IBM IntelliStation M Pro
Types 6220 and 6230

Hardware Maintenance Manual

IBM

IBM IntelliStation M Pro
Types 6220 and 6230

Hardware Maintenance Manual

> **Note**
>
> Before using this information and the product it supports, read "Notices" on page 164.

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 Types 6220 and 6230.

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 129.

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 129.

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

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

安裝本產品之前，請先閱讀「安全資訊」。

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

Lesen Sie alle Sicherheitshinweise, bevor Sie eine Anweisung ausführen.

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

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

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

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

ADVERTENCIA: El contacto con el cable de estm producto o con cables de accesorios que se venden junto con estm 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/.

Contents

General checkout

The diagnostic programs are on the hidden partition on the hard disk. These programs are the primary method of testing the major components of the computer: the system board, Ethernet controller, video adapter, 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 17.

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 correctly.

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 hard disk drive cluster (two or more computers sharing the same external storage devices). Before running diagnostics, make sure that the failing computer is not part of a shared hard disk drive cluster.

A computer might be part of a cluster if any of the following are true:
- 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 hard disk drive cluster, all diagnostic tests can be run except diagnostic tests that test the storage unit (a hard disk drive in the storage unit) or the storage adapter that is attached to the storage unit.

Notes:
1. For computers that are part of a shared hard disk drive cluster, run one test at a time in looped mode. Do not run all tests in looped mode, because this could enable the hard disk drive diagnostic tests.
2. If multiple error codes are displayed, diagnose the first error code that is displayed.
3. If the computer is suspended with a POST error, go to "Symptom-to-FRU index" on page 99.
4. If the computer is suspended and no error message is displayed, see "Undetermined problems" on page 115.
5. For information about power supply problems, see "Symptom-to-FRU index" on page 99
6. For safety information, see "Safety information" on page 129.
7. For intermittent problems, check the error log; see "POST error log" on page 17 and "Undetermined problems" on page 115.

`001` **IS THE COMPUTER PART OF A CLUSTER?**

YES. Schedule maintenance with the customer. Shut down all computers related to the cluster. Run the 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 that are displayed on the screen. If an error is displayed, look up the first error in the "POST error codes" on page 109.
- Check the system-error log. If an error was recorded by the computer, see "Symptom-to-FRU index" on page 99.
- Start the diagnostic programs. See "Starting the diagnostic programs and viewing the test log" on page 19.
- 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 99.

YES. Run the diagnostic programs. If necessary, see "Diagnostic programs and error messages" on page 18.

If you receive an error, see "Symptom-to-FRU index" on page 99.

If the diagnostics were completed successfully and you still suspect a problem, see "Undetermined problems" on page 115.

General information

The IBM IntelliStation M Pro Type 6220 and 6230 computers incorporate many of the latest advances in computing technology and can be expanded and upgraded as your needs change.

You can obtain up-to-date information about your computer and other IBM computer products at http://www.ibm.com/pc/intellistation/.

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

Related publications

This *Hardware Maintenance Manual* contains information for trained service technicians. The latest version of this publication can be found at http://www.ibm.com/support/.

The following IBM documentation contains additional information about your computer. These documents can also be found at http://www.ibm.com.

- *Installation Guide*
  This printed publication contains setup and installation instructions.
- *User's Guide*
  This publication provides general information about your computer, including information about features, how to configure your computer, how to install options, and how to solve problems and get help.
- *Safety Information*
  This publication is in Portable Document Format (PDF) on the IBM *IntelliStation Documentation* CD. It contains translated caution and danger statements. Each caution and danger statement that appears in the documentation has a number that you can use to locate the corresponding statements in your language in the *Safety Information* book.
- *Adaptec SCSI documentation*

  This publication is in PDF on the *Device Drivers* CD. It contains information and instructions for installing and configuring small computer system interface (SCSI) device drivers and devices.
- Readme files on the *Device Drivers* CD
  Several readme files on this CD contain information about the preinstalled device drivers. Other readme files on this CD contain information about the various adapters and devices that might be installed in or attached to your computer.
- IBM *IntelliStation Documentation* CD
  This CD contains all of the IBM IntelliStation M Pro Types 6220 and 6230 publications in Portable Document Format (PDF).

Notices and statements used in this book

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

The following notices and statements are used in the documentation:

- **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 — M Pro Type 6220 (desktop model)

The following table provides a summary of the features and specifications of the IntelliStation M Pro Type 6220 desktop computer. Depending on the model, some features might not be available, or some specifications might not apply.

Table 1. Features and specifications — M Pro Type 6220 (desktop model)

Microprocessor:
- Intel™ Pentium® 4 processor
- 512 KB Level-2 cache
- 800 MHz front-side bus (FSB)

Memory:
- Minimum: 256 MB
- Maximum: 4 GB
- Type: PC2700 or PC3200
- Connectors: four dual inline memory module (DIMM) connectors

Internal Drives:
- Hard disk drive: integrated drive electronics (IDE) or serial ATA (SATA)
- One of the following:
  - CD-ROM: IDE
  - DVD/CD-RW combo: IDE
  - CD-RW: IDE

Expansion bays:
- Two slim-high 3.5-inch drive bays (one hard disk drive installed in some models)
- One half-high 5.25-inch bay (optical drive installed in one bay)

PCI expansion slots:
- Three 33 MHz/32-bit PCI slots on the system board
- One Accelerated Graphic Port (AGP) Pro 110 slot

Power supply:
One 200 watts (115 or 230 V ac)

Cooling:
One or two speed-controlled fans

Integrated functions:
- Intel Ethernet controller on the system board with RJ-45 Ethernet connector
- Two serial ports
- One parallel port
- (Some models) two Institute of Electrical and Electronics Engineers (IEEE) 1394 ports (four-pin on front, six-pin on rear)
- Six Universal Serial Bus (USB) ports (two on front and four on rear)
- Keyboard port
- Mouse port
- Audio ports
  - Line out (front and rear)
  - Mic (front and rear)
  - Line in (rear)
- Dual-channel IDE controller

Video adapter: (depending on the model)
- NVIDIA Quadro4 280NVS (LFH-60), AGP 8X, with 64 MB double-data-rate (DDR) synchronous dynamic random access memory (SDRAM) video memory and dual analog connectors (or dual digital monitor capability with the purchase of an additional pigtail cable)
- NVIDIA Quadro4 580XGL (LFH-60), AGP 8X, with 64 MB DDR SDRAM video memory and dual analog connectors (or dual digital monitor capability with the purchase of an additional pigtail cable)

Electrical input:
- Sine-wave input (50 or 60 Hz) required
- Input voltage and frequency ranges automatically selected
- Input voltage low range:
  - Minimum: 90 V ac
  - Maximum: 137 V ac
- Input voltage high range:
  - Minimum: 180 V ac
  - Maximum: 265 V ac
- Input kilovolt-amperes (kVA) approximately:
  - Minimum: 0.13 kVA
  - Maximum: 0.32 kVA

Heat output:
Approximate heat output in British thermal units (Btu) per hour
- Minimum configuration: 421 Btu (124 watts)
- Maximum configuration: 1050 Btu (308 watts)

Environment:
- Air temperature:
  - 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: 2134 m (7000 ft)
- Humidity (operating and storage): 8% to 80%

Acoustical noise emissions:
- Sound power, idle: 4.3 bel
- Sound power, operating: 4.5 bel

Size:
- Height: 104 mm (4.1 in.)
- Depth: 412 mm (16.2 in.)
- Width: 360 mm (14.2 in.)
- Weight: 9.1 kg (20 lb) when fully configured or 6.8 kg (15 lb) minimum

Features and specifications — M Pro Type 6230 (tower model)

The following table provides a summary of the features and specifications of the IntelliStation M Pro Type 6230 tower computer. Depending on the 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 the system board.

Table 2. Features and specifications

Microprocessor:
• Intel Pentium 4 processor
• 512 KB Level-2 cache
• 800 MHz front-side bus (FSB)
 	
Memory:
• Minimum: 256 MB
• Maximum: 4 GB
• Type: PC2700 or PC3200
• Connectors: four dual inline memory module (DIMM) connectors
 	
Internal Drives:
• Diskette: 1.44 MB (two mode)
• Hard disk drive: IDE, SATA, or SCSI
• One of the following:
  – CD-ROM: IDE
  – DVD/CD-RW combo: IDE
  – CD-RW: IDE
 	
Expansion bays:
• 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)
 	
PCI expansion slots:
• Five 33 MHz/32-bit PCI slots on the system board
• One Accelerated Graphic Port (AGP) Pro 110 slot
 	
Power supply:
One 340 watts (115-230 V ac)
 	
Cooling:
Two speed-controlled fans
	Integrated functions:
	• Intel Ethernet controller on the system board with RJ-45 Ethernet connector
	• Two serial ports
	• One parallel port
	• (Some models) two IEEE 1394 ports (four-pin on front, six-pin on rear)
	• Six Universal Serial Bus (USB) ports (two on front and four on rear)
	• Keyboard port
	• Mouse port
	• Audio ports
	  – Line out (front and rear)
	  – Mic (front and rear)
	  – Line in (front and rear)
	• Dual-channel IDE controller
	
	Video adapter: (depending on the model)
	• NVIDIA Quadro4 280NVS (LFH-60), AGP 8X, with 64 MB double-data-rate (DDR) synchronous dynamic random access memory (SDRAM) video memory and dual analog connectors (or dual digital monitor capability with the purchase of an additional pigtail cable)
	• NVIDIA Quadro4 580XGL (LFH-60), AGP 8X, with 64 MB 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), AGP 8X, with 128 MB DDR synchronous graphics random access memory (SGRAM) video memory with dual DVI-I connectors
	• NVIDIA Quadro FX 1000 (DVI-I), AGP 8X, with 128 MB DDR2 SDRAM video memory with dual DVI-I connectors
	• NVIDIA Quadro FX 3000 (DVI-I), AGP 8X, with 256 MB DDR2 SDRAM video memory with dual DVI-I connectors
		Electrical input:
		• Sine-wave input (50 or 60 Hz) required
		• Input voltage and frequency ranges automatically selected
		• Input voltage low range:
		  – Minimum: 90 V ac
		  – Maximum: 137 V ac
		• Input voltage high range:
		  – Minimum: 180 V ac
		  – Maximum: 265 V ac
		• Input kilovolt-amperes (kVA) approximately:
		  – Minimum: 0.13 kVA
		  – Maximum: 0.55 kVA
		
		Heat output:
		Approximate heat output in British thermal units (Btu) per hour
		• Minimum configuration: 421 Btu (124 watts)
		• Maximum configuration: 1782 Btu (523 watts)
		
		Environment:
		• Air temperature:
		  – 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: 2134 m (7000 ft)
		• Humidity (operating and storage): 8% to 80%
		
		Acoustical noise emissions:
		• Sound power, idle: 4.7 bel
		• Sound power, operating: 5.0 bel
		
		Size:
		• 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

Controls and indicators

The following illustration shows the controls and indicators on the M Pro Type 6220 desktop computer.

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

Ethernet transmit/ receive activity

Ethernet link status LED

CD-ROM drive activity LED

CD eject button

Power-control button

Power-on LED

Hard disk drive activity LED

IEEE 1394 (FireWire) connector

Microphone connector

Line out connector

USB ports

The following illustration shows the controls and indicators on the M Pro Type 6230 tower computer.

Ethernet link status LED

CD-ROM drive activity LED

CD-eject button

Diskette drive activity LED

Diskette-eject button

Hard disk drive activity LED

Ethernet transmit/receive activity LED

Power-on LED

Power-control button

Ethernet transmit/ receive activity LED

System error LED

IEEE 1394 (FireWire) connector

Microphone connector

Line out connector

USB port connector

USB port connector

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.

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.

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

IEEE 1394 connectors
Use these connectors (four-pin on the front and six-pin on the rear) to connect IEEE 1394 devices, such as digital video cameras and external hard disk drives.

> **Note:** Some models come with the IEEE 1394 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.

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.

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.

Power-control button
Press this button to turn the computer on or off.

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).

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.

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 connect your computer to power 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 "POST error codes" on page 109 for the explanation of error codes.

During startup on the Microsoft® Windows® operating system, 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)

During startup on the Red Hat Linux operating system, the following messages might be displayed briefly:
- `Press F1 for Configuration/Setup Utility`
- `Press CTRL+A for SCSISelect Utility` (some models)

Note: To start the Product Recovery Program in Red Hat Linux, watch the screen until the operating system selection menu displays and select `IBM Preload Recovery and Diagnostics`.

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 11 and "Using the SCSISelect Utility program (some models)" on page 14.

During startup, you might not see the message `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 11.

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

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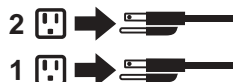
The computer can be turned off in any of the following ways:

- 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**.

    To turn off the computer from the Microsoft Windows 2000 operating system, click **Start → Shut Down**; then, click **OK** to confirm.

    To turn off the computer from the Red Hat Linux operating system, click **Red Hat Linux Main Menu Button → Log out → Shut Down**; then, click **Yes**.

- 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 the computer:

- **Configuration/Setup Utility**

  The Configuration/Setup Utility program is part of the basic input/output system (BIOS) code in 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. For information about using this utility program, see "Using the Configuration/Setup Utility program."

- **Intel Gigabit Ethernet Utility**

  The Intel Gigabit Ethernet Utility program is part of the BIOS code in your computer. You can use the Intel Gigabit Ethernet Utility program to configure the network as a startable device, and you can customize where the network startup option appears in your startup sequence. Enable the Intel Gigabit Ethernet Utility program from the Configuration/Setup Utility program. For more information, see "Enabling the Intel Gigabit Ethernet Utility" on page 14.

- **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. For information about using this utility program, see "Using the SCSISelect Utility program (some models)" on page 14.

- **Ethernet controller configuration**

  To configure the integrated Gigabit Ethernet controller, see "Configuring the Gigabit Ethernet controller" on page 15.

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

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 go off, and restart the computer.

2. When the message `Press F1 for Configuration/Setup` appears on the screen during startup, press F1. (This prompt appears on the screen for only a few seconds. You must press F1 quickly.) 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.

Configuration/Setup Utility menu choices

The following choices are on Configuration/Setup Utility main menu. You can press F1 to display help information for a selected menu item. Depending on the version of the BIOS code in your computer, some menu choices might differ slightly from these descriptions.

- **System Summary**

  Select this choice to view configuration information, including the type, speed, and cache size of the microprocessor and the amount of installed memory. When you make configuration changes through other options in the Configuration/Setup Utility program, the changes are reflected in the system summary; you cannot change settings directly in the system summary.

- **System Information**

  Select this choice to view information about your computer. When you make changes through other options in the Configuration/Setup Utility program, some of those changes are reflected in the system information; you cannot change settings directly in the system information.

  Select **Product Data** to view the machine type and model of the computer, the serial number, and the revision level or issue date of the BIOS and diagnostics code stored in the electrically erasable programmable ROM (EEPROM).

- **Devices and I/O Ports**

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

  Select this choice to enable or disable the integrated SCSI controller, Ethernet controllers, and standard ports (such as serial and parallel). **Enabled** is the default setting for all controllers. If you disable a device, it cannot be configured, and the operating system will not detect it (this is equivalent to disconnecting the device). If you disable the integrated SCSI controller and no SCSI adapter is installed, the computer will have no SCSI capability. If you disable the integrated Ethernet controller and no Ethernet adapter is installed, the computer will have no Ethernet capability.

  The choice is on the full Configuration/Setup Utility menu only.

- **Date and Time**

  Select this choice to set the date and time in the computer, in 24-hour format (*hour:minute:second*).

  This choice is on the Configuration/Setup Utility menu only.

- **System Security**

  Select this choice to set a user password or an administrator password. See "Using passwords" on page 13 for more information. You also can enable the chassis-intrusion detector to alert you each time the computer cover is removed.

- **Start Options**

  Select this choice to view or change the start options. Changes in the start options take effect when you start your computer.

  You can set keyboard operating characteristics, such as the keyboard speed, or specify whether the computer starts with the keyboard number lock on or off.

  The startup sequence specifies the order in which the computer checks devices to find a startup (boot) record. The computer starts from the first startup record that it finds.

  You can enable a virus-detecting test that checks for changes in the boot record when the computer starts. You also can select to run POST in the quick mode or read the microprocessor serial number.

This choice is on the full Configuration/Setup Utility menu only.

- **Advanced Setup**

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

  Important: The computer might malfunction if these options are incorrectly configured. Follow the instructions on the screen carefully.

  – **Power Management Setup**

    Select this choice to enable or disable system power settings, including automatic power-on settings such as Wake on LAN.

  – **Chipset Feature**

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

  – **Processor Control**

    Select this choice to enable or disable the microprocessor cache and hyper-threading.

- **PC Health Status**

  Select this choice to display the computer temperature and voltage status, and fan speeds.

- **Error Logs**

  Select this choice to view or clear error logs. Select **POST Error Log** to view the three most recent error codes and messages that the system generated during POST. Select **Clear event/error logs** to clear the POST error log.

- **Save Settings**

  Select this choice to save the changes you have made in the settings.

- **Restore Settings**

  Select this choice to cancel the changes you have made in the settings and restore the previous settings.

- **Load Default Settings**

  Select this choice to cancel the changes you have made in the settings and restore the factory settings.

- **Exit Setup**

  Select this choice to exit from the Configuration/Setup Utility program. If you have not saved the changes you have made in the settings, you are asked whether you want to save the changes or exit without saving them.

Using passwords

You can use any combination of up to eight characters (A–Z, a–z, and 0–9) for the user (power-on) password or the administrator password.

If you set both a user password and an administrator password, 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 program, you must type the administrator password to access the full Configuration/Setup Utility menu. If you type the user password, you have access to only the limited Configuration/Setup Utility menu.

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.
- Remove the battery, and then install the battery (see "Replacing the battery" on page 29).

Enabling the Intel Gigabit Ethernet Utility

The Intel Gigabit Ethernet Utility is part of the BIOS code in your computer. You can use it 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 configure the Intel Gigabit Ethernet Utility program:

1. From the Configuration/Setup Utility main menu, select **Advanced Setup**, and press Enter.
2. Select **Chipset Feature**, 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)

Use the SCSISelect Utility program to configure SCSI devices.

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. If you have set an administrator password, you are prompted to type the password to start the SCSISelect Utility program.
3. When the prompt `Would you like to configure the SCSI controller 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.
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 SCSI Controller 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:

  – **SCSI Controller ID**

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

  – **SCSI Controller Termination**

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

- **Boot Device Configuration**

  Select this choice to configure SCSI device parameters. You must know the SCSI ID of the device that you want to configure.

- **SCSI Device Configuration**

  Select this choice to configure SCSI device parameters. You must know the SCSI ID of the device that 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**

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

- **SCSI Disk Utilities**

  Select this choice to view the SCSI ID assignments to each device or to format a SCSI device. Select a device from the list, and read the instructions on the screen carefully before making a selection.

  If you press Ctrl+A before a selected drive is ready, an Unexpected SCSI Command Failure screen might appear. Restart the computer, and watch the SCSISelect messages as each drive spins up. When the selected drive is ready, press Ctrl+A.

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 1-Gbps 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 duplex mode (full-duplex or half-duplex) of the network and automatically operates at that rate and mode. 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 device drivers and information about configuring your Gigabit Ethernet controller, go to http://www.ibm.com/pc/support/.

Diagnostics

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

Diagnostic tools overview

The following tools are available to help you diagnose and solve 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 "POST error log" for more information.

- **Diagnostic programs**

  The system diagnostic programs are on a hidden partition on the hard disk. These programs are the primary methods of testing the major components of the computer. See "Diagnostic programs and error messages" on page 18 for more information.

- **Error charts**

  These charts list problem symptoms and steps to correct the problem. See "Error symptoms" on page 20 for more information.

POST error log

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 the operating system opens or an application program starts.

If POST detects a problem, more than one beep or no beep might sound, and an error message appears on the screen.

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

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

POST generates beep codes to indicate successful completion or the detection of a problem.

- One short beep indicates the successful completion of POST.
- More than one beep or no beep indicates that POST detected a problem. For more information, see "Beep symptoms" on page 99.

If POST detects a problem (more than one beep sounds), an error message appears on the screen. See "Beep symptoms" on page 99 and "POST error codes" on page 109 for more information.

Small computer system interface (SCSI) messages (some models)

If the computer has an Ultra320 SCSI adapter installed and you receive a SCSI error message, see "SCSI error codes" on page 112.

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

Diagnostic programs and error messages

The system diagnostic programs are on a hidden partition on the hard disk. These programs are the primary method of testing the major components of the computer.

You can also download the latest version of the diagnostic programs from http://www.ibm.com/pc/support/ and use the downloaded file to create an IBM Enhanced Diagnostics diskette. See "Downloading the diagnostics program" on page 19.

When using diagnostics with a USB keyboard and mouse attached, complete the following steps to enable USB emulation through the Configuration/Setup Utility program:
1. Press F1.
2. Select **Devices and I/O Ports**, and press Enter.
3. Select **USB Setup**, and press Enter.
4. Make sure that the USB keyboard and mouse are enabled.

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

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.

See "Diagnostic error codes" on page 101 for a listing of diagnostic error codes.

Text messages

The diagnostic text message format is as follows:
`result test_specific_string`

Function Name: Result (test specific string)

where:

Result
> is one of the following results:
>
> > **Passed**
> > > The test was completed without any errors.
> >
> > **Failed** The test detected an error.

User Aborted

You stopped the test before it was completed.

Not Applicable

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

Aborted

The test could not proceed because of the computer configuration.

Warning

A possible problem was reported during the test (for example, a device that was to be tested is not installed).

test_specific_string

is an error code or other information about the error.

Downloading the diagnostics program

Complete the following steps to download the latest image of the IBM Enhanced Diagnostics from the World Wide Web and create a startable Enhanced Diagnostics diskette:

1. Go to http://www.ibm.com/pc/support/.
2. Download the diagnostics file for the computer to a hard disk drive directory (not to a diskette).
3. Go to a DOS prompt, and change to the directory where the file was downloaded.
4. Insert a blank high-density diskette into the diskette drive.
5. Type *filename a:*, where *filename* is the name of the file you downloaded, and *a* is the letter of the diskette drive containing the blank diskette; then, press Enter.

The downloaded file is self-extracting and is copied to the diskette. When the copy is completed, you have a startable IBM Enhanced Diagnostics diskette.

Starting the diagnostic programs and viewing the test log

The IBM Enhanced Diagnostics programs run independently of the operating system. 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.

Complete the following steps to start the diagnostic programs in a Windows operating system:

1. Restart your computer, and when the message To start the Product Recovery program displays, quickly press F11.
2. Select **System utilities**.
3. Select **Run diagnostics** to start the diagnostics programs.

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 CD.
2. Shut down your operating system, and restart the computer. If a user password is set, the computer prompts you for it. Type the password, and press Enter.
3. Run the applicable diagnostics program and when the Diagnostic Programs screen appears, select **Utility**.

4. 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 does not contain any information until after the diagnostic program has run.

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

PC-Doctor for Windows

Your computer comes with a version of PC-Doctor designed specifically for the operating system of your computer. 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.

Error symptoms

You can use the error charts to find solutions to problems that have definite symptoms (see "Error symptoms" on page 103).

Recovering your operating system and preinstalled software

This section contains instructions for recovering BIOS code, device drivers, the operating system, and other support software.

Recovering the operating system

Your computer has the Product Recovery program on a hidden partition of the hard disk. The Product Recovery program reinstalls your operating system and preinstalled software. The Product Recovery program runs independently of the operating system.

If you are using FDISK, Disk Management, or another utility to reformat the hard disk, you might see the partition where the Product Recovery program is stored. Do not delete this partition; otherwise, the Product Recovery program will be lost.

If your hard disk drive, including the partition where the Product Recovery program is, becomes damaged or you replace the hard disk drive, contact IBM to order the *IBM Product Recovery* CD to recover your preinstalled operating system, application programs, and device drivers. See "Recovery CD, Type 6220 and 6230" on page 125 for details.

Attention: The Product Recovery program will erase all files on drive C only. It does not affect the data on the hidden recovery partition. The Product Recovery program restores the operating system, device drivers, and applications.

Complete the following steps to recover the Windows operating system.

Important: The recovery process replaces all data stored on drive C. If possible, back up your data files before starting this process.

1. If possible, shut down your operating system.
2. If your computer is still on, turn it off.

   Note: If the computer will not turn off after you hold down the power-control button for at least 4 seconds, disconnect the power cord, and wait a few seconds before reconnecting it.

3. Turn on your computer, and wait for the prompt

   `To start the Product Recovery program, press F11.`

   If the DOS command prompt or the F11 prompt is not displayed, see "Using the recovery-repair diskette" on page 24..
4. Quickly press F11, and wait for the program menu.
5. Select the recovery options you want, and follow the instructions on the screen.
6. When recovery is complete, exit from the program. Remove the CD from the CD-ROM or DVD-ROM drive, if you have not already done so.
7. Restart the computer.

Complete the following steps to recover the Red Hat Linux operating system.

Important: The recovery process replaces all data stored on drive C. If possible, back up your data files before starting this process.

1. If possible, shut down your operating system.
2. If your computer is still on, turn it off.

   Note: If the computer will not turn off after you hold down the power-control button for at least 4 seconds, disconnect the power cord, and wait a few seconds before reconnecting it.

3. Turn on your computer, and wait for the operating system menu to be displayed; then, quickly select **IBM Preload Recovery and Diagnostics**.
4. Select the recovery options you want, and follow the instructions on the screen.
5. When recovery is complete, exit from the program. Remove the CD from the CD-ROM or DVD-ROM drive, if you have not already done so.
6. Restart the computer.

Recovering or installing device drivers

Restoring the factory-preinstalled device drivers is part of the Product Recovery program and the *Device Drivers and Enhanced Diagnostics* CD.

Before you can recover or install device drivers, your operating system must be installed on your computer.

Make sure that you have the documentation and software media for the device before you start recovering or installing device drivers.

Device drivers for IBM devices and the instructions to install them (readme.txt) are on the *Device Drivers and Enhanced Diagnostics* CD and in the c:\ibmtools\drivers\ directory. The latest device drivers are also available at http://www.ibm.com/pc/support/.

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

Use one of the following methods to create an IBM Enhanced Diagnostics diskette.

Complete the following steps to create a startable IBM Enhanced Diagnostics diskette from the Product Recovery program on the hard disk partition:

1. Restart your computer, and watch the monitor.
2. When the message `To start the Product Recovery Program`, press F11 appears, quickly press F11.
3. Select **System Utilities**, and press Enter.
4. Select **Create IBM Enhanced Diagnostics Diskette**, and press Enter.
5. Follow the instructions on the screen.

Complete the following steps to create a startable IBM Enhanced Diagnostics diskette.

1. Go to http://www.ibm.com.
2. Click **Support & downloads**.
3. Click **Search technical support**.
4. In the **Enter search terms** field, type `diagnostics 6220 or 6230`, 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 a:* where *filename* is the name of the file you downloaded and *a* 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.

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.

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 computer becomes unusable, you can use the recovery-repair diskette to access the Product Recovery program. For more information about using this diskette, see "Using the recovery-repair diskette" on page 24.

Creating an emergency recovery-repair diskette in Windows

You can use either of the following methods to create a recovery-repair diskette in Windows:

- Create a diskette from the c:\ibmtools directory
- Create a diskette from the Product Recovery program partition

Complete the following steps to create a recovery-repair diskette from the c:\ibmtools directory:

1. Start your computer and operating system.
2. Use Windows Explorer to display the directory structure of your hard disk.
3. Open the c:\ibmtools folder.
4. Double-click **rrdisk.bat**, and follow the instructions on the screen.

Complete the following steps to create a recovery-repair diskette from the Product Recovery program partition:

1. Shut down the operating system, and turn off the computer.
2. Wait for at least 5 seconds; then, press and hold the F11 key while you restart the computer. When a menu appears, release the F11 key.
3. Use one of the following procedures:
   - If a menu is displayed that gives you the opportunity to select an operating system, use the arrow keys to select the operating system that is currently installed, press Enter, and then continue with the next step.
   - If an operating-system menu is not displayed, continue with the next step.
4. From the Product Recovery Main menu, use the arrow keys to select **System utilities**, and then press Enter.
5. Use the arrow keys to select **Create a Recovery Repair diskette**, and then press Enter.
6. Follow the instructions on the screen.

See "Creating an IBM Enhanced Diagnostics diskette" on page 22 for information about how to create an IBM Enhanced Diagnostics diskette.

Creating an emergency recovery-repair diskette in Red Hat Linux

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 computer becomes unusable, you can use the recovery-repair diskette to access the Product Recovery program. For more information about using this diskette, see "Using the recovery-repair diskette" on page 24.

Complete the following steps to create a recovery-repair diskette for Red Hat Linux:

1. Start your computer.
2. When the operating-system menu is displayed, select **IBM Preload Recovery and Diagnostics**.
3. Follow the instructions on 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 23.

Complete the following steps to use the recovery-repair diskette:

1. Insert the recovery-repair diskette into the diskette drive.
2. Turn off your computer.
3. Turn on your computer, and follow the instructions 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. To obtain a *Product Recovery* CD, contact IBM. See "Recovery CD, Type 6220 and 6230" on page 125 for details.

Erasing a lost or forgotten password

Complete the following steps to set the boot block recovery jumper (J6) and erase a forgotten password:

1. Review the "Safety information" on page 129.
2. Turn off the computer and all attached devices. See "Turning off the computer" on page 10 for instructions.
3. Disconnect the power cord.
4. Remove the cover (see "Removing the cover" on page 34 or "Removing the side cover" on page 52).
5. Remove the support bracket.

6. Locate the boot block recovery jumper (J6) on the system board, removing any adapters that impede access to the jumper. The following illustration shows the location of the boot block jumper on the system board.

Boot block jumper (J6)
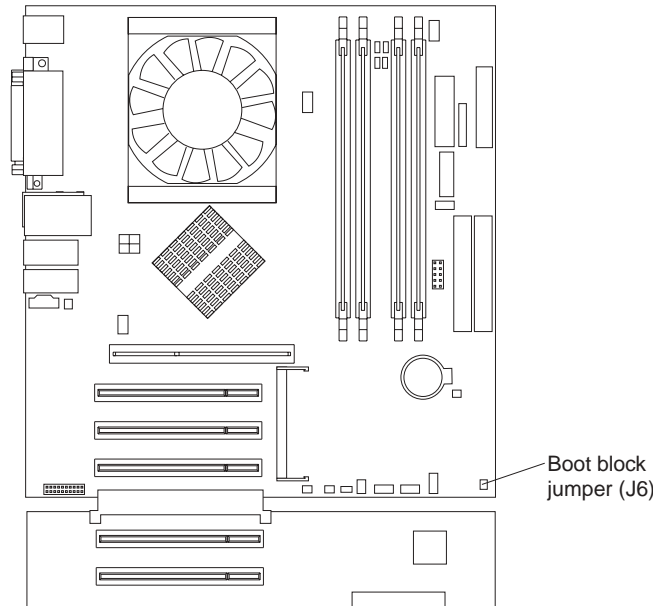
7. Move the jumper from pins 1 and 2 to pins 2 and 3.

8. Replace any adapters that were removed, and replace the cover (see "Replacing the cover" on page 47 or "Replacing the side cover" on page 67). You can now start the computer one time, without having to use the user 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 use the Configuration/Setup Utility program to change or delete the password, the next time you start the computer, the original user password will be reinstated.

9. Connect the computer to a power source, keyboard, monitor, and mouse.

10. Turn on the computer. The Configuration/Setup Utility program starts.

11. Follow the instructions to erase the existing password or create a new password.

12. Select **Save Settings** and press Enter.

Updating BIOS code

You can download the latest BIOS code from http://www.ibm.com/pc/support/. Use this code to create a POST/BIOS flash diskette.

Complete the following steps to update the BIOS code on the computer:

1. Insert the POST/BIOS flash diskette into drive A.

2. Turn on or restart the computer (see "Turning off the computer" on page 10 for instructions). The computer starts from the diskette.

3. When you are prompted to save the current code to a diskette, select **N**. The utility will continue to the next step. If you select **Y**, you are asked to name the file to be saved, and the file is saved to the diskette.

4. When prompted to continue the POST/BIOS flash update, select **Y**. The flash ROM is updated with the new code. When this step is complete, the computer automatically restarts.

5. When the computer starts for the first time after the BIOS is updated, press F1 to select the Configuration/Setup Utility program; then, select the **Load OPtimized Defaults** option.

6. Select the **Save & Exit** option.

7. Select **Y** to save the settings, and exit.

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, complete the following steps to recover:

1. Review the safety information beginning on page 129 and "Handling static-sensitive devices" on page 31.

2. Turn off the computer and all attached devices. See "Turning off the computer" on page 10 for instructions.

3. Disconnect the power cord.

4. Remove the cover and support bracket.

5. Locate the boot block recovery jumper (J6) on the system board. Remove any adapters that impede access to the jumper. The following illustration shows the location of the boot block jumper on the system board.

Boot block jumper (J6)
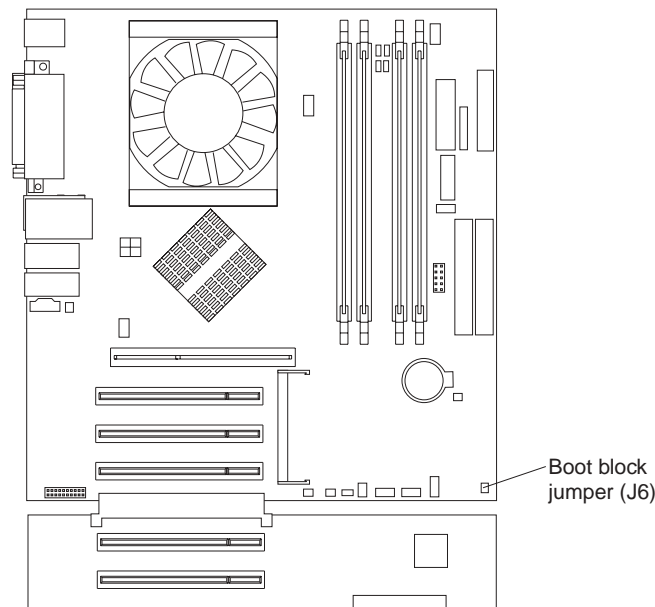
6. Remove the boot block recovery jumper from pins 1 and 2.

7. Replace any adapters that were removed; then, replace the support bracket and replace the cover.

8. Connect the computer to a power source, keyboard, monitor, and mouse.

9. Insert the POST/BIOS update (flash) diskette into the diskette drive. You can download a file to create this diskette from http://www.ibm.com/pc/support/.

10. Turn on the computer and the monitor.

11. After the update is completed, turn off the computer and monitor.

12. Remove the diskette from the diskette drive.

13. Disconnect all power cords; then, remove the computer cover.

14. Return the boot block recovery jumper to pins 1 and 2.

15. Replace the computer cover; then, reconnect all external cables and power cords and turn on the peripheral devices.

16. Turn on the computer to restart the operating system.

Clearing CMOS memory

If you experience severe problems with the computer and the computer does not start, the code might be damaged. You might need to clear the CMOS memory to recover. To clear CMOS memory, complete the following steps:

1. Turn off the computer and all attached devices.

2. Disconnect all power cords from electrical outlets, and remove the computer cover (see "Removing the cover" on page 34 or "Removing the side cover" on page 52).

3. Remove the battery, wait 60 seconds, and replace the battery. For instructions for removing and replacing the battery, see "Replacing the battery" on page 29.

4. Replace the cover (see "Replacing the cover" on page 47 or "Replacing the side cover" on page 67), and reconnect all cables that were disconnected.

5. Turn on the computer to restart the operating system.

Power checkout

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

A general procedure for troubleshooting power problems is as follows:

1. Turn off the computer, and disconnect all ac power cords.

2. Check for loose cables in the power subsystem. Also check for short circuits, for example, if there is a loose screw causing a short circuit on a circuit board.

3. Remove adapters and disconnect the cables and power connectors to all internal and external devices until the computer is at the minimum configuration required to start the computer (see page 115).

4. Reconnect all ac power cords, and turn on the computer. If the computer starts successfully, replace adapters and devices one at a time until the problem is isolated. If the computer does not start from the minimal configuration, replace FRUs of minimal configuration one at a time until the problem is isolated.

To use this method, you must know the minimum configuration required for the computer to start (see page 115).

Troubleshooting the Ethernet controller

This section provides troubleshooting information for problems that might occur with the 1 Gbps Ethernet controller.

Information is also available on the Ethernet controller documentation on the *Device Drivers and IBM Enhanced Diagnostics* CD for information about problems that might occur with the 1 Gbps Ethernet controller.

The way the Ethernet controller is tested depends on which operating system you are using (see the Ethernet controller device-driver file).

You can use the Ethernet wrap test to determine whether a hardware problem is causing the Ethernet connection to fail. To perform the Ethernet wrap test, use the wrap plug (FRU 60G3981) with the diagnostic tests.

If this testing method indicates that the hardware is functioning normally but the problem remains, see "Network connection problems" or inform the network administrator.

Network connection problems

If the Ethernet controller cannot connect to the network, check the following conditions:
- Make sure that the cable is installed correctly.

  The network cable must be securely attached at all connections. If the cable is attached but the problem remains, try a different cable.

  If you set the Ethernet controller to operate at either 100 Mbps or 1000 Mbps, you must use Category 5 or higher cabling.
- Determine whether the hub supports auto-negotiation. If it does not, try configuring the integrated Ethernet controller manually to match the speed and duplex mode of the hub.
- Check the Ethernet controller LEDs on the rear of the computer.

  The Ethernet link status LED, on the rear of the computer, is lit when the Ethernet controller receives a LINK pulse from the hub. If the LED is off, there might be a defective connector or cable or a problem with the hub.
- Make sure that you are using the correct device drivers, which are supplied with the computer.
- Check for operating-system-specific causes for the problem.
- Make sure that the device drivers on the client and computer are using the same protocol.

Ethernet controller troubleshooting chart

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

Ethernet controller problem	FRU/actions
The computer stopped running when loading device drivers.	The PCI BIOS interrupt settings are incorrect. • Determine whether the interrupt (IRQ) setting assigned to the Ethernet controller is also assigned to another device in the Configuration/Setup Utility program. Although interrupt sharing is allowed for PCI devices, some devices do not function well when they share an interrupt with a dissimilar PCI device. Try changing the IRQ assigned to the Ethernet controller or the other device. For example, for NetWare Versions 3 and 4, it is recommended that disk controllers not share interrupts with LAN controllers. • Make sure that you are using the most recent device driver available from the World Wide Web. • Reseat or replace the adapter.
Ethernet link status LED does not work.	• Make sure that the hub is turned on. • Check all connections at the Ethernet controller and the hub. • Use another port on the hub. • If the hub does not support auto-negotiation, manually configure the Ethernet controller to match the hub. • If you manually configured the duplex mode, make sure that you also manually configure the speed. • Reseat or replace the adapter.

Ethernet controller problem	FRU/actions
Data is incorrect or sporadic.	• Make sure that you are using Category 5 or higher cabling when operating the computer at 100 Mbps or at 1000 Mbps. • Make sure that the cables do not run close to noise-inducing sources such as fluorescent lights.
The Ethernet controller stopped working when another adapter was added to the computer.	• Make sure that the cable is connected to the Ethernet controller. • Make sure that the PCI system BIOS code is current. • Reseat the adapter. • Determine whether the interrupt (IRQ) setting assigned to the Ethernet adapter is also assigned to another device in the computer. Use the Configuration/Setup Utility program to determine if this is the case. Although interrupt sharing is allowed for PCI devices, some devices do not function well when they share an interrupt with a dissimilar PCI device. Try changing the IRQ assigned to the Ethernet adapter or the other device. • Reseat or replace the adapter.
The Ethernet controller stopped working without apparent cause.	• Try a different connector on the hub. • Reinstall the device drivers. See the operating-system documentation. • Reseat or replace the adapter.

Replacing the battery

When replacing the battery, you must replace it with a lithium battery of the same type from the same manufacturer. To avoid possible danger, read and follow the information in "Safety information" on page 129.

To order replacement batteries, call 1-800-426-7378 within the United States, and 1-800-465-7999 or 1-800-465-6666 within Canada. Outside the U.S. and Canada, call your IBM reseller or IBM marketing representative.

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

Statement 2:

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

Do not:
• **Throw or immerse into water**
• **Heat to more than 100°C (212°F)**
• **Repair or disassemble**

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

Complete the following steps to replace the battery:

1. Follow any special handling and installation instructions that come with the replacement battery.
2. Turn off the computer and all attached devices. Disconnect all external cables and power cords; then remove the computer cover.
3. Complete the following steps to remove the battery:
   a. Use one 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.
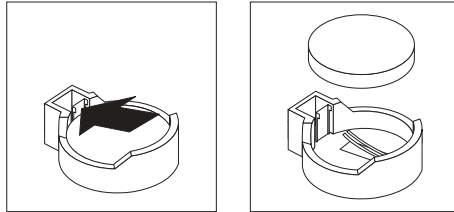
4. Complete the following steps to insert the new battery:
   a. Tilt the battery so that you can insert it into the socket on the side opposite the battery clip.
   b. Press the battery down into the socket until it clicks into place. Make sure the battery clip holds the battery securely.
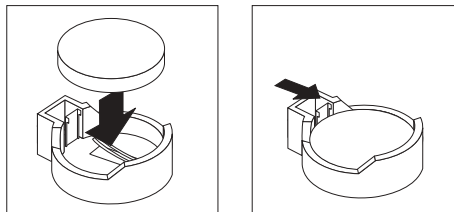
5. Replace the cover, and connect the cables.
6. Turn on the computer.
7. Start the Configuration/Setup Utility program and set configuration parameters.
   • Set the system date and time.
   • Set passwords if necessary.
   • Save the configuration.

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/; 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 safety information beginning on page 129 and "Handling static-sensitive devices." 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.
- The blue color on components and labels identifies touch points, where you can grip a component, move a latch, and so on.

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 and 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.

31

- 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.
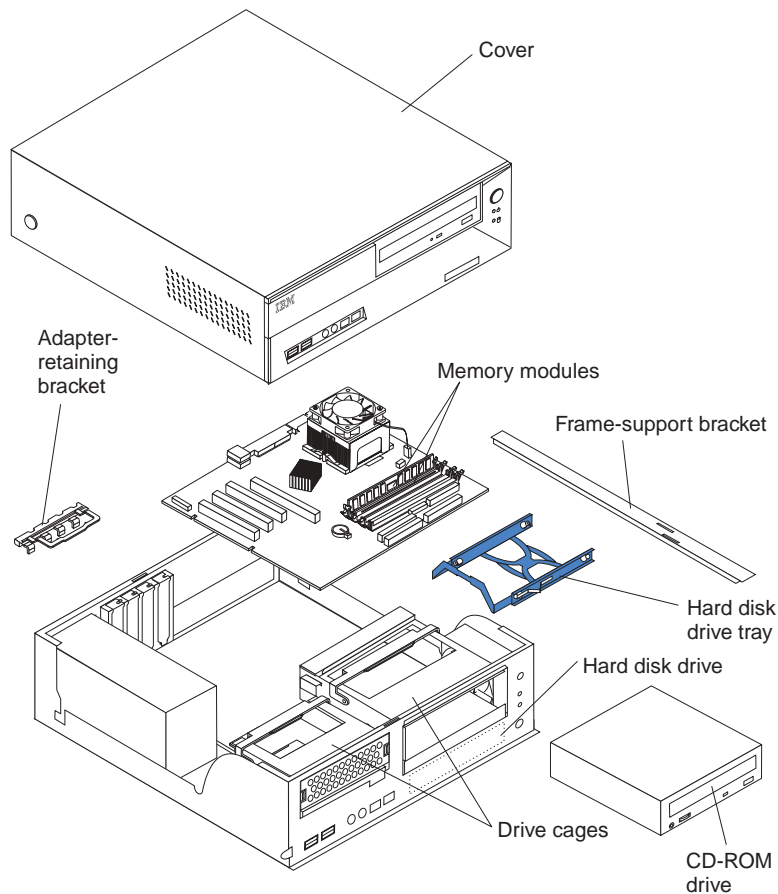
Installing options in the M Pro Type 6220 (desktop model)

This section provides instructions for installing hardware options in the IntelliStation M Pro Type 6220.
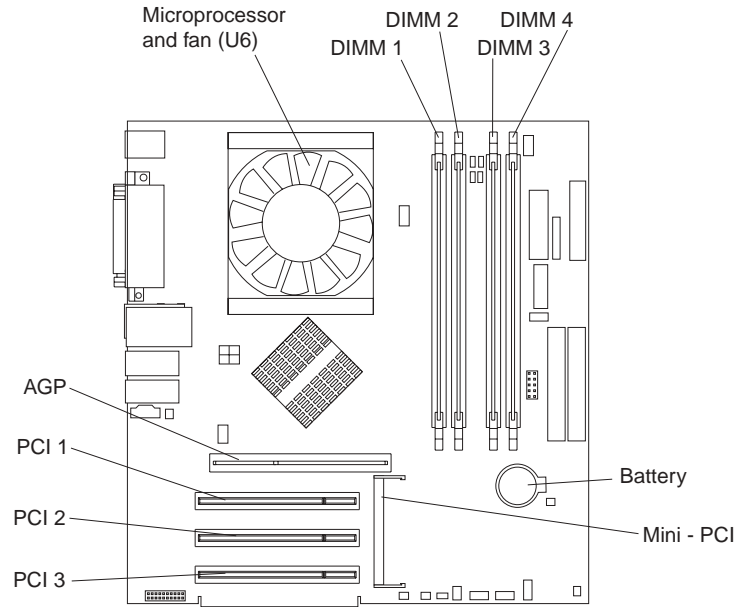
Major components of your computer

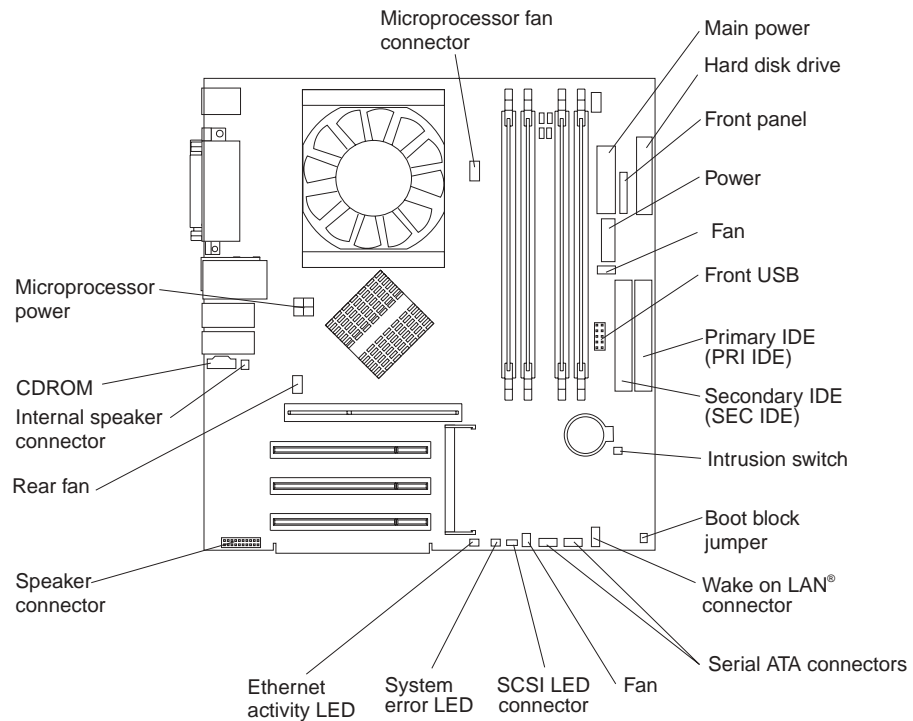The following illustration shows the major components of your M Pro Type 6220 desktop computer.

System-board option connectors

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

Microprocessor and fan (U6) DIMM 2 DIMM 4
DIMM 1 DIMM 3

AGP

PCI 1

PCI 2

PCI 3

Battery

Mini - PCI

System-board internal connectors

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

Microprocessor fan connector

Main power

Hard disk drive

Front panel

Power

Fan

Front USB

Primary IDE (PRI IDE)

Secondary IDE (SEC IDE)

Intrusion switch

Boot block jumper

Wake on LAN® connector

Serial ATA connectors

Microprocessor power

CDROM

Internal speaker connector

Rear fan

Speaker connector

Ethernet activity LED

System error LED

SCSI LED connector

Fan

System-board external connectors

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

Keyboard

Mouse

Serial ports

Parallel

Ethernet

USB ports

Audio
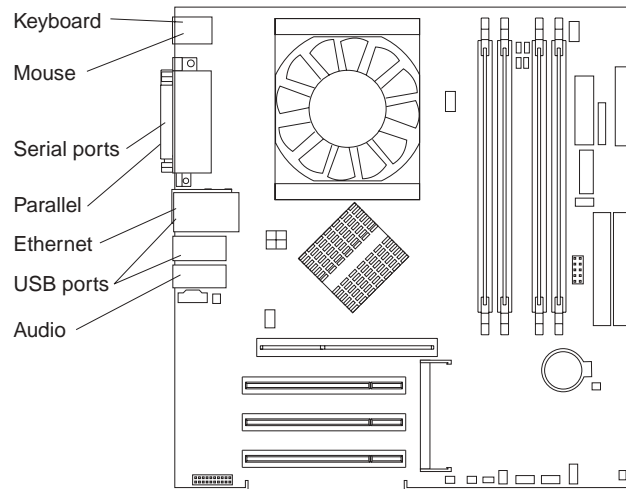
Removing the cover

Complete the following steps to remove the computer cover:

1. Review the safety information beginning on page 129 and the "Installation guidelines" on page 31.

2. Turn off the computer and all attached devices (see "Turning off the computer" on page 10); then, disconnect all power cords and external cables.

3. Press the buttons on both sides of the computer, and lift the cover from the computer.
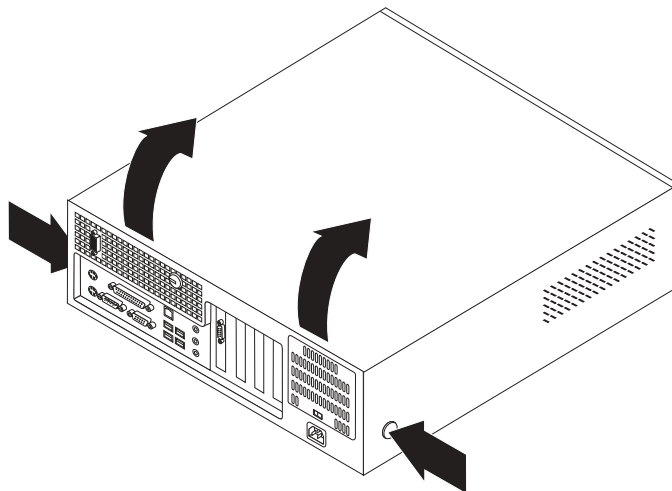
To replace the cover, see "Replacing the cover" on page 47.

Removing and installing the support bracket

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

Complete the following steps to remove the support bracket:

1. Review the "Installation guidelines" on page 31.
2. Turn off the computer and all attached devices (see "Turning off the computer" on page 10); then, disconnect all power cords and external cables.
3. Remove the cover (see "Removing the cover" on page 34).
4. Pivot the drive cages until the pivot locks catch the front of the chassis, holding the drive cages in place.
5. Lift the support bracket out of the computer.
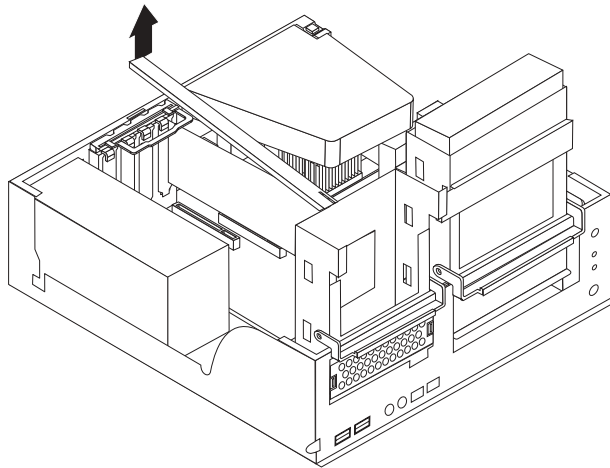
To reinstall the support bracket, reverse the previous steps.

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 controller adapter installed in the mini-PCI slot. You can install up to three additional optional adapters in your computer in PCI slots 1 through 3.

See "System-board option connectors" on page 33 for the location of expansion slots on the system board.

Adapter considerations

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

*   Read the documentation that comes with your operating system.
*   Your computer uses a rotational interrupt technique to configure PCI adapters. Because of this technique, you can install a variety of PCI adapters that currently do not support sharing of PCI interrupts.
*   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 low-profile, 32-bit adapters in PCI slots 1 through 3. The system scans the AGP slot, mini-PCI slot, and PCI expansion slots 1 through 3

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 3.

- Your computer supports 5.0 V signaling and universal PCI adapters; it does not support 3.3 V signaling adapters.
- Some models come with a IEEE 1394 adapter installed in the mini-PCI slot. If your computer did not come with a IEEE 1394 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/support/ on the World Wide Web; then, select your country and navigate to the list of options for your computer.

Installing an adapter

Complete the following steps to install an adapter in your M Pro Type 6220 computer:

1. Review the "Installation guidelines" on page 31 and "Handling static-sensitive devices" on page 31.
2. Turn off the computer and all attached devices (see "Turning off the computer" on page 10); then, disconnect all power cords and external cables.
3. Remove the cover. See "Removing the cover" on page 34.
4. Determine which PCI slot you will use for the adapter. Review the instructions that come with the adapter for any requirements, restrictions, or cabling instructions. It might be easier to route any cables before you install the adapter.
5. Grasp the drive cage, and rotate it out until the drive cage latches on to the front of the computer chassis.
6. Lift the support bracket out of the computer. See "Removing and installing the support bracket" on page 35.
7. Rotate the rear adapter-support bracket to the open (unlocked) position, and remove it from the computer.
8. 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.

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

9. Follow the instructions that come with the adapter to set any jumpers or switches on the adapter or system board.

10. 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.

    Attention: Make sure 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.

Expansion-slot cover   Adapter-support bracket
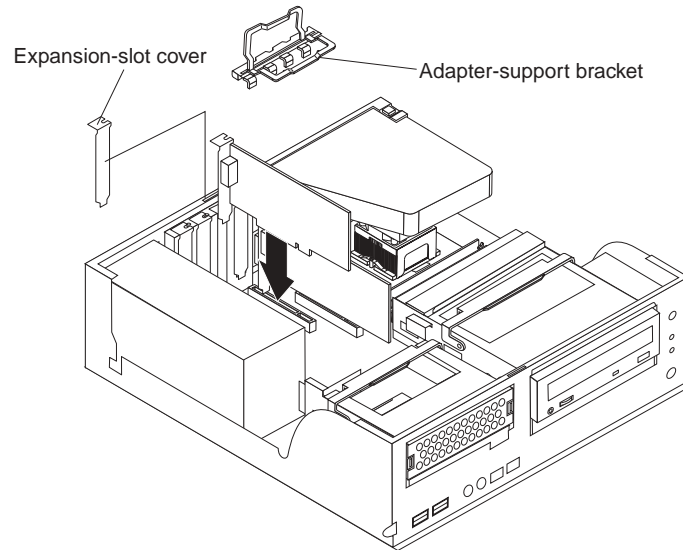
11. Connect required cables to the adapter. Route cables so that they do not block the flow of air from the fans.
12. If you have another adapter to install, repeat steps 1 through 9.
13. Reinstall the rear adapter-support bracket; then, rotate the bracket to the closed (locked) position.
14. Replace the frame-support bracket.
15. If you have other options to install, do so now; otherwise, replace the cover (see "Replacing the cover" on page 47), reconnect the external cables and power cords, and turn on the computer.
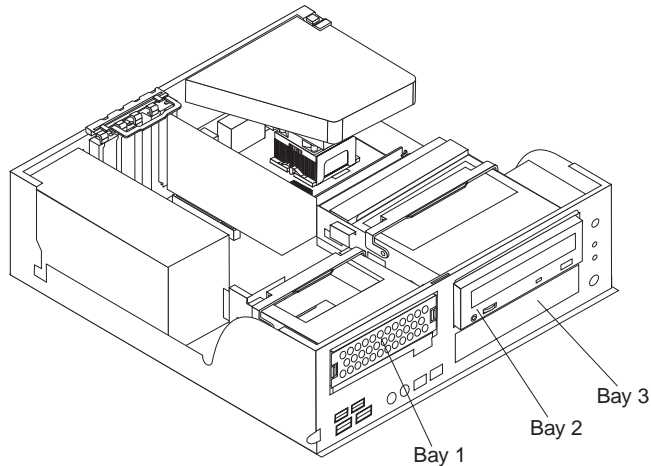
Installing internal drives

Depending on your computer model, you might have one or more of the following drives installed:
• Hard disk
• CD-ROM, CD-RW, or DVD/CD-RW combination drive

Internal drive bays

Your M Pro Type 6220 comes with an IDE CD-ROM, CD-RW, or DVD/CD-RW drive in bay 2 and a hard disk drive in bay 3.

Bay 3

Bay 2

Bay 1

Notes:

1. Tape drives, CD-ROM, DVD/CD-RW, and DVD-ROM drives are examples of removable-media drives. You can install removable-media drives in bay 2 only.

2. You have two serial ATA (SATA) IDE hard disk drive connectors on the system board.

3. You can mix and match parallel IDE or serial ATA IDE hard disk drives in bays 1 and 3.

4. 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.

5. 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 safety information beginning on page 129, "Installation guidelines" on page 31, 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.

Installing a drive in bay 1

Complete the following steps to install a drive in bay 1:

1. Follow the instructions in "Preinstallation steps."

2. Turn off the computer and attached devices.

3. Disconnect all power cords; then, disconnect all external cables.

4. Remove the cover and frame-support bracket. See "Removing the cover" on page 34 and "Removing and installing the support bracket" on page 35 for details.

5. Rotate the drive bay cage until the latch catches the front of the computer chassis.

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.

8. Slide the drive into the drive bay, and then attach the drive to the drive cage with the screws.
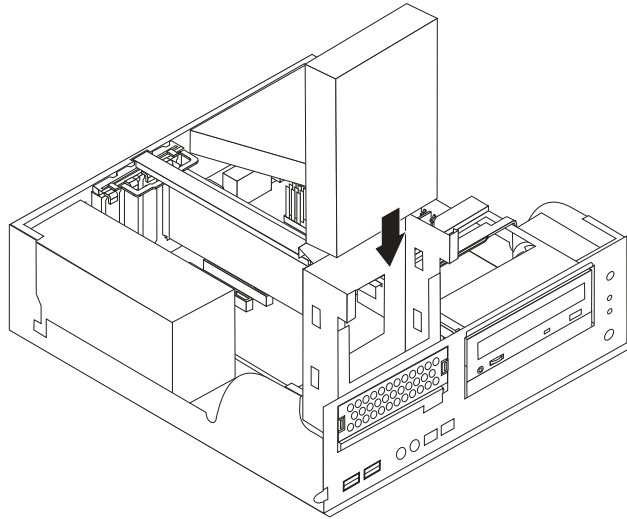
9. Connect one end of the parallel IDE or serial ATA IDE signal cable into the back of the drive and the other end of the cable into the parallel IDE or serial ATA IDE connector on the system board. For the location of the parallel IDE or serial ATA IDE connectors, see "System-board internal connectors" on page 33.

   Note: Make sure to 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. If you have other options to install or remove, do so now.

12. Replace the cover and frame-support bracket. See "Replacing the cover" on page 47 and "Removing and installing the support bracket" on page 35 for details.

13. Reconnect the external cables and power cords; then, turn on the attached devices and the computer.

Installing a drive in bay 2

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

1. Follow the instructions in "Preinstallation steps" on page 38.

2. Turn off the computer and attached devices.

3. Disconnect all power cords; then, disconnect all external cables.

4. Remove the cover and frame-support bracket. See "Removing the cover" on page 34 and "Removing and installing the support bracket" on page 35 for details.

5. Disconnect power and signal cables to the drive.

6. Rotate the hard disk drive cage, and remove it from the computer.
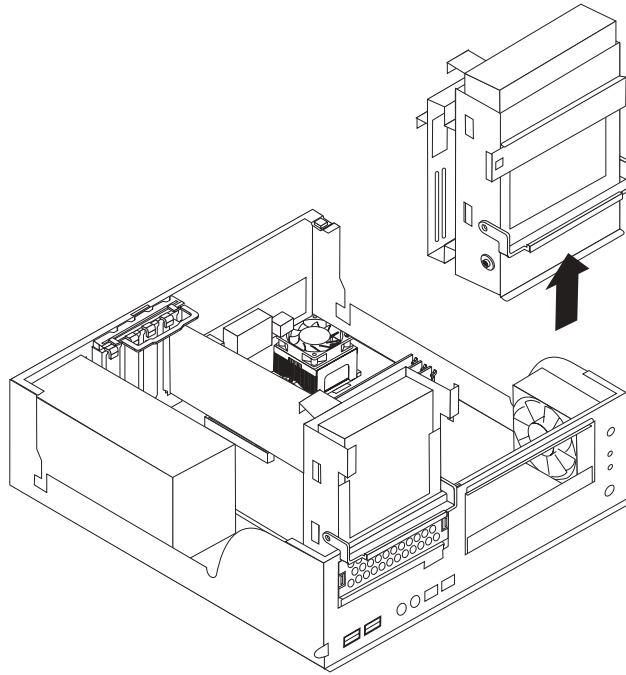
7. Remove the screws holding the drive in place.
8. Slide the drive out of the drive bay from the front of the drive bay.

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.**

9. Touch the static-protective package containing the new drive to any unpainted metal surface on the computer; then, remove the drive from the package and place it on a static-protective surface.
10. Follow the instructions that come with the drive to set jumpers or switches, if any.
11. Slide the drive into the drive bay from the front, and then attach the drive to the drive cage.
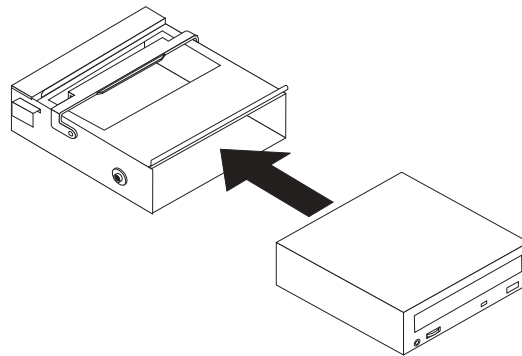
12. Place the drive cage back into the computer.

13. Connect one end of the IDE signal cable into the back of the drive and the other end of the cable into the IDE connector on the system board. For the location of the IDE connectors, see "System-board internal connectors" on page 33

   Note: Make sure to route the signal cable so that it does not block the airflow to the rear of the drives or over the microprocessor.

14. Connect the power cable to the back of the drive. The connectors are keyed and can be inserted only one way.

15. If you have other options to install or remove, do so now.

16. Replace the frame-support bracket and cover. See "Replacing the cover" on page 47 and "Removing and installing the support bracket" on page 35 for details.

17. Reconnect the external cables and power cords; then, turn on the attached devices and the computer.

Installing a hard disk drive in bay 3

Complete the following steps to replace or install a hard disk drive in bay 3:

1. Follow the instructions in "Preinstallation steps" on page 38.

2. Turn off the computer and attached devices.

3. Disconnect all power cords; then, disconnect all external cables.

4. Remove the cover and frame-support bracket. See "Removing the cover" on page 34 and "Removing and installing the support bracket" on page 35 for details.

5. Disconnect the power and signal cables from both drives in the drive cage.

6. Remove the drive cage from the computer.
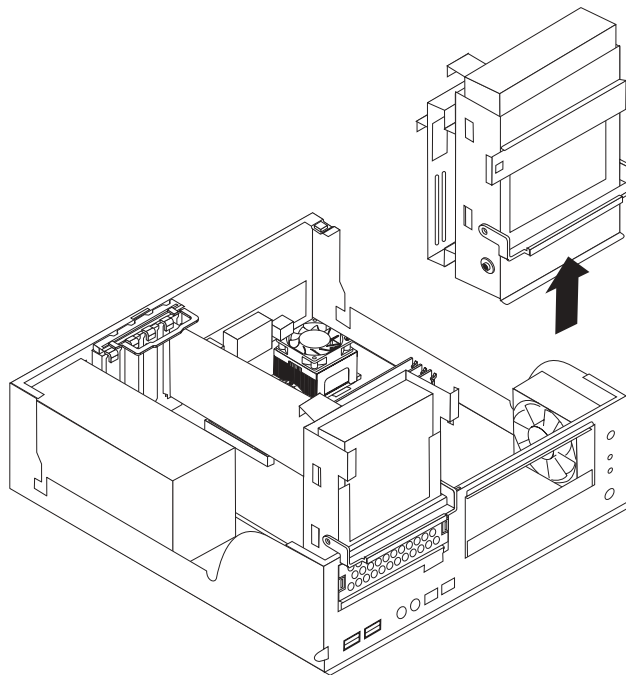
7. Slide the existing drive out of the drive bay. Remove the drive from the drive tray by gently pulling both sides of the drive tray outward until the mounting pins are disengaged from the holes on the drive; then, lift the drive out of the drive tray.

8. Touch the static-protective package containing the new drive to any unpainted metal surface on the computer; then, remove the drive from the package and place it on a static-protective surface.

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

10. Attach the new drive to the drive tray. Place the drive on the drive tray and align the holes on the drive with the mounting pins on the drive tray. Gently pull both sides of the drive tray outward, and insert the mounting pins into the holes on the drive.

11. Slide the drive into the drive bay until the drive snaps into place, and place the drive cage back into the computer.

    Important: The following illustration shows where the connectors on the parallel IDE and serial ATA (SATA) drives should be located when you install the drive in the drive tray.

Connectors on Serial ATA drive

Connectors on IDE drive
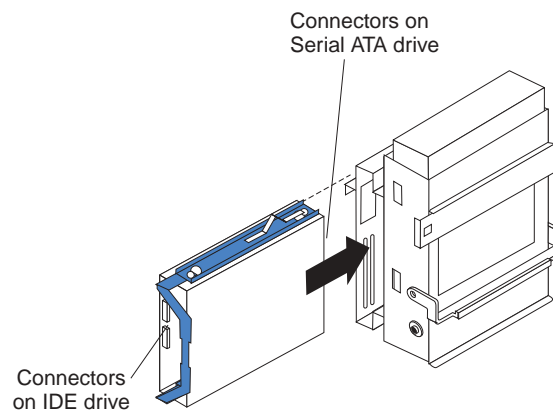
12. If you are installing a parallel IDE or serial ATA device, connect one end of the parallel IDE or serial ATA signal cable into the back of the drive and the other end of the cable into the parallel IDE or serial ATA connector on the system board. For the location of the parallel IDE or serial ATA connectors, see "System-board internal connectors" on page 33.

    Note: Make sure to route the signal cable so that it does not block the airflow to the rear of the drives or over the microprocessor.

13. Connect a power cable to the back of the drive. The connectors are keyed and can be inserted only one way.

14. If you have other options to install or remove, do so now.

15. Replace the support bracket. See "Removing and installing the support bracket" on page 35.

16. Replace the cover. See "Replacing the cover" on page 47 for details.

17. 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 parallel IDE and serial ATA devices to the power supply and to the system board. (See "System-board internal connectors" on page 51 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. You can use either a four-wire power cable or serial ATA power cable with serial ATA drives, but do not use both at the same time (use one or the other).
- **Signal cables:** Signal cables are typically flat cables, also called ribbon cables, that connect parallel IDE and serial ATA 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 to an ATA 100 signal cable. ATA 100 signal cables are color-coded. The blue connector is attached to the system board. The black connector is attached to the master IDE device. The gray middle connector is attached to the subordinate IDE device. 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.
  - **Serial ATA:** The narrower, black signal cable has two connectors. One is attached to the serial ATA IDE drive, and the other is attached to the connector on the system board. Each serial ATA drive comes with a cable. If you install an additional serial ATA drive, you will need an additional cable.

Installing memory modules

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

Notes:

1. When you restart the computer after adding or removing a DIMM, the computer displays a message that the memory configuration has changed.

2. Your IntelliStation M Pro Type 6220 computer uses industry-standard, PC2700 or PC3200 double-data-rate (DDR) dual inline memory modules (DIMMs).

3. The system board contains four DIMM connectors and supports two-way memory interleaving.

4. The DIMM options available for your computer are 256 MB, 512 MB, and 1 GB memory modules . Your computer supports a minimum of 256 MB and a maximum of 4 GB of system memory.

5. 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 will display the total amount of installed memory and the amount of configured memory.

6. Your computer comes with either one or two 256 MB, 512 MB, or 1 GB memory DIMMs installed. If your computer has one DIMM installed, when you install an additional DIMM, it must be installed in DIMM 3 memory connector and must be the same size, speed, type, and technology as the DIMM installed in DIMM 1 memory connector. You can mix compatible DIMMs from various manufacturers. When one DIMM is installed in the computer, the computer runs as a single-channel computer. When you add a DIMM in DIMM 3 memory connector, your computer defaults to a dual-channel computer.

7. DIMMs must be installed in matched pairs. The first pair of DIMMs you install in DIMM 1 and DIMM 3 memory connectors must be the same size, speed, type, and technology. You can mix compatible DIMMs from various manufactures. If you install a second pair of DIMMs in DIMM 2 and DIMM 4 memory connectors, they do not have to be the same size, speed, type, and technology as the DIMMs installed in DIMM 1 and DIMM 3 memory connectors. However, the size, speed, type, and technology of the DIMMs you install in DIMM 2 and DIMM 4 memory connectors must match each other.

8. Install only 2.5 V, 184-pin, double-data-rate (DDR) 333 or 400, PC2700 or PC3200, unbuffered synchronous dynamic random-access memory (SDRAM) with error correcting code (ECC) DIMMs. These DIMMs must be compatible with the latest PC2700 or PC3200 SDRAM unbuffered DIMM specification. For a list of supported options for your computer, go to http://www.ibm.com/pc/; 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 safety information beginning on page 129, "Installation guidelines" on page 31, and "Handling static-sensitive devices" on page 31.

2. Turn off the computer and all attached devices (see "Turning off the computer" on page 10); then, disconnect all power cords and external cables.

3. Remove the cover (see "Removing the cover" on page 34).

4. Remove the support bracket (see "Removing and installing the support bracket" on page 35).

5. For easier access to the memory modules, rotate the drive cage out of the computer. Grasp the drive cage and rotate it until it locks into place.

6. Locate the DIMM connectors on the system board. Determine the connectors into which you will install the DIMMs. Remember that DIMM 1 and DIMM 3 must be paired together (and must be the first pair installed) and DIMM 2 and DIMM 4 must be paired together. The following table shows the DIMM installation sequence.

Table 3. Memory installation sequence

DIMMs	Slots
1 DIMM	1
2 DIMMs	1, 3
4 DIMMs	1, 2, 3, 4

7. Open the retaining clips and, if necessary, remove any existing DIMM.

8. Touch the static-protective package containing the DIMM to any unpainted metal surface on the computer. Then, remove the new DIMM from the package.

9. Gently open the retaining clip on each end of the DIMM slot. Turn the DIMM so that the pins align correctly with the connector.

10. 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 a gap exists between the DIMM and the retaining clips, the DIMM has not been correctly installed. Open the retaining clips, remove the DIMM, then reinsert it.
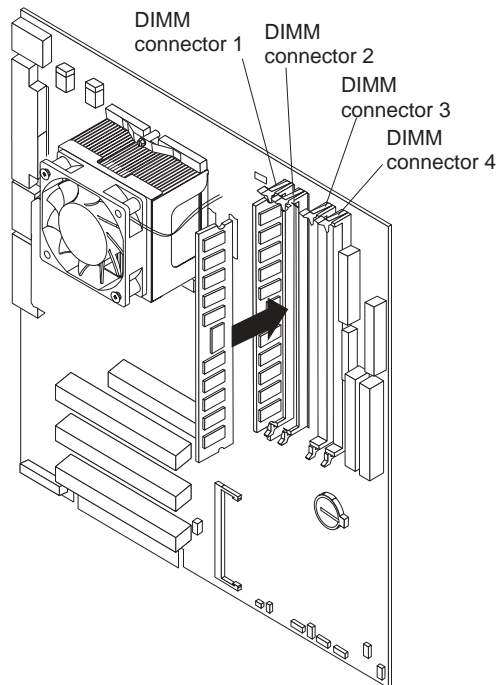
11. If you have other options to install or remove, do so now. Otherwise, rotate the drive cage back into the computer, and replace the support bracket (see "Removing and installing the support bracket" on page 35.

12. Replace the cover (see "Replacing the cover" on page 47).

13. 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. Disconnect all external cables and power cords; then, remove the cover. See "Removing the cover" on page 34.
2. Use a screwdriver to remove the two metal knockouts.
3. Insert the rope clip through the rear panel; then, attach and tighten the nuts.
4. 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.

Rope clip
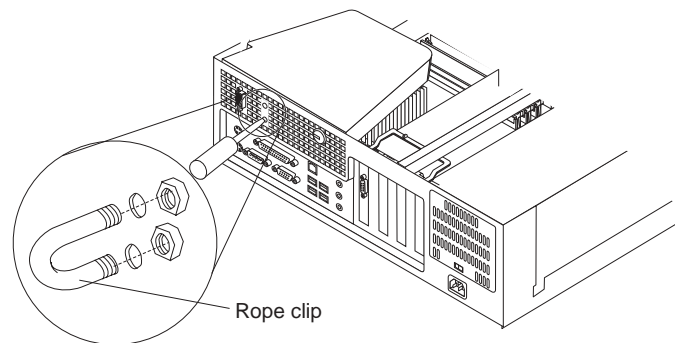
5. If you have other options to install or remove, do so now; otherwise, replace the cover.
6. Reconnect the external cables and power cords. Turn on the attached devices, and turn on the computer.

Replacing the cover

If you removed the support bracket, reinstall it before you replace the cover. See "Removing and installing the support bracket" on page 53.

Complete the following steps to replace the cover:

1. Make sure that all cables, adapters, and other components are installed and seated correctly and that you have cleared all work tools from inside the computer.

2. Install the cover by placing it over the chassis and pivoting it down over the computer until it snaps into place.
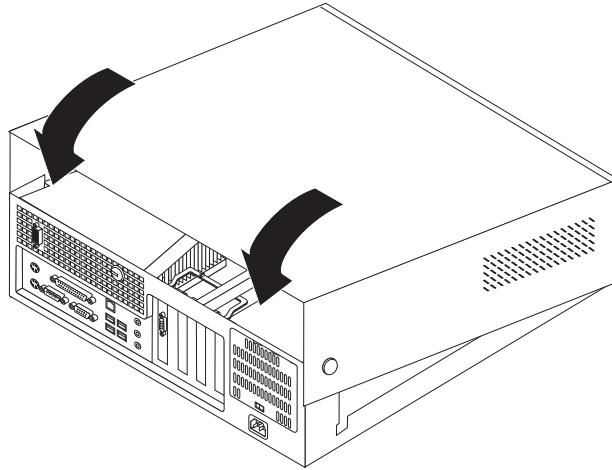
3. Reconnect the external cables and power cords. Turn on the attached devices, and turn on the computer.
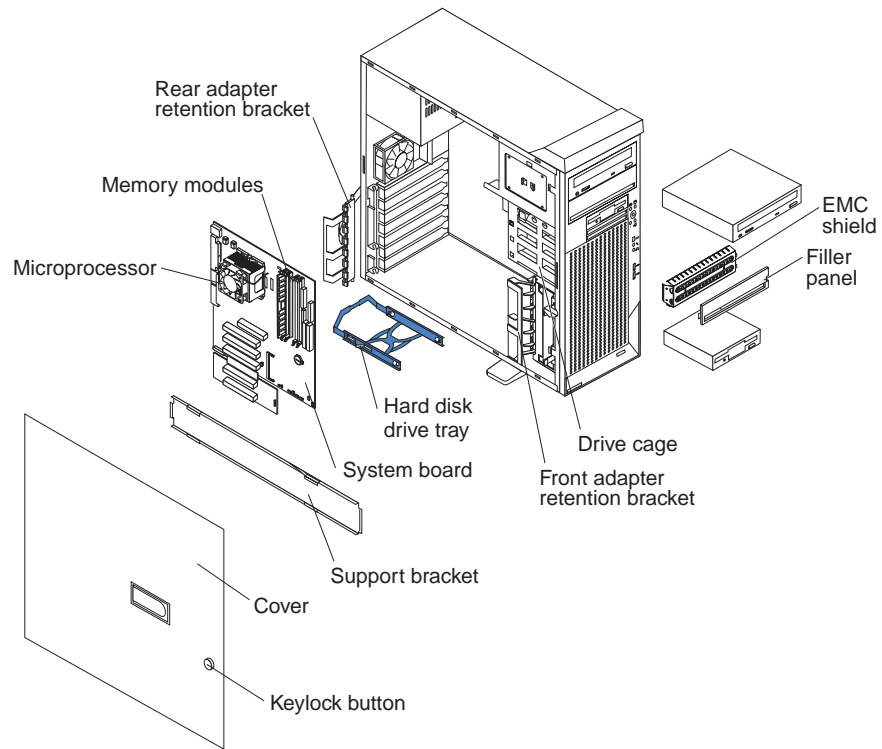
Installing options in the M Pro Type 6230 (tower model)

This section provides instructions for installing hardware options in the IntelliStation M Pro Type 6230 computer.

Major components of your computer

The following illustration shows the major components in the M Pro Type 6230 tower computer.

System-board option connectors

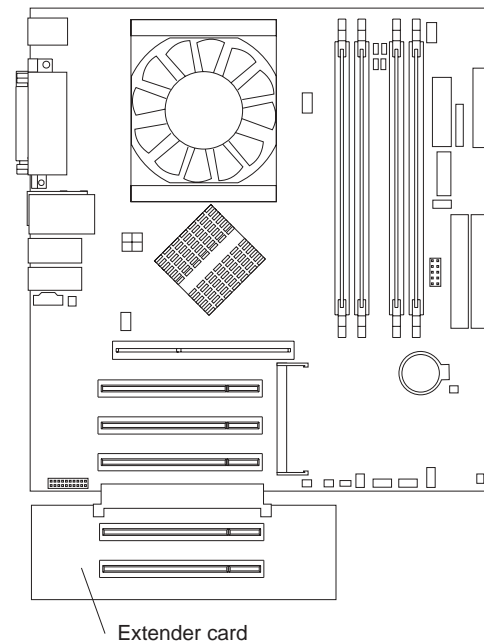The following illustration shows the system-board connectors for user-installable options.

Microprocessor and fan (U6)

DIMM 1 DIMM 2 DIMM 3 DIMM 4

AGP

PCI 1

PCI 2

PCI 3

PCI 4

PCI 5

Battery

Mini - PCI
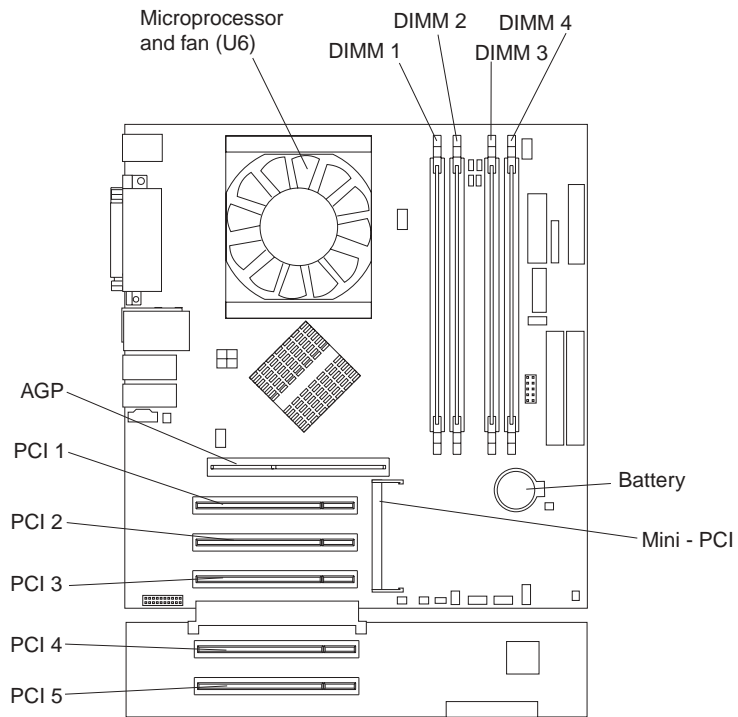
System-board internal connectors

The following illustration shows the internal connectors on the system board.
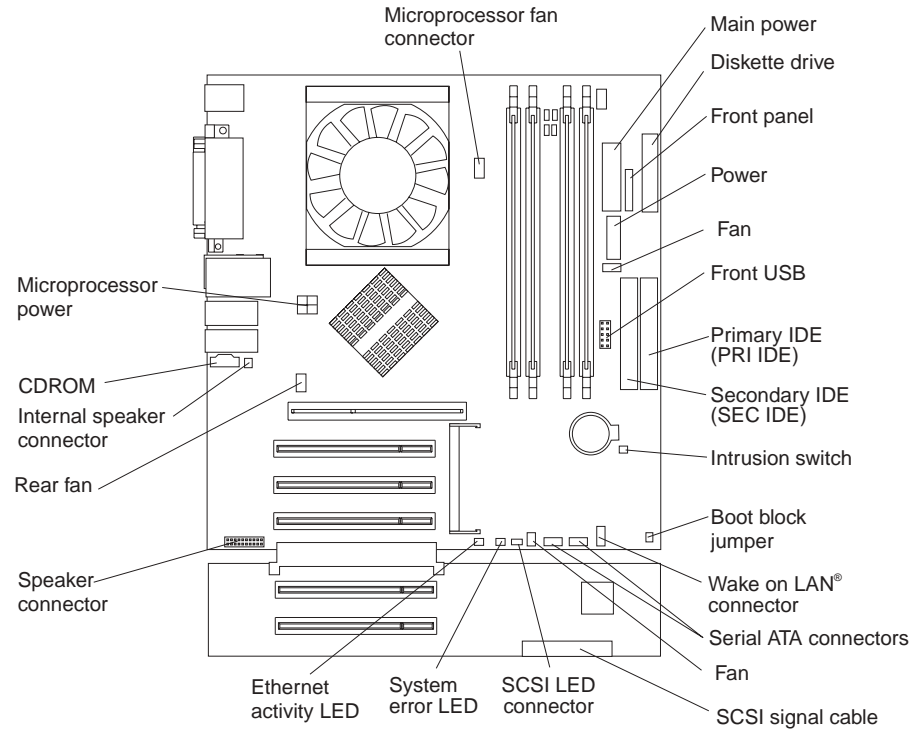
The IDE models for Type 6230 have a shorter extender card, as shown in the following illustration.

Extender card

System-board external connectors

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

Keyboard

Mouse

Serial ports

Parallel

Ethernet

USB ports

Audio
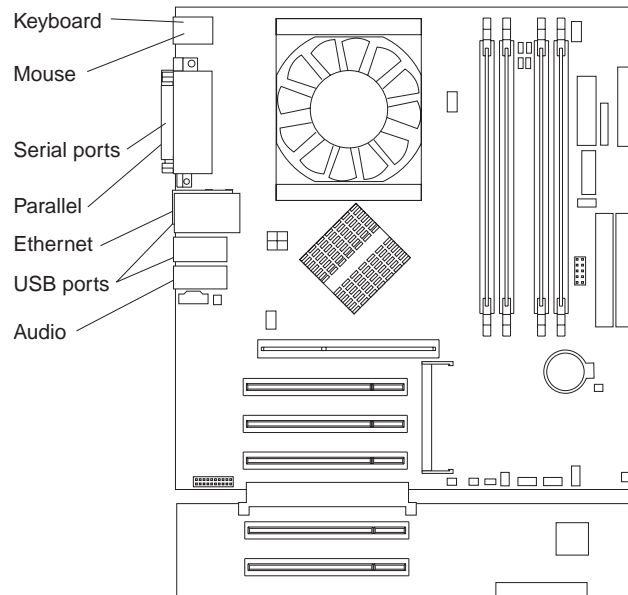
Removing the side cover

To remove the side cover, you might find it easier to lay the computer on its side.

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

1. Review the safety information beginning on page 129.
2. Turn off the computer and all attached devices (see "Turning off the computer" on page 10).
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.
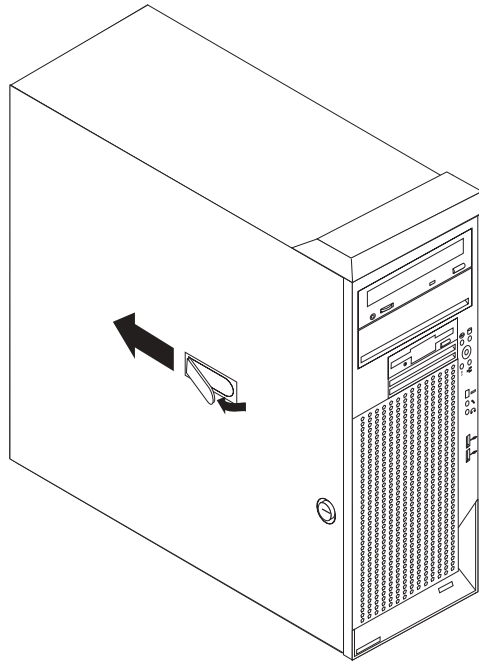
For instructions for replacing the side cover, see "Replacing the side cover" on page 67.

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 31. and the guidelines in "Handling static-sensitive devices" on page 31.
2. Remove the side cover ("Removing the side cover" on page 52).
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.
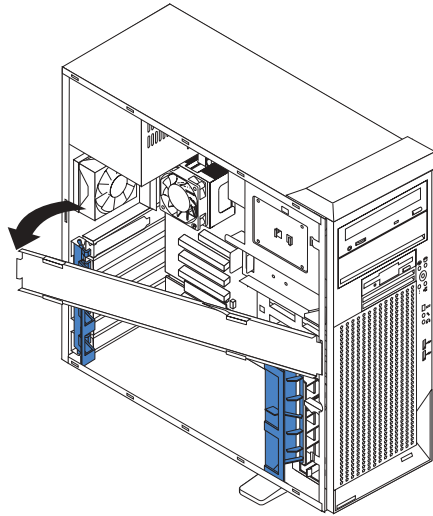
To reinstall the support bracket, reverse the previous steps.

Working with adapters

See "System-board option connectors" on page 50 for the locations of expansion slots on the system board.

Adapter considerations

The following notes describe the types of adapters that your computer supports and other information that you might consider when installing an adapter:

- 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. The Accelerated Graphics Port (AGP) video adapter is installed in the AGP slot.
- 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 adapter installed in the mini-PCI slot. If your computer did not come with a IEEE 1394 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 adapter in the mini-PCI slot. If you are replacing the IEEE 1394 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 safety information beginning on page 129, "Installation guidelines" on page 31, and "Handling static-sensitive devices" on page 31.
2. Turn off the computer and all attached devices. See "Turning off the computer" on page 10.
3. Disconnect all external cables and power cords; then, remove the side cover (see "Removing the side cover" on page 52).
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. Follow the instructions that come with the computer to set any jumpers or switches on the adapter or system board.

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.

Attention: Make sure 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.

Expansion slot cover

Rear adapter retention bracket

Adapter

Front adapter retention bracket
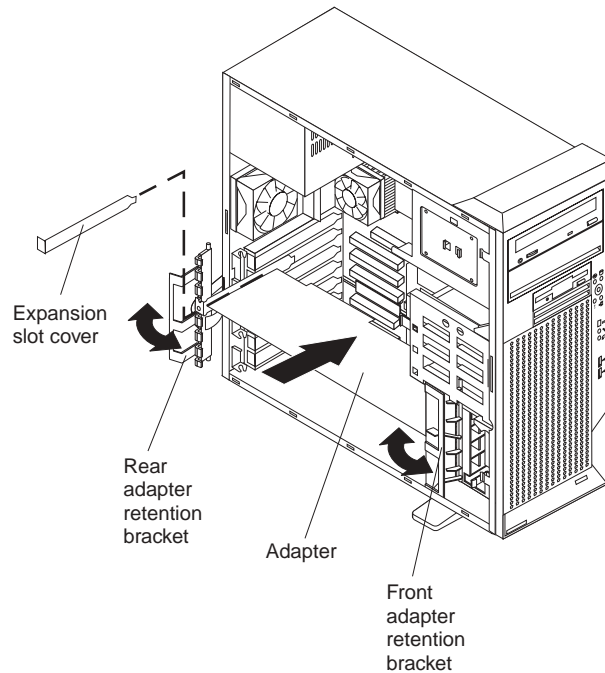
9. Connect required cables to the adapter. Route cables so that they do not block the flow of air from the fans. If you are installing an optional SCSI adapter, see "Cabling an optional SCSI adapter" on page 57 for additional information.
10. If you have another adapter to install, repeat steps 4 through 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. If you use a screw to secure an adapter, you will need to secure all adapters with screws. You cannot use both the screws and the retention brackets to secure an adapter. You must use one or the other.

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 53).
15. Replace the side cover (see "Replacing the side cover" on page 67).
16. Reconnect the external cables and power cords; then, turn on the attached devices and the computer.
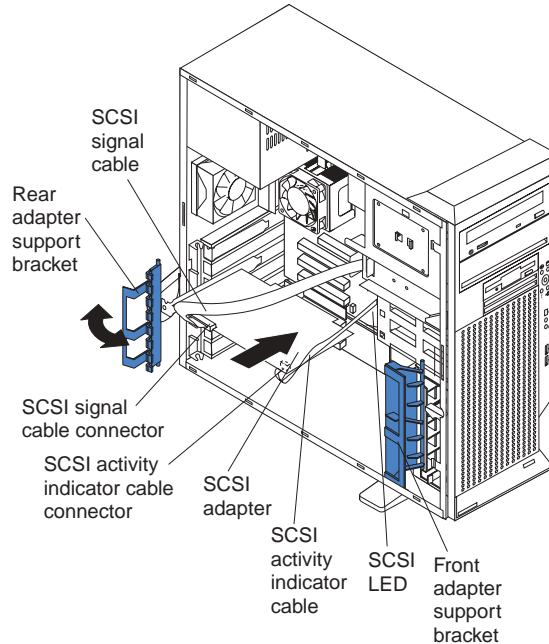
Cabling an optional SCSI adapter

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 on the extender card 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 55).
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 51 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 in your computer:

- Diskette
- Hard disk
- CD-ROM, CD-RW, or DVD/CD-RW combination drive

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 6 or 7.
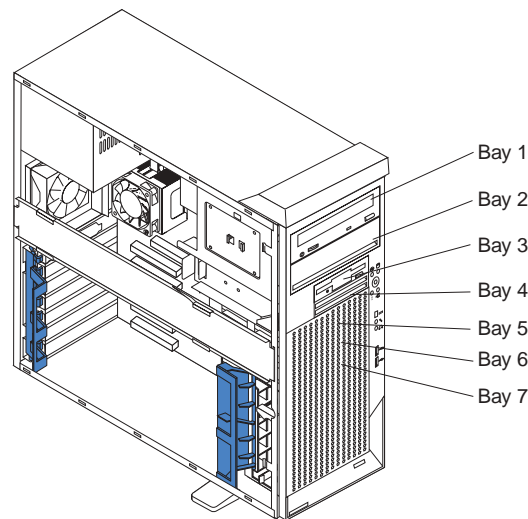
Notes:

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. You have two serial ATA hard disk drive connectors on the system board.

6. You can mix and match parallel IDE and serial ATA IDE drives in bays 2, 4, 5, 6, and 7.

7. 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.

8. 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 safety information beginning on page 129, "Installation guidelines" on page 31, 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 59.

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 52).

4. Remove the support bracket (see "Removing and installing the support bracket" on page 53).

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. Follow the instructions that come with the drive to set any jumpers or switches on the drive, if any.

   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 63 for additional information about cabling drives and "System-board internal connectors" on page 51 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 53).

14. Replace the side cover (see "Replacing the side cover" on page 67).

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 59.

2. Turn off the computer and all attached devices. See "Turning off the computer" on page 10 for instructions.

3. Disconnect all external cables and power cords; then, remove the cover (see "Removing the side cover" on page 52).

4. Remove the support bracket (see "Removing and installing the support bracket" on page 53).

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. Make sure 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.
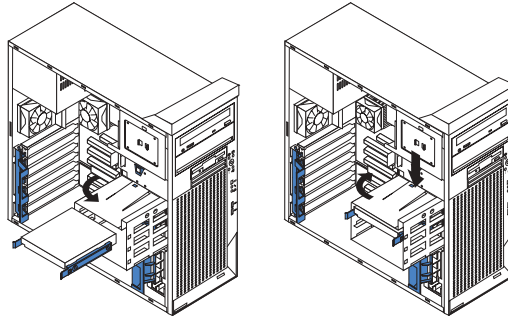
6. Slide the existing drive out of the drive bay. Remove the drive from the drive tray by gently pulling both sides of the drive tray outward until the mounting pins are disengaged from the holes on the drive; then, lift the drive out of the drive tray.

7. Touch the static-protective package containing the new drive to any unpainted metal surface on the computer; then, remove the drive from the package and place it on a static-protective surface.

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

9. Attach the new drive to the drive tray. Place the drive on the drive tray and align the holes on the drive with the mounting pins on the drive tray. Gently pull both sides of the drive tray outward and insert the mounting pins into the holes on the drive.

10. Slide the drive into the drive bay until the drive snaps into place.

11. Determine whether the drive is a parallel IDE, serial ATA, 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 parallel IDE, serial ATA, or SCSI connector on the system board. See "Power and signal cables for internal drives" on page 63 for additional information about cabling drives and "System-board internal connectors" on page 51 for the location of parallel IDE, serial ATA, and SCSI connectors on the system board. If there are open connectors on the cables connecting existing parallel IDE, serial ATA, or SCSI drives, these cables can be used to connect the new drive.

12. Route the signal cable so that it does not block the airflow to the rear of the drives or over the microprocessor.

13. Connect the power cable to the back of the drive. The connectors are keyed and can be inserted only one way.

14. Push the drive cage outward, and press in on the drive-cage release tab; then, rotate the cage back into the computer.

15. If you have other options to install or remove, do so now.

16. Replace the support bracket (see "Removing and installing the support bracket" on page 53).

17. Replace the side cover (see "Replacing the side cover" on page 67).

18. 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 parallel IDE, serial ATA, and SCSI devices to the power supply and to the system board. (See "System-board internal connectors" on page 51 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, make sure 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 parallel IDE, serial ATA, 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.
  - **Serial ATA:** The narrower, black signal cable has two connectors. One attaches to the serial ATA IDE drive, and the other attaches to the connector 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

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

Notes:

1. When you restart the computer after adding or removing a DIMM, the computer displays a message that the memory configuration has changed.

2. Your IntelliStation M Pro Type 6230 computer uses industry-standard, PC2700 or PC3200 double-data-rate (DDR) dual inline memory modules (DIMMs).

3. The system board contains four DIMM connectors and supports two-way memory interleaving.

4. The DIMM options available for your computer are 256 MB, 512 MB, and 1 GB memory modules . Your computer supports a minimum of 256 MB and a maximum of 4 GB of system memory.

5. 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 will display the total amount of installed memory and the amount of configured memory.

6. Your computer comes with either one or two 256 MB, 512 MB, or 1 GB memory DIMMs installed. If your computer has one DIMM installed, when you install an additional DIMM, it must be installed in DIMM 3 memory connector and must be the same size, speed, type, and technology as the DIMM installed in DIMM 1 memory connector. You can mix compatible DIMMs from various manufacturers. When one DIMM is installed in the computer, the computer runs as a single-channel computer. When you add a DIMM in DIMM 3 memory connector, your computer defaults to a dual-channel computer.

7. DIMMs must be installed in matched pairs. The first pair of DIMMs you install in DIMM 1 and DIMM 3 memory connectors must be the same size, speed, type, and technology. You can mix compatible DIMMs from various manufactures. If you install a second pair of DIMMs in DIMM 2 and DIMM 4 memory connectors, they do not have to be the same size, speed, type, and technology as the DIMMs installed in DIMM 1 and DIMM 3 memory connectors. However, the size, speed, type, and technology of the DIMMs you install in DIMM 2 and DIMM 4 memory connectors must match each other.

8. Install only 2.5 V, 184-pin, double-data-rate (DDR) 333 or 400, PC2700 or PC3200, unbuffered synchronous dynamic random-access memory (SDRAM) with error correcting code (ECC) DIMMs. These DIMMs must be compatible with the latest PC2700 or PC3200 SDRAM unbuffered DIMM specification. For a list of supported options for your computer, go to http://www.ibm.com/pc/; 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 safety information beginning on page 129, "Installation guidelines" on page 31, and "Handling static-sensitive devices" on page 31.
2. Remove the side cover (see "Removing the side cover" on page 52).
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 52.)
5. Remove the support bracket (see "Removing and installing the support bracket" on page 53).
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. Remember that DIMM 1 and DIMM 3 must be paired together (and must be the first pair installed) and DIMM 2 and DIMM 4 must be paired together.

Table 4. Memory installation sequence

DIMMs	Slots
1 DIMM	1
2 DIMMs	1, 3
4 DIMMs	1, 2, 3, 4

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.
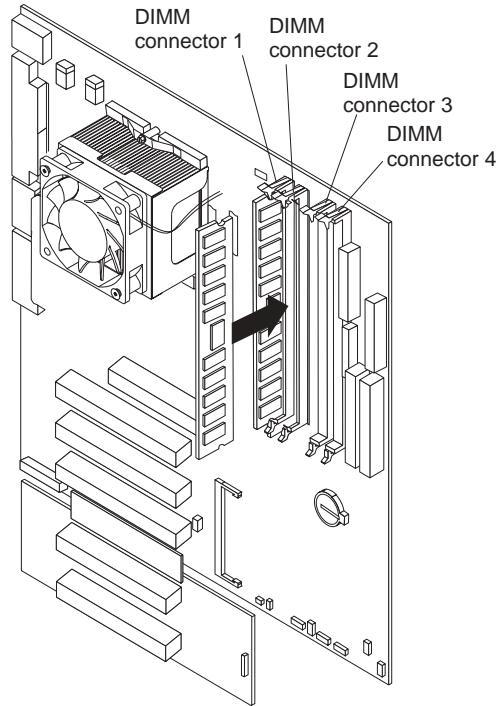
12. If you have other options to install or remove, do so now.
13. Push the drive cage outward and press in on the drive-cage release tab; then, rotate the cage back into the computer.
14. Replace the support bracket (see "Removing and installing the support bracket" on page 53).
15. Replace the side cover (see "Replacing the side cover" on page 67).
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 52.

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.

Rope clip
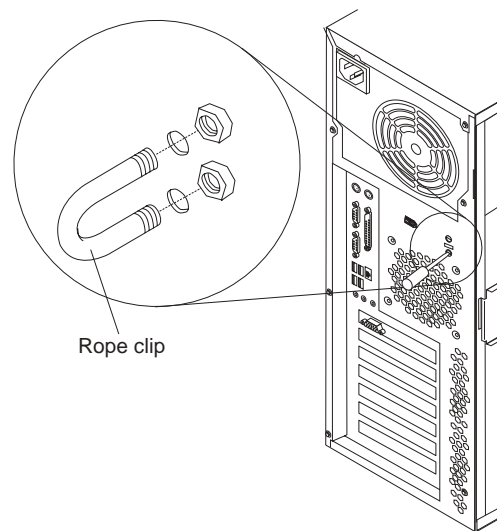
6. If you have other options to install or remove, do so now; otherwise, replace the side cover (see "Replacing the side cover").

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 53.

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. Make sure 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.

2. Install the side cover by placing it into position on the computer. Be certain that the lip on the bottom of the cover rests on the ledge on the bottom of the chassis before rotating the cover up to the vertical position. Press down on the cover-release latch as you slide the side cover forward to lock the side cover.
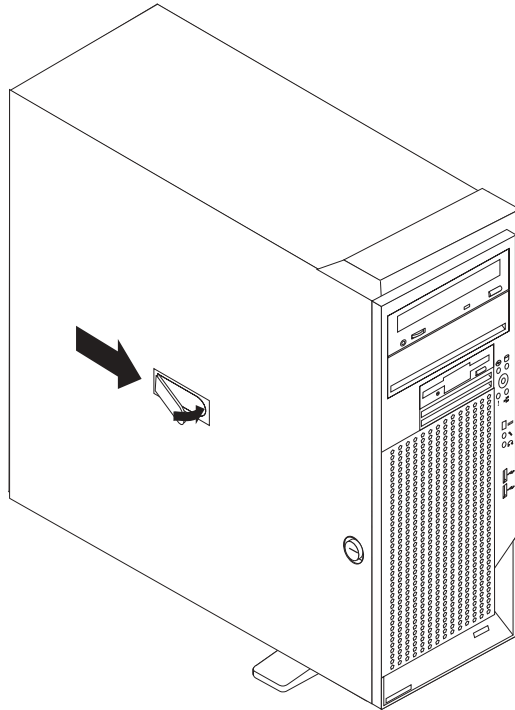
3. Reconnect the external cables and power cords to the computer; then, connect the power cords to electrical outlets.

4. Turn on the attached devices; then, turn on the computer.

Connecting external options

You can connect a number of optional external devices to the connectors on the rear and front of the computer.

Complete the following steps to attach an external device:

1. Review the "Installation guidelines" on page 31, the safety precautions listed in Statement 1 and Statement 5 in the safety information on page 129, and the documentation that comes with your options.

2. Turn off the computer and all attached devices (see "Turning off the computer" on page 10).

3. Follow the instructions that come with the option to prepare it for installation and to connect it to the computer.

If you are attaching a SCSI device, see "Ultra320 SCSI connector" on page 72 for SCSI ID and cabling information.

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 (some models)
- One keyboard
- One mouse
- One parallel
- Two serial
- Six Universal Serial Bus (USB)
- One video

The following illustration shows the locations of the connectors on the M Pro Type 6220.
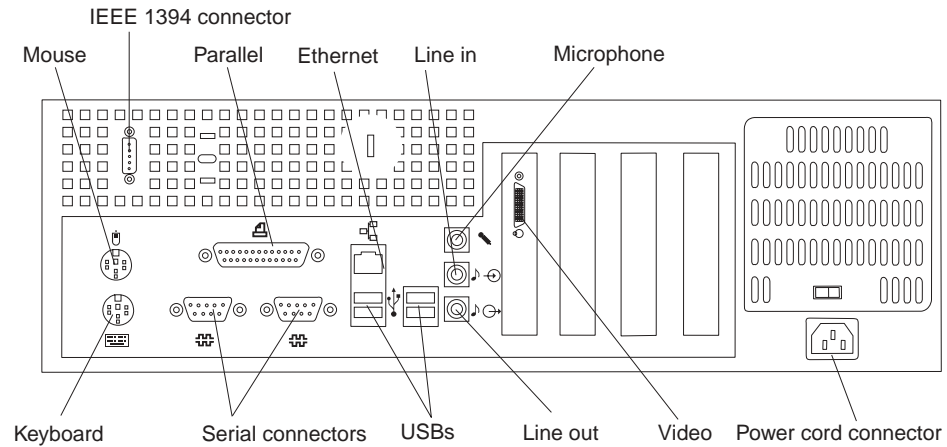
The following illustration shows the locations of the connectors on the M Pro Type 6230.

Power cord connector
1394 IEEE connector
Mouse
Keyboard
Parallel
Serial connectors
Ethernet
USBs
USBs
Line out
Line in
Mic
Video
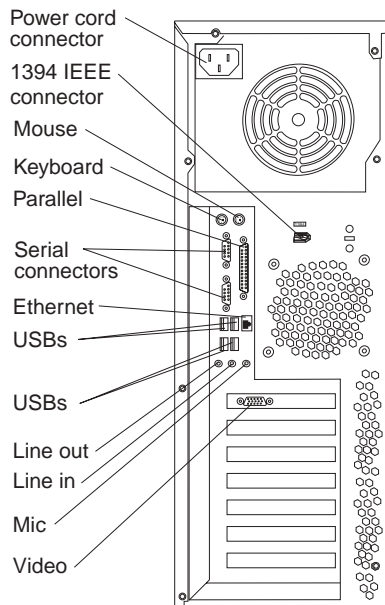
The following sections describe these connectors.

Audio connectors

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

Line out   Line in   Mic
(green)   (blue)   (pink)
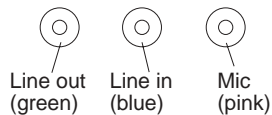
Line in
There is one line-in connector on the rear of the computer. The computer receives audio signals through this connector from an external audio device.

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.

```
6 ⚬   ⚬ 5
4 ⚬   ⚬ 3
   2 1
```
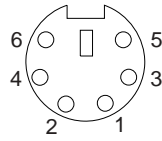
Ethernet (RJ-45) connector

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.

```
Activity LED                    Link LED
(green)                         (green)

              8        1
```
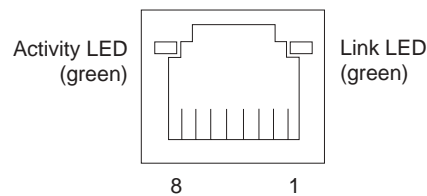
Connect a Category 3, 4, or 5 unshielded twisted-pair (UTP) cable to this connector. The 100BASE-TX and 1000BASE-T Fast Ethernet standards require Category 5 or higher cabling.

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 7).

IEEE 1394 connectors (some models)

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

4-pin IEEE 1394 connector (front)

```
4  3  2  1
```
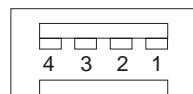
6-pin IEEE 1394 connector (rear)

```
2   4   6


1   3   5
```
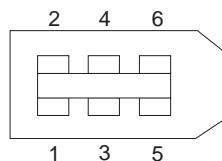
Keyboard connector

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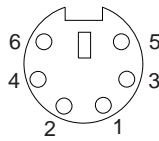
If you attach a keyboard to this connector, USB ports and devices are disabled during the power-on self-test (POST).

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.
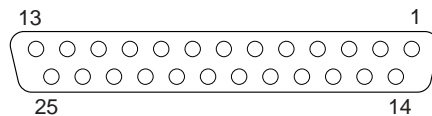
The parallel connector supports three standard IEEE 1284 modes of operation: standard parallel port (SPP), enhanced parallel port (EPP), and extended capability port (ECP). If you configure the parallel port to operate in bidirectional mode, it supports the ECP and EPP modes. When the parallel connector 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.
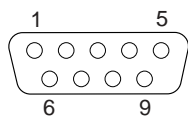
Ultra320 SCSI connector

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

- 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 51 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 (USB) connectors

There are six Universal Serial Bus (USB) 2.0 connectors, two on the front and four 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 multiple USB devices are attached to the computer, 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.
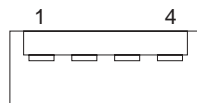
Use a 4-pin USB cable to connect external devices to USB connectors.

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**
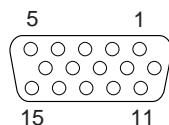
Digital (DVI-I) video connector
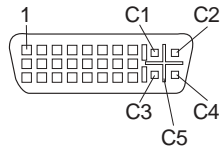
Low force helical-60 (LFH-60) video connector

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 the *User's Guide* on the IBM *Documentation* CD.

Models with the NVIDIA Quadro4 980XGL, NVIDIA Quadro FX 1000, or NVIDIA Quadro FX 3000 video adapter come with a DVI-I to VGA style analog converter for each DVI-I connector.

Attention: To get the best performance from the NVIDIA Quadro FX 1000 and NVIDIA FX 3000 video adapters, you must connect the video adapter to the computer power supply. Otherwise, the video adapter will be operating with very limited power, resulting in a decrease in performance for some applications. You will need to use one of the disk drive power drops to connect the video adapter to the computer power supply. This means that when you install this video adapter in your computer, you have one less power drop for optional internal devices. The following illustration shows the location of the video adapter power connector:
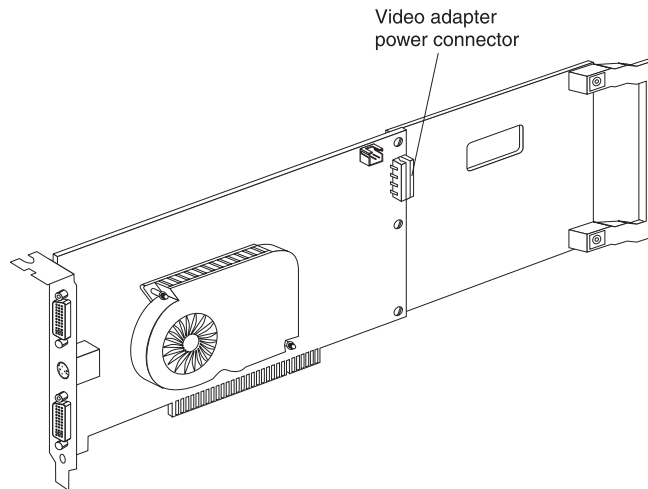
Models with the NVIDIA Quadro4 280NVS or NVIDIA Quadro4 580XGL video adapter come with a low force helical-60 (LFH-60) to dual-analog monitor pigtail cable. If you want to set up two digital monitors, you will need to purchase a separate dual-digital monitor cable.

FRU information (service only)

The field replaceable unit (FRU) procedures are intended for trained servicers who are familiar with IBM products. See "Parts listing for IntelliStation M Pro Type 6220 and 6230 computer" on page 119 for information about CRUs and FRUs.

IntelliStation M Pro Type 6220 (desktop model)

The following section contains information about removing components of the IntelliStation M Pro Type 6220 desktop model.
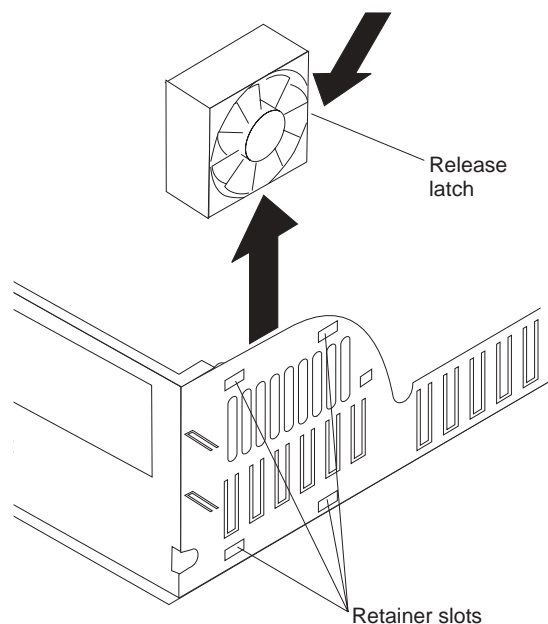
Baffle

Before you begin:
- Read "Safety information" on page 129.
- Read "Installation guidelines" on page 31.
- Review the information in "System reliability considerations" on page 31.

Complete the following steps to remove the baffle:

1. Turn off the computer and attached devices; then, disconnect all external cables and power cords.
2. Remove the cover and the frame-support bracket (see"Removing the cover" on page 34).
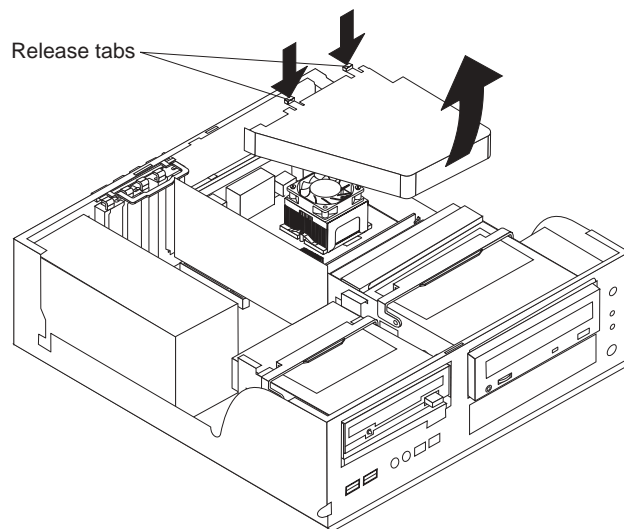
3. Grasp the baffle on the top and bottom of the wide end and squeeze gently; then, pull the baffle up and away from the back of the chassis.
4. When the baffle is free of the back of the chassis, lift it out of the computer.

To reinstall the baffle, set the two pins on the bottom of the baffle into the slots provided for them in the chassis; then, gently squeeze the baffle near the two tabs on the top of the baffle so that the tabs slide into the two notches provided for them.

IEEE 1394 adapter — Type 6220 (desktop model)

Before you begin:
- Read "Safety information" on page 129.

- Read "Installation guidelines" on page 31.
- Review the information in "System reliability considerations" on page 31.

Complete the following steps to remove the IEEE 1394 adapter:

1. Turn off the computer and attached devices; then, disconnect all external cables and power cords.
2. Remove the cover and the frame-support bracket (see"Removing the cover" on page 34).
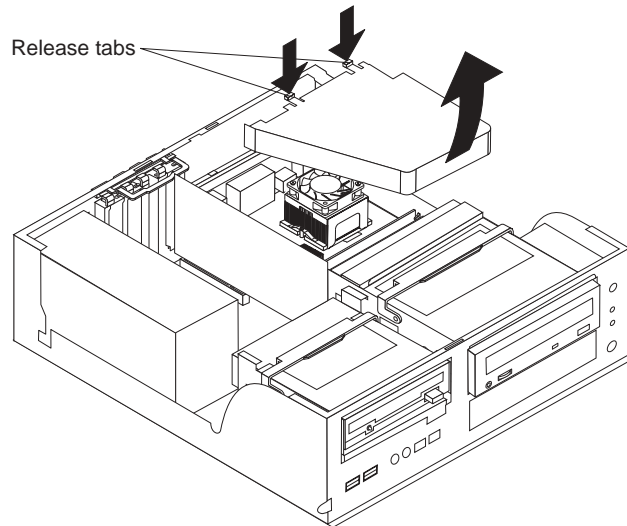
3. Swing the CD-ROM drive cage up.
4. Swing the diskette drive cage up.
5. Remove all cables that impede access to the IEEE 1394 adapter.
6. Pull the retaining latches apart, and lift the IEEE 1394 adapter out of the mini-PCI connector.
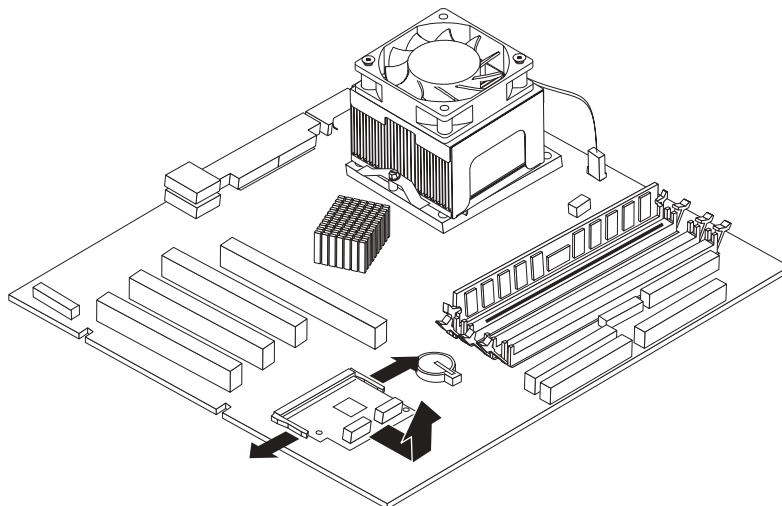
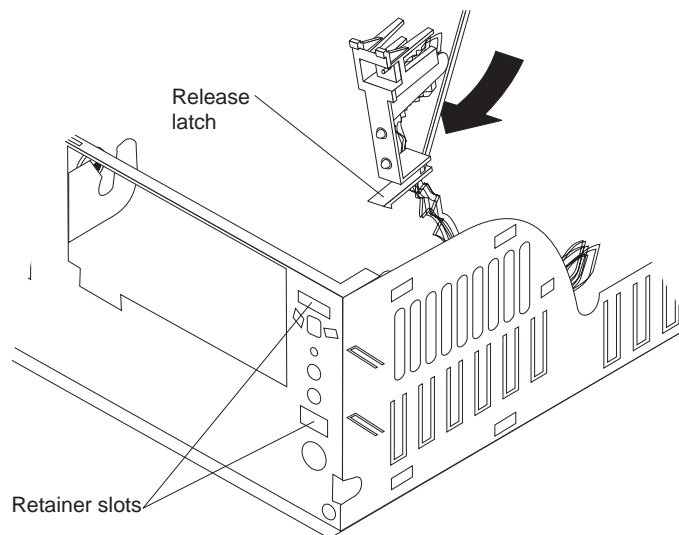To replace the IEEE 1394 adapter, reverse the steps.

Adapter retainer

Before you begin:

- Read "Safety information" on page 129.
- Read "Installation guidelines" on page 31.
- Review the information in "System reliability considerations" on page 31.

Complete the following steps to remove the adapter retainer:

1. Turn off the computer and attached devices; then, disconnect all external cables and power cords. See "Turning off the computer" on page 10.
2. Remove the cover (see"Removing the cover" on page 34).
3. Rotate the retainer up, and pull the adapter retainer away from the chassis.

To install the adapter retainer, reverse the previous steps, sliding the two side knobs on the retainer into the channels provided for them on the chassis and positioning the retainer so that the plastic tabs are pressed against the inside of the PCI slot covers.
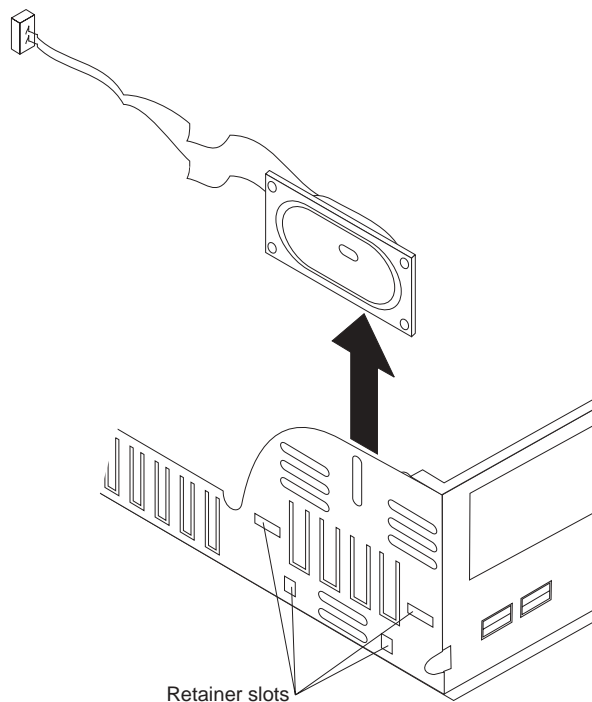
Fan

Before you begin:

- Read "Safety information" on page 129.
- Read "Installation guidelines" on page 31.
- Review the information in "System reliability considerations" on page 31.

Complete the following steps to remove the fan:

1. Turn off the computer and attached devices; then, disconnect all external cables and power cords.
2. Remove the cover and the frame-support bracket (see "Removing the cover" on page 34 and "Removing and installing the support bracket" on page 35).
3. Remove the air baffle (see "Baffle" on page 75).
4. Disconnect the fan cable from the system board.

Release latch

Retainer slots

5. Push the two of the four tabs on the right of the chassis toward the rear, and then push in until the fan is released. Pull the fan out of the computer.

6. Pull the fan up and out of the chassis.

To install the rear fan, reverse the previous steps.
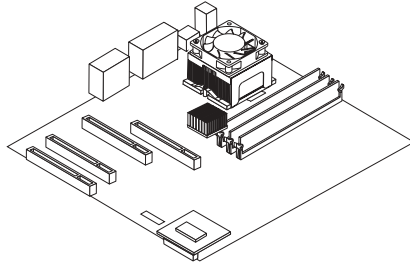
Operator information panel

Before you begin:

• Read "Safety information" on page 129.

• Read "Installation guidelines" on page 31.

• Review the information in "System reliability considerations" on page 31.

Complete the following steps to remove the operator information panel:

1. Turn off the computer and attached devices; then, disconnect all external cables and power cords.

2. Remove the cover and the frame-support bracket (see "Removing the cover" on page 34 and "Removing and installing the support bracket" on page 35).

3. Swing the CD-ROM drive cage up.

4. Disengage the operator information panel cable from the system board.

5. Press upward on the lower tab of the operator information panel until it comes loose.

   Note: It might be necessary to use the tip of a screwdriver to disengage the lower tab.

6. Push inward on the two tabs of the top section of the operator information panel until it pops free of the chassis; then, remove it from the computer, making sure that the cable follows freely.

To install the operator information panel, reverse the previous steps.

Speaker

Before you begin:
- Read "Safety information" on page 129.
- Read "Installation guidelines" on page 31.
- Review the information in "System reliability considerations" on page 31.

Complete the following steps to remove the speaker:

1. Turn off the computer and attached devices; then, disconnect all external cables and power cords.
2. Remove the cover and the frame-support bracket (see "Removing the cover" on page 34 and "Removing and installing the support bracket" on page 35).
3. Rotate the diskette drive cage to its vertical position.
4. Disconnect the speaker cable from the system board.

Retainer slots

5. Lift the speaker up and out of the side brackets.

To replace the speaker, reverse the previous steps.

Power supply

Before you begin:
- Read "Safety information" on page 129.
- Read "Installation guidelines" on page 31.
- Review the information in "System reliability considerations" on page 31.

Complete the following steps to remove the power supply:

1. Turn off the computer and attached devices; then, disconnect all external cables and power cords.
2. Remove the cover and the frame-support bracket (see"Removing the cover" on page 34 and "Removing and installing the support bracket" on page 35).

3. Swing the diskette drive cage up.
4. Disconnect the internal power-supply cables.

5. Remove the two screws that secure the power supply to the chassis.
6. Lift the power supply out of the chassis.

To replace the power supply, reverse the previous steps.

Microprocessor/fan-sink assembly

Before you begin:
- Read "Safety information" on page 129.
- Read "Installation guidelines" on page 31.
- Review the information in "System reliability considerations" on page 31.

Complete the following steps to remove the microprocessor and fan-sink assembly:
1. Turn off the computer and attached devices; then, disconnect all external cables and power cords. See "Turning off the computer" on page 10.
2. Remove the cover and the frame-support bracket (see"Removing the cover" on page 34 and "Removing and installing the support bracket" on page 35).
3. Remove the air baffle (see "Baffle" on page 75).
4. Rotate the CD-ROM drive cage up.
5. Disconnect any cables that impede access to the microprocessor.

   Note: The fan and underlying heat sink are attached and do not need to be separated from each other. Remove the fan-sink assembly from the microprocessor as a single unit.

6. Remove the fan-sink assembly from the microprocessor:
   a. Detach the fan-sink cable.
   b. Loosen the two captive screws (in leaf-spring enclosures) on either side of the fan-sink assembly, exerting pressure on the screwdriver.
   c. With the two captive screws loosened, pivot the leaf-spring assemblies outward and out of the notches on the fan-sink assembly.
   d. Lift the fan-sink assembly up and out of the computer. It might be necessary to gently twist the fan-sink assembly to loosen it from the microprocessor.
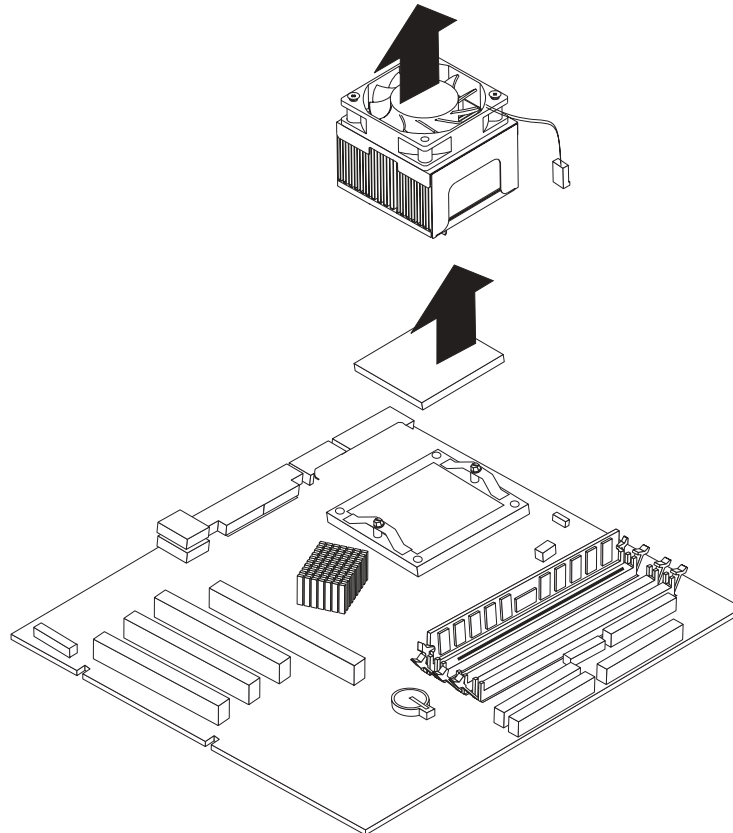
   Important: Be careful when handling the adhesive material on the microprocessor. If the adhesive material on the microprocessor will be reused, do not contaminate it. If replacement adhesive material is provided with the replacement part, be sure to remove all traces of existing adhesive material from the microprocessor before applying the new adhesive material.

7. Rotate the locking lever on the microprocessor socket from its closed and locked position until it stops or clicks in the fully open position (approximately 135° angle), as shown.

   Attention: You must ensure that the locking lever on the microprocessor socket is in the fully open position before you remove or insert the microprocessor in the socket. Failure to do so might result in permanent damage to the microprocessor, microprocessor socket, and system board.

Lever closed

Lever open

Lever closed

Lever open
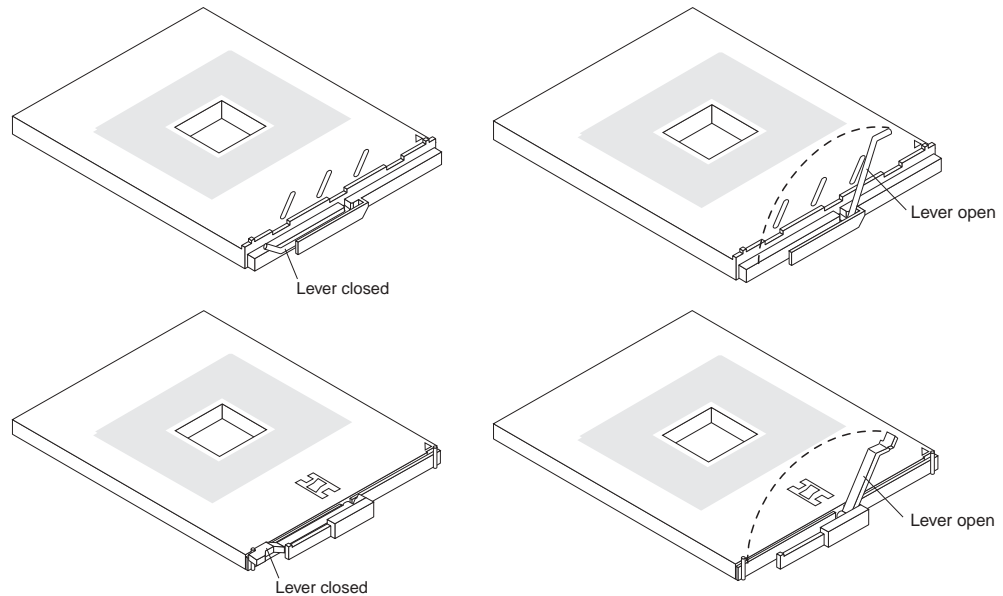
8. Lift the microprocessor up and out of the computer.

To install a microprocessor and fan-sink assembly, reverse the previous steps.

System board

Before you begin:

- Read "Safety information" on page 129.
- Read "Installation guidelines" on page 31.
- Review the information in "System reliability considerations" on page 31.

Complete the following steps to remove the system board.

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

1. Turn off the computer and attached devices; then, disconnect all external cables and power cords.
2. Remove the cover and the frame-support bracket (see"Removing the cover" on page 34 and "Removing and installing the support bracket" on page 35).
3. Remove the air baffle (see "Baffle" on page 75).
4. Disconnect all cables on the system board.
5. Pivot the drive cages up; then, remove the drives and cages from the computer.

6. Remove any of the following components that are installed on the system board:
   - Battery (see "Replacing the battery" on page 29).
   - Microprocessor (see "Microprocessor/fan-sink assembly" on page 80).

     Important: If you plan to reinstall an existing microprocessor to the new system board, be careful when handling the adhesive material on the microprocessor. If the adhesive material on the microprocessor will be reused, do not contaminate it. If replacement adhesive material is provided with the replacement system board, be sure to remove all traces of existing adhesive material from the microprocessor before applying the new adhesive material.

   - Adapters (see "Working with adapters" on page 35).
   - DIMMs ("Installing memory modules" on page 44).

   Note: The power supply has been removed in the illustration for purposes of clarification (see "Power supply" on page 79). If any installed items impede your ability to easily access the system board, you can remove them from the computer.
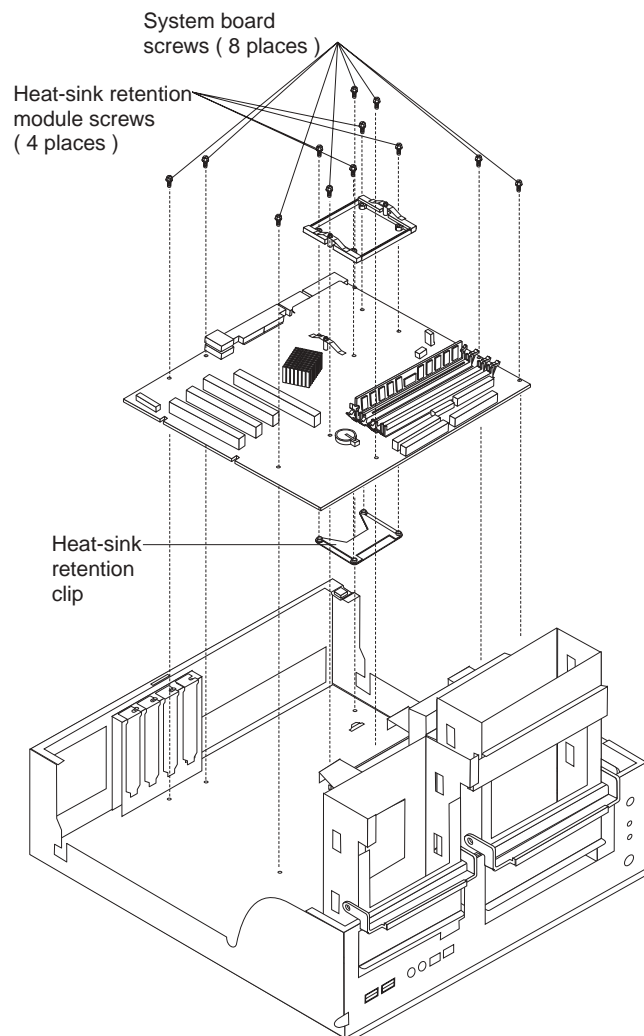
7. Remove the 12 screws that secure the system board to the chassis, and put them in a safe place.

   Note: Four of the screws described in step 7 secure the heat-sink retention module to the heat-sink retention clip, with the system board in between them. It is easier to remove these screws while the system board is positioned in the chassis.

8. Remove the heat-sink retention module, and set it aside.
9. Gently slide the system board slightly toward the front of the computer until it disengages from the chassis; then, lift the board up and out of the computer.
10. Remove the heat-sink retention clip.

To install the system board, reverse the previous steps.

IntelliStation M Pro Type 6230 (tower model)

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

Important: The field replaceable unit (FRU) procedures are intended for trained servicers who are familiar with IBM IntelliStation products. See the parts listing in "Type 6230" on page 122 to determine whether the component being replaced is a customer replaceable unit (CRU) or a FRU.

Note: Before servicing this computer, read "Installation guidelines" on page 31.

Removing the front bezel

Before you begin:
- Read "Safety information" on page 129.
- Read "Installation guidelines" on page 31.
- Review the information in "System reliability considerations" on page 31.

Complete the following steps to remove the bezel:
1. Review the information in "System reliability considerations" on page 31.
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 52).
4. Press the bezel-release latch at the top of the computer to disconnect the top of the bezel from the computer.

5. Release the two tabs at the top edge of the bezel, and pull the top of the bezel slightly away from the computer.
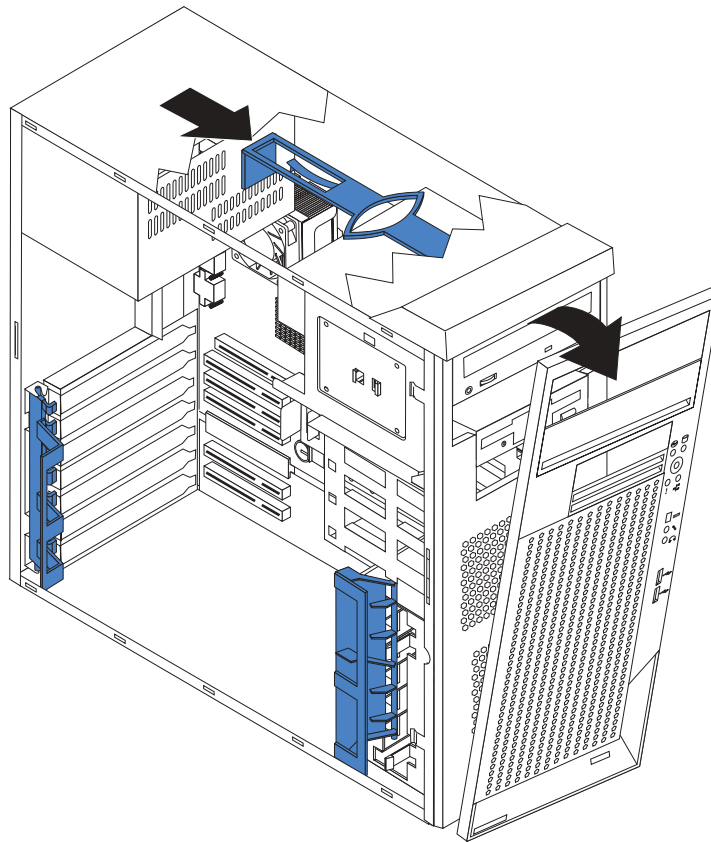
6. Pull the bezel up to release the two tabs at the bottom edge of the bezel. Store the bezel in a safe place.
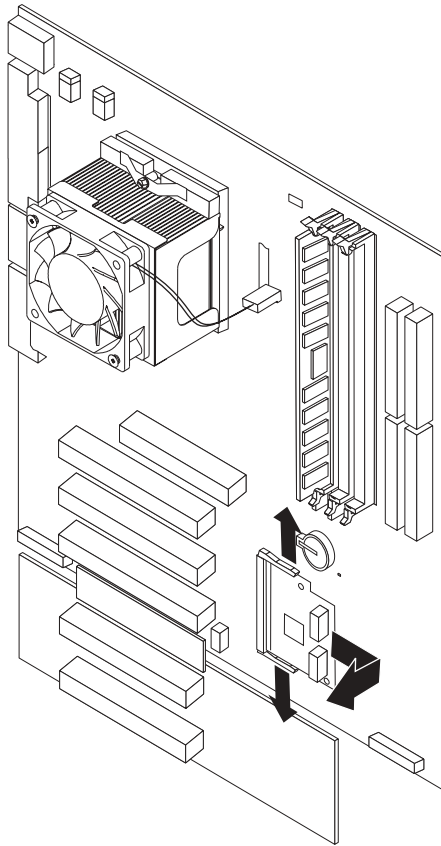
Power button

Before you begin:
- Read "Safety information" on page 129.
- Read "Installation guidelines" on page 31.
- Review the information in "System reliability considerations" on page 31.

To remove the power button, complete the following steps:
1. Turn off the computer, if it is on.
2. Unplug the computer.
3. Remove the side cover. See "Removing the side cover" on page 52.
4. Remove the front bezel. See "Removing the front bezel" on page 84.
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 computer.
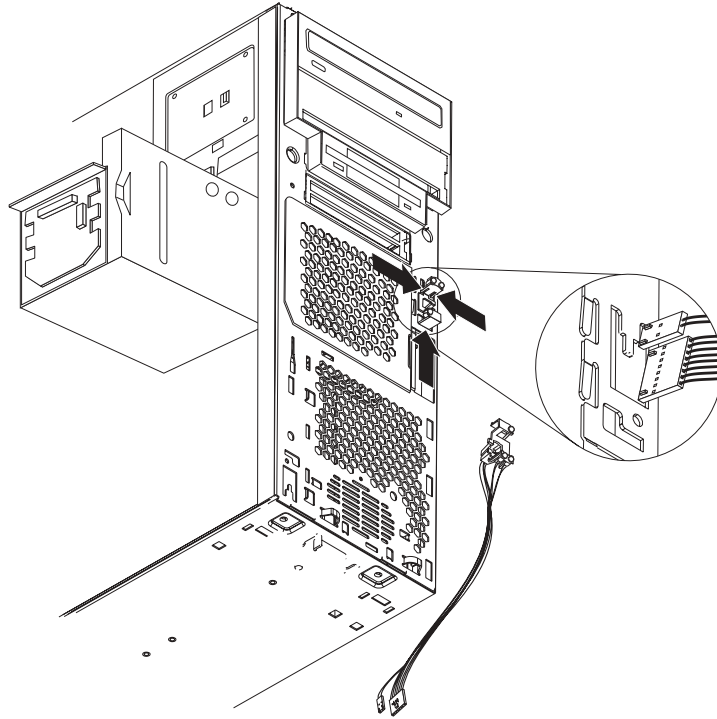
7. Note where the power-switch and LED panel cable is connected to the system board; then, carefully disconnect the cable from the system board.

   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; then, gently press upward, and slide the latch through the aperture.

10. Gently pinch together the upper release latches; then, slide the latches through the aperture, and remove the power button.

IEEE 1394 adapter — Type 6230

Before you begin:
- Read "Safety information" on page 129.
- Read "Installation guidelines" on page 31.
- Review the information in "System reliability considerations" on page 31.

1. Turn off the computer, and remove external cables. See "Turning off the computer" on page 10.
2. Remove the cover and support bracket (see "Removing the side cover" on page 52 and "Removing and installing the support bracket" on page 53).
3. Disconnect any cables that impede access to the mini-PCI IEEE 1394 adapter.

4. Pull the retaining latches on the mini-PCI connector apart, and remove the IEE 1394 adapter.

To replace the mini-PCI IEEE 1394 adapter, reverse the steps.

Microprocessor/fan-sink assembly

Before you begin:

- Read "Safety information" on page 129.
- Read "Installation guidelines" on page 31.
- Review the information in "System reliability considerations" on page 31.

To remove the microprocessor and fan-sink assembly, complete the following steps:

1. Turn off the computer, and remove external cables. See "Turning off the computer" on page 10.
2. Remove the cover and support bracket (see "Removing the side cover" on page 52 and "Removing and installing the support bracket" on page 53).
3. Disconnect any cables that impede access to the microprocessor.
4. Remove the fan-sink assembly from the microprocessor:

   Note: The fan and underlying heat sink are attached and do not need to be separated from each other. Remove the fan-sink assembly from the microprocessor as a single unit.

   a. Detach the fan sink cable.
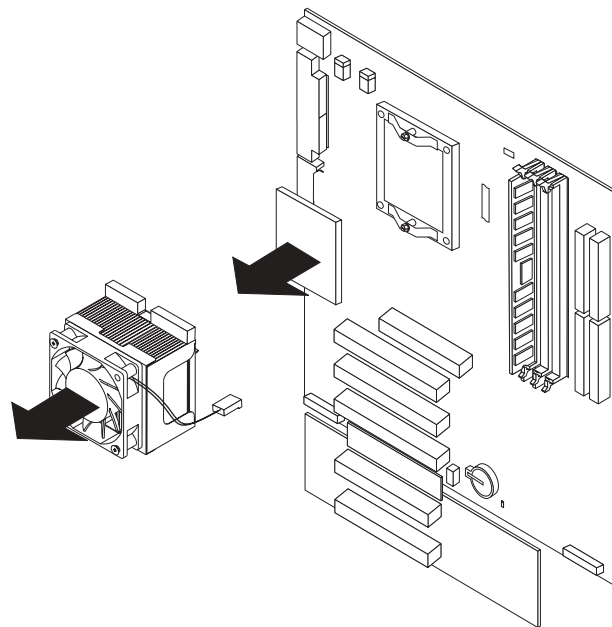
   b. Loosen the two captive screws on either side (in leaf spring enclosures) of the fan sink.
   c. With the two captive screws loosened, pivot the leaf-spring assemblies outward and out of the notches on the fan-sink assembly.
   d. Lift the fan sink up and out of the computer. It might be necessary to gently twist the fan sink to loosen it from the microprocessor.

   Important: Be careful when handling the adhesive material on the microprocessor. If the adhesive material on the microprocessor 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.

To install a processor, reverse the previous steps.

Note: When reconnecting the fan-sink cable to the system board, be sure to connect the cable to the connector marked "CPU fan".

Power supply

Before you begin:
- Read "Safety information" on page 129.
- Read "Installation guidelines" on page 31.
- Review the information in "System reliability considerations" on page 31.
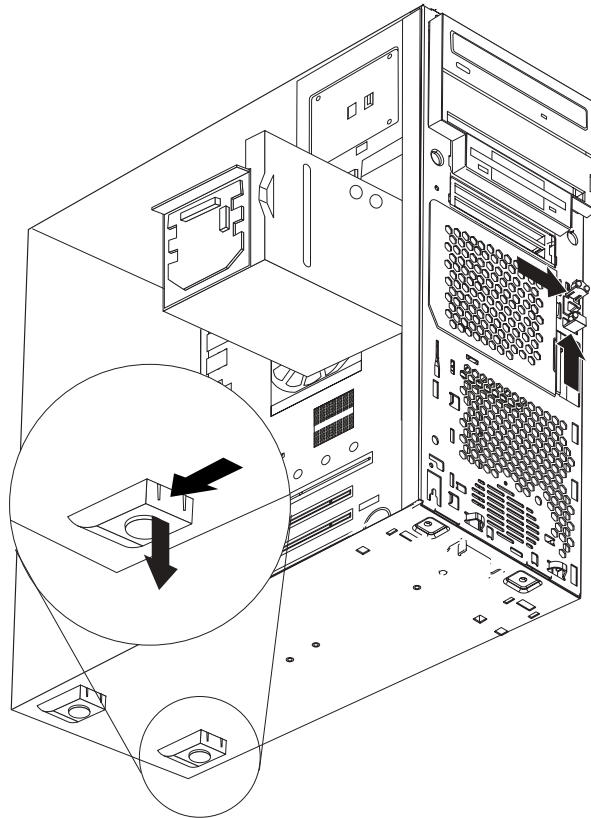
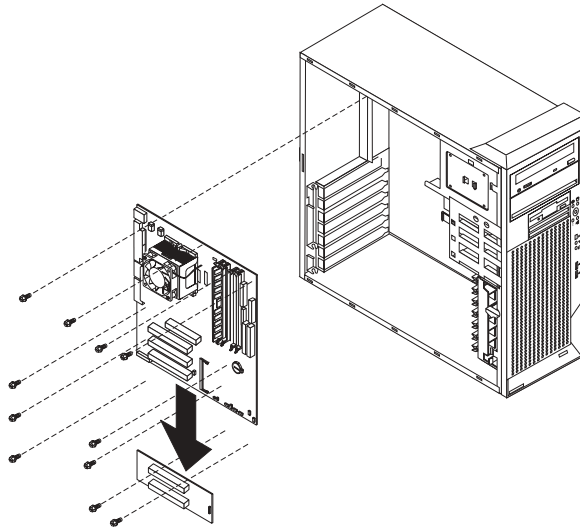To remove the power supply, complete the following steps:
1. Turn off the computer and all attached devices; then, disconnect all external cables and power cords. See "Turning off the computer" on page 10.
2. Remove the cover. See "Removing the side cover" on page 52.
3. Disconnect internal cables from the system board and drives.
4. Remove the screws from the rear of the server.
5. Gently move the power supply away from the chassis, and lift it out of the computer.
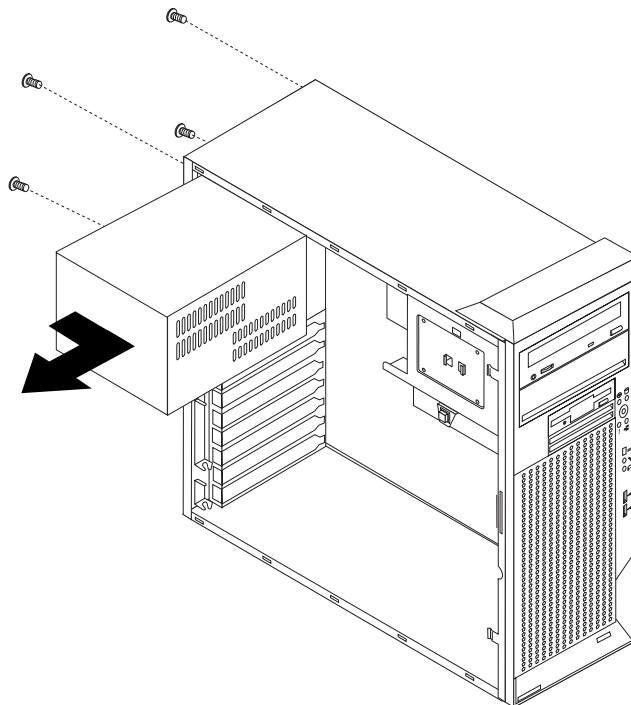
Rear fan

Before you begin:
- Read "Safety information" on page 129.
- Read "Installation guidelines" on page 31.
- Read "Installation guidelines" on page 31.

- Review the information in "System reliability considerations" on page 31.

To remove the rear fan, complete the following steps:
1. Turn off the computer and all attached devices; then, disconnect all external cables and power cords. See "Turning off the computer" on page 10.
2. Remove the cover. See "Removing the side cover" on page 52.
3. Remove the support-bracket assembly. See "Removing the side cover" on page 52.
4. Remove the fan cable from the system board.
5. Use side cutters to sever the four rubber extensions on the outside of the server.
6. Gently pry the fan away from the server, and lift it up and out.
7. To install the new fan assembly, place the fan in position at the rear of the computer.
8. Guide the rubber extensions through the apertures.
9. Use needle-nosed pliers to pull the extensions through the apertures.
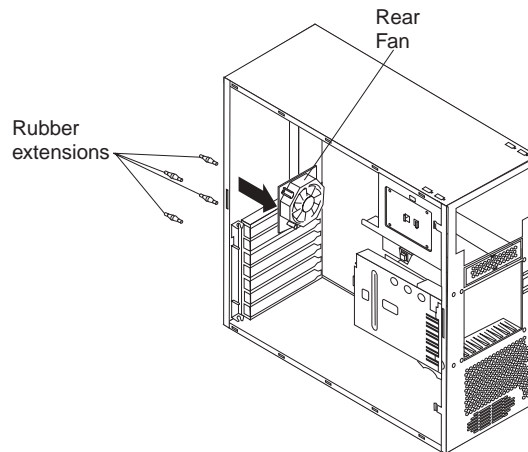
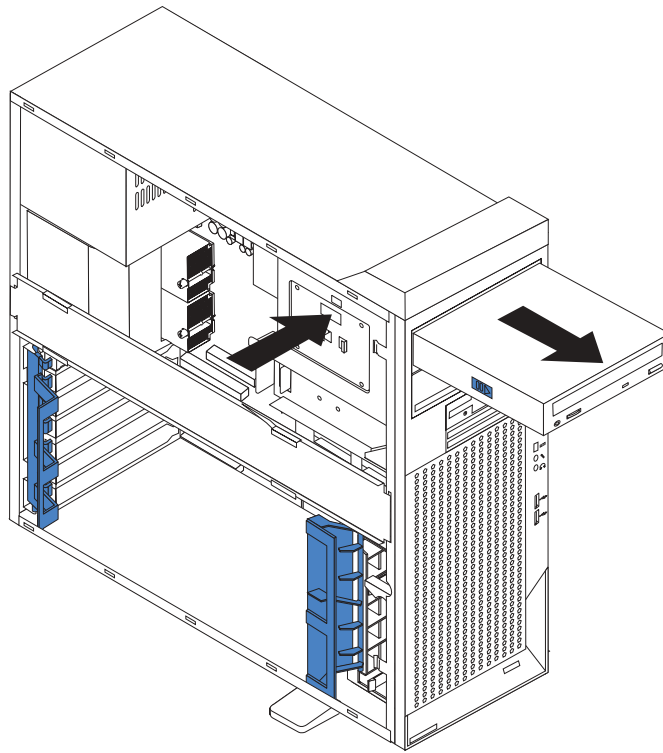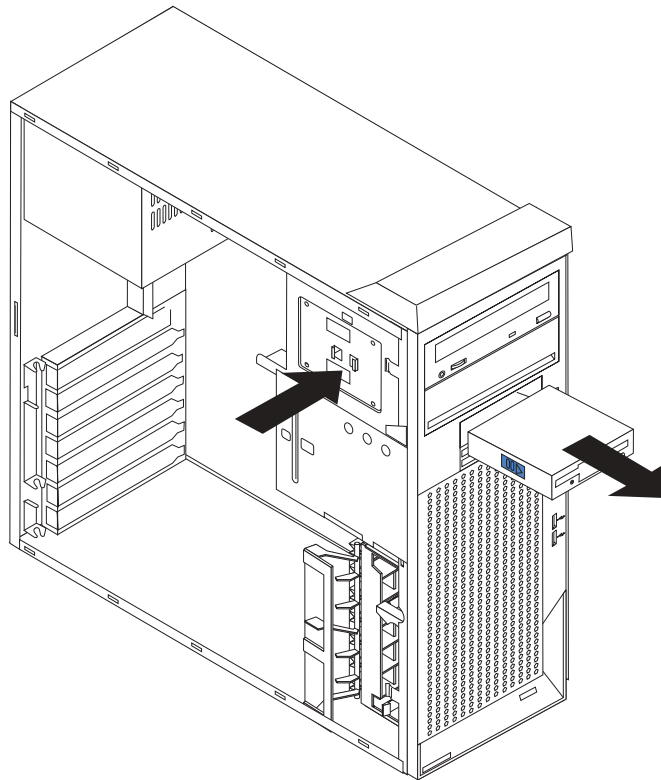

10. Reconnect cables.

System board and extender card

Before you begin:
- Read "Safety information" on page 129.
- Read "Installation guidelines" on page 31.
- Review the information in "System reliability considerations" on page 31.

Notes:
1. When replacing the system board, you must either update the computer with the latest firmware or restore the pre-existing firmware that the customer provides on a diskette or CD image.
2. For easier access, place the computer on its left side before performing this service procedure. Rotate the feet in toward the computer so they are not detached due to the weight of the computer.

To remove the system board and extender card, complete the following steps:
1. Turn off the computer and all attached devices; then, disconnect all external cables and power cords. See "Turning off the computer" on page 10.
2. Remove the side cover. See "Removing the side cover" on page 52.

3. Remove the front bezel. See "Removing the front bezel" on page 84.

4. Remove the support bracket. See "Removing the side cover" on page 52.

5. Disconnect the cables.

6. Remove the adapters and both adapter retaining brackets (see "Installing an adapter" on page 55).

7. Remove memory modules. See "Installing memory modules" on page 64.

8. Remove the microprocessor. See "Microprocessor/fan-sink assembly" on page 80.

9. Remove the extender-card adapters (see "Installing an adapter" on page 55).

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

11. Remove the screws, and lift the system board and extender card out of the computer.

12. Remove the extender-card screws; then, disconnect the extender card connector from the system board edge connector, and remove the extender card.
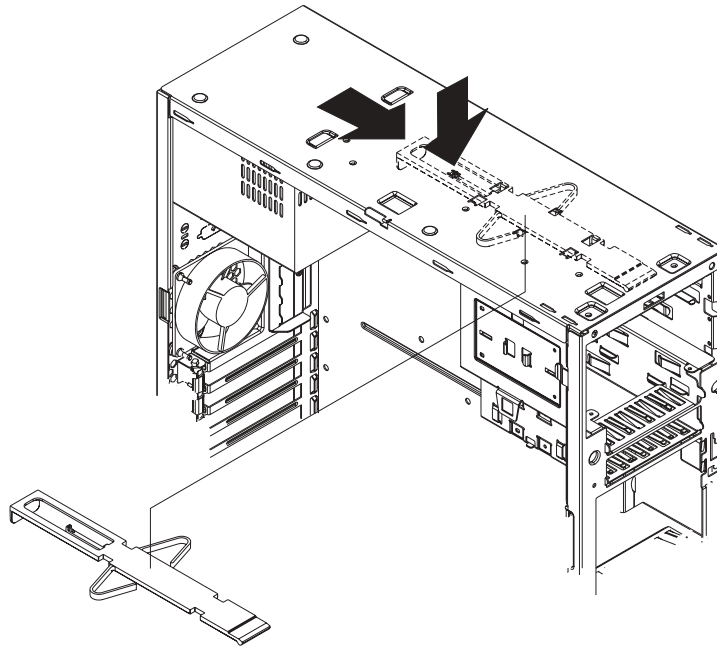

CD-ROM drive

Before you begin:

- Read "Safety information" on page 129.
- Read "Installation guidelines" on page 31.
- Review the information in "System reliability considerations" on page 31.

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

1. Turn off the computer and all attached devices; then, disconnect all external cables and power cords. See "Turning off the computer" on page 10.
2. Remove the side cover. See "Removing the side cover" on page 52.
3. Disconnect the cables.

4. Press the drive retaining tab, gently slide the CD-ROM drive toward the front of the computer, and lift it out.
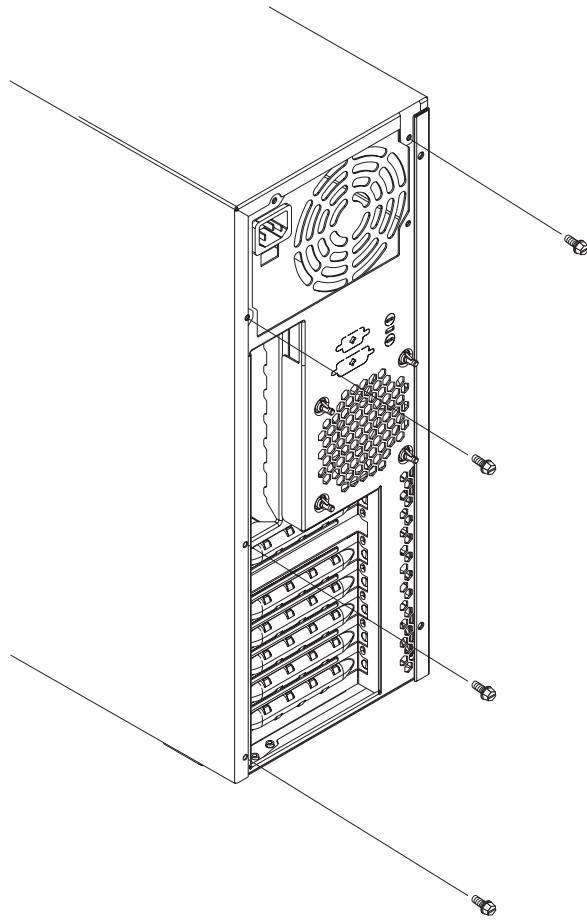

Diskette drive

Before you begin:
- Read "Safety information" on page 129.
- Read "Installation guidelines" on page 31.
- Review the information in "System reliability considerations" on page 31.

To remove the diskette drive, complete the following steps:
1. Turn off the computer and all attached devices; then, disconnect all external cables and power cords. See "Turning off the computer" on page 10.
2. Remove the side cover. See "Removing the side cover" on page 52.
3. Disconnect the cables.
4. Remove the screws from the diskette drive cage.

5. Press the drive retaining tab, gently slide the diskette drive toward the front of the computer, and lift it out.

Bezel-release latch

Before you begin:

- Read "Safety information" on page 129.
- Read "Installation guidelines" on page 31.
- Review the information in "System reliability considerations" on page 31.

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

1. Turn off the computer and all attached devices; then, disconnect all external cables and power cords. See "Turning off the computer" on page 10.
2. Remove the side cover. See "Removing the side cover" on page 52.
3. Remove the front bezel. See "Removing the front bezel" on page 84.
4. Remove the handle assembly. See "Handle assembly" on page 97.
5. Remove the top/side cover. See "Top/side cover" on page 95.
6. Press down on the tab.

7. From the underside, grasp the bezel-release latch in the center, and gently pull it back and away from the computer.

Top/side cover

Before you begin:

- Read "Safety information" on page 129.
- Read "Installation guidelines" on page 31.
- Review the information in "System reliability considerations" on page 31.

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

1. Turn off the computer and all attached devices; then, disconnect all external cables and power cords. See "Turning off the computer" on page 10.
2. Remove the side cover. See "Removing the side cover" on page 52.
3. Remove the front bezel. See "Removing the front bezel" on page 84.
4. Remove the handle assembly. See "Handle assembly" on page 97.
5. Remove the four screws from the back of the computer, and put them in a safe place.

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

# Handle assembly

Before you begin:

- Read "Safety information" on page 129.
- Read "Installation guidelines" on page 31.
- Review the information in "System reliability considerations" on page 31.

To remove the handle cap, complete the following steps:

1. Turn off the computer and all attached devices; then, disconnect all external cables and power cords. See "Turning off the computer" on page 10.
2. Use a flat-blade screwdriver to gently press in and down on the tabs on the interior side wall of the handle.

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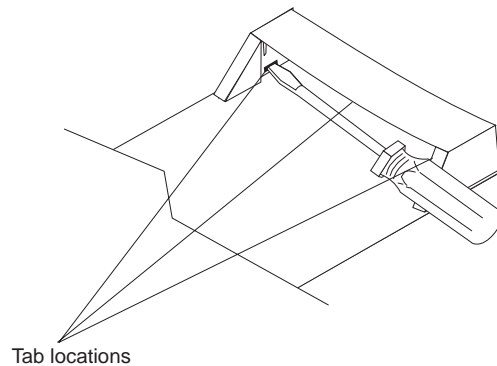
3. Lift up on the handle cap to separate it from the handle support.
4. Turn the computer back to the tower-orientation; then, remove the top handle.
   a. Carefully use a flat-blade screwdriver to push in the tabs inside the plastic cover on the top of the computer; then, remove the plastic cover. Store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

To remove the handle support, complete the following steps:

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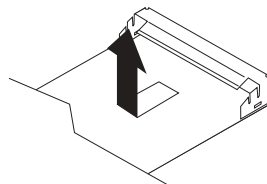
Adapter retainer

Before you begin:

- Read "Safety information" on page 129.
- Read "Installation guidelines" on page 31.
- Review the information in "System reliability considerations" on page 31.

To remove the adapter retainer, complete the following steps:

1. Turn off the computer, if it is on.
2. Disconnect the computer power cord.
3. Remove the side cover. See "Removing the side cover" on page 52.
4. Remove all adapters. See "Installing an adapter" on page 55.
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.
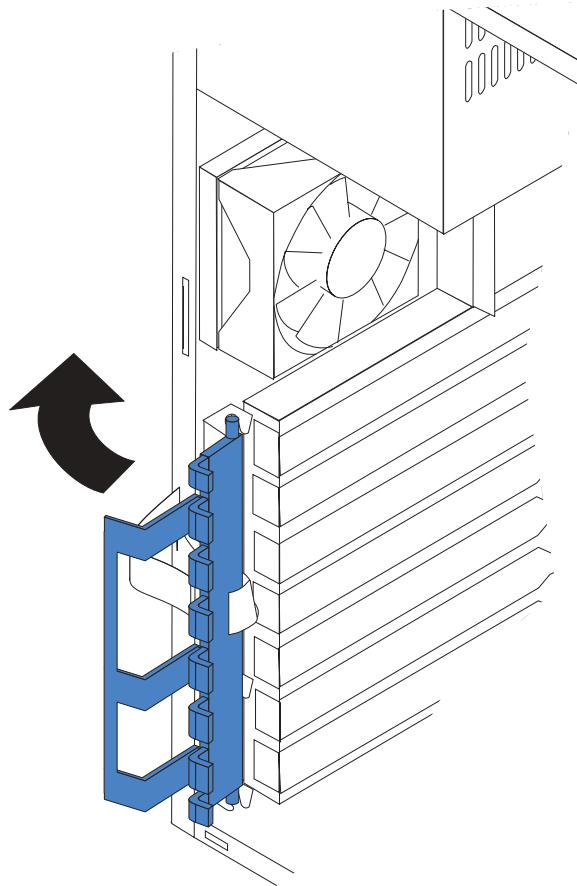
Symptom-to-FRU index

This index supports the IntelliStation M Pro computer.

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 first column in each table 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.

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.
4. 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	• 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 that the computer is functioning correctly.

Beep/symptom	FRU/action
1-1-3 (CMOS write/read test failed.)	1. **Battery** 2. System board
1-1-4 (BIOS EEPROM checksum failed.)	1. **Recover BIOS code.** 2. System board.
1-2-1 (Programmable Interval Timer failed.)	**System board**
1-2-2 (DMA page register test failed.)	**System board**

Beep/symptom	FRU/action
1-2-3 (DMA page register write/read failed.)	**System board**
1-3-1 (First 64K RAM test failed.)	1. **DIMM** 2. Memory adapter
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
2-4-1 (Video failed; screen believed operable.)	**Video card**
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**
3-3-1 (Memory size mismatch occurred.)	1. **DIMM** 2. System board 3. Battery
3-3-2 (Critical SMBUS error occurred, I2C error.)	1. **Disconnect the computer power cord from outlet, wait 30 seconds, and retry.** 2. System board. 3. Microprocessor. 4. DIMMs.
3-3-3 (No operational memory in system.)	1. **Install or reseat the memory modules, and then do a 3-boot reset.** (For more information about a 3-boot reset, see "Using the Configuration/Setup Utility program" on page 11). 2. DIMMs. 3. System board.

No-beep symptoms

No-beep symptom	FRU/action
No beep occurs during POST.	System board
No beep, no video, and the system attention LED (if present) is off.	System board
No beep, no video, and the system attention LED (if supported) is on.	See "Undetermined problems" on page 115.
BIST failed.	Microprocessor

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)	System board
001-XXX-001 (Failed core tests)	System board
001-250-000 (Failed system board ECC)	System board
001-250-001 (Failed system board ECC)	System board
005-XXX-000 (Failed video test)	1. **Video adapter (if installed)** 2. System board
011-XXX-000 (Failed COM1 serial port test)	1. **Check loopback plug connected to externalized serial port.** 2. Check cable from externalized port to system board. 3. System board.
011-XXX-001 (Failed COM2 serial port test)	1. **Check loopback plug connected to externalized serial port.** 2. Check cable from externalized port to system board. 3. System board.
014-XXX-000 (Failed parallel port test)	System board
015-XXX-001 (USB interface not found, board damaged)	System board
015-XXX-198 (USB device connected during USB test.)	1. **Remove USB devices from USB1, USB2, USB3, USB4, and USB5, and USB6; then, run the USB interface test again.** 2. System board.

Error code/symptom	FRU/action
020-XXX-000 (Failed PCI interface test.)	**System board**
030-XXX-00N (Failed SCSI interface test.)	**If N=0, system board; if N>0, SCSI adapter in slot N.**
035-XXX-099 (No adapters were found.)	**If adapter is installed re-check connection.**
035-XXX-S99 (Failed RAID test on PCI slot S. S = number of failing PCI slot.)	1. **RAID adapter** 2. Cable 3. System board
035-XXX-SNN (*s* = number of failing PCI slot, *nn* = SCSI ID of failing fixed disk.)	**Hard disk drive with SCSI ID nn on RAID adapter in PCI slot s**
035-253-S99 (RAID adapter initialization failure.)	1. **ServeRAID™ adapter in slot *s* is not configured properly.** Obtain the basic and extended configuration status and see the *ServeRAID Hardware Maintenance Manual* for more information. 2. Cable. 3. Adapter.
089-XXX-001 (Failed microprocessor test.)	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.)	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.)	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.)	1. **See error text for failing DIMMs.** 2. System board.
202-XXX-001 (Failed system cache test.)	1. **Verify microprocessor 1 is installed and seated correctly.** 2. Verify BIOS code is at latest level. 3. Microprocessor 1. 4. System board.
202-XXX-002 (Failed system cache test.)	1. **Verify microprocessor 2 is installed and seated correctly.** 2. Verify BIOS code is at latest level. 3. Microprocessor 2. 4. System board.
206-XXX-000 (Failed diskette drive test.)	1. **Try test with another diskette.** 2. Cable. 3. Diskette drive. 4. System board.

Error code/symptom	FRU/action
215-XXX-000 (Failed IDE CD-ROM drive test.)	1. **Try test with another CD-ROM.** 2. CD-ROM drive cables. 3. CD-ROM drive. 4. System board.
217-198-XXX (Could not establish drive parameters.)	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.	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.	1. **Fixed disk 2 (hard disk drive 2)** 2. System board
301-XXX-000 (Failed keyboard test.)	1. **Keyboard** 2. System board
302-XXX-000 (Failed mouse test.)	1. **Mouse** 2. System board
405-XXX-000 (Failed Ethernet test on controller on the system board.)	1. **Verify that Ethernet is not disabled in BIOS.** 2. System board.
405-XXX-00N (Failed Ethernet test on adapter in PCI slot *n*.)	1. **For n=0, system board** 2. For n>0, adapter in PCI slot n 3. System board
415-XXX-000 (Failed Modem test.)	1. **Cable** **Note:** Ensure modem is present and attached to computer. 2. Modem 3. System board

Error symptoms

You can use the error-symptom tables 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 19 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 whether 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, reseat the component and replace it if necessary. The most likely cause of the symptom is listed first.

CD-ROM drive problems	
Symptom	**FRU/action**

The CD-ROM drive is not recognized.	1. **Make sure that:**
	  • 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.
	2. Run CD-ROM drive diagnostics.
	3. CD-ROM drive.

The CD is not working correctly.	1. **Clean the CD.** 2. Run CD-ROM drive diagnostics. 3. CD-ROM drive.
The CD-ROM drive tray is not working. (The computer must be turned on.)	1. **Insert the end of a straightened paper clip into the manual tray-release opening.** 2. Run CD-ROM drive diagnostics. 3. CD-ROM drive.

Diskette drive problems	
Symptom	**FRU/action**

The diskette drive activity LED stays lit, or the computer bypasses the diskette drive.	1. **If there is a diskette in the drive, make sure that:**
	  • 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).
	2. To prevent diskette drive read/write errors, make sure that the distance between monitors and diskette drives is at least 76 mm (3 in.).
	3. Run diskette drive diagnostics.
	4. Cable.
	5. Diskette drive.
	6. System board.

General problems	
Symptom	**FRU/action**
A cover lock is broken, an LED is not working, or a similar problem has occurred	**Broken CRU/FRU**

Hard disk drive problems	
Symptom	**FRU/action**
Not all drives are recognized by the hard disk drive diagnostic test (the Fixed Disk test).	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 that you removed with a new one.
The computer stops responding during hard disk drive diagnostic test.	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.

IEEE 1394 (firewire) port problems	
Symptom	**FRU/action**
An IEEE 1394 device does not work.	**Make sure that:** • **The correct IEEE 1394 device driver is installed.** • The operating system supports IEEE 1394 devices.

Intermittent problems	
Symptom	**FRU/action**
A problem occurs only occasionally and is difficult to detect.	1. **Make sure that:** • 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 grille. If there is no airflow, the fan is not working. This causes the computer to overheat and shut down. • The SCSI bus and devices are configured correctly and the last external device in each SCSI chain is terminated correctly. 2. Check the system-error log.

Keyboard, mouse, or pointing-device problems	
Symptom	**FRU/action**
All or some keys on the keyboard do not work.	1. **Make sure that:** • The keyboard cable is securely connected to the computer, and the keyboard and mouse cables are not reversed. • The computer and the monitor are turned on. 2. Keyboard. 3. System board.
The mouse or pointing device does not work.	1. **Make sure that:** • The mouse or pointing-device cable is securely connected to the computer, and 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.	1. **Make sure that:** • The memory modules are seated correctly. • You have installed the correct type of memory. • If you changed the memory, you updated the memory configuration in the Configuration/Setup Utility program. • All banks of memory are enabled. The computer might have automatically disabled a memory bank when it detected a problem, or a memory bank might have been manually disabled. 2. Check POST error log for error message 289: • 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, run the Configuration/Setup Utility program and enable the DIMM. 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 correctly.)	1. **Verify that the microprocessor is seated properly.** 2. Microprocessor.

Monitor problems	
Symptom	**FRU/action**
Testing the monitor.	**See the information that comes with the monitor** for adjusting and testing instructions. (Some IBM monitors have their own self-tests.)

The screen is blank.	1. **Make sure that:**
	• The computer power cord is connected to the computer and a working electrical outlet.
	• The monitor cables are connected correctly.
	• The monitor is turned on and the brightness and contrast controls are adjusted correctly.
	• If the computers are C2T chained together, verify that:
	  – The C2T chain cables are securely connected to the computers.
	  – The C2T breakout cable is connected correctly.
	  – The selected computer is turned on.
	
	Important: In some memory configurations, the 3-3-3 beep code might sound during POST followed by a blank monitor screen. If this occurs and the **Boot Fail Count** feature in the **Start Options** of the Configuration/Setup Utility program is enabled (its default setting), you must restart the computer three times to force the BIOS to reset the configuration settings to the default configuration (memory connector or bank of connectors enabled).
	
	2. If the problem remains, replace:
	  a. Monitor
	  b. Video adapter, if installed
	  c. System board

Only the cursor appears.	See "Undetermined problems" on page 115.

Monitor problems	
Symptom	**FRU/action**

The monitor works when you turn on the computer, but the screen goes blank when you start some application programs.	1. **Make sure that:**
	  • 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 breakout cable.
	  • You have installed the necessary device drivers for the application programs.
	2. If the problem remains, replace the monitor.
	3. Video adapter.
	4. System board.

The monitor has screen jitter, or the screen image is wavy, unreadable, rolling, or distorted.	1. **If the monitor self-tests show that the monitor is working correctly, 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.
	Attention: Moving a color monitor while it is turned on might cause screen discoloration. Move the device and the monitor at least 305 mm (12 in.) apart, and turn on the monitor.
	
	Notes:
	
	  a. To prevent diskette drive read/write errors, make sure that the distance between the monitor 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 marketing representative or authorized reseller.
	2. Monitor.
	3. Video adapter, if installed.
	4. System board.

Wrong characters appear on the screen.	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.	1. **Make sure that the correct computer is selected, if applicable.** 2. Make sure that all cables are locked down.

Option problems	
Symptom	**FRU/action**
An IBM option that was just installed does not work.	1. **Make sure that:** • 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 come 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.	1. **Make sure 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, make sure that: • The cables for all external SCSI options are connected correctly. • The last device in each SCSI chain, or the end of the SCSI cable, is terminated correctly. • Any external SCSI devices are turned on. You must turn on external SCSI devices before turning on the computer. 4. Failing option.

Power problems	
Symptom	**FRU/action**
The power switch does not work and the reset button, if supported, does work.	1. **Reseat the connector.** 2. Power switch card. 3. System board.

The computer does not turn on.	1. **Make sure that:**
	• The power cord is properly connected to the computer and a working electrical outlet.
	• The type of memory that is installed is supported by the computer.
	2. 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.
	3. Override the front-panel power button:
	  a. Disconnect the computer power cords.
	  b. Reconnect the power cords.
	If computer turns on: Operator information panel
	If computer does not turn on: System board
	4. See "Undetermined problems" on page 115.

The computer does not turn off.	1. **Determine whether you are using an ACPI or non-ACPI operating system.** If you are using a non-ACPI operating system:
	  a. Press Ctrl+Alt+Delete.
	  b. Turn off the computer by holding the power-control button for 4 seconds.
	  c. If computer fails during POST and the power-control button does not work, disconnect the ac power cord.
	2. If the problem remains or if you are using an ACPI-aware operating system, replace 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 that are installed.	1. **Make sure that:**
	  • Each port is assigned a unique address in the Configuration/Setup Utility program and none of the serial ports is disabled.
	  • The serial-port adapter, if you installed one, is seated properly.
	2. Failing serial port adapter.

A serial device does not work.	1. **Make sure that:**
	  • 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 69).
	2. Failing serial device.
	3. Serial adapter, if installed.
	4. System board.

Software problem	
Symptom	**FRU/action**

You suspect a software problem.	1. **To determine whether problems are caused by the software, make that:**
	  • 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, the computer 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 computer.
	
	If you received any error messages when using the software, see the information that comes with the software for a description of the messages and suggested solutions to the problem.
	2. If the problem remains, contact your place of purchase of the software.

Universal Serial Bus (USB) port problems	
Symptom	**FRU/action**
A USB device does not work.	**Make sure that:** • You are not trying to use a USB device during POST if a standard (non-USB) keyboard is connected to the keyboard connector. If a standard (non-USB) keyboard is connected to the keyboard connector, 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.)	1. **Run the Configuration/Setup Utility program.** 2. Battery. 3. System board. 4. Microprocessor.

Error code/symptom	FRU/action
101, 102, 106 (System and processor error)	**System board**
151 (Real time clock error)	1. **Run diagnostics.** 2. Battery. 3. System board.
161 (Real time clock battery error)	1. **Run the Configuration/Setup Utility program.** 2. Battery. 3. System board.
162 (Device configuration error) **Note:** Be sure to load the default settings and any additional desired settings; then, *save the configuration*.	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.
184 (Power-on password damaged)	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.
189 (An attempt made to enter the system with invalid passwords)	**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)	**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.
1162 (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.
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
00180700 (PCI device no responding.)	1. **System board** 2. PCI adapter
I9990650 (AC power has been restored)	1. **Check cable.** 2. Check for interruption of power. 3. Power cable.

SCSI error codes

Error code	FRU/action
All SCSI Errors One or more of the following problems might be causing the error: • A failing SCSI device (adapter, drive, controller) • An improper SCSI configuration or SCSI termination jumper setting • Duplicate SCSI IDs in the same SCSI chain • A missing or improperly installed SCSI terminator • A defective SCSI terminator • An improperly installed cable • A defective cable	1. **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.

Temperature error messages

Message	Action
DASD Over Temperature (level-critical; direct access storage device bay *x* was over temperature)	• **Make sure that the computer is being properly cooled**; see "System reliability considerations" on page 31.
DASD Over recommended Temperature (sensor *x*) (level-warning; DASD bay *x* had over temperature condition)	• **Make sure that the computer is being properly cooled**; see "System reliability considerations" on page 31.
DASD under recommended temperature (sensor *x*) (level-warning; direct access storage device bay *x* had under temperature condition)	• **Ambient temperature must be within normal operating specifications**; see "Features and specifications — M Pro Type 6220 (desktop model)" on page 5. or "Features and specifications — M Pro Type 6230 (tower model)" on page 6.
DASD Over Temperature (level-critical; sensor for DASD1 reported temperature over recommended range)	• **Make sure that the computer is being properly cooled**; see "System reliability considerations" on page 31.
Power supply *x* Temperature Fault (level-critical; power supply *x* had over temperature condition)	1. **Make sure that the computer is being properly cooled;** see "System reliability considerations" on page 31. 2. Replace power supply *x*
System board is over recommended temperature (level-warning; system board is over recommended temperature)	1. **Make sure that the computer is being properly cooled**; see "System reliability considerations" on page 31. 2. Replace the system board.
System board is under recommended temperature (level-warning; system board is under recommended temperature)	• **Ambient temperature must be within normal operating specifications**; see "Features and specifications — M Pro Type 6220 (desktop model)" on page 5. or "Features and specifications — M Pro Type 6230 (tower model)" on page 6.
System over temperature for CPU *x* (level-warning; CPU x reporting over temperature condition)	• **Ensure system is being properly cooled;** see "System reliability considerations" on page 31.

Message	Action
System under recommended CPU *x* **temperature** (level-warning; system reporting under temperature condition for CPU x)	**Ambient temperature must be within normal operating specifications**; see "Features and specifications — M Pro Type 6220 (desktop model)" on page 5.

Fan error messages

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

Power error messages

Message	Action
Power supply *x* **current share fault** (level-critical; excessive current demand on power supply *x*)	**Replace power supply *x*.**
Power supply *x* **DC good fault** (level-critical; power good signal not detected for power supply *x*)	**Replace power supply *x*.**
Power supply *x* **temperature fault**	**Replace power supply *x*.**
Power supply *x* **removed**	**No action required - information only**
Power supply *x* **fan fault** (level-critical; fan fault in power supply *x*)	**Replace power supply *x*.**
Power supply *x* **12 V fault** (level-critical; overcurrent condition detected)	**See "Power checkout" on page 27.**
Power supply *x* **3.3 V fault** (level-critical; 3.3 V power supply *x* had an error)	**See "Power checkout" on page 27.**
Power supply *x* **5 V fault** (level-critical; 5 V power supply *x* had an error)	**See "Power checkout" on page 27.**
System running non-redundant power (level-noncritical; system does not have redundant power)	1. **Add another power supply.** 2. Remove options from the computer. 3. The computer can continue to operate without redundancy protection if steps1 and 2 are not followed.
System under recommended voltage for *x* (level-warning; indicated voltage supply under nominal value; value for *x* can be +12, -12, or +5)	1. **Check connections to the power subsystem.** 2. Power supply.

System shutdown

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

Voltage related system shutdown

Message	Action
System shutoff due to *x* current over max value (level-critical; system drawing too much current on voltage *x* bus)	**See "Power checkout" on page 27..**
System shutoff due to *x* V over voltage (level-critical; system shutoff due to *x* supply over voltage)	1. **Check the power-supply connectors** 2. Power supply.
System shutoff due to *x* V under voltage (level-critical system shutoff due to *x* supply under voltage)	1. **Check the power-supply connectors.** 2. Power supply.
System shutoff due to VRM x over voltage	**Replace VRM *x*.**
System shutoff due to excessive (< 240 VA) loading	1. **See "Power checkout" on page 27.** 2. Cycle ac power on and off.

Temperature related system shutdown

Message	Action
System shutoff due to board over temperature (level-critical; board is over temperature)	1. **Make sure that the computer is being properly cooled**; see "System reliability considerations" on page 31. 2. Replace board.
System shutoff due to CPU x over temperature (level-critical; CPU *x* is over temperature)	1. **Make sure that the computer is being properly cooled**; see "System reliability considerations" on page 31. 2. Replace microprocessor.
System shutoff due to CPU x under temperature (level-critical; CPU *x* is under temperature)	**Ambient temperature must be within normal operating specifications;** see "Features and specifications — M Pro Type 6220 (desktop model)" on page 5. or "Features and specifications — M Pro Type 6230 (tower model)" on page 6.
System shutoff due to DASD temperature (sensor *x*) (level-critical; DASD area reported temperature outside recommended operating range)	**Make sure that the computer is being properly cooled**; see "System reliability considerations" on page 31.
System shutoff due to high ambient temperature (level-critical; high ambient temperature)	**Ambient temperature must be within normal operating specifications**; see "Features and specifications — M Pro Type 6220 (desktop model)" on page 5. or "Features and specifications — M Pro Type 6230 (tower model)" on page 6.
System shutoff due to system board under temperature (level-critical; system board is under temperature)	**Ambient temperature must be within normal operating specifications**; see "Features and specifications — M Pro Type 6220 (desktop model)" on page 5. or "Features and specifications — M Pro Type 6230 (tower model)" on page 6.

Hard disk drive checkout

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

Host built-in self test (BIST)

Message	Action
Host fail (level-informational; built-in self-test for the host failed)	1. **Reseat the microprocessor.** 2. Replace the microprocessor.

Bus fault messages

Bus fault messages	Message Action
Failure reading I2C device. Check devices on bus 0.	1. **If an I2C cable is connected between the Remote Supervisor Adapter and the Remote Supervisor Adapter connector, reseat the cable.** 2. DIMMs. 3. System board.
Failure reading I2C device. Check devices on bus 1.	1. **Reseat the I2C cable between the operator information panel and system board (connector CN6).** 2. Operator information panel. 3. System board.
Failure reading I2C device. Check devices on bus 2.	1. **Reseat the cable between the system board and the power supply (connector CN4).** 2. Power supply. 3. System board.
Failure reading I2C device. Check devices on bus 3.	1. **Reseat the cable between the hard disk drive backplane and connector on the system board.** 2. Hard disk drive backplane. 3. System board.
Failure reading I2C device. Check device on bus 4.	**System board**

Undetermined problems

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

Notes:

1. Damaged data in CMOS memory 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 that the power supplies are working correctly, complete the following steps:

1. Turn off the computer.
2. Make sure that 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))

   The following minimum configuration is required for the computer to operate:
   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 following order:
   - 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 the computer passes all the system tests, suspect a network cabling problem external to the computer.

Problem determination tips

Because of the variety of hardware and software combinations that can you can encounter, 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 drive upgrades
- Failure symptom
  - Do diagnostics fail?
  - What, when, where? Single or multiple computers?
  - Is the failure repeatable?
  - Has this configuration ever worked?
  - If it has been working, what changes were made before it failed?
  - 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, computers are considered to be identical only if they:
- Are exactly the same machine type and models
- Have the same BIOS code level

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

Comparing the configuration and software setup between working and nonworking computers will often lead to problem resolution.
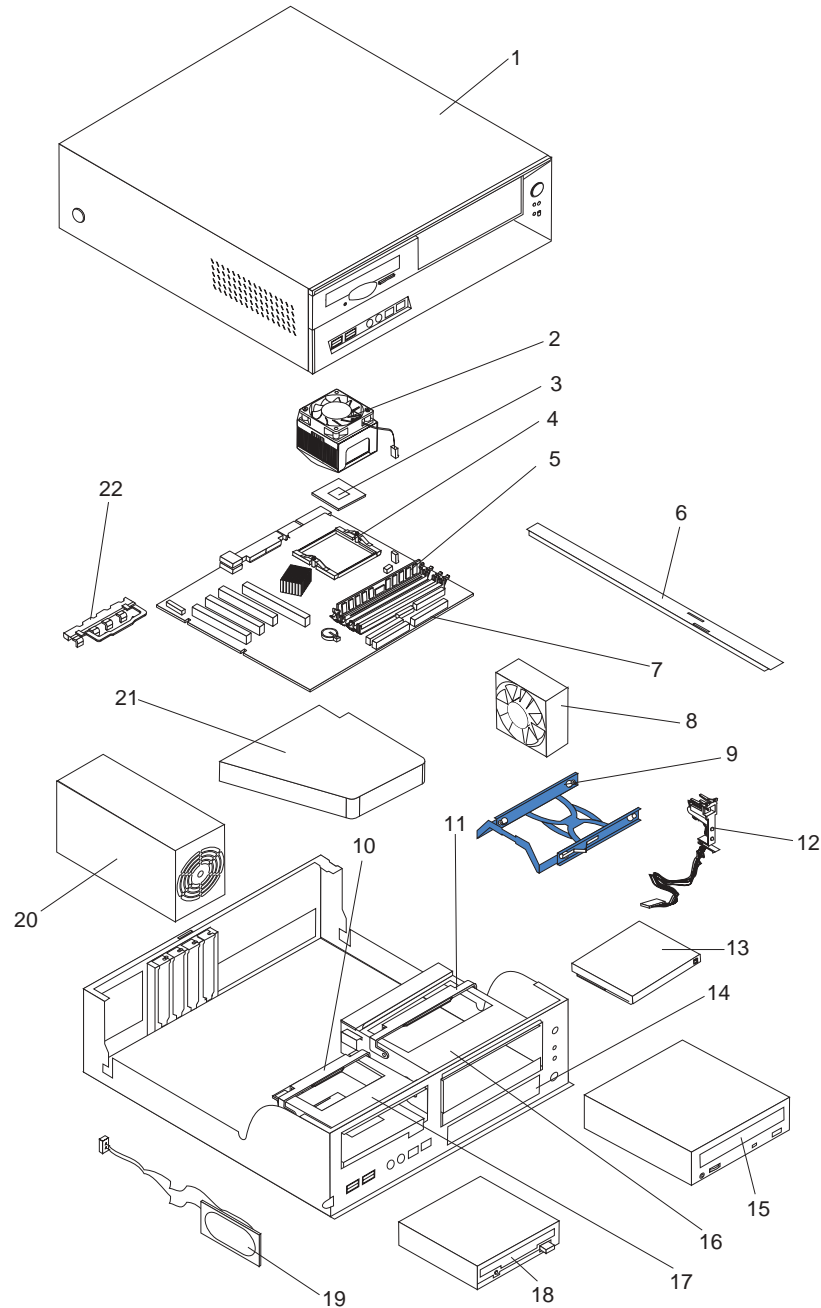
Parts listing for IntelliStation M Pro Type 6220 and 6230 computer

This parts listing supports the IntelliStation M Pro (Type 6220 and Type 6230).

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

Type 6220

Field replaceable units (FRUs) should be serviced only by qualified field service technicians.

Index	System (IntelliStation M Pro, Type 6220, Models 20X, B0X, 24X, B4X, 40X, 50X, 54X, D0X, 44X, D4X, E0X, E4X, 71x, 74x, G4x)	FRU No.	CRU/FRU
1	Cover, top assembly, black (all models)	88P5925	FRU
2	Fan-sink assembly, P4 (all models)	01R3330	FRU
2	Fan-sink assembly, P4 (40x, 44x, D0x, D4x)	23K4714	FRU
3	Microprocessor, 800/2.8 GHz (models 20x, 24x, B0x, D4x)	88P5869	FRU
3	Microprocessor, 800/3.0 GHz	88P5870	FRU
3	Microprocessor, 800/3.2 GHz (models 24x, 44x, D0x, D4x)	23K4904	FRU
3	Microprocessor, 800/3.4 GHz (models 50x, 54x, E0x, E4x)	23K4904	FRU
3	Microprocessor, 800/3.8 GHz (models 71x 74x G4x)	25K9901	FRU
4	Heat-sink retention module (all models)	24P4811	FRU
5	Memory, 256 MB PC2700 ECC (models 20x, 40x, B0x, D0x, 50x, E0x)	06P4060	CRU
5	Memory, 256 MB PC2700 ECC (models 20x, 40x, B0x, D0x, 50x, E0x)	06P4060	CRU
5	Memory, 512 MB PC3200 DDR (models 71x, 74x, G4x)	06P4056	CRU
5	Memory, 512 MB PC3200 DDR (models 54x, E4x)	06P4061	CRU
6	Frame support bracket (all models)	25P5032	FRU
7	System board (50x, 54x, E0x, E4x, 71x, 74x, G4x)	26K3056	FRU
7	System board (20x, B0x, 24x, B4X, 40x, D0x, 44x, D4x, 71x, 74x, G4x)	13M7903	FRU
8	Fan (all models)	22P3635	FRU
9	Hard disk drive tray (all models)	88P5916	CRU
10	Pivot lock handle, 3.5-inch diskette drive (all models)	24P9876	FRU
11	Pivot lock handle, 5.25-inch CD-ROM drive (all models)	24P9877	FRU
12	Operator information panel assembly (all models)	37L5092	FRU
13	Hard disk drive, 18.2 SCSI	19K1485	FRU
13	Hard disk drive, 40 GB (models 20x, 40x, B0x, D0x)	19K1568	CRU
13	Hard disk drive, SATA (models 24x, 44x, B4x, D4x, 54x, E4x)	71P7293	CRU
14	Chassis (all models)	88P5924	FRU
15	CD-ROM drive, 48X, primary (all models)	33P3203	CRU
15	CD-ROM drive, 48X, XP, alternate (all models)	33P3207	CRU
15	CD-ROM drive, 48X, Samsung, alternate (all models)	33P3211	CRU
16	Bracket, 5.25 CD-ROM drive (all models)	24P9875	FRU
17	Bracket, 3.5 diskette drive (all models)	24P9874	FRU
18	Diskette drive, 3.5-inch 1.44, primary (all models)	75H9550	FRU
18	Diskette drive, 3.5-inch 1.44 3-mode (J models only)	19K1543	FRU
18	Diskette drive, 3.5-inch 1.44, alternate (all models)	06P5229	FRU
19	Speaker (all models)	00N5151	FRU
20	Power supply, 200 W, PFC (all models)	74P4306	FRU
21	Baffle (all models)	49P0163	FRU
22	Adapter retention latch (all models)	24P9869	FRU
	Adapter, SCSI	06P2215	FRU
	Air duct without fan (all models except 40x, 44x, D0x, D4x)	73P6069	CRU
	Bezel kit, black (all models)	88P5923	CRU
	Cable, C2 security (all models)	09K9827	CRU
	Cable, CD-ROM drive IDE cable, 1-drop (models 24x, 44x, B4x, D4x, 54x, E4x, 71x, 74x, G4x)	24P9872	CRU
	Cable, CD-ROM drive audio (all models)	75H9219	FRU
	Cable, diskette drive (all models)	24P9871	FRU
	Cable, dual USB (all models)	49P4365	FRU
	Cable, dual VGA pigtail (all models)	48P7586	FRU
	Cable, front audio (all models)	49P1933	FRU
	Cable, IDE 1-drop, primary (models 20x, 40x, B0G, D0G)	88P8178	CRU
	Cable, IDE 2-drop (models 20x, 40x, B0G, D0G)	88P8176	CRU
	Cable, LED/hard disk drive	76H7344	FRU
	Cable, power/LED assembly	37L4985	FRU
	Cable, SATA (models 24x, 44x, B4x, D4x, 54x, E4x, 71x, 74x, G4x)	88P5927	CRU
	Cable, SATA 2-drop (models 20x, 40x, BoG, D0G, 50x, E0x)	88P8176	CRU

Index	System (IntelliStation M Pro, Type 6220, Models 20X, B0X, 24X, B4X, 40X, 50X, 54X, D0X, 44X, D4X, E0X, E4X, 71x, 74x, G4x)	FRU No.	CRU/FRU
	Cable, SATA 1-drop (models 20x, 40x, BoG, D0G, 50x, E0x)	88P8176	CRU
	Cable, SCSI 1-drop	24P9873	FRU
	Diskette drive pivot lock	24P9876	FRU
	Fan bracket assembly (models 40x, 44x, D0x, D4x)	88P5921	CRU
	Front audio card (all models)	49P1752	FRU
	Hard disk drive mounting kit (all models)	73P9577	CRU
	Hard disk drive pivot lock	24P9877	FRU
	Heat sink retention module (all models)	24K4811	FRU
	I/O cam bracket (all models)	24P9869	FRU
	Line cord (all models	69P2301	CRU
	Link bracket (all models)	88P5918	FRU
	Nameplate, M Pro (all models)	89P7698	CRU
	Video adapter, Quadro4 580XGL (models 20x, 40x, B0x, D0x, 54x, E4x, 71x, 74x, G4x)	59P5041	CRU
	Video adapter, Quadro4 280NVS (models 24x, 44, B4x, D4x, 50x, E0x, 71x)	59P4994	CRU
	Rail, hard disk drive, 10000 RPM	23P1328	FRU
	Rail, hard disk drive, 7200 RPM	19K5331	FRU
	Stand, black (all models)	88P5917	FRU
	System service label (all models)	88P8461	CRU
	System service label (all models)	89P7695	CRU
	Foot, bottom, black (4) (all models)	03K9655	FRU
	Miscellaneous hardware kit (contains: M3x5 screws (4); M3.5 machine screws (6); M3.5 thread rolling screws (7); fan isolation mounts (4); key holder (1); system board spacer (2); I/O blank bracket (2); I/O EMC 2-position shield (1)) (all models)	24P9878	CRU
	Screw kit (all models)	00N3517	FRU
	Mouse assembly (all models)	76H6620	CRU
	Keylock (all models)	88P5919	FRU
	Keylock (all models)	88P5920	CRU
	EMC shield 5.25 (all models)	22P1013	FRU
	EMC shield 3.25 (all models)	89P7700	FRU
	Battery, 3.0 V (all models)	33F8354	FRU
	Power cord (all models)	93F2364	FRU

Type 6230

This parts listing supports the IntelliStation M Pro Type 6230.

System, IntelliStation M Pro, Type 6230, Models 13Z, 20X, B0X, 25X, B5X, 27X, B7X, 33X, 34X, C4X, 35Z, 36X, C6X, 38X, C8X, 39X, 41X, 51x, 52x, 55x, 56X, 58X, 59X, D1X, 46X, D6X, 49X, D9X, E1X, E2X, E6X, E8X, E9X, 5PU

Index	5PU	FRU No.	CRU/FRU
1	Chassis (all models)	59P8524	FRU
2	CD-ROM drive, 48X, primary (models 20x, 25x, 41x, B0x, B5x, D1x)	33P3203	CRU
2	CD-ROM drive, 48X XP, alternate (models 20x, 25x, 41x, B0x, B5x, D1x)	33P3207	CRU
2	CD-ROM drive, 48X Samsung, alternate (models 20x, 25x, 41x, B0x, B5x, D1x)	33P3211	CRU
3	5.25 EMC shield (all models)	32P8503	FRU
4	3.5 EMC shield (all models)	32P8501	FRU
5	Bezel kit (all models) • Filler bezel (2) • Blank bezel (2)	00N7082	CRU
6	Hard disk drive, 40.0 GB IDE (models 20x, 27x, 34x, B0x, B7x, C4x)	19K1568	CRU
6	Hard disk drive, 36.4 GB 10K RPM Ultra320 SCSI (models 25x, 36x, 38x, 39x, 49x, B5x, C6x, C8x, C9x, D9x)	24P3704	CRU
6	Hard disk drive, 80 GB SATA (models 41x, 46x, D1x, D6x, 51x, E1x, 71x, 74x, G4x)	71P7293	CRU
7	Front bezel (all models)	49P1966	FRU
8	EMC plate (all models)	32P8505	FRU
9	Hard disk drive cage assembly (all models)	19K4931	FRU
9	Hot-swap drive cage (models 2Ax, 3Ax, 4Ax, 5Ax)	32P8507	FRU
10	Front adapter support (all models)	19K4936	FRU
11	Extender card, SCSI	24P7526	CRU
11	Extender card, IDE (models 20x, 27x, 34x, 41x, 46x, B0x, B7x, C4x, D1x, D6x)	22P9768	CRU
12	Frame-support bracket (all models)	19K4963	CRU
13	Cover, side/top (all models)	49P1965	FRU
14	Memory, 256 MB PC2700 DDR DIMM (20x, B0x, 25x, 27x, 34x, 38x, 41x, B5x, B7x, C4x, C8x, D1x)	06P4060	CRU
14	Memory, 512 MB 166 MHz DDR DIMM (36x, 38x, 39x, 46x, 49x, C6x, C9x, D6x, D9x)	06P4061	CRU
14	Memory, 256 MB 3200 DDR DIMM (71x, 74x, G4x)	06P4056	CRU

System, IntelliStation M Pro, Type 6230, Models 13Z, 20X, B0X, 25X, B5X, 27X, B7X, 33X, 34X, C4X, 35Z, 36X, C6X, 38X, C8X, 39X, 41X, 51x, 52x, 55x, 56X, 58X, 59X, D1X, 46X, D6X, 49X, D9X, E1X, E2X, E6X, E8X, E9X, 5PU

Index		FRU No.	CRU/FRU
14	Memory, 512 MB 3200 DDR DIMM (55x, 56x, 58x, 59x, E6x, E8x, E9x)	06P4057	CRU
15	Heat sink/fan assembly (all models)	01R3330	FRU
16	Microprocessor, 800/2.8 GHz (models 20x, 25x, 27x, B0x, B5x, B7x, 2PU)	88P5869	FRU
16	Microprocessor, 800/3.0 GHz (models 34x, 36x, 38x, 39x, C4x, C6x, C8x, C9x, 3PU)	88P5870	FRU
16	Microprocessor, 800/3.2 GHz (models 41x, 46x, 49x, D1x, D6x, D9x, 4PU)	88P5871	FRU
16	Microprocessor, 800/3.4 GHz (models 51x, 52x, 55x, 56x, 58x, 59x, E1x, E2x, E6x, E8x, E9x, 5PU)	26K8665	FRU
17	System board (51x, 52x, 55x, 56x, 58x, 59x, E1x, E2x, E6x, E8x, E9x, 5PU, 71x, 74x, G4x)	26K3056	FRU
17	System board (all except 51x, 52x, 55x, 56x, 58x, 59x, E1x, E2x, E6x, E8x, E9x, 5PU)	26K4383	FRU
18	Rear adapter-retaining bracket (all models)	19K4945	FRU
19	Fan 80mm (all models)	59P2572	FRU
	Adapter, front audio (all models)	49P1752	CRU
	Adapter, video Q4980XGL (models 27x, 38x, B7x, C8x, 58x, E8x)	59P4991	CRU
	Adapter, video Q4 280NVS (8x) (models 20x, 41x, B0x, D1x, 51x, E1x)	59P4994	CRU
	Adapter, video Q4 580NVS (8x) (models 25x, 34x, B5x, C4x, 74x, G4x)	59P5041	CRU
	Adapter, video Q5 1000FX (models 36x, 46x, C6x, D6x)	71P8380	CRU
	Adapter, video NV35 NVIDIA FX 3000 (models 39x, 49x, C9x, D9x, 59x, E9x)	71P8522	CRU
	Adapter, video NVIDIA Q FX 500 (models 52x, E2x)	73P9607	CRU
	Adapter, video NVIDIA Q FX 1100 (models 55x, 56x, E6x)	73P9613	CRU
	Battery (all models)	33F8354	CRU
	Bezel (all models)	59P4791	FRU
	Bezel blanks kit (all models) • Plug, front • Plug, USB	00N7082	CRU
	Bezel door assembly (all models)	49P1964	FRU
	Cable, 4-drop SCSI (models 25x, 33x, 36x, 38x, 39x, 49x, B5x, C6x, C8x, C9x, 2PU, 3PU, 4PU, 5PU, 56x, E6x, 58x, E8x, 58x, E9x)	59P2614	CRU
	Cable, hard disk drive, ATA66 2-drop (all models)	37L5098	FRU
	Cable, hard disk drive (models 41x, 46x, D1x, D6x, 51x, E1x, 71x, 74x, G4x)	88P5927	FRU
	Cable, C2 switch (all models)	09K9827	CRU
	Cable, audio, CD-ROM drive (all models)	75H9219	FRU
	Cable, diskette drive (all models)	76H4228	FRU
	Cable, front audio (all models)	49P1933	FRU
	Cable, IEEE 1394 rear (models 27x, 36x, 38x, 39x, 41x, 46x, 49x, B7x, C6x, C8x, C9x, D1x, D6x, D9x, E1x, 56x, E6x, 58x, E8x, 59x, E9x)	73P9575	CRU
	Cable, IEEE 1394 front (models 27x, 36x, 38x, 39x, 41x, 46x, 49x, B7x, C6x, C8x, C9x, D1x, D6x, D9x, 51x, E1x, 56x, E6x, 58x, E8x, 59x, E9x)	73P9576	CRU
	Cable, dual USB (all models)	49P4365	CRU
	Cable, SATA 18-in	99P5927	CRU
	Cable, video with tailstock (all models)	02R0814	FRU
	Cable, pigtail LFH-60 to dual D-15 (models 20x, 25x, 34x, 41x, B0x, B5x, C4x, D1x, 51x, E1x)	48P7586	CRU
	Card guide assembly (all models)	19K4947	FRU
	CD-RW drive (models 27x, 34x, 36x, 38x, 39x, 46x, 49x, B7x, C4x, C6x, C8x, C9x, D6x, D9x, 51x, E1x, 56x, E6x, 58x, E8x, 59x, E9x)	33P3289	CRU
	CD-RW drive (models 27x, 34x, 36x, 38x, 39x, 46x, 49x, B7x, C4x, C6x, C8x, C9x, D6x, D9x, 51x, E1x, 56x, E6x, 58x, E8x, 59x, E9x)	33P3293	CRU
	CD-RW drive (models 27x, 34x, 36x, 38x, 39x, 46x, 49x, B7x, C4x, C6x, C8x, C9x, D6x, D9x, 51x, E1x, 56x, E6x, 58x, E8x, 59x, E9x)	71P7347	CRU

System, IntelliStation M Pro, Type 6230, Models 13Z, 20X, B0X, 25X, B5X, 27X, B7X, 33X, 34X, C4X, 35Z, 36X, C6X, 38X, C8X, 39X, 41X, 51x, 52x, 55x, 56X, 58X, 59X, D1X, 46X, D6X, 49X, D9X, E1X, E2X, E6X, E8X, E9X, 5PU	FRU No.	CRU/FRU
Index		
CD-RW drive (models 27x, 34x, 36x, 38x, 39x, 46x, 49x, B7x, C4x, C6x, C8x, C9x, D6x, D9x, 51x, E1x, 56x, E6x, 58x, E8x, 59x, E9x)	71P7349	CRU
Cover assembly, power/LED/USB/audio/1394 (all models)	49P1967	FRU
Diskette drive, two-mode (all models)	06P5227	CRU
Diskette drive, two-mode (all models)	33P3327	CRU
Diskette drive, 2-mode (all models)	76H4091	CRU
Dongle (models 27x, 36x, 38x, 39x, 46x, 49x, B7x, C6x, C9x, D6x, D9x, 56x, E6x, 58x, E8x, 59x, E9x)	09N3435	FRU
Edge retainer (all models)	73P9578	FRU
EXT CD (models 25x, 36x, 38x, 39x, 49x, B5x, C6x, C8x, C9x, D9x)	24P7540	FRU
Fan 60 mm (models 2Ax, 3Ax, 4Ax, 5Ax)	59P8495	CRU
Feet, system kit (all models)	59P8537	FRU
Feet (all models)	01N2196	FRU
Handle cap (all models)	49P1968	FRU
IEEE 1394 paddle card (models 27x, 36x, 38x, 39x, 41x, 46x, 49x, B7x, C6x, C8x, C9x, D1x, D6x, D9x)	24P7526	CRU
Diskette drive cable (all models)	03K9340	FRU
Hard disk drive backplane (models 2Ax, 3Ax, 4Ax, 5Ax)	00N8953	FRU
Hard disk drive mounting kit	73P9577	CRU
Hard disk drive slim blank bezel (all models)	00N7259	CRU
Hard disk drive rail (all models)	23P1328	CRU
Hard disk drive tray assembly (all models)	73P9577	FRU
Cable, hot-swap kit (models 2Ax, 3Ax, 4Ax, 5Ax) • Power jumper cable (1) • I2C cable (1)	06P5850	CRU
Keylock assembly (all models)	24P1751	FRU
Keylock, random (all models)	49P1970	FRU
Kit, nameplates (all models)	59P8525	FRU
Line cord (1.8M)	69P2301	FRU
Lock assembly (all models)	73P9548	FRU
Lock bar (all models)	24P1746	FRU
Mechanical shell (all models)	73P9581	FRU
Microprocessor retention clip (all models)	49P1956	FRU
Miscellaneous hardware kit (all models) • 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)	09N5764	CRU
Mouse, 3-button (all models)	76H6620	CRU
Control panel assembly (all models)	24P2621	FRU
Power button kit (all models)	19K4940	FRU
Power/LEDs holder assembly (all models)	59P8500	FRU
Power supply, 340 watt (all models)	74P4321	FRU
Power supply, 340 watt (all models)	74P4433	FRU
Release bar (all models)	59P4791	FRU
Retainer, cards I/O edge with AGP support	73P9578	FRU

System, IntelliStation M Pro, Type 6230, Models 13Z, 20X, B0X, 25X, B5X, 27X, B7X, 33X, 34X, C4X, 35Z, 36X, C6X, 38X, C8X, 39X, 41X, 51x, 52x, 55x, 56X, 58X, 59X, D1X, 46X, D6X, 49X, D9X, E1X, E2X, E6X, E8X, E9X, 5PU	FRU No.	CRU/FRU
Retainer kit	73P9582	FRU
Retention module, 533 FSB (all models)	71P8107	FRU
Microprocessor retention clip	49P1956	CRU
Heat sink retention module (all models)	24P4811	CRU
Speaker assembly (all models)	19K4929	FRU
Support/cam bracket assembly	19K4963	FRU
Support handle (all models)	49P1969	CRU
System service label (all models)	02R0843	CRU
Switch (all models)	09N8012	FRU
Power cord (all models)	93F2364	CRU

(Index column header appears to the left of the first row.)

Recovery CD, Type 6220 and 6230

Recovery CD (IntelliStation M Pro, Type 6220, Models 20X, B0X, 24X, B4X, 40X, D0X, 44X, D4X and IntelliStation M Pro, Type 6230, Models 20X 22X 30X 32X 35X 40X 42X 45X 50X 52X 54X 55X 60X 63X 64X 65X 2PU 3PU 4PU 5PU 6PU B0X B2X C0X C2X C5X D0X D2X D5X E0X E2X E4X E5X F0X F3X F4X F5X)	FRU No.
International English, Windows XPP (A, G, H. U models)	88P8916
International French, Windows XPP (F, G models)	88P8917
International German, Windows XPP (G models)	88P8918
Italian, Windows XPP (G models)	88P8919
International Spanish, Windows XPP (G models)	88P8920
Dutch, Windows XPP (G models)	88P8921
Danish, Windows XPP (G models)	88P8922
Norwegian, Windows XPP (G models)	88P8923
Swedish, Windows XPP (G models)	88P8924
Finnish, Windows XPP (G models)	88P8925
Japanese, Windows XPP (J models)	88P8926
Korean, Windows XPP (K models)	88P8927
Chinese, IIPC, Windows XPP (C models)	88P8928
Chinese, Hong Kong, Windows XPP (B models)	88P8929
Chinese, Taiwan, Windows XPP (V models)	88P8930

Keyboards

Keyboard	FRU No.
US English	89P8300
Arabic	89P8301
Belgium/French	89P8302
Belgium/UK	89P8303
Brazilian Portuguese	89P8304
Bulgarian	89P8305
Chinese/US	89P8306
Czech	89P8307
Danish	89P8308
Dutch	89P8309
French	89P8310
French Canadian (445)	89P8311
French Canadian (058)	89P8312

Keyboard	FRU No.
German	89P8313
Greek	89P8314
Hebrew	89P8315
Hungarian	89P8316
Iceland	89P8317
Italy	89P8319
Japanese	89P8320
Korean	89P8321
LA Spanish	89P8322
Norwegian	89P8323
Polish	89P8324
Portuguese	89P8325
Romanian	89P8326
Russian	89P8327
Serbian/Cyrillic	89P8329
Slavic	89P8330
Spanish	89P8331
Swedish/Finn	89P8332
Swiss, French/German	89P8333
Thailand	89P8334
Turkish	89P8335
Turkish	89P8336
UK English	89P8337
US English-EMEA	89P8338
Yugosl/Lat	89P8339

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
6952301	Bahamas, Barbados, Bermuda, Bolivia, Brazil, Canada, Cayman Islands, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Japan, Korea (South), Liberia, Mexico, Netherlands Antilles, Nicaragua, Panama, Peru, Philippines, Saudi Arabia, Suriname, Taiwan, Trinidad (West Indies), United States of America, Venezuela

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

This 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 computers during and after maintenance.
- When lifting any heavy object:
  - Make sure that you can stand safely without slipping.
  - Distribute the weight of the object equally between your feet.
  - Use a slow lifting force. Never move suddenly or twist when you attempt to lift.
  - 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 computer, make sure 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 computer.
- 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 computer. Make sure 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 computer 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 that are 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 disconnect 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 computer, disconnect the power cord. If you cannot disconnect it, ask the customer to power off the wall box that supplies power to the computer and to lock the wall box in the off position.
- If you need to work on a computer 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 this rule, you can 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 units or similar units with the power on when they are removed from their normal operating places in a computer:
  – Power-supply units
  – Pumps
  – Blowers and fans
  – Motor generators

  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, has required safety items that were 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 that are 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:
   a. A third-wire ground connector must be 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 must be the applicable 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. Make sure 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 you are 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 preferable 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 connector 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
- Japanese
- Korean
- Spanish

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

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

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

Statement 1:

DANGER

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

To avoid a shock hazard:

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

To Connect:	To Disconnect:
1. Turn everything OFF.	1. Turn everything OFF.
2. First, attach all cables to devices.	2. First, remove power cords from outlet.
3. Attach signal cables to connectors.	3. Remove signal cables from connectors.
4. Attach power cords to outlet.	4. Remove all cables from devices.
5. Turn device ON.	

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 drives, fiber optic devices, or transmitters) are installed, note the following:

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

DANGER

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

Statement 4:
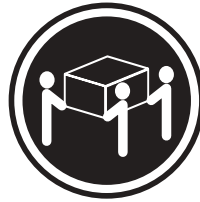
≥ 18 kg (39.7 lb)   ≥ 32 kg (70.5 lb)   ≥ 55 kg (121.2 lb)
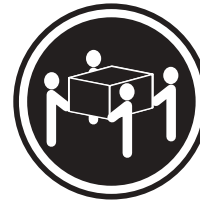
CAUTION:
Use safe practices when lifting.

Statement 5:

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

Statement 8:

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

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

Statement 23

CAUTION:
Do not place any object weighing more than 50 kg (110 lb) on top of rack-mounted devices.

>50 kg (110 lb)

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.

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.*

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 destm 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 essm 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 estm 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 móídulo com uma bateria de lítio, substitua-o apenas pelo mesmo tipo de mídulo, do mesmo fabricante. A bateria contém lítio e pode explodir se não for utilizada, manuseada e descartada de maneira correta.

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

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

Instrução 3

⚠️

PRECAUCIÓN:

Quando produtos a laser (unidades de CD-ROM, unidades de DVD, dispositivos de fibra ítica, transmissores, etc.) estiverem instalados, observe o seguinte:
*   Não remova as tampas. A remoção das tampas de um produto a laser pode resultar em exposição prejudicial à radiação de laser. Nenhuma peça localizada no interior do dispositivo pode ser consertada.
*   A utilização de controles ou ajustes ou a execução dm procedimentos diferentes dos especificados aqui pode resultar em exposição prejudicial à radiação.

PERIGO

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

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

Instrução 4
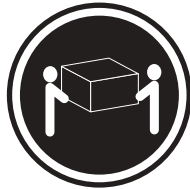
≥18 kg (37 lbs)   ≥32 kg (70.5 lbs)   ≥55 kg (121.2 lbs)

CUIDADO:

Ao levantar a máquina, faça-o com segurança.

Instrução 5

CUIDADO:

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

CUIDADO:

Instrução 8

CUIDADO:

Nunca remova a tampa de uma fonte de alimentação ou de qualcuer peça que tenha esta etiqueta afixada.

Níveis perigosos de voltagem, corrente e energia estão presentes em qualquer componente que tenha esta etiqueta afixada. Nenhuma peça localizada no interior desses componentes pode ser consertada. Se você supeitar de algum problema em alguma dessas peças, entre em contato com um técnico IBM.

Instrução 23

CUIDADO:

Não coloque nenhum objeto com peso superior a 50 kg (110 lbs.) sobre dispositivos montados em rack.

>50 kg (110 lbs)

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

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

警告：
抬起时请采用安全操作方法。

声明 5

警告：

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

2

1
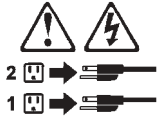
声明 6

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 8：

警告：
切勿卸下电源或附有以下标签的任何部件的外盖。

任何附有此标签的组件内部都存在危险电压、电流和能级。这些组件内部没有可维修的部件。
如怀疑某一此类部件有问题，请联系服务技术人员。

声明 23

警告：

机柜安装的设备上面不能放置重于 50kg（110 磅）的物品。

> 50 kg (110 磅)

重要資訊：

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

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

執行任何指示之前，請詳讀所有「注意」及「危險」的聲明。

聲明 1
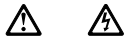
危險

電源、電話及通信電纜上所產生的電流均有危險性。

欲避免電擊危險：

－在雷雨期間，請勿連接或切斷本產品上的任何電纜線，或安裝、維修及重新架構本產品。
－請將電源線接至接線及接地正確的電源插座。
－請將本產品隨附的設備連接至接地正確的插座。
－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，請勿開啟該設備的電源。
－在安裝及架構之時，若非非常熟悉，在開啟裝置蓋子之前，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，或開啟其蓋子時，請依照下表中「連接」及「切斷」電纜線的步驟執行。

連接：	切斷：
1. 關閉所有開關。	1. 關閉所有開關。
2. 先將所有電纜線接上裝置。	2. 先自電源插座拔掉電源線。
3. 將信號電纜接上接頭。	3. 按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. 開啟裝置的電源。	

聲明 2

注意：
更換鋰電池時，只可使用 IBM 零件編號 33F8354 的電池，或製造商建議之相當類型的電池。若系統中具有包含鋰電池的模組，在更換此模組時，請使用相同廠商製造的相同模組類型。如未正確使用、處理或丟棄含有鋰的電池時，可能會引發爆炸。

請勿將電池：
－ 丟入或浸入水中
－ 加熱超過 100 ℃ (212 ℉)
－ 修理或拆開

請遵照當地法令規章處理廢棄電池。

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。

2
1

聲明 8：

注意：
嚴禁移除電源供應器的外殼，或任何貼有下列標籤的組件。

貼有此標籤的元件內均有危險的電壓、電流及能源。這些元件中沒有需要
維修的組件。若您懷疑上述組件有問題時，請與服務人員聯絡。

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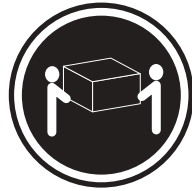
≥18 kg (37 lbs)   ≥32 kg (70.5 lbs)   ≥55 kg (121.2 lbs)

ATTENTION:

Faites-vous aider pour soulever cm 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° 8

ATTENTION:

N'ouvrez jamais le bloc d'alimenation ou tout élément sur lequel est apposée l'étiquette ci-dessous.

Des tension et des courants dangereux sont présents à l'intérieur de tout composant sur lequel est apposée cette étiquette. Ces éléments ne peuvent pas être réparés. Si vous pensez qu'ils peuvent être à l'originè d'un incident, prenez contact avec un technicien de maintenance.

Notice n° 23

ATTENTION:

Ne posez pas d'objet dont le poids dépasse 50 kg sur les unités montées en armoire.

>50 kg

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

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
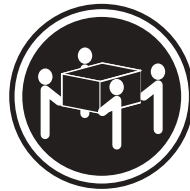
≥18 kg   ≥32 kg   ≥55 kg

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 8

ACHTUNG:
Die Abdeckung oder eine Komponente eines Nezteils, die wie nachfolgend aufgeführt gekennzeichnet ist, darf keinesfalls entfernt werden.

In Komponenten, die so gekennzeichnet sind, können gefährliche Spannungen anliegen. In diesen Komponenten sind keine Teile vorhanden, die vom Benutzer gewartet werden müssen. Besteht der Verdacht, daß an einem dieser Teile ein Fehler aufgetreten ist, ist ein IBM Kundendiensttechniker zu verständigen.

Hinweis 23

ACHTUNG:

Keine Gegenstände, die mehr als 50 kg wiegen, auf Rack-Einheiten ablegen.

>50 kg

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 nellm procedure di installazione e configurazione.
- Collegare e scollegare i cavi come descritto nella seguente tabella quando si effettuano l'installazione, la rimozione o l'apertura dei coperchi di questo prodotto o delle unità collegate.

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

Avviso 2

ATTENZIONE:

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

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

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

Avviso 3

ATTENZIONE:

Quando si installano prodotti laser come, ad esempio, le unità DVD, CD-ROM, a fibre ottiche o trasmettitori, prestare attenzione a quanto segue:
- Non rimuovere i coperchi. L'apertura dei coperchi di prodotti laser può determinare l'esposizione a radiazioni laser pericolose. All'interno delle unità non vi sono parti su cui effettuare l'assistenza tecnica.
- L'utilizzo di controlli, regolazioni o l'esecuzione di procedure non descritti nel presente manuale possono provocare l'esposizione a radiazioni pericolose.

PERICOLO

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

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

Avviso 4
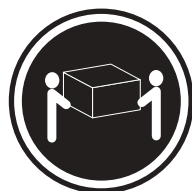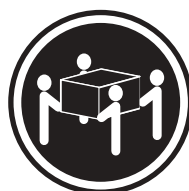
≥18 kg   ≥32 kg   ≥55 kg

ATTENZIONE:

Durante il sollevamento della macchina seguire delle norme di sicurezza.

Avviso 5

ATTENZIONE:

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

Avviso 8

ATTENZIONE:
Non togliere mai il coperchio di un alimentatore o qualsiasi parte su cui è posta la seguente etichetta.

Tensioni pericolose, corrente e livelli di energia sono presenti all'interno del componente su cui è posta questa etichetta. All'interno di questi comonenti non vi sono parti su cui effettuare l'assistenza tecnica. Se si sopetta un problema in una di queste parti, rivolgersi ad un tecnico di manutenzione.

Avviso 23

ATTENZIONE:

Non poggiare oggetti che pesano più di 50 kg sulla parte superiore delle unità montate in rack.

>50 kg

重要：

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

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

手順を実施する前に、すべての注意

・記述 1

⚠ 危険

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

感電を防止するため：

  − 電源コードは正しく接地および配線が行われている
    電源に接続してください。

  − 本製品が接続されるすべての装置もまた正しく配線
    された電源に接続されている必要があります。

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

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

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

・記述 2

⚠ 注意

本製品には、システム・ボード上にリチウム電池が使用さ
れています。電池の交換方法や取り扱いを誤ると、発熱、
発火、破裂のおそれがあります。
電池の交換には、IBM部品番号33F8354の電池またはメーカー
推奨の同等の電池を使用してください。
交換用電池の購入については、お買い求めの販売店または
弊社の営業担当までお問い合わせください。
電池は幼児の手の届かない所に置いてください。
万一、幼児が電池を飲み込んだときは、直ちに医師に相談
してください。
以下の行為は絶対にしないでください。
−水にぬらすこと
−100度C 以上の過熱や焼却
−分解や充電
−ショート
電池を廃棄する場合、および保存する場合にはテープなど
で絶縁してください。他の金属や電池と混ざると発火、
破裂の原因となります。電池は地方自治体の条例、または
規則に従って廃棄してください。ごみ廃棄場で処分される
ごみの中に捨てないでください。

・記述 3

⚠ 注意

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

− ここに記載されている制御方法、調整方法、または性能を超えて使用
すると、危険な放射線を浴びる可能性があります。

− ドライブのカバーを開けると、危険な放射線を浴びる可能性があります。
ドライブの内部に修理のために交換可能な部品はありません。カバーを
開けないでください。

⚠ 危険

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

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

・記述 4

⚠ 注意

18Kg 以上   32Kg 以上   55Kg 以上

装置を持ち上げる場合は、安全に持ち上げる方法に従ってください。

・記述 5

⚠ 注意 ⚡

サーバーの前面にある電源制御ボタンは、サーバーに供給された
電流を遮断しません。
サーバーには、複数の電源コードが接続されているかもしれません。
サーバーから電流を完全に遮断するために、すべての電源コードが
電源から取り外されていることを確認してください。
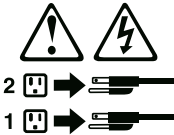
安全 **8:**

注意**:**
電源機構または次のラベルが貼られている部分のカバーは決して取り外さないで
ください。

このラベルが貼られているコンポーネントの内部には、危険な電圧、強い電流が
流れています。これらのコンポーネントの内部には、保守が可能な部品はありま
せん。これらの部品に問題があると思われる場合はサービス技術員に連絡してく
ださい。

・記述 23

 注意

ラック・モデルのサーバーの上に 50 Kg 以上の物を置かないで
ください。

> 50 Kg

聲明 23

注意：
請勿將任何重量超過 50 公斤 (110 磅) 的物品置於已安裝機架的裝置上方。

> 50 公斤 (110 磅)

중요:

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

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

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

경고문 1

⚠ ⚡

위험

전원, 전화 및 통신 케이블로부터 흘러 나오는 전류는
위험합니다.

전기 충격을 피하려면:

- 뇌우를 동반할 때는 케이블의 연결이나 철수, 이 제품의
  설치, 유지보수 또는 재구성을 하지 마십시오.

- 모든 전원 코드를 적절히 배선 및 접지해야 합니다.

- 이 제품에 연결될 모든 장비를 적절하게 배선된 콘센트에
  연결하십시오.

- 가능한한 신호 케이블을 한 손으로 연결하거나
  끊으십시오.

- 화재, 수해 또는 구조상의 손상이 있을 경우 장비를 켜지
  마십시오.

- 설치 및 구성 프로시저에 다른 설명이 없는 한, 장치 덮개를
  열기 전에 연결된 전원 코드, 원거리 통신 시스템, 네트워크
  및 모뎀을 끊어 주십시오.

- 제품 또는 접속된 장치를 설치, 이동 및 덮개를 열 때
  다음 설명에 따라 케이블을 연결하거나 끊도록 하십시오.

연결하려면:	연결을 끊으려면:
1. 모든 스위치를 끕니다.	1. 모든 스위치를 끕니다.
2. 먼저 모든 케이블을 장치에 연결합니다.	2. 먼저 콘센트에서 전원 코드를 뽑습니다.
3. 신호 케이블을 커넥터에 연결합니다.	3. 신호 케이블을 커넥터에서 제거합니다.
4. 콘센트에 전원 코드를 연결합니다.	4. 장치에서 모든 케이블을 제거합니다.
5. 장치 스위치를 켭니다.	

경고문 2

⚠

주의:

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

다음을 주의하십시오.

- 던지거나 물에 담그지 않도록 하십시오.
- 100℃(212℉) 이상으로 가열하지 마십시오.
- 수리하거나 분해하지 마십시오.

지역 법령이나 규정의 요구에 따라 배터리를 처분하십시오.

경고문 3

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

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

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

위험

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

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

경고문 4

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

주의:
기계를 들 때는 안전하게 들어 올리십시오.

경고문 5

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

2

1

경고문 **8:**

주의:
전원 공급 장치의 덮개나 아래의 그림이 부착된 부품은 절대 제거하지 마십시오.

이 그림이 부착된 부품의 내부에는 위험한 전압, 전류와 에너지가 흐르고 있습니다.
이러한 부품의 내부에는 사용자가 수리할 수 있는 부품이 없습니다. 이러한 부품에
문제가 발생하면, 서비스 센터에 연락하십시오.

경고문 23

주의:
서랍형 모델의 장치 상단에 50 kg(110 lbs.)이 넘는 물체를 올려
놓지 마십시오.

> 50 kg (110 lbs)

Notices

This information was developed for products and services offered in the U.S.A.

IBM may not offer the products, services, or features discussed in this document in other countries. Consult your local IBM representative for information on the products and services currently available in your area. Any reference to an IBM product, program, or service is not intended to state or imply that only that IBM product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any IBM intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any non-IBM product, program, or service.

IBM may have patents or pending patent applications covering subject matter described in this document. The furnishing of this document does not give you any license to these patents. You can send license inquiries, in writing, to:

> IBM Director of Licensing
> IBM Corporation
> North Castle Drive
> Armonk, NY 10504-1785

Edition notice

Trademarks

Intel, MMX, and Pentium are trademarks of Intel Corporation in the United States, other countries, or both.

Microsoft, Windows, and Windows NT are trademarks of Microsoft Corporation in the United States, other countries, or both.

UNIX is a registered trademark of The Open Group in the United States and other countries.

Java and all Java-based trademarks and logos are trademarks or registered trademarks of Sun Microsystems, Inc. in the United States, other countries, or both.

Adaptec and HostRAID are trademarks of Adaptec, Inc., in the United States, other countries, or both.

Red Hat, the Red Hat "Shadow Man" logo, and all Red Hat-based trademarks and logos are trademarks or registered trademarks of Red Hat, Inc., in the United States and other countries.

Other company, product, or service names may be trademarks or service marks of others.

Important notes

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

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

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

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

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

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

IBM makes no representation or warranties regarding non-IBM products and services that are ServerProven, including but not limited to the implied warranties of merchantability and fitness for a particular purpose. These products are offered and warranted solely by third parties.

IBM makes no representations or warranties with respect to non-IBM products. Support (if any) for the non-IBM products is provided by the third party, not IBM.

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

Product recycling and disposal

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

Battery return program

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

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

In the Netherlands, the following applies.

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. IBM is not responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

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

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

警告使用者:
這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，在這種情況下，使用者會被要求採取某些適當的對策。

Chinese Class A warning statement

声　　明
此为 A 级产品。在生活环境中，
该产品可能会造成无线电干扰。
在这种情况下，可能需要用户对其
干扰采取切实可行的措施。

Japanese Voluntary Control Council for Interference (VCCI) statement

この装置は、情報処理装置等電波障害自主規制協議会（ＶＣＣＩ）の基準に
基づくクラスA情報技術装置です。この装置を家庭環境で使用すると電波妨害を
引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求
されることがあります。

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
02K0546	China
13F9940	Australia, Fiji, Kiribati, Nauru, New Zealand, Papua New Guinea

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

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

Index

A

acoustical noise emissions   5, 6
adapter
   installing   36
   mini-PCI   35, 36
   retainer   77, 98
   SCSI   57
adapters
   considerations   35, 54
   full length   54
   IEEE 1394 (FireWire)   36, 54
   installing   55
   PCI   35, 54
   working with   35, 54
advanced setup   13
audio
   connectors   70
   line in   70
   line out   70
   microphone   70
auxiliary device connector   71

B

baffle
   removing   75
   replacing   75
battery
   connector   50
   replacement   29
bays
   2 and 4   59
   5, 6, and 7   61
   drive   58
   filler panel   60
beep codes   17
beep symptoms   99
bezel release latch   94
bi-directional parallel port configuration   72
BIOS code, updating   25
built-in self-test   115
bus fault messages   115

C

cable connectors   51, 52
cables
   internal drives   44, 63
   power   44, 63
   signal   44, 63
   universal serial bus (USB)   73
cabling
   Ethernet   71
   serial ATA drives   44
   small computer system interface (SCSI) adapter   57
   small computer system interface (SCSI)
    requirements   72

cabling *(continued)*
   system-board external connectors   52
   system-board internal connectors   51
cache control   13
CD-ROM drive
   activity LED   7
   eject button   7
   installing   58
   problems   104
   removing   92
   replacing   39
   replacing in Type 6220   38
channels, SCSI   73
chart, troubleshooting   20
Class A electronic emission notice   167
clearing CMOS   27
CMOS
   clear jumper   27
   clearing   27
components
   computer   32
   system board   33, 50
   Type 6230 computer   49
computer
   configuring   11
   controls   7
   indicators   7
   turning off   10
   turning on   8
configuration programs
   Configuration/Setup Utility program   11
   general   11
   Intel Gigabit Ethernet Utility   11
   SCSISelect Utility program   11
configuring
   computer   11
   Ethernet controller   15
connecting external options   68
connector
   analog video   73
   audio   8, 70
   Digital (DVI-I) video   74
   DVI monitor pin-assignments   74
   IEEE 1394   8
   keyboard   72
   line out   8
   low force helical-60 (LFH-60) video   74
   microphone   8
   parallel port   72
   serial   72
   serial port   72
   universal serial bus (USB)   8, 73
   video   73
connectors
   adapter   33, 50
   battery   33, 50
   cable   51
   external   52

IBM

Part Number: 90P2681

(1P) P/N: 90P2681