Hardware Maintenance Manual

IBM IntelliStation M Pro Type 6233, 6850

Hardware Maintenance Manual

IBM IntelliStation M Pro Type 6233, 6850

Note
Before using this information and the product it supports, be sure to read “Notices” on page 140.

Fourth Edition (September 2002)

The following paragraph does not apply to the United Kingdom or any country where such provisions are inconsistent with local law.

INTERNATIONAL BUSINESS MACHINES CORPORATION PROVIDES THIS PUBLICATION ″AS IS″ WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some states do not allow disclaimer of express or implied warranties in certain transactions, therefore, this statement may not apply to you.

This publication could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new editions of the publication. IBM may make improvements and/or changes in the product(s) and/or the program(s) described in this publication at any time.

This publication was developed for products and services offered in the United States of America. IBM may not offer the products, services, or features discussed in this document in other countries, and the information is subject to change without notice. Consult your local IBM representative for information on the products, services, and features available in your area.

Requests for technical information about IBM products should be made to your IBM reseller or IBM marketing representative.

About this manual

This manual contains diagnostic information, Symptom-to-FRU indexes, error codes, error messages, service and reference information for the IBM® IntelliStation® Series computer Types 6233 and 6850.

Note:

This manual is intended for trained servicers who are familiar with IBM Personal Computer products. Use this manual along with advanced diagnostic tests to troubleshoot problems effectively.

Before servicing an IBM product, be sure to review the “Safety notices (multi-lingual translations)” on page 107 and “Safety information” on page 103.

Important safety information

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

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

注意和危险声明(简体中文)

重要事项：

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

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

在按说明执行任何操作前，请务必阅读所有注意和危险声明。

注意及危險聲明（中文）

重要資訊：

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

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

執行任何指示之前，請詳讀所有「注意」及「危險」的聲明。

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

Lesen Sie alle Sicherheitshinweise, bevor Sie eine Anweisung ausführen.

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

주의 및 위험 경고문(한글)

중요:

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

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

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

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

Online support

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

File download address is:

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

Contents

General checkout

This general checkout procedure is for Types 6233 and 6850 computers.

Attention:

The drives in the computer you are servicing might have been rearranged or the drive startup sequence changed. Be extremely careful during write operations such as copying, saving or formatting. Data or programs can be overwritten if you select an incorrect drive.

Diagnostic error messages appear when a test program finds a problem with a hardware option. For the test programs to properly determine if a test *Passed*, *Failed* or *Aborted*, the test programs check the error-return code at test completion. See “Diagnostics” on page 18.

General error messages appear if a problem or conflict is found by an application program, the operating system, or both. For an explanation of these messages, refer to the information supplied with that software package.

Notes:

- Types 6233 and 6850 computers default to come up quiet (no beep and no memory count and checkpoint code display) when no errors are detected by POST.
- To enable beep and memory count and checkpoint code display when a successful POST occurs, do the following:
  1. Select **Start Options** in the Configuration/Setup Utility program (see “Setup Utility program” on page 17).
  2. Set **Power-On Self-Test** to **Enhanced**.
- Before replacing any FRUs, ensure that the latest level of BIOS is installed on the system. A down-level BIOS might cause false errors and unnecessary replacement of the system board. For more information on how to determine and obtain the latest level BIOS, see “BIOS levels” on page 38.
- If multiple error codes are displayed, diagnose the first error code displayed.
- If the computer hangs with a POST error, go to “POST error codes” on page 90.
- If the computer hangs and no error is displayed, go to “Undetermined problems” on page 95.
- If an installed device is not recognized by the diagnostics program, that device might be defective.

001

1. Power-off the computer and all external devices.
2. Check all cables and power cords.
3. Make sure the system board is seated properly.
4. Set all display controls to the middle position.
5. Power-on all external devices.
6. Power-on the computer.
7. Check for the following response:
   - Readable instructions or the Main Menu.

DID YOU RECEIVE THE CORRECT RESPONSE?

NO, continue to **002** .

YES, proceed to **003** .

002

If the Power Management feature is enabled, do the following:

1. Start the Configuration/Setup Utility program (see “Setup Utility program” on page 17.)
2. Select **Power Management** from the Configuration/Setup Utility program menu.
3. Select **APM**.
4. Be sure **APM BIOS Mode** is set to **Disabled**. If it is not, press Left Arrow (“) or Right Arrow (”) to change the setting.
5. Select **Automatic Hardware Power Management**.
6. Set **Automatic Hardware Power Management** to **Disabled**.
7. If the problem persists, continue to **003** .

003

Run the Diagnostic programs. If necessary, refer to “Running diagnostics tests” on page 19.

- If you receive an error, replace the part that the diagnostic program calls out or go to “Diagnostics” on page 18.
- If the test stops and you cannot continue, replace the last device tested.

General information

The IBM IntelliStation M Pro professional workstation incorporates many of the latest advances in computer technology and is easy to expand and upgrade as needs change.

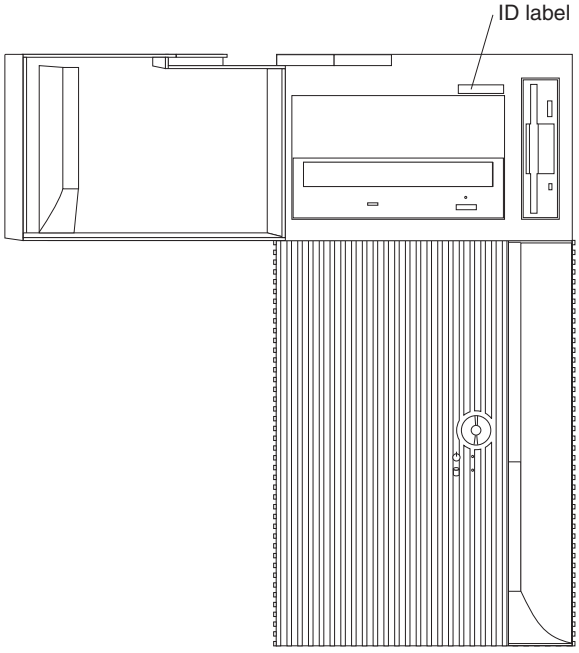
The IntelliStation M Pro computer is a rack mountable system. To install the computer in a rack, refer to the *Tower-to-Rack Conversion Kit* manual and the *Rack Installation Instructions* that are provided with the optional rack hardware for complete installation and removal instructions.

This section provides an overview of the computer features, preinstalled software, and system specifications.

If you have access to the World Wide Web, you can obtain up-to-date information about the IntelliStation M Pro model and other IBM computer products at:

`http://www.ibm.com/pc/us/intellistation/`

The computer model number and serial number are located on labels on top of the computer behind the bezel on the right.



Operating systems

This section lists the operating systems that are either supported on or have been tested for compatibility with the IntelliStation M Pro Types 6850 and 6233.

Supported operating systems

IBM IntelliStation M Pro Type 6850 is supported on the following operating systems:

- Microsoft® Windows® 2000 Professional Workstation
- Microsoft Windows NT® Workstation Version 4.0
- Microsoft Windows XP Professional

Compatible operating systems

IBM IntelliStation M Pro Types 6850 and 6233 have been tested for compatibility with the following operating systems:

- IBM PC DOS Versions 7.0
- Red Hat Linux Version 7.1 or later
- SuSE Linux Version 7.1 or later
- TurboLinux Server Version 6.5 or later

Features and specifications

The following table provides a summary of the features and specifications for this computer. Some features and specifications might not apply to your computer model.

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

Memory:
- Minimum: 256 MB
- Maximum: 4 GB
- Type: PC800 MHz, 400MHz ECC RAMBUS RIMMs only
- Slots: 8

Drives: (depending on model)
- Diskette: 1.44 MB (2 mode)
- CD-ROM: 48X IDE
- IDE hard disk drive (IDE model only)
- SCSI Ultra160 hard disk drive (SCSI model only)

Video: (depending on model)
- Matrox Millennium G450 (DVI-I) with 32 MB DDR SDRAM video memory and a single DVI-I or dual analog connectors
- NVIDIA Quadro4 200NVS (LFH-60) with 64 MB SDR SDRAM video memory and dual analog connectors (or dual digital monitor capability with the purchase of an additional pigtail cable)
- ATI Fire GL 8800 (DVI-I and VGA) with 128 MB DDR SGRAM video memory with one analog and one DVI-I connector
- 3Dlabs Wildcat III 6110 (DVI-I) with 128 MB texture buffer DDR SDRAM video memory and 64 MB frame buffer video memory, and dual DVI-I connectors
- Quadro4 900 XGL

Size and Weight:
- Height: 440 mm (17.3 in.)
- Width: 216 mm (8.50 in.)
- Depth: 606 mm (23.9 in.)
- Weight:
  - Minimum configuration as shipped: 25.0 kg (55 lb)
  - Maximum configuration: 29.5 kg (65 lb)

Environment:
- Air temperature:
  - Operating: 10° to 35°C (50° to 95° F)
  - Storage: -40° to 60°C (-40° to 140° F)
- Humidity:
  - Operating: 8% to 80%
  - Storage: 8% to 80%
- Maximum altitude: 2134 m (7000 ft)

Heat output:

Approximate heat output in British Thermal Units (Btu) per hour:
- Minimum configuration: 340 Btu/hr (100 watts)
- Maximum configuration: 2385 Btu/hr (700 watts)

Expansion bays:
- Two 5.25-in. bays (One CD-ROM drive installed)
- One 3.5-in. bay (Floppy drive installed)
- Six 3.5-in. slim-high bays available (One hard disk drive installed)

PCI expansion slots:
- Three 33 MHz/32-bit on the system board
- Two 66 MHz/64-bit on the system board

AGP Pro slot:
- Accelerated graphics port (AGP)
- Video adapter installed in the 4X AGP Pro video slot on the system board

Power supply:

One 480 watt (90-265 V ac)

Integrated functions:
- Integrated Ultra160 SCSI dual channel
- 10BASE-T/100BASE-TX Ethernet controller on the system board with an RJ-45 Ethernet port
- Two serial ports
- One parallel port
- Two USB ports
- One keyboard port
- One mouse port
- Audio ports
  - Line out
  - Line in
  - Microphone
- Dual-channel bus mastering IDE controller

Acoustical noise emission:
- Declared (upper limit) sound power levels:
  - Idle: 5.2 bels
  - Operating: 5.3 bels
- Average sound-pressure levels:
  - At operator position:
    - Idle: 42 dBA
    - Operating: 45 dBA
  - At bystander position - 1 meter (3.3 ft):
    - Idle: 37 dBA
    - Operating: 39 dBA

Electrical input:
- Input voltage:
  - Low range:
    - Minimum: 90 V ac
    - Maximum: 137 V ac
    - Input frequency range: 57 - 63 Hz
  - High range:
    - Minimum: 180 V ac
    - Maximum: 265 V ac
    - Input frequency range: 47 - 53 Hz
- Input kilovolt-amperes (kVA, approximately):
  - Minimum: configuration as shipped: 0.52 kVA
  - Maximum configuration: 1.50 kVA

Security

- Cover lock and keys (located behind the CD-ROM cover door)
- Support for the addition of a U-bolt and lockable cable
- User and supervisor passwords
- Startup sequence control
- Startup without diskette drive, keyboard, or mouse
- Unattended start mode
- Diskette and hard disk I/O control
- Serial and parallel port I/O control
- Alert on LAN™
- Security profile by device
- IBM Security Solutions

What the IBM IntelliStation M Pro offers

The IBM IntelliStation M Pro takes advantage of advancements in symmetric multiprocessing (SMP), data storage, graphics, memory, systems management, and network environments. The computer includes:

- **High-performance accelerated graphics port (AGP) graphics**

  The computer comes with an AGP graphics adapter installed. This adapter supports high resolutions and includes many performance-enhancing features for the operating system environment.

- **Impressive performance using an innovative approach to SMP**

  The computer supports up to two Intel Xeon microprocessors. The computer comes with one microprocessor installed; you can install an additional microprocessor to enhance performance and provide SMP capability.

- **Large system memory**

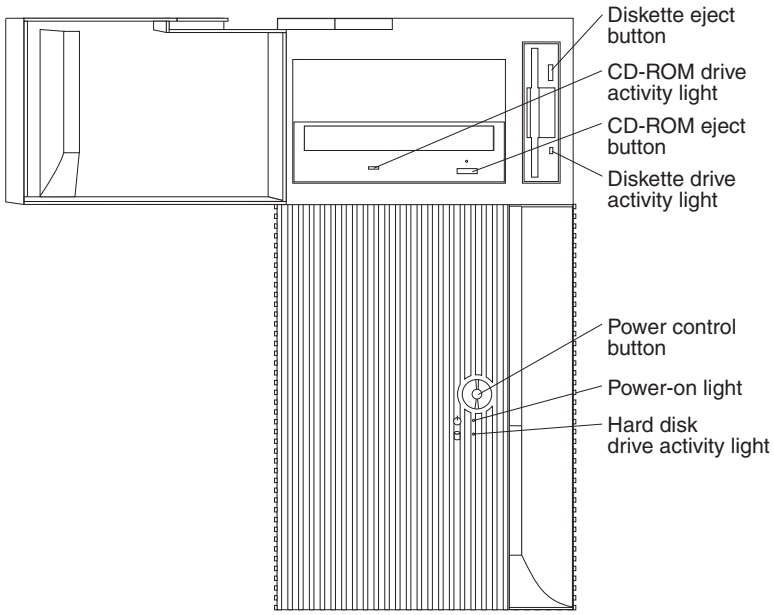
  The memory bus in the computer supports up to 4 GB of system memory. The memory controller provides error correcting code (ECC) support for up to eight industry-standard PC800, 2.5 V, 184-pin, registered, Rambus dynamic random access memory (RDRAM) Rambus inline memory modules (RIMMs).

- **Integrated network environment support**

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

Computer controls and indicators

The button at the front of the computer enables you to turn on and turn off the computer. The lights are status indicators that tell you when a certain device, such as the hard disk drive, is in use.



The following list describes the controls and status indicators on the computer.

CD-ROM drive activity light
When this light is on, the CD-ROM drive is in use.

CD-ROM eject button
Press this button to open the CD tray and remove the CD from the CD-ROM drive.

Diskette drive activity light
When this light is on, the diskette drive is in use.

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

Hard disk drive activity light
When this light is on, the hard disk drive is in use.

Power control button
Press this button to turn the computer on or off. Do not turn off the computer if the in-use light for the hard disk drive or diskette drive is on.

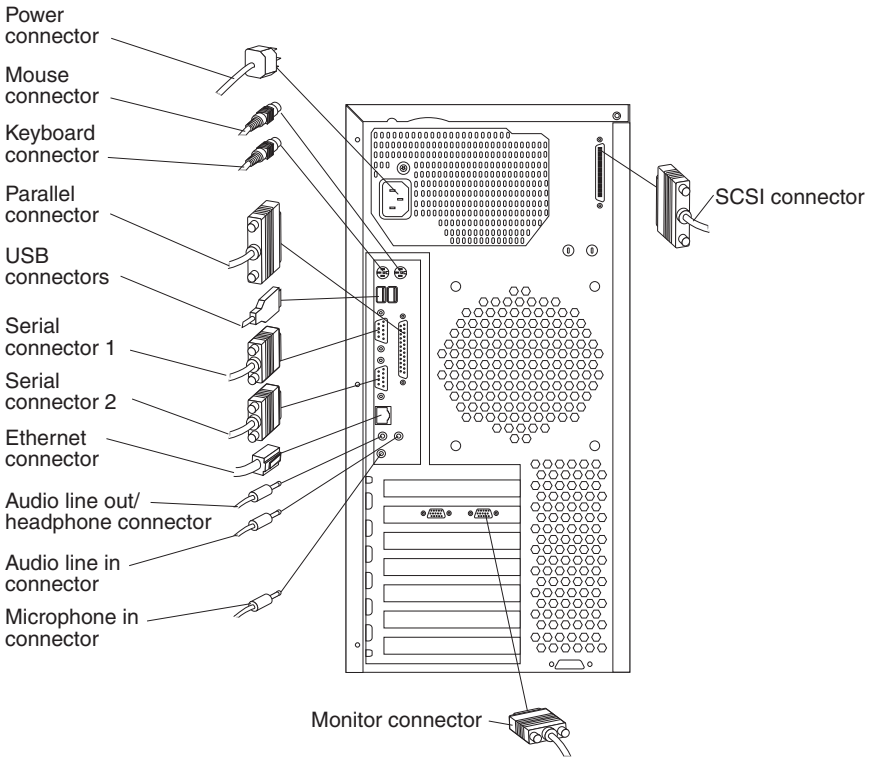
Note: The power control button normally operates with a single touch. However in some circumstances, the computer might not immediately turn off. If this happens, hold the power control button down for 5 to 10 seconds, and the computer will turn off.

Power-on light
This status indicator lights when you turn on the computer.

Input/output connector locations

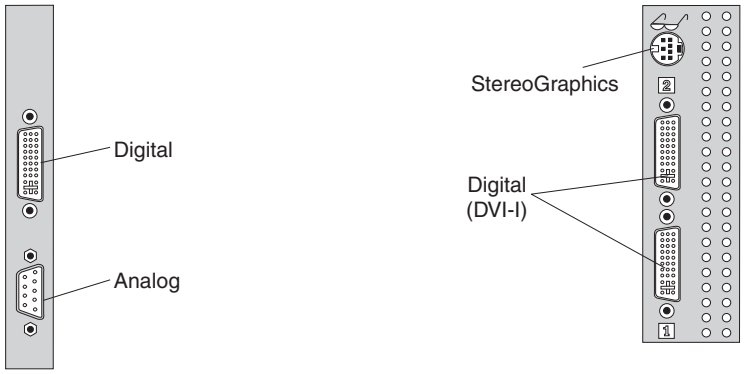
The following illustration shows the input/output connectors and the expansion slots on the rear of the computer.

Use the following illustration to help you connect cables to the rear of the computer. Some connectors are color-coded. You might not have devices for all connectors shown here.



Note: The location of the monitor connector is dependent on the video adapter installed on the computer.

The following illustration shows the video connectors on models with a Fire GL 8800 or Wildcat III 6110 video adapter.



Note: The Wildcat III 6110 adapter occupies the AGP slot and the adjacent PCI slot. Be careful when you install an adapter in PCI slot 2 because the space between the Wildcat III 6110 adapter and PCI slot 2 is very limited, which causes the adapters to be very close to each other.

If the software application supports it, the StereoGraphics connector on a Wildcat III 6110 video adapter is used for 3-D glasses or goggles.

Turning on the computer

After you plug one end of the computer power cord into the power supply connector on the rear of the computer, and the other end of the power cord into an electrical outlet, you can start the computer as follows:

- You can press the power control button on the front of the computer to start the computer.
- If the computer is turned on and a power failure occurs, the computer will start automatically when the power is restored.

If the POST detects a problem when you turn on the computer, you will hear repeating beeps. If this occurs, see “Diagnostics” on page 17 for more information.

During POST, the following messages are displayed:

- `Press F1 for Configuration/Setup`
- `To Start the Product Recovery Program, Press F11`
- `<<< Press <CTRL><A> for SCSISelect Utility! >>>`

Note: The SCSI message only appears if a SCSI adapter is installed in the computer.

If the computer is properly connected and configured to load a startup image from the network, a request is sent and a startup image is loaded into the computer. If the request is unsuccessful or there is no network connection, the operating system and application programs are loaded from the hard disk drive.

The computer can ″wake up″ and be started remotely over a network, if it has a properly configured network connection. For more information, see “Wake on LAN” on page 12 and “Remote Administration” on page 13.

Shutting down the operating system

When you are ready to shut down the computer, follow these instructions to prevent the loss of unsaved data or damage to the software programs. For more information about shutting down the operating system, refer to the operating system documentation that comes with the computer.

Complete the following steps to shut down the operating system.

1. Save any files you are working on.
2. Close all open applications.
3. Click the Windows **Start** button.
4. Click **Shut Down**.
5. Select **Shut Down**; then, click **OK** to confirm the request.

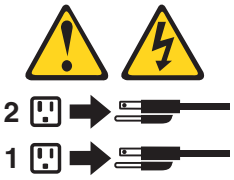
Turning off the computer

You can turn off the computer as follows:

Statement 5:

CAUTION:

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



- You can press the power control button on the front of the computer. This starts an orderly shutdown of the operating system, if this feature is supported by the operating system, and places the computer in standby mode.

  Note: After turning off the computer, wait at least five 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 four seconds to cause an immediate shutdown of the computer and place the computer in standby mode. You can use this feature if the operating system stops functioning.
- If you cannot use the power control button to turn off the computer, disconnect the computer power cords from the electrical outlets.

  Note: After disconnecting the power cords, wait approximately 15 seconds for the computer to stop running.

Operating certain features

This section provides an overview of some of the features of this computer.

Using video features

The computer has an accelerated graphics port (AGP) graphics adapter that uses a standard video protocol for displaying text and graphic images on a monitor screen. The adapter supports a variety of video modes. Video modes are different combinations of resolution, refresh rate, and color defined by a video standard for displaying text or graphics.

Video device drivers

To take full advantage of the graphics adapter in the computer, some operating systems and application programs require custom software, known as video device

drivers. These preinstalled device drivers provide support for greater speed, higher resolution, more available colors, and flicker-free images.

Device drivers for the graphics adapter and a README file with instructions for installing the device drivers are provided on the *Device Drivers and IBM Enhanced Diagnostics* CD that comes with the computer. If the computer has preinstalled software, video device drivers are in the C:\IBMTOOLS\DRIVERS directory.

Note: Video device drivers for the Fire GL4 video adapter are in the IBMTOOLS/DRIVERS/VIDEO/FIREGL4 directory.

You can use the device driver installation instructions if you ever need to reinstall the device drivers, or if you need information on obtaining and installing updated device drivers.

Changing monitor settings

To get the best possible image on the screen and to reduce flicker, you might need to reset the resolution and refresh rate of the monitor. You can view and change monitor settings through the operating system using the instructions provided in the README files on the *Device Drivers and IBM Enhanced Diagnostics* CD or in the C:\ IBMTOOLS\DRIVERS directory on the hard disk drive.

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

To minimize screen flicker and jitter, set the monitor to the highest noninterlaced refresh rate that the monitor supports. If the monitor complies with the VESA display data channel (DDC) standard, it should already be set to the highest refresh rate that the monitor and video controller can support. If you are not sure if the monitor is DDC-compliant, see the documentation provided with the monitor.

If you have a dual-monitor video adapter and you connect both monitors but do not see the second monitor, go to **Start → Settings → Control Panel → Display Properties → Settings → Display Type** and enable the **Multi-head** option.

Note: Refer to the video adapter device driver README file and online help for more information.

Using audio features

The computer has three audio connectors, and an integrated audio controller that supports Sound Blaster applications and is compatible with the Microsoft Windows Sound System. Using the audio controller, you can record sound and music. If you connect external speakers to the Line out connector, you can play sound with multimedia applications.

The audio connectors in the computer are 3.5 mm mini-jacks. A description of the connectors follows.

Line out

This connector is used 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.

Line in
This connector is used to accept audio signals into the computer sound system from external devices, such as line output from a stereo, television, or musical instrument.

Mic
This connector is used to connect a microphone to the computer when you want to record voices or other sounds on the hard disk drive. This connector and a microphone can also be used by speech recognition software.

Note: If you experience interference or speaker feedback while recording, try reducing the microphone recording volume (gain).

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

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

IBM occasionally makes changes and enhancements to the system programs. When updates are released, they are available as downloadable files on the World Wide Web at http:\\www.ibm.com.

You can update system programs by starting the computer using a flash update diskette or by using the Remote Administration feature, if it is enabled. Instructions for using system programs updates are included in a README file provided with the downloadable files.

Managing the computer
The computer comes with features that a network administrator or file server can use to remotely manage and control the computer.

IBM Director Agent
IBM Director Agent streamline and automate personal computer (PC) systems management and support tasks, such as asset deployment and tracking. These utilities are available for IBM computers at no additional charge, helping to reduce the total cost of ownership of the networked computers.

IBM Director Agent enables you to view detailed information about the computer hardware and software, set up alerts, monitor a variety of system resources, and manage the asset security. For more information, go to http://www.ibm.com/pc/support on the World Wide Web and search for IBM Director Agent.

Wake on LAN
A network administrator can use Wake on LAN® to turn on the computer from a remote location. When Wake on LAN is used with network management software, many functions, such as data transfers, software updates, and POST or BIOS code updates can be initiated on the computer remotely.

Note: If the computer power cord is plugged into a surge protector or power strip, make sure that you turn off the computer by the power button, and not the surge protector or power strip switch. Otherwise, the Wake on LAN feature will not work.

Alert on LAN

The computer supports Alert on LAN technology, which provides notification of changes in the computer system even when the computer is turned off. Working with desktop management interface (DMI) and Wake on LAN technologies, Alert on LAN helps manage and monitor the hardware and software features of the computer.

Alert on LAN generates notifications when the computer cover is removed, an error is detected during POST, or the computer is disconnected from the network or unplugged from the electrical outlet. Alert on LAN works in conjunction with UM Services.

Remote Program Load or Dynamic Host Configuration Protocol

A network administrator can use Remote Program Load (RPL) or Dynamic Host Configuration Protocol (DHCP) to control the computer. RPL, when used with software such as IBM LANClient Control Manager™, uses a feature called *Hybrid RPL* to install hybrid images (or files) on the hard disk drive. If the computer is a Hybrid RPL client, each time the computer starts from the network, LANClient Control Manager downloads a small *bootstrap* program to the computer hard disk drive and avoids the network traffic associated with a standard RPL.

DHCP enables network administrators centrally to manage and automate the assignment of Internet Protocol (IP) addresses on a network.

Remote Administration

A network administrator can use the Remote Administration feature to remotely update the POST and BIOS code in the computer.

Network-management software, such as LANClient Control Manager (LCCM), is required to take advantage of this feature.

LANClient Control Manager

LANClient Control Manager is a graphical, computer-based system deployment program that enables mass unattended installations of operating systems, software images, device drivers, and BIOS code updates to remote systems. When used with Wake on LAN, LCCM can remotely turn on the computer, so that the installation can be done while the computer is not being used.

For more information or to download this software, visit http://www.ibm.com/pc/us/desktop/lccm on the World Wide Web.

System Migration Assistant

System Migration Assistant (SMA) enables administrators to remotely transfer configurations, profile settings, printer device drivers, and files from an IBM or non-IBM computer to supported IBM systems.

For more information or to download this software, visit http://www.pc.ibm.com/us/software/sysmgmt/products/sma on the World Wide Web.

Desktop Management Interface

DMI is a method for gathering information about the hardware and software in the computer. In a network environment, network administrators can use DMI to remotely monitor and control the computer.

Using security features

To deter unauthorized use of the computer, anti-intrusion and other security features are provided with the computer.

Anti-intrusion features

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

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

Note: Locksmiths are not authorized to duplicate the cover lock keys; you must order replacement keys from the key manufacturer. When ordering replacement keys, you will need the key code number.

You can also set a chassis-intrusion detector inside the computer to alert the system administrator each time the computer cover is removed. For more information about setting the chassis-intrusion alert, see “Configuration” on page 31.

If the computer uses the Alert on LAN feature and you are connected to a network that uses Intel LANDesk® Desktop Manager or IBM LANClient Control Manager, a message is also sent to the network administrator console indicating that the computer cover has been removed. For more information, see “Alert on LAN” on page 13 and contact the network administrator.

Component protection

The components in the computer have serial numbers on them. You can register the components with a third-party security company to improve the chances of identifying the components if they are ever stolen and recovered. For more information about component registration, see the IBM support page at http://www.ibm.com/pc/us/desktop/assetid/ on the World Wide Web.

Data protection

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

IBM security solutions: IBM security solutions help keep electronic business transactions safe. They include the following:

- Data protection
- Locked keyboard

SMART hard disk drive: The computer comes with a SMART hard disk drive that is enabled to report potential hard disk failures. If an error is detected, a DMI-compliant warning message is sent to the computer screen and, if the computer is part of a network, to an administrator console. When an error is detected, the data on the hard disk can be backed up and the drive replaced.

SMART Reaction: To help back up important data, IBM provides SMART Reaction™ software on the computers with preinstalled software and also on the IBM *Software Selections* CD. SMART Reaction is a client/server software application that helps users and administrators respond effectively to a warning issued by the SMART hard disk drive.

Virus protection: The computer has built-in virus protection that can be enabled through the Configuration/Setup Utility program. This built-in protection only checks for viruses in the boot record. Also, Norton AntiVirus for IBM is available on the IBM *Software Selections* CD.

Locking the keyboard: You can lock the keyboard so that others are unable to use it. If a user password is set, the keyboard is locked when you turn on the computer. You must type the correct password before the keyboard will unlock. You can enable the user password feature with the BIOS Setup Utility program. See **Setting Security Passwords** in Access IBM.

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

Diagnostics

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

- Setup Utility program
- Power-On Self-Test (POST)
  - POST Beep Codes
  - Error Code Format
- Diagnostics
- Recovery
  - Full recovery
  - Repair Utility

Setup Utility program

Attention:

A customized setup configuration (other than default settings) might exist on the computer you are servicing. Running the Setup Utility program might alter those settings. Note the current configuration settings and verify that the settings are in place when service is complete.

The Setup Utility (configuration) program is stored in the permanent memory of the computer. This program includes settings for the following:

- System Summary
- Product Data
- Devices and I/O Ports
- Processor Control
- Start Options
- Date and Time
- System Security
- Advanced Setup
- Power Management
- PC Health Status

To run the Setup Utility program, use the following procedure.

1. Power-off the computer and wait for a few seconds until all in-use lights go off.
2. Power-on the computer.
3. When the Setup Utility prompt appears on the screen during start-up, press **F1**. The Setup Utility menu will appear.
4. Follow the instructions on the screen.

   Note: If prompted for a password, enter the supervisor password.

POST

When you turn on the computer, it performs a series of tests to check the operation of system components and some of the options that are installed in the computer. This series of tests is called the power-on self-test, or POST.

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

Notes:

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

The possible types of beep codes that the system might emit are:

Repeating long beeps
Indicates that a memory error has occurred. Ensure that all RIMMs are correctly installed.

One long beep and two short beeps
Indicates that a video error has occurred and the BIOS code cannot initialize the video screen to display any additional information. Ensure that the video adapter is correctly installed.

Diagnostics

The Diagnostics program uses a full range of diagnostic utilities to determine the operating condition of the computer's hardware components.

For a complete list of error codes and messages, see "Symptom-to-FRU index" on page 83.

Diagnostics program download

To download the Diagnostics program, do the following:

- Go to **http://www.ibm.com/**.
- Select **Support**.
- Select **Desktop computing** from the ″Search by Category″ pull-down menu.
- Select **IntelliStation** or Type from the ″Product Family″ list.
- Search for the machine type in the ″Quick Path″ box on the left.
- Select **Diagnostics** from the ″Downloadable files by Category″ pull-down menu or go directly to the link **PC Enhanced Diagnostics diskette** from the ″Downloadable files by date″ list. This link will take you to the self-starting utility download and instructions.

Navigating through the diagnostics programs

Use the cursor movement keys to navigate within the menus.

- The **Enter** key is used to select a menu item.
- The **Esc** key is used to back up to the previous menu.
- For online help select **F1**.

Running diagnostics tests

There are four ways to run the diagnostic tests.

1. Using the cursor movement keys, highlight **Run Normal Test** or **Run Quick Test** from the Diagnostics menu and then press **Enter**.

   This will automatically run a pre-defined group of tests from each test category. Run **Normal Test** runs a more extensive set of tests than does **Run Quick Test** and takes longer to execute.
2. Press **F5** to automatically run all selected tests in all categories. See ″Test Selection″.
3. From within a test category, press **Ctrl-Enter** to automatically run only the selected tests in that category. See ″Test Selection″.
4. Using the cursor movement keys, highlight a single test within a test category, then press **Enter**. This will run only that test.

Press **Esc** at any time to stop the testing process.

Test results, (N/A, PASSED, FAILED, ABORTED), are displayed in the field beside the test description and in the test log. See “Viewing the test log” on page 23.

Test selection

To select one or more tests, use the following procedure.

1. Open the corresponding test category.
2. Using the cursor movement keys, highlight the desired test.
3. Press the space bar.

   A selected test is marked by **>>**. Pressing the space bar again de-selects a test and removes the chevron.
4. Repeat steps 2 and 3 above to select all desired tests.

Using the IBM Product Recovery CD

The IBM *Product Recovery* CD is provided with the computer so that you can reinstall the operating system, preinstalled applications, and device drivers in case of a hard disk failure or other damage to files.

Note: The *Product Recovery* CD is only available as a FRU.

To use the IBM *Product Recovery* CD, place IBM *Product Recovery* CD in the CD-ROM drive, then shut down the operating system and turn off the computer. Turn on the computer and the Product Recovery program will begin. If the CD does not start, you may need to change the primary startup sequence.

Recovering the operating system and support software

Attention: The recovery process deletes all information stored on the primary partition (drive C), including any personal files, data, and software stored on the hard disk drive. If possible, back up the data before starting this process.

The IBM Product Recovery CD for Windows 2000 Professional contains a Windows 98 startable CD image that copies files from the CD to the hard disk. The CD initially runs Windows 98 DOS, and then installs Windows 2000 Professional.

To run the FDISK command from IBM *Product Recovery* CD, place IBM *Product Recovery* CD in the CD-ROM drive, press Esc at the Recover Main Menu; then type FDISK at the command prompt. Delete the primary partition, leave the IBM

Product Recovery CD in the CD-ROM drive, and restart the computer. The IBM *Product Recovery* CD partitions the hard disk correctly.

Use the following steps to recover or reinstall the IBM preinstalled operating system and software:

1. Make backup copies of configuration files and any files you created. Any files not backed up will be lost.
2. Insert the IBM *Product Recovery* CD into the CD-ROM drive.
3. Restart the computer. If the computer does not start from the CD, you need to change the startup sequence. (See “Changing the startup sequence to start from the CD” on page 25.)
4. You might be prompted to select the appropriate operating system.
5. The Product Recovery program main menu appears with the following options:

   Full recovery
   Select this option to reformat the hard disk and restore the computer to the original preinstalled software.

   Repair Utility
   Select this option to run the emergency repair utility program.

   Select the option you need and follow the instructions on the screen.
6. When the recovery is complete, remove the IBM *Product Recovery* CD and restart the computer.
7. If you changed the startup sequence, make sure you change it back immediately.

Additional resources

The IBM *Product Recovery* CD for Windows 2000 Professional contain additional subdirectories on the root directory called **\support\tools directory**, and **\valueadd**. These directories include application updates provided by Microsoft for your convenience. Later updates of these files might be available on the Microsoft Web site.

Installing other operating systems

If you install (or reinstall) another operating system, you might need additional software or device drivers. Hardware-specific support software is available on the *Device Driver and IBM Enhanced Diagnostics* CD. If you experience problems with device drivers installed from this CD, you can obtain updated device drivers at http://www.ibm.com/support on the World Wide Web.

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

To install an operating system, follow the instructions in the documentation provided with the operating system and any updates.

Additional information about operating systems might be available at http://www.ibm.com/pc/support on the World Wide Web.

Module test menu/hardware configuration report

Depending on the diagnostics version level you are using, the installed devices in the computer are verified in one of two ways.

1. At the start of the diagnostic tests, the Module Test Menu is displayed. Normally, all installed devices in the computer are highlighted on the menu.
2. At the start of the diagnostic tests, the main menu appears. From this menu, select **System Info**, then select **Hardware Configuration** from the next menu. Normally, all installed devices in the computer are highlighted on this report.

If an installed device is not recognized by the diagnostics program, then review the following:

- The diagnostic code for the device is not in the Diagnostics program. Run the diagnostics provided with that device.
- The missing device is defective or it requires an additional diskette or service manual.
- An unrecognizable device is installed.
- A defective device is causing another device not to be recognized.
- The SCSI controller failed (on the system board or SCSI adapter).
- Use the procedure in "Undetermined problems" on page 95 to find the problem.

If a device is missing from the list, replace it. If this does not correct the problem, use the procedure in "Undetermined problems" on page 95.

Memory Diagnostic tests

Follow the steps below to locate the Memory Diagnostic tests options.

1. Select the DIAGNOSTICS option on the toolbar and press **Enter**.

   Note: When you see the intel station logo press **tab** to get to the memory test screen.

2. Highlight either the *Memory Test-Full* or *Memory Test-Quick* option and press **Enter**.
   - **Memory Test-Full**

     The full memory test will take about 80 seconds per MB of memory and will detect marginal, intermittent, and solid (stuck) memory failures.
   - **Memory Test-Quick**

     The quick memory test will take about 20 seconds per MB of memory and will detect solid (stuck) memory failures only.

Note: Either level of memory testing can be performed on all memory or a single SIMM, DIMM or RIMM socket.

Only sockets containing a SIMM, DIMM or RIMM can be selected for testing. Unpopulated sockets are noted by "**.....**" beside the test description.

Alert-On LAN test

The Alert On LAN test does the following:

- Determines if Alert On LAN is supported on the system.
- Checks the revision ID register.
- Verifies the EEPROM checksum.
- Validates that a software alert can be sent.

Test results

Diagnostics test results will produce the following error code format:

Function Code	Failure Type	DeviceID	Date	ChkDigits	Text

- **Function Code:**

  Represents the feature or function within the PC.
- **Failure Type:**

  Represents the type of error encountered.
- **Device ID:**

  Contains the component's unit-ID which corresponds to either a fixed disk drive, removable media drive, serial or parallel port, processor, specific SIMM or DIMM, or a device on the PCI bus.
- **Date:**

  Contains the date on which the diagnostic test was run. The date is retrieved from CMOS and displayed using the YYYYMMDD format.
- **ChkDigits:**

  Contains a 2-digit check-digit value to ensure the following:
  - Diagnostics were run on the specified date.
  - Diagnostics were run on the specified IBM computer.
  - The diagnostic error code is recorded correctly.
- **Text:**

  Description of the error.

Note: See "Diagnostic error codes" on page 86 for error code listings.

Hard file Smart test

Use the Hard File Smart Test when the system management tool has detected a hard file SMART alert.

The Smart test does the following:

- Interrogates IDE devices for support of the SMART instruction set.
- Issues an ENABLE SMART command to make sure SMART functionality is active.
- Checks the **SMART RETURN STATUS** command to determine if any thresholds have been exceeded.

If thresholds have been exceeded, an error message is shown, and the test fails. If no SMART is supported by the drive, the test returns with ″N/A″.

Quick and Full erase - hard drive

The Diagnostics program offers two hard drive format utilities:

- Quick Erase Hard Drive
- Full Erase Hard Drive

The Quick Erase Hard Drive provides a DOS utility that performs the following steps.

- Destroys the Master Boot Record (MBR) on the hard drive.
- Destroys all copies of the FAT Table on all partitions (both the master and backup).
- Destroys the partition table.
- Provides messages that warn the user that this is a non-recoverable process.

The Full Erase Hard Drive provides a DOS utility that performs the following steps.

- Performs all the steps in Quick Erase.
- Provides a DOS utility that writes random data to all sectors of the hard drive.
- Provide an estimate of time to completion along with a visual representation of completion status.
- Provides messages that warn the user about non-recoverable process.

Important: Make sure that all data is backed up before using the Quick or Full Erase functions.

To select the Quick Erase or Full Erase Hard Drive utility, use the following procedure.

1. Select the UTILITY option on the toolbar and press **Enter**.
2. Select either the QUICK ERASE or FULL ERASE HARD DISK option and follow the instructions.

Iomega Zip drive test

Use the Iomega Zip Drive Test to test the Zip drive and the drive interface. The test takes about 20 seconds to run.

The default tests the following:

- Controller
- Max Seek (50 times)
- Random Seek (300 sectors)

Viewing the test log

Errors reported by the diagnostic test will be displayed by the program as a failed test.

To view details of a failure or to view a list of test results, use the following procedure from any test category screen.

- Press **F3** to activate the log file.
- Press **F3** again to save the file to diskette or **F2** to print the file.

When to use the Low-Level Format program

Notes:

1. The low-level format is not available on all diagnostic diskettes.
2. Before formatting the hard disk drive, make a backup copy of the files on the drive to be formatted.

Use the Low-Level Format program in the following situations:

- When you are installing software that requires a low-level format.
- When you get recurring messages from the test programs directing you to run the Low-Level Format program on the hard disk.
- As a last resort before replacing a hard disk drive.

Preparing the hard disk drive for use

When the Low-Level Format program is finished, restore to the hard disk all the files that you previously backed up.

1. Partition the remainder of the hard disk for the operating system. (The commands vary with the operating system. Refer to the operating system manual for instructions.)
2. Format the hard disk using the operating system. (The commands vary with the operating system. Refer to the operating system manual for instructions.)
3. Install the operating system.

You are now ready to restore the files.

This chapter describes diagnostic tools that are available to you. You can use these tools to identify and correct problems that might come up as you use the computer.

If the computer does not start when you press the power switch, do the following:

- Make sure the computer and monitor are connected to working electrical outlets.
- Make sure all cables are securely connected to the correct locations.

If this does not correct the problem, have the computer serviced.

Computer problems can be caused by hardware, software, or user error (for example, pressing the wrong key).

Check the hardware by following the procedures in this chapter. You can also use the diagnostic programs provided with the computer (see “IBM Enhanced Diagnostics” on page 25 for a description of these programs).

If the hardware checks out and you have not made a user error, you might have a software problem. If you suspect that you have a software problem, see “Software-generated error messages” and the operating system documentation that comes with the computer. If you have installed software applications yourself, see the documentation that comes with the software.

The following tools are available to diagnose hardware-related problems:

- Power-on self-test (POST)
- Troubleshooting charts
- IBM Enhanced Diagnostics program

Small computer system interface (SCSI) error messages

These messages appear if a problem or conflict is detected by the SCSI subsystem. See the SCSI documentation on the *Software Selections* CD that comes with the computer for information about these messages.

Software-generated error messages

These messages appear if a problem or conflict is detected by the application program, the operating system, or both. Error messages for operating system and other software problems are generally text messages, but might be numeric codes. For information about these software error messages, see the information supplied with the operating system or application program.

Diagnostic error codes and messages

These codes and messages appear if a hardware problem is detected by one of the IBM Enhanced Diagnostics programs. Along with error codes, the messages present text information that can be used to identify a failing part. For more information, see “IBM Enhanced Diagnostics”.

Changing the startup sequence to start from the CD

If the computer does not start from the CD on the first try, you need to change the startup sequence in the Configuration/Setup Utility program. Follow these steps to change the startup sequence:

1. Turn on the computer. If the 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 lights go off, and restart the computer. (Do not use Ctrl+Alt+Del to restart the computer.)
2. When the Configuration/Setup Utility prompt appears in the lower-left corner of the screen during startup, press F1. (This prompt appears on the screen for only a few seconds. You must press F1 quickly.

   Note: If prompted for a password enter supervisor password.
3. Select **Start Options** from the Configuration/Setup Utility program menu.
4. Select **Startup Sequence** from the Start Options from the menu.
5. Note the first startup device shown in the Startup Sequence. You will need this information to restore the original startup sequence after you complete the recovery process.
6. Change the **First Startup Device** in the Startup Sequence to the CD-ROM drive.
7. Press the **Esc** key until you return to the Configuration/Setup Utility program menu.
8. Before you exit from the program, select **Save and Exit Settings** from the **Configuration/Setup Utility** program menu and press the **Enter** key.
9. Turn off the computer.

Note: Remember to restore the original startup sequence when you have finished using the CD.

IBM Enhanced Diagnostics

IBM provides programs that you can run to diagnose problems you suspect to be hardware related. Several utility programs that provide helpful information about the computer are also included. The user interface for running these diagnostic and utility programs is provided by PC-Doctor for Windows.

The IBM Enhanced Diagnostics program will isolate the computer hardware from software that was preinstalled (or that you have installed) on the hard disk drive. The programs run independently of the operating system, and *must be run either from CD or diskette*. This method of testing is generally used when other methods are not accessible or have not been successful in isolating a problem suspected to be hardware related.

The *Device Driver and IBM Enhanced Diagnostics* CD comes with the computer. To run the IBM Enhanced Diagnostics program from the *Device Driver and IBM Enhanced Diagnostics* CD, do the following:

1. Change the start up sequence for the computer. See “Changing the startup sequence to start from the CD” on page 25.
2. Insert the *Device Driver and IBM Enhanced Diagnostics* CD into the CD-ROM drive.
3. Shut down the computer.
4. Start up the computer. The IBM Enhanced Diagnostics program will automatically run.
5. Follow the instructions on the screen.

You can also download the latest image of the diagnostics from the IBM Web site.

To download the latest image of the IBM Enhanced Diagnostics from the Web site and create a startable Enhanced Diagnostics diskette:

1. Go to http://www.ibm.com/pc/us/intellistation on the World Wide Web.
2. Click **Support**. From the Family drop-down list, select a family. Click **Downloadable files** on the left side of the screen; then, select **Diagnostics** from the Downloadable files by Category drop-down list.
3. Download the.exe file to a hard disk directory (not to a diskette).
4. Go to a DOS prompt and change to the directory where you downloaded the file.
5. Insert a blank high-capacity diskette in diskette drive A.
6. Type the following and press Enter:

   ```
   filename a:
   ```

   Where *filename* is the name of the file you downloaded from the Web.

The self-extracting downloaded file is copied to the diskette, and a startable *IBM Enhanced Diagnostics* diskette is created.

To start the IBM Enhanced Diagnostics program using the diagnostic diskette, do the following:

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

Other diagnostic programs

The computer also contains diagnostic programs designed specifically for the Windows operating environment. Because these diagnostics work with the operating system, they not only test the hardware, but they also analyze certain software components of the computer. They are especially useful in isolating problems related to the operating system and device drivers.

PC-Doctor for Windows

To use PC-Doctor for Windows:

1. If you have not already done so, install the program onto the hard disk drive.
2. To run the program after it is installed, select it from the **Programs** choice on the Windows **Start** menu and follow the instructions on the screen. Help is available online.

Using the ConfigSafe program

ConfigSafe can be used as a troubleshooting tool, especially if problems develop after you install a new application or option. Before you make any changes to the system configuration, use ConfigSafe to take a snapshot of the current, working operating system configuration. If you have preinstalled software, ConfigSafe automatically takes a snapshot of the initial operating system configuration settings when you first start up the computer. Then you can easily return to that configuration if the computer becomes disabled by changes in the configuration files.

ConfigSafe Save Our System (SOS) feature

ConfigSafe has an SOS feature that can be used in a DOS environment if the Windows desktop becomes unusable. To use the SOS feature of ConfigSafe:

1. Access a DOS prompt.
2. At the command prompt, type `cd\cfgsafe`. Press Enter.
3. Type `sos`. Press Enter
4. Select the most recent configuration that is dated before the start of the problem. Press Enter.
5. Restart the computer.

If the problem is not solved, you can repeat these steps selecting a different saved configuration, or using the Undo button. (The Undo button is only available in the Windows version of ConfigSafe.)

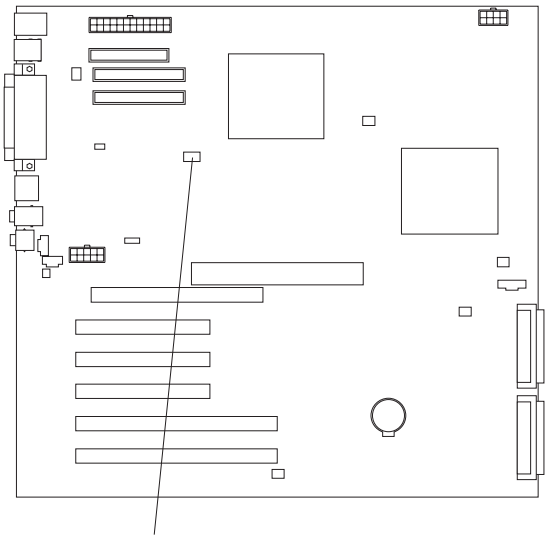
Support documentation is built into the online Help system. To access online Help, run the ConfigSafe program. The online Help files will appear in the pull-down menu on the right side of the screen.

Erasing a lost or forgotten password (clearing CMOS)

This section describes how to erase lost or forgotten passwords. For more information about lost or forgotten passwords, refer to Access IBM on the desktop.

To erase a forgotten password, follow these steps:

1. Turn off the computer and all attached devices.
2. Unplug the power cord.
3. Remove the cover. See “Removing the cover and front bezel” on page 47.
4. See the illustration below for the CMOS jumper location.



5. Move the jumper from the standard position on pins 1 and 2 to the maintenance, or configure position (pins 2 and 3).
6. Replace the cover and connect the power cords. See “Removing the cover and front bezel” on page 47 and “Replacing the cover and connecting the cables” on page 65.
7. After you restart the computer, the BIOS Setup Utility screen displays.
8. In the Maintenance screen, you can clear CMOS settings.
9. Press **Esc**.
10. Select **Exit** from the menu.
11. Select **Exit Saving Changes**.
12. Follow the instructions on the screen.

Note: You must remove the cover again to place the jumper to the normal setting.

Recovering from a POST/BIOS update failure

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

1. Insert the POST/BIOS update (flash) diskette into drive A. You can download a file to create this diskette from http://www.ibm.com/pc/support on the World Wide Web.
2. Turn on the computer and the monitor.
3. After the update session completes, turn off the computer and monitor.

   Note: If prompted, do not backup the BIOS.
4. Remove the diskette from drive A.
5. Turn on the computer to restart the operating system.

Replacing the battery

The computer has a special type of memory that maintains the date, time, and settings for built-in features, such as serial- and parallel-port assignments (configuration). A battery keeps this information active when you turn off the computer.

The battery requires no charging or maintenance throughout its life; however, no battery lasts forever. If the battery fails, the date, time, and configuration information are lost, and an error message is displayed when you turn on the computer.

Note: If Enhanced Security is enabled, the administrator password is not lost when the battery fails.

If you replace the original lithium battery with a heavy-metal battery or a battery with heavy-metal components, be aware of the following environmental consideration. Batteries and accumulators that contain heavy metals must not be disposed of with normal domestic waste. They will be taken back free of charge by the manufacturer, distributor, or representative, to be recycled or disposed of in a proper manner.

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.

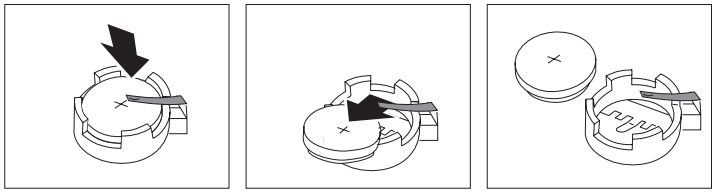
For further information on battery disposal, call IBM at 1-800-IBM-4333 (1-800-426-4333) in the U.S. For information outside of the U.S., contact an IBM reseller or marketing representative.

To change the battery, do the following:

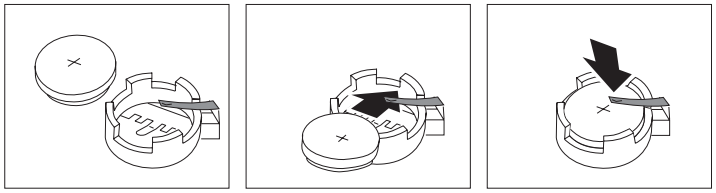
1. Turn off the computer and all attached devices.
2. Unplug the power cord.
3. Remove the cover. See “Removing the cover and front bezel” on page 47.
4. Disconnect the hard disk drive power cable and the hard disk drive fan cable on the memory board.
5. Push the tab on the back of the memory board inward and pull the memory board out of the chassis.

   Note: If any long adapters are installed in PCI slots, they must also be removed. These adapters must also be replaced before replacing the memory board.
6. Locate the battery. Refer to the system board label inside the computer.

7. Remove the old battery.



8. Install the new battery.



9. Replace the memory board and any adapters that were removed to gain access to the battery.
10. Install the cover. See “Completing the installation” on page 71.
11. Plug in the power cord.

    Note: When the computer is turned on for the first time after battery replacement, an error message might be displayed. This is normal after the battery is replaced.

12. Turn on the computer and all attached devices.
13. See “Using the Configuration/Setup Utility program” on page 31 to set the date and time and any passwords.
14. Dispose of the old battery as required by local ordinances or regulations.

Configuration

The following configuration programs are provided with the computer:

Configuration/Setup Utility program
The Configuration/Setup Utility program is part of the BIOS code that comes with the computer. You can use this program to configure serial and parallel-connector assignments, change the drive startup sequence, set the date and time, set passwords, and set the chassis-intrusion alert. See "Using the Configuration/Setup Utility program" for more information.

SCSISelect Utility program
The SCSISelect Utility is a built-in program that enables you to configure the devices that are attached to the SCSI adapter (on some models). Use this program to change default values, resolve configuration conflicts, and perform a low-level format on a SCSI hard disk drive. See "Using the SCSISelect Utility program (some models)" on page 34 for more information.

PXE Boot Agent Utility
The Preboot eXecution Environment (PXE) Boot Agent Utility program is part of the BIOS code that comes with the computer. You can use this program to select operating-system wake-up support and to set menu wait times. For information on how to start this utility, see "Using the PXE Boot Agent Utility program" on page 37.

Using the Configuration/Setup Utility program

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

Starting the Configuration/Setup Utility program

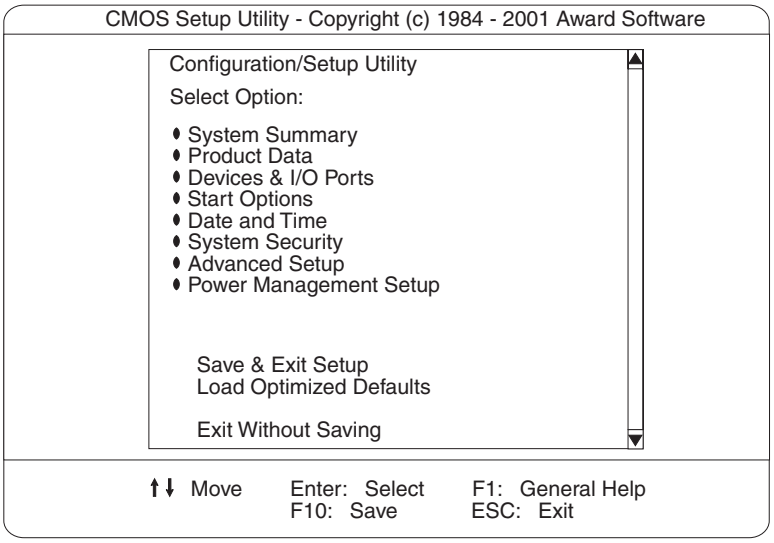
Complete the following steps to start the Configuration/Setup Utility program.

1. Turn on the computer and watch the monitor screen.
2. When the message `Press F1 for Configuration/Setup` displays, press F1.
3. Follow the instructions that appear on the screen.

The Configuration/Setup Utility main menu choices

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

following.



Notes:

1. Press F1 to display help information for a selected menu item.
2. Choices on some menus might differ slightly from the ones that are described in this book, depending on the version of BIOS code in the computer.
3. If both a power-on and administrator password are set, you can type either password at the password prompt that appears as you start the computer. However, if you want to change the settings in the Configuration/Setup, you must type the administrator password to access the full configuration menus. If you type the power-on password, you will see limited information in the Configuration/Setup program. For more information about setting passwords, see "Using passwords" on page 34.

The Configuration/Setup Utility main menu choices are as follows:

- **System Summary**

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

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

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

- **Product Data**

  Select this choice to view system information, such as the machine type and model, the computer serial number, and the revision level or issue date of the BIOS code that is stored in the flash EEPROM.

- **Devices and I/O Ports**

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

- **Start Options**

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

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

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

You can enable a virus-warning test that checks for changes in the master boot record at startup. You also can choose to run POST in the quick mode, or read the microprocessor serial number.

- **Processor Control**

  Select this choice to display processor speed information. If the processor speed is accidently changed, use this choice to reset the processor speed based on the computer model.

- **Date and Time**

  Select this choice to set the system date and time.

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

- **System Security**

  Select this choice to set a power-on or an administrator password. See “Using passwords” on page 34 for more information. You also can enable the chassis-intrusion detector to alert you each time the computer cover is removed.

- **Advanced Setup**

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

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

  – **Cache Control**

    Select this choice to enable or disable the microprocessor cache.

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

  – **ROM Shadowing**

    Select this choice to enable or disable the state of ROM shadowing.

  – **Chipset Feature**

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

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

  – **Memory Settings**

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

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

- **Power Management Setup**

  Select this choice to enable or disable system power settings. This includes automatic power-on settings such as Wake on LAN and Wake on Alarm.
- **PC Health Status**

  Select this choice to display the computer temperature and voltage status.
- **Save and Exit Setup**

  Select this choice to save the customized settings.
- **Load Optimized Defaults**

  Select this choice to discard the changes and restore the factory settings.
- **Exit Without Saving**

  Select this choice if you want to exit without saving changes, or if no changes have been made.

Using passwords

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

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

If you forget the power-on password, you can regain access to the computer through one of the following methods:

- Start the Configuration/Setup Utility program and change the power-on password.
- Change the jumper position on the complimentary metal oxide semiconductor (CMOS) jumper as described in “Erasing a lost or forgotten password (clearing CMOS)” on page 27.

Using the SCSISelect Utility program (some models)

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

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

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

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 displays, press Ctrl+A.
3. When the `Would you like to configure the host adapter or run the SCSI disk utility?` question displays, make your selection; then, press Enter.
4. Use the arrow keys to select a choice from the menu.

- Press Esc to exit the SCSISelect Utility program.
- Press the F5 key to switch between color and monochrome modes (if the monitor permits).

5. Follow the instructions on the screen to change the settings of the selected items; then, press **Enter**.

SCSISelect menu choices

The following choices appear on the SCSISelect Utility menu:

Configure/View Host Adapter Settings

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

You can view or change the following controller settings:

- **Host Adapter SCSI ID**

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

- **SCSI Parity Checking**

  Select this choice to view the assigned value of Enabled.

- **Host Adapter SCSI Termination**

  Select this choice to view the assigned value of Automatic.

- **Boot Device Options**

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

- **SCSI Device Configuration**

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

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

  – The transfer rate for Ultra160 low voltage differential (LVD) devices is 160.0 MBps.

  – The transfer rate for Ultra2 SCSI LVD devices is 80.0 MBps.

  – The transfer rate for Fast SCSI devices is 20.0 MBps.

Advanced Configuration Options

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

SCSI Disk Utilities

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

To use the utility program, select a drive from the list. Read the on-screen instructions carefully before making a selection.

Note: If you press Ctrl+A before the selected drives are ready, an Unexpected SCSI Command Failure screen might appear. Restart

the computer and watch the SCSISelect messages as each drive starts. When the drive that you want to view or format starts, press Ctrl+A.

Using the PXE Boot Agent Utility program

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

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

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

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

Starting the PXE boot agent utility program

To start the PXE Boot Agent Utility program:

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

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

PXE boot agent utility menu choices

The following choices appear on the PXE boot agent utility menu:

- **Network Boot Protocol**

  PXE is the default value for this menu item.

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

  Attention: This option is not supported on this product. To change the boot order use the Configuration/Setup utility. See “Using the Configuration/Setup Utility program” on page 31 for more information.
- **Show setup prompt**

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

  When this choice is enabled, the prompt `Press Ctrl+S to enter the setup menu` appears on the screen under the initializing prompt.
- **Setup time wait menu**

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

– 8 seconds

- **Legacy OS wake up support**

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

  – Disabled (Default)

  – Enabled

Notes:

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

BIOS levels

An incorrect level of BIOS can cause false error and unnecessary FRU replacement. Use the following information to determine the current level of BIOS installed in the computer, the latest BIOS available for the computer, and where to obtain the latest level of BIOS.

- Current Level BIOS information

  Run the Configuration Utility to determine the level of BIOS installed.

- Sources for determining the latest level BIOS available
  1. IBM Home Page, Support

     http://www.ibm.com/support
  2. PC PartnerInfo-Technical Database (CTSTIPS.NSF)
  3. HelpCenter
  4. Levels 1 and 2 Support
  5. RETAIN
- Sources for obtaining the latest level BIOS available
  1. IBM Home Page, Support

     http://www.ibm.com/support
  2. PC PartnerInfo-Technical Database (CTSTIPS.NSF)
  3. HelpCenter
  4. Levels 1 and 2 Support

To update (flash) the BIOS, see “Flash (BIOS/VPD) update procedure”.

Flash (BIOS/VPD) update procedure

Attention: Refer to the information label located inside the system unit cover for any model-specific information.

1. Power-off the computer.
2. Insert the flash update diskette into drive A.
3. Power-on the computer.
4. When the Update Utility appears; select the country/keyboard, then press Enter.
5. If the computer serial number was previously recorded, the number is displayed with an option to update it. Press Y to update the serial number.
6. Type the 7-digit serial number of the computer you are servicing, then press Enter.

7. Follow the instructions on the screen to complete the flash (BIOS/VPD) update procedure.

Flash recovery boot block switch

Attention: If an interruption occurs during a Flash/BIOS upgrade, the BIOS might be left in an unusable state. The Boot Block switch enables you to restart the system and recover the BIOS.

To perform a Flash/BIOS recovery, use the following procedure.

1. Power-off the computer and remove the cover and front bezel.
2. Move the system board rocker switch 3 to the on position. Refer to “System board connectors” on page 42″ or the label inside the computer for more information.
3. Insert the upgrade diskette into the diskette drive.
4. Power-on the computer. The IBM Logo will appear.

   Note: Depending on the amount of memory installed, it may take up to a minute for the Logo to appear.
5. When the Flash Update Utility appears, select the country/keyboard, then press Enter.
6. If the computer serial number was previously recorded, the number is displayed with an option to update it. Press Y to update the serial number.
7. Type the 7-digit serial number of the computer you are servicing, then press Enter.
8. Follow the instructions on the screen to complete the flash (BIOS/VPD) update procedure.
9. When you are instructed to reboot the computer, power-off the computer and move the rocker switch 3 to the normal (off) position. Then replace the cover and power-on the computer.

Installing options

This chapter provides instructions to help you add options to the computer. Use these instructions along with the documentation that comes with the option. Some option-removal instructions are provided, in case you need to remove one option and install another. For a list of supported options for the computer, go to http://www.ibm.com/pc/support on the World Wide Web.

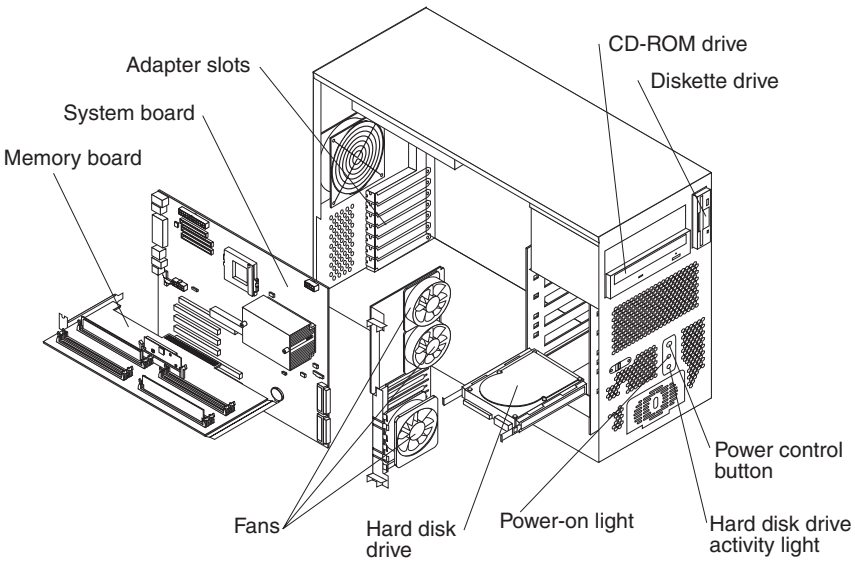
Note: Run ConfigSafe (or a similar application) to take a ″snapshot″ of the operating system configuration before installing an optional device. Using this snapshot, you can view and compare the changes in the operating system configuration after you install an option. Also, if you have problems configuring the option after it is installed, ConfigSafe enables you to restore the operating system configuration to the previous settings.

ConfigSafe is also available on the *Software Selections* CD. For more information, see “Using the ConfigSafe program” on page 27.

Major components of the IntelliStation M Pro Types 6850 and 6233

The following illustration shows the locations of the major components of the IntelliStation M Pro computer.

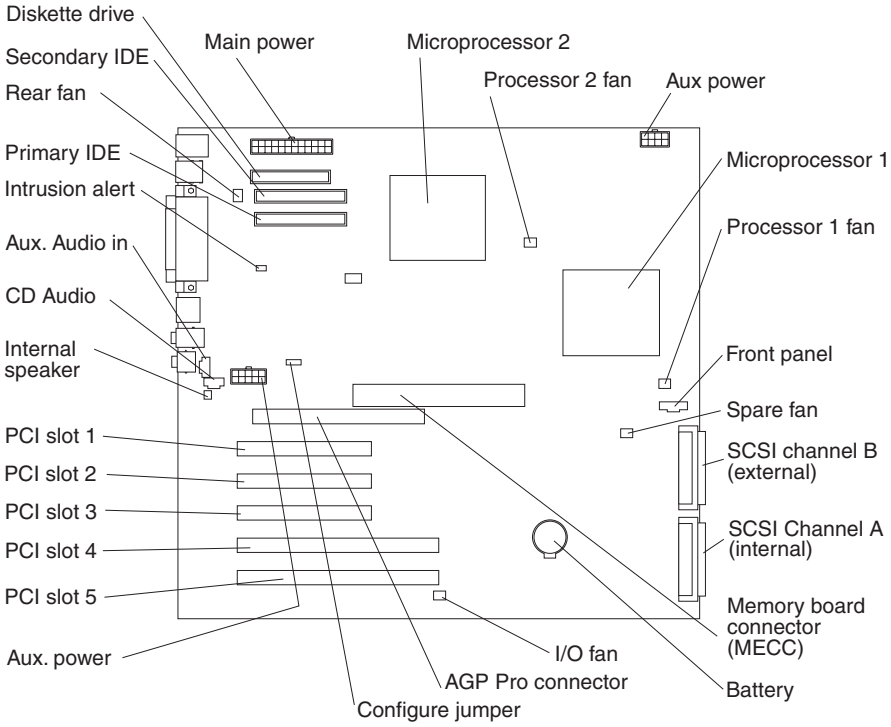
Note: The illustrations in this documentation might differ slightly from your hardware.



System board connectors

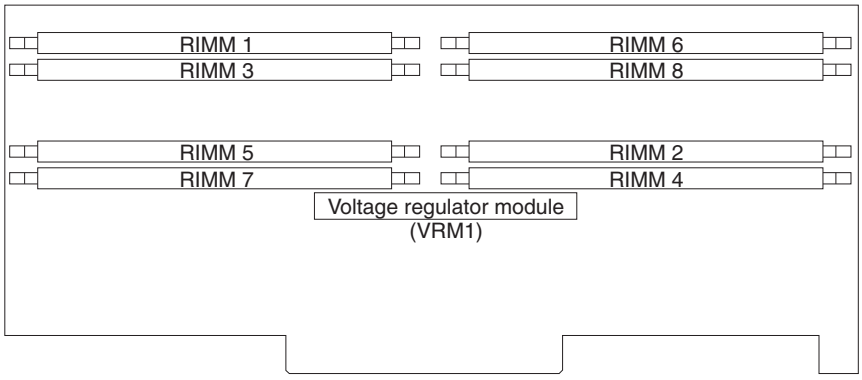
The following illustration shows the components on the system board.

Note: An illustration of the system board with additional information is provided on a label located on the inside of the computer chassis.



Memory board connector

The memory board has RIMM connectors and a memory voltage regulator module (VRM). The memory board has eight RIMM connectors. When installing system memory, refer to the following illustration for the location of the RIMM connectors.



Before you begin

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

- Become familiar with the safety and handling guidelines specified under "Handling static-sensitive devices", and read the "Safety information" on page 103. These guidelines help you work safely while working with the computer or options.
- Make sure that you have an adequate number of properly grounded electrical outlets for the computer, monitor, and other options that you intend to install.
- Back up all important data before you make changes to disk drives.
- Have a small, flat-blade screwdriver available.
- For a list of supported options for the computer, refer to http://www.ibm.com/pc/us/intellistation on the World Wide Web.

System reliability considerations

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

- Each of the drive bays has a filler panel installed.
- The cover is in place during normal operations, or is removed for no longer than 30 minutes while the computer is operating.
- There is space around the computer to allow the computer cooling system to work properly. Leave about 127 mm (5 in.) of space around the front and rear of the computer.
- Cables for optional adapters are routed according to the instructions provided with the adapters.
- A failed fan is replaced within 48 hours.

Handling static-sensitive devices

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

To reduce the possibility of damage from an 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 frame.
- Do not touch solder joints, pins, or exposed printed circuitry.
- Do not leave the device where others can handle and possibly damage the device.
- While the device is still in its static-protective package, touch it to an unpainted metal part of the computer for at least two seconds. (This discharges the static electricity from the package and from your body).
- Remove the device from its package and install it directly into the computer without setting it down. If it is necessary to set the device down, place it on its static-protective package. (If the device is an adapter, place it component side up). Do not place the device on the computer cover or on a metal table.
- Take additional care when handling devices during cold weather because heating reduces indoor humidity and increases static electricity.

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 the 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.

For further information on battery disposal, call IBM at 1-800-IBM-4333 (1-800-426-4333) in the U.S. For information outside of the U.S., contact an IBM reseller or marketing representative.

Statement 3

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

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

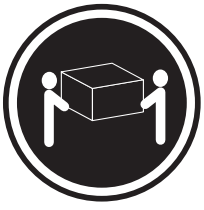
DANGER:

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

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

Statement 4

CAUTION:



≥18 kg (37 lbs)

≥32 kg (70.5 lbs)

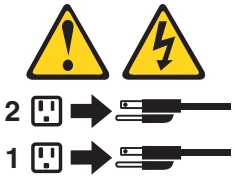
≥55 kg (121.2 lbs)

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.

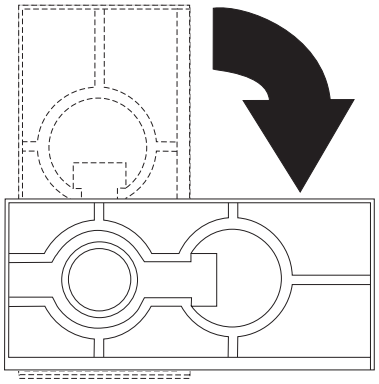
Installing options

This section provides instructions for installing various options in the computer.

Moving the stabilizing feet

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

When installing options in the computer, you might find it easier to lay the computer on its side. If you do so, rotate the feet in towards the computer, so they do not break off due to the weight of the computer.

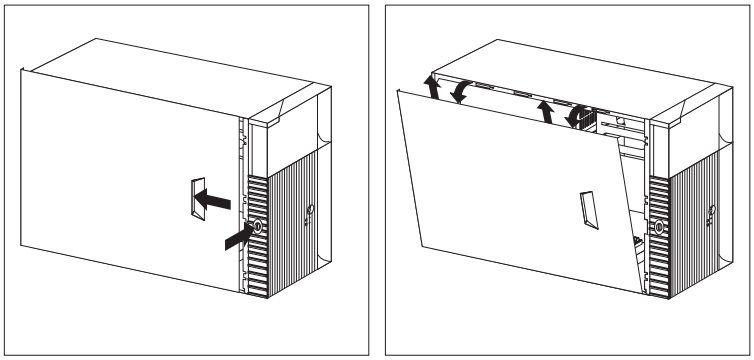


Removing the cover and front bezel

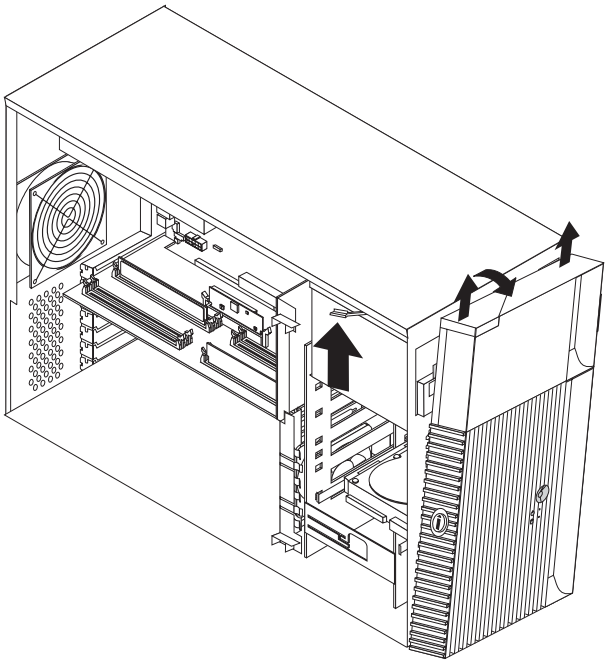
The following information describes how to remove the cover and bezel from the computer. When disconnecting cables, be sure to note where they attach, so that you can correctly reattach them correctly later.

To remove the cover and front bezel, complete the following steps:

1. Review the information in “Before you begin” on page 43.
2. Remove any media (diskettes, CDs, or tapes) from the drives, and shut down the operating system.
3. Turn off the computer and all attached devices. Disconnect all external cables and power cords.
4. If the key-lock button is locked, unlock it.
5. Press the key-lock button on the left side of the front bezel, and slide the side cover toward the rear of the computer.
6. Lift the side cover from the computer.



7. Lift the lever at the top of the chassis and pull the front bezel from the front of the computer. You might need to move the computer closer to the edge of the desk to completely rotate the bezel down to remove it.



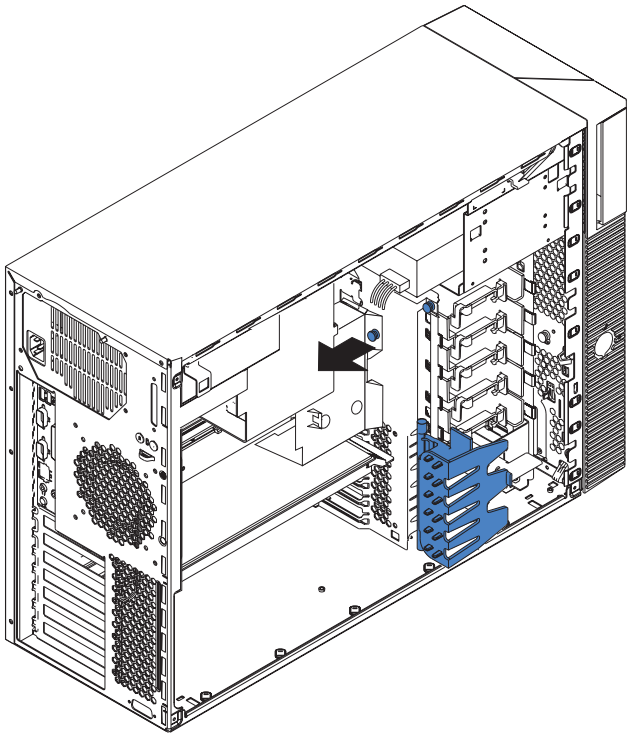
Attention: Proper cooling is required for the reliable performance of internal components. Do not operate the computer with the cover removed.

Removing the air baffle

The computer might come with a plastic air baffle that directs air flow through the processor. When installing options, you might need to lift the air baffle out of the chassis to access some components. Place the baffle back into place before replacing the cover.

To remove the air baffle, do the following:

1. Pull the blue clip outward until the pins disengage.



2. Slide the air baffle back slightly and lift it to remove it.

Working with adapters

You can install a variety of adapters in the expansion slots on the system board. For help in locating the system board, see “Major components of the IntelliStation M Pro Types 6850 and 6233” on page 41.

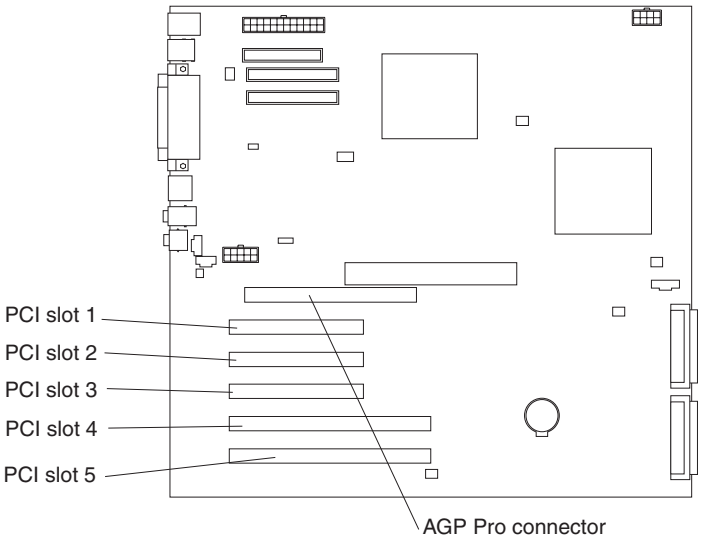
Note: The computer power supply might not be able to support the installation of an adapter in all PCI slots. The ability of the power supply to support an adapter in all slots is dependent on the computer configuration and the type of PCI adapter installed.

You can install various adapters in the expansion slots in the computer. The AGP Pro video adapter is installed in the AGP slot. You can install up to five PCI adapters in PCI expansion slots. There are three 32-bit PCI slots and two 64-bit slots.

Note: Because of its width, the Wildcat III 6110 video adapter requires both the AGP slot and the adjacent PCI slot. If your model contains this video adapter, be careful when you install an adapter in PCI slot 2 because the space between the Wildcat III 6110 adapter and PCI slot 2 is very limited, which causes the adapters to be very close to each other.

The following illustration shows the location of the AGP and PCI expansion slots on the system board.

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



Adapter considerations

Before you install adapters, read the following:

- Review the documentation that comes with the adapter, and follow those instructions in addition to the instructions given in this chapter.
- You can install full-length adapters in all five PCI expansion slots.
- The computer supports 5.0V and 3.3V PCI adapters. The 32-bit adapter slots support 5.0V PCI adapters and the 64-bit slots support 3.3V adapters.

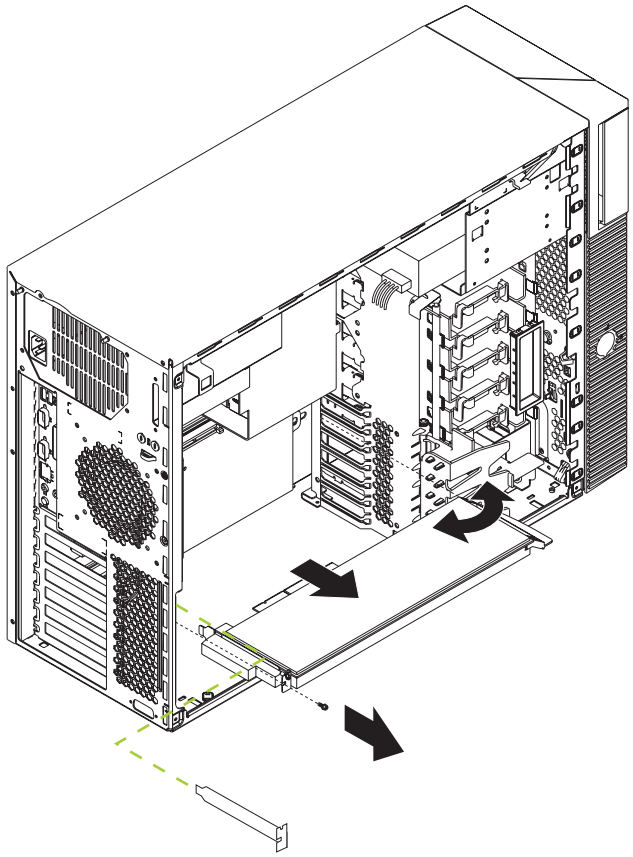
Note: The computer power supply might not be able to support the installation of an adapter in all PCI slots. The ability of the power supply to support an adapter in all slots is dependent on the computer configuration and the type of PCI adapter installed.

Installing an adapter

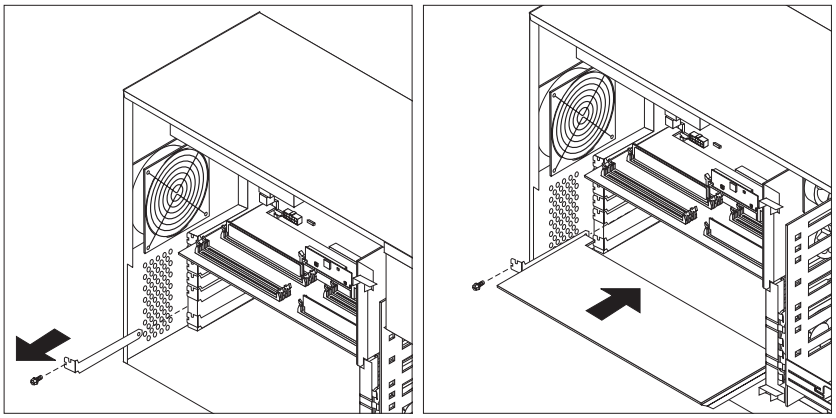
Attention: When you handle static-sensitive devices, take precautions to avoid damage from static electricity. For details on handling these devices, refer to “Handling static-sensitive devices” on page 43.

To install an adapter, complete the following steps:

1. Review the “Safety information” on page 103.
2. Turn off the computer and peripheral devices.
3. Remove all external cables from the computer; then remove the cover. For more information, see “Removing the cover and front bezel” on page 47.
4. Determine which PCI expansion slot you will use for the adapter.
5. If you are installing a full-sized adapter in one of the PCI slots on the system board, rotate the PCI support bracket out of your way.



6. Remove the PCI adapter retention bracket or the adapter retention screw (depending on the model) from the rear of the system and remove the expansion slot cover.
7. Touch the static-protective package containing the adapter to any unpainted metal surface in the computer; then, remove the adapter from the package.
8. Install the adapter in the expansion slot.



9. Replace the PCI adapter retention bracket or adapter retention screw (depending on the model).
10. Rotate the PCI adapter support bracket back into place.
11. Replace the cover, see “Replacing the cover and connecting the cables” on page 65.

Adapters supported by the computer use *Plug and Play* technology, which enables the computer to automatically configure the adapter. For more information, see “Updating the computer configuration” on page 71.

Installing internal drives

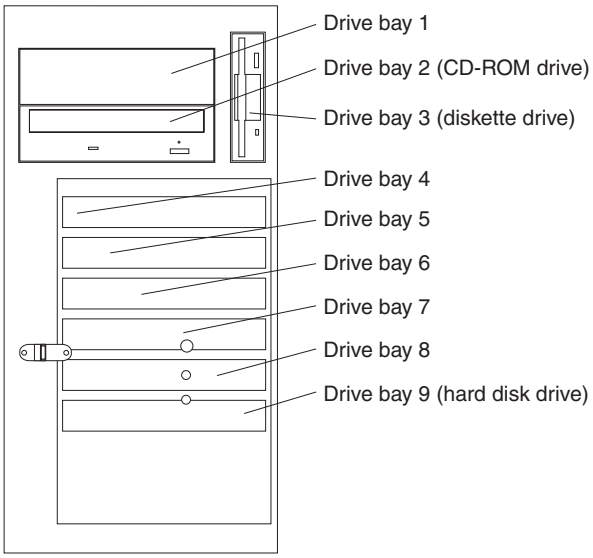
Different types of drives enable the computer to read multiple types of media and store data in different formats. Depending on the computer model, you might have one or more of the following drives installed.

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

Internal drive bays

The IBM IntelliStation M Pro computer comes with an IDE CD-ROM drive installed in bay 2, a 3.5-inch, 1.44 MB diskette drive (2 mode) installed in bay 3, a SCSI hard disk drive installed in bay 9 in SCSI models, and an IDE hard disk drive installed in bay 5 in IDE models. The computer has a static shield and bay panel installed in bay 1.

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



Drive specifications

The following table describes some of the drives you can install in each bay and their height requirements.

Bay number	Type of drive
Bay 1 - Maximum height: 25.4 mm (1.0 in.)	• Tape drive • DVD • Jaz drive • Zip drive (bracket required) • CD-RW
Bay 2 - Maximum height: 25.4 mm (1.0 in.)	CD-ROM drive (preinstalled)
Bay 3 - Maximum height: 25.4 mm (1.0 in.)	3.5-inch diskette drive (preinstalled)
Bay 4 - Maximum height: 25.4 mm (1.0 in.)	3.5-inch hard disk drive
Bay 5 - Maximum height: 25.4 mm (1.0 in.)	3.5-inch hard disk drive (preinstalled in bay 5 on IDE models)
Bay 6 - Maximum height: 25.4 mm (1.0 in.)	3.5-inch hard disk drive
Bay 7 - Maximum height: 25.4 mm (1.0 in.)	3.5-inch hard disk drive
Bay 8 - Maximum height: 25.4 mm (1.0 in.)	3.5-inch hard disk drive
Bay 9 - Maximum height: 25.4 mm (1.0 in.)	3.5-inch hard disk drive (preinstalled in bay 9 on SCSI models)

Notes:

1. Install removable-media drives in bay 1.
2. The computer supports only one diskette drive (bay 3).
3. IDE models are shipped with an IDE hard disk drive in bay 5. If you upgrade, install the second hard disk drive in bay 4.
4. The computer supports up to four IDE hard disk drives. Install the first two hard disk drives in bay 4 and bay 5. You can install two more hard disk drives in bays 6 and 7 by removing the CD-ROM drive connection.
5. SCSI models are shipped with a SCSI hard disk drive in bay 9. If you upgrade, install the next hard disk drive in bay 8; then, bays 7, 6, 5, and 4 (in this order).

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

SCSI Controller

The computer is equipped with a SCSI controller integrated on the system board for use with Ultra160 SCSI devices.

If the computer has preinstalled software, you can find information about the SCSI controller and connecting devices by clicking **Start --> Access IBM--> Get help --> View documentation**. SCSI documentation is also on the *Software Selections* CD that comes with the computer.

Power and signal cables for internal drives

The computer uses cables to connect internal drives to the power supply and system board. The drives that are preinstalled in the computer come with power and signal cables attached. If you replace any drives, it is important to remember which cable is attached to which drive. The following cables are provided:

- Four-wire power cables connect most drives to the power supply. At the end of these cables are plastic connectors that attach to different drives; these connectors vary in size. Also, certain power cables attach to the system board.

- Flat signal cables, also called ribbon cables, connect SCSI, IDE, and diskette drives to the system board.
  - The wider gray signal cable has three connectors. One of these connectors attaches to the CD-ROM drive, one is available for a device installed in bay 1, and one attaches to the secondary IDE connector on the system board.
  - The narrower gray signal cable has two connectors for attaching the diskette drive to the diskette-drive connector on the system board.
  - An Ultra160 twisted ribbon cable connects the internal Ultra160 SCSI hard disk drive to the SCSI connector on the system board. This cable has five additional connectors for attaching more internal SCSI devices.
  - A round SCSI cable connects external SCSI devices to the SCSI connector on the system board and provides an additional connector for a SCSI device installed in bay 1. If a SCSI device is installed in bay 1 but no external SCSI devices are attached, a SCSI terminator must be attached to the external SCSI connector. For more information on connecting SCSI devices, see the Adaptec SCSI documentation on the *Software Selections* CD that comes with the computer.

Note: To locate connectors on the system board, see “System board connectors” on page 42.

Considerations for cabling IDE internal drives: The following are some important points to remember when connecting IDE internal drives:

- When you install a hard disk drive, ensure that the drive connector at the end of the signal cable is always connected to a drive; also, ensure that the drive connector at the other end is connected to the system board. This reduces electronic noise from the computer.
- IDE models ship with a gray ATA100 cable. Attach the blue connector to the primary IDE connector on the system board, attach the black connector to the master hard disk drive, and attach the gray connector to the subordinate hard disk drive.
- 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 system might not recognize some of the IDE devices. Switch or jumper settings on each IDE device determine the master or subordinate designation.
- 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 the master device.
- If you have only one IDE device on a cable, it must be set as master.

Preinstallation steps

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

1. Read the “Safety information” on page 103, “Handling static-sensitive devices” on page 43, and the documentation that comes with the drive.
2. Choose the bay in which you want to install the drive.
3. Check the instructions that come with the drive to see if you need to set any switches or jumpers on the drive. If you are installing a SCSI device, be sure to set the SCSI ID for that device.

Installing a drive in bay 1

Before you begin, do the following:

Attention: When you handle static-sensitive devices, take precautions to avoid damage from static electricity. For details on handling these devices, refer to “Handling static-sensitive devices” on page 43.

- For information on installing SCSI drives, see the SCSI information on the *Software Selections* CD that comes with the computer.
- Review the “Safety information” on page 103.
- Read the documentation that comes with the hard disk drive.
- Turn off the computer and all peripheral devices.
- Disconnect all external cables and power cords; then, remove the computer side cover. See “Removing the cover and front bezel” on page 47.

Statement 3

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

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

DANGER:

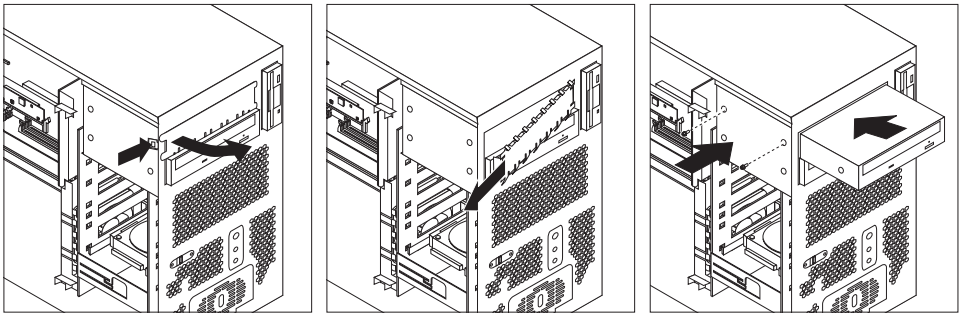
Some laser products contain an embedded Class 3A or Class 3B laser diode. Note the following:

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

To install a drive in drive bay 1, do the following:

Note: You need an industry standard bay adapter bracket to install a 3.5-inch hard disk drive in drive bay 1.

1. Touch the static-protective package containing the new drive to any unpainted metal surface in the computer; then, remove the drive from the package.
2. Remove the EMC shield covering drive bay 1 and insert the drive into the empty drive bay. Then, tighten the screws to hold the drive in place.



3. Attach all cables to the hard disk drive.
4. If the drive is a removable media drive, remove the front bay panel in the cover.
5. Replace the side cover and reconnect the external cables and power cords. See “Replacing the cover and connecting the cables” on page 65.

Installing drives in drive bays 4, 5, 6, 7, and 8

Before you begin, do the following:

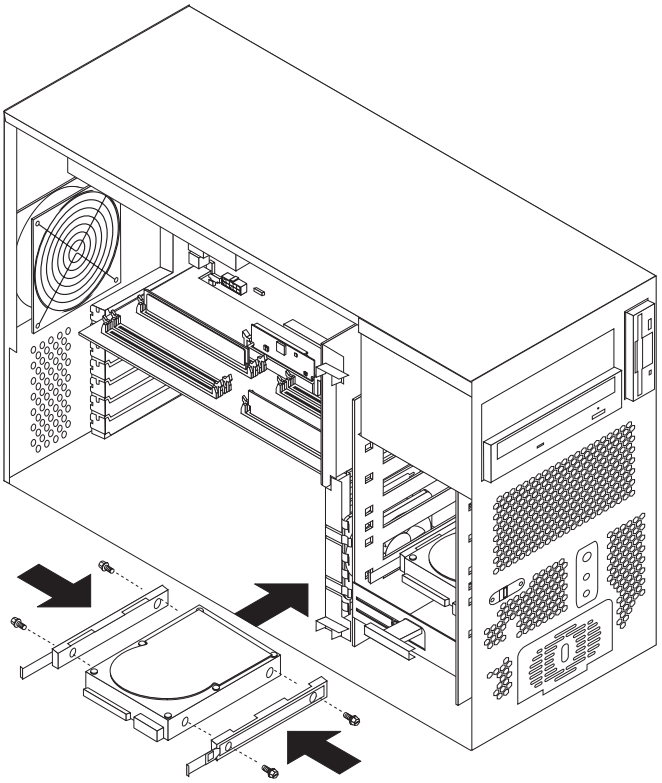
Note: For IDE models, there are only four hard disk drives supported. The IDE models are shipped with a hard disk drive installed bay 5. If you upgrade, install hard disk drives in bay 4, 6, and 7 (in this order).

- SCSI models are shipped with a hard disk drive installed in bay 9. If you upgrade, install hard disk drives in bay 8, 7, 6, 5, and 4 (in this order).

- For information on installing SCSI drives, see the SCSI information on the *Software Selections* CD that comes with the computer.
- Review the “Safety information” on page 103.
- Read the documentation that comes with the hard disk drive.
- Turn off the computer and all peripheral devices.
- Disconnect all external cables and power cords; then, remove the computer side cover. See “Removing the cover and front bezel” on page 47.

To install a drive in drive bays 4, 5, 6, 7, and 8, do the following:

1. Touch the static-protective package containing the new drive to any unpainted metal surface in the computer; then, remove the drive from the package.
2. Get two sliding rail mounts from the plastic bag located underneath the hard disk drive cage.
3. Mount the sliding rails on the hard disk drive you want to install.



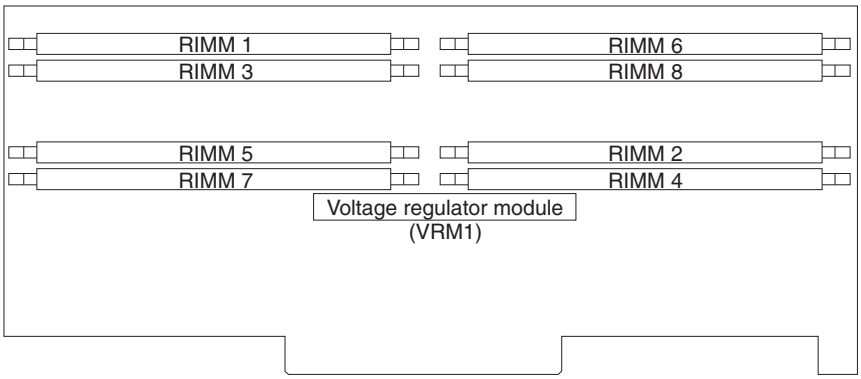
4. Slide the hard disk drive along the rail guides into the drive bay.
5. Attach all cables to the drive.
6. Replace the side cover and reconnect the external cables and power cords. See “Replacing the cover and connecting the cables” on page 65.

Installing memory modules

Adding memory to the computer is an easy way to make programs run faster. You can increase the amount of memory in the computer by installing options called memory modules.

The computer has eight connectors for installing Rambus inline memory modules (RIMMs). The IBM-installed RIMMs that come with the computer are ECC (error checking and correction) RDRAM (Rambus dynamic random access memory)

modules.



RIMM pairing is as follows:

- Pair 1 includes **RIMM 1** and **RIMM 2**.
- Pair 2 includes **RIMM 3** and **RIMM 4**.
- Pair 3 includes **RIMM 5** and **RIMM 6**.
- Pair 4 includes **RIMM 7** and **RIMM 8**.

When installing or replacing RIMMs, note the following:

- The memory board in the computer has eight RIMM connectors arranged in pairs. RIMMs must be installed in matched pairs. This means that the RIMMs installed in a RIMM connector pair must be the same speed, size, and technology. For example, you can install a pair of 144Mbit, ECC, 400MHz, 128 MB RIMMs in RIMM 1 and RIMM 2 slots. You **cannot** install a pair that has one 144Mbit, ECC, 400MHz, 128 MB RIMM in RIMM 1 and one 288Mbit, ECC, 400MHz, 256 MB RIMM in RIMM 2, or vice versa. When you want to upgrade with another pair of RIMMs, you can install either a pair of 128 MB RIMMs, a pair of 256 MB RIMMs, or a pair of 512 MB RIMMs (as long as they are of the same speed, size, and technologies).
- The memory board in the computer has eight RIMM connectors, pairs 1 and 2 must have RIMMs or continuity RIMMs (C-RIMMs) installed in them. For the arrangement of the RIMM connector pairs on the computer memory board, see the following table.

  Refer to the following sequence examples for upgrading memory. For these examples, we use 144Mbit, ECC, 400MHz, 128 MB, 256 MB, and 512 memory modules:

  Sequence 1

  The computer is shipped with a pair of 128 MB RIMMs installed in RIMM 1 and RIMM 2 connectors and a pair of C-RIMMs installed in RIMM 3 and RIMM 4. All other RIMM connectors are empty.

  Sequence 2

  The first upgrade with a pair of 256 MB RIMMs. Remove the C-RIMMs from RIMM 3 and RIMM 4 connectors, and insert them in RIMM 7 and RIMM 8 connectors. Install the new pair of RIMMs in RIMM 3 and RIMM 4 connectors. RIMM 5 and RIMM 6 connectors remain empty.

  Sequence 3

  The second upgrade with a pair of 512 MB RIMMs. Remember, you can mix and match memory modules as long as a pair is of the same size, speed, and technology. Install the pair of 512 MB RIMMs in RIMM 5 and RIMM 6 connectors. No other changes need to be made.

Sequence 4

The third upgrade with a pair of 128 MB RIMMs. Remove the C-RIMMs from RIMM 7 and RIMM 8 (keep the C-RIMMs for future use). Install the new pair of RIMMs into RIMM 7 and RIMM 8 connectors.

- C-RIMMs (termination card) must be populated for unused RIMM slots within the same paired channel.
- C-RIMMs are not needed if the RIMM connectors of the paired channel do not populate any RIMMs.
- Install only ECC RIMMS to enable ECC.
- **Do not** mix RIMM speed, technologies, density, non-ECC and ECC memory within a pair of RIMMs. This is not supported.
- RIMM connectors do not support dual inline memory modules (DIMMs).
- Use only PC800, 400 MHz RIMMs.
- Use only 144 Mbit or 288 Mbit technologies.
- The memory must be installed in matched pairs. To ensure that the RIMM pair match, use RIMMs with identical option part numbers (shown on RIMM labels).

Use the following table to help you to configure a memory card with eight RIMM connectors.

	Pair 1		Pair 2		Pair 3		Pair 4	
	RIMM 1	RIMM 2	RIMM 3	RIMM 4	RIMM 5	RIMM 6	RIMM 7	RIMM 8
2 RIMMs	RIMM	RIMM	C-RIMM	C-RIMM	Empty	Empty	Empty	Empty
4 RIMMs	RIMM	RIMM	RIMM	RIMM	Empty	Empty	C-RIMM	C-RIMM
6 RIMMs	RIMM	RIMM	RIMM	RIMM	RIMM	RIMM	C-RIMM	C-RIMM
8 RIMMs	RIMM	RIMM	RIMM	RIMM	RIMM	RIMM	RIMM	RIMM

Notes:

1. The IBM IntelliStation M Pro computer supports 128 MB, 256 MB, and 512 MB RIMMs. The computer supports a minimum of 256 MB and a maximum of 4 GB of system memory. Refer to http://www.ibm.com/pc/support for a list of memory modules for use with the computer.
2. Installing or removing RIMMs changes the configuration information in the computer. Therefore, after installing or removing a RIMM, you must change and save the new configuration information by using the Configuration/Setup Utility program. When you restart the computer, the system displays a message indicating that the memory configuration has changed. You must start the Configuration/Setup Utility program and select **Save Settings** to save your changes. See “Configuration” on page 31 for more information.
3. The illustrations in this documentation might differ slightly from your computer.

Removing a RIMM or C-RIMM

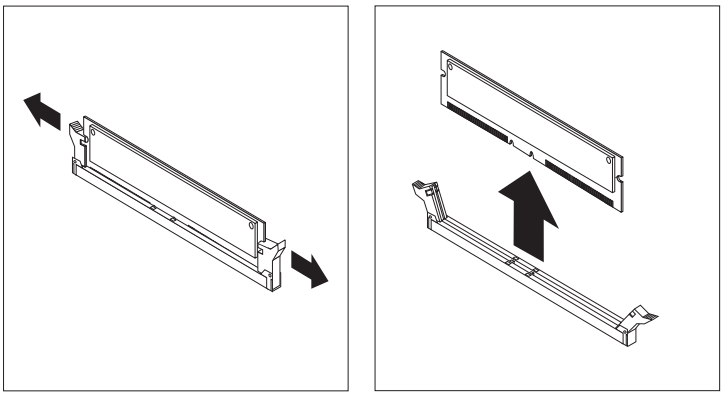
Complete the following steps to remove a RIMM or C-RIMM:

Attention: When you handle static-sensitive devices, take precautions to avoid damage from static electricity. For details on handling these devices, refer to “Handling static-sensitive devices” on page 43.

1. Review the “Safety information” on page 103.
2. Turn off the computer and all attached devices.
3. Disconnect all external cables and power cords from the computer, and remove the computer cover (see “Removing the cover and front bezel” on page 47).

4. If the computer comes with an air baffle, you might need to lift it out to access parts of the system board. See “Removing the air baffle” on page 48 for more information.
5. Remove the PCI adapter retention bracket or the memory board retention screw (depending on the model).
6. Rotate the front adapter support bracket out of the way and pull the memory board out of the chassis.
7. At both ends of the RIMM connector on the memory board, push outward on the retaining clips until the module is loosened. Lift the RIMM or C-RIMM out of the connector.

   Attention: Be careful not to push too hard on the retaining clips, because the RIMM or C-RIMM might eject too quickly.



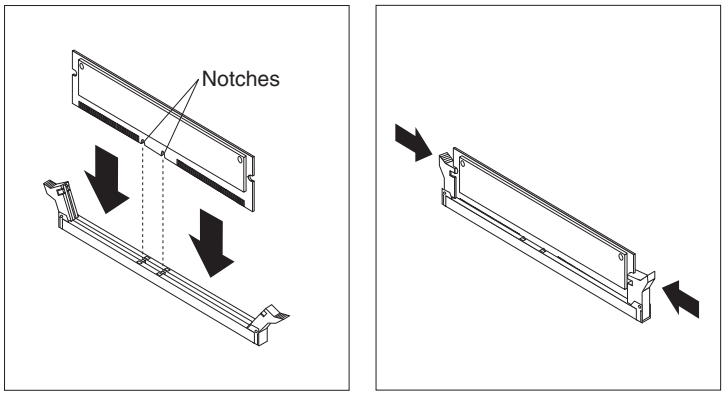
8. Store the RIMM or C-RIMM in a static-protective package. Do not discard or lose this part. It might be needed later if you change the memory configuration.

Installing a RIMM or C-RIMM

Complete the following steps to install a RIMM or C-RIMM:

1. Read the instructions that come with the new system memory.
2. Turn off the computer and all attached devices.
3. Disconnect all external cables and power cords from the computer and remove the computer cover (see “Removing the cover and front bezel” on page 47).
4. Remove any C-RIMMs that are in the slots where you want to add RIMMs.
5. Touch the static-protective package containing the RIMM to any unpainted metal surface on the computer. Then remove the RIMM or C-RIMM from the package.
6. Install the RIMMs in the next highest numbered RIMM slots.
7. Position the RIMM or C-RIMM above the connector so that the two notches on the bottom edge of the module align properly with the empty connector.

   Note: Pay attention to the orientation of the notches on the connectors and RIMMs. Adjacent connectors might not have the same orientation on the memory board.
8. Firmly push the module straight down into the connector until the retaining clips pop up and fit snugly around both ends of the module.



9. Place the memory board into the MEC connector on the system board.
10. Replace the PCI adapter retention bracket.
11. To replace the cover, see “Replacing the cover and connecting the cables” on page 65.
12. Reconnect the external cables and power cords; then, turn on the attached devices and the computer.

Installing a microprocessor

Before you install a second microprocessor on a computer with a preinstalled operating system, do the following:

Notes:

1. Always check the IBM web site at http://www.ibm.com/pc/support for the latest level of diagnostics code before running the diagnostic program.
2. Be sure to check the cache size, type, and speed of the microprocessor that is currently in the computer before installing a second microprocessor. The second microprocessor must be of the same cache size, type, and speed as the microprocessor currently in the computer. Do not install two microprocessors of different cache size, type, and speed.

Use the **System Summary** option on the Configuration/Setup Utility main menu to view the processor speed and other information about the computer. For information on how to start the Configuration/Setup Utility and additional information on configuring the computer, see “Configuration” on page 31.

Installing a second microprocessor on Windows NT

If Windows NT is preinstalled on the computer, follow these steps:

1. Backup the hard disk.
2. Run the Multiprocessor Upgrade Option program, *addcpu.exe*, located at http://www.ibm.com/pc/support before you install the second microprocessor. From the IBM support page, type **addcpu** in the Search field and press Enter. In addition, download and read the addcpu.pdf file for instructions on adding a second microprocessor.
3. Continue with step 1 of “Second microprocessor installation”.

Installing a second microprocessor on Windows 2000

If Windows 2000 is preinstalled on the computer, follow these steps:

Note: Be sure to check the Microsoft web page at http://www.microsoft.com for updates to these instructions. From the Microsoft web page, type **multiprocessor support** in the Search field and press Enter.

1. Backup the hard disk.
2. Do the following:
   a. From the desktop, click **Start--->Settings--->Control Panel**.
   b. On the Control Panel window, double-click the **System** icon.
   c. On the System Properties window, select the **Hardware** tab; then, click the **Device Manager** button.
   d. On the Device Manager window, click on the plus sign (**+**) next to the Computer node to expand the list; then, double-click on **ACPI Uniprocessor PC**.
   e. On the Advanced Configuration and Power Interface (ACPI) PC Properties window, select the **Driver** tab; then, click the **Update Driver** button.
   f. On the Update Device Driver Wizard window, click **Next**.
   g. On the next window, click the **Display a known list of drivers for this device so that I can choose a specific driver** radio button; then, click **Next**.
   h. On the next window, click the **Show all hardware of this device class** radio button. Under the Models field, select **ACPI Multiprocessor PC**; then, click **Next**.
   i. If the configuration shown in the wizard is satisfactory, click **Next** to save the configuration.
   j. Click **Finish** to complete the process.
   k. When prompted as to whether you want to restart the computer, select **Yes**.
3. Continue with step 1 of “Second microprocessor installation”.

Second microprocessor installation

To install a second microprocessor, do the following:

Attention: When you handle static-sensitive devices, take precautions to avoid damage from static electricity. For details on handling these devices, refer to “Handling static-sensitive devices” on page 43.

1. Read the instructions that come with the new microprocessor.

2. Turn off the computer and all attached devices.
3. Disconnect all external cables and power cords from the computer and remove the computer cover (see “Removing the cover and front bezel” on page 47).
4. Lay the computer on its side for better access to the computer components.
5. Remove the memory board.
6. If the computer has an air baffle, remove it (see “Removing the air baffle” on page 48).
7. See the system board label inside the computer for the location of the second microprocessor socket (CPU).
8. Remove the screws from the plastic microprocessor cover; then, remove the plastic microprocessor cover (keep the cover for future use).

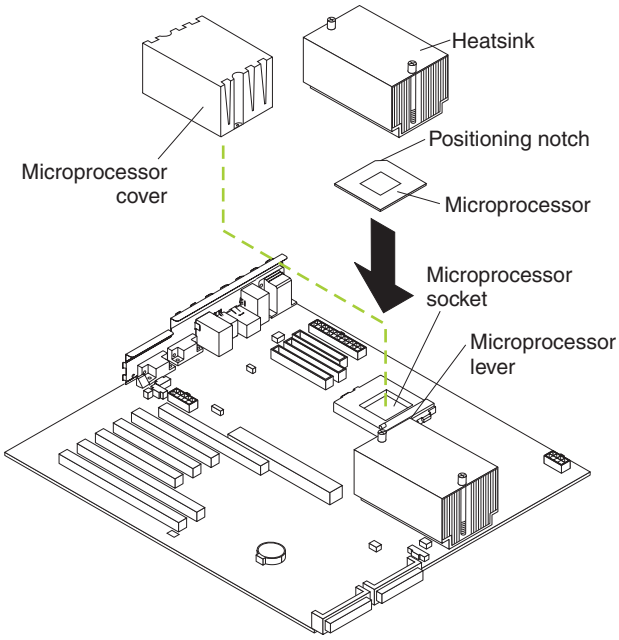
   Note: Some models have the plastic microprocessor cover attached to the air baffle. If this is the case, you must remove the air baffle and microprocessor together, after removing the screws for the plastic microprocessor cover.
9. Touch the static-protective package containing the microprocessor to any unpainted metal surface on the computer. Then, remove the microprocessor from the package.
10. Rotate the microprocessor socket lever back as far as it will go.
11. Insert the microprocessor in the microprocessor socket, lining pin number 1 up with the microprocessor.
12. Rotate the microprocessor socket lever down to secure the microprocessor in place.
13. Touch the static-protective package containing the heatsink to any unpainted metal surface on the computer. Then, remove the heatsink from package.
14. Remove the plastic cap from the bottom of the heatsink. Do not touch the bottom of the heatsink or sit the heatsink down after you remove the plastic cap.

    Notes:

    a. Removing the heatsink from the microprocessor or setting the heatsink down onto any surface when the protective cap is removed from the heatsink can cause the thermal grease on the bottom of the heatsink to become contaminated.

    b. Do not touch the thermal grease on the bottom of the heatsink prior to installing the heatsink.

15. Ensure that you place the heatsink on top of the microprocessor correctly and press firmly.



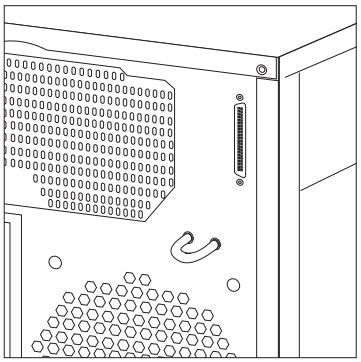
16. When you tighten the screws to secure the heatsink, alternate between the two screws. That is, tighten one screw a little then tighten the other screw a little. Continue switching between the screws until the heatsink is secured to the microprocessor. Alternating the tightening of the screws can help prevent damage to the microprocessor.

    Attention: Ensure that the screws are completely tightened, otherwise, the system will not function properly.

17. Reinstall the air baffle.
18. Reinstall the memory board.
19. Replace the cover (see “Replacing the cover and connecting the cables” on page 65).

Security U-bolt

To help prevent hardware theft, a security U-bolt is attached to the chassis of the computer. To secure the computer, thread a security cable through the U-bolt and around an object that is a not part of or permanently secured to the building structure or foundation, and from which it cannot be removed; then, fasten the cable ends together with a lock. Ensure that the security cable does not interfere with other cables that are connected to the computer.



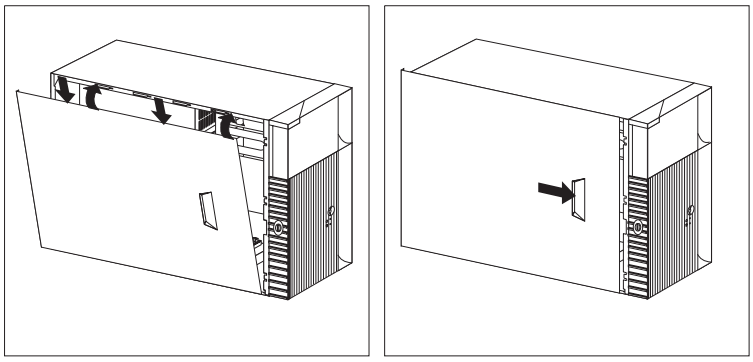
Replacing the cover and connecting the cables

This section provides instructions on how to replace the cover and connect the cables on the computer.

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

Complete the following steps to replace the cover and connect the cables:

1. Review the “Safety information” on page 103.
2. Ensure that all components have been reassembled correctly, and that no tools or loose screws are left inside the computer.
3. Clear any cables that might impede the replacement of the cover.
4. Place the front bezel back onto the front of the chassis and snap it into place.
5. Slide the side cover into place on the chassis and lock the key-lock button.

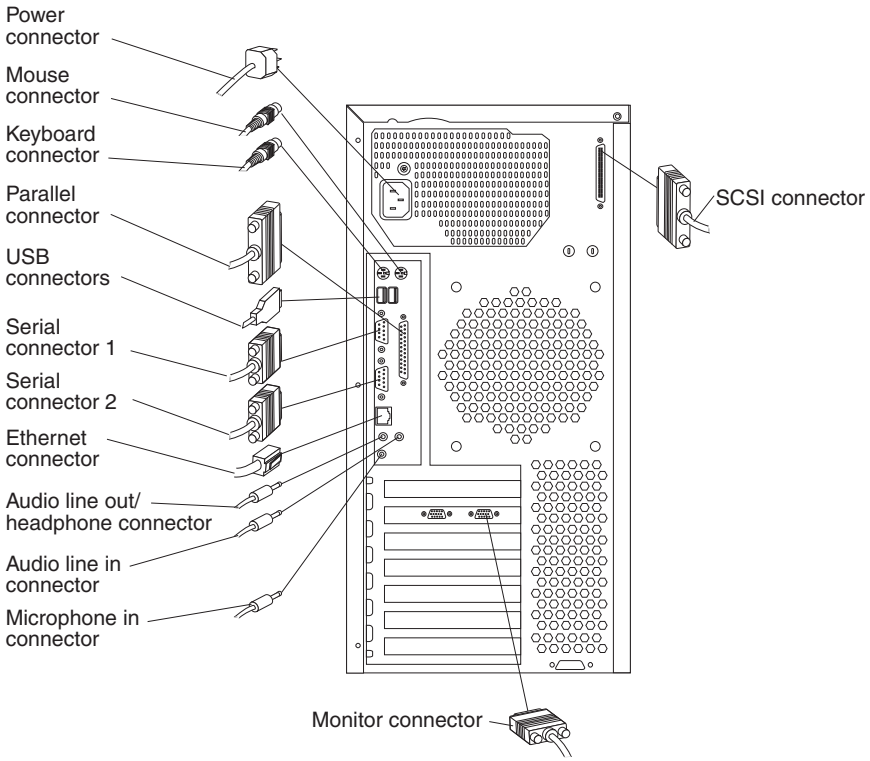


6. Reconnect the external cables and power cords to the computer; then, plug the power cords into properly grounded electrical outlets. Turn on the attached devices and the computer.
7. Update the computer configuration. See “Updating the computer configuration” on page 71.

Note: If an error message related to the chassis-intrusion detector appears after you restart the computer, you must type the administrator password. For more information, see “Using passwords” on page 34.

Input/output connector locations

The following illustrations show the input/output connectors and the expansion slots on the rear of the computer.

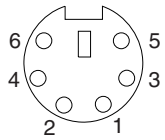


This section provides information about the I/O connectors on the rear of the computer. These connectors include the following:

- One mouse
- One keyboard
- One parallel
- Two USB
- Two serial
- One Ethernet
- Audio
  - Line out
  - Line in
  - Mic
- One video

Mouse connector

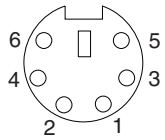
The system board has one mouse connector that supports a mouse or other pointing device. The mouse connector is located on the rear of the computer. See “Input/output connector locations” on page 66 for its location.



Keyboard connector

There is one keyboard connector on the rear of the computer. See “Input/output connector locations” on page 66 for its location.

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



Parallel connector

The computer has one parallel connector. This connector supports three standard Institute of Electrical and Electronics Engineers (IEEE) 1284 modes of operation: standard parallel port (SPP), enhanced parallel port (EPP), and extended capability port (ECP).

Viewing or changing the connector assignments

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

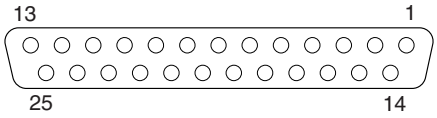
Complete the following steps to view or change the parallel-connector assignment.

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

   Note: When you configure the parallel connector as bidirectional, use an IEEE 1284-compliant cable. The cable must not exceed 3 meters (9.8 feet).
5. Press Esc twice to return to the Configuration/Setup main menu; then, select **Save & Exit Setup** to exit from the Configuration/Setup Utility program.

Parallel connector

There is a 25-pin, female D-shell parallel connector on the rear of the computer. See “Input/output connector locations” on page 66 for the location of this connector.



Serial connectors

The computer has two standard serial connectors: serial connector A and serial connector B.

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

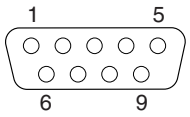
Viewing or changing the serial-connector assignments

Complete the following steps to view or change the serial-connector assignments.

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

Serial connectors

There are two 9-pin, male D-shell serial connectors located on the rear of the computer. See “Input/output connector locations” on page 66 for their locations.



Ethernet connector

The computer comes with an integrated Ethernet controller. This controller provides an interface for connecting to 10-MBps or 100-MBps networks and provides full-duplex capability, which enables simultaneous transmission and reception of data on the Ethernet LAN.

To access the Ethernet connector, attach a Category 3, 4, or 5 unshielded twisted-pair (UTP) cable to the RJ-45 connector on the rear of the computer. See “Input/output connector locations” on page 66 for its location.

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

Configuring the Ethernet controller

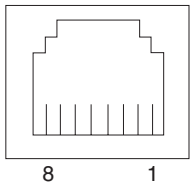
When you connect the computer to the network, the Ethernet controller automatically detects the data-transfer rate (10 MBps or 100 MBps) on the network and then sets the controller to operate at the appropriate rate. In addition, if the

Ethernet connector that the computer is connected to supports auto-negotiation, the Ethernet controller will set the appropriate duplex state. That is, the Ethernet controller will adjust to the network data rate, whether the data rate is standard Ethernet (10BASE-T), Fast Ethernet (100BASE-TX), half duplex (HDX), or full duplex (FDX). The controller supports HDX and FDX modes at both speeds.

The Ethernet controller is integrated on the system board. You do not need to set any jumpers or configure the controller for the operating system before you use the Ethernet controller. However, you must install a device driver to enable the operating system to address the Ethernet controller. The device drivers are provided on the preinstalled software and the *Device Drivers and IBM Enhanced Diagnostics* CD.

Ethernet connector

There is an RJ-45 connector on the rear of the computer. See “Input/output connector locations” on page 66 for the location of this connector.



Universal Serial Bus connectors

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

Notes:

1. If you attach a standard (non-USB) keyboard to the keyboard connector, the USB connectors and devices will be disabled during the power-on self-test.
2. If you install a USB keyboard that has a mouse connector, the USB keyboard emulates a mouse, and you will not be able to disable the mouse settings in the Configuration/Setup Utility program.

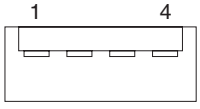
USB cables and hubs

You need a 4-pin cable to connect devices to USB 2 or USB 3. If you plan to attach more than two USB devices, you must use a hub to connect the devices. The hub provides multiple connectors for attaching additional external USB devices.

USB technology transfers data at up to 12 megabits-per-second (MBps) with a maximum of 127 external devices and a maximum signal distance of five meters (16 ft.) per segment.

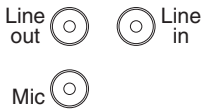
USB connectors

There are two USB connectors on the rear of the computer for attaching USB compatible devices. See “Input/output connector locations” on page 66 for the location of the USB connectors.



Audio connectors

The audio connectors are used to connect external audio equipment to the computer. See “Input/output connector locations” on page 66 for the location of these connectors.



Line out

This connector is used to send audio signals from the computer to external devices, such as powered speakers with built-in amplifiers, headphones, multimedia keyboards, or the audio Line in connector on a stereo system.

Line in

This connector is used to accept audio signals from external devices, such as line output from a stereo, television, or musical instrument into the computer sound system.

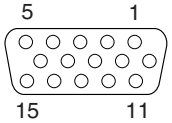
Mic

This connector is used to connect a microphone to the computer when you want to record voice or other sounds on the hard disk drive. It can also be used by speech recognition software.

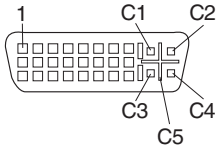
Video connector

The computer uses an AGP video adapter located in the AGP Pro slot on the system board. The video connector is located on the adapter on the rear of the computer. See “Input/output connector locations” on page 66 for the location of this connector.

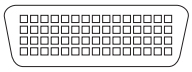
Analog video connector:



Digital (DVI-I) video connector:



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



Some models come with an AGP adapter that has dual video connectors. If you have problems viewing information with a second monitor, see “Changing monitor settings” on page 11.

Models with the Wildcat III 6110 and Fire GL 8800 video adapter come with DVI-I to VGA style analog converters for each DVI-I connector.

Attention: On the Wildcat III 6110 video adapter, the first or only monitor must be connected to the bottom connector (connector number 1).

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

Models with the NVIDIA Quadro4 200NVS video adapter come with a low force helical-60 (LFH-60) to dual-analog monitor pigtail cable. If you want to setup two digital monitors, you will need to purchase a separate dual-digital monitor cable.

Completing the installation

After working with options, you need to reinstall any removed parts, replace the cover, and reconnect cables, such as power cords and monitor cables. Also, depending on the option installed, you might need to update information in the Configuration/Setup Utility program or install device drivers. For instructions on how to install device drivers, see the instructions that come with the option. Some device drivers are included on the *Device Driver and IBM Enhanced Diagnostics* CD that comes with the computer.

Updating the computer configuration

Note: The configuration information in this section applies to installing options. For more information on using the Configuration/Setup Utility program, see “Using the Configuration/Setup Utility program” on page 31.

After adding options, you must update the configuration settings. In most cases, system programs perform this configuration automatically. If the settings are not updated automatically, you can use the Configuration/Setup Utility program to reconfigure the appropriate settings. In either case, you must save the settings before exiting from the Configuration/Setup Utility program.

For information on error messages from resource conflicts, see “Diagnostics” on page 17 and “Symptom-to-FRU index” on page 83.

Configuring Plug and Play adapters

Adapters designed for PCI slots are Plug and Play devices. Plug and Play adapters come with configuration specifications set in the operating system. These specifications provide installation information to the computer during startup. When you install or remove Plug and Play adapters, this information is interpreted by the basic input/output system (BIOS) code, which supports Plug and Play technology. If the required resources are available, the BIOS code automatically configures the adapter using resources not used by other devices. The system board of the computer supports operating systems that use Plug and Play technology.

For more information on error messages from resource conflicts, see “Diagnostics” on page 17 and “Symptom-to-FRU index” on page 83.

Starting the Configuration/Setup Utility program

When you restart the computer for the first time after working with most options, a message similar to the following might appear indicating that a configuration change has occurred.

```
The following error(s) were detected when the system was started:
162 Configuration Changes Has Occurred
Select one of the following:
  Continue
  Exit Setup
```

If such a message appears, you are then prompted to start the Configuration/Setup Utility program to manually update the configuration settings or to confirm and save the settings that were automatically updated by the system programs.

Note: Depending on the configuration changes that occurred, the error message you see might be different from the one shown here. If the preceding screen appears, select **Continue** until you reach the Configuration/Setup Utility program menu (see “Using the Configuration/Setup Utility program” on page 31.

If the preceding message does not appear, use the Configuration/Setup Utility program to configure the computer.

Configuring startup sequence

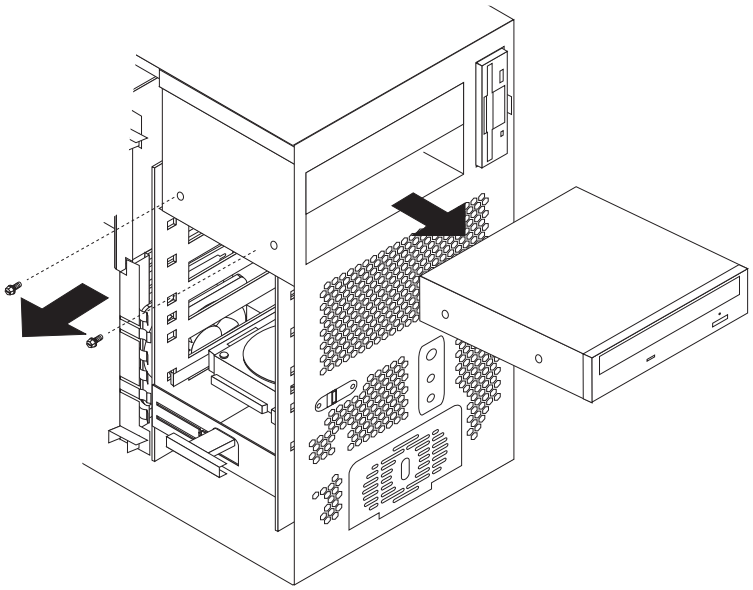
When the computer is turned on and after it completes loading the BIOS code and performs POST, it looks for an operating system. The order in which it searches devices for the operating system is determined by the primary startup sequence or the automatic startup sequence. After adding new devices to the computer, you might want to change the startup sequence. You can use the Configuration/Setup Utility program to configure startup devices.

FRU information (service only)

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

CD-ROM drive removal

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



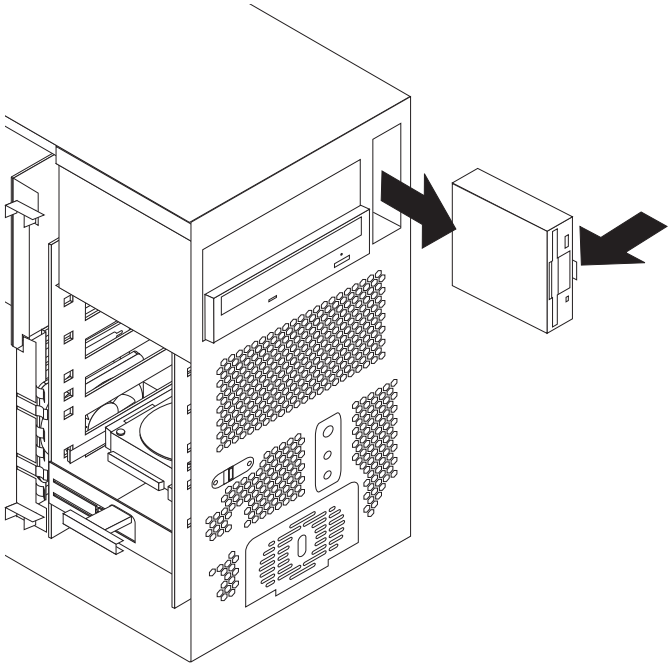
Note: Before performing any removals, read “Safety information” on page 103 and “Before you begin” on page 43.

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

1. Power-off the system.
2. Remove the cover (see “Removing the cover and front bezel” on page 47).
3. Remove the cables.
4. Remove the (2) screws.
5. Gently slide the CD-ROM drive out

Diskette drive

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



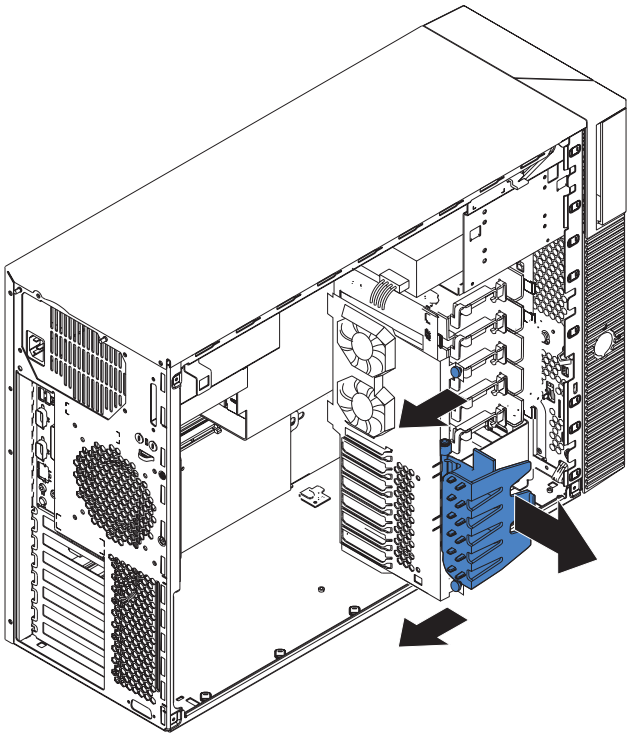
Note: Before performing any removals, read “Safety information” on page 103 and “Before you begin” on page 43.

To remove the diskette drive, do the following:

1. Power-off the system.
2. Remove the cover (see“Removing the cover and front bezel” on page 47).
3. Remove the cables.
4. Push the tab and slide the diskette drive outward.

Fan removal

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



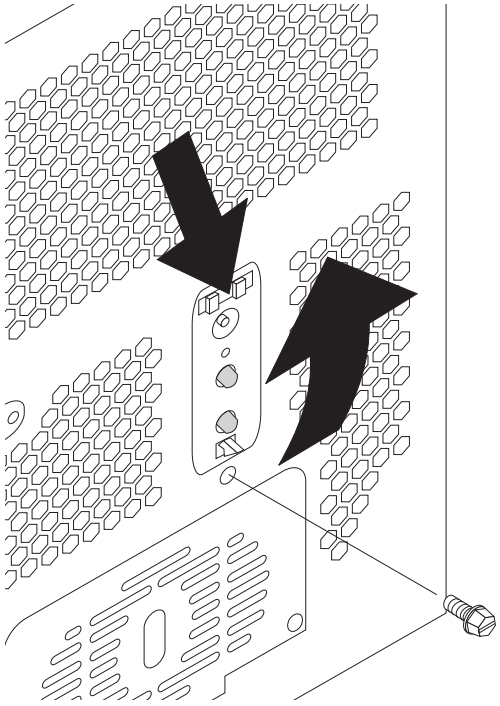
Note: Before performing any removals, read “Safety information” on page 103 and “Before you begin” on page 43.

To remove the fan, do the following:

1. Power-off the system.
2. Unplug the system.
3. Remove the cover (see “Removing the cover and front bezel” on page 47).
4. Disconnect the fan from the system board.
5. Remove the full length PCI cards.
6. Remove the air duct by pushing the blue push pins (2) outward.
7. Pull the (2) blue push pins on the top corners of the assembly.
8. Lean fan bracket assembly towards rear of the computer and pull out.

LED/power switch removal

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



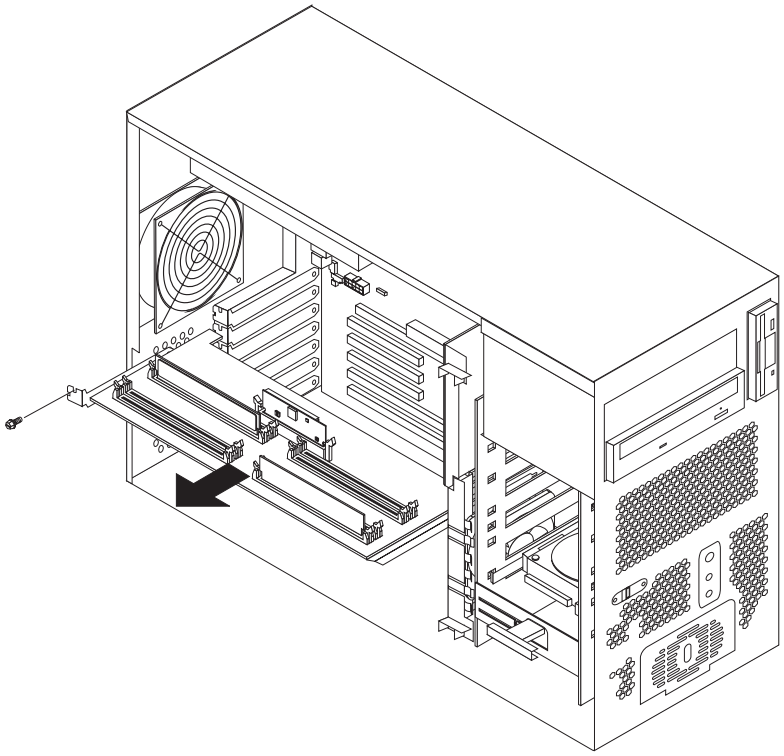
Note: Before performing any removals, read “Safety information” on page 103 and “Before you begin” on page 43.

To remove the LED/power switch, do the following:

1. Power-off the system.
2. Unplug the system.
3. Remove the cover (see “Removing the cover and front bezel” on page 47).
4. Remove the front bezel (see “Removing the cover and front bezel” on page 47).
5. Disconnect connector from planar.
6. Remove the LED/power switch screw.
7. Gently lift the LED/power switch up and out.

Memory board removal

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



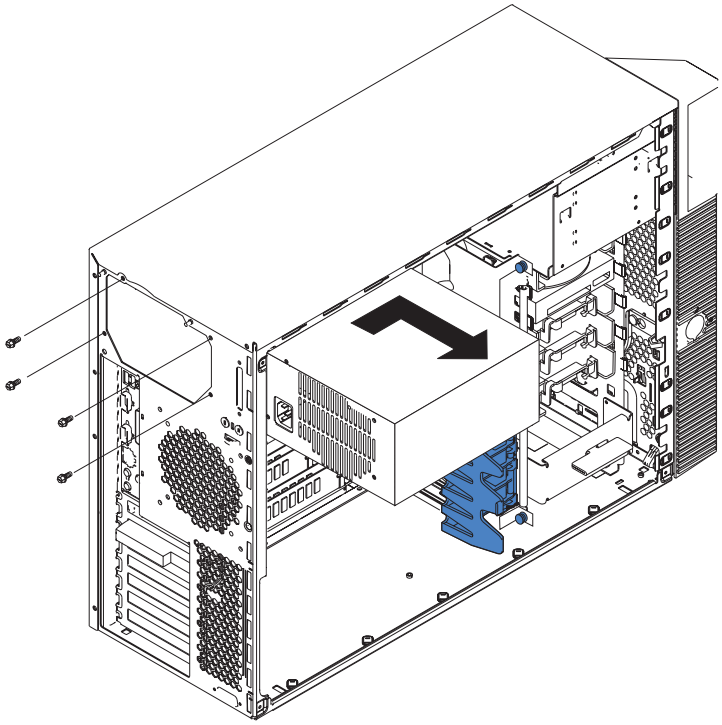
Note: Before performing any removals, read “Safety information” on page 103 and “Before you begin” on page 43.

To remove the memory board, do the following:

1. Power-off the system.
2. Unplug the system.
3. Remove the cover (see “Removing the cover and front bezel” on page 47)
4. Disconnect all external cables and power cords from the computer.
5. Unscrew (1) the memory board.
6. Gently pull the memory board outward.

Power supply removal

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



Note: Before performing any removals, read “Safety information” on page 103 and “Before you begin” on page 43.

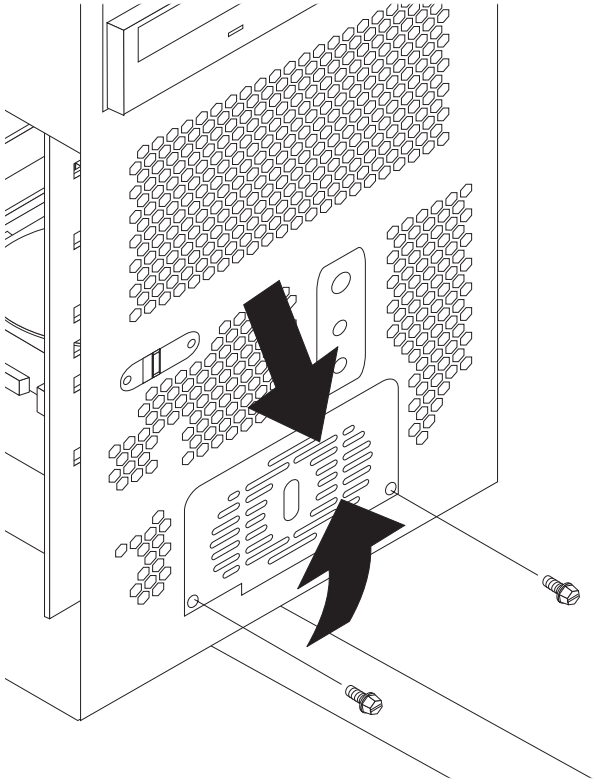
To remove the power supply, do the following:

1. Power-off the system.
2. Unplug the system.

   Note: This procedure can be done easier by laying the system on its side.
3. Remove the cover (see “Removing the cover and front bezel” on page 47).
4. Disconnect cables from the system board and drives.
5. Disconnect the power supply cables from the system board.
6. Remove the screws (4) from the rear of the computer.
7. Gently move the power supply away from the chassis and lift it out of the computer.

Speaker removal

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



Note: Before performing any removals, read “Safety information” on page 103 and “Before you begin” on page 43.

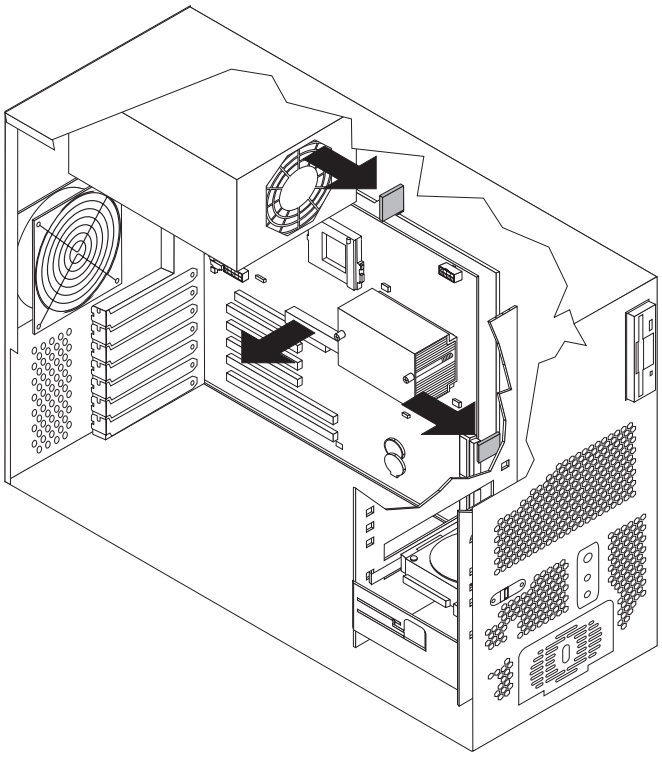
To remove the speaker, do the following:

1. Power-off the system.
2. Unplug the system.
3. Remove the cover (see “Removing the cover and front bezel” on page 47)
4. Disconnect the cables from system board.
5. Remove the front bezel.
6. Remove the speaker screws (2).
7. Gently pull the speaker outward.

System board removal

Notes:

1. When replacing the system board, you must either update the system with the latest firmware or restore the pre-existing firmware that the customer provides on a diskette or CD image.
2. The illustrations in this documents might differ slightly from your hardware.



Note: Before performing any removals, read “Safety information” on page 103 and “Before you begin” on page 43.

To remove the system board, do the following:

1. Power-off the system
2. Remove the cover (see “Removing the cover and front bezel” on page 47)

   Note: This procedure can be done easier by laying the system on its side.
3. Remove the memory board (see “Memory board removal” on page 77).
4. Remove the adapter cards.
5. Remove the air duct.
6. Remove the fan assembly.
7. Disconnect the cables.

   Note: Be sure to disconnect the (2) cables that are connected to the SCSI connectors underneath the fan assembly.
8. Removes (1) screw which fastens the metal system board backing plate to the chassis.

9. Remove the system board backing plate from the chassis by pushing (2) blue tabs toward the front of the computer.
10. Gently pull the system board with backing plate from the system.

Symptom-to-FRU index

Notes:

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

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

Beep symptoms

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

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

Beeps	Description
1-2-3	• One beep • A pause (or break) • Two beeps • A pause (or break) • Three Beeps
4	Four continuous beeps

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. **System Board**
1-2-1 (Programmable Interval Timer failed)	1. **System Board**
1-2-2 (DMA initialization failed)	1. **System Board**
1-2-3 (DMA page register write/read failed)	1. **System Board**
1-2-4 (RAM refresh verification failed)	1. **DIMM** 2. System Board

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

Beep/Symptom	FRU/Action
3-1-2 (Interval timer channel 2 failed)	1. **System Board**
3-1-3 (RAM test failed above address OFFFFH)	1. **DIMM** 2. Memory card 3. System board
3-1-4 (Time-of-Day clock failed)	1. **Battery** 2. System Board
3-2-1 (Serial port failed)	1. **System board**
3-2-2 (Parallel port failed)	1. **System board**
3-2-3 (Math coprocessor failed)	1. **Processor** 2. System board
3-2-4 (Failure comparing CMOS memory size against actual)	1. **DIMM** 2. Battery 3. System board
3-3-1 (Memory size mismatch occurred)	1. **DIMM** 2. System board 3. Battery
3-3-2 (Critical SMBUS error occurred) (I2C bus error)	1. **Disconnect the computer power cord from outlet, wait 30 seconds and retry.** 2. System Board 3. DIMMs 4. Power Supply 5. 12C Cable
3-3-3 (No operational memory in system)	1. **Install or reseat the memory modules, then do a 3 boot reset.** (See “Using the Configuration/Setup Utility program” on page 31.) 2. DIMMs 3. System Board
Two Short Beeps (Information only, the configuration has changed)	1. **Run Diagnostics** 2. Run Configuration/Setup
Three Short Beeps	1. **DIMM** 2. System Board
One Continuous Beep	1. **Processor** 2. System Board
Repeating Short Beeps	1. **Keyboard** 2. System Board
One Long and One Short Beep	1. **Video adapter (if present)** 2. System Board

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

No beep symptoms

No Beep Symptom	FRU/Action
No beep and the system operates correctly.	1. **Check speaker cables** 2. Speaker 3. System board
No Beeps occur after successfully completing POST	1. Check speaker connections 2. Speaker 3. System board
No ac power	1. **Check the power cord.** 2. Power supply.
No beep and no video	1. **See "Undetermined problems" on page 95**

Diagnostic error codes

Note: In the following error codes, if *XXX* is *000*, *195*, or *197*, **do not** replace a FRU. The description for these error codes are:

000 The test passed.

195 The **Esc** key was pressed to abort the test.

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

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

Error Code/Symptom	FRU/Action
001-XXX-000 (Failed core tests)	1. **System Board**
001-XXX-001 (Failed core tests)	1. **System Board**
001-250-000 (Failed System Board ECC)	1. **System Board**
001-250-001 (Failed System Board ECC)	1. **System Board**
005-XXX-000 (Failed Video test)	1. **Video Adapter (if installed)** 2. System Board

Error Code/Symptom	FRU/Action
011-XXX-000 (Failed COM1 Serial Port test)	1. **System Board**
011-XXX-001 (Failed COM2 Serial Port test)	1. **System Board**
014-XXX-000 (Failed Parallel Port test)	1. **System Board**
015-XXX-001 (USB interface not found, board damaged)	1. **System Board**
015-XXX-015 (Failed USB External Loopback test)	1. Make sure parallel port is not disabled 2. Re-run USB External Loopback test 3. **System Board**
015-XXX-198 (USB device connected during USB test)	1. Remove USB devices from USB1 and USB2 2. Re-run test 3. **System Board**
020-XXX-000 (Failed PCI Interface test)	1. **System Board**
030-XXX-000 (Failed Internal SCSI interface test)	1. **System Board**
030-XXX-00N (Failed SCSI test on PCI slot N. Check system error log before replacing a FRU.)	1. **Adapter in Slot N**
035-XXX-099	1. **No adapters were found.** 2. If adapter is installed re-check connection.
035-XXX-S99 (Failed RAID test on PCI slot S. S = number of failing PCI slot. Check System Error Log before replacing a FRU.)	1. **Adapter** 2. SCSI Backplane 3. Cable
035-XXX-SNN (Check System Error Log before replacing a FRU. S = number of failing PCI slot; NN = SCSI ID of failing fixed disk.)	1. **Fixed Disk with SCSI ID NN on RAID adapter in PCI slot S.**
075-XXX-000 (Failed Power Supply test)	1. **Power Supply**

Error Code/Symptom	FRU/Action
089-XXX-001 (Failed Microprocessor test)	1. **Microprocessor**
180-XXX-003 (Failed System Board LED test)	1. **System Board**
201-XXX-0NN (Failed Memory test)	1. **DIMM Location J1-J4** 2. Memory card
201-XXX-999 (Multiple DIMM failure, see error text.)	1. **See error text for failing DIMMs**
202-XXX-001 (Failed System Cache test)	1. **Microprocessor CPU 1**
206-XXX-000 (Failed Diskette Drive test)	1. **Cable** 2. Diskette Drive 3. System Board
215-XXX-000 (Failed IDE CD-ROM test)	1. **CD-ROM Drive Cables** 2. CD-ROM Drive 3. System Board
217-XXX-000 (Failed BIOS Fixed Disk test) **Note:** If RAID is configured, the fixed disk number refers to the RAID logical array.	1. **Fixed Disk 1**
217-XXX-001 (Failed BIOS Fixed Disk test) **Note:** If RAID is configured, the fixed disk number refers to the RAID logical array.	1. **Fixed Disk 2**
217-XXX-002 (Failed BIOS Fixed Disk test) **Note:** If RAID is configured, the fixed disk number refers to the RAID logical array.	1. **Fixed Disk 3**
264-XXX-0NN (NN = SCSI ID of failing Tape Drive)	1. **Tape Cartridge, if user executed the Read/Write Tape Drive test (XXX = 256)** 2. SCSI or power cable connected to the tape drive with SCSI ID NN 3. Tape drive with SCSI ID NN – refer to Help and Service Information appendix of tape drive's User Guide. 4. I/O Legacy Board or SCSI Controller – run SCSI Controller diagnostic to determine of SCSI bus is functioning properly.
264-XXX-999 (Errors on multiple tape drives, see error text for more info)	1. **See error messages/text in the PC Doctor error log for detailed information on each individual tape drive error.**

Error Code/Symptom	FRU/Action
301-XXX-000 (Failed Keyboard test)	1. **Keyboard**
405-XXX-000 (Failed Ethernet test on controller on the System Board)	1. **Verify that Ethernet is not disabled in BIOS.** 2. System Board
405-XXX-00N (Failed Ethernet test on adapter in PCI slot N)	1. **Adapter in PCI slot N.** 2. System Board
415-XXX-000 (Failed Modem test)	1. **Cable** 2. Modem 3. System Board

Error symptoms

General	FRU/Action
CD is not working properly.	1. **Clean the CD.** 2. Run CD-ROM diagnostics. 3. CD-ROM Drive
CD-ROM drive tray is not working. (The computer must be powered-on.)	1. **Insert the end of a paper clip into the manual tray-release opening.** 2. Run CD-ROM diagnostics. 3. CD-ROM Drive
CD-ROM drive is not recognized.	1. **Run Configuration/Setup, enable primary IDE channel.** 2. Check cables and jumpers. 3. Check for correct device driver. 4. Run CD-ROM diagnostics. 5. CD-ROM drive 6. System Board
Power switch does not work.	1. **Verify that switch number 5 of switch block is Off.** 2. Power Switch Assembly 3. System Board
CD-ROM drive cable is not plugged in.	1. Make sure CD-ROM drive cable is plugged in.

General	FRU/Action
Diskette drive in-use light stays on, or the system bypasses the diskette drive, or the diskette drive does not work.	1. **If there is a diskette in the drive, verify that:** a. The diskette drive is enabled in the Configuration/Setup utility program. b. The diskette is good and not damaged. (Try another diskette if you have one.) c. The diskette is inserted correctly in the drive. d. The diskette contains the necessary files to start the computer. e. The software program is OK. f. Cable is installed correctly (proper orientation) 2. Run Diskette Drive Diagnostics. 3. Cable 4. Diskette Drive 5. System Board
Monitor problems (general). Some IBM monitors have their own self-tests. If you suspect a problem with the monitor, refer to the information that comes with the monitor for adjusting and testing instructions.	1. **Monitor** 2. Run Video Diagnostics. If diagnostics pass, the problem may be a video driver. 3. Display Adapter / System Board
System Error and DIMM X LED on	1. **Replace DIMM X**
System Error and CPU X LED on	1. **Replace CPU X**

Setup	Action
Setup and Installation CD won't start.	• Be sure the computer is supported; all systems with a startable (bootable) CD-ROM drive are supported. • If the startup (boot) sequence settings have been altered, be sure the CD-ROM is first in the boot sequence. • If more than one CD-ROM drive is installed, be sure that only one drive is set as the primary drive. Start the CD from the primary drive.
The *Operating System Installation* program continuously loops.	Free up more space on the hard disk.

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

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

POST error codes

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

Error Code/Symptom	FRU/Action
062 (Three consecutive boot failures using the default configuration.)	1. **Run Configuration/Setup** 2. Battery 3. System Board 4. Microprocessor
101, 102, 106 (System and microprocessor error)	1. **System Board**
111 (Channel check error)	1. **Failing adapter** 2. DIMM 3. System board
114 (Adapter read-only memory error)	1. **Failing adapter** 2. Run diagnostics
129 (Internal cache error)	1. **Microprocessor**
151 (Real time clock error)	1. **Run Diagnostics** 2. Battery 3. System Board
161 (Real time clock battery error)	1. **Run Configuration/Setup** 2. Battery 3. System Board
162 (Device Configuration Error) **Note:** Be sure to load the default settings and any additional desired settings; then, **save the configuration.**	1. **Run Configuration/Setup** 2. Battery 3. Failing Device 4. System Board
163 (Real-Time Clock error)	1. **Run Configuration/Setup** 2. Battery 3. System Board
164 (Memory configuration changed)	1. **Run Configuration/Setup** 2. DIMM 3. System Board
175 (Hardware error)	1. **System Board**
176, 177, 178 (Security hardware error)	1. **Run Configuration/Setup** 2. System Board
184 (Power-on password corrupted)	1. **Run Configuration/Setup** 2. System Board

Error Code/Symptom	FRU/Action
185 (Drive startup sequence information corrupted)	1. **Run Configuration/Setup** 2. System Board
186 (Security hardware control logic failed)	1. **Run Configuration/Setup** 2. System Board
187 (VPD serial number not set.)	1. **Set serial number in Setup** 2. System Board
188 (Bad EEPROM CRC #2)	1. **Run Configuration/Setup** 2. System Board
189 (Three attempts were made to access the workstation with invalid passwords)	1. **Run Configuration/Setup, enter the administrator password** 2. System Board.
201 (Memory test error) If the workstation does not have the latest level of BIOS installed, update the BIOS to the latest level and run the diagnostic program again.	1. Run memory diagnostics. 2. DIMM 3. System Board
229 (Cache error)	1. **Microprocessor**
289 (DIMM has been disabled by user or system)	1. **Run Configuration/Setup, if disabled by user** 2. Disabled DIMM, if not disabled by user.
301 (Keyboard or keyboard controller error)	1. **Keyboard** 2. System Board
303 (Keyboard controller error)	1. **System Board** 2. Keyboard
602 (Invalid diskette boot record)	1. **Diskette** 2. Diskette Drive 3. Cable 4. System Board
662 (Diskette drive configuration error)	1. **Run Configuration/Setup and Diagnostics** 2. Diskette Drive 3. Drive Cable 4. System Board
962 (Parallel port error)	1. **Disconnect external cable on parallel port.** 2. Run Configuration/Setup 3. System Board

Error Code/Symptom	FRU/Action
11XX (System board serial port 1 or 2 error)	1. **Disconnect external cable on serial port.** 2. Run Configuration/Setup 3. System Board
1162 (Serial port configuration conflict)	1. **Disconnect external cable on serial port** 2. Run Configuration/Setup 3. System board
1200 (microprocessor machine check)	1. Microprocessor
1800 (No more hardware interrupt available for PCI adapter)	1. Run Configuration/Setup 2. Failing Adapter 3. System Board
1962 (Drive does not contain a valid boot sector)	1. **Verify a bootable operating system is installed.** 2. If RAID system, refer to the Hardware Maintenance Manual for the specific RAID adapter. 3. Run Diagnostics 4. Hard Disk Drive 5. Cable 6. SCSI Backplane 7. System Board
2400 (Video controller test failure)	1. **Video Adapter (if installed)** 2. System Board
2462 (Video memory configuration error)	1. **Video Adapter (if installed)** 2. System Board
5962 (IDE CD-ROM configuration error)	1. **Run Configuration/Setup** 2. CD-ROM Drive 3. CD-ROM Power Cable 4. IDE Cable 5. System Board 6. Battery
8603 (Pointing Device Error)	1. **Pointing Device** 2. System Board
00012000 (Processor machine check)	1. **Update BIOS** 2. Replace microprocessor
00019501 (Microprocessor is not functioning - check VRM and processor LEDs)	1. Microprocessor 2. System Board
00019701 (Microprocessor failed BIST)	1. **Microprocessor** 2. System Board

Error Code/Symptom	FRU/Action
00180100 (No room for PCI option ROM)	1. **Run Configuration/Setup** 2. Failing Adapter 3. System Board
00180200 (No more I/O space available for PCI adapter)	1. **Run Configuration/Setup** 2. Failing Adapter 3. System Board
00180300 (No more memory (above 1MB for PCI adapter))	1. **Run Configuration/Setup** 2. Failing Adapter 3. System Board
00180400 (No more memory (below 1MB for PCI adapter))	1. **Run Configuration/Setup** 2. Failing Adapter 3. System Board
00180500 (PCI option ROM checksum error)	1. **Remove Failing PCI Card** 2. System Board
00180600 (PCI device built-in self test failure)	1. **Run Configuration/Setup** 2. Failing Adapter 3. System Board
00180700 (*xxxxyyyy* planar PCI device not responding (where *xxxx* is PCI vendor ID and *yyyy* is PCI device ID))	1. System Board 2. PCI Card
00180800 (Unsupported PCI device installed)	1. System Board 2. PCI Card
00181000 (PCI error)	1. System Board 2. PCI Card
01295085 (ECC checking hardware test error)	1. **System Board** 2. Microprocessor
01298001 (No update data for microprocessor)	1. **Ensure all microprocessors are the same stepping level and cache size.** 2. Microprocessor
01298101 (Bad update data for microprocessor)	1. **Ensure all microprocessors are the same stepping level and cache size.** 2. Microprocessor
01298200 (Microprocessor speed mismatch)	1. Ensure all microprocessors are the same speed.

Error Code/Symptom	FRU/Action
I9990301 (Fixed boot sector error)	1. **Hard Disk Drive** 2. If RAID system, refer to the Hardware Maintenance Manual for the specific RAID adapter. 3. SCSI Backplane 4. Cable 5. System Board
I9990305 (Fixed boot sector error, no operating system installed)	1. **Install operating system to hard disk drive.**
I9990650 (AC power has been restored)	1. **Check cable** 2. Check for interruption of power supply 3. Power Cable
Other numbers	Follow instructions on screen.

Processor board LEDs

LED	Cause
Fan	1. **Replace the fan assembly.**
Memory	1. **Replace the DIMM indicated by the lit DIMM error.**
CPU	1. If a microprocessor LED is on for a microprocessor connector that has a terminator card installed instead of a microprocessor, the microprocessors are not installed in the correct order. For information about the correct order for installing microprocessors and VRMs. 2. Turn off the workstation, reseat the microprocessor, and restart the workstation. 3. **Replace the microprocessor.**
VRM	1. Turn off the workstation, reseat the VRM indicated by the lit VRM error LED, and restart the workstation. 2. **Replace the VRM**

Undetermined problems

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

Note: A corrupt CMOS can cause undetermined problems.

If power problems are suspected:
1. Power-off the computer.
2. Be sure the system is cabled correctly.
3. Remove or disconnect the following (one at a time) until you find the failure (power-on the computer and reconfigure each time).
   - Any external devices
   - Surge suppressor device (on the computer)
   - Modem, printer, mouse, or non-IBM devices
   - Each adapter

- Drives
- Memory Modules (Minimum requirement = one 128 MB DIMM)

Note: Minimum operating requirements are:
   a. 1 Power Supply
   b. System Board
   c. 1 Microprocessor
   d. Memory: 1 pair of RIMMs (in slots RIMM 1 and RIMM 2) and 1 pair of C-RIMMs (in slots RIMM 3 and RIMM 4); see “Installing memory modules” on page 57.

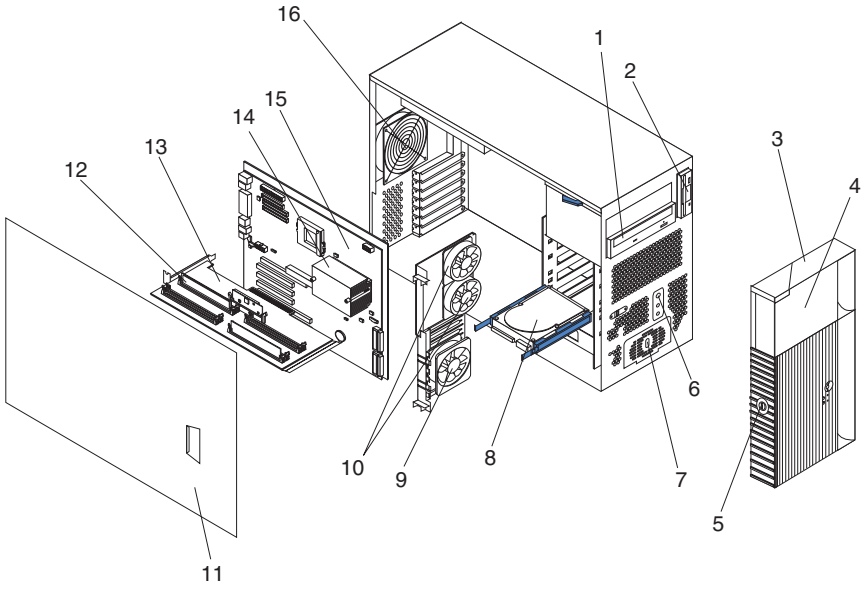
4. Power-on the computer. If the problem remains, suspect the following FRUs in the order listed:
   - Power Supply
   - System Board

Notes:

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

Parts listing Types 6233 and 6850

This parts listing supports models 10X, 1PU, 20X, 21X, 22X, 25X, 2PU, 30X, 31X, 32X, 35X, 3PU, 40X, 42X, 43X, 45X, 46X, 4PU, 50X, 52X, 53X, 55X, 56X, 5PU, 60X, 62X, 63X, 65X, 66X, 67X, 6PU, 70X, 72X, 73X, 75X, 76X, 77X, 7PU, A0X, B0X, B1X, B2X, B5X, C0X, C1X, C2X, C5X, D0X, D2X, D3X, D5X, D6X, E0X, E2X, E3X, E5X, E6X, G0X, G2X, G3X, G5X, G6X, G7X, H0X, H2X, H3X, H5X, H6X, H7X.



Index	System (IntelliStation M Pro - Types 6233 and 6850)	FRU
1	CD-ROM drive (primary) (all models)	33P3207
1	CD-ROM drive (alternate) (all models)	33P3211
2	1.44 MB, 3.5-inch diskette drive (all models)	76H4091
3	Front bezel assembly (all models)	25P6381
4	Door (all models)	25P6382
5	Key lock (all models)	00N3508
6	C2 switch assembly (all models)	09K9827
7	Speaker (all models)	25P6312
8	Hard disk drive, 18.2 SCSI (models 21X 22X 25X 31X 32X 35X 63X 65X 66X 67X 73X 75X 76X 77X B1X B2X B5X C1X C2X C5X G3G G5G G6G G7G H3X H5X H6X H7X)	19K1485
8	Hard disk drive, 40GB IDE (models 10X 20X 30X 60X 62X 70X 72X A0X B0X C0X G0G G2G H0X H2X)	19K1568
9, 16	Fan, 120 mm x 25 mm (all models)	25P6280
10	Fan, 80 mm x 25 mm (all models)	25P6279
11	Left cover (all models)	00N3506
12	Memory, 128MB/800MHz ECC RDRAM (models 10X 20X 21X 30X 31X A0X B0X B1X C0X C1X)	20L0285
12	Memory, 256MB/800MHz ECC RDRAM (models 1PU 20X 21X 22X 25X 2PU 30X 31X 32X 35X 3PU 40X 42X 43X 45X 46X 4PU 50X 52X 53X 55X 56X 5PU 60X 62X 63X 65X 66X 67X 6PU 70X 72X 73X 75X 76X 77X 7PU A0X B0X B1X B2X B5X C0X C1X C2X C5X D0X D2X D3X D5X D6X E0X E2X E3X E5X E6X G0G G2G G3G G5G G6G G7G H0G H2G H3G H5G H6G H7G)	20L0287
13	Memory board (all models)	25P6433
14	Heat sink (all models)	25P6309
15	System board with backplate (models 10X 1PU 20X 21X 22X 25X 2PU 30X 31X 32X 35X 3PU A0X B0X B1X B2X B5X C0X C1X C2X C5X)	24P5416
15	System board with backplate (models 60X 62X 63X 65X 66X 67X 6PU 70X 72X 73X 75X 76X 77X 7PU G0G G2G G3G G5G G6G G7G H0G H2G H3G H5G H6G H7G)	59P4917
15	System board with backplate (models 40X 42X 43X 45X 46X 4PU 50X 52X 53X 55X 56X 5PU D0X D2X D3X D5X D6X E0X E2X E3X E5X E6X)	59P2605
	Processor, 1.5 GHz, 256 K cache (models 10X 1PU A0X)	24P5411
	Processor,1.7 GHz, 256 K cache (models 20X 21X 22X 25X 2PU B0X B2X B5X)	24P5414
	Processor, 2.0 GHz, 256K cache (models 30X 31X 32X 35X 3PU C0X C1X C2X C5X)	25P6629
	Processor, 100/2.0 GHz 512K cache (models 40X 42X 43X 45X 46X 4PU D0X D2X D3X D5X D6X)	25P2671
	Processor, 100/2.2 GHz 512K cache (models 50X 52X 53X 55X 56X 5PU E0X E2X E3X E5X E6X)	32P8582
	Processor, 100/2.4 GHz 512K cache (models 60X 62X 63X 65X 66X 67X 6PU G0G G2G G3G G5G G6G G7G)	37L3570
	Processor, 400/2.8 GHz 512K cache (models 70X 72X 73X 75X 76X 77X 7PU H0G H2G H3G H5G H6G H7G)	59P5055
	Bezel, 5.25 inch (blank) (all models)	00N3259
	Bezel latch (all models)	01N2017
	Latch, cover (all models)	01N2262
	Foot (all models)	01N2196
	Swivel foot (all models)	12J4506
	Hard disk drive filler plate (all models)	00N3511
	Hard disk drive rails (all models)	19K5331
	Cover (all models)	25P6276
	Screw kit (all models)	00N3517
	EMC shield kit (all models)	25P6314
	• EMC shield for system board (1), EMC shield for hard file (1),shield, 5.25″ blank (1), 7-position I/O shield (1)	

Index	System (IntelliStation M Pro - Types 6233 and 6850)	FRU
	Label kit (all models)	25P6315
	• Label, system board location (1), label, I/O shadowbox (1), label, safety (>40lbs.) (1), label, bezel latch information (1)	
	Miscellaneous hardware kit (all models)	25P6414
	• M3.5 x 7 screws (7), screwlock, female 4-40/4-40 (2), I/O blank brackets (tabs) (6), isolation grommets (20), clamp, cable (1), clamp, cable (1), screws, 6-32 shoulder (20), screw, S/T M5-fan (4)	
	Air duct baffle (all models)	25P6423
	Power supply, 480 watt (all models)	24P6820
	CRIMM populated card (all models)	00N5223
	VRM 5V/20A (all models)	24P6827
	Video card, Matrox G450 (models 10X 20X 21X 30X 31X 1PU 2PU 3PU A0X B0X B1X C0X C1X)	22P1987
	Video card, Matrox G450 DVI (models 40X 50X 60X 6PU 70X 7PU D0X E0X G0G H0X)	25P6691
	Video card, Fire GL4 (models 25X 35X B5X)	59P4601
	Video card, Fire GL 8800 (models 45X 55X 65X 75X D5X E5X G5G H5G)	25P6680
	Video card, NVIDIA Quadro2 Pro (models 22X 32X B2X C2X)	25P6324
	Video card, NVIDIA Quadro4 (models 42X 43X 4PU 52X 53X 5PU 62X 63X 72X 73X D2X D3X E2X E3X G2G G3G H2G H3G)	25P6684
	Video card, Wildcat III 6110 (models 46X 56X 66X 76X D6X E6X G6G H6G)	25P6591
	Video card, NVIDIA 83 (models 67X 77X G7X H7G)	25P6687
	Dongle adapter (models 25X 35X B5X C5X)	37L5566
	Dongle adapter (models 45X 46X 55X 56X 65X 66X 67X 75X 76X 77X D5X D6X E5X E6X G5G G6G G7G H5G H6G H7G)	09N3435
	Cable, power switch/LED (all models)	20L3021
	Cable, SCSI extension (all models)	00N3521
	Cable, SCSI, 5-drop (models 1PU 21X 22X 25X 2PU 31X 32X 35X 3PU 43X 45X 46X 4PU 53X 55X 56X 5PU 63X 65X 66X 67X 6PU 73X 75X 76X 77X 7PU C1X C2X C5X D3X D5X D6X E3X E5X E6X G3X G5X G6X G7X H3X H5X H6X H7X)	25P6310
	Cable, EIDE (models 10X 20X 30X 40X 42X 50X 52X 60X 62X 70X 72X A0X B0X C0X D0X D2X E0X E2X G0G G2G H0G H2G)	25P6401
	Cable, IDE CD-ROM drive (all models)	25P6412
	Cable, diskette drive (all models)	25P6413
	Cable, CD-ROM drive audio (all models)	75H9219
	Cable Matrox G450, DVI to dual VGA pigtail (models 40X 50X 60X 6PU 70X 7PU D0X E0X G0G H0X)	48P7583
	Cable, NVIDEA LFH60 to dual VGA pigtail (models 42X 43X 4PU 52X 53X 5PU 62X 63X 72X 73X 7PU D2G D3G E2G E3G G2G G3G H2G H3G)	48P7586
	Line cord (all models)	93F2364
	Mouse assembly (all models)	76H6620
	Thermal grease kit (all models)	59P4740
	Alcohol wipe kit (all models)	59P4739
	Recovery CDs -- see “Recovery CDs”.	

Recovery CDs

The following three tables list the Recovery CDs for the various models. Refer to the heading row in each table to find the correct model.

Recovery CDs (Types 6233 and 6850): Models 10X 20X 21X 22X 25X 1PU 2PU A0X B0X B1X B2X B5X 30X 31X 32X 35X 3PU C0X C1X C2X C5X	FRU
A.P. (Win 2000/AP) (all ″A″ models)	32P0441
Canadian/French (Win 2000) (all ″F″ models)	32P0447
Danish (Win 2000) (all ″G″ models)	32P9432

Recovery CDs (Types 6233 and 6850): Models 10X 20X 21X 22X 25X 1PU 2PU A0X B0X B1X B2X B5X 30X 31X 32X 35X 3PU C0X C1X C2X C5X	**FRU**
Dutch (Win 2000) (all ″G″ models)	32P9431
Finland (Win 2000) (all ″G″ models)	32P9430
French (Win 2000) (all ″G″ models)	32P9426
German (Win 2000) (all ″G″ models)	32P9427
Hong Kong /AP EN (Win 2000) (all ″D″ models)	32P0444
IIPC/CH (Win 2000) (all ″C″ models)	32P0443
Italy (Win 2000) (all ″G″ models)	32P9429
Japan (Win 2000) (all ″J″ models)	32P0442
Korea (Win 2000) (all ″K″ models)	32P0446
Norwegian (Win 2000) (all ″G″ models)	32P9434
Spain (Win 2000) (all ″G″ models)	32P9428
Swedish (Win 2000) (all ″G″ models)	32P9433
Taiwan (Win 2000) (all ″V″ models)	32P0445
UK English (all ″G″ models)	32P0440
U.S. (Win 2000) (all ″U″ models)	32P0396

Recovery CDs (Types 6233 and 6850): Models 40X 42X 43X 45X 46X 4PU 50X 52X 53X 55X 56X 5PU D0X D2X D3X D5X D6X E0X E2X E3X E5X E6X	**FRU**
A.P. (Win 2000/AP) (all ″A″ models)	59P2784
Canadian/French (Win 2000) (all ″F″ models)	59P2786
Danish (Win 2000) (all ″G″ models)	59P2792
Dutch (Win 2000) (all ″G″ models)	59P2791
Finland (Win 2000) (all ″G″ models)	59P2795
French (Win 2000) (all ″G″ models)	59P2787
German (Win 2000) (all ″G″ models)	59P2788
Hong Kong /AP EN (Win 2000) (all ″D″ models)	59P2797
Hong Kong /CH (Win 2000) (all ″M″ models)	59P2798
Italy (Win 2000) (all ″G″ models)	59P2789
Japan JA (Win 2000) (all ″J″ models)	59P2796
Norwegian (Win 2000) (all ″G″ models)	59P2794
Spain (Win 2000) (all ″G″ models)	59P2790
Swedish (Win 2000) (all ″G″ models)	59P2793
Taiwan TA (Win 2000) (all ″V″ models)	59P2799
U.S. (Win 2000) (all ″U″ models)	59P2783
UK English (all ″G″ models)	59P2785

Recovery CDs (Types - 6233 and 6850): Models 60X 62X 63X 65X 66X 67X 6PU 70X 72X 73X 75X 76X 77X 7PU G0X G2X G3X G5X G6X G7X H0X H2X H3X H5X H6X H7X	**FRU**
Danish (Win XP) (all ″G″ models)	59P2941
Dutch (Win XP) (all ″G″ models)	59P2940
Finnish (Win XP) (all ″G″ models)	59P2944
French (Win XP) (all ″G″ models)	59P2936
German (Win XP) (all ″G″ models)	59P2937
Hong Kong (Win XP) (all ″M″ models)	59P2948
Hong Kong / AP ENG (Win XP) (all ″D″ models)	59P2946
Italian (Win XP) (all ″G″ models)	59P2938
Japan (Win XP) (all ″J″ models)	59P2945
Norwegian (Win XP) (all ″G″ models)	59P2943
Spanish (Win XP) (all ″G″ models)	59P2939
Swedish (Win XP) (all ″G″ models)	59P2942
Taiwan (Win XP) (all ″V″ models)	59P2947
U.S. English (Win XP) (all ″U″ models)	59P2935

Keyboards

Keyboards	FRU
Arabic	37L2555
Belgian-French	37L2556
Belgian-UK	37L2557
Brazil/Portugal	37L2554
Bulgarian	37L2558
Chinese	37L2585
Czech	37L2559
Danish	37L2560
Dutch	37L2561
French	37L2562
French/Canadian-ID 058	37L0913
French/Canadian-ID 445	37L2552
German	37L2563
Greek	37L2564
Hebrew	37L2565
Hungarian	37L2566
Icelandic	37L2567
Italian	37L2568
Korean	28L1905
Japanese	37L2584
Latin/Spanish	37L2553
Norwegian	37L2569
Polish	37L2570
Portuguese	37L2571
Romania	37L2572
Russian	37L2573
Serbian/Cyrillic	37L2574
Slovakian	37L2575
Spanish	37L2576
Swed/Fin	37L2577
Swiss French/German	37L2578
Thailand	37L2587
Turkish (ID 179)	37L2579
Turkish (ID 440)	37L2580
UK English	37L2581
US English	37L2551
Yugoslavian	37L2582

Power cords

Arabic Countries	14F0033
Argentina	36L8880
Australia	93F2365
Belgium	1339520
Bulgaria	1339520
Canada	93F2364
Chile	14F0069
Czechoslovakia	1339520
Denmark	13F9997

Finland	1339520
France	1339520
Germany	1339520
Hungary	1339520
Israel	14F0087
Italy	14F0069
Latin-America	6952301
Netherlands	1339520
New Zealand	93F2365
Norway	1339520
Paraguay	36L8880
Poland	1339520
Portugal	1339520
Serbia	1339520
Slovakia	1339520
South Africa	14F0015
Spanish	1339520
Switzerland	1339520
Switzerland (French, German)	14F0051
U.S.	93F2364
UK, Ireland	14F0033
Uruguay	36L8880
Yugoslavia	1339520

The following tools are required to service these computers:

- A volt-ohm meter, IBM P/N 73G5404
- Wrap plug, IBM P/N 72X8546
- T10 Torx bit from Torx bit set, IBM P/N 93F2830

Related service information

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

Safety information

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

General safety

Follow these rules to ensure general safety:

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

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

Electrical safety

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

Observe the following rules when working on electrical equipment.

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

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

- Find the room emergency power-off (EPO) switch, disconnecting switch, or electrical outlet. If an electrical accident occurs, you can then operate the switch or unplug the power cord quickly.
- Do not work alone under hazardous conditions or near equipment that has hazardous voltages.
- Disconnect all power before:
  - Performing a mechanical inspection
  - Working near power supplies
  - Removing or installing main units
- Before you start to work on the machine, unplug the power cord. If you cannot unplug it, ask the customer to power-off the wall box that supplies power to the machine and to lock the wall box in the off position.
- If you need to work on a machine that has exposed electrical circuits, observe the following precautions:
  - Ensure that another person, familiar with the power-off controls, is near you.

    Remember: Another person must be there to switch off the power, if necessary.
  - Use only one hand when working with powered-on electrical equipment; keep the other hand in your pocket or behind your back.

    Remember: There must be a complete circuit to cause electrical shock. By observing the above rule, you may prevent a current from passing through your body.
  - When using testers, set the controls correctly and use the approved probe leads and accessories for that tester.
  - Stand on suitable rubber mats (obtained locally, if necessary) to insulate you from grounds such as metal floor strips and machine frames.

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

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

  and similar units. (This practice ensures correct grounding of the units.)
- If an electrical accident occurs:
  - Use caution; do not become a victim yourself.
  - Switch off power.
  - Send another person to get medical aid.

Safety inspection guide

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

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

Consider these conditions and the safety hazards they present:

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

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

Checklist:

1. Check exterior covers for damage (loose, broken, or sharp edges).
2. Power-off the computer. Disconnect the power cord.
3. Check the power cord for:

a. A third-wire ground connector in good condition. Use a meter to measure third-wire ground continuity for 0.1 ohm or less between the external ground pin and frame ground.
b. The power cord should be the appropriate type as specified in the parts listings.
c. Insulation must not be frayed or worn.

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

Handling electrostatic discharge-sensitive devices

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

Notes:

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

When handling ESD-sensitive parts:

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

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

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

Grounding requirements

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

Safety notices (multi-lingual translations)

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

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

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

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

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

- Statement 1

DANGER

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

To avoid a shock hazard:

- **Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.**
- **Connect all power cords to a properly wired and grounded electrical outlet.**
- **Connect to properly wired outlets any equipment that will be attached to this product.**
- **When possible, use one hand only to connect or disconnect signal cables.**
- **Never turn on any equipment when there is evidence of fire, water, or structural damage.**

- **Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.**
- **Connect and disconnect cables as described in the following table when installing, moving, or opening covers on this product or attached devices.**

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

- Statement 2

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

Do not:

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

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

- Statement 3

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

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

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

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

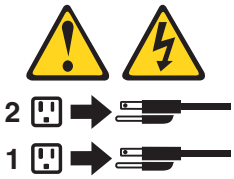
- Statement 4

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

CAUTION:
Use safe practices when lifting.

- Statement 5

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



- Statement 10

CAUTION:

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

Importante:

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

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

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

Instrução 1

PERIGO

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

Para evitar risco de choque:

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

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

Instrução 2

CUIDADO:

Ao substituir a bateria de lítio, utilize apenas uma bateria IBM, Número de Peça 33F8354 ou uma bateria de tipo equivalente, recomendada pelo fabricante. Se o seu sistema possui um móídulo com uma bateria de lítio, substitua-o apenas pelo mesmo tipo de mídulo, do mesmo fabricante. A bateria contém lítio e pode explodir se não for utilizada, manuseada e descartada de maneira correta.

Não:

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

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

Instrução 3

PRECAUCIÓN:

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

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

PERIGO

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

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

Instrução 4

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

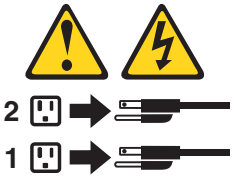
CUIDADO:

Ao levantar a máquina, faça-o com segurança.

Instrução 5

CUIDADO:

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



CUIDADO:

Instrução 10

CUIDADO:

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

重要：

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

例如，如果一个提醒条款前的数字为 1，则本部分中相应的译文也带有标号 1。

在执行任何指示的操作之前，请确保您已经阅读了全部提醒和危险条款。

声明 1

危险

电源、电话和通信电缆中带有危险电流。

为避免电击：

雷电期间不要拆接电缆或安装、维修及重新配置本产品。

将所有电源线连接至正确布线并已安全接地的电源插座上。

将应与本产品连接的所有设备连接至正确布线的插座上。

尽量只使用单手拆接信号电缆。

有水、火及结构损坏迹象时，请勿打开任何设备。

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

安装、移动或打开本产品及其附带设备的机盖时，应按下表所述连接和断开电缆。

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

声明 2

警告：

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

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

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

声明 3

警告：

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

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

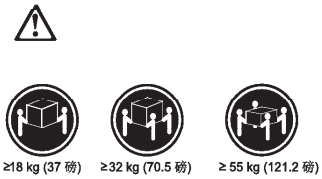
非此处指定的其它控制、调整或与性能有关的操作都有可能导致激光辐射的危险。

危险

某些激光产品中包含内嵌的 3A 级或 3B 级激光二极管。请注意以下事项。

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

声明 4



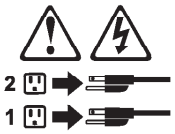
警告：

抬起时请采用安全操作方法。

声明 5

警告：

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



声明 6

警告：

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

声明 7

警告：

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

声明 8

警告：
不要拆除电源外盖或贴有下列标签的任何部件。

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

声明 9

警告：

为避免人员伤害，拆除设备上的风扇前应拔下热插拔风扇电缆。

声明 10

警告：

机柜安装的设备上面不能放置重于 82kg（180 磅）的物品。

> 82 kg (180 磅)

声明 11

警告：

下面的标签表明附近有锋利的边、角或接头。

声明 12

警告：
下面的标签表明附近有高热表面。

重要資訊：

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

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

執行任何指示之前，請詳讀所有「注意」及「危險」的聲明。

聲明 1

危險

電源、電話及通信電纜上所產生的電流均有危險性。

欲避免電擊危險：

- 在雷雨期間，請勿連接或切斷本產品上的任何電纜線，或安裝、維修及重新架構本產品。
- 請將電源線接至接線及接地正確的電源插座。
- 請將本產品隨附的設備連接至接線正確的插座。
- 儘可能使用單手來連接或切斷信號電纜線。
- 當設備有火燒或泡水的痕跡，或有結構性損害時，請勿開啓該設備的電源。
- 在安裝及架構之時，若非非常熟悉，在開啓裝置蓋子之前，請切斷電源線、電信系統、網路及數據機。
- 在安裝、移動本產品或附加裝置，或開啓其蓋子時，請依照下表中「連接」及「切斷」電纜線的步驟執行。

連接：	切斷：
1. 關閉所有開關。	1. 關閉所有開關。
2. 先將所有電纜線接上裝置。	2. 先自電源插座拔掉電源線。
3. 將信號電纜接上接頭。	3. 拔掉接頭上的所有信號電纜。
4. 再將電源線接上電源插座。	4. 再拔掉裝置上的所有電纜線。
5. 開啓裝置的電源。	

聲明 2

注意：

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

請勿將電池：

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

請遵照當地法令規章處理廢棄電池。

聲明 3

注意：

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

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

危險

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

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

聲明 4

≥ 18 公斤 (37 磅)

≥ 32 公斤 (70.5 磅)

≥ 55 公斤 (121.2 磅)

注意：

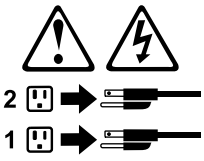
抬起裝置時，請注意安全措施。

聲明 5

注意：

裝置上的電源控制按鈕及電源供應器上的電源開關均無法關閉裝置上的電流。

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



聲明 10

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

>82 公斤 (180 磅)

Important:

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

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

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

Notice n° 1

DANGER

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

Pour éviter tout risque de choc électrique:

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

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

Notice n° 2

ATTENTION:

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

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

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

Notice n° 3

ATTENTION:

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

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

DANGER

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

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

Notice n° 4

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

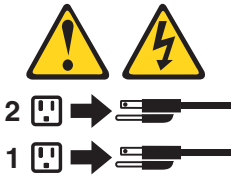
ATTENTION:

Faites-vous aider pour soulever ce produit.

Notice n° 5

ATTENTION:

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



Notice n° 10

ATTENTION:

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

Wichtig:

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

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

Lesen Sie alle Sicherheitshinweise, bevor Sie eine Anweisung ausführen.

Hinweis 1


VORSICHT

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

Aus Sicherheitsgründen:

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

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

Hinweis 2

ACHTUNG:

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

Die Batterie nicht:

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

Die örtlichen Bestimmungen für die Entsorgung von Sondermüll beachten.

Hinweis 3

ACHTUNG:

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

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

VORSICHT

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

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

Hinweis 4

≥18 kg ≥32 kg ≥55 kg

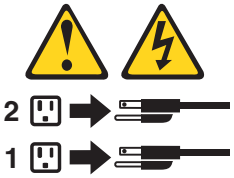
ACHTUNG:

Beim Anheben der Maschine die vorgeschriebenen Sicherheitsbestimmungen beachten.

Hinweis 5

ACHTUNG:

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



Hinweis 10

ACHTUNG:

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

Importante:

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

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

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

Avviso 1

PERICOLO

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

Per evitare il pericolo di scosse elettriche:

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

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

Avviso 2

ATTENZIONE:

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

Evitare di:

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

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

Avviso 3

ATTENZIONE:

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

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

PERICOLO

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

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

Avviso 4

≥18 kg ≥32 kg ≥55 kg

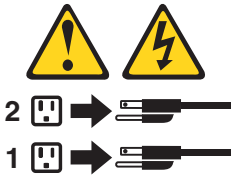
ATTENZIONE:

Durante il sollevamento della macchina seguire delle norme di sicurezza.

Avviso 5

ATTENZIONE:

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



Avviso 10

ATTENZIONE:

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

・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。

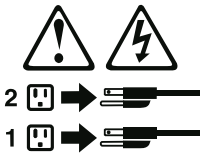
・記述 5

⚠ 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。



・記述 10

⚠ 注意

ラック・モデルのサーバーの上に 82 Kg 以上の物を置かないで
ください。

중요:

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

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

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

경고문 1

위험

전원, 전화 및 통신 케이블로부터 흘러 나오는 전류는 위험합니다.

전기 충격을 피하려면:

- 뇌우를 동반할 때는 케이블의 연결이나 철수, 이 제품의 설치, 유지보수 또는 재구성을 하지 마십시오.
- 모든 전원 코드를 적절히 배선 및 접지해야 합니다.
- 이 제품에 연결될 모든 장비를 적절하게 배선된 콘센트에 연결하십시오.
- 가능한한 신호 케이블을 한 손으로 연결하거나 끊으십시오.
- 화재, 수해 또는 구조상의 손상이 있을 경우 장비를 켜지 마십시오.
- 설치 및 구성 프로시저에 다른 설명이 없는 한, 장치 덮개를 열기 전에 연결된 전원 코드, 원거리 통신 시스템, 네트워크 및 모뎀을 끊어 주십시오.
- 제품 또는 접속된 장치를 설치, 이동 및 덮개를 열 때 다음 설명에 따라 케이블을 연결하거나 끊도록 하십시오.

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

경고문 2

주의:

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

다음을 주의하십시오.

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

지역 법령이나 규정의 요구에 따라 배터리를 처분하십시오.

경고문 3

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

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

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

위험

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

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

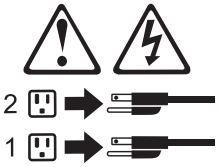
경고문 4

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

주의:
기계를 들 때는 안전하게 들어 올리십시오.

경고문 5

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



경고문 10

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

>82 kg (180 lbs)

Importante:

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

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

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

Declaración 1

PELIGRO

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

Para evitar una descarga eléctrica:

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

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

Declaración 2

PRECAUCIÓN:

Cuando desee sustituir la batería de litio, utilice únicamente el número de pieza 33F8354 de IBM o cualquier tipo de batería equivalente que recomiende el fabricante. Si el sistema tiene un mídulo que contiene una batería de litio, sustitúyalo únicamente por el mismo tipo de mídulo, que ha de estar creado por el mismo fabricante. La batería contiene litio y puede explotar si el usuario no la utiliza ni la maneja de forma adecuada o si no se desprende de la misma como corresponde.

No realice las acciones siguientes:

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

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

Declaración 3

PRECAUCIÓN:

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

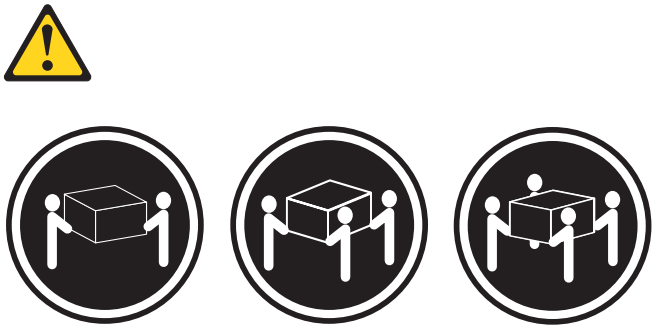
- No retire las cubiertas. Si retira las cubiertas del producto láser, puede quedar expuesto a radiaciín láser perjudicial. Dentro del dispositivo no existe ninguna pieza que requiera mantenimiento.
- El uso de controles o ajustes o la realizaciín de procedimientos que no sean los que se han especificado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

PELIGRO

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

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

Declaración 4



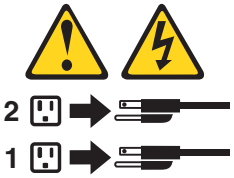
PRECAUCIÓN:

Tome medidas de seguridad al levantar el producto.

Declaración 5

PRECAUCIÓN:

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



Declaración 10

PRECAUCIÓN:

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

Send us your comments!

We want to know your opinion about this manual (part number 24P2929). Your input will help us to improve our publications.

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

Name: _____

Phone number: _____

1. Do you like this manual?

   ☐ Yes ☐ No

   _____

   _____

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

   _____

   _____

3. What is your service experience level?

   ☐ Less than five years

   ☐ More than five years

4. Which servers do you service most?

   _____

   _____

   _____

   _____

Thank you for your response!

Problem determination tips

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

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

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

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

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

Notices

References in this publication to IBM products, programs, or services do not imply that IBM intends to make these available in all countries in which IBM operates. 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. Subject to IBM's valid intellectual property or other legally protectable rights, any functionally equivalent product, program, or service may be used instead of the IBM product, program, or service. The evaluation and verification of operation in conjunction with other products, except those expressly designated by IBM, are the responsibility of the user.

IBM makes no representations or warranties regarding non-IBM products. For non-IBM software, third-party software licenses may apply.

GHz, MHz only measures microprocessor internal clock speed, not application performance. Many factors affect application performance.

When referring to hard disk drive capacity, GB equals one billion bytes. Total user-accessible capacity may vary depending on operating environments.

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

Trademarks

The following terms are trademarks of International Business Machines Corporation in the United States, other countries, or both:

Alert on LAN
HelpCenter
IBM
IntelliStation
LANClient Control Manager
ScrollPoint
SMART Reaction
TechConnect
Tivoli
Update Connector
Wake on LAN

Lotus, Domino and SmartSuite are trademarks of Lotus Development Corporation and/or IBM Corporation in the United States, other countries, or both.

Intel, Celeron, MMX, LANDesk, Pentium, Pentium II Xeon, and Pentium III Xeon, and Xeon 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.

Linux is a registered trademark of Linus Torvalds.

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

Part Number: 24P2929

(1P) P/N: 24P2929