Short Beeps	1. **Keyboard**
One Long and One Short Beep	1. **Video adapter (if present)** 2. System Board
One Long and Two Short Beeps	1. **Video adapter (if present)** 2. System Board
Two Long and Two Short Beeps	1. **Video adapter**

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 (The Power-On Status is disabled.)	1. **Run Configuration/Setup, set the Start Options Power-On Status to enable.** 2. System Board
No ac power (Power supply ac LED is off)	1. **Check the power cord.** 2. Power Supply (If two are installed, swap them to determine if one is defective.) 3. Power Backplane 4. Hot-Swap Power AC Inlet Box
No beep and no video	1. **See "Undetermined Problems" on page 126**
System will not power-up (Power supply ac LED is on)	1. **See"Power supply LED errors" on page 116**

Diagnostic Panel LED

Diagnostic Panel LED	FRU/Action
MEM LED on (The LED next to the failing DIMM is on.)	1. **Processor/PCI Board.** 2. Failing DIMM in slot J1-J4.
CPU LED on (The LED next to the failing CPU should be on.)	1. **Processor 1 or 2.** 2. System Board

Diagnostic Panel LED	FRU/Action
PCI A LED on	1. **PCI Card in slot 1.** 2. Remove all PCI adapters from slots 1-5. 3. System Board.
PCI B LED on	1. **Card in slots 2-3.** 2. Remove all PCI adapters from slots 1-5. 3. System Board.
PCI C LED on	1. **Card in slots 4-5.** 2. Remove all PCI adapters from slots 1-5. 3. System Board.
VRM LED on (The LED next to the failing VRM should be on.)	1. **Voltage regulator module indicated by the VRM LED on.** 2. Processor indicated by the Processor LED.
DASD LED on (The LED located next to the drive bay that the failing drive is installed in will be turned on. Check amber drive LED for failing hard drive.)	1. Be sure the fans are operating correctly and the air flow is good. 2. If installed, reseat I2C cable between DASD backplane and DASD I2C on planar (J9). 3. Failing drive. SCSI channel A has failed (This is the SCSI channel for the hot-swap hard disk drives). 4. SCSI Backplane.
SP LED	1. **Unplug server for 30 seconds, retry** 2. Reflash or update firmware for ISMP, BIOS 3. System Board
PS1 LED on	1. **Check the DC Good LED on power supply 1. If off, replace power supply 1.** 2. Power Backplane.
PS2 LED on	1. **Check the DC Good LED on power supply 2. If off, replace power supply 2.** 2. Power Backplane.
PS3 LED on	1. **Check the DC Good LED on power supply 3. If off, replace power supply 3.** 2. Power Backplane.
NON LED on	1. **Check the PS1, PS2, and PS3 LEDs and replace any indicated power supply.** 2. Install an additional power supply or remove optional devices from the server.
OVER LED on	1. **Install an optional additional power supply, or remove optional devices from the server.**
NMI LED on	1. **Reboot the system.** 2. Check the System Error Log.

Diagnostic Panel LED	FRU/Action
TEMP LED on	1. **Ambient temperature must be within normal operating specifications. See"Features and specifications" on page 3.** 2. Ensure fans are operating correctly. 3. Examine System Error Log. a. System over recommended temperature 1) Information LED Panel b. DASD over recommended temperature (DASD LED also on) 1) Overheating hard drive 2) DASD Backplane c. System over recommended temperature for CPU X (where X is CPU 1, 2) (CPU LED also on) 1) CPU X 2) System Board d. I/O Legacy Board over recommended temperature 4. If the CPU LED on the diagnostics panel is also on, one of the microprocessors has caused the error.
FAN LED on	1. **Check individual fan LEDs.** 2. Replace respective fan. 3. Fan Cable. 4. System Board. 5. Power Backplane Board.

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
005-XXX-000 (Failed Video test)	1. **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
015-XXX-001 (Failed USB test)	1. **System Board**

Error Code/Symptom	FRU/Action
015-XXX-015 (Failed USB external loopback test)	1. **Make sure parallel port is not disabled.** 2. Re-run USB external loopback test. 3. System Board
015-XXX-198 (USB device connected during USB test)	1. **Remove USB devices from USB1 and USB2.** 2. Re-run USB external loopback test. 3. System Board
020-XXX-000 (Failed PCI Interface test)	1. System Board
030-XXX-000 (Failed Internal SCSI interface test)	1. **System Board**
030-XXX-00N (Failed SCSI test on PCI slot N. Check system error log before replacing a FRU.)	1. **Adapter**
035-XXX-099	1. **No adapters were found.** 2. If adapter is installed re-check connection.
035-XXX-S99 (Failed RAID test on PCI slot S. Check System Error Log before replacing a FRU.)	1. **Cable** 2. SCSI Backplane 3. Adapter 4. System Board
035-XXX-SNN (Check System Error Log before replacing a FRU. NN = SCSI ID of failing fixed disk.)	1. **Fixed Disk with SCSI ID NN on RAID adapter in PCI slot S.**
035-253-S99 (RAID adapter initialization failure)	1. **ServeRAID Adapter in slot S is not configured properly.** Obtain the basic and extended configuration status and refer to the ServeRAID Hardware Maintenance Manual for more information. 2. Cable 3. SCSI Backplane 4. Adapter
075-XXX-000 (Failed Power Supply test)	1. **Power Supply**
089-XXX-001 (Failed Microprocessor test)	1. **VRM 1** 2. Microprocessor 1 3. System Planar
089-XXX-002 (Failed Optional Microprocessor test)	1. **VRM 2** 2. Microprocessor 2 3. System Planar
166-198-000 System Management: Aborted (Unable to communicate with ASM adapter. It may be busy. Run the test again) (Communication with ASM adapter has failed)	1. **Re-run the Diagnostic test** 2. Fix other error conditions and retry. These include other Failed System Management tests, and items logged in the optional ASM adapter's System Error Log. 3. Disconnect all server and option power cords from server, wait 30 seconds, reconnect, and retry. 4. Advanced System Management adapter, if installed. 5. System board

Error Code/Symptom	FRU/Action
166-201-000 System Management: Failed (I2C Bus Error(s). ISMP indicates I2C errors on bus 0. Potential FRU: Memory DIMMS, system board)	1. If installed, Reseat I2C cable between Advanced System Management adapter (in PCI slot 1/J44) and system board (J54). 2. Reseat Memory DIMMS 3. Memory DIMMS 4. System Board
166-201-002 System Management: Failed (I2C Bus Error(s). ISMP indicates I2C errors on bus 2. Potential FRUs: LED front panel, system board)	1. Reseat I2C cable between operator information panel and system board (J39). 2. Operator information panel 3. System Board
166-201-003 System Management: Failed (I2C Bus Error(s). ISMP indicates I2C errors on bus 3. Potential FRUs: power backplane, system board)	1. Reseat cables between power backplane and planar. 2. Power backplane 3. System Board
166-201-004 System Management: Failed (I2C Bus Error(s). ISMP indicates I2C errors on bus 4. Potential FRUs: DASD backplane, system board)	1. If installed, reseat I2C cable between DASD backplane and DASD I2C on system board (J9). 2. System Board
166-201-005 System Management: Failed (I2C Bus Error(s). ISMP indicates I2C errors on bus 0, 1, or 5. Potential FRUs: Memory DIMMS, CPUs, system board)	1. Reseat Memory DIMMS 2. Reseat processors 3. Memory DIMMS 4. Processors 5. System Board
166-250-000 System Management: Failed (I2C cable is disconnected. Reconnect I2C cable between Remote Supervisor Adapter and System Board.)	1. **Reseat I2C cables between Advanced System Management adapter (in PCI slot 1/J44) and system board (J54)** 2. I2C Cable(s)
166-260-000 System Management: Failed (Unable to restart ASM adapter). (Restart ASM adapter Error. After restarting, ASM communication was lost. Unplug and cold boot to reset ASM adapter.)	1. **Disconnect all server and option power cords from server, wait 30 seconds, reconnect, and retry.** 2. Reseat Advanced System Management adapter (in PCI slot 1/J44). 3. Advanced System Management adapter
166-342-000 System Management: Failed (ASM adapter BIST indicate failed tests).	1. **Ensure latest firmware levels for ASM and BIOS.** 2. Disconnect all server and option cords from server, wait 30 seconds, reconnect, and retry. 3. Advanced System Management adapter
166-400-000 System Management: Failed (System Management hardware on system board failed) (ISMP Self Test Result failed tests: x where x = Flash, RAM, or ROM)	1. **Re-flash or Update firmware for ISMP** 2. System Board
180-XXX-000 (Diagnostics LED failure)	1. **Run Diagnostic LED test for the failing LED.**
180-XXX-001 (Failed Front LED panel test)	1. **Operator Information Panel** 2. System Board
180-XXX-002 (Failed Diagnostics LED Panel test)	1. System Board
180-361-003 (Failed Fan LED test)	1. **Fan(s)** 2. System Board

Error Code/Symptom	FRU/Action
180-XXX-003 (Failed System Board LED test)	1. **System Board**
180-XXX-005 (Failed SCSI Backplane LED test)	1. **SCSI Backplane** 2. SCSI Backplane Cable 3. System Board
201-XXX-0NN (Failed Memory test, see "Memory Settings" on "Memory modules" on page 65	1. **DIMM Location DIMM1 - DIMM4** where NN = 1 = DIMM2, 2 = DIMM1, 3 = DIMM4, 4 = DIMM3. 2. System Board
201-XXX-999 (Multiple DIMM failure, see error text.)	1. **See error text for failing DIMMs** 2. System Board
202-XXX-001 (Failed System Cache test)	1. **VRM 1** 2. Microprocessor 1
202-XXX-002 (Failed System Cache test)	1. **VRM 2** 2. Microprocessor 2
206-XXX-000 (Failed Diskette Drive test)	1. **Cable** 2. Diskette Drive 3. System Board
215-XXX-000 (Failed IDE CD-ROM test)	1. **CD-ROM Drive Cables** 2. CD-ROM Drive 3. System Board
217-XXX-000 (Failed BIOS Fixed Disk test) **Note:** If RAID is configured, the fixed disk number refers to the RAID logical array.	1. **Fixed Disk 1**
217-XXX-001 (Failed BIOS Fixed Disk test) **Note:** If RAID is configured, the fixed disk number refers to the RAID logical array.	1. **Fixed Disk 2**
217-XXX-002 (Failed BIOS Fixed Disk test) **Note:** If RAID is configured, the fixed disk number refers to the RAID logical array.	1. **Fixed Disk 3**
217-XXX-003 (Failed BIOS Fixed Disk test) **Note:** If RAID is configured, the fixed disk number refers to the RAID logical array.	1. **Fixed Disk 4**
217-XXX-004 (Failed BIOS Fixed Disk test) **Note:** If RAID is configured, the fixed disk number refers to the RAID logical array.	1. **Fixed Disk 5**
217-XXX-005 (Failed BIOS Fixed Disk test) **Note:** If RAID is configured, the fixed disk number refers to the RAID logical array.	1. **Fixed Disk 6**
217-XXX-006 (Failed BIOS Fixed Disk test) **Note:** If RAID is configured, the fixed disk number refers to the RAID logical array.	1. **Fixed Disk 7**
217-XXX-007 (Failed BIOS Fixed Disk test) **Note:** If RAID is configured, the fixed disk number refers to the RAID logical array.	1. **Fixed Disk 8**
217-XXX-008 (Failed BIOS Fixed Disk test) **Note:** If RAID is configured, the fixed disk number refers to the RAID logical array.	1. **Fixed Disk 9**

Error Code/Symptom	FRU/Action
217-198-XXX (Could Not Establish Drive Parameters)	1. **Check cable and termination** 2. SCSI Backplane 3. Fixed Disk
264-XXX-0NN (Failed Tape Drive test)	1. **Tape Cartridge, if user executed the Read/Write Tape Drive test (XXX = 256)** 2. SCSI or Power Cable connected to tape drive with SCSI ID NN. 3. Tape Drive with SCSI ID NN (Refer to the Help and Service Information appendix of the tape drive's User Guide). 4. System Board or SCSI Controller. (Run SCSI Controller Diagnostic to determine if the SCSI bus is functioning properly.)
264-XXX-999 (Errors on multiple tape drives, see error text for more info)	1. **See error messages/text in the PC Doctor error log for detailed information on each individual tape drive error.**
301-XXX-000 (Failed Keyboard test)	1. **Keyboard**
405-XXX-000 (Failed Ethernet test on controller on the System Board)	1. **Verify that Ethernet is not disabled in BIOS.** 2. System Board
405-XXX-00N (Failed Ethernet test on adapter in PCI slot N)	1. **Adapter in PCI slot N.** 2. System Board
415-XXX-000 (Failed Modem test)	1. **Cable** 2. Modem **Note:** Ensure modem is present and attached to server. 3. System Board

Error symptoms

Error Symptom	FRU/Action
CD is not working properly.	1. **Clean the CD.** 2. Run CD-ROM Diagnostic 3. CD-ROM Drive
CD-ROM drive tray is not working. (The server must be powered-on.)	1. **Insert the end of a paper clip into the manual tray-release opening.** 2. Run CD-ROM Diagnostic 3. CD-ROM Drive
CD-ROM drive is not recognized.	1. **Run Configuration/Setup, enable primary IDE channel.** 2. Check cables and jumpers. 3. Check for correct device driver. 4. System Board 5. Run CD-ROM diagnostics 6. CD-ROM Drive
Power switch does not work and reset button does work.	1. **Verify that the power-on control jumper on J23 extension cable is on pins 1 and 2.** 2. Power Switch Assembly 3. System Board

Error Symptom	FRU/Action
Diskette drive in-use light stays on, or the system bypasses the diskette drive, or the diskette drive does not work.	1. **If there is a diskette in the drive, verify that:** a. The diskette drive is enabled in the Configuration/Setup utility program. b. The diskette is good and not damaged. (Try another diskette if you have one.) c. The diskette is inserted correctly in the drive. d. The diskette contains the necessary files to start the server. e. The software program is OK. f. Cable is installed correctly (proper orientation) 2. Run Diskette Drive Diagnostics. 3. Cable 4. Diskette Drive 5. System Board
Monitor problems (general). 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.	1. **Monitor** 2. Run Video Diagnostics. If diagnostics pass, the problem may be a video driver. 3. Display Adapter / System Board
Drives not recognized by the Fixed Disk diagnostic. (e.g. you have 6 drives but the fixed disk test only shows 3)	1. **Remove the first drive that did not show up.** 2. Rerun the fixed disk diagnostic. 3. If successful, replace the drive you removed.

Power supply LED errors

Use the power supply LED information on the following page to troubleshoot power supply problems.

Note: The minimum configuration required for the DC Good light to come on is:

- Power Supply
- One processor and VRM (With pins 2 and 3 on J23 extension cable connected together to bypass the power switch; see "Operator information panel" on page 11.
- 2 stick 128 mb memory (total 256) (Verify that System Board are properly connected together; see "System board option connectors" on page 40.

AC Good LED	DC Good LED	Description	FRU/Action
Off	Off	No power to system or ac problem.	1. **Check ac power to system.** 2. Power Supply 3. Power AC Inlet Box

AC Good LED	DC Good LED	Description	FRU/Action
On	Off	Standby mode or dc problem.	1. **Check the cable connector, J33.** Move jumper on J32's extension cable to pins 2-3 to bypass power control. If the DC Good LED comes on, press Ctrl+Alt+Delete. Watch the screen for any POST errors. Check the System Error Log for any listed problems. If the system powers up with no errors: a. Power Switch Assembly b. System Board 2. Remove the adapters and disconnect the cables and power connectors to all internal and external devices. Power-on the system. If the DC Good LED comes on, replace the adapters and devices one at a time until you isolate the problem. 3. Power Supply 4. System Board
On	On	Power is OK.	N/A

POST error codes

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

Error Code/Symptom	FRU/Action
062 (Three consecutive boot failures using the default configuration.)	1. **Run Configuration/Setup** 2. Battery 3. System Board 4. Processor
101, 102 (System and processor error)	1. **System Board**
106 (System and processor error)	1. **System Board**
111 (Channel check error)	1. **Failing ISA Adapter** 2. Memory DIMM 3. System Board
114 (Adapter read-only memory error)	1. **Failing Adapter** 2. Run Diagnostics
129 (Internal cache error)	1. **Processor** 2. Optional Processor (if installed) 3. System Planar
151 (Real time clock error)	1. **Run Diagnostics** 2. Battery 3. System Board
161 (Real time clock battery error)	1. **Run Configuration/Setup** 2. Battery 3. System Board

Error Code/Symptom	FRU/Action
162 (Device Configuration Error) **Note:** Be sure to load the default settings and any additional desired settings; then, **save the configuration**	1. **Run Configuration/Setup** 2. Battery 3. Failing Device 4. System Board
163 (Real-Time Clock error)	1. **Run Configuration/Setup** 2. Battery 3. System Board
164 (Memory configuration changed, see ″Memory settings″ in “Memory modules” on page 65.)	1. **Run Configuration/Setup** 2. DIMM 3. System Board
175 (Hardware error)	1. **System Board**
176 (Computer cover or cable cover was removed without a key being used)	1. **Run Configuration/Setup** 2. System Board
177, 178 (Security hardware error)	1. **Run Configuration/Setup** 2. System Board
184 (Power-on password corrupted)	1. **Run Configuration/Setup** 2. System Board
185 (Drive startup sequence information corrupted)	1. **Run Configuration/Setup** 2. System Board
186 (Security hardware control logic failed)	1. **Run Configuration/Setup** 2. System Board
187 (VPD serial number not set.)	1. **Set serial number in Setup** 2. System Board
188 (Bad EEPROM CRC #2)	1. **Run Configuration/Setup** 2. System Board
189 (An attempt was made to access the server with invalid passwords)	1. **Run Configuration/Setup, enter the administrator password**
201 (Memory test error, see ″Memory Settings″ “Memory modules” on page 65.) 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. **DIMM** 2. System Board
229 (Cache error)	1. **Processor** 2. Optional Processor (if installed)
262 (DRAM parity configuration error)	1. **Run Configuration/Setup** 2. Battery 3. System Board
289 (DIMM disabled by POST or user)	1. **Run Configuration/Setup, if disabled by user** 2. Disabled DIMM, if not disabled by user.
301 (Keyboard or keyboard controller error)	1. **Keyboard** 2. System Board

Error Code/Symptom	FRU/Action
303 (Keyboard controller error)	1. **System Board** 2. Keyboard
602 (Invalid diskette boot record)	1. **Diskette** 2. Diskette Drive 3. Cable 4. System Board
604 (Diskette drive error)	1. **Run Configuration/Setup and Diagnostics** 2. Diskette Drive 3. Drive Cable 4. System Board
605 (Unlock failure)	1. **Diskette Drive** 2. Drive Cable 3. System Board
662 (Diskette drive configuration error)	1. **Run Configuration/Setup and Diagnostics** 2. Diskette Drive 3. Drive Cable 4. System Board
762 (Coprocessor configuration error)	1. **Run Configuration/Setup** 2. Battery 3. Processor
962 (Parallel port error)	1. **Disconnect external cable on parallel port.** 2. Run Configuration/Setup 3. System Board
11XX (System board serial port 1 or 2 error)	1. **Disconnect external cable on serial port.** 2. Run Configuration/Setup 3. System Board
0001200 (Machine check architecture error)	1. **Processor** 2. Optional Processor 3. System Planar
0001295 (ECC circuit check)	1. **System Board**
1301 (I^2C cable to front panel not found)	1. **Cable** 2. Front Panel 3. System Board
1302 (I^2C cable from system board to power on and reset switches not found)	1. **Cable** 2. Power Switch Assembly 3. System Board
1303 (I^2C cable from system board to power backplane not found)	1. **Cable** 2. Power Backplane 3. System Board

Error Code/Symptom	FRU/Action
1600 (The System Management Processor is not functioning) Do the following before replacing a FRU: 1. Ensure that a jumper is not installed on J47. 2. Remove the ac power to the system, wait 20 seconds; then, re-connect the ac power. Wait 30 seconds; then, power-on the system.	1. **System Board**
1601 (The system is able to communicate to the System Management Processor, but the System Management Processor failed to respond at the start of POST.) Do the following before replacing a FRU: 1. Remove the ac power to the system, wait 20 seconds; then, re-connect the ac power. Wait 30 seconds; then, power-on the system. 2. Flash update the Service Processor.	1. **Remote Supervisor Adapter, if installed** 2. System Board
1762 (Fixed Disk Configuration error)	1. **Fixed Disk Cables** 2. Run Configuration/Setup 2 3. Fixed Disk Adapter 4. Fixed Disk Drive 5. SCSI Backplane 6. System Board
178X (Fixed Disk error)	1. **Fixed Disk Cables** 2. Run Diagnostics 3. Fixed Disk Adapter 4. Fixed Disk Drive 5. System Board
1800 (No more hardware interrupt available for PCI adapter)	1. Run Configuration/Setup 2. Failing Adapter 3. System Board
1962 (Drive does not contain a valid boot sector)	1. **Verify a bootable operating system is installed.** 2. Run Diagnostics 3. Hard Disk Drive 4. SCSI Backplane 5. Cable 6. System Board
2400 (Video controller test failure)	1. **Video Adapter (if installed)** 2. System Board
2462 (Video memory configuration error)	1. **Video Adapter (if installed)** 2. System Board

Error Code/Symptom	FRU/Action
5962 (IDE CD-ROM configuration error)	1. **Run Configuration/Setup** 2. CD-ROM Drive 3. CD-ROM Power Cable 4. IDE Cable 5. System Board 6. Battery
8603 (Pointing Device Error)	1. **Pointing Device** 2. System Board
00019501 (Processor 1 is not functioning - check VRM and processor LEDs)	1. **VRM 1** 2. Processor 1 3. System Board
00019502 (Processor 2 is not functioning - check VRM and processor LEDs)	1. **VRM 2** 2. Processor 2 3. System Board
00019701 (Processor 1 failed BIST)	1. **Processor 1** 2. System Board
00019702 (Processor 2 failed BIST)	1. **Processor 2** 2. System Board
00180100 (A PCI adapter has requested memory resources that are not available)	1. **Reorder the adapters in the PCI slots. It is important that your boot device is positioned early in the scan order so that it is executed by POST.** 2. Ensure 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. 3. If all memory resources are being used, you might need to remove an adapter to make memory available to the PCI adapter. Disabling the adapter BIOS on the adapter should correct the error. Refer to documentation provided with the adapter.
00180200 (No more I/O space available for PCI adapter)	1. **Run Configuration/Setup** 2. Failing Adapter 3. System Board
00180300 (No more memory (above 1MB for PCI adapter))	1. **Run Configuration/Setup** 2. Failing Adapter 3. System Board
00180400 (No more memory (below 1MB for PCI adapter))	1. **Run Configuration/Setup** 2. Move the failing adapter to slot 1 or 2 3. Failing Adapter 4. System Board
00180500 (PCI option ROM checksum error)	1. **Remove Failing PCI Card** 2. System Board
00180600 (PCI built-in self test failure) PCI to PCI Bridge error	1. **Run Configuration/Setup** 2. Move the failing adapter to slot 1 or 2 3. Failing Adapter 4. System Board

Error Code/Symptom	FRU/Action
00180700, 00180800 (General PCI error)	1. **System Board** 2. PCI Card
01295085 (ECC checking hardware test error)	1. Processor
01298001 (No update data for processor 1)	1. **Ensure all processors are the same stepping level and cache size.** 2. Processor 1
01298002 (No update data for processor 2)	1. **Ensure all processors are the same stepping level and cache size.** 2. Processor 2
01298101 (Bad update data for processor 1)	1. **Ensure all processors are the same stepping level and cache size.** 2. Processor 1
01298102 (Bad update data for processor 2)	1. **Ensure all processors are the same stepping level and cache size.** 2. Processor 2
I9990301 (Fixed disk sector error)	1. **Hard Disk Drive** 2. SCSI Backplane 3. Cable 4. System Board
I9990305 (Fixed disk sector error, no operating system installed)	1. **Install operating system to hard disk drive.**
I9990650 (AC power has been restored)	1. **Check cable** 2. Check for interruption of power supply 3. Power Cable

Service processor error codes

When viewed from POST, service processor error codes will appear in hexadecimal form (generally beginning with A2, A3, A4, A5, A6, A7, AD, AE or E1). However, when viewed from the System Error Log, the messages will appear as text. To determine a possible error condition for the service processor, refer to the System Error Log (see “Log viewing from diagnostic programs” on page 14).

SCSI error codes

Error Code	FRU/Action
All SCSI Errors One or more of the following might be causing the problem: • A failing SCSI device (adapter, drive, controller) • An improper SCSI configuration or SCSI termination jumper setting • Duplicate SCSI IDs in the same SCSI chain • A missing or improperly installed SCSI terminator • A defective SCSI terminator • An improperly installed cable • A defective cable	1. **External SCSI devices must be powered-on before you power-on the server.** 2. The cables for all external SCSI devices are connected correctly. 3. If you have attached an external SCSI device to the server, make sure the external SCSI termination is set to automatic. 4. The last device in each SCSI chain is terminated correctly. 5. The SCSI devices are configured correctly.

Temperature error messages

Message	Action
DASD ″X″ Over Temperature (level-critical; Direct Access Storage Device bay ″X″ was over temperature)	1. **Ensure system is being properly cooled**; see“Temperature error messages”.
DASD ″X″ Over recommended Temperature (level-warning; DASD bay ″X″ had over temperature condition)	1. **Ensure system is being properly cooled**; see “Temperature error messages”.
DASD ″X″ under recommended temperature (level-warning; direct access storage device bay ″X″ had under temperature condition)	1. **Ambient temperature must be within normal operating specifications**; (see“Features and specifications” on page 3.)
DASD 1 Over Temperature (level-critical; sensor for DASD1 reported temperature over recommended range)	1. **Ensure system is being properly cooled**; see “Temperature error messages”.
Power Supply ″X″ Temperature Fault (level-critical; power supply ″x″ had over temperature condition)	1. **Ensure system is being properly cooled;** see “Temperature related system shutdown” on page 125. 2. Replace Power Supply ″X″
System board is over recommended temperature (level-warning; system board is over recommended temperature)	1. **Ensure system is being properly cooled; see “Temperature error messages”.** 2. Replace system board
System board is under recommended temperature (level-warning; system board is under recommended temperature)	1. **Ambient temperature must be within normal operating specifications**; (see “Features and specifications” on page 3.)
System over temperature for CPU ″X″ (level-warning; CPU ″X″ reporting over temperature condition)	1. **Ensure system is being properly cooled; see “Temperature error messages”.**
System under recommended CPU ″X″ temperature (level-warning; system reporting under temperature condition for CPU ″X″)	1. **Ambient temperature must be within normal operating specifications**; (see “Features and specifications” on page 3.

Fan error messages

Message	Action
Fan ″X″ failure (level-critical; fan ″X″ had a failure)	1. **Check connections to fan ″X″** 2. Replace fan ″X″
Fan ″X″ fault (level-critical; fan ″X″ beyond recommended RPM range)	1. **Check connections to fan ″X″** 2. Replace fan ″X″

Power error messages

Message	Action
Power supply ″X″ 12V current fault (level-critical; overcurrent condition detected)	1. **Check for short circuit or overload on +12V bus.** 2. If appropriate add additional supply into N+1 redundant array option.
Power supply ″X″ 5V current fault (level-critical; overcurrent condition detected)	1. **Check for short circuit or overload on +5V bus.**
Power supply ″X″ 3.3V current fault (level-critical; overcurrent condition detected)	1. **Check for short circuit or overload on +3.3V bus.**
Power supply ″X″ DC good fault (level-critical; power good signal not detected for power supply ″X″)	1. **Replace power supply ″X″**
Power supply ″ X″ overvoltage (level-critical; power supply ″X″ has detected an overvoltage condition and shutdown)	1. **Check power supply connectors** 2. Replace power supply 3. Replace power backplane
Power supply ″X″ current share fault (not level-critical, power supply X is not functioning correctly and may shut down)	1. **Replace power supply**
Power Supply ″X″ fan fault (level-critical; power supply will shutdown)	1. **Replace power supply.**
System under recommended voltage for ″X″ V (level-warning: indicated voltage is lower than acceptance, ″X″ may be 3.3/5/12))	1. **Check power supply connectors** 2. Replace power supply 3. Replace power backplane

System shutdown

Refer to the following tables when experiencing system shutdown related to power supply voltage, current, or temperature problems.

Power related system shutdown

Message	Action
240VA bus fault (level-critical; system has shutdown due to excessive current on either the +12v or 5 v bus)	1. Check for short circuit or major overload on both the +12v and +5v bus throughout the system. The system will be locked in an OFF state. Remove then replace AC power to reset.

Message	Action
Power ″X″ fan fault (level-critical; power supply has shutdown due to fan failure	1. Replace power supply ″X″
Power Supply ″X″ thermal fault (level-critical; power supply ″X″ has exceed permitted temperature limits and has shutdown)	1. Replace Power supply ″X″
System shutoff due to ″X″ over-voltage (level-critical system shutoff due to ″X″ supply over-voltage)	1. **Check power supply connectors** 2. Replace power supply 3. Replace power backplane
System shutoff due to ″X″ under-voltage (level-critical system shutoff due to ″X″ supply under-voltage)	1. **Check power supply connectors** 2. Replace power supply 3. Replace power backplane
System shutoff due to VRM ″X″ over voltage	1. **Replace VRM ″X″**

Temperature related system shutdown

Message	Action
System shutoff due to board over temperature (level-critical; board is over temperature)	1. **Ensure system is being properly cooled**, see “General checkout” on page 1. 2. Replace board
System shutoff due to CPU ″X″ over temperature (level-critical; CPU ″X″ is over temperature)	1. **Ensure system is being properly cooled**, see “General checkout” on page 1. 2. Replace CPU ″X″
System shutoff due to CPU ″X″ under temperature (level-critical; CPU ″X″ is under temperature)	1. **Ambient temperature must be within normal operating specifications** (see “Features and specifications” on page 3.)
System shutoff due to DASD temperature (sensor X) (level-critical; DASD area reported temperature outside recommended operating range)	1. **Ensure system is being properly cooled**, see “General checkout” on page 1.
System shutoff due to high ambient temperature (level-critical; high ambient temperature)	1. **Ambient temperature must be within normal operating specifications** (see “Features and specifications” on page 3.).
System shutoff due to system board under temperature (level-critical; system board is under temperature)	1. **Ambient temperature must be within normal operating specifications** (see “Features and specifications” on page 3.).

DASD checkout

Message	Action
Hard drive ″X″ removal detected (level-critical; hard drive ″X″ has been removed)	1. **Information only, take action as appropriate.**

Host Built-In Self Test (BIST)

Message	Action
Host BIST fail(level-informational; host's built-in self test failed)	1. **Reseat CPU** 2. Reseat VRM 3. Replace CPU

Bus fault messages

Message	Action
Failure reading I2C device. Check devices on bus 0.	1. **If installed, reseat I2C cable between Remote Supervisor Adapter (in PCI slot 1/J44) and planar (J45)** 2. Reseat Memory DIMMs 3. Memory DIMMS 4. System Board
Failure reading I2C device. Check devices on bus 1.	1. **Reseat Front LED cable to J39 connector** 2. Replace front LED card 3. Replace System Board
Failure reading I2C device. Check devices on bus 2.	1. **Reseat cable (Power Backplane to System Board-Signal) to J43 connector of system board** 2. Reseat Power backplane if one is installed 3. Reseat Power Supply 4. Replace power backplane if one is installed 5. Replace Power Supply 6. Replace system board
Failure reading I2C device. Check devices on bus 3.	1. **Reseat cable (Power backplane to System Board-Signal) to J43 connector of system board** 2. Reseat cable (Power backplane to DASD backplane 3. Replace DASD backplane 4. Replace system board
Failure reading I2C device. Check devices on bus 4.	1. Replace system board

Undetermined Problems

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

Notes:
1. If you suspect a software mismatch is causing failures (solid or intermittent), be sure to see "Error symptoms" on page 115.
2. A corrupt CMOS can cause undetermined problems.
3. A corrupt BIOS can cause undetermined problems. See "Recovering BIOS code" on page 17.

Check the LEDs on all the power supplies, see"Power supply LED errors" on page 116. If the LEDs indicate the power supplies are working correctly, return here and do the following:

1. Power-off the computer.
2. Be sure the system is cabled correctly.
3. 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 = 256 MB (2x128 MB DIMMs))

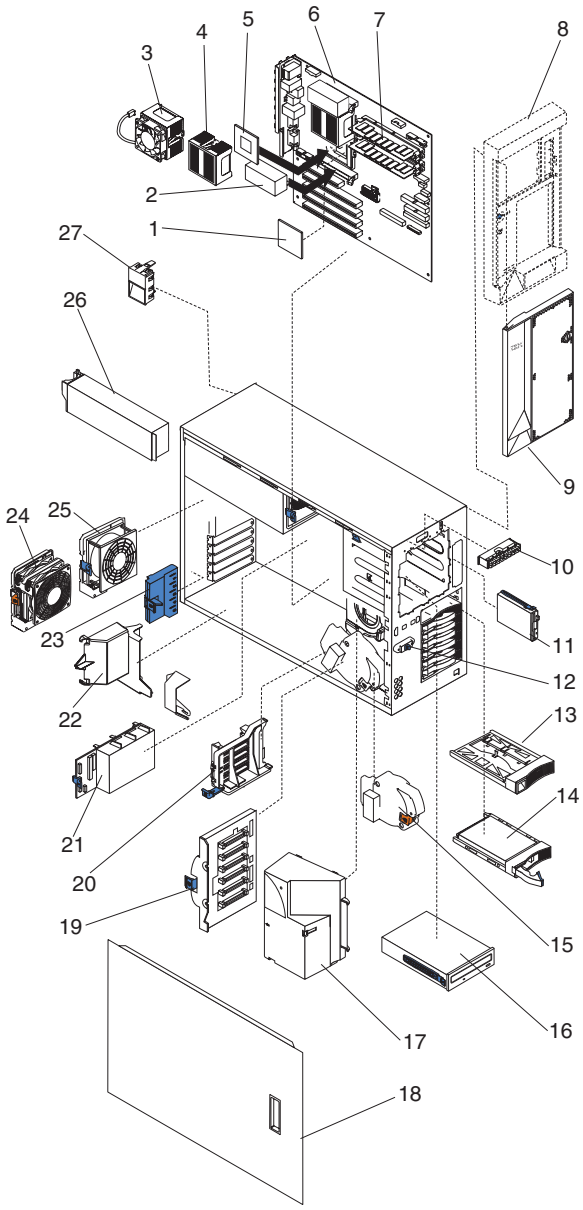
Note: Minimum operating requirements are:
   a. 1 Power Supply
   b. Power Backplane (If 250-watt model/upgrade)
   c. System Board
   d. 1 Microprocessor and VRM
   e. Processor Terminator Card
   f. Memory Module (with a minimum of two 128 MB DIMMs)
4. Power-on the computer. If the problem remains, suspect the following FRUs in the order listed:
   Power Supply
   Power Backplane
   System Board

Notes:

1. If the problem goes away when you remove an adapter from the system, and replacing that adapter does not correct the problem, suspect the System Board.
2. If you suspect a networking problem and all the system tests pass, suspect a network cabling problem external to the system.

Parts listing, xSeries 232

This parts listing supports the xSeries 232 Models 11X, 13G, 1RX, 21X, 22X, 23G, 24X, 2RX, 2SX, 2TX, 41X, 42X, 43G, 44X, 4RX, 4SX, 4TX, 54X, 5TX.



System

Index	System (xSeries 232, Type 8668, Models 11X, 13G, 1RX, 21X, 22X, 23G, 24X, 2RX, 2SX, 2TX, 41X, 42X, 43G, 44X, 4RX, 4SX, 4TX, 54X, 5TX)	FRU No.
1	Terminator Card (All Models)	25P1866
2	Voltage Regulator Module (All Models)	24P6893
3	Fan sink (Models 11X, 13G, 1RX, 21X, 22X, 23G, 2RX, 2SX, 41X, 42X, 43G, 4RX, 4SX)	22P4370
4	Heatsink (Models 24X, 2TX, 44X, 4TX, 54X, 5TX)	32P0575
5	1000/133 256K Processor (Models 11X, 1RX)	25P2603
5	1000/133 256K Processor (Models 13G)	32P1112
5	1133/133 256K Processor (Models 21X, 22X, 23G, 2RX, 2SX)	25P2605
5	1133/133 256K Processor (Models 24X, 2TX)	22P1990
5	1266/133 512K Processor (Models 41X, 42X, 43G, 4RX, 4SX)	25P2601
5	1266/133 512K Processor (Models 44X, 4TX)	22P1991
5	1400/133 512K Processor (Models 54X, 5TX)	49P2814
6	System Board (Models 11X, 13G, 1RX, 21X, 22X, 23G, 2RX, 2SX, 41X, 42X, 43G, 4RX, 4SX)	49P9071
6	System Board (Models 24X, 2TX, 44X, 4TX, 54X, 5TX)	48P8252
7	Memory 128MB ECC SDRAM (Models 11X, 1RX, 21X, 22X, 24X, 2RX, 2SX, 2TX, 41X, 42X, 44X, 4RX, 4SX, 4TX, 54X, 5TX)	33L3321
7	Memory 256MB ECC SDRAM (Models 13G, 23G, 43G)	33L3323
8	Front Bezel, Tower (Models 11X, 13G, 21X, 22X, 23G, 24X, 41X, 42X, 43G, 44X, 54X)	21P9697
9	Door, tower (Models 11X, 13G, 21X, 22X, 23G, 24X, 41X, 42X, 43G, 44X, 54X)	24P0615
10	Front LED Card Assembly (All Models)	37L6773
11	Floppy Disk Drive, 1.44 MB (Black) (All Models)	76H4091
12	Power Reset Card Assembly (All Models)	21P9582
13	Blank Filler Panel, Hark Disk Drive (All Models)	00N7259
14	Hard Disk Drive, 18G / 10K RPM (Models 13G, 23G, 43G)	19K1467
15	Fan assembly (Models 24X, 2TX, 44X, 4TX, 54X, 5TX)	09N7499
16	CD-ROM Drive, 48X (All Models)	19K1531
16	CD-ROM Drive, 48X LG, Black (Optional) (All Models)	24P3605
16	CD-ROM Drive, 48X (Optional) (All Models)	06P5281
17	Blower Assembly (All Models)	36L9998
18	Cover Assembly (Models 11X, 13G, 21X, 22X, 23G, 24X, 41X, 42X, 43G, 44X, 54X)	00N6401
19	DASD Backplane (All Models)	21P9719
20	PCI Adapter Card Support Assembly (All Models)	00N7056
21	Power Backplane Assembly (Models 22X, 2SX, 42X, 4SX)	21P9248
22	Baffle Assembly (Models 24X, 2TX, 44X, 4TX, 54X, 5TX)	32P0574
23	PCI Adapter Card Retainer (All Models)	36L9994
24	Rear Fan Assembly (Models 11X, 13G, 1RX, 21X, 22X, 23G, 2RX, 2SX, 41X, 42X, 43G, 4RX, 4SX)	36L9995
25	Rear Fan Assembly (Models 24X, 2TX, 44X, 4TX, 54X, 5TX)	21P9601
26	Power Supply, 250 Watt (Models 13G, 22X, 23G, 24X, 2SX, 2TX, 42X, 43G, 44X, 4SX, 4TX, 54X, 5TX)	36L8819
27	Power Supply Filler Panel (All Models)	00N6405
	Fan blower housing (Models 24X, 2TX, 44X, 4TX, 54X, 5TX)	00N6409
	Front Bezel, Rack Assembly (Models 1RX, 2RX, 2SX, 2TX, 4RX, 4SX, 4TX, 5TX)	21P9731
	Cover Assembly (Models 1RX, 2RX, 2SX, 2TX, 4RX, 4SX, 4TX)	00N6403
	Chassis, Tower (Models 11X, 13G, 21X, 22X, 23G, 41X, 42X, 43G)	21P9561
	Chassis, Tower (Models 24X, 44X, 54X)	32P0566
	Chassis, Rack (Models 1RX, 2RX, 2SX, 4RX, 4SX)	21P9562
	Chassis, Rack (Models 2TX, 4TX, 5TX)	32P0565
	Chassis Weldment (Models 11X, 13G, 1RX, 21X, 22X, 23G, 2RX, 2SX, 41X, 42X, 43G, 4RX, 4SX)	00N7046
	Keylock Assembly (All Models)	00N6393
	Floppy Disk Drive Filler Panel (All Models)	00N6407
	Floppy Disk Drive Slide (All Models)	00N6413
	Foot Screw-in (4) (Models 11X, 13G, 21X, 22X, 23G, 24X, 41X, 42X, 43G, 44X, 54X)	32P0579

Index	System (xSeries 232, Type 8668, Models 11X, 13G, 1RX, 21X, 22X, 23G, 24X, 2RX, 2SX, 2TX, 41X, 42X, 43G, 44X, 4RX, 4SX, 4TX, 54X, 5TX)	FRU No.
	Plastic CD / DASD Slide (2) (All Models)	00N6412
	Rack Slide Kit (Model 1RX, 2RX, 2SX, 2TX, 4RX, 4SX, 4TX, 5TX)	00N6417
	Miscellaneous Parts Kit (Models 1RX, 2RX, 2SX, 2TX, 4RX, 4TX, 5TX)	00N6419
	Rack Bracket Assemblies (2) (Model 1RX, 2RX, 2SX, 2TX, 4RX, 4SX, 4TX, 5TX)	00N6429
	Service Label (Models 11X, 13G, 1RX, 21X, 22X, 23G, 2RX, 2SX, 41X, 42X, 43G, 4RX, 4SX)	21P9564
	Service Label (All Models)	32P0568
	Lightbox Assembly (All Models)	21P9572
	Bezel, USB Blank (All Models)	21P9596
	385-Watt Power Supply (Models 11X, 1RX, 21X, 2RX, 41X, 4RX)	24P6809
	Battery, 3.0 V (All Models)	33F8354
	ServeRAID 4L Card Assembly (Models 13G, 23G, 43G)	06P5741
	Cable, Power Backplane to DASD Backplane (Models 22X, 24X, 2SX, 2TX, 42X, 44X, 4SX, 4TX, 54X, 5TX)	00N6579
	Cable, Power Backplane-I2C (Models 22X, 24X, 2SX, 2TX, 42X, 44X, 4SX, 4TX, 54X, 5TX)	00N6581
	Cable, Signal (All Models)	00N7187
	Cable, Power Backplane to System Board-Signal (All Models)	21P9544
	Cable, Power Backplane to Media (Models 22X, 24X, 2SX, 2TX, 42X, 44X, 4SX, 4TX, 54X, 5TX)	21P9578
	Cable, Floppy Disk Drive (All Models)	21P9579
	Cable, I2C 2x7 (All Models)	21P9588
	Cable, LVD (All Models)	37L0350
	Cable, CD-ROM Drive (All Models)	37L6055
	Cable, Power Backplane/ Proc (All Models)	37L6777
	Cable, dual blowers (Models 24X, 44X, 2TX, 4TX, 54X, 5TX)	32P0559
	Cable, rear fan (Models 24X, 44X, 2TX, 4TX, 54X, 5TX)	32P0564
	Mouse Assembly (Model 11X, 13G, 21X, 22X, 24X, 23G, 41X, 42X, 43G, 44X, 54X)	24P0383
	Keyboard, US English (Models 11X, 13G, 21X, 22X, 24X, 23G, 41X, 42G, 43G, 44X, 54X)	37L2551
	Power Cord (All Models)	6952300

Keyboards

Keyboard	FRU No.
US English	37L2551
French Canadian	37L2552
LA Spanish	37L2553
Arabic	37L2555
Belgium/French	37L2556
Belgium/UK	37L2557
Bulgarian	37L2558
Czech	37L2559
Danish	37L2560
Dutch	37L2561
French	37L2562
German	37L2563
Greek	37L2564
Hebrew	37L2565
Hungarian	37L2566
Korean	02K0901
Iceland	37L2567
Italy	37L2568
Norwegian	37L2569
Polish	37L2570
Portugese	37L2571

Keyboard	FRU No.
Romanian	37L2572
Russian	37L2573
Serbian/Cyrillic	37L2574
Slovic	37L2575
Spanish	37L2576
Swedish/Finn	37L2577
Swiss, F/G	37L2578
Turkish	37L2579
Turkish	37L2580
UK English	37L2581
Yugosl/Lat	37L2582
US English-EMEA	37L2583
Chinese/US	37L2585
Thailand	37L2587
French Canadian	37L0913

Power cords

Power cord	FRU No.
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)

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.

Safety information

The following section contains the safety information that you need to be familiar with before servicing an IBM mobile 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 electrostatic discharge-sensitive devices

Any computer part containing transistors or integrated circuits (ICs) should be considered sensitive to electrostatic discharge (ESD). ESD damage can occur when there is a difference in charge between objects. Protect against ESD damage by equalizing the charge so that the 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
1. Turn everything OFF. 2. First, attach all cables to devices. 3. Attach signal cables to connectors. 4. Attach power cords to outlet. 5. Turn device ON.	1. Turn everything OFF. 2. First, remove power cords from outlet. 3. Remove signal cables from connectors. 4. Remove all cables from devices.

- Statement 2

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

Do not:

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

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

- Statement 3

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

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

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

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

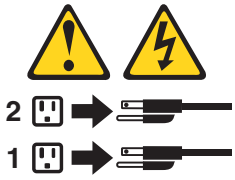
- Statement 4

≥18 kg (37 lbs) ≥32 kg (70.5 lbs) ≥55 kg (121.2 lbs)

CAUTION:
Use safe practices when lifting.

- Statement 5

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



- Statement 10

CAUTION:

Do not place any object weighing more than 82 kg (180 lbs.) on top of rack-mounted devices.

Importante:

Todas as instruções de cuidado e perigo da IBM documentation começam com um número. Este número é utilizado para fazer referência cruzada de uma instrução de cuidado ou perigo no idioma inglês com as versões traduzidas das instruções de cuidado ou perigo encontradas nesta seção.

Por exemplo, se uma instrução de cuidado é iniciada com o número 1, as traduções para aquela instrução de cuidado aparecem nesta seção sob a instrução 1.

Certifique-se de ler todas as instruções de cuidado e perigo antes de executar qualquer operação.

Instrução 1

PERIGO

A corrente elétrica proveniente de cabos de alimentação, de telefone e de comunicações é perigosa.

Para evitar risco de choque:

- Não conecte ou desconecte cabos e não realize instalação, manutenção ou reconfiguração deste produto durante uma tempestade com raios.
- Conecte todos os cabos de alimentação a tomadas elétricas corretamente instaladas e aterradas.
- Conecte todos os equipamentos ao qual esse produto será conectado a tomadas corretamente instaladas.
- Sempre que possível, utilize apenas uma das mãos para conectar ou desconectar cabos de sinal.
- Nunca ligue qualquer equipamento quando existir evidência de danos por fogo, água ou na estrutura.
- Desconecte cabos de alimentação, sistemas de telecomunicação, redes e modems antes de abrir as tampas dos dispositivos, a menos que especificado de maneira diferente nos procedimentos de instalação e configuração.
- Conecte e desconecte cabos conforme descrito na seguinte tabela, ao instalar ou movimentar este produto ou os dispositivos conectados, ou ao abrir suas tampas.

Para Conectar:	Para Desconectar:
1. DESLIGUE Tudo. 2. Primeiramente, conecte todos os cabos aos dispositivos. 3. Conecte os cabos de sinal aos conectores. 4. Conecte os cabos de alimentação às tomadas. 5. LIGUE os dispositivos.	1. DESLIGUE Tudo. 2. Primeiramente, remova os cabos de alimentação das tomadas. 3. Remova os cabos de sinal dos conectores. 4. Remova todos os cabos dos dispositivos.

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 móídulo com uma bateria de lítio, substitua-o apenas pelo mesmo tipo de mídulo, 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 ítica, 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 íticos, e evite exposição direta ao raio.

Instrução 4

≥18 kg (37 lbs) ≥32 kg (70.5 lbs) ≥55 kg (121.2 lbs)

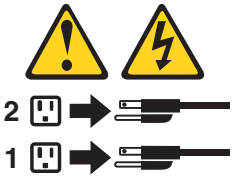
CUIDADO:

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：
扔入或浸入水电 °
加热超过 100 （212 F）
进行修理或分解
请按本地法规要求处理电池。

声明 3

警告：

安装激光产品（如 CD-ROM、DVD 驱动器、光纤设备或送话器）时，应注意以下事项：

不要拆除外盖。拆除激光产品的外盖可能会导致激光辐射的危险，本设备中没有用户可维修的部件。

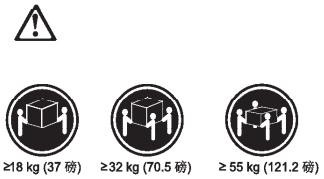
非此处指定的其它控制、调整或与性能有关的操作都有可能导致激光辐射的危险。

危险

某些激光产品中包含内嵌的 3A 级或 3B 级激光二极管。请注意以下事项。

打开时会产生激光辐射。不要直视光束，不要使用光学仪器直接观看光束，避免直接暴露于光束之下。

声明 4



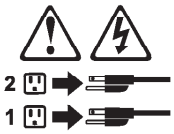
警告：

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。
- 儘可能使用單手來連接或切斷信號電纜線。
- 當設備有火燒或泡水的痕跡，或有結構性損害時，請勿開啓該設備的電源。
- 在安裝及架構之時，若非非常熟悉，在開啓裝置蓋子之前，請切斷電源線、電信系統、網路及數據機。
- 在安裝、移動本產品或附加裝置，或開啓其蓋子時，請依照下表中「連接」及「切斷」電纜線的步驟執行。

連接：	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。	

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 ℃ (212 ℉)
- 修理或拆開

請遵照當地法令規章處理廢棄電池。

聲明 3

注意：

安裝雷射產品 (如 CD-ROM、DVD 光碟機、光纖裝置或發射器) 時，請注意下列事項：

– 請勿移開蓋子。移開雷射產品的蓋子，您可能會暴露於危險的雷射輻射之下。裝置中沒有需要維修的組件。
– 不依此處所指示的控制、調整或處理步驟，您可能會暴露於危險的輻射之下。

危險

有些雷射產品含有內嵌式 Class 3A 或 Class 3B 雷射二極體。請注意下列事項：

開啓時會產生雷射輻射。請勿凝視光束，不要使用光學儀器直接觀察，且應避免直接暴露在光束下。

聲明 4

≥ 18 公斤 (37 磅)

≥ 32 公斤 (70.5 磅)

≥ 55 公斤 (121.2 磅)

注意：

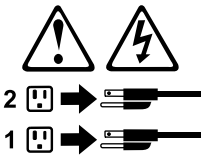
抬起裝置時，請注意安全措施。

聲明 5

注意：

裝置上的電源控制按鈕及電源供應器上的電源開關均無法關閉裝置上的電流。

本裝置可能有一條以上的電源線。如要移除裝置上的所有電流，請確認所有電源線已與電源分離。



聲明 10

注意：
請勿將任何重量超過 82 公斤 (180 磅) 的物品置於已安裝機架的裝置上方。

>82 公斤 (180 磅)

Important:

Toutes les consignes Attention et Danger indiquées dans la bibliothèque IBM documentation sont précédées d'un numéro. Ce dernier permet de mettre en correspondance la consigne en anglais avec ses versions traduites dans la présente section.

Par exemple, si une consigne de type Attention est précédée du chiffre 1, ses traductions sont également précédées du chiffre 1 dans la présente section.

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

Notice n° 1

DANGER

Le courant électrique passant dans les câbles de communication, ou les cordons téléphoniques et d'alimentation peut être dangereux.

Pour éviter tout risque de choc électrique:

- Ne manipulez aucun câble et n'effectuez aucune opération d'installation, d'entretien ou de reconfiguration de ce produit au cours d'un orage.
- Branchez tous les cordons d'alimentation sur un socle de prise de courant correctement câblé et mis à la terre.
- Branchez sur des socles de prise de courant correctement câblés tout équipement connecté à ce produit.
- Lorsque cela est possible, n'utilisez qu'une seule main pour connecter ou déconnecter les câbles d'interface.
- Ne mettez jamais un équipement sous tension en cas d'incendie ou d'inondation, ou en présence de dommages matériels.
- Avant de retirer les carters de l'unité, mettez celle-ci hors tension et déconnectez ses cordons d'alimentation, ainsi que les câbles qui la relient aux réseaux, aux systèmes de télécommunication et aux modems (sauf instruction contraire mentionnée dans les procédures d'installation et de configuration).
- Lorsque vous installez ou que vous déplacez le présent produit ou des périphériques qui lui sont raccordés, reportez-vous aux instructions ci-dessous pour connecter et déconnecter les différents cordons.

Connexion	Déconnexion
1. Mettez les unités hors tension. 2. Commencez par brancher tous les cordons sur les unités. 3. Branchez les câbles d'interface sur des connecteurs. 4. Branchez les cordons d'alimentation sur des prises. 5. Mettez les unités sous tension.	1. Mettez les unités hors tension. 2. Débranchez les cordons d'alimentation des prises. 3. Débranchez les câbles d'interface des connecteurs. 4. Débranchez tous les câbles des unités.

Notice n° 2

ATTENTION:

Remplacez la pile au lithium usagée par une pile de référence identique exclusivement - voir la référence IBM - ou par une pile équivalente recommandée par le fabricant. Si votre système est doté d'un module contenant une pile au lithium, vous devez le remplacer uniquement par un module identique, produit par le même fabricant. La pile contient du lithium et présente donc un risque d'explosion en cas de mauvaise manipulation ou utilisation.

- **Ne la jetez pas à l'eau.**
- **Ne l'exposez pas à une température supérieure à 100 °C.**
- **Ne cherchez pas à la réparer ou à la démonter.**

Pour la mise au rebut, reportez-vous à la réglementation en vigueur.

Notice n° 3

ATTENTION:

Si des produits laser sont installés (tels que des unités de CD-ROM ou de DVD, des périphériques contenant des fibres optiques ou des émetteurs-récepteurs), prenez connaissance des informations suivantes:

- **N'ouvrez pas ces produits pour éviter une exposition directe au rayon laser. Vous ne pouvez effectuer aucune opération de maintenance à l'intérieur.**
- **Pour éviter tout risque d'exposition au rayon laser, respectez les consignes de réglage et d'utilisation des commandes, ainsi que les procédures décrites dans le présent document.**

DANGER

Certains produits laser contiennent une diode laser de classe 3A ou 3B. Prenez connaissance des informations suivantes:

Rayonnement laser lorsque le carter est ouvert. évitez de regarder fixement le faisceau ou de l'observer à l'aide d'instruments optiques. évitez une exposition directe au rayon.

Notice n° 4

≥18 kg (37 lbs) ≥32 kg (70.5 lbs) ≥55 kg (121.2 lbs)

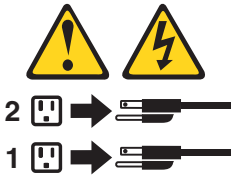
ATTENTION:

Faites-vous aider pour soulever ce produit.

Notice n° 5

ATTENTION:

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



Notice n° 10

ATTENTION:

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

Wichtig:

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

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

Lesen Sie alle Sicherheitshinweise, bevor Sie eine Anweisung ausführen.

Hinweis 1


VORSICHT

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

Aus Sicherheitsgründen:

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

Kabel anschließen:	**Kabel lösen:**
1. Alle Geräte ausschalten und Netzstecker ziehen. 2. Zuerst alle Kabel an Einheiten anschließen. 3. Signalkabel an Anschlußbuchsen anschließen. 4. Netzstecker an Steckdose anschließen. 5. Gerät einschalten.	1. Alle Geräte ausschalten. 2. Zuerst Netzstecker von Steckdose lösen. 3. Signalkabel von Anschlußbuchsen lösen. 4. Alle Kabel von Einheiten lösen.

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

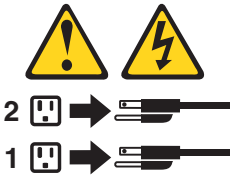
ACHTUNG:

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:**
1. SPEGNERE tutti i dispositivi. 2. Collegare prima tutti i cavi alle unità. 3. Collegare i cavi di segnale ai connettori. 4. Collegare i cavi di alimentazione alle prese elettriche. 5. ACCENDERE le unità.	1. SPEGNERE tutti i dispositivi. 2. Rimuovere prima i cavi di alimentazione dalle prese elettriche. 3. Rimuovere i cavi di segnale dai connettori. 4. Rimuovere tutti i cavi dalle unità.

Avviso 2

ATTENZIONE:

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

Evitare di:

- Gettarla o immergerla in acqua
- Riscaldarla ad una temperatura superiore ai 100°C
- Cercare di ripararla o smontarla

Smaltire secondo la normativa in vigore (D.Lgs 22 del 5/2/9) e successive disposizioni nazionali e locali.

Avviso 3

ATTENZIONE:

Quando si installano prodotti laser come, ad esempio, le unità DVD, CD-ROM, a fibre ottiche o trasmettitori, prestare attenzione a quanto segue:

- Non rimuovere i coperchi. L'apertura dei coperchi di prodotti laser può determinare l'esposizione a radiazioni laser pericolose. All'interno delle unità non vi sono parti su cui effettuare l'assistenza tecnica.
- L'utilizzo di controlli, regolazioni o l'esecuzione di procedure non descritti nel presente manuale possono provocare l'esposizione a radiazioni pericolose.

PERICOLO

Alcuni prodotti laser contengono all'interno un diodo laser di Classe 3A o Classe 3B. Prestare attenzione a quanto segue:

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

Avviso 4

≥18 kg ≥32 kg ≥55 kg

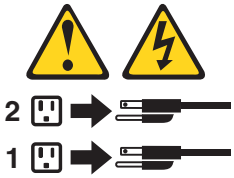
ATTENZIONE:

Durante il sollevamento della macchina seguire delle norme di sicurezza.

Avviso 5

ATTENZIONE:

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



Avviso 10

ATTENZIONE:

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

중요:

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

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

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

경고문 1

위험

전원, 전화 및 통신 케이블로부터 흘러 나오는 전류는 위험합니다.

전기 충격을 피하려면:

- 뇌우를 동반할 때는 케이블의 연결이나 철수, 이 제품의 설치, 유지보수 또는 재구성을 하지 마십시오.
- 모든 전원 코드를 적절히 배선 및 접지해야 합니다.
- 이 제품에 연결될 모든 장비를 적절하게 배선된 콘센트에 연결하십시오.
- 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:	연결을 끊으려면:
1. 모든 스위치를 끕니다.	1. 모든 스위치를 끕니다.
2. 먼저 모든 케이블을 장치에 연결합니다.	2. 먼저 콘센트에서 전원 코드를 뽑습니다.
3. 신호 케이블을 커넥터에 연결합니다.	3. 신호 케이블을 커넥터에서 제거합니다.
4. 콘센트에 전원 코드를 연결합니다.	4. 장치에서 모든 케이블을 제거합니다.
5. 장치 스위치를 켭니다.	

경고문 2

주의:

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

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.

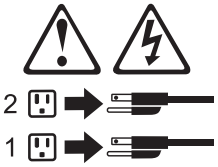
열면 레이저 광선에 노출됩니다. 광선을 주시하거나 광학 기계를 직접 쳐다보지 않도록 하고 광선에 노출되지 않도록 하십시오.

경고문 4

주의:
기계를 들 때는 안전하게 들어 올리십시오.

경고문 5

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



경고문 10

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

Importante:

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

Por ejemplo, si una declaraciín de peligro empieza con el número 1, las traducciones de esta declaraciín de precauciín aparecen en esta secciín bajo Declaraciín 1.

Lea atentamente todas las declaraciones de precauciín y peligro antes de llevar a cabo cualquier operaciín.

Declaración 1

PELIGRO

La corriente eléctrica de los cables telefínicos, de alimentaciín y de comunicaciones es perjudicial.

Para evitar una descarga eléctrica:

- No conecte ni desconecte ningún cable ni realice las operaciones de instalaciín, mantenimiento o reconfiguraciín de este producto durante una tormenta.
- Conecte cada cable de alimentaciín a una toma de alimentaciín eléctrica con conexiín a tierra y cableado correctos.
- Conecte a tomas de alimentaciín con un cableado correcto cualquier equipo que vaya a estar conectado a este producto.
- Si es posible, utilice una sola mano cuando conecte o desconecte los cables de sent.al.
- No encienda nunca un equipo cuando haya riesgos de incendio, de inundaciín o de daños estructurales.
- Desconecte los cables de alimentaciín, sistemas de telecomunicaciones, redes y mídems conectados antes de abrir las cubiertas del dispositivo a menos que se indique lo contrario en los procedimientos de instalaciín y configuraciín.
- Conecte y desconecte los cables tal como se describe en la tabla siguiente cuando desee realizar una operaciín de instalaciín, de traslado o de apertura de las cubiertas para este producto o para los dispositivos conectados.

Para la conexin	Para la desconexiín
1. APÁGUELO todo. 2. En primer lugar, conecte los cables a los dispositivos. 3. Conecte los cables de señal a los conectores. 4. Conecte cada cable de alimentaciín a la toma de alimentaciín. 5. ENCIENDA el dispositivo.	1. APÁGUELO todo. 2. En primer lugar, retire cada cable de alimentaciín de la toma de alimentaciín. 3. Retire los cables de señal de los conectores. 4. Retire los cables de los dispositivos.

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 mídulo que contiene una batería de litio, sustitúyalo únicamente por el mismo tipo de mídulo, 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 legislaciín local.

Declaración 3

PRECAUCIÓN:

Cuando instale productos láser (como, por ejemplo, CD-ROM, unidades DVD, dispositivos de fibra íptica o transmisores), tenga en cuenta las advertencias siguientes:

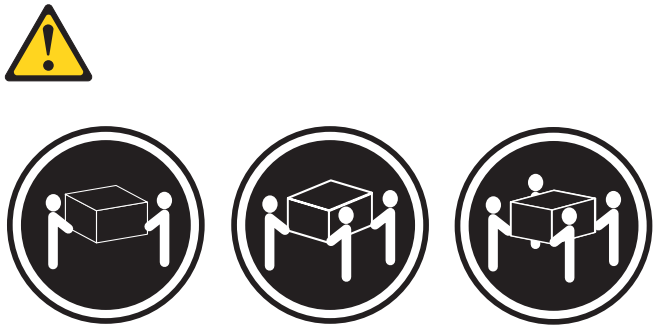
- No retire las cubiertas. Si retira las cubiertas del producto láser, puede quedar expuesto a radiaciín láser perjudicial. Dentro del dispositivo no existe ninguna pieza que requiera mantenimiento.
- El uso de controles o ajustes o la realizaciín de procedimientos que no sean los que se han especificado aquí pueden dar como resultado una exposiciín 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 radiaciín láser. No mire fijamente el rayo ni lleve a cabo ningún examen directamente con instrumentos ípticos; evite la exposiciín directa al rayo.

Declaración 4



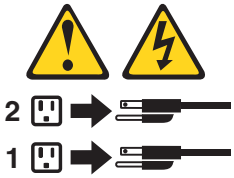
PRECAUCIÓN:

Tome medidas de seguridad al levantar el producto.

Declaración 5

PRECAUCIÓN:

El botín de control de alimentaciín del dispositivo y el interruptor de alimentaciín de la fuente de alimentaciín no apagan la corriente eléctrica suministrada al dispositivo. Es posible también que el dispositivo tenga más de un cable de alimentaciín. Para eliminar la corriente eléctrica del dispositivo, asegúrese de desconectar todos los cables de alimentaciín de la fuente de alimentaciín.



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 24P2921). 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!

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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