

IBM IntelliStation M Pro
Type 6219



Hardware Maintenance Manual

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Type 6219



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Note

Before using this information and the product it supports, read “Notices” on page 138.

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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® IntelliStation® M Pro Type 6219.

Important: The field replaceable unit (FRU) procedures are intended for trained servicers who are familiar with IBM products. Before servicing an IBM product, be sure to review “Safety information” on page 107.

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 107.

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

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

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.

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

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

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

Online support

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

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General checkout

The computer diagnostic programs are stored on the *Device Drivers and IBM Enhanced Diagnostics* CD. These programs are the primary method of testing the major components of the computer: the system board, Ethernet controller, video controller, RAM, keyboard, mouse (pointing device), diskette drive, serial ports, hard disk drives, and parallel port. You can also use them to test some external devices. See “Diagnostics” on page 25.

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 computer might be part of a shared DASD cluster (two or more computers sharing the same external storage devices). Prior to running diagnostics, verify that the failing computer is not part of a shared DASD cluster.

A computer might be part of a cluster if:

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

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

Notes:

1. For computers that are part of a shared DASD cluster, run one test at a time in looped mode. Do not run all tests in looped mode, because this could enable the DASD diagnostic tests.
2. If multiple error codes are displayed, diagnose the first error code displayed.
3. If the computer hangs with a POST error, go to “Symptom-to-FRU index” on page 79.
4. If the computer is suspended and no error message is displayed, see “Undetermined problems” on page 98.
5. For information about power supply problems, see “Symptom-to-FRU index” on page 79.
6. For safety information, see “Important safety information” on page iii.
7. For intermittent problems, check the error log; see “Diagnostic tools overview” on page 25 and “Undetermined problems” on page 98.

001

IS THE COMPUTER PART OF A CLUSTER?

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

NO. Go to step **002** .

002

IF THE COMPUTER IS NOT PART OF A CLUSTER:

- Turn off the computer and all external devices.
- Check all cables and power cords.
- Set all display controls to the middle position.
- Turn on all external devices.
- Turn on the computer.
- Record any POST error messages displayed on the screen. If an error is displayed, look up the first error in the “POST error codes” on page 90.
- Start the Diagnostic Programs. See “Starting the diagnostic programs and viewing the test log” on page 28.
- Check for the following responses:
 1. One beep.
 2. Readable instructions or the main menu.

003

DID YOU RECEIVE BOTH OF THE CORRECT RESPONSES?

NO. Find the failure symptom in “Symptom-to-FRU index” on page 79.

YES. Run the diagnostic programs. If necessary, see “Diagnostic programs and error messages” on page 27.

If you receive an error, see “Symptom-to-FRU index” on page 79.

If the diagnostics were completed successfully and you still suspect a problem, see “Undetermined problems” on page 98.

General information

The IBM IntelliStation M Pro Type 6219 computer incorporates many of the latest advances in computing technology and can be expanded and upgraded as your needs change.

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

The computer model and serial numbers are on labels on the bottom of the computer and on the lower-right side of the bezel. You will need these numbers to register your computer with IBM.

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

The latest version of this publication is available from the IBM Web site. Go to <http://www.ibm.com> and click **Support & downloads**. In the **Technical support** keyword search field, type 6219 and click **Go**. A list of publications for your computer is displayed.

Notices and statements used in this book

The caution and danger statements used in this book also appear in the multilingual safety information book that is accessible through Access IBM and on the IBM *IntelliStation Documentation* CD. Each statement is numbered for easy reference corresponding to statements in the safety book.

The notices and statements are as follows:

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

Features and specifications

The following table provides a summary of the features and specifications of your IntelliStation M Pro Type 6219 computer. Depending on your model, some features might not be available, or some specifications might not apply.

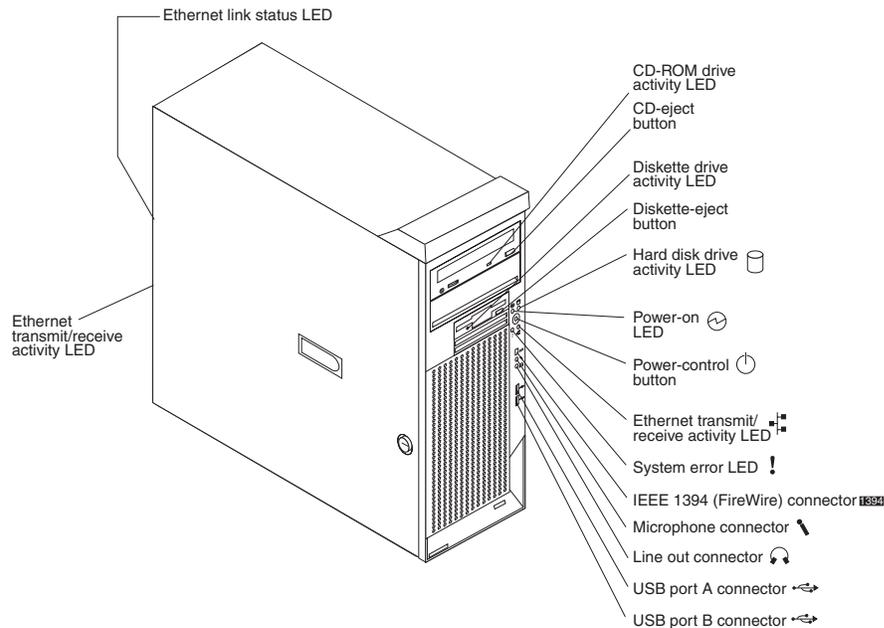
You can use the Configuration/Setup Utility program in your computer to determine the specific type of microprocessor that is on your system board.

Table 1. Features and specifications

<p>Microprocessor:</p> <ul style="list-style-type: none"> Intel Pentium 4 processor 512 KB Level-2 cache 533 MHz front-side bus (FSB) <p>Memory:</p> <ul style="list-style-type: none"> Minimum: 256 MB Maximum: 4 GB Type: PC2100 Connectors: four dual inline memory module (DIMM) connectors <p>Internal Drives:</p> <ul style="list-style-type: none"> Diskette: 1.44 MB (two mode) Hard disk drive: IDE or SCSI One of the following: <ul style="list-style-type: none"> CD-ROM: IDE DVD/CD-RW combo: IDE CD-RW: IDE <p>Expansion bays:</p> <ul style="list-style-type: none"> Three slim-high 3.5-inch drive bays (one hard disk drive installed in some models) Two half-high 5.25-inch bays (optical drive installed in one bay) Two slim-high 3.5-inch removable-media drive bays (one diskette drive installed) <p>PCI expansion slots:</p> <ul style="list-style-type: none"> Five 33 MHz/32-bit PCI slots on the system board One Accelerated Graphics Port (AGP) Pro 50 slot <p>Power supply:</p> <p>One 340 watts (115-230 V ac)</p> <p>Cooling:</p> <p>Two speed-controlled fans</p>	<p>Integrated functions:</p> <ul style="list-style-type: none"> Broadcom 5702 10/100/1000 Ethernet controller on the system board with RJ-45 Ethernet connector Two serial ports One parallel port (Some models) two IEEE 1394 (FireWire) ports (four-pin on front, six-pin on rear) Four Universal Serial Bus (USB) ports (two on front and two on rear) Keyboard port Mouse port Audio ports <ul style="list-style-type: none"> Line out (front and rear) Mic (front and rear) Line in (rear) Dual-channel IDE controller <p>Video adapter: (depending on your model)</p> <ul style="list-style-type: none"> Matrox Millennium G450 (DVI-I) 4X with 32 MB double-data-rate (DDR) synchronous dynamic random access memory (SDRAM) video memory and a single DVI-I or dual analog connectors (or dual VGA monitor capability with the pigtail cable that comes with the computer) NVIDIA Quadro4 280NVS (LFH-60), AGP 8X, with 64 MB double-data-rate (DDR) SDRAM video memory and dual analog connectors (or dual digital monitor capability with the purchase of an additional pigtail cable) NVIDIA Quadro4 980XGL (DVI-I and VGA), AGP 8X, with 128 MB DDR synchronous graphics random access memory (SGRAM) video memory with one analog and one DVI-I connector 3DLabs Wildcat 4 7110 (DVI-I), AGP 8X, with 128 MB texture buffer DDR SDRAM video memory, 128 MB frame buffer video memory, and dual DVI-I connectors 	<p>Electrical input:</p> <ul style="list-style-type: none"> Sine-wave input (50 or 60 Hz) required Input voltage and frequency ranges automatically selected Input voltage low range: <ul style="list-style-type: none"> Minimum: 90 V ac Maximum: 137 V ac Input voltage high range: <ul style="list-style-type: none"> Minimum: 180 V ac Maximum: 265 V ac Input kilovolt-amperes (kVA) approximately: <ul style="list-style-type: none"> Minimum: 0.08 kVA Maximum: 0.52 kVA <p>Heat output:</p> <p>Approximate heat output in British thermal units (Btu) per hour</p> <ul style="list-style-type: none"> Minimum configuration: 257 Btu (75 watts) Maximum configuration: 686 Btu (200 watts) <p>Environment:</p> <ul style="list-style-type: none"> Air temperature: <ul style="list-style-type: none"> Computer on: 10° to 35°C (50° to 95°F) Altitude: 0 to 2134 m (7000 ft) Computer off: -40° to +60°C (-40° to 140°F) Maximum altitude: 2133 m (7000 ft) Humidity (operating and storage): 8% to 80% <p>Acoustical noise emissions:</p> <ul style="list-style-type: none"> Sound power, idle: 5.0 bel maximum Sound power, operating: 5.4 bel maximum <p>Size:</p> <ul style="list-style-type: none"> Height: 438 mm (17.25 in.) Depth: 483 mm (19 in.) Width: 265 mm (6.5 in.) Weight: 16.3 kg (36 lb) to 20.8 kg (45.8 lb) depending upon configuration
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Controls and indicators

This section identifies the controls and indicators on your computer.



CD-ROM drive activity LED

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

CD-eject button

Press this button to insert a CD into or remove a CD from the CD-ROM drive.

Diskette drive activity LED

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

Diskette-eject button

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

Hard disk drive activity LED

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

Power-on LED

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

Power-control button

Press this button to turn the computer on or off.

Ethernet transmit/receive activity LED

When this LED is lit, it indicates that there is activity between the computer and the network. There are two of these LEDs, one on the front and one on the rear of the computer.

Ethernet link status LED

When this LED is lit, it indicates that there is an active connection on the Ethernet port. This LED is located on the rear of the computer.

System-error LED

When this amber LED is lit, it indicates that a system error has occurred. An LED on the system board is also lit to help isolate the error.

IEEE 1394 (FireWire) connectors

Use these connectors (four-pin on the front and six-pin on the rear) to connect FireWire devices, such as digital video cameras and external hard disk drives.

Note: Some models are shipped with the IEEE 1394 FireWire adapter installed. If your computer did not come with this adapter installed, do not install any adapter in the mini-PCI slot. It is not supported.

Mic connector (pink)

Use this connector to connect a microphone to your computer when you want to record voices or other sounds on the hard disk. You can also use this connector (and a microphone) with speech recognition software.

Line out connector (green)

Use this connector to send audio signals from the computer to external devices, such as speakers with built-in amplifiers, headphones, multimedia keyboards, or the audio line-in jack on a stereo system.

USB ports

Use these connectors to connect USB devices to your computer, using redundant Plug and Play technology.

Turning on the computer

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

Notes:

1. Turn on all external devices, such as the monitor, before turning on the computer.
2. The power-on LED on the front of the computer is lit when the computer is on and while it is being turned on.
3. You can install a circular disk over the power-control button to prevent the computer from being turned off accidentally. This disk, known as the power-control button shield, comes with your computer.

Approximately 20 seconds after the computer is connected to ac power, the power-control button becomes active, and you can turn on the computer and start the operating system by pressing the power-control button. The computer can also be turned on in any of the following ways:

- If a power failure occurs while the computer is turned on, the computer will restart automatically when power is restored.
- When you plug in your computer for the first time, the Wake on LAN[®] feature can turn on the computer. If your computer was previously turned on, it must be properly turned off for the Wake on LAN feature to turn on the computer.

What you see and hear when you start your computer depends on the features installed and the settings in the Configuration/Setup Utility program.

If power-on self-test (POST) detects a problem, there might be a series of beeps or no beep, and a numeric error message might appear on the screen. Write down any beep series and error code numbers with descriptions, and then see "Symptom-to-FRU index" on page 79.

During startup, the following messages might be displayed briefly:

- To start the Product Recovery Program, Press F11
- Press F1 for Configuration/Setup Utility, Press F12 for Boot Menu
- Press CTRL+A for SCSISelect Utility (some models)

To use these features, press the appropriate function key or keys quickly. The messages appear for only a short time. For more information about these messages, see “Using the Configuration/Setup Utility program” on page 17 and “Using the SCSISelect Utility program (some models)” on page 22.

During startup, you might not see Press F1 for Configuration/Setup. If you want to see the prompt, see the instructions for displaying the prompt in “Using the Configuration/Setup Utility program” on page 17.

Use the Configuration/Setup Utility program to configure your computer with passwords, PCI adapters, and other options. The Configuration/Setup Utility menu is displayed at the top of the screen. To navigate the menu and screen items, follow the instructions on the screen.

The operating system and application programs start from the hard disk drive. If your computer is attached to a network, the computer will begin attaching to any LANs and remote applications to which you have access. A network administrator can also start your computer remotely to download programs or gather information about computer performance.

Using preinstalled software

This section contains information to assist you in setting up the preinstalled Microsoft® operating system and describes how to use the programs that come with your computer.

Running the operating-system setup program

If you are starting your computer for the first time, the Microsoft Windows® setup program runs automatically when you start the computer. The program will prompt you to make choices or type information. If you need more detailed information than is provided in this *User's Guide*, see your Microsoft operating-system manual.

Important:

1. After turning on your computer for the first time, you must complete the operating-system setup procedure before turning off your computer; otherwise, unexpected results might occur.
2. The setup program might be slightly different from the one described in your operating-system manual. Some choices do not appear because they are preset.
3. During the setup procedure, you must indicate that you accept the license agreement.
4. The Microsoft registration information will already be displayed in the registration field. If the Product ID number is not already displayed, you must type it. The Product ID is on a label attached to the computer.

You will need the following information to complete the setup program:

- The Microsoft documentation that comes with your computer.
- Network information from your network administrator, if your computer is being connected to a network.

- The printer model and port, if a printer is attached directly to your computer.

After the setup procedure finishes and the computer restarts, the Windows desktop opens. Your computer is ready for use.

Installing other operating systems

Your computer comes with Microsoft Windows XP Professional preinstalled. To install another operating system, follow the instructions in the documentation provided with the operating system.

If you are installing another Microsoft Windows operating system, follow the instructions in the readme file on the *Device Drivers and IBM Enhanced Diagnostics* CD to install the device drivers. If you install other than a Microsoft Windows operating system, you might need additional software or device drivers.

Note: If you experience problems with the device drivers installed from the *Device Drivers and IBM Enhanced Diagnostics* CD, you can obtain the latest device drivers at <http://www.ibm.com/pc/support/> on the World Wide Web.

Before installing any operating system, be sure you obtain the latest updates. Contact the operating-system manufacturer or, if applicable, check the manufacturer's World Wide Web site to obtain the updates.

Viewing the license agreement

The IBM International License Agreement for Non-Warranted Programs is viewable through Access IBM. Use of your computer signifies acceptance of this agreement. Complete the following steps to view the license agreement:

1. Double-click the **Access IBM** icon on the Windows desktop. If the **Access IBM** icon is not available on your desktop, click **start** → **Access IBM**.
2. Click the **How do I...** tab; then, click **Solve problems**.
3. Click **IBM International License Agreement**.

Using Access IBM

Access IBM is an interface through which you can quickly access information or perform specific tasks.

The following choices are available from the Access IBM Welcome window:

- **How do I...**

Select this choice to display information about tasks that are typically performed immediately after you install a new computer, such as personalizing your computer to fit your needs, protecting your data, using recovery tools, upgrading your computer hardware, purchasing IBM services, purchasing IBM options, solving problems, and viewing the IBM International License Agreement for Non-Warranted Programs.

- **Tools & Tips**

Select this choice to display information about Access Support, antivirus tools, configuration backup and restoration tools, diagnostic programs, data migration tools, help, online books, system information and personalization, and updates.

- **On the Web**

Select this choice to display information about obtaining additional information and support on the World Wide Web.

Complete the following steps to use Access IBM:

1. Double-click the **Access IBM** icon on the Windows desktop. If the **Access IBM** icon is not available on your desktop, click **start** → **All Programs** → **IBM Information** → **Access IBM**.
2. Click one of the tabs listed on the Welcome window (for example, **How do I...**).
3. Click a topic.

Creating an emergency recovery-repair diskette

At your earliest opportunity, create a recovery-repair diskette and an IBM Enhanced Diagnostics diskette, and store them in a safe place. In the unlikely event that your Windows desktop becomes unusable, you can use the recovery-repair diskette to access the Product Recovery program. Additional information about the diskette is in Access IBM. For more information about using this diskette, see “Using the recovery-repair diskette” on page 31.

Complete the following steps to create a recovery-repair diskette:

1. From Access IBM, click the **How do I** tab; then, click **Protect data**.
2. Click **Creating emergency diskettes**.
3. Click **Recovery Repair diskette**.
4. Follow the instructions on the screen.

See “Creating an IBM Enhanced Diagnostics diskette” for information about how to create an IBM Enhanced Diagnostics diskette.

Creating an IBM Enhanced Diagnostics diskette

The *IBM Enhanced Diagnostics* diskette is a self-starting diagnostics diskette used to test hardware components on your computer.

You can use one of the following methods to create an IBM Enhanced Diagnostics diskette:

- Create a diskette using Access IBM
- Download a program image from the World Wide Web
- Create a diskette from the *Device Drivers and IBM Enhanced Diagnostics CD*

Complete the following steps to create an IBM Enhanced Diagnostics diskette using Access IBM:

1. Double-click the **Access IBM** icon and click the **How do I...** tab; then, click **Protect data**.
2. Click **Creating emergency diskettes** → **Diagnostics diskette**. A help panel with instructions for creating a diagnostics diskette appears.
3. Follow the instructions on the screen to create the diskette.

Complete the following steps to create a startable IBM Enhanced Diagnostics diskette from the World Wide Web:

1. Go to <http://www.ibm.com>.
2. Click **Support & downloads**.
3. Click **Search technical support**.
4. In the **Enter keyword(s)** field, type *diagnostics 6219*, and click **Submit**.
5. From the “Search results” page, click the *Enhanced Diagnostics* item for your computer.

6. On the next page, click the executable file for the Enhanced Diagnostics code to download it (be sure to download the file to a hard disk directory and not to a diskette). You can click the text file to display the readme file.
7. At a command prompt, change to the directory where the file was downloaded.
8. Insert a blank, high-density diskette into the diskette drive.
9. Type `filename x:` where `filename` is the name of the file you downloaded and `x` is the letter for the diskette drive; then, press Enter.

The downloaded file is self-extracting and is copied to the diskette. When the copy completes, store the diskette in a safe place.

Complete the following steps to create an IBM Enhanced Diagnostics diskette from the *Device Drivers and IBM Enhanced Diagnostics* CD:

1. Insert a formatted, blank, high-density diskette into the diskette drive.
2. Insert the *Device Drivers and IBM Enhanced Diagnostics* CD into the CD-ROM drive.
3. At a command prompt, change to the CD-ROM drive letter. For example, type `e:` (where `e` is the CD-ROM drive letter), and press Enter.
4. Change to the PCDR directory (type, `cd pcdr` and press Enter).
5. Type `makediag` and press Enter.
6. Follow the instructions on the screen to create the diskette.

For more information, see “Using the IBM Enhanced Diagnostics diskette” on page 31.

Using video features

Your computer has an Accelerated Graphics Port (AGP) graphics adapter that renders 2D or 3D image quality and uses a standard video protocol for displaying text and graphic images on a monitor screen. The adapter supports a variety of video modes. Video modes are different combinations of resolution, refresh rate, and color defined by a video standard for displaying text or graphics.

Video device drivers

To take full advantage of the graphics adapter in your computer, some operating systems and application programs require custom video device drivers. These device drivers provide greater speed, higher resolution, more available colors, and flicker-free images.

Device drivers for the graphics adapter and a readme file with instructions for installing the device drivers are provided on the *Device Drivers and IBM Enhanced Diagnostics* CD that comes with your computer and in the `c:\ibmtools\drivers` directory on the hard disk. Use the device-driver installation instructions if you need to reinstall the device drivers or if you need information about obtaining and installing updated device drivers.

Changing monitor settings

To get the best possible image on your screen and to reduce flicker, you might need to reset the resolution and refresh rate of your monitor. You can view and change monitor settings through your operating system using the instructions in the readme files on the *Device Drivers and IBM Enhanced Diagnostics* CD or in the `c:\ibmtools\drivers\` directory on the hard disk. See your operating-system documentation for more information about monitor settings.

Attention: Before changing monitor settings, review the documentation that comes with your monitor. Using a resolution or refresh rate that is not supported by your monitor might cause the screen to become unreadable and could damage the monitor. The information that comes with your monitor usually includes resolution and screen refresh rates that your monitor supports. If you need additional information, contact the manufacturer of the monitor.

If you are using a cathode ray tube (CRT) monitor, set your monitor for the highest noninterlaced refresh rate that the monitor supports. If your monitor complies with the Video Electronics Standards Association (VESA) display data channel (DDC) standard, it is probably already set to the highest refresh rate the monitor and video controller can support. If you are not sure whether your monitor is DDC-compliant, see the documentation that comes with the monitor.

If you are using a flat-panel monitor, the refresh rate does not have to be set to the highest noninterlaced refresh rate that the monitor supports. Flat-panel monitors produce flicker-free images even when they are operating at a minimum 60 Hz noninterlaced rate.

If you have a dual-monitor video adapter, see the video adapter device-driver readme file and documentation for more information about enabling dual monitors.

Using audio features

Your computer has an integrated audio controller that supports Sound Blaster applications and is compatible with the Microsoft Windows Sound System. Your computer also has a single internal speaker and three types of audio connectors. Using the audio controller, you can record and play back sound and music to enhance multimedia applications. Optionally, you can connect external speakers to the line-out connector to provide improved sound with multimedia applications.

The audio connectors in your computer are 3.5 mm (0.125-in.) mini-jacks. For the location of the audio connectors, see "Input/output connectors" on page 55.

Line in

This connector accepts audio signals into the computer sound system from external devices, such as the line output from a stereo, television, or a musical instrument. One line-in connector is on the rear of the computer.

Line out

This connector sends audio signals from the computer to external devices, such as speakers with built-in amplifiers, headphones, multimedia keyboards, or the audio line-in jack on a stereo system. Line-out connectors are on both the front and the rear of the computer.

Microphone

This connector is used to connect a microphone to your computer when you want to record voice or other sounds on the hard disk. With a microphone attached to the computer, you can also use speech recognition software. Microphone connectors are on both the front and the rear of the computer.

Using security features

To deter unauthorized use of your computer, you can use anti-intrusion features and other security features that are provided with your computer.

Anti-intrusion features

IBM anti-intrusion features help protect against the theft of computer components, such as the microprocessor, system memory modules, or hard disk drives.

A cover lock is built into your computer to prevent the cover from being removed. Two identical keys for the cover lock are also supplied. A tag attached to the keys has the key serial number and the address of the key manufacturer.

Important: Keep the key-code number, manufacturer address, and phone number in a safe place. Because locksmiths are not authorized to duplicate cover-lock keys, you must order replacement keys from the key manufacturer. You will need the key code when ordering replacement keys.

You can set the chassis-intrusion detector switch inside the computer to alert the network system administrator each time the computer cover is removed. For more information about setting the chassis-intrusion alert, see “Configuration” on page 17.

Component protection

Each component in your computer has a serial number that you can register with a security company. You can register the components individually or you can register the entire computer. By registering computer components, you can improve the chances of identifying the components if they are ever stolen and recovered. For more information about component registration, go to <http://www.ibm.com/pc/support/> on the World Wide Web.

Data protection

You can lose data from the hard disk for a variety of reasons. Security violations, viruses, or hard disk drive failures can all contribute to data loss. To help protect against the loss of valuable information, IBM has incorporated the following data-saving features in your computer.

- **SMART hard disk drive**

Your computer comes with a self-monitoring and reporting technology (SMART) hard disk drive that is enabled to report potential hard disk failures. If an error is detected, a Desktop Management Interface (DMI) compliant warning message is sent to the monitor screen and, if the computer is part of a network, to an administrator console. When an error is detected, the data on the hard disk can be backed up and the drive replaced.

- **Virus protection**

Your computer has built-in virus protection that can be enabled through the IBM Configuration/Setup Utility program. This built-in protection checks for viruses in the boot record only. Also, Norton AntiVirus for IBM is available on the hard disk.

Locking the keyboard

You can lock the keyboard so that others are unable to use it. If a user password is set using the Configuration/Setup Utility program, the keyboard is locked when you turn on the computer. You must type the password before the keyboard will unlock. See “Setting Security Passwords” in Access IBM or “Using passwords” on page 19.

Some operating systems have a keyboard and mouse lock-up feature. See the documentation that comes with your operating system for more information.

Updating system programs

System programs are the basic layer of software built into your computer. They include the power-on self-test (POST), the basic input/output system (BIOS) code, and the Configuration/Setup Utility program. POST is a set of tests and procedures that are performed each time you turn on your computer. BIOS is a layer of software that translates instructions from other layers of software into electrical signals that the computer hardware can understand. You can use the Configuration/Setup Utility program to view and change the configuration and setup of your computer.

System programs are stored in electrically erasable programmable read-only memory (EEPROM) on the system board. This is sometimes referred to as flash memory.

IBM occasionally makes changes and enhancements to the system programs. When updates are released, they are available as downloadable files on the World Wide Web. You can update system programs by starting your computer using a flash update diskette or by using the Remote Administration feature, if it is enabled. Instructions for using system programs updates are included in a readme file provided with the downloadable files.

Shutting down your operating system

When you are ready to turn off the computer, use the shutdown procedure for your operating system to save data and prevent damage to your applications. See your operating-system manual for more information.

If you are using the preinstalled Microsoft Windows XP operating system, complete the following steps to shut down your operating system and computer:

1. Save and close all files with which you are working.
2. Close all open applications.
3. Click the Windows **start** button.
4. Click **Turn Off Computer**; then, click **Turn Off** to confirm.

Turning off the computer

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

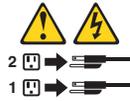
Some operating systems require an orderly shutdown before you turn off the computer. See your operating-system documentation for information about shutting down the operating system.

Statement 5

CAUTION:

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

Statement 5



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

- You can turn off your computer from the operating system. If this feature is supported by your operating system, it will turn off the computer after performing an orderly shutdown of the operating system.

To turn off the computer from the Microsoft Windows XP operating system, click **Start → Turn Off Computer**; then, click **Turn Off**.

- You can press the power-control button on the front of the computer to start an orderly shutdown of the operating system and turn off the computer, if your operating system supports this feature.

Note: After turning off the computer, wait at least 5 seconds before you press the power-control button to turn on the computer again.

- You can press and hold the power-control button for more than 4 seconds to cause an immediate shutdown of the computer. You can use this feature to turn off the computer if the operating system stops functioning.

Configuration

The following configuration programs are available to configure your computer:

- **Configuration/Setup Utility program**

The Configuration/Setup Utility program is part of the basic input/output system (BIOS) code that comes with your computer. You can use this program to configure serial port assignments, change interrupt request (IRQ) settings, change the device startup sequence, set the date and time, set passwords, and set the chassis-intrusion detector.

- **Broadcom NetXtreme Gigabit Ethernet Boot Agent**

The Broadcom NetXtreme Gigabit Ethernet Boot Agent is part of the BIOS code that comes with your computer. You can enable the Broadcom NetXtreme Gigabit Ethernet Boot Agent from the Configuration/Setup Utility program. You can use the Broadcom NetXtreme Gigabit Ethernet Boot Agent to configure the network as a startable device, and you can customize where the network startup option appears in your startup sequence.

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

If your computer comes with a SCSI adapter, you can use the SCSISelect Utility program to configure devices that are attached to the SCSI adapter. Use this program to change default values, resolve configuration conflicts, and perform a low-level format on a SCSI hard disk drive.

- **Boot Menu**

The Boot Menu program is part of the BIOS code that comes with your computer. You can use the Boot Menu program to change the startup sequence for one startup session without changing settings in the Configuration/Setup Utility program.

- **Ethernet controller configuration**

To configure the integrated Gigabit Ethernet controller, see “Configuring the Gigabit Ethernet controller” on page 24.

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

The Configuration/Setup Utility program starts automatically when POST detects that newly installed or removed hardware is not reflected in your current configuration. A diagnostic error message is displayed. See “Diagnostics” on page 25 for detailed information about POST and error messages.

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

1. Turn on the computer and watch the monitor screen. If your computer is already on when you start this procedure, you must shut down the operating system, turn off the computer, wait a few seconds until all in-use LEDs turn off, and restart the computer. (Do not use Ctrl+Alt+Del to restart the computer.)
2. When the message Press F1 for Configuration/Setup, Press F12 for Boot Menu appears at the bottom of the screen during startup, press F1. (This prompt appears on the screen for only a few seconds. You must press F1 quickly.)

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

3. Follow the instructions that appear on the screen.

Use the Up Arrow (↑) and Down Arrow (↓) keys to select menu choices in any Configuration/Setup Utility menu. Some menu choices provide information only. Some menu choices show fields that you can change. These fields are enclosed by square brackets. You can change the values in these fields by using Left Arrow (←) and Right Arrow (→) keys to change the value, or you can type information in the field.

Configuration/Setup Utility menu choices

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

Notes:

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

The following choices are available from the main menu:

- **System Summary**

This choice contains general information about your computer, such as a summary of components and computer configuration. You can view information about the type and speed of the microprocessor and the amount of memory that is installed.

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

- **System Information**

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

- **Devices and I/O Ports**

Select this choice to view or change the assignments for devices and input/output ports.

- **Start Options**

Select this choice to view or change start options. Start options take effect when you start your computer. You can designate keyboard operating characteristics, such as the keyboard speed and whether the computer starts with the keyboard number lock on or off. You also can enable the computer to run without a diskette drive, monitor, or keyboard.

The startup sequence specifies the order in which the computer checks devices to find a boot record. For example, you can define a startup sequence that checks for a startable diskette in the diskette drive; checks the hard disk drive, and then checks a network adapter. You can enable a virus-warning test that checks for changes in the master boot record at startup. You can choose to run POST in the quick mode, or read the microprocessor serial number.

You can also enable the computer to start from the network by enabling the Broadcom NetXtreme Gigabit Ethernet Boot Agent to customize the network as the first startable device in the startup sequence.

- **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 an administrator password or a system owner's name. This choice appears only on the full Configuration/Setup Utility main menu.

You can set the computer to prompt you for an administrator password or user password at startup. You can also set the security on diskette and hard disk drives to protect your data from tampering.

Select **Administrator Password** to set or change an administrator password.

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

You must set an administrator password to set a user password. A user password grants a user access to the computer for use but denies the user access to configuration settings.

You must set a user password to use the **Password on Boot** option. If a user password is set, the computer will require a password at startup.

If you set an administrator password and a user password, you can set your diskette drive and hard disk drive security settings to prevent tampering with important data. You can set **Floppy Drive** and **Hard Disk Drive** security settings to **Normal**, **Write Protect All Sectors**, and **Write Protect Boot Sectors**.

- **Advanced Setup**

Select this choice to change the values for advanced hardware features, such as PCI configuration and Plug and Play operating-system settings.

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

- **Power Management**

Select this choice to enable or disable system power settings.

- **Error Logs**

Select this choice to view any errors that occur during POST.

- **Save Settings**

Select this choice to save your customized settings.

- **Restore Settings**

Select this choice to restore the previous settings.

- **Load Default Settings**

Select this choice to restore the factory settings.

- **Exit Setup**

Select this choice to exit from the Configuration/Setup Utility program.

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

Using passwords

You can use any combination of up to seven characters (A–Z, a–z, and 0–9) for the user (power-on) password or the administrator password. When you have set one or both of the passwords, record the passwords and keep them in a secure place.

If both a user and administrator password are set, you can type either password at the password prompt that appears as you start your computer. However, if you want to change the settings in the Configuration/Setup Utility, you must type the administrator password to access the full configuration menus. If you type the user password, you can only view limited information in the Configuration/Setup Utility program.

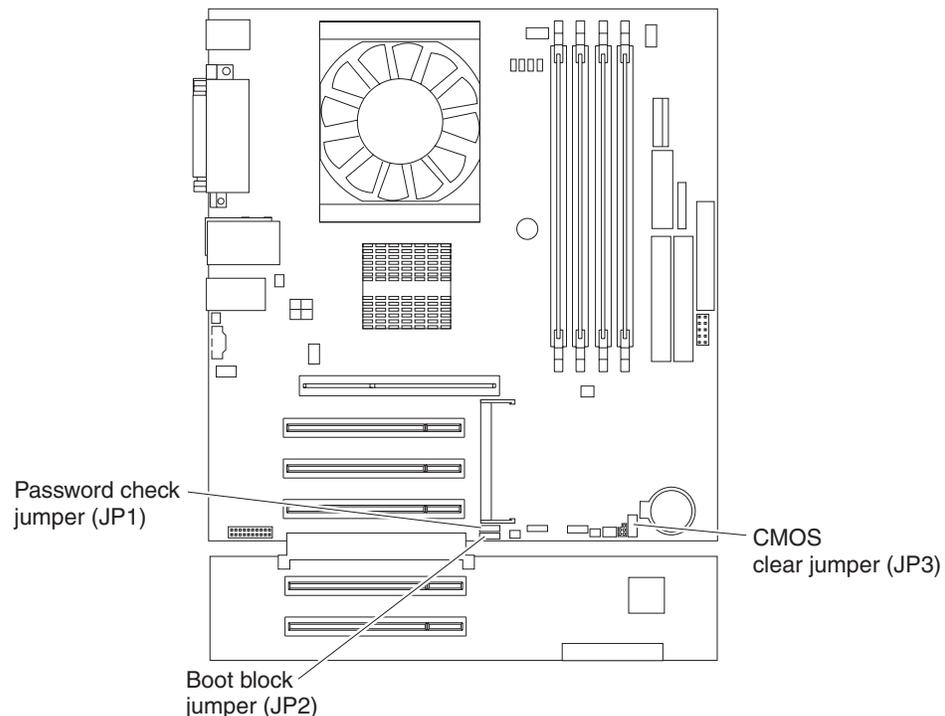
Keep a record of your password in a secure place. If you forget the user or administrator password, you can regain access to the computer through one of the following methods:

- If you have forgotten the user password and an administrator password is set, type the administrator password at the power-on prompt. Start the Configuration/Setup Utility program and change the user password.
- Clear CMOS settings by changing the position of the CMOS recovery jumper. See “Erasing a lost or forgotten password (clearing CMOS)” on page 32 for instructions.
- Change the position of the password check jumper as described in “Setting the password check jumper (JP1)” on page 21.
- Remove the battery and then install the battery (see “Replacing the battery” on page 33).

Setting the password check jumper (JP1)

The following illustration shows the location of the password check jumper (JP1) on the system board.

Note: The default setting is enabled (2-3); however, some early system may default to disable (1-2).



Complete the following steps to set the password check jumper (JP1):

1. Review "Important safety information" on page iii.
2. Turn off the computer and peripheral devices.
3. Disconnect all external cables and power cords; then, remove the cover. See "Turning off the computer" on page 14 for instructions.
 - To disable password checking, set JP1 to disable (1-2).
 - To enable password checking, set JP1 to (2-3).
4. Connect the computer to a power source, keyboard, monitor, and mouse.
5. Turn on the computer.

Enabling Broadcom NetXtreme Gigabit Ethernet Boot Agent

The Broadcom NetXtreme Gigabit Ethernet Boot Agent is part of the BIOS code that comes with your computer. You can enable the Broadcom NetXtreme Gigabit Ethernet Boot Agent from the Configuration/Setup Utility program. You can use the Broadcom NetXtreme Gigabit Ethernet Boot Agent to configure the network as a startable device, and you can customize where the network startup option appears in your startup sequence.

Complete the following steps to enable Broadcom NetXtreme Gigabit Ethernet Boot Agent:

1. From the Configuration/Setup Utility main menu, select **Devices and I/O Ports** and press Enter.

2. Select **System Board Ethernet PXE/DHCP** and use the Right Arrow (→) key to set it to **Enabled**.
3. Select **Save Settings** and press Enter.

Using the SCSISelect Utility program (some models)

SCSISelect is a menu-driven configuration utility program that you can use for models that come with a SCSI adapter. You can use this program to:

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

The following sections provide instructions for starting the SCSISelect Utility program and descriptions of the menu choices.

Starting the SCSISelect Utility program

Complete the following steps to start the SCSISelect utility program:

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

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

3. When the question *Would you like to configure the host adapter or run the SCSI disk utility?* appears, make your selection and press Enter.
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, and press Enter.

SCSISelect menu choices

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.

- **Host Adapter SCSI Termination**

This choice is set to **Enabled** and cannot be changed.

- **Boot Device Options**

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

- **SCSI Device Configuration**

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

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

- The transfer rate for Ultra3 SCSI LVD devices is 160 MBps
- The transfer rate for Ultra2 SCSI LVD devices is 80 MBps
- The transfer rate for Fast SCSI devices is 20 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 instructions on 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 computer 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 Boot Menu program

The Boot Menu program is a built-in, menu-driven configuration utility program that you can use to temporarily redefine the startup sequence without changing settings in the Configuration/Setup Utility program.

Complete the following steps to use the Boot Menu program to change the startup sequence of your computer:

1. Turn off the computer.
2. Restart the computer.
3. Press F12.
4. Select the startup device.

The next time the computer is started, it returns to the startup sequence set in the Configuration/Setup Utility program.

Configuring the Gigabit Ethernet controller

The Ethernet controller is integrated on the system board. It provides an interface for connecting to a 10-Mbps, 100-Mbps, or 1000-Mbps network and provides full duplex (FDX) capability, which enables simultaneous transmission and reception of data on the network. If the Ethernet port in the computer supports auto-negotiation, the controller detects the data-transfer rate of the network (10BASE-T, 100BASE-TX, or 1000BASE-T) and automatically operates at that rate, in full-duplex or half-duplex mode, as appropriate. The Ethernet controller supports optional modes, such as teaming, priority packets, load balancing, fault tolerance, and virtual LANs, which provide better performance, security, and throughput. These modes apply to the integrated Ethernet controller and to controllers on supported Ethernet adapters.

You do not need to set any jumpers or configure the controller. However, you must install a device driver to enable the operating system to address the controller. For the latest device drivers and information about configuring your Gigabit Ethernet controller, go to <http://www.ibm.com/pc/support/> on the World Wide Web.

Diagnostics

This section provides basic troubleshooting information to help you identify and resolve some problems that might occur.

If you cannot locate and correct the problem using the information in this chapter, see “Symptom-to-FRU index” on page 79.

Diagnostic tools overview

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

- **POST beep codes and error messages**

The power-on self-test generates beep codes and messages to indicate successful test completion or the detection of a problem. See “Power-on self-test (POST)” on page 26 for more information.

- **Error log**

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

To view the contents of the error logs, start the Configuration/Setup Utility program; then, select **Error Logs** from the main menu.

- **Diagnostic programs**

The system diagnostic programs are on the *Device Drivers and IBM Enhanced Diagnostics* CD. These programs are the primary methods of testing the major components of your computer. See “Diagnostic programs and error messages” on page 27 for more information.

- **Symptom-to-FRU index**

This index lists problem symptoms and steps to correct each problem. See the “Symptom-to-FRU index” on page 79 for more information.

Power-on self-test (POST)

When you turn on the computer, the power-on self-test (POST) performs a series of tests to check the operation of system components and some of the installed options.

If POST finishes without detecting any problems, the first window of your operating system or application program appears.

If POST detects a problem, more than one beep sounds and an error message appears on your screen.

Notes:

1. If you have a user password set, you must type the password and press Enter, when prompted, before the operating system will start.
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 be resolved the next time you run the test.

POST beep codes

The possible types of beep codes are:

No beeps

If no beep occurs after your computer completes POST, see “Undetermined problems” on page 98.

Continuous beep

Your startup (boot) microprocessor has failed, or your system board or speaker subsystem might contain a failing component. If the system continues through POST with no errors, see “General checkout” on page 1. If no video appears, the startup processor has failed.

Beep codes for specific failures

Beep codes indicating specific system problems. For complete list of beep codes see “POST error codes” on page 90.

POST error messages

POST error messages can appear when a problem is detected during startup. For a complete list of POST messages, see “POST error codes” on page 90.

Diagnostic programs and error messages

The system diagnostic programs are stored on the *Device Drivers and IBM Enhanced Diagnostics* CD. These programs are the primary method of testing the major components of your computer.

Diagnostic error messages indicate that a problem exists; they are not intended to be used to identify a failing part. For a complete list of Diagnostic error messages, see “Diagnostic error codes” on page 81.

Sometimes the first error to occur causes additional errors. In this case, the computer 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 be displayed 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 201 is for memory.

ttt is the three-digit failure code for the exact test failure. (These codes are for trained service personnel and are described in the *Hardware Maintenance Manual*.)

iii is the three-digit device ID. (These codes are for trained service personnel and are described in the *Hardware Maintenance Manual*.)

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

cc are the check digits that are 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) described in the previous list.

Result

can be one of the following:

Passed

This result occurs when the diagnostic test is completed 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 is used to analyze the problem.

Starting the diagnostic programs and viewing the test log

The IBM Enhanced Diagnostics programs isolate problems from your computer hardware and software. The programs run independently of the operating system and *must be run either from a CD or diskette*. This method of testing is generally used when other methods are not accessible or have not been successful in isolating a problem suspected to be hardware related.

A Device Drivers and IBM Enhanced Diagnostics CD comes with your computer. You can also download the latest version of the diagnostic programs from <http://www.ibm.com/pc/support/> on the World Wide Web.

Complete the following steps to view the test log.

Note: If you are already running the diagnostic program, begin with step 4.

1. Insert the IBM Enhanced Diagnostics diskette or the *Device Drivers and IBM Enhanced Diagnostics CD*.
2. Shut down your operating system and restart the computer.
3. If a user password is set, the system prompts you for it. Type the password, and press Enter.
4. Run the appropriate diagnostics program and when the Diagnostic Programs screen appears, select **Utility**.
5. Select **View Test Log** from the list that appears; then, follow the instructions on the screen.

The test log records data about system failures and other pertinent information. The test log will not contain any information until after the diagnostic program has run.

6. Save the test log to a file on a diskette or to your hard disk.

Notes:

- a. 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.
- b. The system maintains the test-log data while the system is turned on. When you turn off the power to the computer, the test log is cleared.

Small computer system interface (SCSI) messages

If you receive a SCSI error message when running the SCSISelect Utility program, 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 computer.
- 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 you have verified these items and the problem persists, run the diagnostic programs to obtain additional information about the failing device. If the error remains or recurs, see “Symptom-to-FRU index” on page 79.

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

PC-Doctor for Windows

Your computer contains PC-Doctor for Windows, which is designed specifically for the Windows operating environment. Because these diagnostics work with the operating system, they test hardware and analyze certain software components. These diagnostic programs are especially useful for isolating operating-system and device-driver problems.

Complete the following steps to use PC-Doctor for Windows:

1. On the Windows desktop, click **Start→All Programs → PC-Doctor → PC-Doctor**.
2. Follow the instructions on the screen. Help is available online.

Creating and using an IBM Enhanced Diagnostics diskette

The IBM Enhanced Diagnostics diskette is used to test hardware components on your computer. Use the following information and instructions to create and use an IBM Enhanced Diagnostics diskette.

Creating an IBM Enhanced Diagnostics diskette

You can use one of the following methods to create an IBM Enhanced Diagnostics diskette:

- Create a diskette using Access IBM
- Download a program image from the World Wide Web
- Create a diskette from the *Device Drivers and IBM Enhanced Diagnostics CD*

Complete the following steps to create the diagnostics diskette using Access IBM:

1. Double-click the **Access IBM** icon and click the **How do I...** tab; then, click **Protect data**.
2. Click **Creating emergency diskettes → Diagnostics diskette**. A help panel card with instructions for creating a diagnostics diskette appears.
3. Follow the instructions on the screen to create the diskette.

Complete the following steps to create a startable IBM Enhanced Diagnostics diskette from the World Wide Web:

1. Go to <http://www.ibm.com>.
2. Click **Support & downloads**.
3. Click **Search technical support**.
4. In the **Enter keyword(s)** field, type `diagnostics 6219`, and click **Submit**.
5. From the “Search results” page, click the Enhanced Diagnostics item for your computer.
6. On the next page, click the executable file for the Enhanced Diagnostics code to download it (be sure to download the file to a hard disk directory and not to a diskette). You can click the text file to display the readme file.
7. At a command prompt, change to the directory where the file was downloaded.
8. Insert a blank, high-density diskette into the diskette drive.
9. Type `filename x:` where `filename` is the name of the file you downloaded and `x` is the letter for the diskette drive; then, press Enter.

The downloaded file is self-extracting and is copied to the diskette. When the copy completes, store the diskette in a safe place.

Complete the following steps to create an IBM Enhanced Diagnostics diskette from the *Device Drivers and IBM Enhanced Diagnostics* CD:

1. Insert a formatted, blank, high-density diskette into the diskette drive.
2. Insert the *Device Drivers and IBM Enhanced Diagnostics* CD into the CD-ROM drive.
3. At a command prompt, change to the CD-ROM drive letter. For example, type *e:* (where *e* is the CD-ROM drive letter), and press Enter.
4. Change to the PCDR directory (type, *cd pcdr* and press Enter).
5. Type *makediag* and press Enter.
6. Follow the instructions on the screen to create the diskette.

Using the IBM Enhanced Diagnostics diskette

Complete the following steps to start the IBM Enhanced Diagnostics diskette:

1. Turn off any attached devices and your computer.
2. Insert the IBM Enhanced Diagnostics diskette into the diskette drive.
3. Turn on all attached devices; then, turn on your computer.
4. Follow the instructions on the screen.

When the tests have been completed, you can view the test log by selecting **Utility** from the top of the screen.

Using the recovery-repair diskette

In some circumstances, files on your hard disk might become damaged so that the F11 prompt is not displayed when you start your computer. If you have created a recovery-repair diskette, use the following procedure to access the Product Recovery program on the hard disk. For instructions to create a recovery-repair diskette, see "Creating an emergency recovery-repair diskette" on page 10.

1. Insert the recovery-repair diskette into the diskette drive.
2. Turn off your computer.
3. Turn on your computer, and follow the directions on the screen.

Note: If the repair operation finishes without error, the F11 prompt will be displayed the next time you restart your computer.

If an error message is displayed during the repair operation and the repair operation cannot be completed, you might have a problem with the Product Recovery program or the partition that contains the Product Recovery program. Use a *Product Recovery* CD to access the Product Recovery program.

Recovering from a POST/BIOS update failure

If power to your computer is interrupted while POST/BIOS code is being updated (flash update), your computer might not restart (reboot) correctly. If this happens, use the following procedure to recover:

1. Review the "Important safety information" on page iii and "Handling electrostatic discharge-sensitive devices" on page 110.
2. Copy the *flashfil.fls* file from the POST/BIOS update (flash) diskette to a blank, formatted diskette.

3. Insert the diskette containing the flashfil.fl5 file into the diskette drive. You can also download this file from <http://www.ibm.com/pc/support/> on the World Wide Web.
4. Turn on the computer and the monitor.
5. After the update session is completed, turn off the computer and monitor.
6. Remove the diskette from the diskette drive.
7. Turn on the computer to restart the operating system.

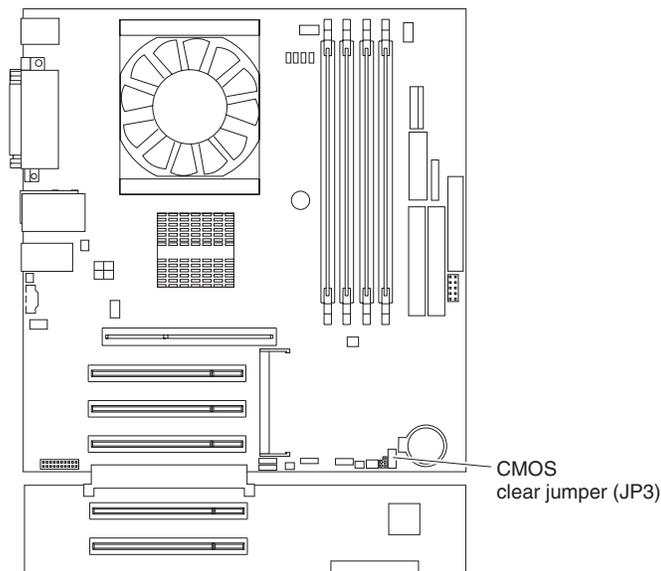
Erasing a lost or forgotten password (clearing CMOS)

This section applies to lost or forgotten passwords.

The CMOS recovery jumper is used to clear CMOS memory in the event you lose your user or administrator password. This jumper is also used to recover from a BIOS failure. See “Recovering from a POST/BIOS update failure” on page 31.

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

1. Review the “Important safety information” on page iii and “Handling electrostatic discharge-sensitive devices” on page 110.
2. Turn off the computer and all attached devices.
3. Unplug the power cord.
4. Remove the side cover. See “Removing the side cover” on page 41.
5. Remove the support bracket (see “Removing and installing the support bracket” on page 41).
6. Locate the CMOS recovery jumper (JP3) on the system board, removing any adapters that impede access to the jumper. The following illustration shows the location of the jumper on the system board.



7. Move the CMOS recovery jumper from pins 1 and 2 to pins 2 and 3.
8. Wait 60 seconds: then, return the CMOS recovery jumper to pins 1 and 2.
9. Replace any adapters that were removed; then, replace the support bracket and the side cover. (See “Removing and installing the support bracket” on page 41 and “Replacing the side cover” on page 53).

You can now start the computer one time without having to use the power-on password and start the Configuration/Setup Utility program. At this time, you can either delete the old password or set a new user password. If you do not change or delete the password, the next time you start the computer, the original user password will be reinstated.

10. Connect the computer to a power source, keyboard, monitor, and mouse.
11. Turn on the computer. The Configuration/Setup Utility program starts.
12. Follow the instructions to erase the existing password or create a new password.
13. Select **Save Settings** and press Enter.

Replacing the battery

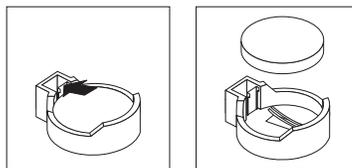
When replacing the battery, you must replace it with a lithium battery of the same type from the same manufacturer. To avoid possible danger, read “Important safety information” on page iii.

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

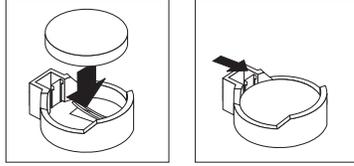
Note: After you replace the battery, you must reconfigure your computer and reset the system date and time.

Complete the following steps to replace the battery:

1. Review the “Important safety information” on page iii, “Installation guidelines” on page 35, and “Handling electrostatic discharge-sensitive devices” on page 110.
2. Follow any special handling and installation instructions supplied with the replacement battery.
3. Turn off the computer and all attached devices. Disconnect all external cables and power cords; then, remove the computer cover and the support bracket. (See “Removing the side cover” on page 41 and “Removing and installing the support bracket” on page 41.)
4. Remove the battery:
 - a. Use a fingernail to press the top of the battery clip away from the battery. The battery pops up when released.
 - b. Use your thumb and index finger to lift the battery from the socket.



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



6. Replace the support bracket (see “Removing and installing the support bracket” on page 41).
7. Replace the cover and connect the cables.
8. Turn on the computer.
9. Start the Configuration/Setup Utility program and set configuration parameters.
 - Set the system date and time.
 - Set passwords if necessary.
 - Save the configuration.

Installing options

This chapter provides instructions for installing or replacing options in your computer. For a list of supported options for your computer, go to <http://www.ibm.com/pc/> on the World Wide Web; then, select your country and navigate to the list of options for your computer.

Installation guidelines

Before you begin installing options in your computer, read the following information:

- Review the “Important safety information” on page iii, “Installation guidelines”, and “Handling electrostatic discharge-sensitive devices” on page 110. This information will help keep you safe while working with your computer and options.
- Ensure that you have an adequate number of properly grounded electrical outlets for your computer, monitor, and other devices that you will connect to the computer.
- Back up all important data before you make changes to disk drives.
- Have a small flat-blade screwdriver available.
- When you need to access the inside of the computer to install options, you might find it easier to lay the computer on its side. Before laying the computer on its side, rotate the two front stabilizing feet a quarter turn inward toward the computer, so that they do not break. Before returning the computer to an upright position, rotate the front stabilizing feet a quarter turn outward from the computer. See “Moving the stabilizing feet” on page 40 for more information.
- The blue color on components and labels identifies touch points, where you can grip a component, move a latch, and so on.
- For a list of supported options for your computer, go to <http://www.ibm.com/pc/> on the World Wide Web; then, select your country and navigate to the list of options for your computer.

System reliability considerations

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

- Each of the drive bays has a drive or a filler panel and electromagnetic compatibility (EMC) shield installed.
- There is adequate space around the computer to allow the computer cooling system to work properly. Leave approximately 50 mm (2 in.) of open space around the front and rear of the computer. Do not place objects in front of the fans. For proper cooling and airflow, replace the computer cover before turning on the computer. Operating the computer for extended periods of time (over 30 minutes) with the computer cover removed might damage computer components.
- You have followed the cabling instructions that come with optional adapters.
- You have replaced a failed fan as soon as possible.

Handling static-sensitive devices

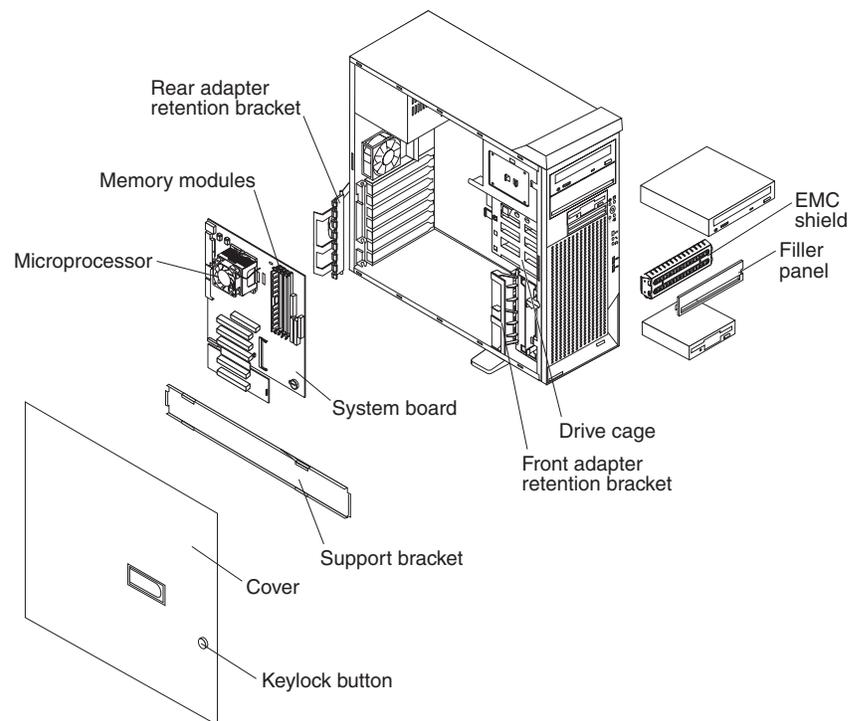
Attention: Static electricity can damage electronic devices, including your computer. To avoid damage, keep static-sensitive devices in their static-protective packages until you are ready to install them.

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

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

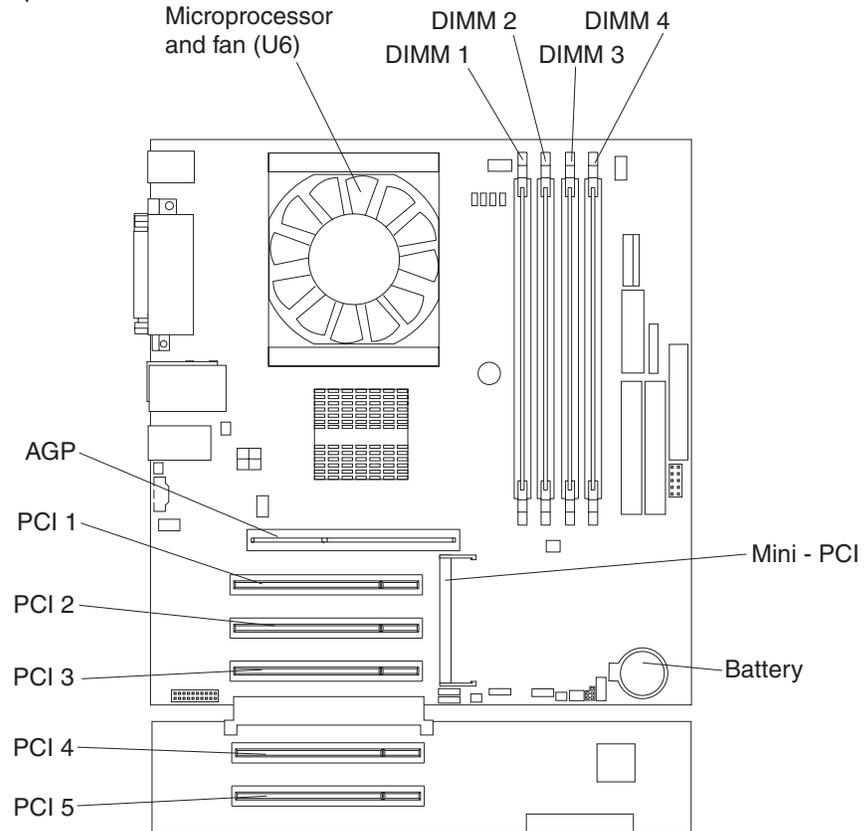
Major components of the computer

The following illustration shows the major components in the computer.



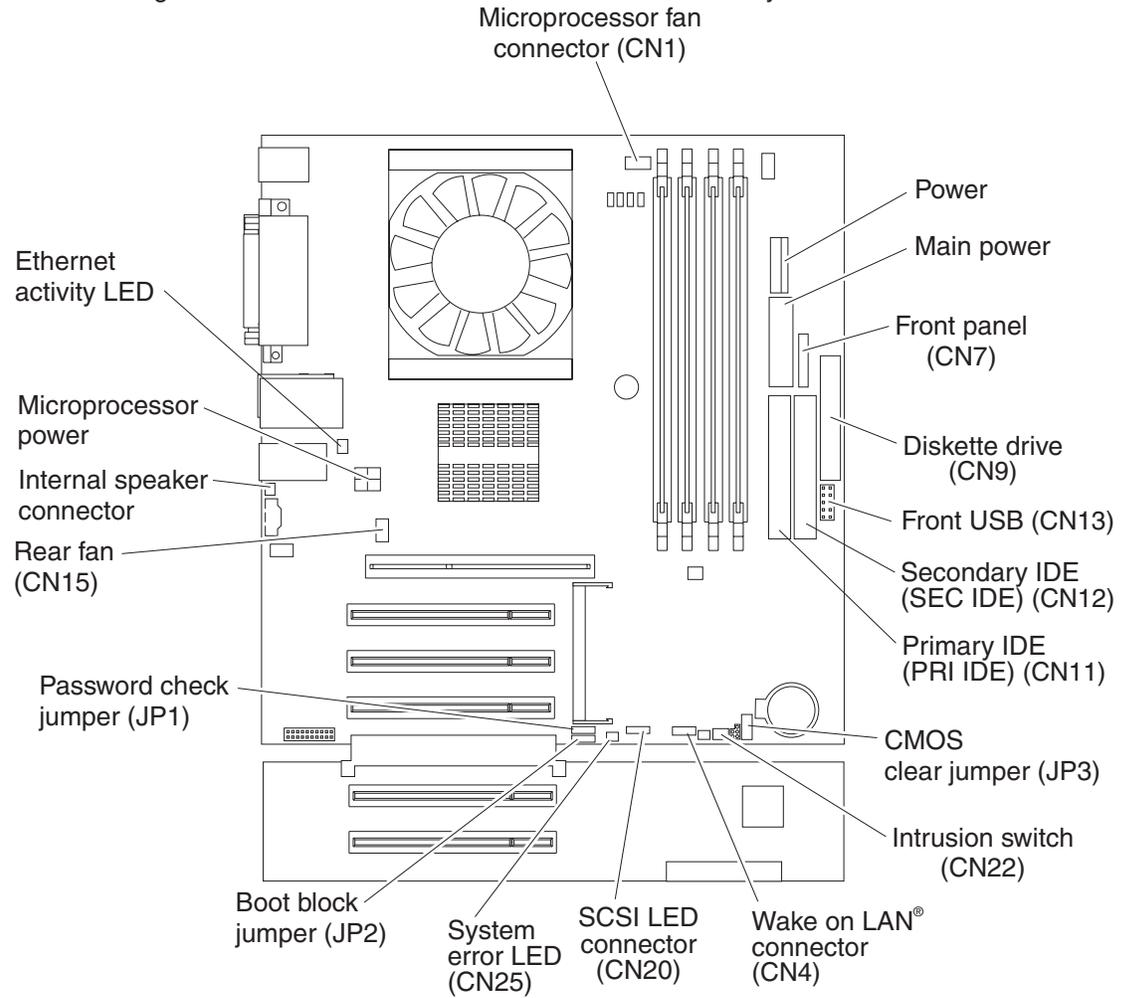
System-board option connectors

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

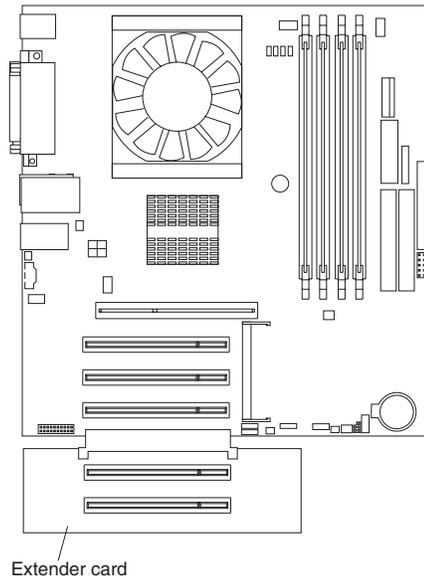


System-board internal connectors

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

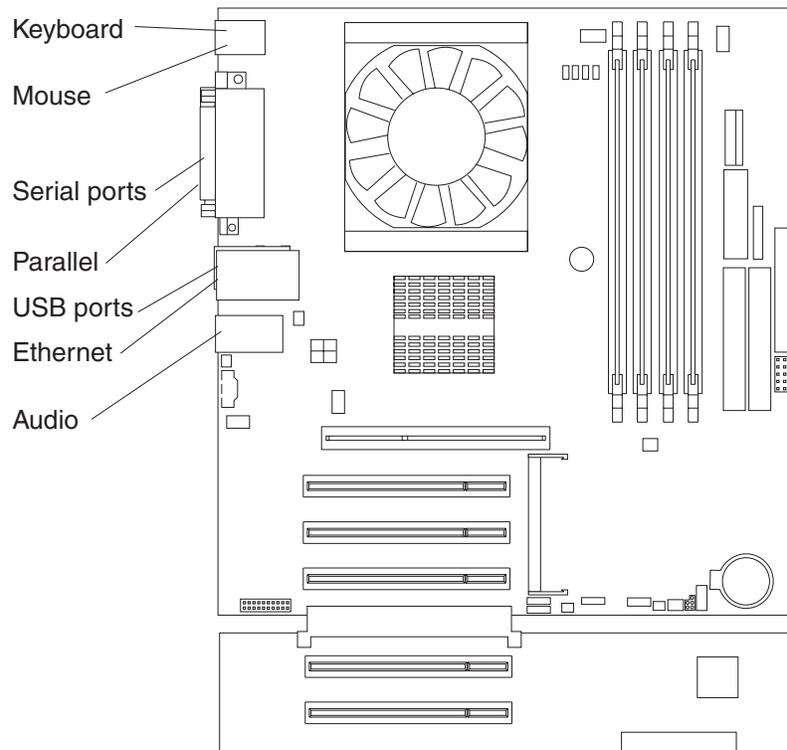


The IDE models have a shorter extender card, as shown in the following illustration.



System-board external connectors

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



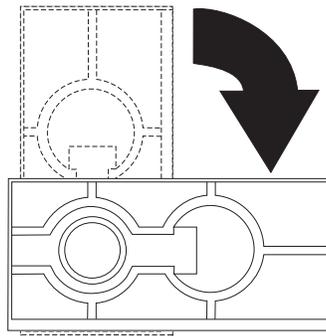
Installing options

This section provides instructions for installing hardware options in your computer.

Moving the stabilizing feet

The two front feet on the bottom of the computer rotate 90 degrees to provide additional stability.

When installing options in the computer, you might find it easier to lay the computer on its side. If you do so, rotate the feet inward toward the computer, so that they do not break off.

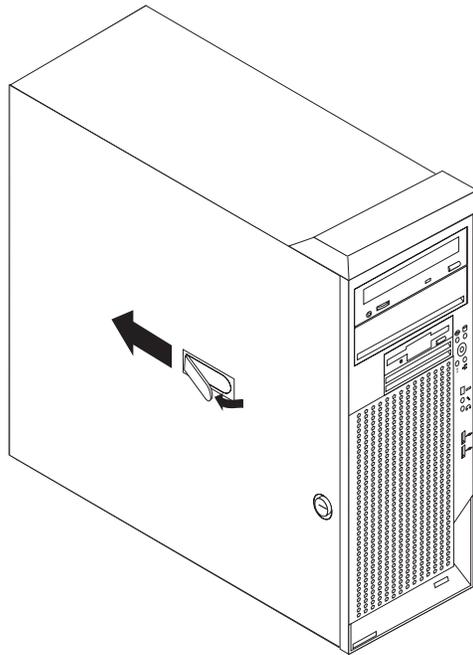


Removing the side cover

To remove the side cover, you might find it easier to lay the computer on its side. If you do, move the stabilizing feet so that they do not break (see “Moving the stabilizing feet” on page 40).

Complete the following steps to remove the side cover of the computer:

1. Review the “Important safety information” on page iii.
2. Turn off the computer and all attached devices (see “Turning off the computer” on page 14).
3. Disconnect all external cables and power cords.
4. Pull the cover-release latch away from the computer, and push the cover toward the rear of the computer. Lift the side cover off the computer and set it aside.



For instructions for replacing the side cover, see “Replacing the side cover” on page 53.

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

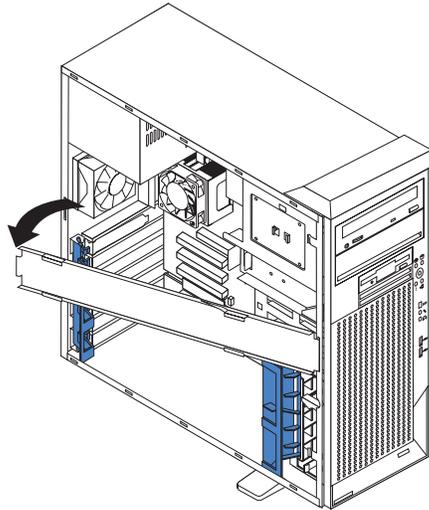
Removing and installing the support bracket

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

Complete the following steps to remove the support bracket:

1. Review the “Installation guidelines” on page 35.
2. Remove the side cover (“Removing the side cover”).
3. Pull out on the rear end of the support bracket approximately 150 mm (6 in.).

4. Disengage the front end of the support bracket from the computer and set the bracket aside.



To reinstall the support bracket, reverse the previous steps.

Working with adapters

Your computer comes with adapter connectors or *slots*. The Accelerated Graphics Port (AGP) video adapter is installed in the AGP slot and some models have an IEEE 1394 (FireWire) adapter installed in the mini-PCI slot. You can install up to five additional optional adapters in your computer in PCI slots 1 through 5.

See “System-board option connectors” on page 37 for the locations of expansion slots on the system board.

Adapter considerations

Before you install an adapter, review the following information:

- Read the documentation that comes with your operating system.
- Locate the documentation that comes with the adapter and follow those instructions in addition to the instructions in this chapter. If you need to change the switch or jumper settings on your adapter, follow the instructions that come with the adapter.
- You can install only 32-bit adapters in the 32-bit PCI slots 1 through 5.
- You can install full-length adapters in all five expansion slots. None of the expansion slots are hot-plug slots.
- Your computer supports 5.0 V signaling and universal PCI adapters; it does not support 3.3 V signaling adapters.
- The system scans the AGP slot, mini-PCI slot, and PCI expansion slots 1 through 5 to assign system resources. Then, the system starts the PCI devices in the following order, if you have not changed the default startup sequence: AGP slot, mini-PCI slot, PCI expansion slot 1, system-board integrated drive electronics (IDE) or small computer system interface (SCSI) devices, and then PCI slots 2 through 5.
- Some models come with a IEEE 1394 (FireWire) adapter installed in the mini-PCI slot. If your computer did not come with a IEEE 1394 (FireWire) adapter installed, do not install any adapter in the mini-PCI slot.

- For a list of supported options for your computer, go to <http://www.ibm.com/pc/> on the World Wide Web; then, select your country and navigate to the list of options for your computer.

Installing an adapter

Note: The AGP Pro slot and PCI slots 1, 2, and 3 must be empty for you to access the IEEE 1394 (FireWire) adapter in the mini-PCI slot. If you are replacing the IEEE 1394 (FireWire) adapter, the optional PCI adapter and the AGP video adapter will need to be temporarily removed.

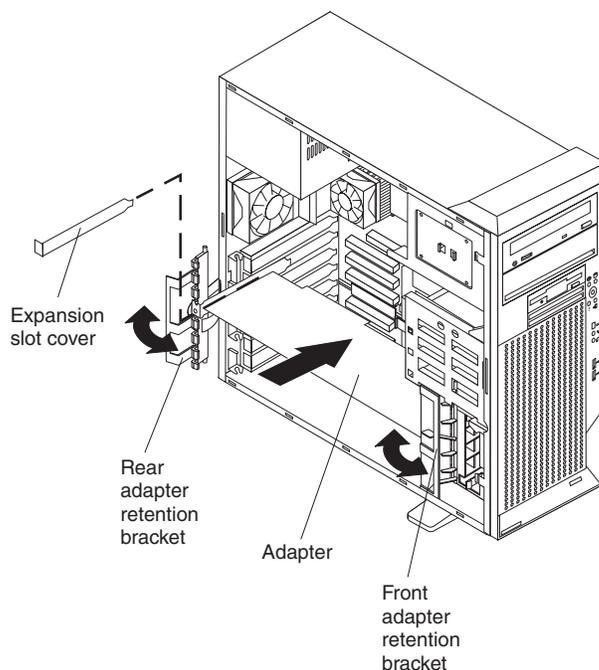
Complete the following steps to install an adapter in your computer:

1. Review the “Important safety information” on page iii, and “Handling electrostatic discharge-sensitive devices” on page 110.
2. Turn off the computer and all attached devices.
3. Disconnect all external cables and power cords; then, remove the side cover (see “Removing the side cover” on page 41).
4. Determine which PCI slot you will use for the adapter. Check the instructions that come with the adapter for any requirements, restrictions, or cabling instructions. It might be easier to route cables before you install the adapter.
5. For full-length adapters, rotate the rear adapter-retention bracket to the open (unlocked) position and remove it from the computer. Rotate the front adapter-retention bracket to the open position. If you are installing a smaller adapter, remove only the rear adapter-retention bracket.
6. If there is an adapter already installed in the slot, remove it and place it on a static-protective surface.

If the slot is empty, remove the expansion-slot cover. From the rear of the computer, press on the slot cover. Grasp it and pull it out of the expansion slot. Store it in a safe place for future use.

Attention: Expansion-slot covers must be installed on all vacant slots. This maintains the electronic emissions standards of the computer and ensures proper ventilation of computer components.

7. Set any jumpers or switches on the adapter or system board according to the documentation that comes with the adapter.
8. Remove the adapter from the static-protective package, carefully grasp the adapter by the top edge or upper corners, and align it with the expansion slot guides; then, press the adapter *firmly* into the expansion slot. Move the adapter directly from the static-protective package to the adapter slot. Avoid touching the components and gold-edge connectors on the adapter. Ensure that the adapter is correctly seated in the expansion slot before you turn on the computer. Incomplete installation of an adapter might damage the system board or the adapter.



9. Connect required cables to the adapter. Route cables so that they do not block the flow of air from the fans. If you are installing an optional SCSI adapter, see “Cabling an optional SCSI adapter” on page 45 for additional information.
10. If you have another adapter to install, repeat steps 4 through 9.
11. If you have installed a full-length adapter, rotate the front adapter-support bracket to the closed (locked) position.

Note: If any adapter in your computer is large or has heavy cables attached to it, you can secure the adapter with a screw: insert one backup expansion-slot screw (stored next to slot 1) through the top of each adapter bracket into the screw hole and secure the adapter before proceeding to the next step.

12. Reinstall the rear adapter-retention bracket; then, rotate the bracket to the closed (locked) position.

Note: The rear retention bracket rests against the computer side cover. You might find it easier to lay the computer on its side to replace the side cover.

13. If you have other options to install, do so now; otherwise, continue with step 14.
14. Replace the support bracket (see “Removing and installing the support bracket” on page 41).
15. Replace the side cover (see “Replacing the side cover” on page 53).
16. Reconnect the external cables and power cords; then, turn on the attached devices and the computer.

Cabling an optional SCSI adapter

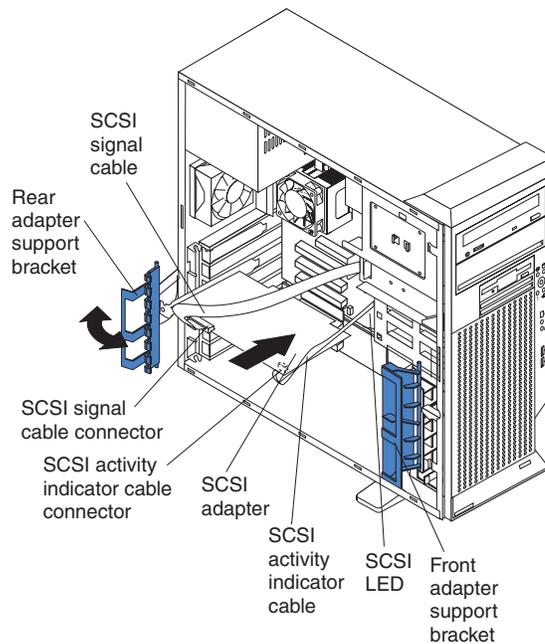
You can install an optional SCSI adapter in your computer to control the internal hard disk drives. With a SCSI adapter installed, you can configure the internal hard disk drives into disk arrays. You can also cable a SCSI adapter to external hard disk drives. See your SCSI adapter option documentation for complete instructions for installing a SCSI adapter in your computer and for additional information about SCSI adapters.

Notes:

1. An optional SCSI adapter is required to connect external SCSI devices.
2. The SCSI cables used by the integrated SCSI controller cannot be used with an optional SCSI adapter.

Complete the following steps to cable an optional SCSI adapter:

1. Install the SCSI adapter (see “Installing an adapter” on page 43).
2. Connect the SCSI-signal cable to the adapter and to one or more of the signal-cable connectors on the rear of the SCSI devices.
3. Connect the SCSI-activity-indicator cable to the adapter and to the SCSI-LED connector on the system board. See “System-board internal connectors” on page 38 for the location of the SCSI-LED connector.



4. Complete the installation of the optional SCSI adapter.

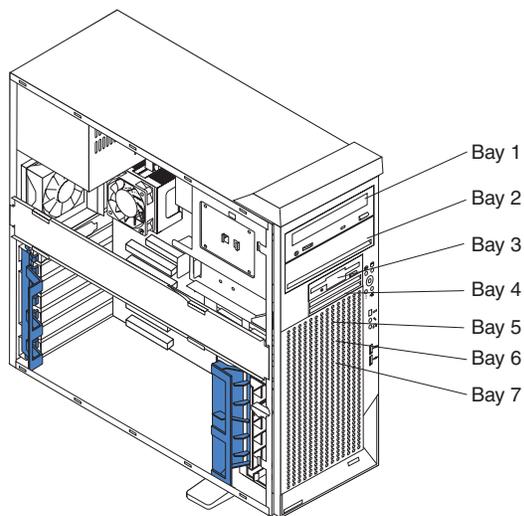
Installing internal drives

Depending on your computer model, you might have one or more of the following drives installed:

- Diskette
- Hard disk
- CD-ROM, CD-RW, or DVD/CD-RW combo

Internal drive bays

Your IntelliStation M Pro computer comes with an IDE CD-ROM or DVD/CD-RW drive in bay 1, a 3.5-in., 1.44 MB diskette drive in bay 3, and a hard disk drive in bay 7.



Notes:

1. Diskette drives, tape drives, CD-ROM, DVD/CD-RW, and DVD-ROM drives are examples of removable-media drives. You can install removable-media drives in bays 1, 2, 3, and 4 only.
2. You can install a 3.5-in. slim-high or 5.25-in. half-high removable-media drive, such as a tape backup drive, in bay 2.
3. The IntelliStation M Pro computer supports only one diskette drive.
4. To install a 3.5-in. drive in a 5.25-in. bay, you must use the 5.25-in. conversion kit, supplied with the option.
5. The electromagnetic interference (EMI) integrity and cooling of the computer are protected by having all bays and PCI slots covered or occupied. When you install a drive or PCI adapter, save the EMC shield and filler panel from the bay or the PCI adapter slot cover in the event you later remove the option.
6. For a complete list of supported options for your computer, go to <http://www.ibm.com/pc/> on the World Wide Web; then, select your country and navigate to the list of options for your computer.

Preinstallation steps

Some of these steps are required only the first time you install a hard disk drive in a specific bay.

1. Review the “Important safety information” on page iii, “Installation guidelines” on page 35, and the documentation that comes with your drive.
2. Verify that you have all the cables and other equipment specified in the documentation that comes with the drive.
3. Choose the bay in which you want to install the drive.
4. Check the instructions that come with the drive to see if you need to set any switches or jumpers on the drive. If you are installing a SCSI device, be sure to set the SCSI ID for that device.

Installing a drive in bay 2 or 4

Complete the following steps to install a drive in bay 2 or 4:

1. Follow the instructions in “Preinstallation steps” on page 47.
2. Turn off the computer and all attached devices.
3. Disconnect all external cables and power cords; then, remove the side cover (see “Removing the side cover” on page 41).
4. Remove the support bracket (see “Removing and installing the support bracket” on page 41).
5. Use a screwdriver to pry the filler panel and EMC shield away from the computer.

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

Statement 3

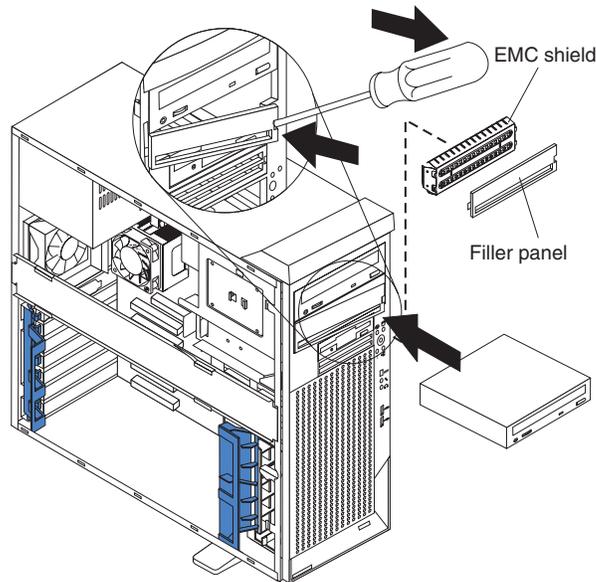
CAUTION:

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

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

Danger

Some laser products contain an embedded Class 3A or Class 3B laser diode. Note the following. Laser radiation when open. Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam.



6. Touch the static-protective package containing the drive to any unpainted metal surface on the computer; then, remove the drive from the package and place it on a static-protective surface.
7. Set any jumpers or switches on the drive according to the documentation that comes with the drive.

Note: You might find it easier to install the new drive into the appropriate opening on the front, and then attach the cables.

8. If you are installing a 5.25-in. drive in bay 2, push the drive into the bay; then, use the two screws to attach the drive to the drive cage. If you are installing a 3.5-in. drive in bay 2, you must attach the 5.25-in. conversion kit, supplied with your option, to the 3.5-in. drive.
9. Determine whether the drive is an IDE or SCSI device; then, connect one end of the appropriate signal cable into the back of the drive and the other end of this cable into the appropriate IDE or SCSI connector on the system board. See "Power and signal cables for internal drives" on page 50 for additional information about cabling drives and "System-board internal connectors" on page 38 for the location of IDE and SCSI connectors on the system board. If there are open connectors on the cables connecting existing IDE or SCSI drives, these cables can be used to connect the new drive.
10. Route the signal cable so that it does not block the airflow to the rear of the drives or over the microprocessor.
11. Connect the power cable to the back of the drive. The connectors are keyed and can be inserted only one way.
12. If you have other options to install or remove, do so now.
13. Replace the support bracket (see "Removing and installing the support bracket" on page 41).
14. Replace the side cover (see "Replacing the side cover" on page 53).
15. Reconnect the external cables and power cords; then, turn on the attached devices and the computer.

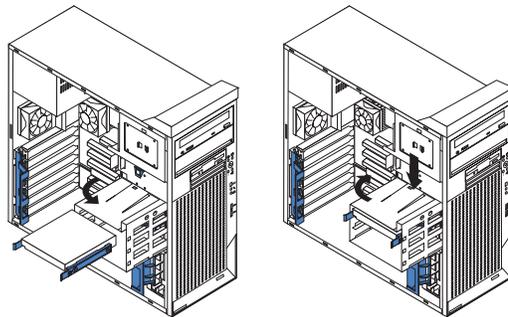
Installing a hard disk drive in bay 5, 6, or 7

Bays 5, 6, and 7 are in the drive cage. The drive cage is behind the front of the adapter-support bracket.

Note: When installing options, you might find it easier to work with the computer lying on its side.

Complete the following steps to install a drive in bay 5, 6, or 7:

1. Follow the instructions in “Preinstallation steps” on page 47.
2. Turn off the computer and all attached devices.
3. Disconnect all external cables and power cords; then, remove the cover (see “Removing the side cover” on page 41).
4. Remove the support bracket (see “Removing and installing the support bracket” on page 41).
5. Grasp the drive cage and rotate the cage out of the computer until it locks into place with the drive-cage retention tab and the open ends of the drive slots and installed drives are facing you. Ensure that the drive cage locks into place over the drive-cage retention tab by rotating the drive cage all the way out of the computer.



6. Attach the blue guide rails to the side of the drive using the screws that are provided.
7. Slide the drive into the drive cage until the plastic tabs on the drive guide rails lock into place in the drive cage. Clear any cables that might impede the replacement of the drive cage.
8. Determine whether the drive is an IDE or SCSI device; then, connect one end of the appropriate signal cable into the back of the drive and the other end of this cable into the appropriate IDE or SCSI connector on the system board. See “Power and signal cables for internal drives” on page 50 for additional information about cabling drives and “System-board internal connectors” on page 38 for the location of IDE and SCSI connectors on the system board. If there are open connectors on the cables connecting existing IDE or SCSI drives, these cables can be used to connect the new drive.
9. Route the signal cable so that it does not block the airflow to the rear of the drives or over the microprocessor.
10. Connect the power cable to the back of the drive. The connectors are keyed and can be inserted only one way.
11. Push the drive cage outward, and press in on the drive-cage release tab; then, rotate the cage back into the computer.
12. If you have other options to install or remove, do so now.
13. Replace the support bracket (see “Removing and installing the support bracket” on page 41).
14. Replace the side cover (see “Replacing the side cover” on page 53).
15. Reconnect the external cables and power cords; then, turn on the attached devices and the computer.

Power and signal cables for internal drives

Your computer uses cables to connect IDE and SCSI devices to the power supply and to the system board. (See “System-board internal connectors” on page 38 for the location of system-board connectors.) Review the following information before connecting power and signal cables to internal drives:

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

The following cables are provided:

- **Power cables:** Four-wire power cables connect the drives to the power supply. At the end of these cables are plastic connectors that can be attached to different drives; these connectors vary in size.
- **Signal cables:** Signal cables are typically flat cables, also called ribbon cables, that connect IDE, SCSI, and diskette drives to the system board. Two or three types of signal cable come with your computer:
 - **IDE:** The wider IDE signal cable has three connectors. One of these connectors is attached to the drive, one is a spare, and the third is attached to the master or subordinate IDE connector on the system board. The spare connector can be used to connect additional IDE drives to your computer.
The CD-ROM drive is attached an ATA 100 signal cable. ATA 100 signal cables are color-coded. The blue connector is attached to the system board. The black connector is attached to the master IDE device. The gray middle connector is attached to the subordinate IDE device. If you are installing an additional hard disk drive, you must change the switch or jumper setting on the CD-ROM drive to make the drive a subordinate device, set the switch or jumper setting on the new drive to master, and change the connector used for the CD-ROM drive to the gray middle connector. The new drive will be connected to the black master IDE device connector.
 - **Diskette drive:** The narrower signal cable has two connectors. One is attached to the diskette drive, and the other is attached to the connector (FDD1) on the system board.
 - **SCSI:** The following cables can be used to attach SCSI devices to the integrated SCSI controller on the system board:
 - An Ultra320 twisted ribbon cable connects the internal Ultra320 SCSI hard disk drive to the SCSI connector on the system board. This cable has four additional connectors for attaching more internal SCSI devices.
 - A round SCSI cable connects external SCSI devices to the integrated SCSI controller on the system board. For more information about connecting SCSI devices, see the SCSI documentation.

Installing memory modules

You can increase the amount of memory in your computer by installing memory modules. Your IntelliStationM Pro computer uses industry-standard PC2100 double-data-rate (DDR) dual inline memory modules (DIMMs).

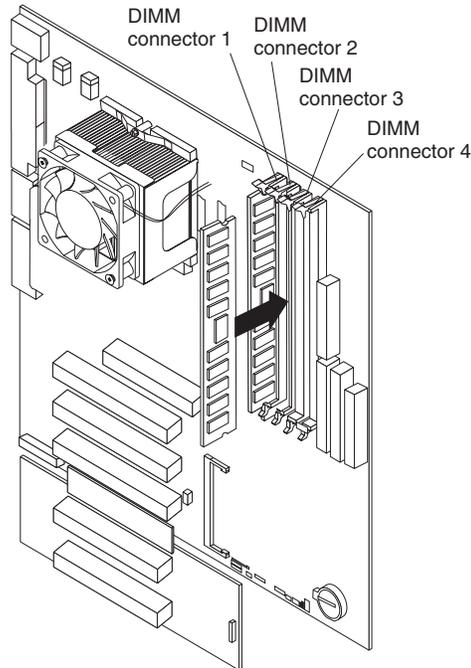
Notes:

1. The system board contains four DIMM connectors and supports two-way memory interleaving.
2. The DIMM options available for your computer are 256 MB, 512 MB, and 1 GB . Your computer supports a minimum of 256 MB and a maximum of 4 GB of system memory.
3. The amount of usable memory will be reduced depending on the system configuration. A certain amount of memory must be reserved for system resources. The BIOS code will display the total amount of installed memory and the amount of configured memory.
4. Your computer comes with two 128 MB, 256 MB, or 512 MB DIMMs (for a total of 256 MB, 512 MB, or 1024 MB) installed in the DIMM 1 and DIMM 2 memory connectors. When you install additional DIMMs, be sure to install them as a pair in DIMM connectors 3 and 4.
5. DIMMs must be installed in matched pairs. The first pair of DIMMs you install in DIMM 1 and 2 memory connectors must be the same size, speed, type, and technology. You can mix compatible DIMMs from various manufacturers. If you install a second pair of DIMMs in DIMM 3 and DIMM 4 memory connectors, they do not have to be the same size, speed, type, and technology as the DIMMs you installed in DIMM 1 and DIMM 2 memory connectors. However, the size, speed, type, and technology of the DIMMs you install in DIMMs 3 and DIMM 4 memory connectors must match each other.
6. Install only 133 MHz (memory bus), 2.5 V, 184-pin, double-data-rate (DDR), PC2100, unbuffered synchronous dynamic random-access memory (SDRAM) with error correcting code (ECC) DIMMs. These DIMMs must be compatible with the latest PC2100 SDRAM unbuffered DIMM specification. For a list of supported options for your computer, go to <http://www.ibm.com/pc/> on the World Wide Web; then, select your country and navigate to the list of options for your computer.

Complete the following steps to install a DIMM:

1. Review the “Important safety information” on page iii, “Installation guidelines” on page 35, and “Handling electrostatic discharge-sensitive devices” on page 110.
2. Remove the side cover (see “Removing the side cover” on page 41).
3. Turn off the computer and all attached devices.
4. Disconnect all external cables and power cords; then, remove the side cover (see “Removing the side cover” on page 41.)
5. Remove the support bracket (see “Removing and installing the support bracket” on page 41).
6. To make it easier to install memory modules, rotate the drive cage out of the computer. Grasp the drive cage and rotate it until it locks into place.
7. Locate the DIMM connectors on the system board. Determine the connectors into which you will install the DIMMs.
8. Open the retaining clips and, if necessary, remove any existing DIMM.

9. Touch the static-protective package containing the DIMM to any unpainted metal surface on the computer. Then, remove the new DIMM from the package.
10. Gently open the retaining clip on each end of the DIMM slot. Turn the DIMM so that the pins align correctly with the connector.
11. Insert the DIMM into the connector. Firmly press the DIMM straight down into the connector by applying pressure on both ends of the DIMM simultaneously. The retaining clips snap into the locked position when the DIMM is firmly seated in the connector. If there is a gap between the DIMM and the retaining clips, the DIMM has not been correctly installed. Open the retaining clips, remove the DIMM; then, reinsert it.



12. If you have other options to install or remove, do so now.
13. Push the drive cage outward and press in on the drive-cage release tab; then, rotate the cage back into the computer.
14. Replace the support bracket (see “Removing and installing the support bracket” on page 41).
15. Replace the side cover (see “Replacing the side cover” on page 53).
16. Reconnect the external cables and power cords. Turn on the attached devices, and turn on the computer.

Installing a security rope clip

To help prevent hardware theft, you can add a security rope clip and cable to your computer. After you add the security cable, make sure that it does not interfere with other cables that are connected to the computer.

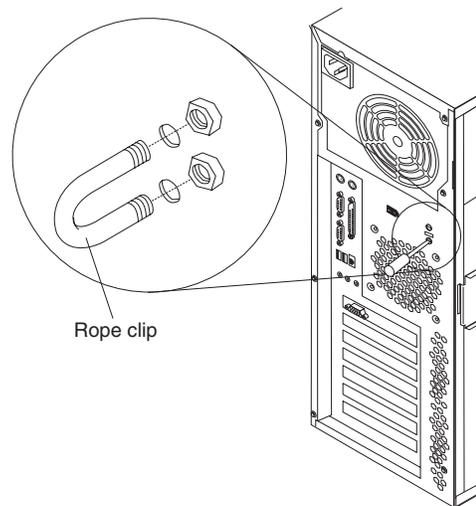
Before you begin, obtain the following items:

- A flat-blade screwdriver
- An adjustable wrench
- A 19 mm (0.75 in.) rope clip or wire rope (similar to National Manufacturing No. 3230, Stock No. 176-735)

- Threaded nuts that fit the rope clip
- A security cable
- A lock, such as a combination lock or padlock

Complete the following steps to install a rope clip:

1. Turn off the computer and all attached devices.
2. Disconnect all external cables and power cords; then, remove the side cover. See “Removing the side cover” on page 41.
3. Use a screwdriver to remove the two metal knockouts.
4. Insert the rope clip through the rear panel; then, attach and tighten the nuts.
5. Thread the cable through the rope clip and around an object that is not part of or permanently secured to the building structure or foundation, and from which the cable cannot be removed. Fasten the cable ends together with a lock. After you add the security cable, be certain it does not interfere with other cables connected to the computer.



6. If you have other options to install or remove, do so now; otherwise, replace the side cover (see “Replacing the side cover”).
7. Reconnect the external cables and power cords. Turn on the attached devices, and turn on the computer.

Replacing the side cover

If you removed the support bracket, reinstall it before you replace the side cover. See “Removing and installing the support bracket” on page 41.

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

Complete the following steps to replace the side cover:

1. Before installing the cover, check that all cables, adapters, and other components are installed and seated correctly and that you have not left loose tools or parts inside the computer.

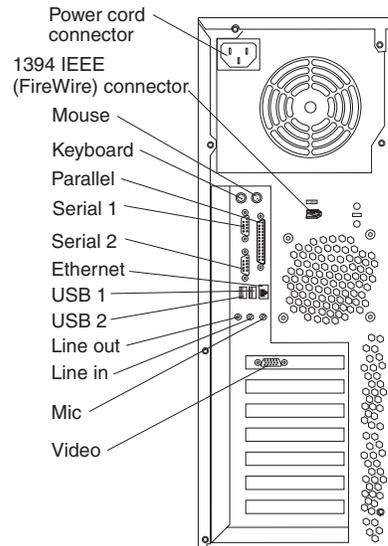
Input/output connectors

Connect optional external devices to the connectors on the front and rear of the computer.

Your computer has the following input/output (I/O) connectors:

- One audio line in
- Two audio line out
- Two audio microphone
- One Ethernet
- Two IEEE 1394 (FireWire) (some models)
- One keyboard
- One mouse
- One parallel
- Two serial
- Four Universal Serial Bus (USB)
- One video

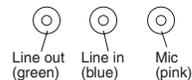
The following illustration shows the locations of these connectors.



The following sections describe these connectors.

Audio connectors

The audio connectors are used to connect external audio equipment to the computer.



Line in

There is one line-in connector on the rear of the computer. The computer receives audio signals through this connector from an external audio device.

Line out

There are two line-out connectors, one on the front and one on the rear of the computer. The computer sends audio signals through this connector to powered

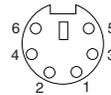
speakers with built-in amplifiers, headphones, a multimedia keyboard, or the audio line-in connector on a stereo system. The internal speaker in your computer is disabled when any device is attached to this connector.

Microphone

There are two microphone connectors, one on the front and one on the rear of the computer. Connect a microphone to this connector to record sounds onto the hard disk or to use speech-recognition software. There are two microphone connectors, one on the front and one on the rear of the computer.

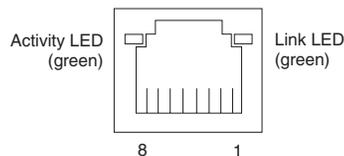
Auxiliary-device (pointing-device) connector

There is one auxiliary-device connector on the rear of the computer. Use this connector to connect a mouse or other pointing device. The following illustration shows an auxiliary-device connector.



Ethernet (RJ-45) connector

There is one Ethernet connector on the rear of the computer. Use this connector to connect the computer to a 10-Mbps, 100-Mbps, or 1000-Mbps network. The following illustration shows an Ethernet connector.



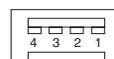
Connect a Category 3, 4, or 5 unshielded twisted-pair (UTP) cable to this connector. The 100BASE-TX and 1000BASE-T Fast Ethernet standards require Category 5 or higher cabling.

The Ethernet connector has one LED that indicates Ethernet-link status. When this LED is lit, it indicates that there is an active connection on the Ethernet port. Activity between the computer and the network is indicated by the Ethernet transmit/receive activity LEDs on the front and rear of the computer (see "Controls and indicators" on page 6).

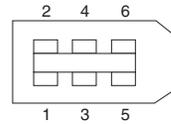
IEEE 1394 (FireWire) connectors (some models)

There is one 4-pin IEEE 1394 (FireWire) connector on the front of the computer and one 6-pin IEEE 1394 (FireWire) connector on the rear of the computer. Use these connectors to connect IEEE 1394 (FireWire) devices. The following illustrations show the IEEE 1394 (FireWire) connectors.

4-pin IEEE 1394 (FireWire) connector (front)

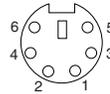


6-pin IEEE 1394 (FireWire) connector (rear)



Keyboard connector

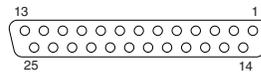
There is one keyboard connector on the rear of the computer. Use this connector to connect a PS/2 (non-USB) keyboard. The following illustration shows a keyboard connector.



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

Parallel connector

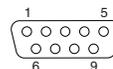
There is one parallel connector on the rear of the computer. Use this connector to connect a parallel device. The following illustration shows a parallel connector.



The parallel connector supports three standard Institute of Electrical and Electronics Engineers (IEEE) 1284 modes of operation: standard parallel port (SPP), enhanced parallel port (EPP), and extended capability port (ECP). If you configure the parallel port to operate in bidirectional mode, it supports the ECP and EPP modes. When the parallel connector is configured as bidirectional, use an IEEE 1284-compliant cable that does not exceed 3 meters (9.8 ft). Use the **Devices and I/O Ports** options in the IBM Configuration/Setup Utility program to configure the parallel connector as bidirectional.

Serial connectors

There are two serial connectors on the rear of the computer. Use these connectors to connect serial devices. The following illustration shows a serial connector.



Ultra320 SCSI connector

Your computer has an integrated SCSI controller. This single-channel controller supports an independent, Ultra320 SCSI channel. The SCSI connector for the channel is on the system board. The channel supports up to 15 SCSI devices. This controller uses:

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

SCSI cabling requirements

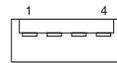
You can install four internal SCSI devices using the SCSI signal cable that comes with some computer models. If you plan to attach external SCSI devices, you must order an optional PCI SCSI adapter and external cable. To select and order the correct cables for use with external devices, contact your IBM reseller or IBM marketing representative. To receive an indication of SCSI hard-disk drive activity, you must also connect the SCSI adapter to the SCSI LED connector on the system board. See "System-board internal connectors" on page 38 for the location of the SCSI connectors.

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. See the information that is provided with the device for instructions about setting its SCSI ID.

Universal Serial Bus connectors

There are four Universal Serial Bus (USB) 2.0 connectors, two on the front and two on the rear of the computer. Use the USB connectors to connect optional telephony and multimedia devices. USB 2.0 technology transfers data at up to 480 Mb per second (Mbps) with a maximum of 127 external devices and a maximum signal distance of 5 meters (16 ft) per segment (if the device that is attached to the computer is a USB 2.0 device). If the computer has multiple USB devices attached to it, the USB hub must be USB 2.0, otherwise, all USB 2.0 devices will transfer data at 12 Mbps. Using Plug and Play technology, USB devices are configured automatically. The following illustration shows a USB connector.



Use a 4-pin USB cable to connect external devices to USB connectors.

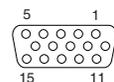
If you connect a PS/2 (non-USB) keyboard to the keyboard connector, USB ports and devices are disabled during power-on self-test (POST).

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

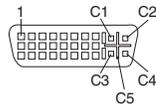
Video connector

The Accelerated Graphics Port (AGP) adapter, which is in the AGP slot on the system board, provides the video connector. This connector is on the rear of the computer. Use the video connector to connect a monitor or other display. The following illustrations are examples of different video connectors.

Analog video connector



Digital (DVI-I) video connector



Low force helical-60 (LFH-60) video connector



Some models come with a digital video interface (DVI) connector for connecting a digital monitor. If you have problems viewing information with a second monitor, see “Changing monitor settings” on page 11.

Models with the Wildcat 4 7110 or NVIDIA Quadro4 980XGL video adapter come with a DVI-I to VGA style analog converter for each DVI-I connector.

Note: On the Wildcat 4 7110 video adapter, the first or only monitor must be connected to the bottom connector (connector number 1).

Models with the Matrox Millennium G450 DVI-I video adapter come with a DVI-I to dual-analog monitor pigtail cable.

Models with the NVIDIA Quadro4 280NVS video adapter come with a low force helical-60 (LFH-60) to dual-analog monitor pigtail cable. If you want to set up two digital monitors, you will need to purchase a separate dual-digital monitor cable.

FRU information (service only)

The field replaceable unit (FRU) procedures are intended for trained servicers who are familiar with IBM products.

Removing the front bezel

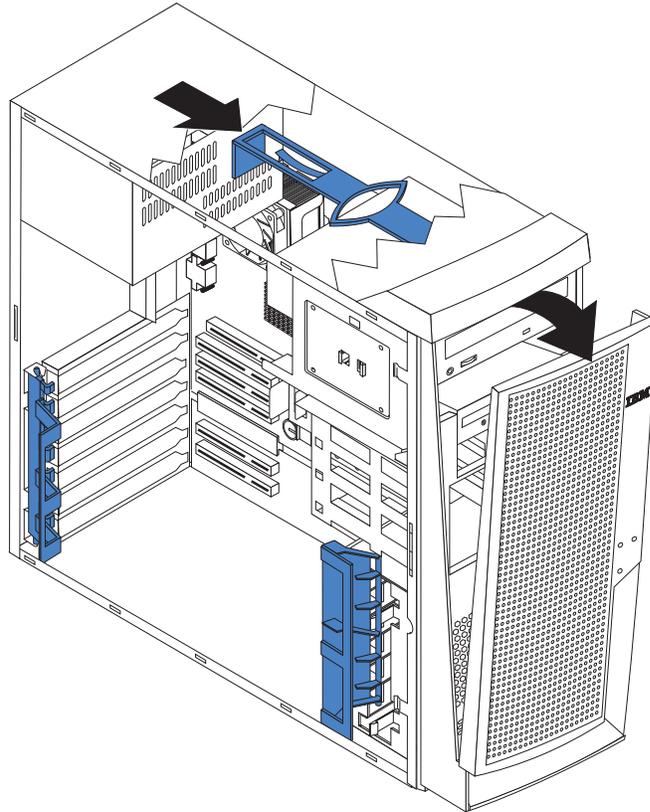
The following illustration shows how to remove the bezel from the server.

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

Do the following to remove the bezel:

1. Review the information in “System reliability considerations” on page 35.
2. Turn off the server and peripheral devices and disconnect all power cords and then all external cables.
3. Remove the side cover (see “Removing the side cover” on page 41).
4. Press the bezel-release latch at the top of the server to disconnect the top of the bezel from the server.

5. Release the two tabs at the top edge of the bezel and pull the top of the bezel slightly away from the server.



6. Pull the bezel up to release the two tabs at the bottom edge of the bezel. Store the bezel in a safe place.

Power button

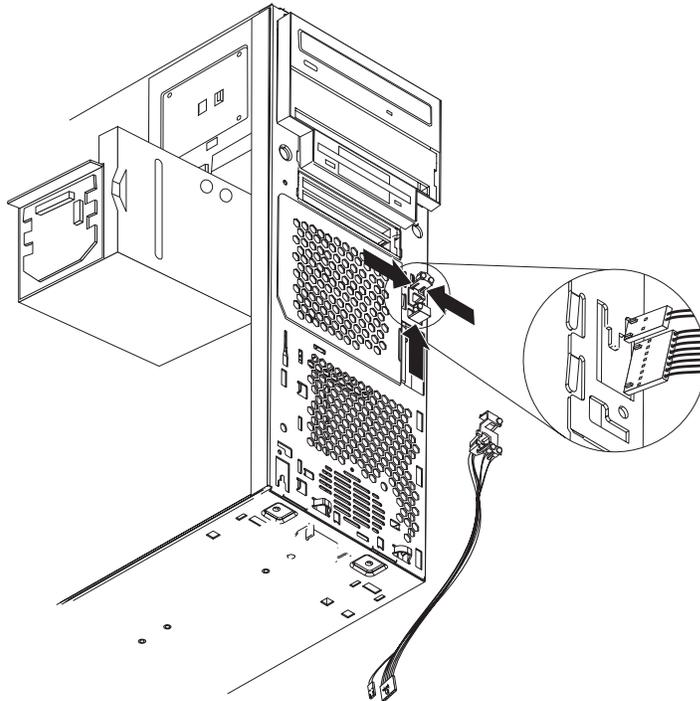
Before you begin:

- Read “Important safety information” on page iii.
- Review the information in “System reliability considerations” on page 35.

To remove the power button, complete the following steps:

1. Turn off the server, if it is on.
2. Unplug the server.
3. Remove the side cover. See “Removing the side cover” on page 41.
4. Remove the front bezel. See “Removing the front bezel” on page 61.
5. Rotate the drive cage outward until it locks in the vertical position, so that you can reach through to the other side of the power-switch and LED panel cable.
6. To remove the power-switch and LED panel, press in on the tab on the left side of the panel; then, squeeze the top and bottom of the right-side of the

panel and carefully pull the panel away from the system.



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

Notes:

- a. You might need to remove the diskette and IDE cables to access the power switch and LED panel cable connector.
 - b. Some cables might have two connectors for you to disconnect.
 - c. See the system service label for system board connector locations.
8. Disconnect the cable of the power button from the system board.
 9. Place a screwdriver against the bottom release latch of the power button and gently press upward and slide the latch through the aperture.
 10. Gently pinch together the upper release latches and slide the latches through the aperture and remove the power button.

Thermal grease

This section contains information about removing and replacing the thermal grease between the heat sink and the microprocessor. The thermal grease must be replaced anytime the heat sink has been removed from the top of the microprocessor and is going to be reused, or when debris is found in the grease.

Note:

- Read “Installation guidelines” on page 35.
- Read “Important safety information” on page iii.
- Read “Handling electrostatic discharge-sensitive devices” on page 110.

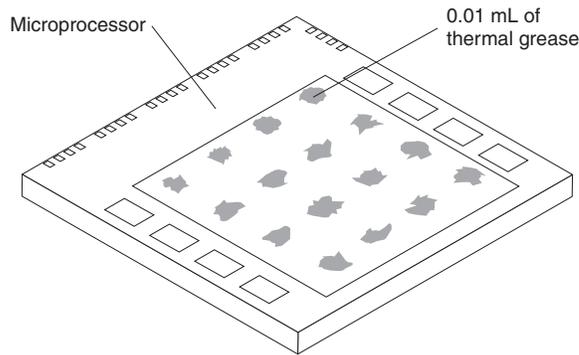
Complete the following steps to replace damaged or contaminated thermal grease on the microprocessor and heat sink:

1. Place the heat sink on a clean work surface.

2. Remove the cleaning pad from its package and unfold it completely.
3. Use the cleaning pad to wipe the thermal grease from the bottom of the heat sink.

Note: Be sure that all of the thermal grease is removed.

4. Use a clean area of the cleaning pad to wipe the thermal grease from the microprocessor; then, dispose of the cleaning pad after all of the thermal grease is removed.



5. Use the thermal grease syringe to place 16 uniformly spaced dots of 0.01ML each on the top of the microprocessor.



Note: 0.01ML is one tick mark on the syringe. If the grease is properly applied, approximately half (0.02ML) of the grease will remain in the syringe.

6. Install the heat sink onto the microprocessor as described in “Microprocessor / fan sink”.

Microprocessor / fan sink

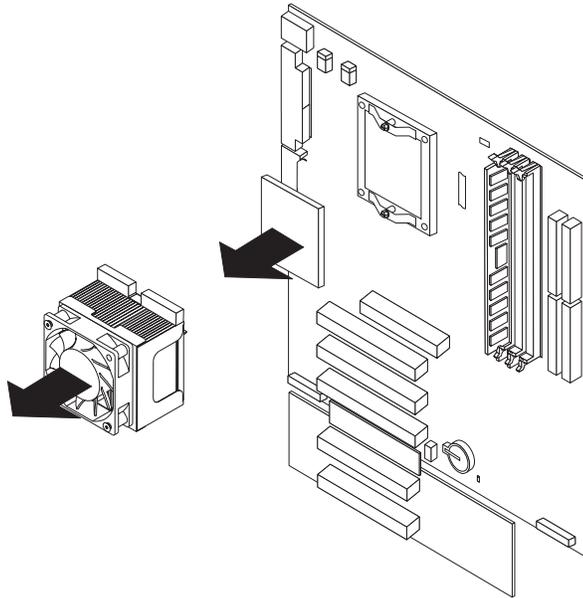
To remove the microprocessor and fan sink, do the following:

Note: Read “Installation guidelines” on page 35 and “Important safety information” on page iii.

1. Power-off the computer and remove external cables.
2. Remove the cover and support bracket (see “Removing the side cover” on page 41 and “Removing and installing the support bracket” on page 41).
3. Disconnect any cables that impede access to the processor.
4. Remove the fan sink from the processor:

Note: The fansink and underlying heatsink are attached and do not need to be separated from each other. Remove the fansink/heatsink assembly from the processor as a single unit.

- a. Detach the fan sink cable.



- b. Loosen the two captive screws on either side (in leaf spring enclosures) of the fansink.
- c. With the two captive screws loosened, pivot the leaf spring assemblies outward and out of the notches on the fansink assembly.
- d. Lift the fan sink up and out of the computer.

Note: It may be necessary to gently twist the fansink to loosen it from the processor.

Important: Be careful when handling the adhesive material on the processor. If the adhesive material on the processor will be reused, do not contaminate it. If replacement adhesive material is provided with the replacement part, be sure to remove all traces of existing adhesive material from the processor before applying the new adhesive material.

5. Free the processor from the system board by rotating the processor socket lever arm upward to its maximum vertical position.
6. Lift the processor up and out of the computer.
7. To install a processor, reverse the previous steps.

Note: When reconnecting the fansink cable to the system board, be sure to connect the cable to the connector marked “CPU fan”.

Hard disk drive cage

Before you begin:

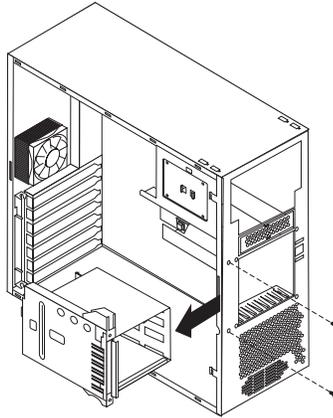
- Read “Important safety information” on page iii.
- Review the information in “System reliability considerations” on page 35.

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

To remove the hard disk drive, complete the following steps:

1. Turn off the server, if it is on.

2. Unplug the server.
3. Remove the front bezel. See “Removing the front bezel” on page 61.
4. Remove the side cover. See “Removing the side cover” on page 41.
5. Remove the support-bracket assembly. See “Removing the side cover” on page 41.
6. Remove any hard disk drives or drive fillers from the drives.
7. Disconnect the hard disk drive cables that connect to the system board.
8. Remove the screws from the front of the hard disk drive cage.
9. Move the cage slightly in and up until it is free of the chassis and lift it out of the server.

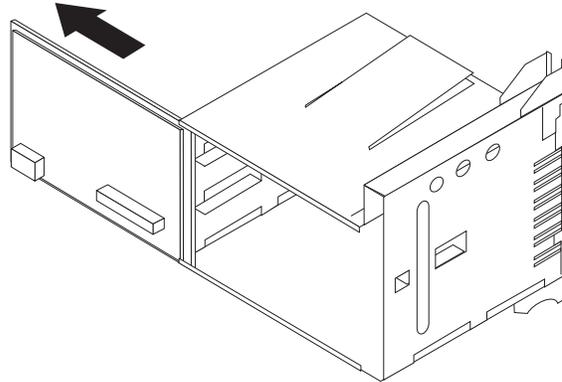


Note: Take care not to dislodge the memory when you remove the cage.

Hard disk drive backplane

Before you begin:

- Read “Important safety information” on page iii.
- Review the information in “System reliability considerations” on page 35.



To remove the hard disk drive backplane, complete the following steps:

1. Turn off the server, if it is on.
2. Unplug the server.
3. Remove the front bezel. See “Removing the front bezel” on page 61.
4. Remove the side cover. See “Removing the side cover” on page 41.
5. Remove the support-bracket assembly. See “Removing the side cover” on page 41.
6. Remove any hard disk drives or drive fillers from the drives.
7. Disconnect the hard disk drive cables that connect to the system board.
8. Swing the cage out.
9. Slide the backplane out of the cage.

Power supply

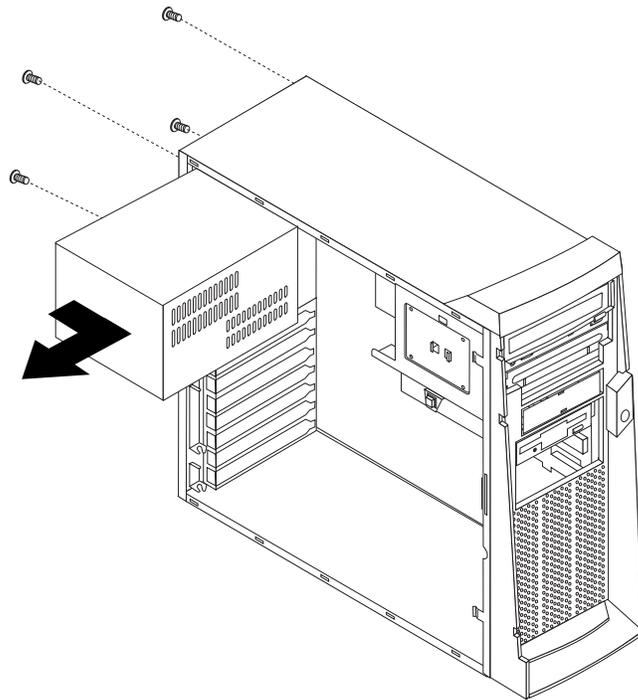
Before you begin:

- Read “Important safety information” on page iii.
- Review the information in “System reliability considerations” on page 35.

To remove the power supply, do the following:

1. Turn off the server, if it is on.
2. Unplug the server.
3. Remove the cover. See “Removing the side cover” on page 41.
4. Disconnect internal cables from the planar and drives.
5. Remove the screws from the rear of the server.

6. Gently move the power supply away from the chassis and lift it out of the server.



Rear fan

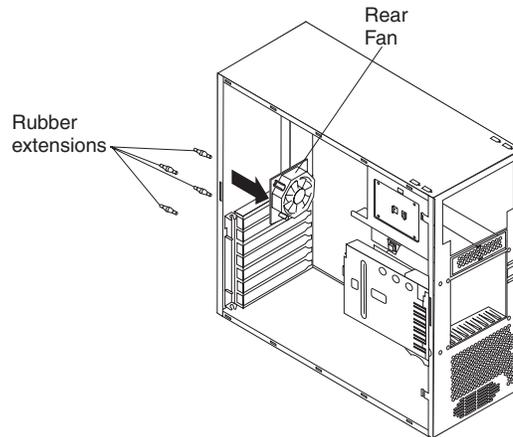
Before you begin:

- Read “Important safety information” on page iii.
- Review the information in “System reliability considerations” on page 35.

To remove the rear fan, complete the following steps:

1. Turn off the server, if it is on.
2. Unplug the server.
3. Remove the cover. See “Removing the side cover” on page 41.
4. Remove the support-bracket assembly. See “Removing the side cover” on page 41.
5. Remove the fan cable from the system board.
6. Use side cutters to sever the four rubber extensions on the outside of the server.
7. Gently pry the fan away from the server and lift it up and out.
8. To install the new fan assembly, place the fan in position at the rear of the server.
9. Guide the rubber extensions through the apertures.

10. Use needle-nosed pliers to pull the extensions through the apertures.



11. Reconnect cables.

Extender card

Before you begin:

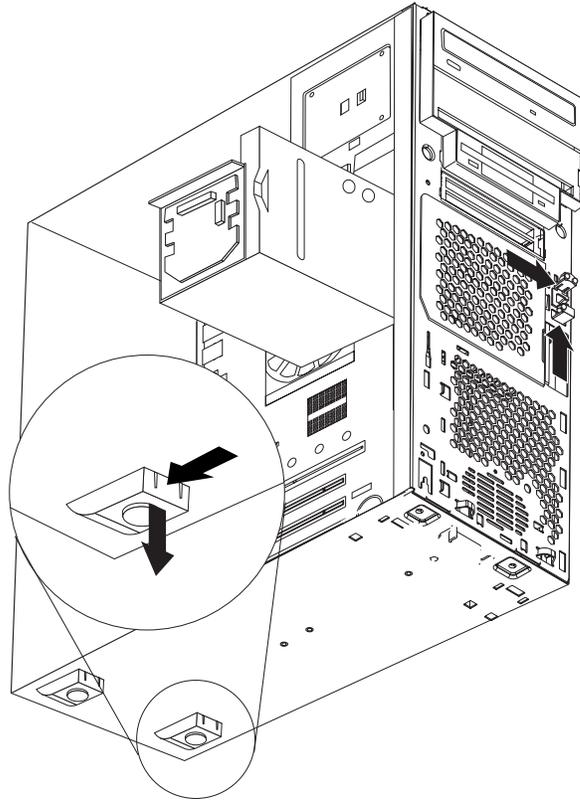
- Read “Important safety information” on page iii.
- Review the information in “System reliability considerations” on page 35.

Note: It is recommended that the server be placed on its left side before performing this service procedure. Rotate the feet in toward the server so they do not detach due to the weight of the server.

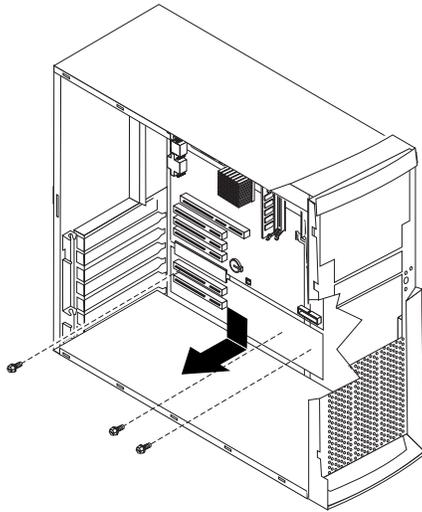
To remove the system board, complete the following steps:

1. Turn off the server, if it is on.
2. Unplug the server.
3. Remove the side cover. See “Removing the side cover” on page 41.
4. Remove the support bracket. See “Removing the side cover” on page 41.
5. Disconnect the video connector cable.
6. Remove the extender card adapters (see “Installing an adapter” on page 43).

7. To remove the rear server foot, press the foot locking tab on the inside of the server and lift the foot out of the chassis.



8. Remove the extender card screws.



9. Disconnect the extender card connector from the system board edge connector: then, tilt the extender card and remove it from the server.

To install an extender card reverse this procedure.

System board

Before you begin:

- Read “Important safety information” on page iii.
- Review the information in “System reliability considerations” on page 35.

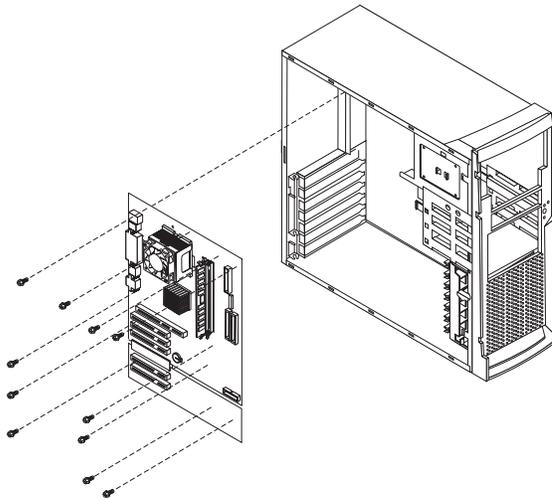
Notes:

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

To remove the system board, complete the following steps:

1. Turn off the server, if it is on.
2. Unplug the server.
3. Remove the side cover. See “Removing the side cover” on page 41.
4. Remove the front bezel. See “Removing the front bezel” on page 61.
5. Remove the support bracket. See “Removing the side cover” on page 41.
6. Disconnect the cables.
7. Remove the adapter cards and both adapter retaining brackets (see “Installing an adapter” on page 43).
8. Remove the hard disk drive cage. See “Hard disk drive cage” on page 65.
9. Remove memory modules. See “Installing memory modules” on page 51.
10. Remove the microprocessor. See “Microprocessor / fan sink” on page 64.

11. Remove screws and lift the system board out of the server.



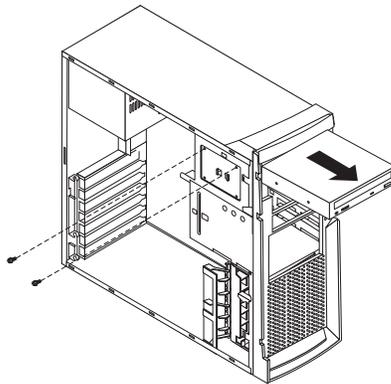
CD-ROM drive

Before you begin:

- Read “Important safety information” on page iii.
- Review the information in “System reliability considerations” on page 35.

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

1. Turn off the server, if it is on.
2. Unplug the server.
3. Remove the side cover. See “Removing the side cover” on page 41.
4. Disconnect the cables.
5. Remove the screws from the CD-ROM drive cage.
6. Gently slide the CD-ROM drive toward the front of the server and lift it out.



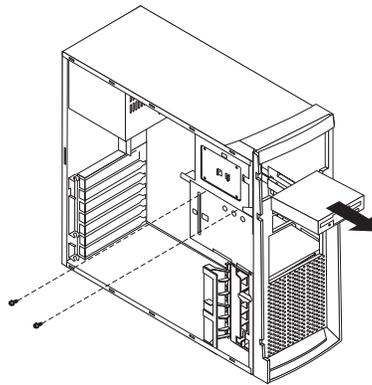
Diskette drive

Before you begin:

- Read “Important safety information” on page iii.
- Review the information in “System reliability considerations” on page 35.

To remove the diskette drive, complete the following steps:

1. Turn off the server, if it is on.
2. Unplug the server.
3. Remove the side cover. See “Removing the side cover” on page 41.
4. Disconnect the cables.
5. Remove the screws from the diskette drive cage.
6. Gently slide the floppy disk drive toward the front of the server and lift it out.



Bezel release latch

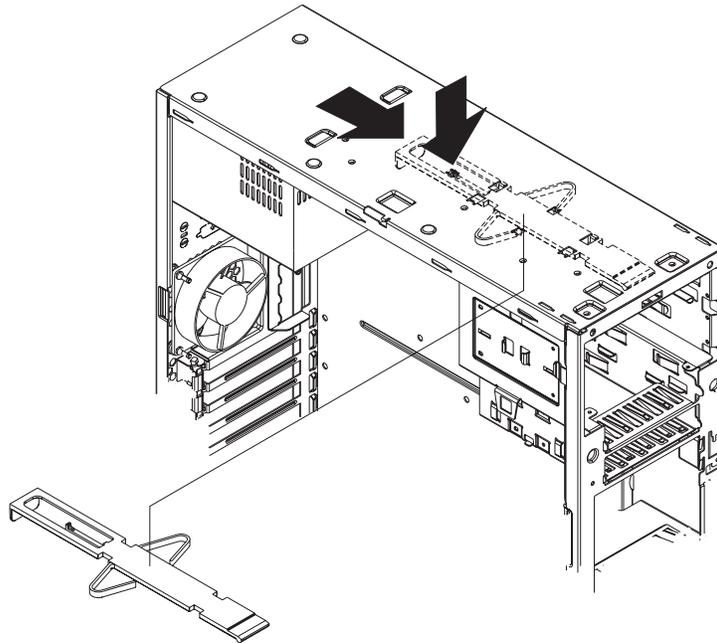
Before you begin:

- Read “Important safety information” on page iii.
- Review the information in “System reliability considerations” on page 35.

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

1. Turn off the server, if it is on.
2. Unplug the server.
3. Remove the side cover. See “Removing the side cover” on page 41.
4. Remove the front bezel. See “Removing the front bezel” on page 61.
5. Remove the handle assembly. See “Handle assembly” on page 75.
6. Remove the top/side cover. See “Top/side cover” on page 74.
7. Press down on the tab.

8. From the underside, grasp the bezel release latch in the center and gently pull it back and away from the server.



Top/side cover

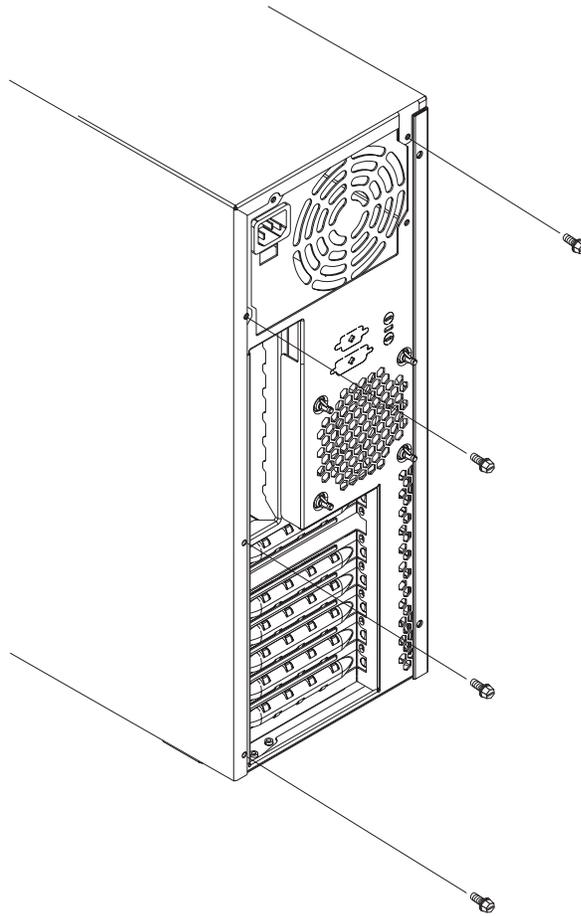
Before you begin:

- Read “Important safety information” on page iii.
- Review the information in “System reliability considerations” on page 35.

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

1. Turn off the server, if it is on.
2. Unplug the server.
3. Remove the side cover. See “Removing the side cover” on page 41.
4. Remove the front bezel. See “Removing the front bezel” on page 61.
5. Remove the handle assembly. See “Handle assembly” on page 75.
6. Remove the four screws from the back of the server and put them in a safe place.

7. Using a screwdriver, gently pry the cover away from the server in the rear and slide the unit away from the server.



Handle assembly

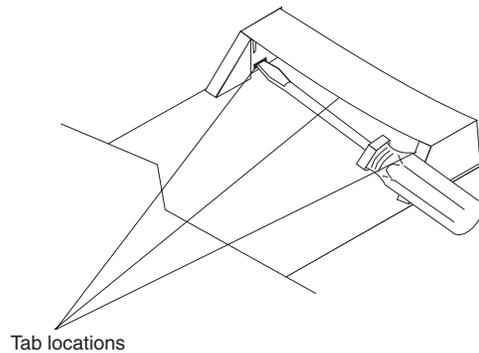
Before you begin:

- Read “Important safety information” on page iii.
- Review the information in “System reliability considerations” on page 35.

To remove the handle cap, complete the following steps:

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

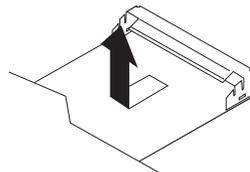
3. Use a flathead screwdriver to gently press in and down on the tabs located on the interior side wall of the handle.



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

To remove the handle support, complete the following steps:

1. Turn off the server, if it is on.
2. Unplug the server.
3. Firmly grasp the handle support and slide it away from the front bezel.
4. Lift up on the handle support to remove it from the slots in the top of the chassis.



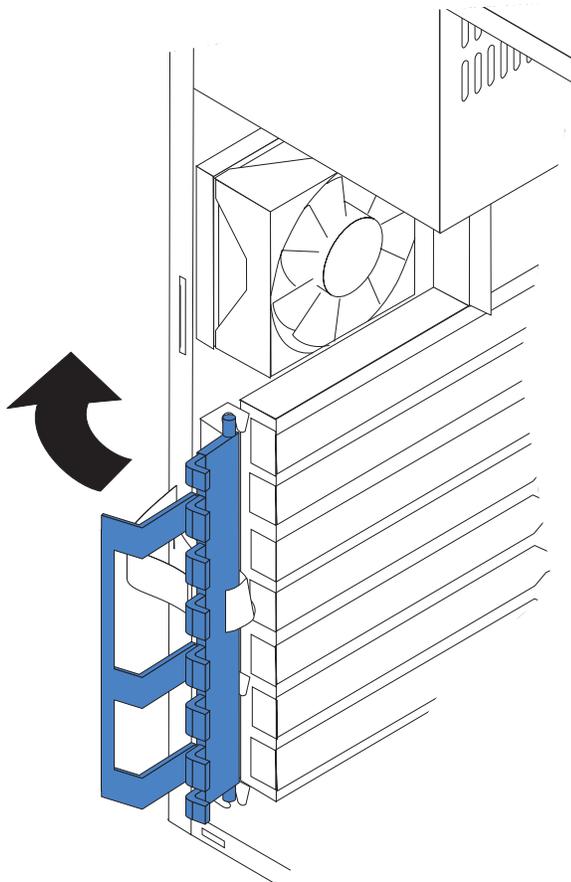
Adapter retainer

Before you begin:

- Read “Important safety information” on page iii.
- Review the information in “System reliability considerations” on page 35.

To remove the adapter retainer, complete the following steps:

1. Turn off the server, if it is on.
2. Unplug the server.
3. Remove the side cover. See “Removing the side cover” on page 41.
4. Remove all adapters. See “Installing an adapter” on page 43.
5. Rotate the adapter retainer to the open position.
6. Grasp the adapter retainer and gently slide the top and bottom tabs out of the notches.



Symptom-to-FRU index

This index supports the IntelliStation M Pro computer.

Notes:

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

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

The initial column or columns of the tables in this index lists error codes or messages, and the final column lists one or more suggested actions or FRUs to replace. Take the action (or replace the FRU) suggested first in the list of the entries in the final column, and then restart the computer to see if the problem has been corrected.

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

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

Beep symptoms

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

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

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

Beep/symptom	FRU/action
1-1-3 (CMOS write/read test failed.)	<ol style="list-style-type: none">1. Battery2. System board
1-1-4 (BIOS EEPROM checksum failed.)	<ol style="list-style-type: none">1. Recover BIOS code.2. System board.
1-2-1 (Programmable Interval Timer failed.)	<ul style="list-style-type: none">• System board
1-2-2	<ul style="list-style-type: none">• System board

Beep/symptom	FRU/action
1-2-3 (DMA page register write/read failed.)	• System board
1-2-4 (RAM refresh verification failed.)	1. DIMM 2. System board
1-3-1 (First 64K RAM test failed.)	• DIMM
1-3-2 (First 64K RAM parity test failed.)	• System board
2-1-1 (Secondary DMA register failed.)	• System board
2-1-2 (Primary DMA register failed.)	• System board
2-1-3 (Primary interrupt mask register failed.)	• System board
2-1-4 (Secondary interrupt mask register failed)	• System board
2-2-2 (Keyboard controller failed.)	1. Keyboard 2. System board
3-1-1 (Timer tick interrupt failed.)	• System board
3-1-2 (Interval timer channel 2 failed.)	• 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.)	• System board
3-2-2 (Parallel port failed.)	• System board
3-2-4 (Failure comparing CMOS memory size against actual.)	1. DIMM 2. System board 3. Battery
3-3-1 (Memory size mismatch occurred.)	1. DIMM 2. System board 3. Battery
3-3-2 (Critical SMBUS error occurred.)	1. System board 2. Microprocessor. 3. DIMMs.
3-3-3 (No operational memory.)	1. Install or reseal the memory modules, and then do a 3-boot reset. 2. DIMMs. 3. System board.

No-beep symptoms

No-beep symptom	FRU/action
No beep occurs during POST.	<ul style="list-style-type: none"> System 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 stop the test.
- 197** Warning; a hardware failure might not have occurred.

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

Error code/symptom	FRU/action
001-XXX-000 (Failed core tests)	<ul style="list-style-type: none"> System board
001-XXX-001 (Failed core tests)	<ul style="list-style-type: none"> System board
001-250-000 (Failed system board ECC)	<ul style="list-style-type: none"> System board
001-250-001 (Failed system board ECC)	<ul style="list-style-type: none"> System board
005-XXX-000 (Failed video test)	<ol style="list-style-type: none"> Video adapter (if installed) System board
011-XXX-000 (Failed COM1 serial port test)	<ol style="list-style-type: none"> Check loopback plug connected to externalized serial port. Check cable from externalized port to system board. System board.
011-XXX-001 (Failed COM2 serial port test)	<ol style="list-style-type: none"> Check loopback plug connected to externalized serial port. Check cable from externalized port to system board. System board.
014-XXX-000 (Failed parallel port test)	<ul style="list-style-type: none"> System board
015-XXX-001 (USB interface not found, board damaged)	<ol style="list-style-type: none"> System board
015-XXX-198 (USB device connected during USB test.)	<ol style="list-style-type: none"> Remove USB devices from USB1, USB2, USB3 and USB4; then, run the USB interface test again. System board.
020-XXX-000 (Failed PCI interface test.)	<ul style="list-style-type: none"> System board
030-XXX-00N (Failed SCSI interface test.)	<ul style="list-style-type: none"> If N=0, system board; if N>0, SCSI adapter in slot N.

Error code/symptom	FRU/action
035-XXX-099 (No adapters were found.)	<ul style="list-style-type: none"> • If adapter is installed re-check connection.
035-XXX-S99 (Failed RAID test on PCI slot S. S = number of failing PCI slot.)	<ol style="list-style-type: none"> 1. RAID adapter 2. Cable 3. System board
035-XXX-SNN (s = number of failing PCI slot, nn = SCSI ID of failing fixed disk.)	<ul style="list-style-type: none"> • Hard disk drive with SCSI ID nn on RAID adapter in PCI slot s
035-253-S99 (RAID adapter initialization failure.)	<ol style="list-style-type: none"> 1. ServeRAID™ adapter in slot s is not configured properly. Obtain the basic and extended configuration status and see the <i>ServeRAID Hardware Maintenance Manual</i> for more information. 2. Cable. 3. Adapter.
089-XXX-001 (Failed microprocessor test.)	<ol style="list-style-type: none"> 1. Verify microprocessor 1 is installed an seated correctly. 2. Verify BIOS code is at latest level. 3. Microprocessor 1. 4. System board.
089-XXX-002 (Failed optional microprocessor test.)	<ol style="list-style-type: none"> 1. Verify microprocessor 2 is installed an seated correctly. 2. Verify BIOS code is at latest level. 3. Microprocessor 2. 4. System board.
201-XXX-0NN (Failed memory test.)	<ol style="list-style-type: none"> 1. DIMM Location slots 1-2 where nn = DIMM location Note: nn 1=DIMM 1; 2=DIMM 2 2. System board
201-XXX-999 (Multiple DIMM failure, see error text.)	<ol style="list-style-type: none"> 1. See error text for failing DIMMs. 2. System board.
202-XXX-001 (Failed system cache test.)	<ol style="list-style-type: none"> 1. Verify microprocessor 1 is installed an seated correctly. 2. Verify BIOS code is at latest level. 3. Microprocessor 1. 4. System board.
202-XXX-002 (Failed system cache test.)	<ol style="list-style-type: none"> 1. Verify microprocessor 2 is installed an seated correctly. 2. Verify BIOS code is at latest level. 3. Microprocessor 2. 4. System board.
206-XXX-000 (Failed diskette drive test.)	<ol style="list-style-type: none"> 1. Try test with another diskette. 2. Cable. 3. Diskette drive. 4. System board.
215-XXX-000 (Failed IDE CD-ROM drive test.)	<ol style="list-style-type: none"> 1. Try test with another CD-ROM. 2. CD-ROM drive cables. 3. CD-ROM drive. 4. System board.

Error code/symptom	FRU/action
217-198-XXX (Could not establish drive parameters.)	<ol style="list-style-type: none"> 1. Check cable and termination. 2. SCSI backplane. 3. Hard disk.
217-XXX-000 (Failed BIOS hard disk test) Note: If RAID is configured, the hard disk number refers to the RAID logical array.	<ol style="list-style-type: none"> 1. Fixed disk 1 (hard disk drive 1) 2. System board
217-XXX-001 (Failed BIOS hard disk test) Note: If RAID is configured, the hard disk number refers to the RAID logical array.	<ol style="list-style-type: none"> 1. Fixed disk 2 (hard disk drive 2) 2. System board
301-XXX-000 (Failed keyboard test.)	<ol style="list-style-type: none"> 1. Keyboard 2. System board
302-XXX-000 (Failed mouse test.)	<ol style="list-style-type: none"> 1. Mouse 2. System board
405-XXX-000 (Failed Ethernet test on controller on the system board.)	<ol style="list-style-type: none"> 1. Verify that Ethernet is not disabled in BIOS. 2. System board.
405-XXX-00N (Failed Ethernet test on adapter in PCI slot <i>n</i> .)	<ol style="list-style-type: none"> 1. For n=0, system board 2. For n>0, adapter in PCI slot n 3. System board
415-XXX-000 (Failed Modem test.)	<ol style="list-style-type: none"> 1. Cable Note: Ensure modem is present and attached to computer. 2. Modem 3. System board

Error symptoms

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

If you cannot find the problem in the error symptom charts, go to “Starting the diagnostic programs and viewing the test log” on page 28 to test the computer.

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

1. Remove the software or device that you just added.
2. Run the diagnostic tests to determine if the computer is running correctly.
3. Reinstall the new software or new device.

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

CD-ROM drive problems	
Symptom	FRU/action
CD-ROM drive is not recognized.	<ol style="list-style-type: none"> Verify that: <ul style="list-style-type: none"> The IDE channel to which the CD-ROM drive is attached (primary or secondary) is enabled in the Configuration/Setup Utility program. All cables and jumpers are installed correctly. The correct device driver is installed for the CD-ROM drive. Run CD-ROM drive diagnostics. CD-ROM drive.
CD is not working properly.	<ol style="list-style-type: none"> Clean the CD. Run CD-ROM drive diagnostics. CD-ROM drive.
CD-ROM drive tray is not working. (The computer must be turned on.)	<ol style="list-style-type: none"> Insert the end of a straightened paper clip into the manual tray-release opening. Run CD-ROM drive diagnostics. CD-ROM drive.

Diskette drive problems	
Symptom	FRU/action
Diskette drive activity LED stays on, or the system bypasses the diskette drive.	<ol style="list-style-type: none"> If there is a diskette in the drive, verify that: <ul style="list-style-type: none"> The diskette drive is enabled in the Configuration/Setup utility program. The diskette is good and not damaged. (Try another diskette if you have one.) The diskette is inserted correctly in the drive. The diskette contains the necessary files to start the computer. The software program is working properly. The cable is installed correctly (in the proper orientation). To prevent diskette drive read/write errors, be sure the distance between monitors and diskette drives is at least 76 mm (3 in.). Run diskette drive diagnostics. Cable. Diskette drive. System board.

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

Hark disk drive problems	
Symptom	FRU/action
Not all drives are recognized by the hard disk drive diagnostic test (Fixed Disk test).	<ol style="list-style-type: none"> 1. Remove the first drive not recognized and try the hard disk drive diagnostic test again. 2. If the remaining drives are recognized, replace the drive you removed with a new one.
System stops responding during hard disk drive diagnostic test.	<ol style="list-style-type: none"> 1. Remove the hard disk drive being tested when the computer stopped responding and try the diagnostic test again. 2. If the hard disk drive diagnostic test runs successfully, replace the drive you removed with a new one.

General problems	
Symptom	FRU/action
Problems such as broken cover locks or indicator LEDs not working	<ul style="list-style-type: none"> • Broken CRU/FRU

Intermittent problems	
Symptom	FRU/action
A problem occurs only occasionally and is difficult to detect.	<ul style="list-style-type: none"> • Verify that: <ul style="list-style-type: none"> – All cables and cords are connected securely to the rear of the computer and attached options. – When the computer is turned on, air is flowing from the rear of the computer at the fan grill. If there is no airflow, the fan is not working. This causes the computer to overheat and shut down. – Ensure that the SCSI bus and devices are configured correctly and that the last external device in each SCSI chain is terminated correctly.

Keyboard, mouse, or pointing-device problems	
Symptom	FRU/action
All or some keys on the keyboard do not work.	<ol style="list-style-type: none"> 1. Verify that: <ul style="list-style-type: none"> • The keyboard cable is securely connected to the system, and the keyboard and mouse cables are not reversed. • Both the computer and the monitor are turned on. 2. Keyboard. 3. System board.
The mouse or pointing device does not work.	<ol style="list-style-type: none"> 1. Verify that: <ul style="list-style-type: none"> • The mouse or pointing-device cable is securely connected, and that the keyboard and mouse cables are not reversed. • The mouse device drivers are installed correctly. • Both the computer and the monitor are turned on. 2. Mouse or pointing device. 3. System board.

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

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

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

Monitor problems	
Symptom	FRU/action
The screen is blank.	<ol style="list-style-type: none"> 1. Verify that: <ul style="list-style-type: none"> • The computer power cord is plugged into the computer and a working electrical outlet. • The monitor cables are connected properly. • The monitor is turned on and the Brightness and Contrast controls are adjusted correctly. • If the computers are C2T chained together, verify that: <ul style="list-style-type: none"> – The C2T chain cables are securely connected to the computers. – The C2T breakout cable is connected properly. – A computer that is turned on is selected. <p>Important: In some memory configurations, the 3-3-3 beep code might sound during POST followed by a blank display screen. If this occurs and the Boot Fail Count feature in the Start Options of the Configuration/Setup Utility program is set to Enabled (its default setting), you must restart the computer three times to force the system BIOS code to reset the CMOS values to the default configuration (memory connector or bank of connectors enabled).</p> <ol style="list-style-type: none"> 2. If you have verified these items and the screen remains blank, replace: <ol style="list-style-type: none"> a. Monitor b. Video adapter, if installed c. System board
Only the cursor appears.	<ul style="list-style-type: none"> • See “Undetermined problems” on page 98.
The monitor works when you turn on the computer but goes blank when you start some application programs.	<ol style="list-style-type: none"> 1. Verify that: <ul style="list-style-type: none"> • The application program is not setting a display mode higher than the capability of the monitor. • The primary monitor cable is connected to the C2T device breakout cable. • You installed the necessary device drivers for the applications. 2. If you have verified these items and the screen remains blank, replace the monitor. 3. Video adapter. 4. System board.
The screen is wavy, unreadable, rolling, distorted, or has screen jitter.	<ol style="list-style-type: none"> 1. If the monitor self-tests show the monitor is working properly, consider the location of the monitor. Magnetic fields around other devices (such as transformers, appliances, fluorescent lights, and other monitors) can cause screen jitter or wavy, unreadable, rolling, or distorted screen images. If this happens, turn off the monitor. (Moving a color monitor while it is turned on might cause screen discoloration.) Then move the device and the monitor at least 305 mm (12 in.) apart. Turn on the monitor. <p>Notes:</p> <ol style="list-style-type: none"> a. To prevent diskette drive read/write errors, be sure the distance between monitors and diskette drives is at least 76 mm (3 in.). b. Non-IBM monitor cables might cause unpredictable problems. c. An enhanced monitor cable with additional shielding is available for the 9521 and 9527 monitors. For information about the enhanced monitor cable, contact your IBM reseller or IBM marketing representative. 2. Monitor. 3. Video adapter, if installed. 4. System board.

Monitor problems	
Symptom	FRU/action
Wrong characters appear on the screen.	<ol style="list-style-type: none"> 1. If the wrong language is displayed, update the BIOS code with the correct language. 2. Monitor. 3. Video adapter, if installed. 4. System board.
No video.	<ol style="list-style-type: none"> 1. Make sure the correct machine is selected, if applicable. 2. Make sure all cables are locked down.

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

Power problems	
Symptom	FRU/action
Power switch does not work and reset button, if supported, does work.	<ol style="list-style-type: none"> 1. Reseat connector. 2. Power switch card. 3. System board.

Power problems	
Symptom	FRU/action
The computer does not turn on.	<ol style="list-style-type: none"> Verify that: <ul style="list-style-type: none"> The power cables are properly connected to the computer. The electrical outlet functions properly. The type of memory installed is correct. If you just installed an option, remove it, and restart the computer. If the computer now turns on, you might have installed more options than the power supply supports. Override front panel power button: <ol style="list-style-type: none"> Disconnect computer power cords. Reconnect power cords. <p>If computer turns on:</p> <ol style="list-style-type: none"> Operator information panel <p>If computer does not turn on:</p> <ul style="list-style-type: none"> System board See “Undetermined problems” on page 98.
The computer does not turn off.	<ol style="list-style-type: none"> Verify whether you are using an ACPI or non-ACPI operating system. If you are using a non-ACPI operating system: <ol style="list-style-type: none"> Press Ctrl+Alt+Delete. Turn off the system by holding the power-control button for 4 seconds. If computer fails during BIOS POST and power-control button does not work, remove the AC power cord. If the problem remains or if you are using an ACPI-aware operating system, suspect the system board.

Serial port problems	
Symptom	FRU/action
The number of serial ports identified by the operating system is less than the number of serial ports installed.	<ol style="list-style-type: none"> Verify that: <ul style="list-style-type: none"> Each port is assigned a unique address by the Configuration/Setup Utility program and none of the serial ports is disabled. The serial-port adapter, if you installed one, is seated properly. Failing serial port adapter.
A serial device does not work.	<ol style="list-style-type: none"> Verify that: <ul style="list-style-type: none"> The device is compatible with the computer. The serial port is enabled and is assigned a unique address. The device is connected to the correct port (see “Input/output connectors” on page 55). Failing serial device. Serial adapter, if installed. System board.

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

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

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.)	<ol style="list-style-type: none"> Run the Configuration/Setup Utility program. Battery. System board. Microprocessor.
101, 102, 106 (System and processor error)	<ul style="list-style-type: none"> System board
114 (Adapter read-only memory error)	<ol style="list-style-type: none"> Failing adapter. Run diagnostics.
151 (Real time clock error)	<ol style="list-style-type: none"> Run diagnostics. Battery. System board.
161 (Real time clock battery error)	<ol style="list-style-type: none"> Run the Configuration/Setup Utility program. Battery. 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, <i>save the configuration.</i>	1. Run the Configuration/Setup Utility program. 2. Battery. 3. Failing device. 4. System board.
163 (Real-time clock error)	1. Run the Configuration/Setup Utility program. 2. Battery. 3. System board.
164 (Memory configuration changed.)	1. Run the Configuration/Setup Utility program. 2. DIMM. 3. System board.
176 (Computer cover or cable removed without use of key.)	Information only.
184 (Power-on password damaged)	1. Run the Configuration/Setup Utility program. 2. System board.
185 (Drive startup sequence information corrupted)	1. Run the Configuration/Setup Utility program. 2. System board.
187 (VPD serial number not set.)	1. Set serial number in the Configuration/Setup Utility program. 2. System board.
188 (Bad EEPROM CRC #2)	1. Run the Configuration/Setup Utility program. 2. System board.
189 (An attempt made to enter the system with invalid passwords)	<ul style="list-style-type: none"> • Run the Configuration/Setup Utility program.
201 (Memory test error.)	1. DIMM 2. System board
289 (DIMM disabled by the user or system.)	1. Run the Configuration/Setup Utility program. 2. DIMM. 3. System board.
301 (Keyboard or keyboard controller error)	1. Keyboard 2. System board
303 (Keyboard controller error)	<ul style="list-style-type: none"> • System board
602 (Invalid diskette boot record)	1. Diskette 2. Diskette drive 3. Drive cable 4. System board
604 (Diskette drive error)	1. Run the Configuration/Setup Utility program and diagnostics. 2. Diskette drive. 3. Drive cable. 4. System board.

Error code/symptom	FRU/action
662 (Diskette drive configuration error)	1. Run the Configuration/Setup Utility program and diagnostics. 2. Diskette drive. 3. Drive cable. 4. System board.
962 (Parallel port error)	1. Run the Configuration/Setup Utility program. 2. System board.
11XX (System board serial port 1 or 2 error)	1. Run the Configuration/Setup Utility program. 2. System board.
1762 (Hard drive configuration error, IDE only.)	1. Hard disk drive. 2. Hard disk cables. 3. Run the Configuration/Setup Utility program. 4. System board.
178X (Hard drive error, IDE only.)	1. Hard disk cables 2. Hard disk adapter 3. Hard disk drive 4. System board
1800 (No more hardware interrupt available for PCI adapter.)	1. Run the Configuration/Setup Utility program. 2. Remove adapter.
1801 (No more ROM space available for PIC adapter.)	1. Run the Configuration/Setup Utility program. 2. Remove adapter. 3. Disable the adapter BIOS and run the Configuration/Setup Utility program.
1962 (Drive does not contain a valid boot sector)	1. Verify that a startable operating system is installed. 2. Run diagnostics. 3. Hard disk drive. 4. SCSI backplane. 5. Cable. 6. System board.
5962 (IDE CD-ROM drive configuration error)	1. Run the Configuration/Setup Utility program. 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
00012000 (Machine check architecture error.)	1. Microprocessor 2. System board
00019701 (Microprocessor 1 failed)	1. Microprocessor 2. System board

Error code/symptom	FRU/action
00180200 (No more I/O space available for PCI adapter.)	<ol style="list-style-type: none"> 1. Run the Configuration/Setup Utility program. 2. Adapter. 3. System board.
00180300 (No more memory above 1MB for PCI adapter.)	<ol style="list-style-type: none"> 1. Run the Configuration/Setup Utility program. 2. Adapter. 3. System board.
00180500 (PCI option ROM checksum error.)	<ol style="list-style-type: none"> 1. PCI adapter 2. System board
00180600 (PCI device BIST failure. PCI bridge error.)	<ol style="list-style-type: none"> 1. Run the Configuration/Setup Utility program. 2. Adapter. 3. System board.
00180700 (PCI device no responding.)	<ol style="list-style-type: none"> 1. System board 2. PCI adapter
00181000 (General PCI error)	<ul style="list-style-type: none"> • Adapter • System board
I9990650 (AC power has been restored)	<ol style="list-style-type: none"> 1. Check cable. 2. Check for interruption of power. 3. Power cable.

POST (ISPR) error procedures

Use the ISPR error procedures to help you solve ServeRAID problems. A complete list of error codes is listed at “ServeRAID error codes” on page 95.

Note: Where the ISPR Error Procedures refer to a hard disk drive backplane, see the chapter of this publication that concerns field replaceable units.

EF10 (Default ISPR)

1. No ISPR error present.

9ZXX thru BZXX (SCSI bus error caused by cables, termination, or defective drives.)

1. Isolate the SCSI subsystem from the controller by disconnecting all hard disk drive cables from the suspect adapter, and restart the computer.

CAUTION:

Do not press F5. Doing so changes the configuration of the server.

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

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

Notes:

- a. SCSI channel cable details, if any, appear elsewhere in this publication.
 - b. The adapter/controller detects a configuration change. *Do not* select **Save Changes**. Instead, press F10 to bypass any options to this effect.
2. If ISPR error is **EF10** after disconnecting cables:

- a. Identify which channel is causing the error by the second digit (Z) of the original ISPR code as indicated in the following table:

Note: ServeRAID-4H controllers have four channels; ServeRAID-4L and -4Lx controllers have only one channel; and ServeRAID-4M and -4Mx controllers have two channels. ServeRAID-5i controllers have no channels. The ServeRAID-5i uses the channel connectors of the integrated SCSI controller of the server.

Table 2. SCSI identifier

SCSI channel code	Descriptions
1	Channel 1
2	Channel 2
3	Channel 1 and 2
4	Channel 3
5	Channel 1 and 3
6	Channel 2 and 3
7	Channel 1, 2, and 3
8	Channel 4
9	Channel 1 and 4
A	Channel 2 and 4
B	Channel 1, 2, and 4
C	Channel 3 and 4
D	Channel 1, 3, and 4
E	Channel 2, 3, and 4
F	Channel 1, 2, 3, and 4

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

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

- d. Check for proper backplane jumper configuration.

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

- e. Check for proper cabling configuration in systems that use hard disk drive status cables. Reconnect all cables removed in step 1 on page 93.
- f. Disconnect one drive at a time attached to the channel identified in step 2a; then, restart the computer to determine which drive is causing the error.
- g. Replace the hard disk drive cable.
- h. Replace the hard disk drive backplane.

FFFF or other code not listed

1. Place download jumpers on the controller and try to flash the firmware code to the adapter.

2. Isolate the SCSI subsystem from the controller by disconnecting all hard disk drive cables attached to the suspect adapter, and restart the computer.

CAUTION:

Do not press F5. Doing so will change the configuration of the server.

If ISPR code is **EF10** after disconnecting cables, complete the following steps until the error is eliminated:

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

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

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

ServeRAID error codes

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

Error code/symptom	FRU/action
1xxx (Microcode checksum error)	1. ServeRAID controller
2xxx (Code DRAM error)	1. Install download jumpers, flash latest level BIOS code and firmware for controller. Remove jumpers. 2. ServeRAID controller.
3000-31XX (Code DRAM error)	1. Install download jumpers, flash latest level BIOS code and firmware for controller. Remove jumpers. 2. ServeRAID controller.
3200 (Code DRAM error)	1. Install download jumpers, flash latest level BIOS code and firmware for controller. Remove jumpers. 2. ServeRAID controller.
3300 (ServeRAID-5i only)	1. Install ServeRAID-5i controller in an extended PCI option slot. See the documentation that came with the server for more information.
3E20 (ServeRAID-5i only)	1. Remove the ServeRAID-5i controller from its slot and install it in the proper PCI option slot. 2. Verify that the ServeRAID-5i controller is supported in this server. 3. ServeRAID-5i controller. 4. System board.

Error code/symptom	FRU/action
3E2x	<ol style="list-style-type: none"> 1. Reseat the ServeRAID controller. 2. Flash latest level of BIOS code and firmware for controller. 3. ServeRAID-5i controller. 4. Integrated RAID controller on server).
4xxx thru 5xxx (Code DRAM error)	<ol style="list-style-type: none"> 1. Install download jumpers, flash latest level BIOS code and firmware for controller; then, remove jumpers. 2. ServeRAID controller.
6xxx (Cache DRAM error) (ServeRAID-4H only)	<ol style="list-style-type: none"> 1. Reseat adapter. 2. Install download jumpers, flash latest level BIOS code and firmware for controller; then, remove jumpers. 3. ServeRAID controller.
7xxx thru 8xxx (Host/local PCI bus interface error)	<ol style="list-style-type: none"> 1. Flash latest level of BIOS code and firmware for controller. 2. If ServeRAID-4x controller, replace controller. 3. If ServeRAID-5i controller, integrated RAID controller on the server.
9003	<ol style="list-style-type: none"> 1. Flash latest level of BIOS code and firmware for controller. 2. Confirm that this controller is a supported option for this system. 3. ServeRAID controller. 4. Integrated RAID controller on the server).
9xxx thru BZxx (SCSI bus error caused by cables, termination, defective drives, etc.). Z refers to the specific channel or channels that cause the error.	<ol style="list-style-type: none"> 1. Follow indications at "POST (ISPR) error procedures" on page 93. Follow those instructions before continuing with the next steps listed in this index. 2. Hard disk drive cable. 3. Hard disk drive backplane. 4. Hard disk drive. 5. ServeRAID controller.
EFFF (Firmware code corrupt or download jumpers are in place)	<ol style="list-style-type: none"> 1. Flash latest level BIOS code and firmware for controller; then, remove jumpers. 2. ServeRAID controller.
FFFF or other code not listed	<ol style="list-style-type: none"> 1. Follow indications at "POST (ISPR) error procedures" on page 93. 2. Hard disk drive cable. 3. Hard disk drive backplane. 4. Hard disk drive. 5. ServeRAID controller.

SCSI error codes

Error code	FRU/action
<p>All SCSI Errors One or more of the following might be causing the problem:</p> <ul style="list-style-type: none">• 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	<ol style="list-style-type: none">1. Make sure that external SCSI devices are turned on before you turn on the computer.2. Make sure that the cables for all external SCSI devices are connected correctly.3. If you have attached an external SCSI device to the computer, make sure the external SCSI termination is set to automatic.4. Make sure that the last device in each SCSI chain is terminated correctly.5. Make sure that the SCSI devices are configured correctly.

Undetermined problems

Use the information in this section if the diagnostic tests did not identify the failure, the devices list is incorrect, or the system is inoperative.

Notes:

1. Damaged data in CMOS can cause undetermined problems.
2. Damaged data in BIOS code can cause undetermined problems.

Check the LEDs on all the power supplies. If the LEDs indicate the power supplies are working correctly, complete the following steps:

1. Turn off the computer.
2. Be sure the computer is cabled correctly.
3. Remove or disconnect the following devices (one at a time) until you find the failure (turn 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 (two banks of 128 MB DIMMs))

Note: Minimum operating requirements are:

- a. One power supply
 - b. System board
 - c. One microprocessor and VRM
 - d. Memory module (with a minimum of two 128 MB DIMMs)
4. Turn on the computer. If the problem remains, suspect the following FRUs in the order listed:
 - Power supply
 - System board

Notes:

1. If the problem is corrected 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.

Problem determination tips

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

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

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

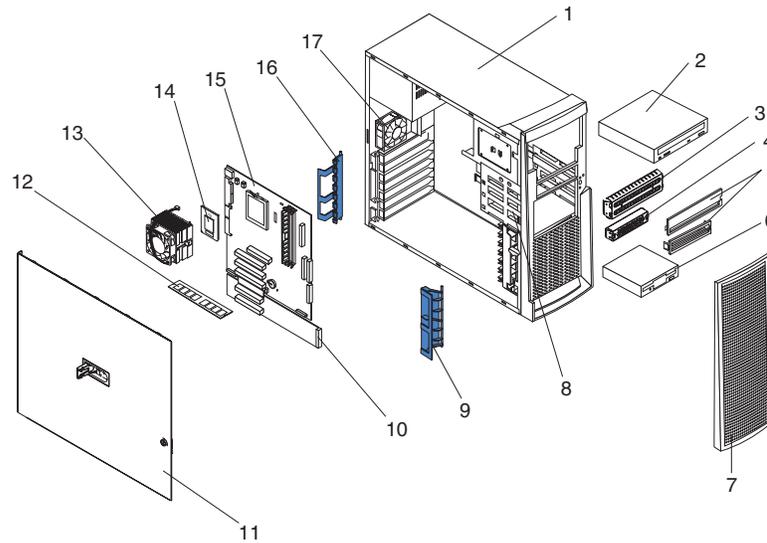
- Are the exact machine type and models
- Have the same BIOS code level
- Have the same adapters/attachments in the same locations
- Have the same address jumpers/terminators/cabling
- Have the same software versions and levels
- Have the same diagnostics code (version)
- Have the same configuration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

Comparing the configuration and software setup between working and non-working computers will often lead to problem resolution.

Parts listing for the IntelliStation M Pro Type 6219

This parts listing is for the IntelliStation M Pro (Type 6219).

System



System, Type 6219

Note: Field replaceable units (FRUs) should be serviced only by qualified field service technicians. Customer replaceable units (CRUs) can be replaced by the customer.

Index	System (IntelliStation M Pro, Type 6219, Models 10x, 12x, 1PU, 21x, 22x, 23x, 26x, 27x, 2PU, 32x, 34x, 35x, 36x, 37x, 38x, 39x, 3PU, 42x, 45x, 46x, 47x, 48x, 49x, 4PU, A0G, A2G, B1G, B2G, B3G, B6G, B7G, C2G, C4G, C5G, C6G, C7G, C8G, C9G, D2G, D5G, D6G, D7G, D8G, D9G)	FRU No.	CRU/FRU
1	Chassis (models all)	59P8524	CRU
2	48X CD-ROM, primary (models 10x, 12x, 32x, A0G, A2G, C2G)	33P3203	CRU
2	48X CD-ROM, alternate (models 10x, 12x, 32x, A0G, A2G, C2G)	33P3207	CRU
2	48X CD-ROM, alternate (models 10x, 12x, 32x, A0G, A2G, C2G)	33P3211	CRU
2	48X CD-ROM, primary (models 23x, 27x, 34x, 35x, 38x, 39x, 45x, 48x, 49x, B3G, B7G, C4G, C5G, C8G, C9G, D5G, D8G, D9G)	33P3289	CRU
2	48X CD-ROM, alternate (models 23x, 27x, 34x, 35x, 38x, 39x, 45x, 48x, 49x, B3G, B7G, C5G, C4G, C8G, C9G, D5G, D8G, D9G)	33P3293	CRU
2	CD (read/write) / DVD, primary (models 21x, B1G)	33P3251	CRU
2	DVD combo (models 22x, B2G)	33P3301	CRU
2	CD (read/write) / DVD, primary (models 26x, 36x, 37x, B6G, C6G, C7G)	33P3269	CRU
2	CD (read/write) / DVD, alternate (models 26x, 36x, 37x, B6G, C6G, C7G)	33P3273	CRU
3	5.25 EMC shield (models all)	32P8503	CRU
4	3.5 EMC shield (models all)	32P8501	CRU
5	Bezel kit (all models)	00N7082	CRU
	<ul style="list-style-type: none"> • Filler bezel (2) • Blank bezel (2) 		
	Miscellaneous hardware kit (all models)	09N5764	CRU
	<ul style="list-style-type: none"> • Screw, M3.5 (7) • Gasket, EMC two position (1) • Bracket, I/O blank (1) • Bracket, power supply (1) • Support, blank isolator (4) • Bracket, key holder (1) • Screw, M3X5 slotted (4) • Clip (1) • Spacer, system board (4) • Clamp, SCSI cable (1) • Screw, M3.5 slotted (6) 		
6	Diskette drive (all except models)	76H4228	CRU
6	Diskette drive, primary (all J models)	76H4091	CRU
7	Front bezel (models all)	49P1966	CRU
8	Hard disk drive cage (models all)	19K4931	FRU
8	Hot-swap drive cage (models all)	19K4947	FRU
9	Support cam bracket (models all)	19K4963	FRU
10	IDE extender card (models 10x, 12x, 23x, 32x, 42x, A0G, A2G, B2G, C2G, D2G)	22P9768	FRU
10	SCSI extender card (models 21x 22x, 26x 27x, 34x, 35x, 36x, 37x, 38x, 39x, 45x, 48x, 49x, B1G, B2G, B6G, B7G, C4G, C5G, C6G, C7G, C8G, C9G, D5G, D8G, D9G)	24P7540	FRU
11	Sliding door assembly (models all)	49P1964	FRU
12	Memory, 128MB (models 10x, 12x, 1PU, 2PU, 3PU, 4PU, A0G, A2G)	10K0066	CRU

System (IntelliStation M Pro, Type 6219, Models 10x, 12x, 1PU, 21x, 22x, 23x, 26x, 27x, 2PU, 32x, 34x, 35x, 36x, 37x, 38x, 39x, 3PU, 42x, 45x, 46x, 47x, 48x, 49x, 4PU, A0G, A2G, B1G, B2G, B3G, B6G, B7G, C2G, C4G, C5G, C6G, C7G, C8G, C9G, D2G, D5G, D6G, D7G, D8G, D9G)			
Index		FRU No.	CRU/FRU
12	Memory, 256MB (models 21x, 22x, 23x, 26x, 27x, 32x, 34x, 36x, 38x, 42x, 46x, 48x, B1G, B2G, B3G, B6G, C2G, C4G, C6G, C8G, D2G, D6G, D8G)	10K0068	CRU
12	Memory, 512MB (models 35x, 37x, 39x, 45x, 47x, 49x, C5G, C7G, C9G, D5G, D7G, D9G)	10K0070	CRU
13	Heat/fan sink (models all)	32P4004	FRU
14	Microprocessor, 533/2.4-512 (models 10x, 12x, 1PU, A0G, A2G)	48P7684	FRU
14	Microprocessor, 533/2.67-512 (models 21x, 22x, 23x, 26x, 27x, 2PU, B1G, B2G, B3G, B7G)	58P9963	FRU
14	Microprocessor, 533/2.8-512 (models 32x, 34x, 35x, 36x, 37x, 3PU, 38x, 39x, 3PU, C2G, C4G, C5G, C6G, C7G, C8G, C9G)	01R3171	FRU
14	Microprocessor, 533/3006-512 (models 42x, 45x, 46x, 47x, 48x, 49x, 4PU, D2G, D5G, D6G, D7G, D8G, D9G)	24P7636	FRU
15	System board (models all)	24P7527	FRU
16	Rear adapter-retainer bracket (models all)	19K4945	FRU
17	Fan, 80x38 fixed speed (models all)	59P2572	CRU
	2-drop cable (models all)	37L5098	FRU
	3 volt battery (models all)	33F8354	FRU
	36.4 SCSI hard disk drive (models 21x, 26x, 35x, 36x, 37x, 45x, B1G, B6G, C5G, C6G, C7G, D5G)	24P3704	CRU
	40 GB IDE hard disk drive (models 10x, 12x, 32x, A0G, A2G, C2G)	19K1568	CRU
	340 watt power supply (models all)	49P2040	FRU
	1394 card (models 21x, 22x, 26x, 27x, 35x, 36x, 37x, 38x, 39x, 45x, 48x, 49x, B1G, B2G, B6G, B7G, C5G, C6G, C7G, C8G, C9G, D5G, D8G, D9G)	24P7526	FRU
	1394, back (models 21x, 22x, 26x, 27x, 35x, 36x, 37x, 38x, 39x, 45x, 48x, 49x, B1G, B2G, B6G, B7G, C5G, C6G, C7G, C8G, C9G, D5G, D8G, D9G)	59P8515	FRU
	Audio card (models all)	49P1752	FRU
	Bezel release (models all)	59P4791	FRU
	C2 switch with cable (models all)	09K9827	FRU
	CD audio cable (models all)	75H9219	FRU
	Control panel (models all)	19K4935	FRU
	Diskette drive cable (models all)	76H4228	FRU
	Dongle (models 26x, 27x, 35x, 36x, 37x, 38x, 39x, 42x, 45x, 46x, 47x, 48x, 49x, B6G, B7G, C5G, C6G, C7G, C8G, C9G, D5G, D6G, D7G, D8G, D9G)	09N3435	CRU
	Dual USB cable (models all)	49P4365	CRU
	DVI dual VGA cable (models 10x, 21x, 22x, A0G, B1G, B2G)	48P7583	CRU
	Feet (models all)	59P8537	CRU
	Front audio cable (models all)	49P1933	FRU
	Front audio cable (models 21x, 22x, 26x, 27x, 35x, 36x, 37x, 38x, 39x, 45x, 48x, 49x, B1G, B2G, B6G, B7G, C5G, C6G, C7G, C8G, C9G, D5G, D8G, D9G)	49P1995	FRU
	G450 DVI card (models 10x, 21x, 22x, A0G, B1G, B2G)	25P6691	FRU
	Handle cap (models all)	49P1968	FRU
	Handle support (models all)	49P1969	FRU
	Hard disk drive rail (models all)	23P1328	CRU
	LEDs holder assembly (models all)	59P8500	FRU
	Lock assembly (models all)	49P1970	FRU
	Microprocessor retainer clip (models all)	49P1956	FRU
	Mouse (models all)	76H6620	CRU

Index	FRU No.	CRU/FRU
System (IntelliStation M Pro, Type 6219, Models 10x, 12x, 1PU, 21x, 22x, 23x, 26x, 27x, 2PU, 32x, 34x, 35x, 36x, 37x, 38x, 39x, 3PU, 42x, 45x, 46x, 47x, 48x, 49x, 4PU, A0G, A2G, B1G, B2G, B3G, B6G, B7G, C2G, C4G, C5G, C6G, C7G, C8G, C9G, D2G, D5G, D6G, D7G, D8G, D9G)		
Nameplate kit. (models all)	59P8525	CRU
Power cord (see "Power cords" on page 105)	N/A	FRU
Power/LED/USB/audio cover assembly (models all)	49P1967	FRU
SCSI, U320 cable (models 21x, 22x, 26x, 27x, 34x, 35x, 36x, 37x, 38x, 39x, 45x, 48x, 49x, B2G, B1G, B6G, B7G, C4G, C5G, C6G, C7G, C8G, C9G, D5G, D8G, D9G)	59P2614	FRU
Screw kit (models all)	00N3517	CRU
Side/top cover (models all)	49P1965	CRU
Speaker assembly (models all)	19K4929	FRU
System service label (models all)	59P8527	CRU
Video card (models 26x, 27x, 36x, 38x, 46x, 48x, B6G, B7G, C6G, C8G, D6G, D8G)	59P4991	FRU
Video card (models 12x, 32x, 42x, 1PU, 2PU, 3PU, 4PU, A2G, C2G, D2G)	59P4994	FRU
Video card (models 37x, 39x, 47x, 49x, C7G, C9G, D7G, D9G)	59P5000	FRU
Video card, Q4 580XGL (models 23x, 34x, B3G, C4G)	59P5041	FRU
Video card, Nvidia FX 1000 (models 35x, 45x, C5G, D5G)	71P8380	FRU
VGA pigtail (models 12x, 1PU, 23x, 2PU, 32x, 34x, 3PU, 42x, 4PU, A2G, B3G, C2G, C4G, D2G)	48P7586	CRU

Recovery CD, Type 6219

Recovery CD (IntelliStation M Pro, Type 6219, Models)	FRU No.	CRU/FRU
English, Windows XP (all A, H, U models)	02R2998	CRU
French, Windows XP (all G models)	02R2999	CRU
German, Windows XP (all G models)	02R3000	CRU
Italian, Windows XP (all G models)	02R3001	CRU
Spanish, Windows XP (all G models)	02R3002	CRU
Norwegian, Windows XP (all G models)	02R3003	CRU
Dutch, Windows XP (all G models)	02R3004	CRU
Danish, Windows XP (all G models)	02R3005	CRU
Swedish, Windows XP (all G models)	02R3006	CRU
Finnish, Windows XP (all G models)	02R3007	CRU
Japanese, Windows XP (all J models)	02R3181	CRU
Korean, Windows XP (all K models)	02R3181	CRU
Chinese, IIPC, Windows XP (all C models)	02R3183	CRU
Chinese, Hong Kong, Windows XP (all B models)	02R3184	CRU
Chinese, Taiwan, Windows XP (all V models)	02R2185	CRU

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
Portuguese	37L2571
Romanian	37L2572
Russian	37L2573
Serbian/Cyrillic	37L2574
Slavic	37L2575
Spanish	37L2576
Swedish/Finn	37L2577
Swiss, French/German	37L2578
Turkish	37L2579
Turkish	37L2580
UK English	37L2581
Yugosl/Lat	37L2582
US English-EMEA	37L2583
Chinese/US	37L2585
Thailand	37L2587
French Canadian	37L0913

Power cords

For your safety, IBM provides a power cord with a grounded attachment plug to use with this IBM product. To avoid electrical shock, always use the power cord and plug with a properly grounded outlet.

IBM power cords used in the United States and Canada are listed by Underwriter's Laboratories (UL) and certified by the Canadian Standards Association (CSA).

For units intended to be operated at 115 volts: Use a UL-listed and CSA-certified cord set consisting of a minimum 18 AWG, Type SVT or SJT, three-conductor cord, a maximum of 15 feet in length and a parallel blade, grounding-type attachment plug rated 15 amperes, 125 volts.

For units intended to be operated at 230 volts (U.S. use): Use a UL-listed and CSA-certified cord set consisting of a minimum 18 AWG, Type SVT or SJT, three-conductor cord, a maximum of 15 feet in length and a tandem blade, grounding-type attachment plug rated 15 amperes, 250 volts.

For units intended to be operated at 230 volts (outside the U.S.): Use a cord set with a grounding-type attachment plug. The cord set should have the appropriate safety approvals for the country in which the equipment will be installed.

IBM power cords for a specific country or region are usually available only in that country or region.

IBM power cord part number	Used in these countries and regions
13F9940	Argentina, Australia, China (PRC), New Zealand, Papua New Guinea, Paraguay, Uruguay, Western Samoa
13F9979	Afghanistan, Algeria, Andorra, Angola, Austria, Belgium, Benin, Bulgaria, Burkina Faso, Burundi, Cameroon, Central African Rep., Chad, China (Macau S.A.R.), Czech Republic, Egypt, Finland, France, French Guiana, Germany, Greece, Guinea, Hungary, Iceland, Indonesia, Iran, Ivory Coast, Jordan, Lebanon, Luxembourg, Malagasy, Mali, Martinique, Mauritania, Mauritius, Monaco, Morocco, Mozambique, Netherlands, New Caledonia, Niger, Norway, Poland, Portugal, Romania, Senegal, Slovakia, Spain, Sudan, Sweden, Syria, Togo, Tunisia, Turkey, former USSR, Vietnam, former Yugoslavia, Zaire, Zimbabwe
13F9997	Denmark
14F0015	Bangladesh, Burma, Pakistan, South Africa, Sri Lanka
14F0033	Antigua, Bahrain, Brunei, Channel Islands, China (Hong Kong S.A.R.), Cyprus, Dubai, Fiji, Ghana, India, Iraq, Ireland, Kenya, Kuwait, Malawi, Malaysia, Malta, Nepal, Nigeria, Polynesia, Qatar, Sierra Leone, Singapore, Tanzania, Uganda, United Kingdom, Yemen, Zambia
14F0051	Liechtenstein, Switzerland
14F0069	Chile, Ethiopia, Italy, Libya, Somalia
14F0087	Israel
1838574	Thailand
93F2364	Bahamas, Barbados, Bermuda, Bolivia, Brazil, Canada, Cayman Islands, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Japan, Korea (South), Liberia, Mexico, Netherlands Antilles, Nicaragua, Panama, Peru, Philippines, Saudi Arabia, Suriname, Taiwan, Trinidad (West Indies), United States of America, Venezuela

Related service information

The service procedures are designed to help you isolate problems. They assume that you have model-specific training on all computers, or that you 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 computer.

General safety

Follow these rules to ensure general safety:

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

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

Electrical safety



CAUTION:

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

Observe the following rules when working on electrical equipment.

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

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

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

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

- Regularly inspect and maintain your electrical hand tools for safe operational condition.

- Do not use worn or broken tools and testers.
 - *Never assume* that power has been disconnected from a circuit. First, *check* that it has been powered-off.
 - Always look carefully for possible hazards in your work area. Examples of these hazards are moist floors, nongrounded power extension cables, power surges, and missing safety grounds.
 - Do not touch live electrical circuits with the reflective surface of a plastic dental mirror. The surface is conductive; such touching can cause personal injury and machine damage.
 - Do not service the following parts with the power on when they are removed from their normal operating places in a machine:
 - Power supply units
 - Pumps
 - Blowers and fans
 - Motor generators
- and similar units. (This practice ensures correct grounding of the units.)
- If an electrical accident occurs:
 - Use caution; do not become a victim yourself.
 - Switch off power.
 - Send another person to get medical aid.

Safety inspection guide

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

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

Consider these conditions and the safety hazards they present:

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

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

Checklist:

1. Check exterior covers for damage (loose, broken, or sharp edges).
2. Turn off the computer. Disconnect the power cord.
3. Check the power cord for:
 - a. A third-wire ground connector in good condition. Use a meter to measure third-wire ground continuity for 0.1 ohm or less between the external ground pin and frame ground.

- b. The power cord should be the appropriate type as specified in the parts listings.
- c. Insulation must not be frayed or worn.
4. Remove the cover.
5. Check for any obvious non-IBM alterations. Use good judgment as to the safety of any non-IBM alterations.
6. Check inside the unit for any obvious unsafe conditions, such as metal filings, contamination, water or other liquids, or signs of fire or smoke damage.
7. Check for worn, frayed, or pinched cables.
8. Check that the power-supply cover fasteners (screws or rivets) have not been removed or tampered with.

Handling electrostatic discharge-sensitive devices

Any computer part containing transistors or integrated circuits (ICs) should be considered sensitive to electrostatic discharge (ESD). ESD damage can occur when there is a difference in charge between objects. Protect against ESD damage by equalizing the charge so that the server, the part, the work mat, and the person handling the part are all at the same charge.

Notes:

1. Use product-specific ESD procedures when they exceed the requirements noted here.
2. Make sure that the ESD-protective devices you use have been certified (ISO 9000) as fully effective.

When handling ESD-sensitive parts:

- Keep the parts in protective packages until they are inserted into the product.
- Avoid contact with other people.
- Wear a grounded wrist strap against your skin to eliminate static on your body.
- Prevent the part from touching your clothing. Most clothing is insulative and retains a charge even when you are wearing a wrist strap.
- Use the black side of a grounded work mat to provide a static-free work surface. The mat is especially useful when handling ESD-sensitive devices.
- Select a grounding system, such as those in the following list, to provide protection that meets the specific service requirement.

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

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

Grounding requirements

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

Safety notices (multilingual translations)

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

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

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

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

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

- Statement 1



DANGER

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

To avoid a shock hazard:

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

To Connect	To Disconnect
<ol style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> 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

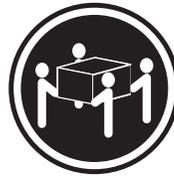




≥18 kg (37 lbs)



≥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.	1. DESLIGUE Tudo.
2. Primeiramente, conecte todos os cabos aos dispositivos.	2. Primeiramente, remova os cabos de alimentação das tomadas.
3. Conecte os cabos de sinal aos conectores.	3. Remova os cabos de sinal dos conectores.
4. Conecte os cabos de alimentação às tomadas.	4. Remova todos os cabos dos dispositivos.
5. LIGUE os 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 módulo com uma bateria de lítio, substitua-o apenas pelo mesmo tipo de módulo, do mesmo fabricante. A bateria contém lítio e pode explodir se não for utilizada, manuseada e descartada de maneira correta.

Não:

- Jogue ou coloque na água
- Aqueça a mais de 100°C (212°F)
- Conserte nem desmonte

Para descartar a bateria, entre em contato com a área de atendimento a clientes IBM, pelo telefone (011) 889-8986, para obter informações sobre como enviar a bateria pelo correio para a IBM.

Instrução 3



PRECAUCIÓN:

Quando produtos a laser (unidades de CD-ROM, unidades de DVD, dispositivos de fibra ótica, transmissores, etc.) estiverem instalados, observe o seguinte:

- Não remova as tampas. A remoção das tampas de um produto a laser pode resultar em exposição prejudicial à radiação de laser. Nenhuma peça localizada no interior do dispositivo pode ser consertada.
- A utilização de controles ou ajustes ou a execução de procedimentos diferentes dos especificados aqui pode resultar em exposição prejudicial à radiação.

PERIGO

Alguns produtos a laser contêm um diodo laser da Classe 3A ou Classe 3B embutido. Observe o seguinte:

Radiação de laser quando aberto. Não olhe diretamente para o raio a olho nu ou com instrumentos óticos, e evite exposição direta ao raio.

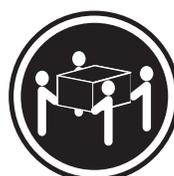
Instrução 4



≥18 kg (37 lbs)



≥32 kg (70.5 lbs)



≥55 kg (121.2 lbs)

CUIDADO:

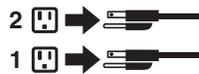
Ao levantar a máquina, faça-o com segurança.

Instrução 5



CUIDADO:

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



CUIDADO:

Instrução 10



CUIDADO:



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

重要:

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

例如，如果一个提醒条款前的数字为 1，则本部分中相应的译文也带有标号 1。

在执行任何指示的操作之前，请确保您已经阅读了全部提醒和危险条款。

声明 1



危险

电源、电话和通信电缆中带有危险电流。
为避免电击：
雷电期间不要拆接电缆或安装、维修及重新配置本产品。
将所有电源线连接至正确布线并已安全接地的电源插座上。
将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



≥16 kg (37 磅) ≥32 kg (70.5 磅) ≥55 kg (121.2 磅)

警告:

抬起时请采用安全操作方法。

声明 5



警告:

使用设备上的电源控制按钮和电源上的开关都不能断开本设备上的电流。
另外，本设备可能带有多条电源线。如要断开设备上的所有电流，请确
保所有电源线均已与电源断开连接。



声明 6



警告:

如果在电源线连接设备的一端安装了固定松紧夹，则必须将电源线的另一端连接至
使用方便的电源。

声明 7



警告:

如果设备带有外门，则在移动或抬起设备前应将其拆除或固定以避免造成人员伤害。外门支撑不了设备的重量。

声明 8



警告:

不要拆除电源外盖或贴有下列标签的任何部件。



贴有此标签的组件内部存在高电压、高电流的危险。这些组件中没有用户可维修的部件。如果怀疑其中的部件存在问题，应与服务技术人员联系。

声明 9



警告:

为避免人员伤害，拆除设备上的风扇前应按下热插拔风扇电缆。

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. 拆信號電纜線上接頭。	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。若系統中具有含鋰電池的模組，在更換此模組時，請使用相同廠商製造的相同模組類型。如未正確使用、處理或丟棄含有鋰的電池時，可能會引發爆炸。

請勿將電池：

- 丟入或浸入水中
- 加熱超過 100 °C (212 °F)
- 修理或折開

請遵照當地法令規章處理廢棄電池。

聲明 3



注意：

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

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



危險

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

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

聲明 4



≥ 18 公斤 (37 磅) ≥ 32 公斤 (70.5 磅) ≥ 55 公斤 (121.2 磅)

注意：
抬起裝置時，請注意安全措施。

聲明 5



注意：
裝置上的電源控制按鈕及電源供應器上的電源開關均無法關閉裝置上的電流。
本裝置可能有一條以上的電源線。如要移除裝置上的所有電流，請確認所有電源線已與電源分離。



聲明 10



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



> 82 公斤 (180 磅)

Important:

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

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

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

Notice n° 1



DANGER

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

Pour éviter tout risque de choc électrique:

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

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



Notice n° 2

ATTENTION:

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

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

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



Notice n° 3

ATTENTION:

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

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



DANGER

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

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

Notice n° 4





≥18 kg (37 lbs)



≥32 kg (70.5 lbs)



≥55 kg (121.2 lbs)

ATTENTION:

Faites-vous aider pour soulever ce produit.

Notice n° 5



ATTENTION:

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



Notice n° 10



ATTENTION:

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

Wichtig:

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

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

Lesen Sie alle Sicherheitshinweise, bevor Sie eine Anweisung ausführen.

Hinweis 1



VORSICHT

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

Aus Sicherheitsgründen:

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

Kabel anschließen:	Kabel lösen:
<ol style="list-style-type: none">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.	<ol style="list-style-type: none">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:

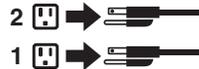
Beim Anheben der Maschine die vorgeschriebenen Sicherheitsbestimmungen beachten.

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:
<ol style="list-style-type: none">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.	<ol style="list-style-type: none">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:

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

Avviso 4



≥18 kg



≥32 kg



≥55 kg

ATTENZIONE:

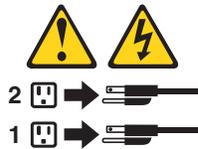
Durante il sollevamento della macchina seguire delle norme di sicurezza.

Avviso 5



ATTENZIONE:

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



Avviso 10



ATTENZIONE:



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

중요:

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

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

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

경고문 1



위험

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

다음은 주의하십시오.

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

지역 법령이나 규정의 요구에 따라 배터리를 처분하십시오.

경고문 3



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

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

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



위험

일부 레이저 제품에는 클래스 3A 또는 클래스 3B 레이저 다이오드가 들어 있습니다. 다음을 주의하십시오.

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

경고문 4



≥ 18 kg (37 lbs)



≥ 32 kg (70.5 lbs)



≥ 55 kg (121.2 lbs)

주의:

기계를 들 때는 안전하게 들어 올리십시오.

경고문 5



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



경고문 10



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



> 82 kg (180 lbs)

Importante:

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

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

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

Declaración 1



PELIGRO

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

Para evitar una descarga eléctrica:

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

Para la conexión	Para la desconexión
<ol style="list-style-type: none">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 alimentación a la toma de alimentación.5. ENCIENDA el dispositivo.	<ol style="list-style-type: none">1. APÁGUELO todo.2. En primer lugar, retire cada cable de alimentación de la toma de alimentación.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 módulo que contiene una batería de litio, sustitúyalo únicamente por el mismo tipo de módulo, que ha de estar creado por el mismo fabricante. La batería contiene litio y puede explotar si el usuario no la utiliza ni la maneja de forma adecuada o si no se desprende de la misma como corresponde.

No realice las acciones siguientes:

- Arrojarla al agua o sumergirla
- Calentarla a una temperatura que supere los 100°C (212°F)
- Repararla o desmontarla

Despréndase de la batería siguiendo los requisitos que exija el reglamento o la legislación local.

Declaración 3



PRECAUCIÓN:

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

- No retire las cubiertas. Si retira las cubiertas del producto láser, puede quedar expuesto a radiación láser perjudicial. Dentro del dispositivo no existe ninguna pieza que requiera mantenimiento.
- El uso de controles o ajustes o la realización de procedimientos que no sean los que se han especificado aquí pueden dar como resultado una exposición perjudicial a las radiaciones.



PELIGRO

Algunos productos láser contienen un diodo de láser incorporado de Clase 3A o de Clase 3B. Tenga en cuenta la advertencia siguiente.

Cuando se abre, hay radiación láser. No mire fijamente el rayo ni lleve a cabo ningún examen directamente con instrumentos ópticos; evite la exposición directa al rayo.

Declaración 4





≥18 kg



≥32 kg



≥55 kg

PRECAUCIÓN:

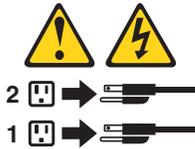
Tome medidas de seguridad al levantar el producto.

Declaración 5



PRECAUCIÓN:

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



Declaración 10



PRECAUCIÓN:



No coloque ningún objeto que pese más de 82 kg (180 libras) encima de los dispositivos montados en bastidor.

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

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

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

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

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

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

Electronic emission notices

Federal Communications Commission (FCC) statement

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

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

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

Industry Canada Class A emission compliance statement

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

Avis de conformité à la réglementation d'Industrie Canada

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

Australia and New Zealand Class A statement

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

United Kingdom telecommunications safety requirement

Notice to Customers

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

European Union EMC Directive conformance statement

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

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

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

Taiwanese Class A warning statement

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居住的環境中使用時，可
能會造成射頻干擾，在這
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