

User Guide

IntelliStation M Pro Type 6868

Professional Workstation

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Note

Before using this information and the product it supports, be sure to read the general information under Appendix C, "Viewing the license agreement" on page 145 and Appendix D, "Product warranties and notices" on page 147.

First Edition (October 1999)

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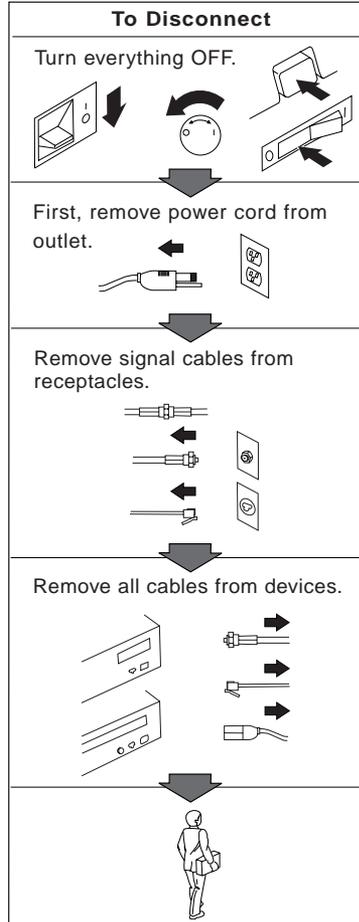
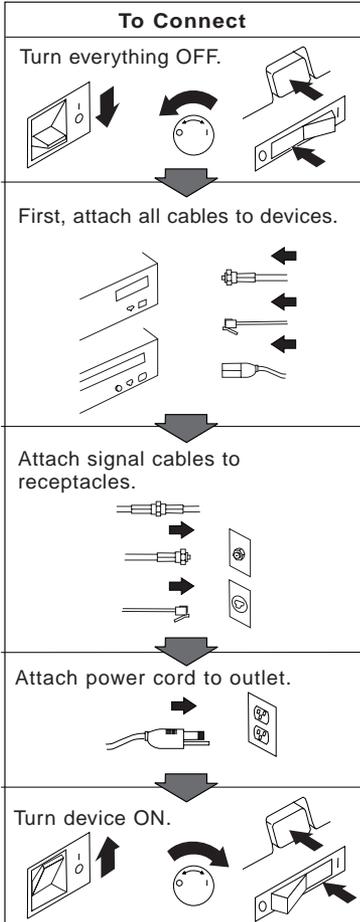
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Safety information



DANGER:

Electrical current from power, telephone, and communication cables is hazardous. To avoid shock hazard, connect and disconnect cables as shown below when installing, moving or opening the covers of this product or attached devices. The power cord must be used with a properly grounded outlet.



DANGER

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.

Laser compliance statement

Some IBM Personal Computer models are equipped from the factory with a CD-ROM drive or a DVD-ROM drive. CD-ROM drives and DVD-ROM drives are also sold separately as options. CD-ROM drives and DVD-ROM drives are laser products. These drives are certified in the U.S. to conform to the requirements of the Department of Health and Human Services 21 Code of Federal Regulations (DHHS 21 CFR) Subchapter J for Class 1 laser products. Elsewhere, these drives are certified to conform to the requirements of the International Electrotechnical Commission (IEC) 825 and CENELEC EN 60 825 for Class 1 laser products.

When a CD-ROM drive or a DVD-ROM drive is installed, note the following.

CAUTION:

Use of controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.

Removing the covers of the CD-ROM drive or DVD-ROM drive could result in exposure to hazardous laser radiation. There are no serviceable parts inside the CD-ROM drive or DVD-ROM drive. **Do not remove the drive covers.**

Some CD-ROM drives and DVD-ROM drives contain an embedded Class 3A or Class 3B laser diode. Note the following.

DANGER

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

Certains modèles d'ordinateurs personnels sont équipés d'origine d'une unité de CD-ROM ou de DVD-ROM. Mais ces unités sont également vendues séparément en tant qu'options. L'unité de CD-ROM/DVD-ROM est

un appareil à laser. Aux États-Unis, l'unité de CD-ROM/DVD-ROM est certifiée conforme aux normes indiquées dans le sous-chapitre J du DHHS 21 CFR relatif aux produits à laser de classe 1. Dans les autres pays, elle est certifiée être un produit à laser de classe 1 conforme aux normes CEI 825 et CENELEC EN 60 825.

Lorsqu'une unité de CD-ROM/DVD-ROM est installée, tenez compte des remarques suivantes:

ATTENTION

Pour éviter tout risque d'exposition au rayon laser, respectez les consignes de réglage et d'utilisation des commandes, ainsi que les procédures décrites.

L'ouverture de l'unité de CD-ROM/DVD-ROM peut entraîner un risque d'exposition au rayon laser. Pour toute intervention, faites appel à du personnel qualifié.

Certaines unités de CD-ROM/DVD-ROM peuvent contenir une diode à laser de classe 3A ou 3B. Tenez compte de la consigne qui suit:

DANGER

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

Lithium battery notice

CAUTION:

Danger of explosion if battery is incorrectly replaced.

When replacing the battery, use only IBM Part Number 33F8354 or an equivalent type battery recommended by the 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.

ATTENTION

Danger d'explosion en cas de remplacement incorrect de la batterie.

Remplacer uniquement par une batterie IBM de type 33F8354 ou d'un type équivalent recommandé par le fabricant. La batterie contient du lithium et peut exploser en cas de mauvaise utilisation, de mauvaise manipulation ou de mise au rebut inappropriée.

Ne pas :

- Lancer ou plonger dans l'eau
- Chauffer à plus de 100°C (212°F)
- Réparer ou désassembler

Mettre au rebut les batteries usagées conformément aux règlements locaux.

About this book

This book will help you become familiar with your IBM IntelliStation workstation and its many features. It describes how to set up, configure, operate, install options, and maintain your computer. There is also information about problem solving, getting help, and the software that comes with your computer.

Related documentation

The following documentation contains additional information about your computer. You can also go to the World Wide Web at <http://www.ibm.com/pc/us/intellistation> for more information.

- *Understanding Your Computer*

This online publication is provided on the *Software Selections CD* that comes with your computer. If your computer has IBM-preinstalled software, this document is also available using Access IBM. It includes general information about using personal computers and in-depth information about the specific features of your computer.

- Adaptec SCSI documentation

This documentation is provided on the *Software Selections CD* that comes with your computer. If your computer has IBM-preinstalled software, this document is also available using Access IBM. It contains information and instructions for installing and configuring small computer system interface (SCSI) device drivers, the Adaptec 2940U2B SCSI adapter, and SCSI devices.

- README files on the *Device Driver and IBM Enhanced Diagnostics CD*

There are several README files on this CD that contain information about the various adapters and devices that might be attached to your computer.

- *Hardware Maintenance Manual*

This publication contains information for trained service technicians. It can be found at <http://www.ibm.com/pc/support> on the World Wide Web. Type the machine type and model number (type-model) into the **Quick Path** field and click **Go**. Click **Online publications** and then click **Hardware Maintenance Manuals**.

You can also order this manual from IBM. To purchase a copy, see to Chapter 7, "Getting help, service, and information" on page 127.

- *Technical Information Manual*

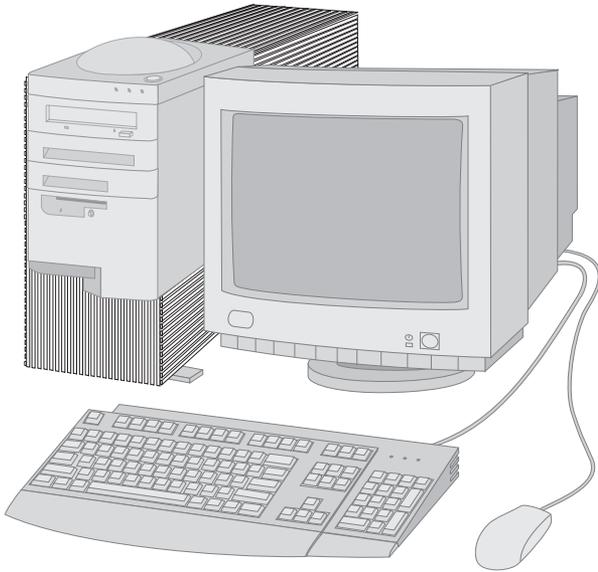
This publication contains information for those who want to know more about the technical aspects of their computer. It can be found at <http://www.ibm.com/pc/us/> on the World Wide Web. Type the

machine type and model number (type-model) into the Quick Path field and click **Go**. Click **Online publications** and then click **Technical Manuals**.

Chapter 1. IBM IntelliStation overview

Thank you for selecting an IBM® IntelliStation® Professional Workstation. Your computer incorporates many of the latest advances in computer technology and is easy to expand and upgrade as your needs change.

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



Features

System summary

See the System Summary screen in the Configuration/Setup utility program for an overview of the features on your computer. Refer to Chapter 4, "Using the Configuration/Setup Utility program" on page 43.

Microprocessor

- Intel® Pentium® III microprocessor with up to 256 KB of L2 cache memory integrated into the microprocessor
- Support for dual microprocessors

Memory

- Support for:
 - 2.5 V, 184-pin, Rambus inline memory module (RIMM) containing checking and error correcting code (ECC) or non-error correcting code, Rambus dynamic random access memory (RDRAM)
 - RIMM heights up to 63.5 mm (2.5 inches)
 - 64 MB, 128 MB, 256 MB, and 512 MB RIMMs (when available)
 - A maximum of 2 GB of memory
- 512 KB flash memory for system programs

Removable-media drives

- One 3.5-inch, 1.44 MB diskette drive
- One IDE CD-ROM drive

Internal hard disk drives

- One SCSI hard disk drive
- Support for additional SCSI or enhanced integrated drive electronics (EIDE) hard disk drives
 - Maximum integrated drive electronics (IDE) and EIDE devices: Four total
 - Maximum SCSI devices: See the SCSI documentation in Access IBM or on the *Software Selections CD* supplied with your computer

Graphics subsystem

High-performance accelerated graphics port (AGP) adapter with up to 32 MB synchronous graphics RAM (SGRAM) video memory.

Audio subsystem

- Integrated audio controller compatible with Microsoft® Windows® Sound System
- Supports most Sound Blaster applications

Integrated Ethernet adapter:

- Support for Wake on LAN®
- Support for Alert on LAN™

System management features

- Remote Program Load (RPL) and Dynamic Host Configuration Protocol (DHCP)
- Wake on LAN (requires Wake on LAN-supported network adapter)
- Wake on Alarm
- Remote Administration (ability to update the power-on self-test (POST) and the basic input/output system (BIOS) over the network)
- Automatic power-on startup
- System Management (SM) BIOS and software
- Ability to store POST hardware test results
- Built-in system-management hardware (temperature sensors, fan-speed monitor, chassis-intrusion detector, power supply and microprocessor voltage monitor, and power-switch bypass)

Input/output features

- 25-pin, Extended Capabilities Port (ECP)/Extended Parallel Port (EPP)
- One 9-pin, 16550 universal asynchronous receiver/transmitter serial port
- Two 4-pin, Universal Serial Bus (USB) ports
- Mouse port
- Keyboard port
- Monitor port (on the AGP adapter)
- Three audio connectors (line out/headphone out, line in, and microphone)

Expansion capability

- Four available drive bays.
- Four or five available PCI expansion slots (depending on model) with support for 32-bit PCI Plug and Play adapters.
- Support for additional internal and external SCSI devices (the number of internal devices that can be installed is limited by the number of available drive bays, power, and cooling requirements).
- Support for additional IDE or EIDE devices.

Power

- Automatic switching between ranges, 90–137/180–265 V ac
- Automatic switching, 57–63/47–53 Hz input frequency range
- Built-in overload and surge protection
- Advanced Power Management support
- Advanced Configuration and Power Interface (ACPI) support

Security features

- Cover lock and keys
- Support for the addition of a U-bolt and lockable cable
- Power-on and administrator 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
- Security profile by device
- IBM Security Solutions

IBM preinstalled software

Your computer might come with preinstalled software. If so, an operating system, device drivers to support built-in features, and other support programs are included. See “Preinstalled software” on page 5 for a description of this software.

Additional software

Additional software is provided on the *Software Selections CD* and the *Device Driver and IBM Enhanced Diagnostics CD*. See “Additional software” on page 6 for a description of this software.

Operating systems (supported)

- Microsoft Windows NT® Workstation Version 4.0
- Microsoft Windows 98

Operating systems (tested for compatibility)¹

- IBM PC DOS Version 7.0
- MS-DOS® Versions 6.22
- Novell NetWare Versions 3.2, 4.2, 5.0 (not supported on some models)
- SCO OpenServer 5.05

Software

Your computer might come with a Microsoft operating system² and a variety of software, including application programs, diagnostic tools, and device drivers. Some of the software is *preinstalled* and some is on the *Software Selections CD* and the *Device Driver and IBM Enhanced Diagnostics CD*. Software, other than Microsoft software, is licensed under the terms of the IBM International License Agreement for Non-Warranted Programs. Appendix C of this book contains instructions for viewing the license agreement.

Preinstalled software

Your preinstalled software includes the following:

- Access IBM, which is a central location from which you can set up hard disk partitions, install software provided by IBM, register your computer, set the time and date, set up your printer, view online books, start the *Software Selections CD*, and obtain information about IBM products and technical support.
- Device drivers for factory-installed features.
- The latest Service Pack available is also provided for Windows NT Workstation models. For important information on this software, see “Additional setup tasks” on page 20.
- Internet Explorer 5.0, see “Internet Explorer” on page 21 for more information.

¹ The operating systems listed here are being tested for compatibility at the time this publication goes to press. Additional operating systems might be identified by IBM as compatible with your computer following the publication of this book. Corrections and additions to the list are available in IBM's online compatibility report, which can be found on the World Wide Web. For World Wide Web pages, see Chapter 7, “Getting help, service, and information” on page 127.

² The Microsoft Certificate of Authenticity is your assurance that the Windows software in your computer is legally licensed from Microsoft Corporation.

Additional information about your preinstalled software is in “Getting started” on page 15.

Important:

1. No backup diskettes for your preinstalled software come with your computer. However, the *Software Selections CD* contains most of your IBM-preinstalled programs.
2. Your computer comes with an IBM *Product Recovery CD*. This CD contains Windows and all the preinstalled applications and device drivers. For information about reinstalling Windows and preinstalled software from the IBM *Product Recovery CD*, see “Using the IBM Product Recovery CD” on page 121.
3. The device drivers and some programs are also available at <http://www.ibm.com/pc/us/files.html> on the World Wide Web.

Additional software

In addition to your IBM-preinstalled programs and device drivers, additional software is provided on the *Software Selections CD* or other CDs. You decide which programs to install based on your needs.

Following is a list of some of the software that is provided. Note that the software on the CD is subject to change and might be different from the following list. Similar software for other operating systems is also provided on the CD. See Appendix A, “Using the Software Selections CD” on page 137 for further information about the CD.

Norton AntiVirus for IBM

A comprehensive product that detects and removes viruses from your computer.

ConfigSafe

A comprehensive configuration tracking and recovery tool for Windows NT. It provides features that you or support personnel can use to restore your system if your configuration becomes damaged or unusable. ConfigSafe can also be a valuable troubleshooting tool, especially if problems develop after you install a new application or adapter.

CoSession Remote 32

A communication tool that an IBM technician or in-house administrator can use to diagnose and fix computer problems from a remote location. The connection can be made through a modem or over a LAN.

IBM Update Connector™	Update Connector provides an easy-to-use tool to update software data from an IBM server to your computer over the Internet. Once installed, you only need to start the program to be connected to the Update Connector database. Once connected, Update Connector automatically determines whether available updates are appropriate and, if so, downloads and installs them at your convenience. Update Connector automatically recognizes machine types and models as well as software versions and other criteria when figuring which updates to download.
IBM Internet Connection	Software that you can use to dial into the Internet through the IBM Global Network™. You can use this software with the Netscape Navigator browser, which is available on your <i>Software Selections CD</i> .
IBM Universal Manageability Services (UM Services)	Software that you can use to view detailed information about your computer hardware and software, browse Desktop Management Interface (DMI) information, set up alerts, monitor a variety of system resources, and manage your asset security. For more information, go to http://www.ibm.com/pc/ww/software on the World Wide Web and search for Universal Manageability Services.
IBM Universal Manageability Desktop Extensions (UM Desktop Extensions)	These Life Cycle Tools plug into UM Services to provide enhanced network management. For more information, go to http://www.ibm.com/pc/ww/software on the World Wide Web and search for Universal Manageability Desktop Extensions.
PC-Doctor for Windows	Diagnostic tools that you can use within Windows operating systems. In addition to isolating hardware problems, these tools also provide information about your computer operating environment and some software components. Support documentation is built into the Help system. (See also “IBM Enhanced Diagnostics” on page 123.)
IBM ViaVoice™	A continuous speech dictation and desktop navigation program. If you experience problems using ViaVoice, see the READ1ST.TXT file in the appropriate language folder on the ViaVoice CD.

System specifications

Dimensions

- Depth: 460 mm (18.1 in.)
- Width: 200 mm (7.9 in.)
- Height: 492 mm (19.4 in.)

Computer weight

- Maximum configuration (as shipped): 20.5 kg (45 lb)

Environment

- Air temperature:
 - System on: 10° to 35°C (50° to 95°F) at altitude 0-2134 m (7000 ft)
 - System off: 10° to 43°C (50° to 110°F)
- Humidity:
 - System on: 8% to 80%
 - System off: 8% to 80%

Electrical Input

- Sine-wave input (50/60 Hz) is required
- Input voltage/current:
 - Low range:
 - Minimum: 100 V ac
 - Maximum: 127 V ac
 - Current rating: 5.0 amps
 - High range:
 - Minimum: 200 V ac
 - Maximum: 240 V ac
 - Current rating: 3.0 amps
 - Input kilovolt-amperes (kVA) (approximately):
 - Maximum (configuration as shipped): 0.75 kVA

Note: Power consumption and heat output vary depending on the number and type of optional features installed and the power-management optional features in use.

Heat Output

- Approximate heat output in British thermal units (Btu) per hour:
 - Maximum configuration (as shipped): 361 Btu/hour (106 watts)
 - Maximum configuration (theoretical):³ 1564 Btu/hour (460 watts)

Air flow

- Approximately 0.56 cubic meters per minute (20 cubic feet per minute)

Acoustical Noise-Emission Values

- Average sound-pressure levels:
 - At operator position:
 - 40 dBA idle
 - 44 dBA operating
 - At bystander position-1 meter (3.3 ft):
 - 37 dBA idle
 - 40 dBA operating
- Declared (upper limit) sound power levels:
 - 5.2 bels idle
 - 5.5 bels operating

Note: These levels were measured in controlled acoustical environments according to procedures specified by the American National Standards Institute (ANSI) S12.10 and ISO 7779, and are reported in accordance with ISO 9296. Actual sound-pressure levels in your location might exceed the average values stated because of room reflections and other nearby noise sources. The declared sound power levels indicate an upper limit, below which a large number of computers will operate.

³ Under typical maximum configurations, the heat output will be substantially below the theoretical maximum.

Chapter 2. Setting up your computer

This chapter provides the information necessary to set up your computer and prepare it to run your applications.

Before You Begin

- Read “Safety information” on page vii before setting up your computer.
- Set up and start your computer before installing any internal options (such as memory or an adapter). See Chapter 5, “Installing options” on page 61 for more information.

You will need the following:

- Computer
- Computer power cord
- Keyboard
- Mouse
- Monitor (sold separately with signal cable and power cord)

If you are missing an item, contact your place of purchase.

Arranging your workspace

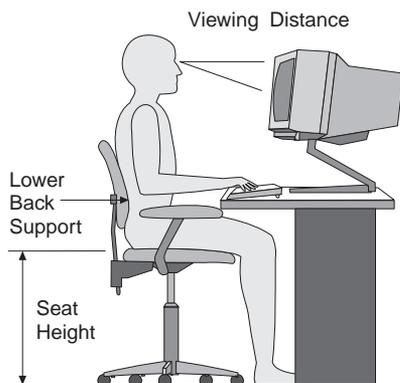
To get the most from your computer, arrange the equipment you use and your work area to suit your needs and the kind of work you do. Your comfort is of foremost importance, but light sources, air circulation, and the location of electrical outlets also can affect the way you arrange your workspace.

Comfort

Although no single working position is ideal for everyone, the following guidelines will help you find a position that suits you best.

Choose a good chair to reduce the frequency of fatigue from sitting in the same position for a long time. The backrest and seat should adjust independently and provide good support. The seat should have a curved front to relieve pressure on the thighs. Adjust the seat so that your thighs are parallel to the floor and your feet are either flat on the floor or on a footrest.

When using the keyboard, keep your forearms parallel to the floor and your wrists in a neutral, comfortable position. Try to keep a light touch on the keyboard and your hands and fingers relaxed. You can change the angle of the keyboard for maximum comfort by adjusting the position of the keyboard feet.



Adjust the monitor so that the top of the screen is at, or slightly below, eye level. Place the monitor at a comfortable viewing distance, usually 51 to 61 cm (20 to 24 in.), and position it so that you can view it without having to twist your body.

Glare and lighting

Position the monitor to minimize glare and reflections from overhead lights, windows, and other light sources. Place the monitor at right angles to windows and other light sources whenever possible. Reduce overhead lighting, if necessary, by turning off lights or using lower wattage bulbs. If you install the monitor near a window, use curtains or blinds to block the sunlight. You might have to adjust the Brightness and Contrast controls on the monitor as the room lighting changes throughout the day.

Where it is impossible to avoid reflections or to adjust the lighting, place an antiglare filter over the screen. These filters might affect the clarity of the image on the screen; try them only after you have exhausted other methods of reducing glare.

Dust buildup compounds problems associated with glare. Remember to clean your monitor screen periodically using a soft cloth moistened with a nonabrasive liquid glass cleaner.

Air circulation

Your computer and monitor produce heat. The computer has a fan that pulls in fresh air and forces out hot air. The monitor lets hot air escape through vents. Blocking the air vents can cause overheating, which might result in a malfunction or damage. Place the computer and monitor so that nothing blocks the air vents; usually, 51 mm (2 in.) of air space is sufficient. Also, make sure the vented air is not blowing on someone else.

Electrical outlets and cable lengths

The location of electrical outlets and the length of power cords and cables that connect to the monitor, printer, and other devices might determine the final placement of your computer.

When arranging your workspace:

- Avoid the use of extension cords. Whenever possible, plug the computer power cord directly into an electrical outlet.
- Keep power cords and cables neatly routed away from walkways and other areas where they might be kicked accidentally.

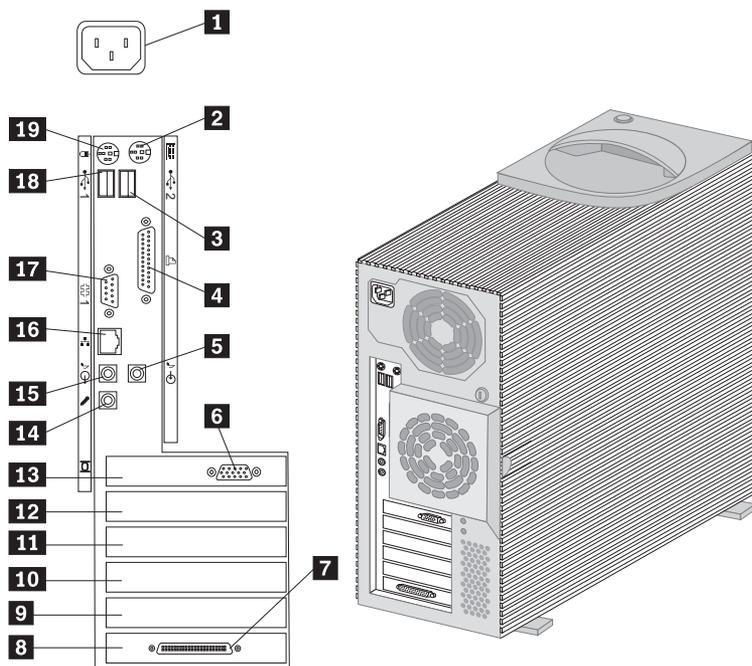
For more information about power cords, see “Power cord notice” on page 164.

Connecting cables

Read the following before connecting cables:

- Connect all device cables before plugging any power cords into an electrical outlet.
- Connect the monitor cable to the monitor if it is not already attached.
- If your computer comes with Windows NT Workstation and a ScrollPoint™ mouse, the first time you start up your computer your mouse ScrollPoint function might not work. The ScrollPoint mouse function will be enabled after you shut down and restart your computer.
- Connect the power cords to the computer, monitor, and other devices first before plugging them into an electrical outlet.
- In some circumstances, the computer might not turn off immediately when you press the power switch. If this happens, hold the power switch down for approximately 5 seconds until the computer turns off.

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



- | | | | |
|-----------|-------------------|-----------|----------------|
| 1 | Power cord | 11 | PCI slot 2 |
| 2 | Keyboard | 12 | PCI slot 1 |
| 3 | USB-2 | 13 | AGP slot |
| 4 | Parallel | 14 | Microphone |
| 5 | Audio line in | 15 | Audio line out |
| 6 | Monitor connector | 16 | Ethernet |
| 7 | SCSI connector | 17 | Serial |
| 8 | PCI slot 5 | 18 | USB-1 |
| 9 | PCI slot 4 | 19 | Mouse |
| 10 | PCI slot 3 | | |

Identification numbers

Locate identification numbers (serial and model/type) and record this information in Appendix B, “Computer records” on page 141.

Getting started

This section contains the following information to help you get started using your computer:

- Starting your computer for the first time.
- What you need before, and what happens after, you start your computer for the first time
- Accessing information and performing tasks from Access IBM on the desktop
- Setting up your hard disk partitions
- Creating an emergency repair disk

If you suspect a problem, see Chapter 6, “Troubleshooting” on page 97.

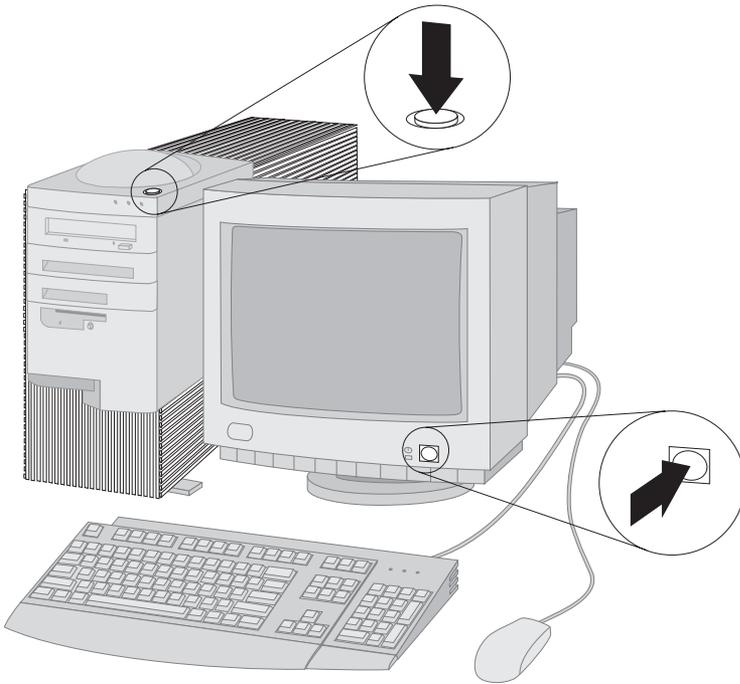
See “Related documentation” on page xi for sources of other information about your computer.

For information about IBM-installed software, see “Software” on page 5. Additional programs are on the *Software Selections CD* and, in some cases, on other CDs and diskettes. If you are installing your own operating system, make sure that you install the device drivers after you install your operating system. Installation instructions are provided with the media or in README files on the diskettes or CDs.

Starting your computer for the first time

To start your computer:

1. Turn on all devices connected to the computer.
2. Press and release the power switch on your computer.



Important

1. You must complete the Windows setup program before you can access Windows for the first time.
2. After you have started the Windows setup program, you must complete it before turning off your computer; otherwise, unexpected results might occur.

Running the setup program

Before you start the setup procedure, you need the following:

- The Windows manual that is provided with your computer, in case you need more detailed information than is provided in this chapter
- Microsoft Certificate of Authenticity (attached to the front cover of your Windows manual) for the Product ID number
- Network information (if applicable) from your network administrator
- The printer model and port that is used by the printer, if a printer is attached directly to your computer

The setup program appears when you start the computer for the first time. The program will prompt you to make choices or type information as required.

Notes:

1. If the setup program has already been run once, it will not appear when you start your computer (if you need more detailed information, see your Windows manual).
2. The setup program that appears when you start the computer is slightly different from the one that is described in your Windows manual. Some choices described in your Windows manual do not appear because they are preset.
3. During the setup procedure, you must indicate that you accept the Microsoft Windows license agreement. If your operating system is Windows NT Workstation, type in the Product ID number from the Certificate of Authenticity, when prompted. The Certificate of Authenticity is attached to the front cover of your Windows manual.

For Windows NT

After the setup procedure is completed and the computer is restarted, when prompted, press Ctrl+Alt+Delete to display the log on window. After the log on procedure is completed, the Windows NT Workstation desktop appears.

Using Access IBM

Access IBM provides menus on your computer desktop where you can easily access programs and utilities for many of the common tasks that you might want to perform.

The Access IBM menu on the desktop includes the following items:

- Start up
- Customize
- Get help
- View license and warranty

The menu selections under each of these main menu items are as follows:

- Start up
 - Arrange your workspace
 - Register with IBM
 - Set the date and time
 - Set up a printer
 - Change screen settings
 - Create a diagnostic diskette
 - Partition your hard disk
 - Set up your network
- Customize
 - View system information
 - Back up your configuration
 - Install software
 - Customize Access IBM
- Get help
 - Read about support
 - Link to IBM Web sites
 - View documentation
 - Recover software
 - Diagnose a problem
- View license and warranty
 - View the license
 - View the warranty

To remove Access IBM from your desktop:

1. From the main menu, click **Customize**.
2. From the Customize menu, click **Customize Access IBM**.
3. Follow the instructions on the screen.

Information for Windows NT Workstation only

The following information is for computers running Windows NT Workstation only.

Setting up your hard disk partitions

Your hard disk has a 2 GB partition (referred to as drive C). This partition contains Windows NT Workstation and the other preinstalled software.

Important: The remaining hard disk space has been left unformatted and cannot be used until you partition it.

You can format and partition hard disk space into multiple drives (such as C, D, and E) as you wish. For example, if you want to install another operating system, it can be installed into a separate primary partition.

To set up your hard disk partitions:

1. In the Access IBM menu, click **Start up**.
2. In the Start up menu, click **Partition your hard disk**.
3. Disk Administrator starts. If you need more information about partitioning your hard disk, click **Help** on the Disk Administrator screen.
4. After creating your hard disk partitions, close the Disk Administrator program.

Creating an emergency repair disk

At your earliest opportunity, create a *Microsoft Windows NT Emergency Repair Disk*. It is important that you create this diskette, which can be used for recovery purposes. If you add features to your computer, create a new Emergency Repair Disk to ensure that the diskette reflects your current system configuration. Additional information about creating and using the diskette is in your Windows NT Workstation manual.

Service Pack 5

Service Pack 5 is a Windows NT Workstation update made available to Windows NT Workstation users by Microsoft.

To install device drivers without affecting the Service Pack 5 installation, you must install the device drivers from the I386 directory on drive C. If you install device drivers from any directory or device other than the I386 directory on drive C, you will have to reinstall Service Pack 5.

To reinstall Service Pack 5, double-click **Service Pack 5** on the desktop. Then click **OK**.

Your computer might come with a Windows NT Workstation Service Pack 5 CD, made available by Microsoft. You can also download Service Pack 5 at <http://www.ibm.com/pc/us/news/msinfo.html> from the World Wide Web.

Setup Wizard

Microsoft Network Setup Wizard gives you access to the Internet. To begin setting up Windows NT Workstation Networking, click **Set Up Your Network**. You will be asked if you wish to install Windows NT Workstation Networking now. To continue with the setup procedure, click **Yes**, and the Microsoft Network Setup Wizard will open. For information about using the Microsoft Network Setup Wizard, see the Windows NT Workstation manual.

Additional setup tasks

This section includes information about several tasks that you might want to perform as part of the setup of your computer. These tasks are optional, but you should consider each of them before completing the setup.

- Creating an IBM Enhanced Diagnostic Diskette
- Using Internet Explorer
- Using Access IBM to register your computer with IBM and then accessing complimentary screen savers
- Installing additional software
- Installing other operating systems

Creating an IBM Enhanced Diagnostic Diskette

The *IBM Enhanced Diagnostics* Diskette is a self-starting, diagnostic diskette used to test hardware (and some software) components of your computer.

To create a diagnostic diskette:

1. Obtain a blank formatted diskette.
2. Click **Start up** → **Create a diagnostic diskette** in Access IBM and follow the instructions on the screen.

A diagnostic diskette image can also be downloaded from <http://www.ibm.com/pc/support> on the World Wide Web.

Internet Explorer

Internet Explorer is a tool that you can use to navigate your company intranet or the World Wide Web.

Note: You *must* be connected to your company intranet or to the World Wide Web (or both) to be able to use Internet Explorer. For information on connecting to the Internet, as well as further information about Internet Explorer, see the operating system manual provided with your computer.

Registering your computer

Registering takes only a few minutes and helps IBM provide better service to you. When your registration information is received, it is placed into a central database accessible by IBM technical support representatives. If you need technical assistance, the support representative will already have information about your computer, saving you time on the phone. In addition, your comments about your computer are reviewed by a team dedicated to customer satisfaction and are taken into consideration in making improvements to IBM computers.

Use Access IBM to register your computer (see “Using Access IBM” on page 18). The registration program gathers your name, address, voice and fax telephone numbers, e-mail address, machine type, and machine serial number. Then, forward the registration information to IBM using one of these methods:

- Print the information and then mail it to IBM.
- If you have access to the Internet, you can use the following procedures to register your computer:
 1. In access IBM, click **Start up**. The related menu is displayed. (See “Using Access IBM” on page 18 for help using Access IBM.)
 2. Click **Register with IBM**, and then follow the instructions on the screen.

Accessing your complimentary screen savers

After you complete the product registration procedure, you are given the option to install a complimentary suite of Windows screen savers. Use the following steps to access the new screen savers:

1. Click the Windows **Start** button.
2. Click **Settings**.
3. Click **Control Panel**.

4. Double-click **Display**.
5. Click the **Screen Saver** tab.
6. Click the Screen Saver pull-down menu in the Screen Saver section.
7. Click one of the screen savers to select it.
8. Locate the **Wait** field scroll bar and set the minutes of inactivity that you want to elapse before the screen saver appears.
9. Click **OK**.

Installing additional software

In addition to your IBM-preinstalled programs and device drivers, additional software is provided on the *Software Selections CD*. You decide which programs to install based on your needs. See “Additional software” on page 6 for a description of these programs.

To install software, use the Customize menu in Access IBM (see “Using Access IBM” on page 18).

The *Software Selections CD* contains diagnostic programs and other support software for several operating system environments.

Important

The *Software Selections CD* does not contain operating systems. Before you can use the CD, your operating system must already be installed in your computer.

You can use the CD to:

- Install some products directly from the CD.
- Create an image of the *Software Selections CD* on an attached network disk and install software products from that LAN disk.
- Create diskettes for software products that cannot be installed from the CD and install the products from diskette.
- Uninstall software products that were installed from the CD.

The *Software Selections CD* has an easy-to-use graphical interface and automated installation procedures for most products. It also has a help system that describes the features of the CD.

The products on the *Software Selections CD* are licensed according to the terms and conditions of the IBM International License Agreement for Non-Warranted Programs, which is available through Access IBM. For

more information, see Appendix C, “Viewing the license agreement” on page 145.

To use the *Software Selections CD*:

1. Insert the *Software Selections CD* into your CD-ROM drive.
2. From the Access IBM menu, click **Customize** → **Install software** → **Run the Software Selections CD**.
3. When the main menu appears, select the desired option; then follow the instructions on the screen.

After a program is installed, you can access it through the Programs choice on the Windows Start menu. For most programs, support documentation is built into the online Help system; for some programs, online documentation is also provided.

Installing other operating systems

If you install (or reinstall) Microsoft Windows 95, Microsoft Windows 98, or Microsoft Windows NT Workstation 4.0, 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. Then, follow the instructions in Appendix A, “Using the Software Selections CD” on page 137 to install the support software.

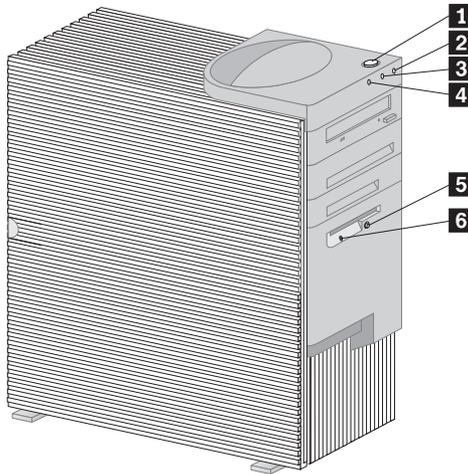
Additional information about operating systems might be available at <http://www.ibm.com/pc/support/> on the World Wide Web.

Chapter 3. Operating and caring for your computer

This chapter provides information to help you in the day-to-day use and care of your computer.

Controls and status indicators

The buttons at the front of your computer are controls that enable you to perform a specific function, such as powering on the computer. The lights are status indicators that tell you when a certain device, such as the diskette drive, is in use. The following illustration shows the controls and status indicators for your computer.



- 1** Power switch
- 2** Power-on light
- 3** Hard-disk drive light

- 4** Client LAN light
- 5** Diskette eject button
- 6** Diskette drive light

Following is a description of the controls and status indicators on your computer.

- **Power switch:** This switch is used to manually turn your computer on or off. Do not turn off your computer if the in-use light for the hard disk drive or diskette drive is on.

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

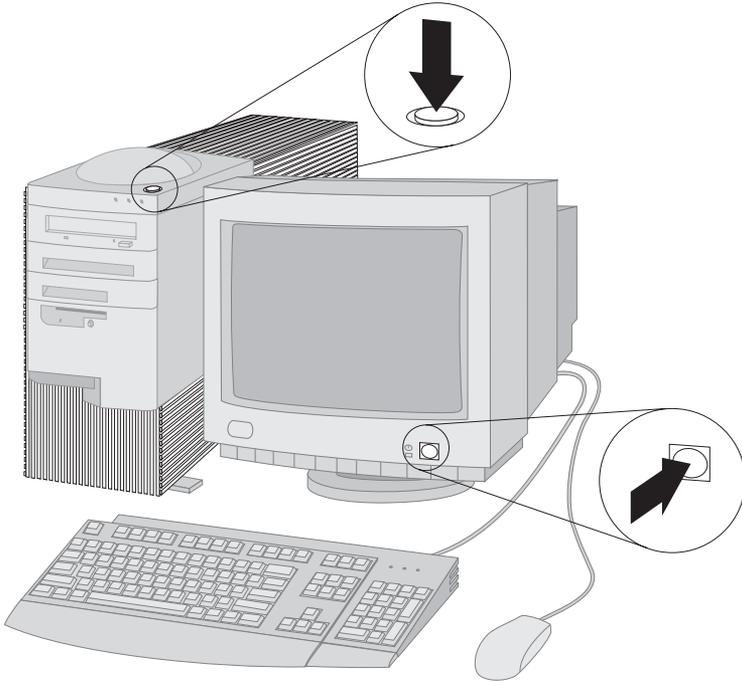
- **Power-on light:** This light is on when computer power is turned on.
- **Hard disk drive light:** This light indicates that the hard disk drive heads are being positioned or that your computer is reading from or writing to the hard disk.
- **LAN client light:** This light indicates when there is communications activity on the LAN.
- **Diskette eject button:** This button is used to eject a diskette from the drive.
- **Diskette drive light:** This light indicates that the diskette drive heads are being positioned or that your computer is reading from or writing to a diskette.

Note: See “Using a CD-ROM drive” on page 30 for information about the controls and status indicators for the CD-ROM drive.

Starting your computer

To start your computer:

1. Turn on all devices connected to the computer.
2. Press and release the power switch on your computer.



What you see and hear when you start up your computer depends on the features installed and the BIOS settings.

If POST detects an error you hear multiple beeps (or no beep) and an error message appears on the screen. Write down any error numbers and descriptions. If a problem is detected, see Chapter 6, “Troubleshooting” on page 97 for more information.

When POST completes, the following message appears:

Press F12 to boot from the network
Press F1 for Configuration/Setup

If a power-on or administrator password has been set, a password prompt appears on the screen. Type either password at the prompt and press Enter. For more information about passwords, see “Using passwords” on page 46.

If your 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 your computer. If the request is unsuccessful or there is no network connection, the operating system and application programs are loaded from the hard disk.

If the system hardware configuration has changed or an error is detected, the Configuration/Setup utility program menu might be displayed when you press Enter.

Shutting down

When you are ready to turn off your computer, follow the shutdown procedure for your operating system to prevent the loss of unsaved data or damage to your software programs. See your operating system documentation for instructions.

Using diskettes

You can use 3.5-inch diskettes in the diskette drive of your computer.

Handling and storing diskettes

Inside the protective diskette case is a flexible disk with a magnetic-sensitive coating on which data is stored. A plastic cover protects this disk from damage by heat, dust, magnetic fields, and fingerprints.

Use the following guidelines when handling and storing diskettes:

- If the plastic cover that protects the disk is damaged, *do not* use the diskette. A damaged diskette might damage the diskette drive.
- A protective slide on the top of a 3.5-inch diskette covers part of the magnetic surface. The diskette drive moves this slide to read data from or write data to the diskette. *Do not* move this slide because fingerprints and dust can cause loss of data.
- Never touch the magnetic disk itself.
- Keep diskettes away from magnets or devices that create a strong magnetic field, such as electric motors and generators. Diskettes are sensitive to magnets found in television sets, telephones, stereo

speakers, and other such items. A magnetic field can erase the data on your diskettes. *Do not* set diskettes on the monitor or use magnets to attach notes to your computer.

- Do not store diskettes at high temperatures, low temperatures, or in direct sunlight. Temperatures ranging from 4° to 53°C (39° to 127°F) are acceptable for 3.5-inch diskettes. Keep diskettes away from heat. The plastic outer covering might warp, damaging the diskette.

Inserting and removing diskettes

To insert a 3.5-inch diskette, hold the diskette with the label facing up and insert the end with the protective slide first. Push the diskette into the diskette drive until the diskette clicks into place.

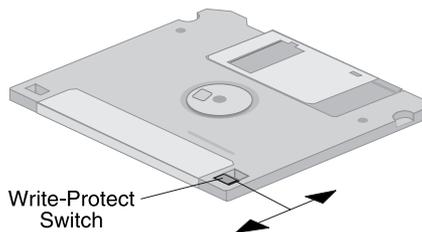
To remove the diskette, press the eject button and slide the diskette out of the drive. Do not remove the diskette while the in-use light is on.

Write-protecting diskettes

It is possible to accidentally format a diskette or unintentionally write data to it. Important information can be written over or lost. For this reason, it is a good idea to write-protect important diskettes. You can read data from a write-protected diskette, but you cannot erase or change the data.

Most 3.5-inch diskettes have a write-protect switch that can be used to prevent data from being written to or erased from the diskette. If a 3.5-inch diskette does not have a write-protect switch, it is permanently write-protected.

The write-protect switch is located on the back of 3.5-inch diskettes.



- To allow writing to the diskette, slide the switch so the write-protect window is covered.

- To prevent writing to the diskette, slide the switch so the write-protect window is open.

Using a CD-ROM drive

Some models have a preinstalled CD-ROM drive. CD-ROM drives can play back or read from a CD but cannot write information to it. CD-ROM drives use industry standard, 12 cm (4.75-inch) CDs.

Follow these guidelines when using a CD-ROM drive:

- Do not place the drive where there is:
 - High temperature
 - High humidity
 - Excessive dust
 - Excessive vibration or sudden shock
 - An inclined surface
 - Direct sunlight
- Do not insert any object other than a CD into the drive.
- Before moving the computer, remove the CD from the drive.

Handling a CD

When handling a CD, follow these guidelines:

- Hold the CD by its edges. Do not touch the surface of the side that is not labeled.
- To remove dust or fingerprints, wipe the CD with a clean, soft cloth from the center to the outside. Wiping the CD in a circular direction might cause loss of data.
- Do not write or stick paper on the CD.
- Do not scratch or mark the CD.
- Do not place or store the CD in direct sunlight.
- Do not use benzene, thinners, or other cleaners to clean the disk.
- Do not drop or bend the CD.

Loading a CD

To load a CD into a CD-ROM drive:

1. Press the eject/load button. The tray slides out of the drive. (Do not manually force the tray open.)
2. Place the CD in the tray with the label facing up.
3. Close the tray by pressing the eject/load button or by gently pushing the tray forward. When the tray is closed, the indicator light on the front of the drive will activate to indicate that the drive is in use.
4. To eject the CD, press the eject/load button. When the tray slides out, carefully remove the disk.
5. Close the tray by pressing the eject/load button or by gently pushing the tray forward.

Note: If the tray does not slide out of the drive when you press the eject/load button, insert the pointed end of a large paper clip into the emergency-eject hole located on the front of the CD-ROM drive.

Important

If you set up your computer so that the CD-ROM drive tray is in a vertical position, make sure that the CD retainer devices on the tray are positioned to hold the CD in place after you close the tray. (Several different retainer device designs are found on CD-ROM drives. For some, you will need to rotate or extend two or more tabs or clips. Other designs use a wire bail that you need to reposition in the drive so that it will hold the CD in place.)

Using video features

Your computer has an accelerated graphics port (AGP) adapter with SGRAM video memory. AGP is a video standard for displaying text and graphic images on a monitor screen. AGP 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. For more information on video modes, see *Understanding Your Computer* provided on the *Software Selections CD* that comes with your computer.

Video device drivers

To take full advantage of the graphics adapter in your computer, some operating systems and application programs require custom software, known as video device drivers. These 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 Driver and IBM Enhanced Diagnostics CD* that comes with your computer. If your computer has IBM-preinstalled software, video device drivers have already been installed on the hard disk. However, you can use the device driver installation instructions if you need to reinstall the device drivers or if you need information about obtaining and installing updated device drivers.

See Chapter 7, “Getting help, service, and information” on page 127 for more information.

Changing monitor settings

To get the best possible image on your screen and to reduce flicker, you might need to reset the resolution and refresh rate of your monitor. You can view and change monitor settings through your operating system using the instructions provided in the video device driver README files on the *Device Driver and IBM Enhanced Diagnostics CD* or the *Product Recovery CD* that comes with your computer. See your operating system documentation for more information on monitor settings.

Attention

Before you change any monitor settings, be sure to review the information that comes with your monitor. Using a resolution or refresh rate that is not supported by your monitor might cause the screen to become unreadable and could damage the monitor. The information that comes with your monitor usually includes 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 your monitor for the highest noninterlaced refresh rate that the monitor supports. If your monitor complies with the VESA Display Data Channel (DDC) standard, it is probably already set to the highest refresh rate that the monitor and video controller can support. If you are not sure if your monitor is DDC-compliant, see the documentation provided with the monitor.

Using audio features

Your computer has an integrated audio controller that supports Sound Blaster applications and is compatible with the Microsoft Windows Sound System. Your computer also has a single internal speaker and three audio connectors. Using the audio controller, you can record and play back sound and music and enjoy sound with multimedia applications.

Optionally, you can connect two stereo speakers to the line-out connector to enjoy better sound with multimedia applications.

The audio connectors in your computer are 3.5 mm (1/8-in.) mini-jacks. A description of the connectors follows. (For the location of the connectors, see “Connecting cables” on page 13.)

Line out/headphone out

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

Note: The internal speaker in your computer is disabled when an external speaker is connected to the headphone connector on your computer.

Audio line in

This jack 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.

Microphone in

This jack is used to connect a microphone to your computer when you want to record voice or other sounds on the hard disk. This jack 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).

Procedures for recording and playing back sound vary by operating system. See your operating system documentation for information and instructions.

Updating system programs

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

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

IBM occasionally makes changes and enhancements to the system programs. When updates are released, they are made available as downloadable files from the World Wide Web (see Chapter 7, “Getting help, service, and information” on page 127). System programs are updated by starting your computer with a flash update diskette in the diskette drive or by using the Remote Administration feature. Instructions for using system programs updates are included in a README file provided with the downloadable files. See “Setting Remote Administration” on page 54 for more information.

Managing your computer

Your computer comes with features that a network administrator or file server can use to remotely manage and control your computer. For more information about system management, see *Understanding Your Computer* (provided on the IBM *Software Selections CD* that comes with your computer).

IBM Universal Manageability Services (UM Services) streamline and automate PC systems management and support tasks, such as asset deployment and tracking. These PC tools are available for IBM PCs at no additional charge, helping to reduce total cost of ownership of your networked PCs so that you can focus vital company resources on essential business activities.

Go to <http://www.ibm/pc/us/software/sysgmt/> on the World wide Web and select **Products** for more information about available system management programs.

Wake on LAN

Your computer has a Wake on LAN network adapter built into the system board. A network administrator can use the Wake on LAN feature to turn on your computer from a remote location. When Wake on LAN is used with network-management software, many types of functions, such as data transfers, software updates, and POST or BIOS updates to your computer can be initiated remotely.

Note: If the computer power cord is plugged into a surge protector, make sure to use the computer power switch and not the surge protector switch when you turn off the power. Otherwise, the Wake on LAN feature will not work.

Alert on LAN

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

Alert on LAN generates notifications when the internal computer components have been 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 Universal Management 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 your computer. If you use RPL with software such as IBM LANClient Control Manager, you can use a feature called *Hybrid RPL*, to install hybrid images (or files) on the hard disk. If your computer is a Hybrid RPL client, each time the computer starts from the network, LANClient Control Manager downloads a small *bootstrap* program and avoids the network traffic associated with a standard RPL.

Remote Administration

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

Network-management software, such as LANClient Control Manager, is required in order to take advantage of this feature. See “Setting Remote Administration” on page 54 for configuration information.

LANClient Control Manager

LANClient Control Manager (LCCM) is a graphical, server-based program that aids in system deployment by mass unattended installation of operating systems, complete software images, device drivers, and BIOS updates to remote systems. Used with Wake on LAN, LCCM can remotely start up your system from a powered-off state, which means that installation can be done while the system is not being used. You can download LCCM at no additional charge (Internet access fees excepted).

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 (SMA)

System Migration Assistant (SMA) delivers wizard-like functionality to help administrators remotely transfer configurations, profile settings, device drivers, and files from an IBM or non-IBM PC to supported IBM systems. You can download SMA at no additional charge (Internet access fees excepted).

For more information or to download this software visit

<http://www.ibm.com/pc/us/software/sysmgmt/products/sma> on the World Wide Web.

Desktop Management Interface

Desktop Management Interface (DMI) is a method for gathering information about the hardware and software in your computer. In a network environment, network administrators can use DMI to remotely monitor and control your computer. For more information about DMI, see *Understanding Your Computer* (provided on the IBM *Software Selections CD* that comes with your computer).

Using security features

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

Anti-intrusion features

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

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

— Important —

Record the "key code" number along with the manufacturer address and phone number in the space provided in Appendix B, "Computer records" on page 141. Because 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 set a chassis-intrusion detector inside your computer to alert the system administrator each time the computer cover is removed. This detector is enabled after you set an administrator password in the Configuration/Setup utility program. After the password is set, and after the computer cover is removed, a POST error message (176) displays on the computer screen the next time the computer is plugged in and turned on. You must type the correct administrator password to start up the computer. For information on setting passwords, see Chapter 4, "Using the Configuration/Setup Utility program" on page 43.

If your computer uses the Alert on LAN feature, and you are connected to a network that uses Intel LANDesk® Desktop Manager or IBM LANClient Manager, a message is also sent to the network administrator console notifying that the computer cover has been removed. For more information, see "Alert on LAN" on page 35 and contact your network administrator.

Asset ID capability

IBM provides the basis for Asset ID™⁴ support in your computer. Asset ID provides the capability to access information about your computer that is stored in an EEPROM module on the system board, using a radio-frequency-enabled portable scanner.

The Asset ID EEPROM contains prerecorded information about the system, including its configuration and the serial numbers of key components. The Asset ID EEPROM also includes a number of blank fields you can record with your choice of information. The Asset ID can be scanned from a short distance. The scanning of the Asset ID does not require the computer cover to be removed or even require that the computer be removed from the box in which it is shipped. This type of wireless tracking enables quicker system deployment and improved asset control. Asset ID information is also available through UM Services. See “Managing your computer” on page 34.

For the latest information on personal computer security features, visit the IBM support page at <http://www.ibm.com/pc/us/desktop/assetid> on the World Wide Web.

IBM security solutions

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

- Integrated security chip that gives you the functionality of a SMART card without the added cost
- Enhanced Security support
- User Verification Manager software that helps manage authentication so that you decide who has access to the components of your system

Data protection

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

⁴ Asset ID enables your personal computer to be scanned by various radio frequency-emitting devices supplied by independent companies. Asset ID is intended for use only with radio frequency equipment that meets ANSI/IEEE C95.1 1991 RF Radiation Limits.

SMART hard disk drive

Your computer comes with a SMART (Self-Monitoring, Analysis, and Reporting Technology) 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 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

Your computer has built-in virus protection that can be enabled through the Configuration/Setup utility program. Also, Norton AntiVirus for IBM is installed on the hard disk of computers that have preinstalled software. Norton AntiVirus for IBM is also on the IBM *Software Selections CD*.

Enhanced security

Your computer has an enhanced security feature that provides extra protection for your administrator password and your startup sequence settings. With enhanced security, your administrator password and startup sequence are stored in a highly protected, nonvolatile, security EEPROM module that is separate from CMOS memory and the EEPROM module that stores system programs. When your administrator password and security sequence are protected by enhanced security, they remain intact even if the battery in your computer expires or is removed by someone. For more information, see “Using Enhanced Security” on page 51.

Locking the keyboard

You can disable the keyboard so that others are unable to use it. If a power-on 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 power-on password feature with the Configuration/Setup utility program. See Chapter 4, “Using the Configuration/Setup Utility program” on page 43.

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

Taking care of your computer

Use these guidelines for the proper handling and care of your computer.

Basics

Here are some basic points about keeping your computer functioning properly:

- Keep your computer in a clean, dry environment. Make sure it rests on a flat, sturdy surface.
- Do not place items on top of the monitor or cover any of the vents in the monitor or computer. These vents provide air flow to keep your computer from overheating.
- Keep food and drinks away from all parts of your computer. Food particles and spills might make the keyboard and mouse sticky and unusable.
- Do not get the power switches or other controls wet. Moisture can damage these parts and cause an electrical hazard.
- Always disconnect a power cord by grasping the plug, not the cord.

Cleaning your computer

It is a good practice to clean your computer periodically to protect the surfaces and ensure trouble-free operation.

CAUTION:

Be sure to turn off the computer and monitor power switches before cleaning the computer and monitor screen.

Computer and keyboard

Use only mild cleaning solutions and a damp cloth to clean the painted surfaces of the computer.

Monitor screen

Do not use abrasive cleaners when cleaning the surface of the monitor screen. The screen surface is easily scratched, so avoid touching it with pens, pencil points, and erasers.

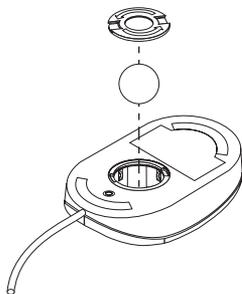
To clean the screen surface, wipe it gently with a soft, dry cloth, or blow on the screen to remove grit and other loose particles. Then use a soft cloth moistened with a nonabrasive liquid glass cleaner.

Mouse

If the pointer on the screen does not move smoothly with the mouse, you might need to clean the mouse.

To clean your mouse:

1. Turn off the computer.
2. Disconnect the mouse cable from the computer.
3. Turn the mouse upside down. Unlock the retainer on the bottom of the mouse by moving it in the direction indicated by the arrow on the retainer.



4. Turn the mouse right-side up, and the retainer and ball will drop out.
5. Wash the ball in warm, soapy water and dry it well.
6. Using a damp cloth, wipe the outside of the mouse and the retainer. Be sure to wipe the rollers inside the mouse.
7. Insert the ball and retainer. Lock the retainer by moving it in the opposite direction of the arrow.
8. Reconnect the mouse cable to the computer.

Moving your computer

Take the following precautions before moving your computer.

1. Back up all files and data from the hard disk.
Operating systems can vary in the way they perform backup procedures. See your operating system documentation for information about software backup.
2. Remove all media (diskettes, compact discs, tapes, and so on) from the drives.
3. Turn off the computer and all attached devices. Your hard disk drive automatically parks the read/write heads in a nondata area. This process prevents damage to the hard disk.
4. Unplug the power cords from electrical outlets.
5. Note where you have attached your cables to the rear of the computer; then remove them.
6. If you saved the original shipping cartons and packing materials, use them to pack the units. If you are using different cartons, cushion the units to avoid damage.

Chapter 4. Using the Configuration/Setup Utility program

The Configuration/Setup utility program is stored in the electrically erasable programmable read-only memory (EEPROM) of your computer. You can use the Configuration/Setup utility program to view and change the configuration settings of your computer, regardless of which operating system you are using. However, the settings you select in your operating system might override any similar settings in the Configuration/Setup utility program.

Starting and using the Configuration/Setup Utility program

The Configuration/Setup utility program is started automatically when POST detects that hardware installed in your computer has resulted in a downgraded configuration. A 162 POST message is displayed. See “Power-on self-test (POST)” on page 98.

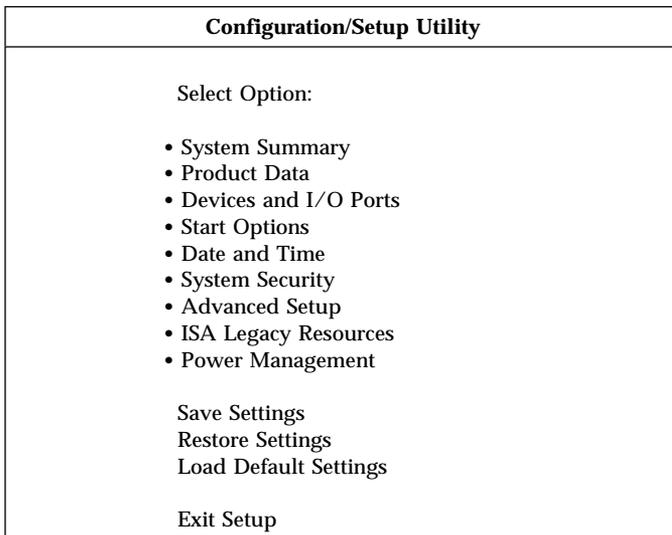
To start the Configuration/Setup utility program:

1. Turn on your computer. If your computer is already on when you start this procedure, you must shut down the operating system, turn off the computer, wait a few seconds until all in-use 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.)
3. If you have *not* set a password, the Configuration/Setup utility program menu appears on the screen. If you have set a password, the Configuration/Setup utility program menu will not appear until you type your password and press Enter. See “Using passwords” on page 46 for more information.

Note: If new system hardware has been added *and* one or more of the following statements are true, the Configuration/Setup utility program menu will display before control is passed to the operating system.

- Enhanced POST is in effect.
- Power-on password is enabled.
- Administrator password is enabled.

The menu you see on your computer might look slightly different from the menu shown here, but it will operate the same way.



Viewing and changing settings

The Configuration/Setup utility program menu lists items that identify system configuration topics. You might see symbols next to configuration menu items. See the following table for the meaning of the symbols.

Symbol	Explanation
•	An additional menu or screen is available
▶	A change to that item has been made in the system configuration or the Configuration/Setup utility program has detected an error and attempted to correct it. Also, an additional menu might follow a menu item with a ▶ beside it.
*	A system resource conflict was detected. Resolve this conflict before exiting from the Configuration/Setup utility program so that your computer will function properly.
[]	In the Configuration/Setup utility program menus, the configuration information you can change is enclosed in brackets like these. You cannot change information that is not surrounded by brackets.

When working with the Configuration/Setup utility program menu, you must use the keyboard. The following table shows the keys used to accomplish various tasks.

Keys	Function
↑ ↓	Use these arrow keys to move among menu items until the item you want is highlighted.
← →	Use these arrow keys to display and toggle among choices for a menu item.
Enter	Press this key to select a highlighted menu item.
Esc	Press this key to exit from a menu after viewing or making changes to the settings in the menu.
+	Use this key in some menus to increase the numerical value of a setting.
-	Use this key (the minus or hyphen key) in some menus to decrease the numerical value of a setting.
0-9	Use these number keys in some menus to change the numerical value of a setting.
F1	Press this key for help on a selected menu item.
F9	Press this key if you changed and saved the setting of a selected menu item and you want to restore the setting that was active before you made the change.
F10	Press this key to return the setting of a selected menu item to a default value.

Note: Active keys are displayed at the bottom of each screen; not all of the above keys are active on every menu.

Exiting from the Configuration/Setup Utility program

When you finish viewing or changing settings, press Esc to return to the Configuration/Setup utility program menu (you might have to press Esc several times). If you want to save the new settings, select Save Settings before you exit. Otherwise, your changes will not be saved.

Using passwords

You can use passwords to provide security for your computer and data. There are two kinds of passwords: a power-on password and an administrator password. You do not have to set a password of either type to use your computer. However, if you decide to set one, read the following sections.

Using a power-on password

The *power-on* password feature deters unauthorized persons from gaining access to your computer. When you set the power-on password, you can choose from three password prompt modes:

On In password prompt On mode, you are prompted for the power-on password when you turn on the computer. Until the correct password is entered, the computer operating system will not start, and you will not be able to use the keyboard or mouse to input any other information.

Notes:

1. If your mouse is connected to the serial port, it will be activated when the computer is started, regardless of whether a password is set.
2. If **Remote Administration** is enabled, you cannot select **On**. In this case, select **Dual**. If you try to set this mode to **On** when **Remote Administration** is enabled, it will automatically be reset to **Dual**. For more information, see “Setting Remote Administration” on page 54.

Off In password prompt Off mode (sometimes referred to as unattended start mode), you are not prompted to enter your power-on password when you turn on the computer. The operating system will start but you must type the password before you can log on or access applications.

— Important information for mouse users —

This information applies only to computers with a mouse connected to the mouse port; a serial mouse is not affected by the password prompt Off mode.

The password prompt Off mode prevents the computer from detecting that a mouse is attached. In this mode, the mouse device driver does not load automatically. Instead, the operating system displays an error message informing you that the mouse connector is disabled.

Once the operating system starts in password prompt Off mode, the computer will remain locked until you type your password. However, the mouse connected to the mouse port remains locked.

Dual In the password prompt Dual mode, the startup behavior of the computer depends on whether the computer is started from the computer power switch or by an unattended method, such as remotely over a LAN.

If you start your computer using the power switch, you will be prompted for the password.

If the computer is started by an unattended method, the computer operates the same as it does in password prompt Off mode.

The password does not appear on the screen as you type it. If you type the wrong password, you receive a screen message telling you so. If you type the wrong password three times, you must turn off the computer and start again. When you type the correct password, the computer begins normal operation.

Setting, changing, and deleting a power-on password

A power-on password can be any combination of up to seven characters (A–Z, a–z, and 0–9).

— Attention —

Keep a record of your power-on password in a secure place. If you lose or forget your password, you cannot change or delete it without removing the computer cover and moving a jumper on the system board. See “Erasing a lost or forgotten password” on page 49 for more information.

To set, change, or delete a power-on password:

1. Start the Configuration/Setup utility program (see “Starting and using the Configuration/Setup Utility program” on page 43).
2. From the Configuration/Setup utility program menu, select **System Security** and press Enter.
3. Select **Power-On Password** and press Enter.
4. To set or change a power-on password, type your new password and press the Down Arrow (↓). Type your new password again and press the Down Arrow (↓).
5. At **Change Power-On Password**, press Enter.
6. If you want to change the password prompt mode, select **Password Prompt** and then select either **Off**, **On**, or **Dual**. Continue at step 8.
7. To delete a power-on password, select **Delete Power-On Password** and press Enter.
8. Press Esc twice to return to the Configuration/Setup utility program menu.
9. Select **Save Settings** from the Configuration/Setup utility menu; then press Enter and follow the instructions on the screen to exit from the Configuration/Setup utility program.

Using an administrator password

Important

If Enhanced Security is enabled, keep a record of your administrator password in a secure place. If you forget or lose the administrator password, you must replace the system board in order to recover.

Setting an administrator password deters unauthorized persons from changing configuration settings. If you are responsible for maintaining the settings of several computers, you might want to set an administrator password.

After you set an administrator password, a password prompt appears each time you try to access the Configuration/Setup utility program. If you type the wrong password, you will see an error message. If you type the wrong password three times, you must turn the computer off and start again.

If both a power-on and administrator password are set, you can type either password. However, in order to change any settings, you must use your administrator password. If you enter the power-on password, you will only be able to view limited information.

Setting, deleting, or changing an administrator password

An administrator password can be any combination of up to seven characters (A-Z, a-z, and 0-9).

To set, change, or delete an administrator password:

1. Start the Configuration/Setup utility program (see “Starting and using the Configuration/Setup Utility program” on page 43).
2. From the Configuration/Setup utility program menu, select **System Security** and press Enter.
3. Select **Administrator Password** and press Enter.
4. To set or change an administrator password, type your password, press the Down Arrow (↓). Type your password again and press the Down Arrow (↓).
5. At **Change Administrator Password**, press Enter.
6. At **Power-On Password Changeable by User**, select **Yes** or **No**. (If you select **Yes** and an administrator password is set, the power-on password can be changed without having to enter the administrator password. If you select **No** and an administrator password is set, the power-on password cannot be changed unless the administrator password is entered.)
7. At **Require Power-On Password on Warm boot**, select **Yes** or **No**. Continue at step 9.
8. To delete an administrator password, select **Delete Administrator Password** and press Enter.
9. Press Esc until you return to the Configuration/Setup utility program menu.
10. Select **Save Settings** from the Configuration/Setup utility program menu; then press Enter and follow the instructions on the screen to exit from the Configuration/Setup utility program.

Erasing a lost or forgotten password

This section applies to lost or forgotten passwords that are *not* protected by Enhanced Security. For information on lost or forgotten passwords that *are* protected by Enhanced Security, see “Using Enhanced Security” on page 51.

Important

If possible, record the configuration information of your computer *before* setting the fail safe recovery jumper.

To erase a lost or forgotten password:

1. Turn off the computer and all attached devices.
2. Unplug the power cord.
3. Remove the cover. See “Disconnecting cables and removing the cover” on page 64.
4. Refer to the system board cover label inside the computer to locate the Admin Jumper.
5. Move the jumper from the Enable to the Disable position.
6. Replace the cover.
7. Plug in the power cord.
8. Restart the computer, leave it on for about 10 seconds, and then turn off the computer.
9. Unplug the power cord and remove the cover. See “Disconnecting cables and removing the cover” on page 64.
10. Move the jumper back to the original position.
11. Replace the computer cover.
12. Plug in the power cord.

Using Security Profile by Device

Security Profile by Device enables you to control the level of security for the following:

- IDE controller (for example, hard disk drives) - when this feature is set to Disable, all devices connected to the IDE controller are disabled and will not appear in the system configuration.
- Diskette Drive Access - when this feature is set to Disable, the diskette drive cannot be accessed.
- Diskette Write Protect - when this feature is set to Enable, all diskettes are treated as if write-protected.

Setting Security Profile by Device also enables you to control which devices require a password before they start up. There are three classes of these devices:

- Removable media, such as diskette drives and CD-ROM drives
- Hard disk drives
- Network devices

You can set these devices to request a user password, an administrator password, or not to require a password. This way, if you have a power-on or administrator password set for your system, you can configure your

computer to prompt you for a password only when certain devices are accessed at startup. For example, if you set Hard Disk Devices to require a user password, each time you attempt to start up from the hard disk, you will be prompted to type the password before the startup proceeds.

Some operating systems require you to type a password before the operating system will load. Security Profile by Device does not change the way the operating system works. If an operating system password is required, you must still type it when prompted, regardless of the Security Profile by Device settings.

To set Security Profile by Device:

1. Start the Configuration/Setup utility program (see “Starting and using the Configuration/Setup Utility program” on page 43).
2. From the Configuration/Setup utility program menu, select **System Security** and press Enter.
3. Select **Security Profile by Device** and press Enter.
4. Select the desired devices and settings and press Enter.
5. Press Esc twice to return to the Configuration/Setup utility program menu.
6. Select **Save Settings** from the Configuration/Setup utility menu; then press Esc and follow the instructions on the screen to exit from the Configuration/Setup utility program.

Using Enhanced Security

Enhanced Security can be enabled or disabled only when you update system programs.

If Enhanced Security is enabled and you have not set an administrator password, your computer will operate as if enhanced security were disabled.

If enhanced security is enabled and you have set an administrator password, your computer will operate as follows:

- The contents of the security EEPROM (your administrator password and startup sequence) will be protected from failure of the battery and CMOS memory.
- The security EEPROM will be protected from unauthorized access because it locks after your computer is turned on and the system programs have completed their startup routine. Once it is locked, the security EEPROM cannot be read from or written to by any software application or system software until the computer is turned off and

back on again. In a networking environment, this might prevent certain functions from being performed remotely on your computer.

Enhanced Security adds a *hard lock* for an extra measure of protection for the system programs in your computer. Normally, the entire contents of the system programs EEPROM is write protected with a *soft lock*. A soft lock enables the Remote Administration program to function in a network environment. With a hard lock, when your computer is turned on and the system programs startup routine is completed, Remote Administration is locked and cannot be unlocked until the computer is turned off and back on again and the administrator password is entered. In a networking environment, this prevents the system programs in your computer from being updated remotely. Someone must be present at your computer to turn it on and off and enter the administrator password.

- A chassis-intrusion feature will alert you if the cover of your computer has been opened. This feature will work if your computer is on or off. If the cover has been opened, a prompt for your administrator password will appear on the screen, and your computer will remain in a suspended state until your administrator password is entered.
- Your configuration settings cannot be changed in the Configuration/Setup Utility program until you enter the administrator password. This means that any changes in computer hardware that the system programs in your computer detect will generate a configuration error until you enter the administrator password.

To enable or disable Enhanced Security:

1. Insert a system programs update (flash) diskette into the diskette drive (drive A) in your computer. System programs updates are available at <http://www.ibm.com/pc/support> on the World Wide Web.
2. Turn on the computer. If it is on already, you must turn it off and back on again.
3. The update begins, your computer halts, and you are prompted for your administrator password (if you have set an administrator password). The computer remains in a halted state until you enter the administrator password.
4. When you enter the administrator password, or if no administrator password has been set, the update diskette will continue to run, and you are given the option of enabling or disabling Enhanced Security. Your choice is automatically recorded in the System Security menu of the Configuration/Setup Utility program.

Other settings in the Configuration/Setup Utility program

The information in this section includes instructions for changing other settings using the Configuration/Setup utility program, such as the startup sequence, remote administration, and power management.

Changing and viewing the startup sequence

Your computer can be started from several devices including the hard disk drive, diskette drive, CD-ROM drive, or from the network. The startup program looks for these devices in a selected sequence. A different startup sequence can be selected for when your computer is turned on using the power switch than when it is turned on automatically, such as over a LAN or by a timer. The Configuration/Setup utility is used to select the primary startup sequence and the automatic power on startup sequence.

Primary startup sequence

These settings are used to select the sequence of devices used to startup your computer when it is turned on using the power switch. The default settings for the primary startup sequence are shown here.

First startup device	[Diskette drive]
Second startup device	[Hard disk 0]
Third startup device	[Network]
Fourth startup device	[Disabled]

Automatic power on startup sequence

These settings are used to select the sequence of devices used to startup your computer when it is turned on automatically by a timer, a PCI device, or by a wake up request from the LAN. The default settings for the automatic power on startup sequence are shown here.

First startup device	[Network]
Second startup device	[Hard disk 0]
Third startup device	[Disabled]

To view or change the primary or automatic power on startup sequence:

1. Start the Configuration/Setup utility program (see “Starting and using the Configuration/Setup Utility program” on page 43).
2. Select **Start Options** and press Enter.
3. Select **Startup Sequence** from the Start Options menu and press Enter.

4. Use the arrow keys to make your selections and press Esc until you return to the Configuration/Setup utility program menu.
5. Select **Save Settings** from the Configuration/Setup utility menu and press Enter; then press Esc and follow the instruction on the screen to exit from the Configuration/Setup utility program.

Setting Remote Administration

You can remotely update the system programs, such as POST and BIOS, from a network server by enabling Remote Administration. If you have set an administrator password for your computer, the password does *not* have to be entered in order to remotely update programs. Consult your network administrator for information on setting up your network server to perform POST and BIOS updates.

To set Remote Administration, follow these steps:

1. Start the Configuration/Setup utility program. See “Starting and using the Configuration/Setup Utility program” on page 43.
2. Select **System Security** and press Enter.
3. Select **Remote Administration** and press Enter.
4. To enable update remote administration, select **Enabled**. To disable, select **Disabled**.
5. Press Esc until you return to the Configuration/Setup utility program main menu.
6. Select **Save Settings** from the Configuration/Setup utility program menu; then press Esc and follow the instructions on the screen to exit from the Configuration/Setup utility program.

Interrupt and DMA resources

This section lists the settings for the default interrupt and direct memory access (DMA) resources for your computer. The interrupt and DMA settings might change if your computer is reconfigured.

Interrupt request	System resource
0	Timer
1	Keyboard
2	Interrupt controller
3	Serial port
4	Serial port
5	Available
6	Diskette
7	Parallel port
8	Real Time Clock
9	ACPI

Interrupt request	System resource
10	Available
11	Available
12	Mouse
13	Coprocessor
14	Available
15	IDE drives

Note: IRQs 4 and 7 can be modified to alternative settings or disabled.

DMA request	System resource
0	Available
1	Available
2	Diskette
3	Parallel port
4	System resource
5	Available
6	Available
7	Available

Power-management features

Your computer comes with built-in energy-saving capabilities. You can view and change energy-saving settings using the power-management menu in the Configuration/Setup utility program. This section describes the power-management features in your computer and provides instructions for using these features.

Attention

If a device, such as a monitor, does not have power-management capabilities, it can be damaged when exposed to a reduced power state. Before you make energy-saving selections for your monitor, check the documentation that comes with your monitor to see if it supports Display Power Management Signaling (DPMS).

ACPI BIOS IRQ

Automatic Configuration and Power Interface (ACPI) BIOS IRQ enables the operating system to control the power-management features of your computer. You can use the ACPI BIOS IRQ setting to configure the interrupts that this feature uses so that you can free resources for other devices. Not all operating systems support ACPI BIOS IRQ. See your operating system documentation to determine if ACPI is supported.

ACPI standby mode

When you select the ACPI BIOS IRQ, you can also select which power level (S1 or S3) your system goes to when it enters standby mode.

Standby Mode S1

When Your computer enters S1 Standby Mode, power is maintained to all devices but microprocessor activity is halted.

Standby Mode S3

When the computer enters S3 mode, power is maintained only for main memory. Some computers do not support Standby Mode S3. If the Standby Mode setting in the Configuration/Setup utility program does not allow you to select S3, your computer only supports Standby Mode S1. If the Standby Mode setting in the Configuration/Setup utility program allows you to select S3, be sure to read the following important information.

Important

Some adapters might not wake up properly from standby mode S3. If your computer appears to have stopped and will not wake up from standby, press and hold the power switch for 5 seconds. Your computer will exit standby mode and turn off. Press the power switch to turn the computer back on.

If you encounter a problem with Standby Mode S3, set this option to S1 and check to see if updated device drivers that support Standby Mode S3 are available for your adapters.

Setting power-management features

With power management, the computer and monitor (if the monitor supports DPMS) can be set to go into a reduced power state if they are inactive for a specified length of time.

- **Time to Low Power:** When you enable **Automatic Hardware Power Management**, you can use this option to specify the amount of time that the computer must be inactive before power-management features are activated.
- **System Power:** You can select **ON** if you want the computer to remain on or **OFF** if you want the computer to shut down.
- **Display:** You can use this option to select one of the following reduced-power states:

- **Standby:** In this mode, the screen is blanked, but the screen image is restored *immediately* when any activity is detected.
- **Suspend:** In this mode, the monitor uses less power than in standby mode. The screen is blanked, but the screen image is restored *within a few seconds* after any activity is detected.
- **OFF:** In this mode, the monitor power is turned off. To restore power to the monitor, you must press the monitor power switch. On some monitors, you might have to press the power switch twice.

If **OFF** is selected, you must specify the **Time to Display 'OFF'**. You can select 5 minutes to 1 hour.

Note: *Time to display off* is the amount of time from when the reduced-power state begins until the display turns off.

- **Disable:** In this mode, the monitor is unaffected by the power management settings.
- **IDE Drives:** You can use this selection to specify whether the IDE drives are enabled or disabled when power-management features are activated.

To set power management features:

1. Start the Configuration/Setup utility program (see “Starting and using the Configuration/Setup Utility program” on page 43).
2. Select **Power Management** and press Enter.
3. Select **APM** and press Enter.
4. Set **APM BIOS Mode** to Enabled or Disabled.
5. Set **Automatic Hardware Power Management** to Enabled.
6. Select values for power management (time to low power, system power, processor speed, display, and time to display off), as desired.
7. Select **Low Power Entry Activity Monitor** and press Enter.
8. Set to **Enabled** or **Disabled** devices you want to be monitored for power management.

Note: If all devices are set to disabled, you must restart the computer to wake the system.

9. Press Esc three times to return to the Configuration/Setup utility program menu.
10. Select **Save Settings** from the Configuration/Setup utility program menu; then press Esc and follow the instructions on the screen to exit from the Configuration/Setup utility program.

Setting automatic power-on features

You can use the automatic power-on features on the power-management menu to enable and disable features that automatically turn on your computer. You must also select the startup sequence you want to use for the type of power-on event you select.

- **Wake on LAN:** If you have remote network-management software you can use the IBM-developed Wake on LAN feature. When you set Wake on LAN to **Enabled**, your computer will turn on when it receives a specific signal from another computer on your local area network (LAN).
- **Wake Up on Alarm:** With this feature, you can specify a date and time at which the computer will be turned on automatically. This can be either a single event, a daily event, or a weekly event.
- **PCI Wake Up:** If this setting is enabled, your computer turns on in response to wake up requests from PCI devices that support this feature.

To set automatic power-on features, follow these steps:

1. Start the Configuration/Setup utility program (see “Starting and using the Configuration/Setup Utility program” on page 43).
2. Select **Power Management** and press Enter.
3. Select **Automatic Power On** and press Enter.
4. Select the menu item for the feature you want to set. Use Left Arrow (←) or Right Arrow (→) to select either **Enabled** or **Disabled**. Press Enter.
5. Select Startup Sequence for the feature. Use Left Arrow (←) or Right Arrow (→) to select either **Primary** or **Automatic**. If you select **Automatic**, make sure **Automatic Power On Startup Sequence** in the Startup Sequence menu is set to **Enabled**. Otherwise, the system will use the **Primary** startup sequence.
6. Press Esc until you return to the Configuration/Setup utility program menu.
7. Select **Save Settings** from the Configuration/Setup utility program menu and press Enter. Then press Esc and follow the instructions on the screen to exit from the Configuration/Setup utility program.

Quick reference for network-related settings

The following tables provide a quick reference to help you if your computer is connected to other computers over a network. This information is intended to help you quickly find specific network settings. You can view the current setting or select a different setting. When finished, you can either save the settings and exit the utility program or exit without saving the settings.

The steps in the following table always start at the Configuration/Setup utility main menu.

To enable:	Select:
Remote Administration	<ol style="list-style-type: none"> 1. System Security 2. Remote Administration 3. Enabled <p>Remote Administration allows POST/BIOS updates over the LAN.</p>
Bypass of normal boot and use network	<ol style="list-style-type: none"> 1. Start options 2. Network boot F12 option 3. Enabled
Wake on LAN	<ol style="list-style-type: none"> 1. Power Management 2. Automatic Power On 3. Wake on LAN 4. Enabled 5. Startup Sequence 6. Automatic <p>Press Esc to go back to the main menu.</p> <ol style="list-style-type: none"> 7. Start Options 8. Startup Sequence 9. Automatic Power On Startup Sequence 10. Enabled 11. First, second, and third startup devices
Wake on PCI	<ol style="list-style-type: none"> 1. Power Management 2. Automatic Power On 3. Wake on PCI 4. Enabled 5. Startup Sequence 6. Automatic <p>Press Esc to go back to the main menu.</p> <ol style="list-style-type: none"> 7. Start Options 8. Startup Sequence 9. Automatic Power On Startup Sequence 10. Enabled 11. First, second, and third startup devices

To enable:	Select:
Wake on Alarm	<ol style="list-style-type: none"> 1. Power Management 2. Automatic Power On 3. Wake on Alarm 4. Single Event, Daily Event, or Weekly Event 5. Alarm settings 6. Startup Sequence 7. Automatic <p style="margin-left: 40px;">Press Esc to go back to the main menu.</p> <ol style="list-style-type: none"> 8. Start Options 9. Startup Sequence 10. Automatic Power On Startup Sequence 11. Enabled 12. First, second, and third startup devices

Enabling the Pentium III processor serial number feature

The Pentium III microprocessor features a processor serial number. The processor serial number is an electronic number unique to each Pentium III microprocessor. This feature is used primarily to enhance security with Internet transactions. The default setting for this feature is Off (disabled).

To enable this feature, use the following procedure:

1. Start the Configuration/Setup utility program. See “Starting and using the Configuration/Setup Utility program” on page 43 if you need instructions for starting the program.
2. Select **Advanced Setup** and press Enter.
3. Select **Processor Control** and press Enter.
4. Change the value for **Processor Serial Number Access** from **Disabled** to **Enabled** and press Enter.
5. Save the settings, exit the program and restart your computer with the computer power switch to activate the new setting.

Chapter 5. Installing options

You can expand the capabilities of your computer by adding adapters, drives, memory, and a microprocessor. When installing options, use these instructions along with the instructions that come with the option.

Available options

The following are some available options:

- Advanced Graphics Port (AGP) adapters
- Peripheral component interconnect (PCI) adapters
- Internal drives
 - CD-ROM
 - Hard disk
 - Diskette drives and other removable media drives
- System memory, called Rambus inline memory modules (RIMMs)

For the latest information about available options, see the following World Wide Web pages:

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

You can also obtain information by calling the following telephone numbers:

- Within the United States, call 1-800-IBM-2YOU (1-800-426-2968), your IBM reseller, or IBM marketing representative.
- Within Canada, call 1-800-565-3344 or 1-800-465-7999.
- Outside the United States and Canada, contact your IBM reseller or IBM marketing representative.

Preparing to install options

Attention

Before you install any option, read the “Safety information” on page vii and “Handling static-sensitive devices.” These precautions and guidelines will help you work safely.

The presence of 5 V standby power might result in damage to your hardware unless you disconnect the power cord from the electrical outlet before opening the computer cover.

Caution: Be careful when working near the microprocessor. Under normal use, the microprocessor can become very hot.

Handling static-sensitive devices

Static electricity, although harmless to you, can seriously damage computer components and options. When you add an option, do *not* open the static-protective package containing the option until you are instructed to do so.

When you handle options and other computer components, take these precautions to avoid static electricity damage:

- Limit your movement. Movement can cause static electricity to build up around you.
- Always handle components carefully. Handle adapters, memory RIMMs, and continuity RIMMs by the edges. Never touch any exposed circuitry.
- Prevent others from touching components.
- When you install a new option, touch the static-protective package containing the option to a metal expansion-slot cover or other unpainted metal surface on the computer for at least two seconds. This reduces static electricity in the package and your body.
- When possible, remove the option and install it directly in the computer without setting the option down. When this is not possible, place the static-protective package that the option came in on a smooth, level surface and place the option on it.
- Do not place the option on the computer cover or other metal surface.

Tools required

To install or remove some options in your computer, you will need a flat-blade screwdriver. Additional tools might be needed for certain options. See the instructions that come with the option.

Important

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

Note: If you have preinstalled software, ConfigSafe took a snapshot of the initial configuration of your computer when you started your computer for the first time. You might be able to use this snapshot to restore the configuration to the initial settings.

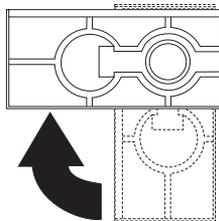
ConfigSafe is a part of the preinstalled software in your computer. For more information, see “Using the ConfigSafe program” on page 126 and “Software” on page 5.

Using the stabilizing feet

The four feet attached to the bottom cover rotate 90° to provide additional stability for your computer.

When you need to access the inside of the computer, you might find it easier to place the computer on its side. If you do so, rotate the feet inward so they do not break off due to the weight of the computer.

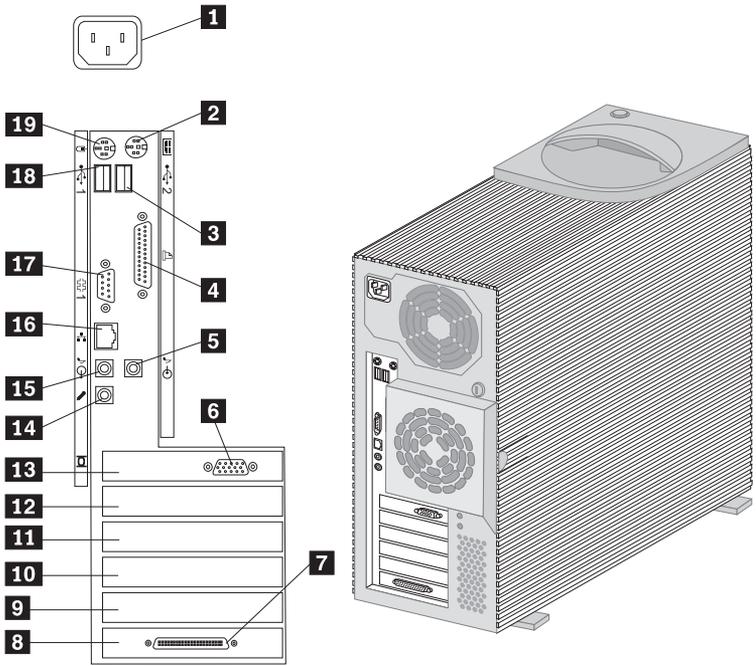
When you are finished installing options and have reinstalled the side cover, rotate the four stabilizing feet a quarter turn and place the computer carefully back on its feet.



Disconnecting cables and removing the cover

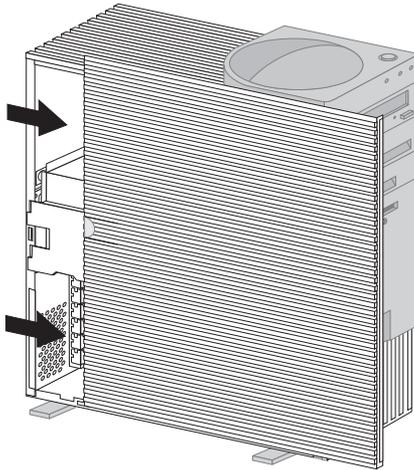
Before you begin

- Read “Preparing to install options” on page 62.
 - Remove any media (diskettes, compact discs, or tapes) from the drives, and then turn off all attached devices and the computer.
1. Touch the rear of the bare metal frame to dissipate any static electricity from your body.
 2. Unplug all power cords from electrical outlets.
 3. If you have a modem or fax machine attached to your computer, disconnect the telephone line from the wall outlet and the computer.
 4. Disconnect all cables attached to the computer; this includes power cords, input/output (I/O) cables, and any other cables.



- | | | | |
|-----------|-------------------|-----------|----------------|
| 1 | Power cord | 11 | PCI slot 2 |
| 2 | Keyboard | 12 | PCI slot 1 |
| 3 | USB-2 | 13 | AGP slot |
| 4 | Parallel | 14 | Microphone |
| 5 | Audio line in | 15 | Audio line out |
| 6 | Monitor connector | 16 | Ethernet |
| 7 | SCSI connector | 17 | Serial |
| 8 | PCI slot 5 | 18 | USB-1 |
| 9 | PCI slot 4 | 19 | Mouse |
| 10 | PCI slot 3 | | |

5. If necessary, unlock the computer cover.
6. Pull out on the cover release tab at the rear of the side cover and slide the cover toward the front of the computer.



Locating components

The following information helps you locate components and serves as a reference when you need to install options or connect input/output devices.

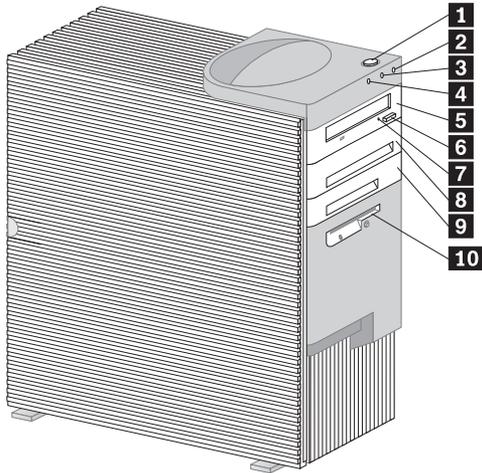
Your computer comes with the following adapters and devices preinstalled:

- A graphics adapter in the AGP slot
- A SCSI adapter in a PCI slot
- A CD-ROM drive in drive bay 1
- A diskette drive in drive bay 4
- A SCSI hard disk drive in drive bay 7.

For more information on drive bays, see “Installing internal drives” on page 81.

The following illustrations will help you locate the various components in your computer. For information on removing the cover, see “Disconnecting cables and removing the cover” on page 64.

External View

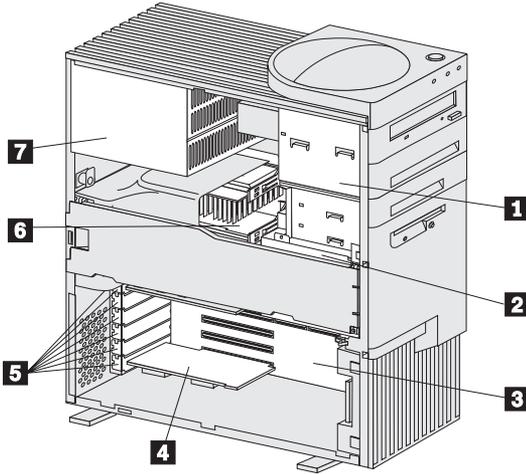


- 1** Power switch
- 2** Power-on light
- 3** Hard disk drive light
- 4** Client LAN light
- 5** Bay 1, CD-ROM drive

- 6** CD-ROM eject button
- 7** CD-ROM emergency eject hole
- 8** Bay 2
- 9** Bay 3
- 10** Bay 4, 3.5-inch diskette drive

Internal View

For information on removing the cover, see “Disconnecting cables and removing the cover” on page 64.

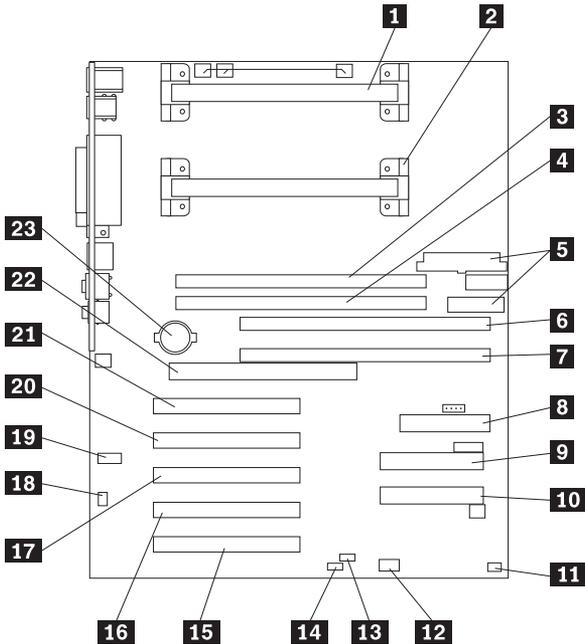


- 1** Upper drive bracket
- 2** Lower drive bracket
- 3** System board
- 4** Expansion adapter

- 5** Adapter slots
- 6** Microprocessor
- 7** Power supply

Locating system board components

The system board, also called the *planar* or *motherboard*, is the main circuit board in your computer. It provides basic computer functions and supports a variety of devices that are preinstalled by IBM or that you can install later. An illustration of the system board and additional information is also provided on a label located inside the computer.



- | | | | |
|-----------|--------------------------|-----------|-------------------------------|
| 1 | Primary microprocessor | 13 | ROM recover jumper |
| 2 | Secondary microprocessor | 14 | Administrator password jumper |
| 3 | RIMM connector 1 | 15 | PCI slot 5 |
| 4 | RIMM connector 2 | 16 | PCI slot 4 |
| 5 | Power connectors | 17 | PCI slot 3 |
| 6 | RIMM connector 3 | 18 | Internal speaker connector |
| 7 | RIMM connector 4 | 19 | CD audio connector |
| 8 | Diskette drive connector | 20 | PCI slot 2 |
| 9 | IDE secondary connector | 21 | PCI slot 1 |
| 10 | IDE primary connector | 22 | AGP slot |
| 11 | Tamper detect connector | 23 | Battery |
| 12 | RFID antenna connector | | |

Accessing the system board

To access the system board, it helps to place the computer on its side on a table. You might need to remove some parts that impede your access to components on the system board. When disconnecting cables, it is important to note where they attach, so you can correctly reattach them later.

For information on removing the computer cover, see “Disconnecting cables and removing the cover” on page 64.

Installing memory

You can add memory to the IntelliStation M Pro to increase system performance using *Rambus inline memory modules (RIMMs)*. There are four connectors (RIMM 1, RIMM 2, RIMM 3, and RIMM 4) for installing Rambus memory. The maximum amount of system memory the IntelliStation M Pro supports is 2 GB.

The IBM-installed RIMMs that come with your computer are Rambus dynamic random access memory (RDRAM) modules. They are either non-error checking and correction (non-ECC) modules or error checking and correction (ECC) modules.

When installing or replacing RIMMs, take the following information into consideration:

- Rambus memory is divided up into two channels (channels A and B). RIMM connectors 1 and 2 are on channel A and RIMM connectors 3 and 4 are on channel B.
- Each channel must contain the same amount of memory.
- Each RIMM connector supports a maximum of 512 MB of memory.
- Install only ECC RIMMs to enable ECC. If you use ECC and non-ECC memory together, all memory will function as non-ECC.
- RIMM connectors do not support dual inline memory modules (DIMMs).
- Any connector that does not have a memory RIMM installed must have a continuity RIMM (C-RIMM) installed. A C-RIMM is used to continue the connection for a RIMM connector that does not have memory installed in it.
- Use PC600 (300 MHz) or PC800 (400 MHz) RIMMs. Both can be used in the same computer but when there is a mix, all memory will run at the rate of the slowest RIMM.

The following table shows some valid configurations of RIMMs and continuity RIMMs. There might be other valid configurations as well.

Table 1. Memory configurations

Channel A		Channel B		
RIMM 1	RIMM 2	RIMM 3	RIMM 4	Functions as
PC600	PC600	PC600	PC600	PC600
PC800	PC800	PC800	PC800	PC800
PC600	PC600	PC600	PC800	PC600
PC600	PC600	PC800	PC600	PC600
PC600	PC800	PC600	PC600	PC600
PC800	PC600	PC600	PC600	PC600
PC800	PC600	PC800	PC600	PC600
PC600	PC800	PC600	PC800	PC600
PC800	PC800	PC800	PC600	PC600
PC600	C-RIMM	PC600	C-RIMM	PC600
C-RIMM	PC600	C-RIMM	PC600	PC600
PC800	C-RIMM	PC800	C-RIMM	PC800
C-RIMM	PC800	C-RIMM	PC800	PC800
PC600	C-RIMM	PC800	C-RIMM	PC600
C-RIMM	PC600	C-RIMM	PC800	PC600
PC800	C-RIMM	PC600	C-RIMM	PC600
C-RIMM	PC800	C-RIMM	PC600	PC600

Note:

- PC600 RIMM runs at 300 MHz
- PC800 RIMM runs at 400 MHz

Removing a RIMM or C-RIMM

To install a RIMM, you must first remove the memory RIMM or C-RIMM occupying the connector into which you are installing memory. Use the following instructions to help you remove a RIMM.

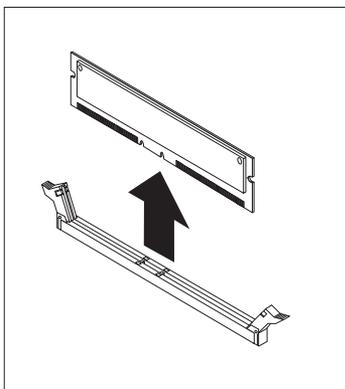
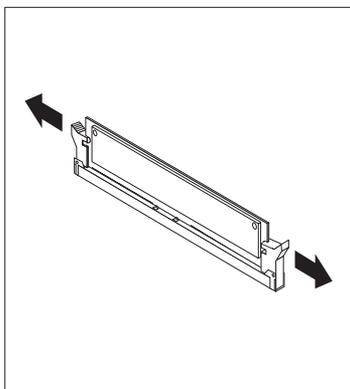
Before you begin

- Turn off the computer and all other connected devices.
- Disconnect all cables attached to the computer and remove the cover (see “Disconnecting cables and removing the cover” on page 64).

Attention: The presence of 5 V standby power might result in damage to your hardware unless you disconnect the power cord from the electrical outlet before opening the computer cover.

1. To locate the RIMM connectors inside your computer, see “Locating system board components” on page 69.
2. At both ends of the RIMM connector, push outward on the retaining clips until the RIMM is loosened. Lift the RIMM out of the connector.

Note: Be careful not to push too hard on the retaining clips, because the RIMM might eject too quickly.



3. Store the RIMM in a static-protective package.

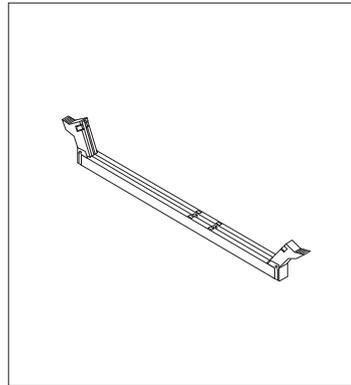
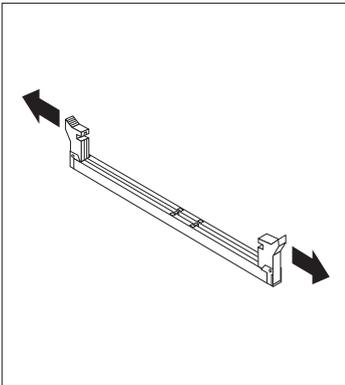
Installing a RIMM or C-RIMM

Before you begin

- Read the instructions that come with the new memory RIMM.
- Turn off the computer and all other connected devices.
- Disconnect all cables attached to the computer and remove the computer cover (see “Disconnecting cables and removing the cover” on page 64).

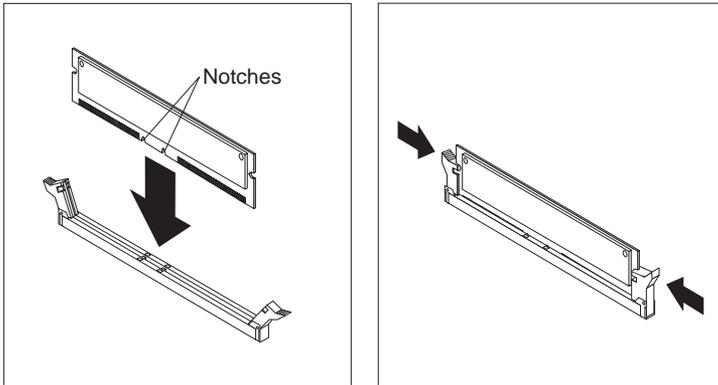
To install a memory RIMM or continuity RIMM:

1. Locate the RIMM connectors inside your computer. See “Locating system board components” on page 69.
2. Remove the RIMM occupying the RIMM connector. See “Removing a RIMM or C-RIMM” on page 71 for instructions on removing a RIMM. Do not discard or lose this part. It might be needed later if you change your memory configuration.



3. Touch the static-protective package containing the RIMM to any *unpainted* metal surface in the computer, and then remove the RIMM.
4. Position the RIMM above the empty connector so that the two notches on the bottom edge align properly with the connector.

5. Firmly push the RIMM straight down into the connector until the retaining clips pop up and snugly fit around both ends of the RIMM.



6. To install another RIMM, repeat steps 2–5.
7. Go to the device-record form in Appendix B, “Computer records” on page 141 and record this installation.

What to do next

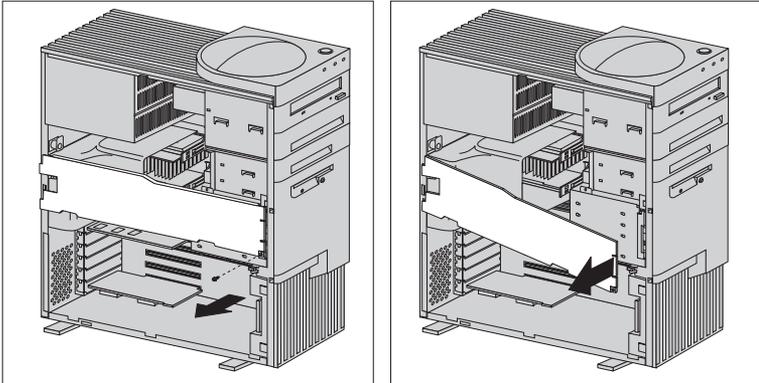
- To work with another option, go to the appropriate section.
- To complete the installation, go to “Completing the installation” on page 92.

Installing a second microprocessor

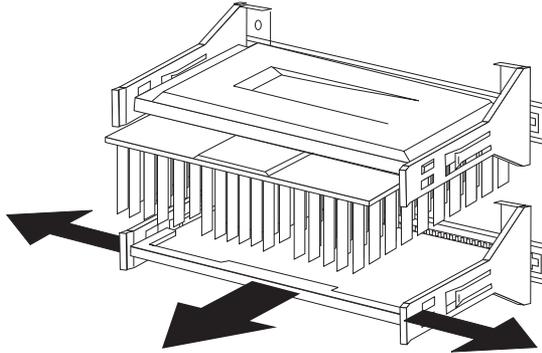
Before you begin

- Microsoft Windows 98 does not support dual microprocessors
- Be sure to perform a backup of the hard disk before you add a second microprocessor.
- Read the instructions that come with the new memory RIMM.
- Turn off the computer and all other connected devices.
- Disconnect all cables attached to the computer and remove the computer cover (see “Disconnecting cables and removing the cover” on page 64).

1. Note the position of the metal cover and the air baffle so that they can be reinstalled later. Remove the metal cover and the air baffle to gain access to the microprocessor sockets.



2. See the system board label inside your computer for the location of the terminator and secondary microprocessor socket (secondary CPU).
3. Read the instructions that come with the new microprocessor.
4. Push outward on the retainers on each end of the terminator card while pulling the card out of the socket.



5. Remove the terminator card from the secondary microprocessor socket.
6. Remove the microprocessor from its static-protective package and insert it into the guides. Push the microprocessor into the socket until it is properly seated.

Notes:

1. If you add a second microprocessor that runs at a different speed than the primary microprocessor, both will run at the speed of the slowest one.
2. The Configuration/Setup Utility program runs automatically after the computer is restarted. Then, when Windows NT Workstation starts, the second microprocessor will be recognized.

What to do next

- To work with another option, go to the appropriate section.
- To complete the installation, go to “Completing the installation” on page 92.

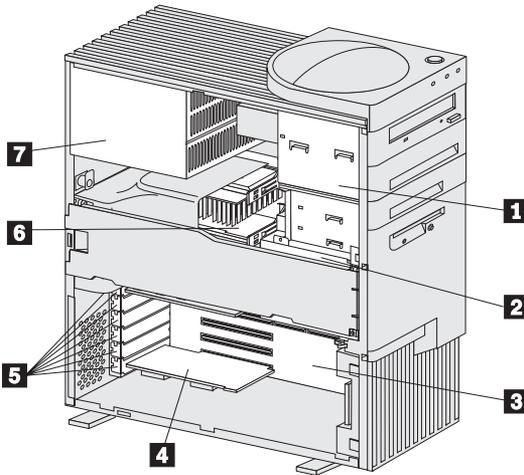
Installing adapters

This section provides information and instructions for installing and removing adapters.

Adapter Slots

Your computer system board has five peripheral component interconnect (PCI) expansion slots used to connect adapters to the bus. There is also an Accelerated Graphics Port (AGP) slot.

This illustration shows the location of expansion slots. Your computer comes with a preinstalled AGP graphics adapter and a SCSI adapter in PCI slot 5.



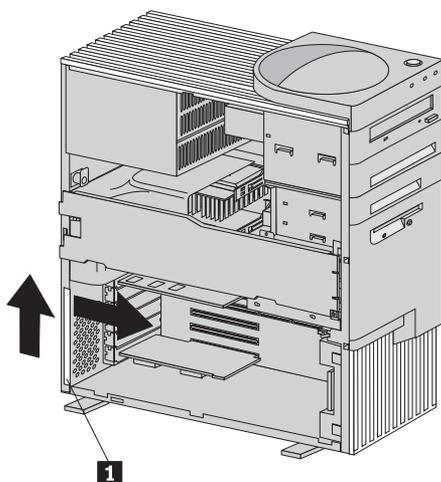
- 1** Upper drive bracket
- 2** Lower drive bracket
- 3** System board
- 4** Expansion adapter

- 5** Expansion slots
- 6** Microprocessor
- 7** Power supply

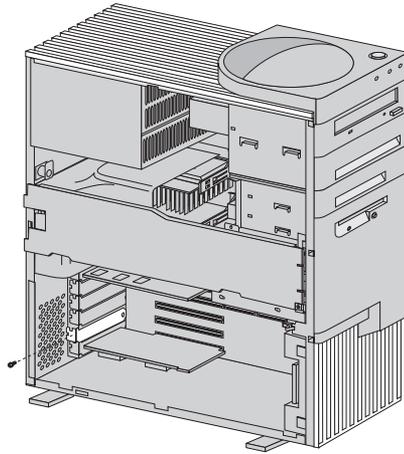
Before you begin

- Read “Preparing to install options” on page 62.
- Read the instructions that come with the new adapter.
- Turn the computer and all other connected devices off.
- Disconnect all cables attached to the computer and remove the computer cover (see “Disconnecting cables and removing the cover” on page 64).

1. Review the instructions that come with the adapter to determine if it must be installed in an AGP or PCI expansion slot.
2. Remove the access clip **1** on the rear frame by sliding it upward approximately 12 mm (0.5 in) then slide it to the right until it comes off.

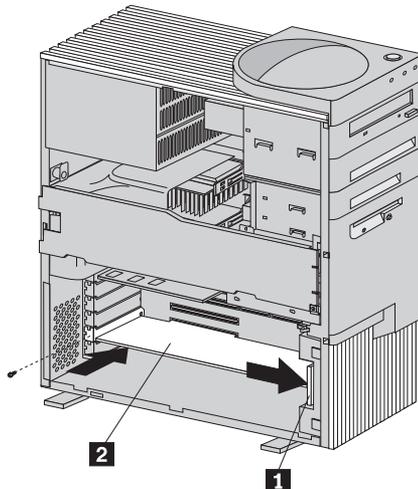


3. Remove the screw and slot cover for the appropriate expansion slot.



4. Remove the adapter from its static-protective package.
5. For full length adapters or adapters with extenders, push the card retainer **1** toward the front of the computer until it latches into a position where you can insert the adapter into the guides. Then install the adapter **2** into the appropriate slot on the system board. When the adapter is fully seated, release the retainer by pushing inward on the latch. Make sure the retainer holds the adapter securely in place.

Note: AGP graphics adapters must be installed in the top expansion slot.



6. Install the screw that secures the adapter.

7. Replace the access clip by sliding it onto the rear frame until it latches into position.

Adapter Configuration

Along with the documentation that comes with your adapter, use the following information to help with adapter configuration.

Plug and Play Adapters

Plug and Play is a configuration method that makes expanding your computer easier. Support for Plug and Play is built into the system board of your computer.

If an adapter is Plug and Play, there are no switches or jumpers to set on the adapter. A Plug and Play adapter comes with configuration specifications set in memory that provides 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)*. If the required resources are available, the BIOS software automatically configures the adapter using resources *not* already used by other devices.

What to do next

- To work with another option, go to the appropriate section.
- To complete the installation, go to “Completing the installation” on page 92.

Installing internal drives

This section provides information and instructions for installing and removing internal drives.

Internal drives are devices that your computer uses to read and store data. Additional or higher capacity drives are added to your computer to increase storage capacity and performance. Some of the different drives available for your computer are:

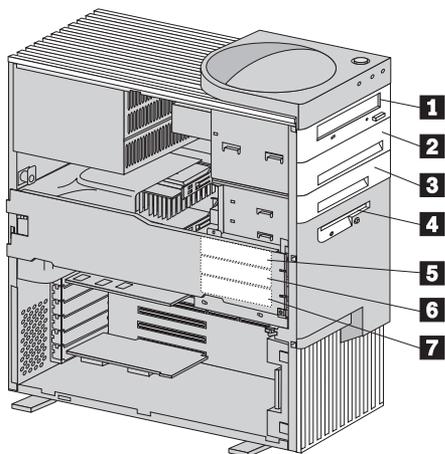
- Diskette drives
- Hard disk drives
- Tape drives
- CD-ROM drives

Internal drives are installed in *bays*. Within this book, the bays are referred to as bay 1, bay 2, and so on.

When you are installing an internal drive, it is important to note what kind of drive you can install in each bay and the height restrictions imposed by each drive bay. Also, it is important to correctly connect the internal drive cables to the installed drive.

Your computer comes with the following IBM-installed drives:

- A CD-ROM drive in bay 1.
- A 3.5-inch diskette drive in bay 4.
- A 3.5-inch hard disk drive in bay 7.



- | | |
|----------------------------------------------|---------------------------------|
| 1 Bay 1 (CD-ROM drive) | 5 Bay 5 (3.5-inch drive) |
| 2 Bay 2 (5.25-inch or 3.5-inch drive) | 6 Bay 6 (3.5-inch drive) |
| 3 Bay 3 (3.5-inch drive) | 7 Bay 7 (3.5-inch drive) |
| 4 Bay 4 (diskette drive) | |

Drive Specifications

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

Bay 1

- Maximum height: 41.3mm (1.6 in.)
- CD-ROM drive
- 3.5-inch or 5.25-inch diskette drive
- 3.5-inch or 5.25-inch tape backup drive
- 3.5-inch or 5.25-inch hard disk drive

Bay 2

- Maximum height: 41.3mm (1.6 in.)
- CD-ROM drive
- 3.5-inch or 5.25-inch diskette drive
- 3.5-inch or 5.25-inch tape backup drive
- 3.5-inch or 5.25-inch hard disk drive

Bay 3

- Maximum height: 25.4mm (1.0 in.)
- 3.5-inch hard disk drive
- 3.5-inch diskette drive
- 3.5-inch tape backup drive

Bay 4

- Maximum height: 25.4mm (1.0 in.)
- 3.5-inch diskette drive

Bay 5

- Maximum height: 41.3mm (1.6 in.)
- 3.5-inch hard disk drive

Bay 6

- Maximum height: 41.3mm (1.6 in.)
- 3.5-inch hard disk drive

Bay 7

- Maximum height: 41.3mm (1.6 in.)
- 3.5-inch hard disk drive

Notes:

1. Install removable media (diskettes, tapes, or CDs) drives in the accessible bays: bays 1, 2, 3, or 4.
2. If a 41.3 mm (1.6 in.) drive is installed in either bay 5, 6, or bay 7, only two of the three bays can be used.
3. To properly mount a 3.5-inch drive into bay 1 or 2 (5.25-inch bays), you must use a 3.5-inch conversion bracket. Your computer comes with the conversion bracket preinstalled in bay 2.

Adaptec 2940U2B SCSI adapter

Your computer is equipped with an Adaptec 2940U2B Ultra-2 SCSI adapter designed to be used with Ultra-2 SCSI devices.

For computers with preinstalled software, information about the Adaptec SCSI adapter and connecting devices is available by selecting **Get help** → **View documentation** in the Access IBM menu. Adaptec SCSI documentation is also on the *Software Selections CD* that comes with your computer.

Power and signal cables

Your computer uses cables to connect integrated drive electronics (IDE) and SCSI drives to the power supply and system board. 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* for connecting IDE and diskette drives to the system board; signal cables are sometimes called *ribbon cables*. There are two sizes of ribbon signal cables that come with your computer:
 - The wider IDE signal cable has three connectors. One of these connectors is attached to the CD-ROM drive, one is a spare, and the third attaches to the primary IDE connector on the system board.
 - The narrower signal cable has two connectors for attaching the diskette drive to the diskette-drive connector on the system board.
 - If your computer is equipped with an internal Ultra-2 SCSI hard disk drive, an Ultra-2 ribbon cable connects the drive to the Adaptec 2940U2B SCSI adapter. This cable also has additional connectors for attaching more internal SCSI devices.

Note: To locate connectors on the system board, see “Locating system board components” on page 69. Following are some important points to remember when connecting power and signal cables to internal drives:

- For computers with preinstalled software, more information on connecting SCSI devices is available by selecting **Get help** → **View documentation** in the Access IBM menu. Adaptec SCSI documentation is also on the *Software Selections CD* that comes with your computer.
- The diskette drive, hard disk drive, and CD-ROM drive that are preinstalled in your 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.
- When you install a 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.
- If two IDE devices are used on a single cable, one must be designated as the primary or master device and the other a secondary or subordinate device; otherwise, some of the IDE devices might not be

recognized by the system. The primary or secondary designation is determined by switch or jumper settings on each IDE device.

- To optimize performance when installing more than two IDE hard disk drives, be sure to attach IDE hard disk drives with faster data transfer speeds (mode 1 or higher) to the primary hard disk drive signal cable (hard disk drives 0 and 1).
- To install more than two IDE hard disk drives, you must purchase an additional signal cable. The cable must meet the following specifications:
 - Maximum length: 0.46 meters (18 inches)
 - Wire size: 28 AWG
 - Cable capacitive loading: 200 pF maximum
- If you want to install more than one diskette drive, you must purchase a four-wire, Y-cable that provides two power connectors.
- To attach an external drive, you must install an appropriate adapter in the computer.

For help in selecting drives, cables, and other options for your computer, do one of the following:

- Within the United States, call 1-800-IBM-2YOU (1-800-426-2968), your IBM reseller, or your IBM marketing representative.
- Within Canada, call 1-800-565-3344 or 1-800-465-7999.
- Outside the United States and Canada, contact your IBM reseller or IBM marketing representative.

Drive bays

- Drive bays 1, 4, and 7 come with drives preinstalled.
- Drive bays 2 and 3 have a bay panel and static shield installed.
- Drive bay 2 has a preinstalled 3.5-inch conversion bracket. You must remove it to install a 5.25-inch drive.
- In the lower drive bracket (bays 5, 6, and 7), when a 25.4mm (1.6-in.) high drive is installed, there is room for only one additional drive to be installed.
- If you remove a drive which has removable media and you do not intend to install a new drive immediately, reinstall the static shield and bay panel for that bay.

To install a drive in bays 1, 2, or 3, go to “Installing Drives in Bays 1, 2, or 3.”

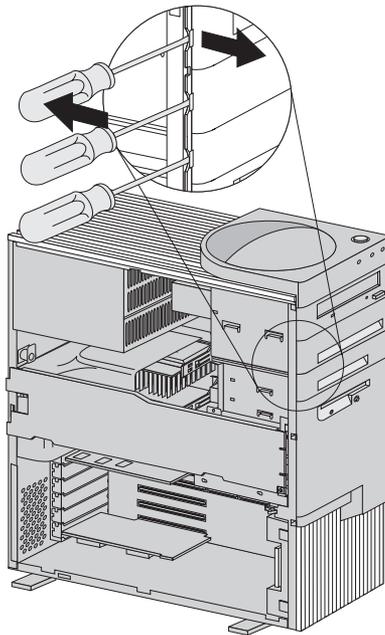
To install a drive in bays 5, 6, or 7, go to “Installing a drive in bay 5, 6, or 7” on page 88.

Installing Drives in Bays 1, 2, or 3

Before you begin

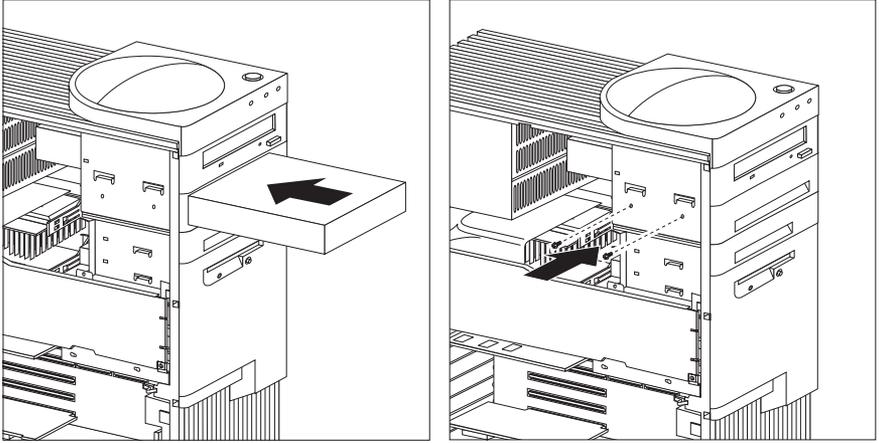
- Read “Preparing to install options” on page 62.
- Turn off the computer and all other connected devices.
- Disconnect all external cables and power cords, and then remove the computer cover (see “Disconnecting cables and removing the cover” on page 64).

1. Remove the bay panel covering the bay where you want to install the drive.

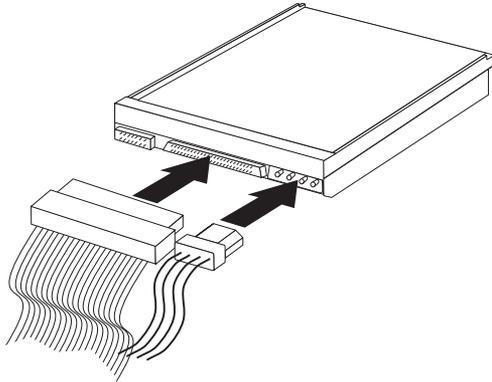


2. Remove the static shield from the drive bay where you are installing the drive.
3. Bay 2 has a conversion bracket installed that allows for the installation of 3.5-inch drive. If you are installing a 5.25-inch drive into bay 2, remove the bracket.

4. Install the drive into the upper drive bracket. Align the screw holes and insert the two screws.



5. If the drive you installed has nonremovable media (such as a hard disk drive), replace the bay panel.
6. Connect the power and signal cables to the drives.



What to do next

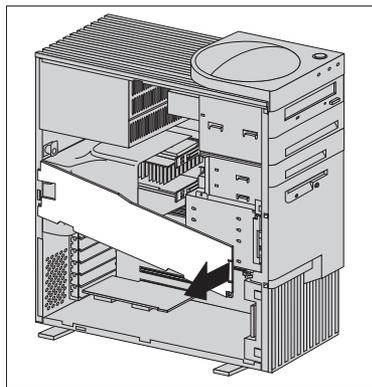
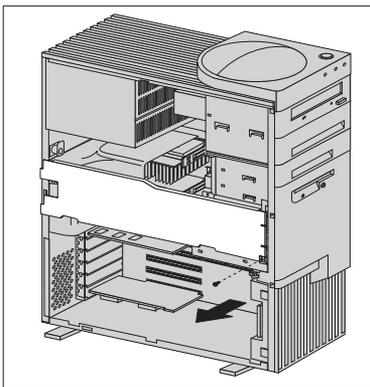
- To work with another option, go to the appropriate section.
- To complete the installation, go to “Completing the installation” on page 92.

Installing a drive in bay 5, 6, or 7

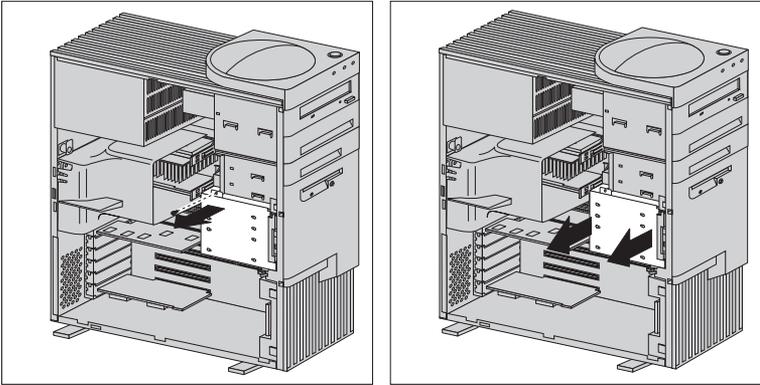
Before you begin

- For information on installing SCSI drives, see the SCSI information provided on the *Software Selections CD* that comes with your computer.
- Read “Preparing to install options” on page 62.
- Turn off the computer and all other attached devices.
- Disconnect all external cables and power cords, and then remove the computer cover (see “Disconnecting cables and removing the cover” on page 64).
- Read the documentation that comes with the drive.
- To install a SCSI drive in a model that has IDE drives only, you must purchase an internal SCSI cable. See your IBM reseller or IBM marketing representative.
- Read “Installing internal drives” on page 81.

1. Remove the metal cover.

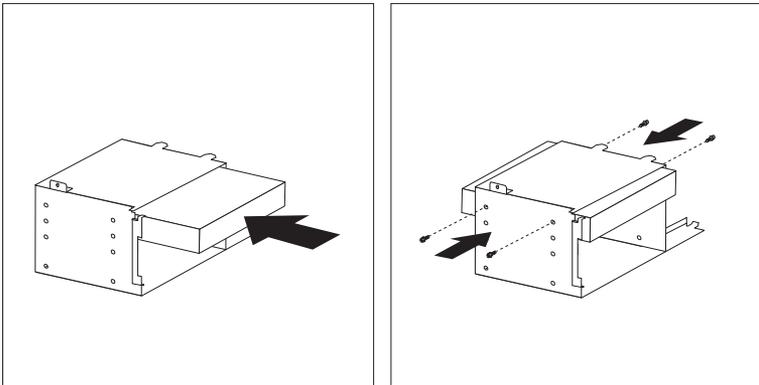


2. Remove the lower drive bracket for bays 5, 6, and 7. If there are drives already installed in the lower drive bracket, you might have to disconnect the cables attached to them in order to install the new drive. Make sure to note where the cables are attached.

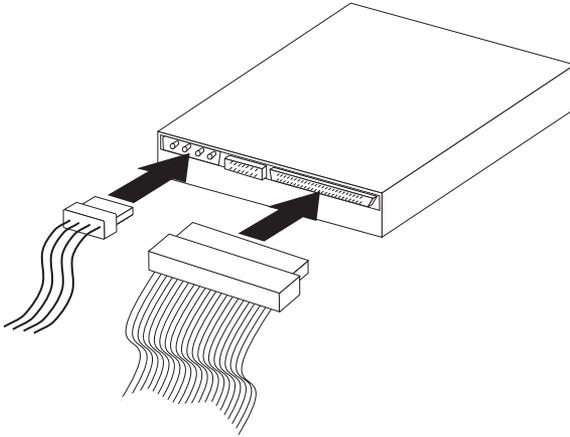


3. The screws for mounting a drive in the lower drive bracket are in the conversion bracket installed in drive bay 2. See "Installing Drives in Bays 1, 2, or 3" on page 86 to access the upper drive bracket. If the screws provided in the bracket have already been used, order kit P/N 10L5600 from your IBM reseller or IBM marketing representative. This kit includes a variety of screws.

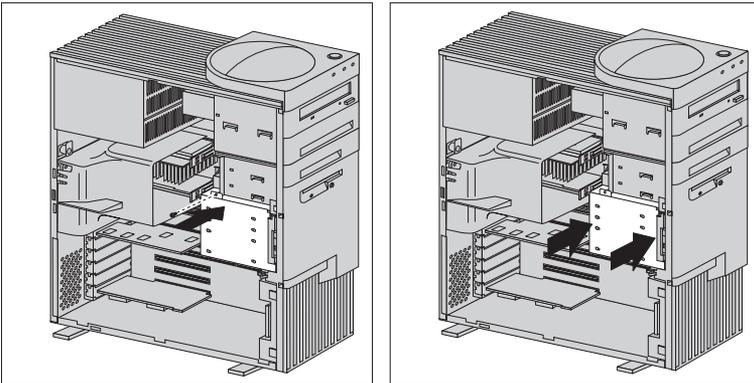
Install the drive into the lower drive bracket so that the power and signal cable connectors are to the rear of the computer. Align the screw holes and insert the four screws.



4. Connect the power and signal cables to the drives.



5. Reinstall the lower drive bracket and secure it with the screw.



What to do next

- To work with another option, go to the appropriate section.
- To complete the installation, go to “Completing the installation” on page 92.

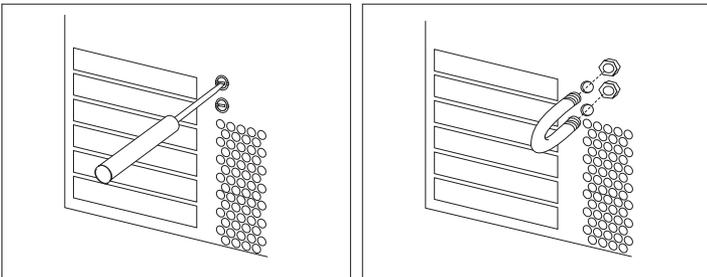
Installing a security U-bolt

To help prevent hardware theft you can use the cover lock and add a security U-bolt and cable to your computer. After you add the security cable, make sure that it does not interfere with other cables that are connected to the computer.

Before you begin

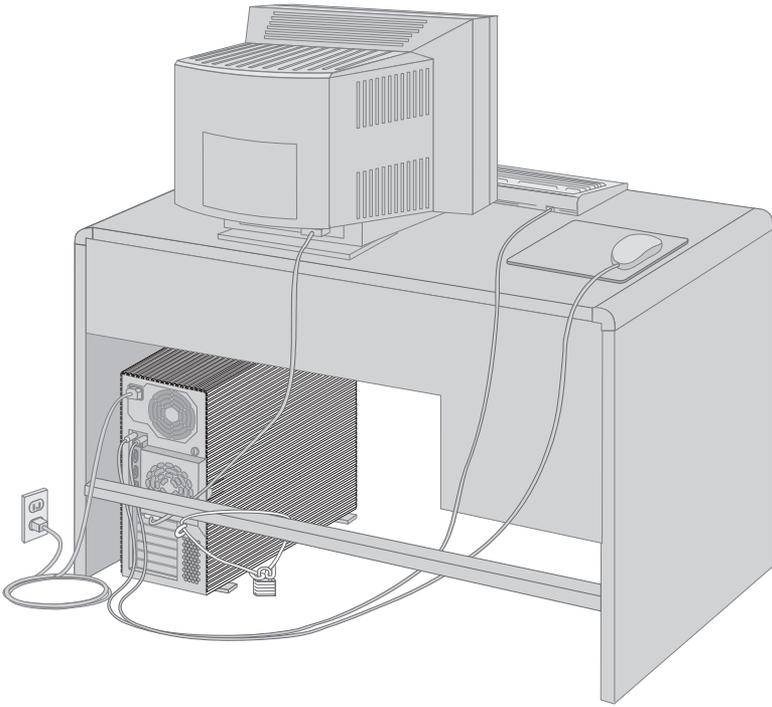
- Obtain the following:
 - A 19-mm (3/4 in.) U-bolt and threaded nuts that fit the U-bolt
 - A security cable
 - A lock, such as a combination lock or padlock
 - An appropriately sized or adjustable wrench
 - A flat-bladed screwdriver
- Read “Preparing to install options” on page 62.
- Turn the computer and all other connected devices off.
- Disconnect all external cables and power cords, and remove the computer cover.

1. Use a tool, such as a screwdriver, to remove the two metal knockouts.
2. Insert the U-bolt through the rear panel, then attach and tighten the nuts with an appropriately sized or adjustable wrench.



3. Replace the computer cover. For more information, see “Replacing the cover” on page 92.
4. Thread the cable through the U-bolt and around an object that is not a 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.

The following illustration shows an example of how this might work.

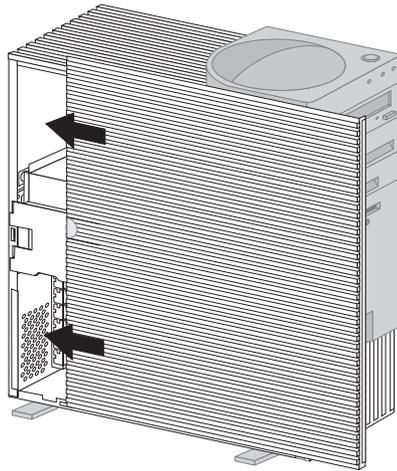


Completing the installation

After working with options, you need to reinstall any removed parts, replace the cover, and reconnect any cables, including power cords and telephone lines. Also, depending on the option installed, you might need to install device drivers or update information in the Configuration/Setup utility program. Refer to the documentation that comes with the option.

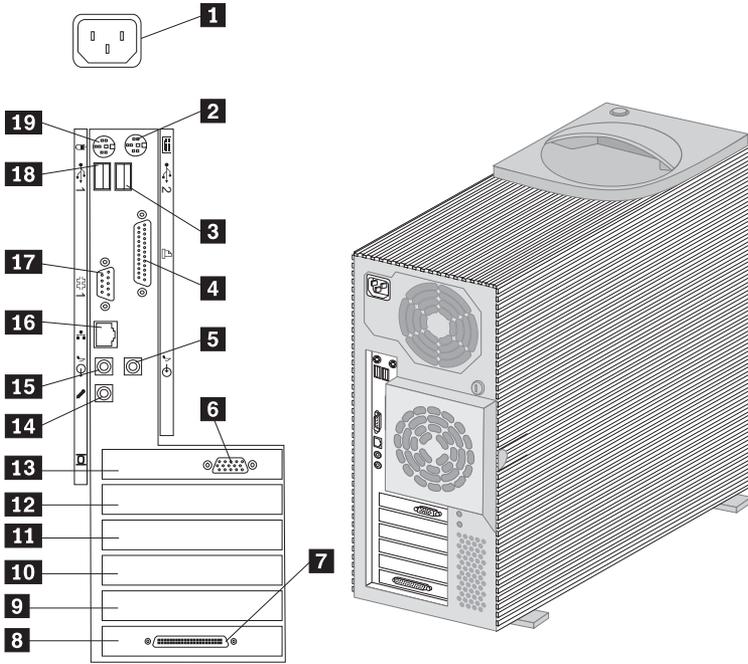
Replacing the cover

1. Ensure that all components have been reassembled correctly and that no tools or loose screws are left inside your computer.
2. Clear any cables that might impede the replacement of the cover.
3. Install the side cover by placing it into position and sliding it to the rear as shown in the following illustration. Make sure the cover is latched into position.



4. Lock the cover if necessary.
5. Make sure the stabilizing feet are rotated outward so that they properly support the computer. Refer to “Using the stabilizing feet” on page 63.
6. Reconnect the cables and cords that were disconnected.

Connecting cables



- 1** Power cord
- 2** Keyboard
- 3** USB-2
- 4** Parallel
- 5** Audio line in
- 6** Monitor connector
- 7** SCSI connector
- 8** PCI slot 5
- 9** PCI slot 4
- 10** PCI slot 3
- 11** PCI slot 2
- 12** PCI slot 1
- 13** AGP slot
- 14** Microphone
- 15** Audio line out
- 16** Ethernet
- 17** Serial
- 18** USB-1
- 19** Mouse

Note: If you have a modem or fax machine attached to the computer, reconnect the telephone line to the wall outlet and the computer. Plug the power cords into properly grounded electrical outlets.

Updating the computer configuration

Important:

The configuration information in this section applies to installing options. For more information on using the Configuration/Setup utility program, see the Chapter 4, “Using the Configuration/Setup Utility program” on page 43.

You might need to install device drivers after updating the configuration settings. For more information, see the instructions that come with the option to determine if device drivers are required and how to install them. Some device drivers are included on the *Device Driver and IBM Enhanced Diagnostics CD* that comes with your computer.

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 example, when you start your computer after adding most internal hard disk drives, the settings might be updated. If the settings are not updated, use the Configuration/Setup utility program to make and save those changes.

Note: For more information on error messages from resource conflicts, see Chapter 6, “Troubleshooting” on page 97.

Chapter 6. Troubleshooting

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

Note

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

- Make sure your computer and monitor are connected to working electrical outlets.
- Make sure all cables are securely connected to the correct locations.
- Your computer might be in standby mode. Press and hold the power switch for 5 seconds. If it was in standby, it will turn off. Press the power switch to turn the computer back on.

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). Using the diagnostic aids discussed in this chapter, you might be able to solve such problems yourself or gather helpful information you can pass on to a service technician.

You can check the hardware by following the procedures in this chapter. You can also use the diagnostic programs provided with your computer (see “IBM Enhanced Diagnostics” on page 123 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 the following:

- “Other diagnostic programs” on page 125
- “Software problem” on page 118
- The operating system documentation that comes with your computer
- Documentation that comes with software applications you have installed yourself

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

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

Power-on self-test (POST)

Each time you turn on your computer, it performs a series of tests that check the operation of the base computer. This series of tests is called the *power-on self-test (POST)*.

POST does the following:

- Checks basic system board operations
- Checks the memory operation
- Compares the current system configuration with that established by the Configuration/Setup Utility program
- Starts the video operation
- Verifies that the diskette drives are working
- Verifies that the hard disk drive and the CD-ROM drive are working

If **Power-On Self-Test** is set to **enhanced**, numbers showing the amount of memory being tested appear in the top-left corner of the screen until the total amount of memory in the system is reached. Options for accessing the Configuration/Setup utility appear in the lower-left corner of the screen. Quick POST is the default mode of operation.

Note: The amount of available memory shown might be somewhat less than expected because of basic input/output system (BIOS) shadowing in random access memory (RAM).

If POST finishes without detecting any problems, the first screen of your operating system or application program appears if you have not set a power-on password. If you have set a power-on password, a password prompt appears. You must type your password before the first screen of your operating system or application program will appear. (For more information about using passwords, see Chapter 4, “Using the Configuration/Setup Utility program” on page 43.)

If **Power-On Status** is enabled and POST detects no problems, you will hear a single beep. If POST detects a problem, you will hear multiple beeps or no beep. In most cases, an error code appears in the top-left corner of the screen, and in some cases a description of the error is displayed beside the code. (Note that the screen will sometimes display multiple error codes and descriptions.) For more information about what caused an error message to appear and what action to take, see “POST messages” on page 101.

POST error messages appear when POST finds problems with or changes to the hardware during startup. POST error messages are 3-, 4-, 5-, 8-, or 12-character alphanumeric messages and include brief explanations (except 1999XXXX errors).

Troubleshooting MAP

Use this procedure as a starting point for problem isolation.

001

- Turn off the computer and wait a few seconds.
- Turn on the computer, monitor, and any other attached devices.
- Wait the normal amount of time for the first screen of your application or the operating system to display.

Is the first screen of your application or operating system displayed?

Yes No

002

Continue at Step 004.

003

You might have an I/O device that is failing or an intermittent problem with your computer.

Go to “IBM Enhanced Diagnostics” on page 123 and run the Enhanced Diagnostics.

004

You have an unreadable display, an error message, or the computer is sounding a series of beeps.

Is an error message displayed?

Yes No

005

Do you hear a series of beeps?

Yes No

006

- Make sure that the monitor is turned on and the Brightness and Contrast controls are adjusted correctly.
- Make sure that the monitor signal cable is securely connected to the monitor and to the monitor connector on the graphics adapter. To find the monitor connector on the graphics adapter installed in your computer, see “Connecting cables” on page 13.

If the problem persists, have the computer serviced.

007

Go to “POST beep codes” on page 105.

008

- See “POST messages” on page 101 and look for the error message; then return here.

Is the error message in this table?

Yes No

009

A SCSI error message might be displayed. See the SCSI documentation that comes with your computer.

– or –

An application message might be displayed. See the documentation for your application program.

010

Did the Configuration/Setup utility start automatically after the error message displayed?

Yes No

011

- Follow the action for the error message. See “POST messages” on page 101.

012

Have you recently added, removed, or changed any hardware?

Yes No

013

Have the computer serviced.

014

- At the POST Startup Errors screen, select **Continue** if you want to access the Configuration/Setup utility menu. Select **Exit Setup** if you want to exit from the Configuration/Setup utility.

If you selected **Continue**, the Configuration/Setup utility menu appears on the screen. You will see a pointer next to any menu items that are malfunctioning or that have been changed since the last time you turned on your computer. If you did not knowingly make a change to a flagged menu item, there is probably a malfunction in that item. If you made a

change to the hardware recently, continue with the Configuration/Setup utility. See Chapter 4, “Using the Configuration/Setup Utility program” on page 43. If you have not made changes, have the computer serviced.

POST messages

Code	Description	Action
101	Interrupt failure	Have the computer serviced.
102	Timer failure	Have the computer serviced.
106	System board failure	Have the computer serviced.
110	System board memory parity error	Have the computer serviced.
111	I/O parity error 2 (I/O channel check latch set)	Go to “IBM Enhanced Diagnostics” on page 123 for instructions on running diagnostics.
114	External ROM checksum error	Have the computer serviced.
121	Hardware error	Have the computer serviced.
151	Real time clock failure	Have the computer serviced.
161	Defective CMOS battery	Replace the battery. See “Replacing the battery” on page 119.
162	CMOS RAM checksum/configuration error	<ol style="list-style-type: none"> 1. Go to Chapter 4, “Using the Configuration/Setup Utility program” on page 43 and follow the instructions to fix any configuration errors and save the new configuration. 2. If the problem persists, have the computer serviced.
163	Clock not updating	Have the computer serviced.
164	CMOS RAM memory size does not match.	<ol style="list-style-type: none"> 1. See the RIMM information at “Installing memory” on page 70. 2. Go to “IBM Enhanced Diagnostics” on page 123 for instructions on running diagnostics.

Code	Description	Action
166	Boot block check sum error	<ol style="list-style-type: none"> 1. Go to “Recovering from a POST/BIOS update failure” on page 119 and follow the instructions to run the POST/BIOS recovery procedure. 2. If the problem persists, have the computer serviced.
167	Clock not updating	Update the BIOS. See “Updating system programs” on page 34.
168	Alert on LAN is not working correctly.	<ol style="list-style-type: none"> 1. Go to Chapter 4, “Using the Configuration/Setup Utility program” on page 43 and follow the instructions to view the configuration settings. Verify that Alert on LAN is enabled. 2. If Alert on LAN is enabled and the problem persists, have the computer serviced.
175	System board error	Have the computer serviced.
176	The system cover has been removed.	Type the administrator password. If the problem persists, have the computer serviced.
177	An inventory violation occurred, such as a hardware component was removed. This error message is part of the AssetCare and Asset ID features of the computer.	Type the administrator password. If the problem persists, have the computer serviced.
184	The asset control antenna has not been detected.	Have the computer serviced.
186	A system board or hardware security error occurred.	Have the computer serviced.
187	The administrator password and boot sequences have been cleared.	Go to Chapter 4, “Using the Configuration/Setup Utility program” on page 43 for instructions on setting an administrator password and the startup sequences.

Code	Description	Action
190	The computer chassis-intrusion detector was cleared.	This is an informational message. No action is required.
20x	A memory error occurred.	Go to "IBM Enhanced Diagnostics" on page 123 for instructions for running diagnostics.
301 or 303	A keyboard error occurred.	<ol style="list-style-type: none"> 1. Make sure the keyboard is properly connected. 2. If the keyboard is properly connected, have the computer serviced.
601	A diskette drive or controller error occurred.	<ol style="list-style-type: none"> 1. Go to "IBM Enhanced Diagnostics" on page 123 and if possible follow the instructions to run the Enhanced Diagnostics. 2. Have the computer serviced.
602	The diskette IPL startup (boot) record is not valid.	<ol style="list-style-type: none"> 1. The diskette might be defective. Try another diskette. 2. If the problem persists, have the computer serviced.
604	An unsupported diskette drive is installed.	<ol style="list-style-type: none"> 1. Go to "IBM Enhanced Diagnostics" on page 123 and if possible follow the instructions to run the Enhanced Diagnostics. 2. Have the computer serviced.
662	Diskette drive configuration error	<ol style="list-style-type: none"> 1. Go to Chapter 4, "Using the Configuration/Setup Utility program" on page 43 and follow the instructions to view the configuration settings. Verify the diskette drive configuration. 2. Run the diagnostics program for the diskette drive. See "IBM Enhanced Diagnostics" on page 123. 3. If the problem persists, have the computer serviced.

Code	Description	Action
762	A math coprocessor configuration error occurred.	Have the computer serviced.
11xx	A serial port error (xx = serial port number) occurred.	Have the computer serviced.
1762	A hard disk configuration error occurred.	<ol style="list-style-type: none"> 1. Go to Chapter 4, "Using the Configuration/Setup Utility program" on page 43 and follow the instructions to view the configuration settings. Verify the hard disk drive configuration. 2. If the problem persists, have the computer serviced.
178x	A hard disk or IDE device failed.	<ol style="list-style-type: none"> 1. Go to "IBM Enhanced Diagnostics" on page 123 for instructions on running the diagnostics program on the hard disk and the IDE devices. 2. If the problem persists, have the computer serviced.
18xx	A PCI adapter has requested an unavailable resource.	Go to Chapter 4, "Using the Configuration/Setup Utility program" on page 43 and follow the instructions to view the configuration settings. Verify that the correct PCI resources are configured.
1962	A startup (boot) sequence error occurred.	<ol style="list-style-type: none"> 1. Go to Chapter 4, "Using the Configuration/Setup Utility program" on page 43 and follow the instructions to view the configuration settings. Verify that the correct startup sequence is configured. 2. If the problem persists, have the computer serviced.
8603	A pointing device or system board error occurred.	Have the computer serviced.
I9990301	The hard disk drive failed.	Have the computer serviced.

POST beep codes

One beep and the appearance of text on the monitor indicate successful completion of POST. More than one beep indicates that POST detected an error.

Beep codes are sounded in a series of two or three sets of beeps. The duration of each beep is constant, but the pattern of beeps and pauses between the beeps varies. For example, a 1-2-4 beep code sounds like one beep, a pause, two consecutive beeps, another pause, and four more consecutive beeps.

For the following beep codes, the numbers indicate the sequence and number of beeps. For example, a “2-3-2” error symptom (a burst of two beeps, three beeps, then two beeps) indicates a memory-module problem.

If you hear a series of beeps, have the computer serviced.

Note: Depending on your computer, you might hear beep codes that are not in the following table.

Beep code	Probable cause
1-1-3	CMOS write/read failure
1-1-4	BIOS ROM checksum failure
1-2-1	Programmable interval-timer test failure
1-2-2	DMA initialization failure
1-2-3	DMA page register write/read test failure
1-2-4	RAM refresh verification failure
1-3-1	Memory failure or too many devices on RIMMs
1-3-2	First 64 KB RAM parity test failure or too many devices on RIMMs
2-1-1	Secondary DMA register test in progress or failure
2-1-2	Primary DMA register test in progress or failure
2-1-3	Primary interrupt mask register test failure
2-1-4	Secondary interrupt mask register test failure
2-2-2	Keyboard controller test failure
2-3-2	Screen memory test in progress or failure
2-3-3	Screen retrace tests in progress or failure
3-1-1	Timer tick interrupt test failure
3-1-2	Interval timer channel 2 test failure
3-1-4	Time-of-day clock test failure

Beep code	Probable cause
3-2-4	Comparing CMOS memory size against actual
3-3-1	Memory size mismatch occurred

SCSI error messages

These messages appear if a problem or conflict is detected by the Adaptec SCSI subsystem. See the SCSI documentation on the *Software Selections CD* that comes with your 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 they also can be numeric codes. For information about these software error messages, see the information supplied with the operating system and 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” on page 123.

Troubleshooting charts

You can use the troubleshooting charts in this section to find solutions to problems that have definite symptoms.

Important

If you find it necessary to remove the computer cover, first read “Safety information” on page vii and “Disconnecting cables and removing the cover” on page 64 for important safety information and instructions.

If you have just added new software or a new computer option and your computer is not working, do the following before using the troubleshooting charts:

1. Remove the software or device you just added.
2. Run the diagnostic programs to determine if your computer is running correctly. (See “IBM Enhanced Diagnostics” on page 123 for information about diagnostic programs provided with your computer.)
3. Reinstall the new software or new device.

The following directory will help you quickly locate problem categories in the troubleshooting charts.

Problem type	Go to:
Diskette drive	“Diskette drive problems” on page 108
General	“General problems” on page 112
Intermittent	“Intermittent problems” on page 112
Keyboard, mouse, or pointing-device	“Keyboard, mouse, or pointing-device problems” on page 113
Memory	“Memory problems” on page 114
Monitor	“Monitor problems” on page 109
Option	“Option problems” on page 115
Parallel port	“Parallel port problems” on page 116
Printer	“Printer problems” on page 117
Serial ports	“Serial port problems” on page 117
Software	“Software problem” on page 118
Universal Serial Bus ports	“Universal Serial Bus port problems” on page 118

Diskette drive problems

Diskette drive problems	Action
Diskette drive in-use light stays on, or the system bypasses the diskette drive.	<p>If there is a diskette in the drive, verify that:</p> <ol style="list-style-type: none">1. The diskette drive is enabled. Use the Configuration/Setup utility to check this. For more information, see Chapter 4, "Using the Configuration/Setup Utility program" on page 43.2. The computer is checking for the diskette drive in the startup sequence. Use the Configuration/Setup utility to verify this.3. The diskette you are using is good and not damaged. Try inserting another diskette if you have one.4. The diskette is inserted correctly, with its label up and its metal-shutter end first in the drive.5. The diskette contains the necessary files to start the computer (the diskette must be startable).6. The diskette drive cable is properly installed and securely connected.7. There is no problem with your software program (see "Software problem" on page 118). <p>If you cannot correct the problem, have the computer serviced.</p>

Monitor problems

Monitor problems	Action
General monitor problems	<p>Some IBM monitors have their own self-tests. If you suspect a problem with your monitor, see the information supplied with the monitor for adjustment and testing instructions.</p> <p>If you cannot find the problem, check the other listings on monitor problems in this table.</p> <p>If you cannot correct the problem, have the monitor and computer serviced.</p>
Wavy, unreadable, rolling, distorted, or jittery screen images	<p>If the monitor self-tests show that the monitor is working properly, verify that:</p> <ol style="list-style-type: none"> 1. The location of the monitor is appropriate. Magnetic fields around other devices, such as transformers, appliances, fluorescent lights, and other monitors might be causing the problem. To determine if the location is causing the problem: <ol style="list-style-type: none"> a. Turn off the monitor. (Moving a color monitor while it is turned on might cause screen discoloration.) b. Adjust the placement of the monitor and other devices so that they are at least 300 mm (12 in.) apart. Also, when relocating the monitor, be sure it is at least 75 mm (3 in.) from the diskette drives to prevent diskette drive read/write errors. c. Turn on the monitor. 2. An IBM monitor signal cable is properly connected to the monitor and computer and that the cable is installed securely. Non-IBM monitor signal cables might cause unpredictable problems. 3. You are not trying to run your monitor at a higher refresh rate than the monitor supports. See the documentation supplied with your monitor for supported refresh rates. <p>Note: An enhanced monitor signal cable with additional shielding might be available for your monitor. See your IBM reseller or marketing representative for information.</p> <p>If you cannot correct the problem, have the monitor and computer serviced.</p>

Monitor problems	Action
<p>The screen flickers.</p>	<p>Set the monitor for the highest, noninterlaced refresh rate supported by your monitor and the video controller in your computer. For more information, see the documentation supplied with your monitor and the README files for the graphics adapter that comes with your computer. The README files are on the <i>Software Selections CD</i> supplied with your computer.</p> <p>Attention: Using a resolution or refresh rate that is not supported by your monitor might damage it.</p> <p>You can reset the refresh rate through your operating system, using the instructions provided in the README files. See your operating system documentation for further information on monitor settings.</p> <p>If this does not correct the problem, have the monitor and computer serviced.</p>
<p>The monitor works when you turn on the computer, but goes blank when you start some application programs.</p>	<p>Verify that:</p> <ol style="list-style-type: none"> 1. The monitor signal cable is securely connected to the monitor and the monitor connector on the graphics adapter. For the location of the monitor connector on the graphics adapter installed in your computer, see “Connecting cables” on page 13. 2. The necessary device drivers for the application programs are installed. <p>If you cannot correct the problem, have the monitor and computer serviced.</p>
<p>The monitor works when you turn on the computer, but goes blank after some period of computer inactivity.</p>	<p>The computer is probably set for energy savings using one of the power-management settings. If the power-management features are enabled, disabling or changing power-management settings might solve the problem (see “Power-management features” on page 55).</p> <p>If you cannot correct the problem, have the computer serviced.</p>

Monitor problems	Action
Blank screen	Verify that: <ol style="list-style-type: none"> 1. The computer power cord is plugged into the computer and a working electrical outlet. 2. The monitor is turned on and the Brightness and Contrast controls are adjusted correctly. 3. The monitor signal cable is securely connected to the monitor and the monitor connector on the graphics adapter. To find the monitor connector on the graphics adapter installed in your computer, see “Connecting cables” on page 13. If you cannot correct the problem, have the monitor and computer serviced.
Only the cursor appears.	Have the computer serviced.
Wrong characters appear on the screen.	Have the computer serviced.

General problems

General problems	Action
The computer does not start when you press the power switch.	Verify that: <ol style="list-style-type: none"><li>1. All cables are securely connected to the proper connectors on the computer. For the location of the connectors, see “Connecting cables” on page 13.<li>2. The computer cover is properly installed. If you cannot correct the problem, have the computer serviced.
Problems such as a broken cover lock or indicator lights not working	Have the computer serviced.

Intermittent problems

Intermittent problems	Action
A problem occurs only occasionally and is difficult to diagnose.	Verify that: <ol style="list-style-type: none"><li>1. All cables and cords are securely connected to the rear of the computer and attached devices.<li>2. When the computer is turned on, the fan grill is not blocked (there is air flow around the grill), and the fans are working. If air flow is blocked or the fans are not working, the computer might overheat.<li>3. If SCSI devices are installed, the last external device in each SCSI chain is terminated correctly. (See your SCSI documentation.) If you cannot correct the problem, have the computer serviced.

Keyboard, mouse, or pointing-device problems

Keyboard, mouse, or pointing-device problems	Action
All or some keys on the keyboard do not work.	Verify that: <ol style="list-style-type: none"><li>1. The computer and the monitor are turned on.<li>2. The keyboard cable is securely connected to the keyboard connector on the computer. For the location of the keyboard connector, see “Connecting cables” on page 13. If you cannot correct the problem, have the keyboard and computer serviced.
The mouse or pointing device does not work.	Verify that: <ol style="list-style-type: none"><li>1. The mouse or pointing-device cable is securely attached to the proper connector on the computer. Depending on the type of mouse you have, the mouse cable will connect to either the mouse or serial connector. To find the mouse and serial connectors, see “Connecting cables” on page 13.<li>2. The device drivers for the mouse are installed correctly. If you cannot correct the problem, have the device and computer serviced.

Memory problems

Memory problems	Action
<p>The amount of memory displayed is less than the amount of memory installed.</p>	<p>The amount of available memory shown might be somewhat less than expected because of basic input/output system (BIOS) shadowing in random access memory (RAM).</p> <p>Verify that:</p> <ol style="list-style-type: none"><li>1. You have installed the correct type of RIMMs for your computer. See “Installing memory” on page 70 for instructions on adding RIMMs.<li>2. The RIMMs are properly installed and securely connected. <p>If the problem persists, run the memory test from the diagnostic program supplied with your computer. (See “IBM Enhanced Diagnostics” on page 123 for further information.) The system might have detected a bad RIMM and automatically reallocated memory to enable your computer to continue to operate.</p> <p>If you cannot correct the problem, have the computer serviced.</p>

Option problems

Option problems	Action
<p>An IBM option that was just installed does not work.</p>	<p>Verify that:</p> <ol style="list-style-type: none"><li>1. The option is designed for your computer.<li>2. You followed the installation instructions supplied with the option and in Chapter 5, "Installing options" on page 61.<li>3. All option files (if required) are installed correctly. See the documentation that comes with the option for information about installing option files.<li>4. You have not loosened any other installed options or cables.<li>5. If the option is an adapter, you have provided enough hardware resources for the adapter to function correctly. See the documentation supplied with the adapter (as well as the documentation for any other installed adapters) to determine the resources required for each adapter.<li>6. You updated the configuration information in the Configuration/Setup utility, if necessary, and have no conflicts. For more information, see Chapter 4, "Using the Configuration/Setup Utility program" on page 43.) <p>If the problem persists, run the diagnostic programs. (See "IBM Enhanced Diagnostics" on page 123 for information about diagnostic programs provided with your computer.)</p> <p>If you cannot correct the problem, have the option and computer serviced.</p>

Option problems	Action
<p>An IBM option that previously worked does not work now.</p>	<p>Verify that all of the option hardware and cable connections are secure.</p> <p>If the option comes with its own test instructions, use those instructions to test the option.</p> <p>If the failing option is a SCSI option, verify that:</p> <ol style="list-style-type: none"> 1. The cables for all external SCSI options are connected correctly. 2. The last option in each SCSI chain, or the end of the SCSI cable, is terminated correctly. 3. All external SCSI options are turned on. External SCSI options must be turned on before the system is turned on. <p>For more information, see your SCSI documentation.</p> <p>If you cannot correct the problem, have the option and computer serviced.</p>

Parallel port problems

Parallel port problems	Action
<p>The parallel port cannot be accessed.</p>	<p>Verify that:</p> <ol style="list-style-type: none"> 1. Each port is assigned a unique address. See Configuration/Setup utility program for more information. 2. The parallel-port adapter, if you added one, is properly installed and firmly seated. See "Installing adapters" on page 77 for instructions on adding adapters. <p>If you cannot correct the problem, have the computer serviced.</p>

Serial port problems

Serial port problems	Action
The serial port cannot be accessed.	<p>Verify that:</p> <ol style="list-style-type: none"><li>1. Each port is assigned a unique address. See Configuration/Setup utility program for more information.<li>2. The serial-port adapter, if you added one, is properly installed and firmly seated. See “Installing adapters” on page 77 for instructions on adding adapters. <p>If you cannot correct the problem, have the computer serviced.</p>

Printer problems

Printer problems	Action
The printer does not work.	<p>Verify that:</p> <ol style="list-style-type: none"><li>1. The printer is turned on and is online.<li>2. The printer signal cable is securely connected to the correct parallel, serial, or USB port on the computer. (See “Connecting cables” on page 13 for the location of the parallel, serial, and USB ports.) <p>Note: Non-IBM printer signal cables might cause unpredictable problems.</p> <ol style="list-style-type: none"><li>3. You have assigned the printer port correctly in your operating system or application program.<li>4. You have assigned the printer port correctly in the Configuration/Setup utility. For more information, see Chapter 4, “Using the Configuration/Setup Utility program” on page 43.<li>5. If the problem persists, run the tests described in the documentation that comes with your printer. <p>If you cannot correct the problem, have the printer and computer serviced.</p>

Software problem

Software problem	Action
Is your software program OK?	<p>To determine if problems are caused by installed software, verify that:</p> <ol style="list-style-type: none"><li>1. Your computer has the minimum memory requirements needed to use the software. See the information supplied with the software to verify memory requirements. <p>Note: If you have just installed an adapter or memory, you might have a memory address conflict.</p> <ol style="list-style-type: none"><li>2. The software is designed to operate on your computer.<li>3. Other software works on your computer.<li>4. The software you are using works on another computer. <p>If you received any error messages while using the software program, see the information supplied with the software for a description of the messages and solutions to the problem.</p> <p>If you cannot correct the problem, have the computer serviced.</p>

Universal Serial Bus port problems

Universal Serial Bus port problems	Action
The Universal Serial Bus ports cannot be accessed.	<p>Verify that:</p> <ol style="list-style-type: none"><li>1. Each port is assigned a unique address. See Chapter 4, "Using the Configuration/Setup Utility program" on page 43 and follow the instructions to view the configuration settings.<li>2. The USB device is properly installed and firmly seated. <p>If you cannot correct the problem, have the computer serviced.</p>

Recovering from a POST/BIOS update failure

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

1. Turn off the computer and any attached devices, such as printers, monitors, and external drives.
2. Unplug all power cords from electrical outlets.
3. Remove the cover. See “Disconnecting cables and removing the cover” on page 64.
4. Refer to the system board cover label inside the computer to locate the ROM Recover Jumper.
5. Move the jumper from the Normal to the Boot Block Recover position.
6. Install the computer cover. See “Completing the installation” on page 92.
7. Connect the power cords for the computer and monitor to electrical outlets.
8. Insert the POST/BIOS update (flash) diskette into drive A.
9. Turn on the computer and the monitor.
10. After the update session completes, turn off the computer and monitor.
11. Remove the diskette from drive A.
12. Unplug the power cords from electrical outlets.
13. Remove the computer cover.
14. Move the jumper back to the normal position.
15. Install the cover and reconnect any cables that were disconnected.
16. Turn on the computer to restart the operating system.

Replacing the battery

Your 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.

Refer to “Lithium battery notice” on page x for information about replacing the battery.

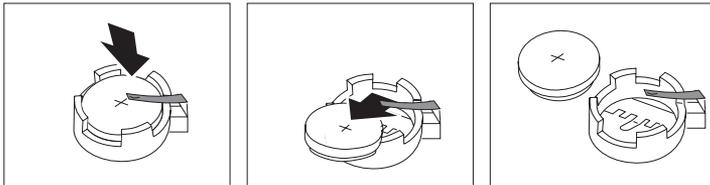
Note: If Enhanced Security is enabled, the administrator password is not lost when the battery fails.

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.

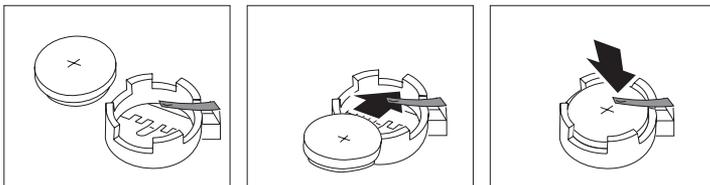
For further information on battery disposal, call IBM at 1-800-IBM-4333 (1-800-426-4333) in the U.S. For information outside of the U.S., contact your IBM reseller or marketing representative.

To change the battery:

1. Turn off the computer and all attached devices.
2. Unplug the power cord.
3. Remove the cover. See “Disconnecting cables and removing the cover” on page 64.
4. Locate the battery. See the system board label inside your computer.
5. If necessary, remove any adapters that impede access to the battery.
6. Remove the old battery.



7. Install the new battery.



8. Replace any adapters that were removed to gain access to the battery.
9. Install the cover. See “Completing the installation” on page 92.

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.

10. Plug in the power cord.
11. Turn on the computer and all attached devices.
12. See Chapter 4, “Using the Configuration/Setup Utility program” on page 43 to set the date and time and any passwords.
13. Dispose of the old battery as required by local ordinances or regulations.

Using the IBM Product Recovery CD

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

Warning: The recovery process deletes all information stored on the primary partition (drive C). If possible, back up your data before starting this process.

The IBM *Product Recovery CD* contains a startable CD image that copies files from the CD to the hard disk. The CD initially runs Windows 98 DOS and then installs your original operating system (either Windows 98 or Windows NT).

Your computer was shipped from the factory with either a FAT16 or FAT32 primary partition. The IBM *Product Recovery CD* for Windows NT Workstation will work correctly only if your primary partition is FAT16. The IBM *Product Recovery CD* for Windows 98 will work correctly only if your primary partition is FAT16 or FAT32.

Important

If your primary partition is not set correctly, you will see a message about an invalid partition that needs to be repartitioned with the FDISK command.

To run the FDISK command from the IBM *Product Recovery CD*, with the *Product Recovery CD* in the CD-ROM drive, 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 your hard disk correctly.

Additional resources

The IBM *Product Recovery CD* for Windows 98 includes an additional directory called CDEXTRA\TOOLS. This directory includes application updates provided by Microsoft for your convenience. Later updates of these files might be available on the Microsoft Web site.

The IBM *Product Recovery CD* for Windows NT Workstation 4.0 includes an additional directory called MSEXTRA. This directory includes application updates provided by Microsoft for your convenience. Later updates of these files might be available on the Microsoft Web site.

Recovering the operating system and support software

Use the following steps to recover the factory-installed 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 your CD-ROM drive.
3. Restart your computer and follow the instructions on the screen. If your computer does not start from the CD, you need to change your startup sequence. (See “Changing the startup sequence to start from the CD.”)
4. When the recovery is complete, remove the IBM *Product Recovery CD* and restart your computer.
5. If you changed your startup sequence, make sure you change it back immediately.

Changing the startup sequence to start from the CD

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

1. Turn on your computer. If your computer is already on when you start this procedure, you must shut down the operating system, turn off the computer, wait a few seconds until all in-use 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.)
3. Select **Start Options** from the Configuration/Setup Utility program menu.

4. Select **Startup Sequence** from the Start Options menu.
5. Write down the startup sequence that is shown on the screen. You will need this information to restore your original startup sequence after you complete the recovery process.
6. Change your **First Startup Device** 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 Settings** from the Configuration/Setup Utility program menu and press the Enter key.
9. Turn off your computer.

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

IBM Enhanced Diagnostics

IBM provides programs that you can run to diagnose hardware and some software problems. Several utility programs that provide helpful information about your computer are also included. The user interface for running these diagnostic and utility programs is provided by Watergate Software PC-Doctor.

The IBM Enhanced Diagnostics program will isolate your computer hardware from software that was preinstalled (or that you have installed) on your hard disk. 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 your computer. You can also download the latest image of the diagnostics program from the IBM Web site.

To download the latest image of the IBM Enhanced Diagnostics program 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**. Select your type/model number and click **Downloadable files → Diagnostics**
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 the file was downloaded.

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 using the diagnostic diskette, do the following:

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

Other diagnostic programs

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

PC-Doctor for Windows

To use the PC-Doctor for Windows program:

1. If you have not already done so, install the program onto your hard disk. For information about installing software from the *Software Selections CD*, see “Installing additional software” on page 22.
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.

CoSession Remote 32

Artisoft CoSession Remote 32 availability varies by computer model and country. CoSession Remote 32 is a remote-control diagnostic program that can be used by another individual, such as your network administrator, to help diagnose problems with your computer from a remote location. CoSession Remote 32 is provided on the *Software Selections CD* that comes with your computer. To use CoSession Remote 32, it must be installed on your computer, and your computer must have a modem or a LAN connection.

Important

Before attempting to use CoSession Remote 32, contact your network administrator for specific instructions on setting up and using the program.

Using the ConfigSafe program

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

If you are unable to solve a problem yourself and you need assistance from an IBM technical support representative, use ConfigSafe to generate a report about recent changes in your configuration before you call the PC HelpCenter®. The IBM technical support representative will be able to use the information in this report to help you solve the problem.

To run ConfigSafe:

1. Click the Windows **Start** button.
2. Select **Programs** → **ConfigSafe** → **CONFIGSAFE**.

Support documentation is built into the online Help system. To access online Help, click the Windows **Start** button. Then select **Programs** → **ConfigSafe**. The online Help files will appear in the pull-down menu on the right side of the screen.

Chapter 7. Getting help, service, and information

If you need help, service, technical assistance, or just want more information about IBM products, you will find a wide variety of sources available from IBM to assist you.

For example, IBM maintains pages on the World Wide Web where you can get information about IBM products and services, find the latest technical information, and download device drivers and updates. Some of these pages are:

http://www.ibm.com	Main IBM home page
http://www.ibm.com/pc	IBM Personal Computing
http://www.ibm.com/pc/support	IBM Personal Computing Support
http://www.ibm.com/pc/us/ibmpc	IBM Commercial Desktop PCs (U.S.)
http://www.ibm.com/pc/us/intellistation	IBM IntelliStation Workstations (U.S.)
http://www.ibm.com/pc/us/accessories	Options by IBM (U.S.)
http://www.ibm.com/pc/us/netfinity	IBM Netfinity Servers (U.S.)

You can select a country-specific Web site from these pages.

Help is also available from bulletin boards and online services, as well as by fax and telephone. This section provides information about these sources.

Services available and telephone numbers listed are subject to change without notice.

Service support

With the original purchase of an IBM hardware product, you have access to extensive support coverage. During the IBM hardware product warranty period, you may call the IBM Personal Computer HelpCenter (1-800-772-2227 in the U.S.) for hardware product assistance covered under the terms of the IBM hardware warranty. See "Getting help by telephone" on page 131 for HelpCenter telephone numbers in other countries.

The following services are available during the warranty period:

- Problem determination - Trained personnel are available to assist you with determining if you have a hardware problem and deciding what action is necessary to fix the problem.
- IBM hardware repair - If the problem is determined to be caused by IBM hardware under warranty, trained service personnel are available to provide the applicable level of service.
- Engineering change management - Occasionally, there might be changes that are required after a product has been sold. IBM or your reseller, if authorized by IBM, will make Engineering Changes (ECs) available that apply to your hardware.

Be sure to retain your proof of purchase to obtain warranty service.

Please have the following information ready when you call:

- Machine Type and Model
- Serial numbers of your IBM hardware products
- Description of the problem
- Exact wording of any error messages
- Hardware and software configuration information

If possible, be at your computer when you call.

The following items are not covered:

- Replacement or use of non-IBM parts or nonwarranted IBM parts
- Note:** All warranted parts contain a 7-character identification in the format IBM FRU XXXXXXXX.
- Identification of software problem sources
 - Configuration of BIOS as part of an installation or upgrade
 - Changes, modifications, or upgrades to device drivers
 - Installation and maintenance of network operating systems (NOS)
 - Installation and maintenance of application programs

Refer to your IBM hardware warranty for a full explanation of IBM's warranty terms.

Before you call for service

Many computer problems can be solved without outside assistance, by using the online help or by looking in the online or printed documentation that comes with your computer or software. Also, be sure to read the information in any README files that come with your software.

Most computers, operating systems, and application programs come with documentation that contains troubleshooting procedures and explanations of error messages. The documentation that comes with your computer also contains information about the diagnostic tests you can perform.

If you receive a POST error code when you turn on your computer, refer to the POST error-message charts in your hardware documentation. If you do not receive a POST error code, but suspect a hardware problem, refer to the troubleshooting information in your hardware documentation or run the diagnostic tests.

If you suspect a software problem, consult the documentation (including README files) for the operating system or application program.

Getting customer support and service

Purchasing an IBM PC hardware product entitles you to standard help and support during the warranty period. If you need additional support and services, a wide variety of extended services are available for purchase that address almost any need.

Using the World Wide Web

On the World Wide Web, the IBM Personal Computing Web site has up-to-date information about IBM Personal Computer products and support. The address for the IBM Personal Computing home page is:

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

You can find support information for your IBM products, including supported options, on the IBM Personal Computing Support page at:

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

If you select Profile from the support page, you can create a customized support page that is specific to your hardware, complete with Frequently Asked Questions, Parts Information, Technical Hints and Tips, and Downloadable Files. You will have the information you need, all in one place. In addition, you can choose to receive e-mail notifications whenever new information becomes available about your registered products. You

also can access online support forums, which are community sites monitored by IBM support staff.

For information about specific Personal Computer products, visit the following pages:

<http://www.ibm.com/pc/us/intellistation>

<http://www.ibm.com/pc/us/ibmpc>

<http://www.ibm.com/pc/us/netfinity>

<http://www.ibm.com/pc/us/thinkpad>

<http://www.ibm.com/pc/us/accessories>

http://www.direct.ibm.com/content/home/en_US/aptiva

You can select a country-specific Web site from these pages.

Using electronic support services

If you have a modem, you can get help from several popular services. Online information services provide assistance through question-and-answer message areas, live chat rooms, searchable databases, and more.

Technical information is available on a wide range of topics, such as:

- Hardware setup and configuration
- Preinstalled software
- Windows, OS/2, and DOS
- Networking
- Communications
- Multimedia

In addition, the latest device driver updates are available.

Commercial online services, such as America Online (AOL), contain information about IBM products. (For AOL, use the “Go to” keyword **IBM Connect**.)

Getting information by fax

If you have a touch-tone telephone and access to a fax machine, in the U.S. and Canada you can receive by fax marketing and technical information on many topics, including hardware, operating systems, and local area networks (LANs). You can call the IBM Automated Fax System 24 hours a day, 7 days a week. Follow the recorded instructions, and the requested information will be sent to your fax machine.

To access the IBM Automated Fax System, do the following:

- In the U.S., call 1-800-426-3395.
- In Canada, call 1-800-465-3299.

Getting help online

Online Housecall is a remote communication tool that allows an IBM technical-support representative to access your PC by modem. Many problems can be remotely diagnosed and corrected quickly and easily. In addition to a modem, a remote-access application program is required. This service is not available for servers. There might be a charge for this service, depending on the request.

For more information about configuring your PC for Online Housecall:

- In the U.S., call 1-800-772-2227.
- In Canada, call 1-800-565-3344.
- In all other countries, contact your IBM reseller or IBM marketing representative.

Getting help by telephone

During the warranty period, you can get help and information by telephone through the IBM PC HelpCenter. Expert technical-support representatives are available to assist you with questions you might have on the following:

- Setting up your computer and IBM monitor
- Installing and setting up IBM options purchased from IBM or an IBM reseller
- 30-day, preinstalled-operating-system support
- Arranging for service (on-site or carry-in)
- Arranging for overnight shipment of customer-replaceable parts

In addition, if you purchased an IBM PC Server or IBM Netfinity Server, you are eligible for IBM Start Up Support for 90 days after installation. This service provides assistance for:

- Setting up your network operating system
- Installing and configuring interface cards
- Installing and configuring network adapters

Please have the following information ready when you call:

- Machine Type and Model
- Serial numbers of your computer, monitor, and other components, or your proof of purchase
- Description of the problem
- Exact wording of any error messages

- Hardware and software configuration information for your system

If possible, be at your computer when you call.

In the U.S. and Canada, these services are available 24 hours a day, 7 days a week. In the U.K., these services are available Monday through Friday, from 9:00 a.m. to 6:00 p.m.⁵

Country		Telephone number
Austria	Österreich	1-546 585 075
Belgium - Dutch	Belgie	02-717-2504
Belgium - French	Belgique	02-717-2503
Canada	Canada	1-800-565-3344
Denmark	Danmark	03-525-6905
Finland	Suomi	9-22-931805
France	France	01-69-32-40-03
Germany	Deutschland	069-6654-9003
Ireland	Ireland	01-815-9207
Italy	Italia	02-4827-5003
Luxembourg	Luxembourg	298-977-5060
Netherlands	Nederland	020-504-0531
Norway	Norge	2-305-3203
Portugal	Portugal	01-791-5147
Spain	España	091-662-4270
Sweden	Sverige	08-632-0063
Switzerland - German	Schweiz	01-212-1810
Switzerland - French	Suisse	022-310-0418
Switzerland - Italian	Svizzera	091-971-0523
United Kingdom	United Kingdom	01475-555555
U.S.A. and Puerto Rico	U.S.A. and Puerto Rico	1-800-772-2227

⁵ Response time will vary depending on the number and complexity of incoming calls.

In all other countries, contact your IBM reseller or IBM marketing representative.

Getting help around the world

If you travel with your computer or need to move it to another country, you can register for International Warranty Service. When you register with the International Warranty Service Office, you will receive an International Warranty Service Certificate that is honored virtually worldwide, wherever IBM or IBM resellers sell and service IBM PC products.

For more information or to register for International Warranty Service:

- In the U.S. or Canada, call 1-800-497-7426.
- In Europe, call 44-1475-893638 (Greenock, U.K.).
- In Australia and New Zealand, call 61-2-9354-4171.

In all other countries, contact your IBM reseller or IBM marketing representative.

Purchasing additional services

During and after the warranty period, you can purchase additional services, such as support for IBM and non-IBM hardware, operating systems, and application programs; network setup and configuration; upgraded or extended hardware repair services; and custom installations. Service availability and name might vary by country.

Enhanced PC support line

Enhanced PC Support is available for desktop and mobile IBM computers that are not connected to a network. Technical support is provided for IBM computers and IBM or non-IBM options, operating systems, and application programs on the Supported Products list.

This service includes technical support for:

- Installing and configuring your out-of-warranty IBM computer
- Installing and configuring non-IBM options in IBM computers
- Using IBM operating systems in IBM and non-IBM computers
- Using application programs and games
- Tuning performance
- Installing device drivers remotely
- Setting up and using multimedia devices
- Identifying system problems
- Interpreting documentation

You can purchase this service on a per-call basis, as a multiple-incident package, or as an annual contract with a 10-incident limit. For more information about purchasing Enhanced PC Support, see “Ordering support line services” on page 134.

900-number operating system and hardware support line

In the U.S., if you prefer to obtain technical support on a pay-as-you-go basis, you can use the 900-number support line. The 900-number support line provides support for IBM PC products that are out of the warranty period.

To access this support, call 1-900-555-CLUB (2582). You will be notified of the charge per minute.

Network and server support line

Network and Server Support is available for simple or complex networks made up of IBM servers and workstations using major network operating systems. In addition, many popular non-IBM adapters and network interface cards are supported.

This service includes all of the features of the Enhanced PC Support Line, plus:

- Installing and configuring client workstations and servers
- Identifying system problems and correcting problems on the client or the server
- Using IBM and non-IBM network operating systems
- Interpreting documentation

You can purchase this service on a per-call basis, as a multiple-incident package, or as an annual contract with a 10-incident limit. For more information about purchasing Network and Server Support, see “Ordering support line services.”

Ordering support line services

Enhanced PC Support Line and Network and Server Support Line services are available for products on the Supported Products list. To receive a Supported Products list:

- In the U.S.:
 1. Call 1-800-426-3395.
 2. Select document number 11683 for Network and Server support.
 3. Select document number 11682 for Enhanced PC support.

- In Canada, contact IBM Direct at 1-800-465-7999, or:
 1. Call 1-800-465-3299.
 2. Select the HelpWare catalog.
- In all other countries, contact your IBM reseller or IBM marketing representative.

For more information or to purchase these services:

- In the U.S., call 1-800-772-2227.
- In Canada, call 1-800-465-7999.
- In all other countries, contact your HelpCenter.

Warranty and repair services

You can upgrade your standard hardware warranty service or extend the service beyond the warranty period.

Warranty upgrades in the U.S. include:

- Carry-in service to on-site service

If your warranty provides carry-in repair service, you can upgrade to on-site repair service, either standard or premium. The standard upgrade provides a trained servicer within the next business day (9 a.m. to 5 p.m., local time, Monday through Friday). The premium upgrade provides 4-hour average response, 24 hours a day, 7 days a week.

- On-site service to premium on-site service

If your warranty provides for on-site service, you can upgrade to premium on-site service (4-hour average on-site response, 24 hours a day, 7 days a week).

You also can extend your warranty. Warranty and Repair Services offers a variety of post-warranty maintenance options, including ThinkPad EasyServ Maintenance Agreements. Availability of the services varies by product.

For more information about warranty upgrades and extensions:

- In the U.S., call 1-800-426-4968.
- In Canada, call 1-800-465-7999.
- In all other countries, contact your IBM reseller or IBM marketing representative.

Ordering publications

Additional publications are available for purchase from IBM. For a list of publications available in your country:

- In the U.S., Canada, and Puerto Rico, call 1-800-879-2755.
- In other countries, contact your IBM reseller or IBM marketing representative.

Appendix A. Using the Software Selections CD

Use the information in this chapter if you want to install or reinstall device drivers and other software from the IBM *Software Selections CD*.

Important: You must have Microsoft Internet Explorer 4.0 or later installed to run the IBM *Software Selections CD*.

Features of the CD

The IBM *Software Selections CD* contains diagnostic programs and other support software for Windows 95, Windows 98, Windows NT Workstation 3.51, and Windows NT Workstation 4.0.

Note: Not all software is available for all operating systems. See the IBM *Software Selections CD* to find out which programs are for your operating system.

Important

The IBM *Software Selections CD* does not contain operating systems. Before you can use the CD, your operating system must be installed in your computer.

You can use the CD to:

- Install some software products directly from the CD on models equipped with a CD-ROM drive.
- Create an image of the IBM *Software Selections CD* on your hard disk or on a local area network (LAN) disk and install the software products from that image.
- Create diskettes for software products that cannot be installed from the CD and install the products from diskette.

The IBM *Software Selections CD* has an easy-to-use, graphical interface and automated installation procedures for most products. It also has a help system that describes the features of the CD.

The products on the IBM *Software Selections CD* are licensed according to the terms and conditions of the IBM International License Agreement for Non-Warranted Programs. (See Appendix C, "Viewing the license agreement" on page 145 for information about viewing the license agreement.)

Starting the CD

To use the IBM *Software Selections CD*, insert the CD into your CD-ROM drive. The Software Selections program starts automatically.

If the auto-run feature is disabled in your computer:

1. Click the Windows **Start** button; then click **Run**.
2. Type `e:\swselect.exe` where *e* is the CD-ROM drive letter.
3. Press Enter. The Software Selections menu appears.
4. Select the desired option; then follow the instructions on the screen.

or

1. In Access IBM, click **Customize**. (For information about opening Access IBM, see “Using Access IBM” on page 18.)
2. In the Customize menu, click **Install Software**.
3. When prompted, insert the IBM *Software Selections CD* into the CD-ROM drive.

After a program is installed, you can access it through the Programs choice on the Windows Start menu. For most programs, support documentation is built into the online Help system; for some, online documentation is also provided.

Using the Software Selections program

A Software Selections program is provided on the *Software Selections CD*.

To use the Software Selections program:

1. In the Software Selections menu, click the check box next to each program you want to install.
2. After selecting the software, click **Install**. A window opens showing the software programs that will be installed. Click **OK** to continue with the installation process or click **Cancel** to reset your options.
3. To complete a task, make the applicable selections and follow the instructions on the screen.

After a program is installed, you can access it through the Programs choice on the Windows Start menu. For most programs, support documentation is built into the online Help system; for some, online documentation is also provided.

Appendix B. Computer records

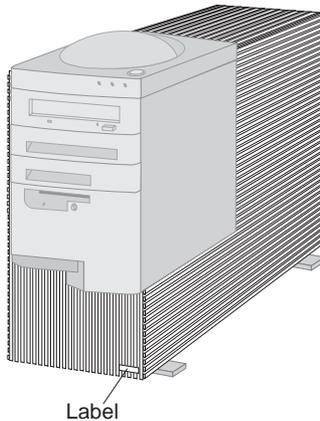
This appendix contains forms for recording information about your computer, which can be helpful if you decide to install additional hardware, or if you ever need to have your computer serviced.

Serial numbers and keys

Record and retain the following information.

Product Name	IntelliStation M Pro Type 6868
Model/Type (M/T)	_____
Serial Number (S/N)	_____

The model and type (M/T) numbers and the serial number (S/N) are located on a label on the lower right-hand corner on the front.



Device records

Use the following tables to keep a record of the options in or attached to your computer. This information can be helpful when you install additional options, or if you ever need to have your computer serviced.

Location	Option Description
System memory (channel A)	<input type="checkbox"/> 64 MB <input type="checkbox"/> 128 MB <input type="checkbox"/> 256 MB <input type="checkbox"/> 512 MB <input type="checkbox"/> 64 MB <input type="checkbox"/> 128 MB <input type="checkbox"/> 256 MB <input type="checkbox"/> 512 MB
System memory (channel B)	<input type="checkbox"/> 64 MB <input type="checkbox"/> 128 MB <input type="checkbox"/> 256 MB <input type="checkbox"/> 512 MB <input type="checkbox"/> 64 MB <input type="checkbox"/> 128 MB <input type="checkbox"/> 256 MB <input type="checkbox"/> 512 MB
AGP Slot	_____
PCI Expansion Slot 1	_____
PCI Expansion Slot 2	_____
PCI Expansion Slot 3	_____
PCI Expansion Slot 4	_____
PCI Expansion Slot 5	_____
Microprocessor	<input type="checkbox"/> Intel _____ MHz
Parallel Connector	_____
Serial Connector	_____
USB Connector 1	_____
USB Connector 2	_____
Monitor Connector	_____
Audio Connectors	_____
Keyboard Connector	<input type="checkbox"/> 104-key keyboard <input type="checkbox"/> Other
Mouse Connector	<input type="checkbox"/> ScrollPoint mouse <input type="checkbox"/> 2-button mouse <input type="checkbox"/> Other:

Location	Option Description
5.25-Inch Bay 1	<input type="checkbox"/> IDE CD-ROM drive <input type="checkbox"/> Other: <hr/>
5.25-Inch Bay 2	<hr/>
3.5-Inch Bay 3	<input type="checkbox"/> Hard disk drive <input type="checkbox"/> Other: <hr/>
3.5-Inch Bay 4	<input type="checkbox"/> 1.44 MB diskette drive <hr/>
3.5-Inch Bay 5	<input type="checkbox"/> hard disk drive <hr/>
3.5-Inch Bay 6	<input type="checkbox"/> Hard disk drive <hr/>
3.5-Inch Bay 7	<input type="checkbox"/> Hard disk drive <hr/>
Key manufacturer address, phone number and key code number	<hr/>

Appendix C. Viewing the license agreement

The IBM International License Agreement for Non-Warranted Programs is viewable through Access IBM in your preinstalled software. Use of your computer signifies acceptance of this agreement. To view the license agreement, do the following:

1. Click the Windows **Start** button.
2. Scroll to and click **Access IBM**.
3. In the Access IBM window, click **View license and warranty**.
4. Click **View the license**.

If your preinstalled software is no longer installed in your computer, you can view the license agreement on the IBM *Software Selections CD* by clicking **Read the license agreement** in the Software Selections program. For more information about IBM *Software Selections CD* "Getting started" on page 15.

Appendix D. Product warranties and notices

This appendix includes product warranties, trademarks and notices.

Warranty Statements

The warranty statements consist of two parts: Part 1 and Part 2. Part 1 varies by country. Part 2 is the same for both statements. Be sure to read both the Part 1 that applies to your country and Part 2.

- **United States, Puerto Rico, and Canada (Z125-4753-05 11/97)**
(Part 1 - General Terms on page 147)
- **Worldwide except Canada, Puerto Rico, Turkey, and United States (Z125-5697-01 11/97)**
(Part 1 - General Terms on page 150)
- **Worldwide Country-Unique Terms**
(Part 2 - Country-Unique Terms on page 153)

IBM Statement of Limited Warranty for United States, Puerto Rico, and Canada (Part 1 - General Terms)

This Statement of Limited Warranty includes Part 1 - General Terms and Part 2 - Country-unique Terms. The terms of Part 2 may replace or modify those of Part 1. The warranties provided by IBM in this Statement of Limited Warranty apply only to Machines you purchase for your use, and not for resale, from IBM or your reseller. The term "Machine" means an IBM machine, its features, conversions, upgrades, elements, or accessories, or any combination of them. The term "Machine" does not include any software programs, whether pre-loaded with the Machine, installed subsequently or otherwise. Unless IBM specifies otherwise, the following warranties apply only in the country where you acquire the Machine. Nothing in this Statement of Warranty affects any statutory rights of consumers that cannot be waived or limited by contract. If you have any questions, contact IBM or your reseller.

Machine - IntelliStation M Pro Type 6868
Warranty Period* - Parts: Three (3) Years Labor: Three (3) Years

**Contact your place of purchase for warranty service information. Some IBM Machines are eligible for on-site warranty service depending on the country where service is performed.*

The IBM Warranty for Machines

IBM warrants that each Machine 1) is free from defects in materials and workmanship and 2) conforms to IBM's Official Published Specifications. The warranty period for a Machine is a specified, fixed period commencing on its Date of

Installation. The date on your sales receipt is the Date of Installation, unless IBM or your reseller informs you otherwise.

During the warranty period IBM or your reseller, if approved by IBM to provide warranty service, will provide repair and exchange service for the Machine, without charge, under the type of service designated for the Machine and will manage and install engineering changes that apply to the Machine.

If a Machine does not function as warranted during the warranty period, and IBM or your reseller are unable to either 1) make it do so or 2) replace it with one that is at least functionally equivalent, you may return it to your place of purchase and your money will be refunded. The replacement may not be new, but will be in good working order.

Extent of Warranty

The warranty does not cover the repair or exchange of a Machine resulting from misuse, accident, modification, unsuitable physical or operating environment, improper maintenance by you, or failure caused by a product for which IBM is not responsible. The warranty is voided by removal or alteration of Machine or parts identification labels.

THESE WARRANTIES ARE YOUR EXCLUSIVE WARRANTIES AND REPLACE ALL OTHER WARRANTIES OR CONDITIONS, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OR CONDITIONS OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THESE WARRANTIES GIVE YOU SPECIFIC LEGAL RIGHTS AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM JURISDICTION TO JURISDICTION. SOME JURISDICTIONS DO NOT ALLOW THE EXCLUSION OR LIMITATION OF EXPRESS OR IMPLIED WARRANTIES, SO THE ABOVE EXCLUSION OR LIMITATION MAY NOT APPLY TO YOU. IN THAT EVENT, SUCH WARRANTIES ARE LIMITED IN DURATION TO THE WARRANTY PERIOD. NO WARRANTIES APPLY AFTER THAT PERIOD.

Items Not Covered by Warranty

IBM does not warrant uninterrupted or error-free operation of a Machine.

Unless specified otherwise, IBM provides non-IBM machines **WITHOUT WARRANTIES OF ANY KIND.**

Any technical or other support provided for a Machine under warranty, such as assistance via telephone with “how-to” questions and those regarding Machine set-up and installation, will be provided **WITHOUT WARRANTIES OF ANY KIND.**

Warranty Service

To obtain warranty service for the Machine, contact your reseller or IBM. In the United States, call IBM at 1-800-772-2227. In Canada, call IBM at 1-800-565-3344. You may be required to present proof of purchase.

IBM or your reseller provides certain types of repair and exchange service, either at your location or at a service center, to keep Machines in, or restore them to, conformance with their Specifications. IBM or your reseller will inform you of the available types of service for a Machine based on its country of installation. IBM may repair the failing Machine or exchange it at its discretion.

When warranty service involves the exchange of a Machine or part, the item IBM or your reseller replaces becomes its property and the replacement becomes yours. You represent that all removed items are genuine and unaltered. The replacement may not be new, but will be in good working order and at least functionally equivalent to the item replaced. The replacement assumes the warranty service status of the replaced item.

Any feature, conversion, or upgrade IBM or your reseller services must be installed on a Machine which is 1) for certain Machines, the designated, serial-numbered Machine and 2) at an engineering-change level compatible with the feature, conversion, or upgrade. Many features, conversions, or upgrades involve the removal of parts and their return to IBM. A part that replaces a removed part will assume the warranty service status of the removed part.

Before IBM or your reseller exchanges a Machine or part, you agree to remove all features, parts, options, alterations, and attachments not under warranty service.

You also agree to

1. ensure that the Machine is free of any legal obligations or restrictions that prevent its exchange;
2. obtain authorization from the owner to have IBM or your reseller service a Machine that you do not own; and
3. where applicable, before service is provided
 - a. follow the problem determination, problem analysis, and service request procedures that IBM or your reseller provides,
 - b. secure all programs, data, and funds contained in a Machine,
 - c. provide IBM or your reseller with sufficient, free, and safe access to your facilities to permit them to fulfill their obligations, and
 - d. inform IBM or your reseller of changes in a Machine's location.

IBM is responsible for loss of, or damage to, your Machine while it is 1) in IBM's possession or 2) in transit in those cases where IBM is responsible for the transportation charges.

Neither IBM nor your reseller is responsible for any of your confidential, proprietary or personal information contained in a Machine which you return to IBM or your reseller for any reason. You should remove all such information from the Machine prior to its return.

Production Status

Each IBM Machine is manufactured from new parts, or new and used parts. In some cases, the Machine may not be new and may have been previously installed. Regardless of the Machine's production status, IBM's appropriate warranty terms apply.

Limitation of Liability

Circumstances may arise where, because of a default on IBM's part or other liability, you are entitled to recover damages from IBM. In each such instance, regardless of the basis on which you are entitled to claim damages from IBM (including fundamental breach, negligence, misrepresentation, or other contract or tort claim), IBM is liable for no more than

1. damages for bodily injury (including death) and damage to real property and tangible personal property; and
2. the amount of any other actual direct damages, up to the greater of U.S. \$100,000 (or equivalent in local currency) or the charges (if recurring, 12 months' charges apply) for the Machine that is the subject of the claim.

This limit also applies to IBM's suppliers and your reseller. It is the maximum for which IBM, its suppliers, and your reseller are collectively responsible.

UNDER NO CIRCUMSTANCES IS IBM LIABLE FOR ANY OF THE FOLLOWING: 1) THIRD-PARTY CLAIMS AGAINST YOU FOR DAMAGES (OTHER THAN THOSE UNDER THE FIRST ITEM LISTED ABOVE); 2) LOSS OF, OR DAMAGE TO, YOUR RECORDS OR DATA; OR 3) SPECIAL, INCIDENTAL, OR INDIRECT DAMAGES OR FOR ANY ECONOMIC CONSEQUENTIAL DAMAGES (INCLUDING LOST PROFITS OR SAVINGS), EVEN IF IBM, ITS SUPPLIERS OR YOUR RESELLER IS INFORMED OF THEIR POSSIBILITY. SOME JURISDICTIONS DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU.

IBM Statement of Warranty Worldwide except Canada, Puerto Rico, Turkey, United States (Part 1 - General Terms)

This Statement of Warranty includes Part 1 - General Terms and Part 2 - Country-unique Terms. The terms of Part 2 may replace or modify those of Part 1. The warranties provided by IBM in this Statement of Warranty apply only to Machines you purchase for your use, and not for resale, from IBM or your reseller. The term "Machine" means an IBM machine, its features, conversions, upgrades, elements, or accessories, or any combination of them. The term "Machine" does not include any software programs, whether pre-loaded with the Machine, installed subsequently or otherwise. Unless IBM specifies otherwise, the following warranties apply only in the country where you acquire the Machine. Nothing in this Statement of Warranty affects any statutory rights of consumers that cannot be waived or limited by contract. If you have any questions, contact IBM or your reseller.

IntelliStation M Pro Type 6868

Warranty Period* -

- Bangladesh, China, Hong Kong, India, Indonesia, Malaysia, Philippines, Singapore, Sri Lanka, Taiwan, Thailand, and Vietnam - Parts: Three (3) Years Labor: One (1) Year **
- Japan - Parts: One (1) Year Labor: One (1) Year
- All other countries not listed - Parts: Three (3) Years Labor: Three (3) Years

* *Contact your place of purchase for warranty service information. Some IBM Machines are eligible for on-site warranty service depending on the country where service is performed.*

** IBM will provide warranty service without charge for:

1. parts and labor during the first year of the warranty period
2. parts only, on an exchange basis, in the second and third years of the warranty period.

IBM will charge you for any labor it provides in performance of the repair or replacement.

The IBM Warranty for Machines

IBM warrants that each Machine 1) is free from defects in materials and workmanship and 2) conforms to IBM's Official Published Specifications. The warranty period for a Machine is a specified, fixed period commencing on its Date of Installation. The date on your sales receipt is the Date of Installation, unless IBM or your reseller informs you otherwise.

During the warranty period IBM or your reseller, if approved by IBM to provide warranty service, will provide repair and exchange service for the Machine, without charge, under the type of service designated for the Machine and will manage and install engineering changes that apply to the Machine.

If a Machine does not function as warranted during the warranty period, and IBM or your reseller are unable to either 1) make it do so or 2) replace it with one that is at least functionally equivalent, you may return it to your place of purchase and your money will be refunded. The replacement may not be new, but will be in good working order.

Extent of Warranty

The warranty does not cover the repair or exchange of a Machine resulting from misuse, accident, modification, unsuitable physical or operating environment, improper maintenance by you, or failure caused by a product for which IBM is not responsible. The warranty is voided by removal or alteration of Machine or parts identification labels.

THESE WARRANTIES ARE YOUR EXCLUSIVE WARRANTIES AND REPLACE ALL OTHER WARRANTIES OR CONDITIONS, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OR CONDITIONS OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THESE WARRANTIES GIVE YOU SPECIFIC LEGAL RIGHTS AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM JURISDICTION TO JURISDICTION. SOME JURISDICTIONS DO NOT ALLOW THE EXCLUSION OR LIMITATION OF EXPRESS OR IMPLIED WARRANTIES, SO THE ABOVE EXCLUSION OR LIMITATION MAY NOT APPLY TO YOU. IN THAT EVENT, SUCH WARRANTIES ARE

LIMITED IN DURATION TO THE WARRANTY PERIOD. NO WARRANTIES APPLY AFTER THAT PERIOD.

Items Not Covered by Warranty

IBM does not warrant uninterrupted or error-free operation of a Machine.

Unless specified otherwise, IBM provides non-IBM machines **WITHOUT WARRANTIES OF ANY KIND.**

Any technical or other support provided for a Machine under warranty, such as assistance via telephone with “how-to” questions and those regarding Machine set-up and installation, will be provided **WITHOUT WARRANTIES OF ANY KIND.**

Warranty Service

To obtain warranty service for the Machine, contact your reseller or IBM. You may be required to present proof of purchase.

IBM or your reseller provides certain types of repair and exchange service, either at your location or at a service center, to keep Machines in, or restore them to, conformance with their Specifications. IBM or your reseller will inform you of the available types of service for a Machine based on its country of installation. IBM may repair the failing Machine or exchange it at its discretion.

When warranty service involves the exchange of a Machine or part, the item IBM or your reseller replaces becomes its property and the replacement becomes yours. You represent that all removed items are genuine and unaltered. The replacement may not be new, but will be in good working order and at least functionally equivalent to the item replaced. The replacement assumes the warranty service status of the replaced item.

Any feature, conversion, or upgrade IBM or your reseller services must be installed on a Machine which is 1) for certain Machines, the designated, serial-numbered Machine and 2) at an engineering-change level compatible with the feature, conversion, or upgrade. Many features, conversions, or upgrades involve the removal of parts and their return to IBM. A part that replaces a removed part will assume the warranty service status of the removed part.

Before IBM or your reseller exchanges a Machine or part, you agree to remove all features, parts, options, alterations, and attachments not under warranty service.

You also agree to

1. ensure that the Machine is free of any legal obligations or restrictions that prevent its exchange;
2. obtain authorization from the owner to have IBM or your reseller service a Machine that you do not own; and
3. where applicable, before service is provided
 - a. follow the problem determination, problem analysis, and service request procedures that IBM or your reseller provides,
 - b. secure all programs, data, and funds contained in a Machine,
 - c. provide IBM or your reseller with sufficient, free, and safe access to your facilities to permit them to fulfil their obligations, and
 - d. inform IBM or your reseller of changes in a Machine's location.

IBM is responsible for loss of, or damage to, your Machine while it is 1) in IBM's possession or 2) in transit in those cases where IBM is responsible for the transportation charges.

Neither IBM nor your reseller is responsible for any of your confidential, proprietary or personal information contained in a Machine which you return to IBM or your reseller for any reason. You should remove all such information from the Machine prior to its return.

Production Status

Each IBM Machine is manufactured from new parts, or new and used parts. In some cases, the Machine may not be new and may have been previously installed. Regardless of the Machine's production status, IBM's appropriate warranty terms apply.

Limitation of Liability

Circumstances may arise where, because of a default on IBM's part or other liability, you are entitled to recover damages from IBM. In each such instance, regardless of the basis on which you are entitled to claim damages from IBM (including fundamental breach, negligence, misrepresentation, or other contract or tort claim), IBM is liable for no more than

1. damages for bodily injury (including death) and damage to real property and tangible personal property; and
2. the amount of any other actual direct damages, up to the greater of U.S. \$100,000 (or equivalent in local currency) or the charges (if recurring, 12 months' charges apply) for the Machine that is the subject of the claim.

This limit also applies to IBM's suppliers and your reseller. It is the maximum for which IBM, its suppliers, and your reseller are collectively responsible.

UNDER NO CIRCUMSTANCES IS IBM LIABLE FOR ANY OF THE FOLLOWING: 1) THIRD-PARTY CLAIMS AGAINST YOU FOR DAMAGES (OTHER THAN THOSE UNDER THE FIRST ITEM LISTED ABOVE); 2) LOSS OF, OR DAMAGE TO, YOUR RECORDS OR DATA; OR 3) SPECIAL, INCIDENTAL, OR INDIRECT DAMAGES OR FOR ANY ECONOMIC CONSEQUENTIAL DAMAGES (INCLUDING LOST PROFITS OR SAVINGS), EVEN IF IBM, ITS SUPPLIERS OR YOUR RESELLER IS INFORMED OF THEIR POSSIBILITY. SOME JURISDICTIONS DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU.

Part 2 - Worldwide Country-Unique Terms

ASIA PACIFIC

AUSTRALIA: The IBM Warranty for Machines: The following paragraph is added to this Section:

The warranties specified in this Section are in addition to any rights you may have under the Trade Practices Act 1974 or other legislation and are only limited to the extent permitted by the applicable legislation.

Extent of Warranty: The following replaces the first and second sentences of this Section:

The warranty does not cover the repair or exchange of a Machine resulting from misuse, accident, modification, unsuitable physical or operating environment, operation in other than the Specified Operating Environment, improper maintenance by you, or failure caused by a product for which IBM is not responsible.

Limitation of Liability: The following is added to this Section:

Where IBM is in breach of a condition or warranty implied by the Trade Practices Act 1974, IBM's liability is limited to the repair or replacement of the goods or the supply of equivalent goods. Where that condition or warranty relates to right to sell, quiet possession or clear title, or the goods are of a kind ordinarily acquired for personal, domestic or household use or consumption, then none of the limitations in this paragraph apply.

PEOPLE'S REPUBLIC OF CHINA: Governing Law: The following is added to this Statement:

The laws of the State of New York govern this Statement.

INDIA: Limitation of Liability: The following replaces items 1 and 2 of this Section:

1. liability for bodily injury (including death) or damage to real property and tangible personal property will be limited to that caused by IBM's negligence;
2. as to any other actual damage arising in any situation involving nonperformance by IBM pursuant to, or in any way related to the subject of this Statement of Warranty, IBM's liability will be limited to the charge paid by you for the individual Machine that is the subject of the claim.

NEW ZEALAND: The IBM Warranty for Machines: The following paragraph is added to this Section:

The warranties specified in this Section are in addition to any rights you may have under the Consumer Guarantees Act 1993 or other legislation which cannot be excluded or limited. The Consumer Guarantees Act 1993 will not apply in respect of any goods which IBM provides, if you require the goods for the purposes of a business as defined in that Act.

Limitation of Liability: The following is added to this Section:

Where Machines are not acquired for the purposes of a business as defined in the Consumer Guarantees Act 1993, the limitations in this Section are subject to the limitations in that Act.

EUROPE, MIDDLE EAST, AFRICA (EMEA)

The following terms apply to all EMEA countries.

The terms of this Statement of Warranty apply to Machines purchased from an IBM reseller. If you purchased this Machine from IBM, the terms and conditions of the applicable IBM agreement prevail over this warranty statement.

Warranty Service

If you purchased an IBM Machine in Austria, Belgium, Denmark, Estonia, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland or United Kingdom, you may obtain warranty service for that Machine in any of those countries from either (1) an IBM reseller approved to perform warranty service or (2) from IBM.

If you purchased an IBM Personal Computer Machine in Albania, Armenia, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Georgia, Hungary, Kazakhstan, Kirghizia, Federal Republic of Yugoslavia, Former Yugoslav Republic of Macedonia (FYROM), Moldova, Poland, Romania, Russia, Slovak Republic, Slovenia, or Ukraine, you may obtain warranty service for that Machine in any of those countries from either (1) an IBM reseller approved to perform warranty service or (2) from IBM.

The applicable laws, Country-unique terms and competent court for this Statement are those of the country in which the warranty service is being provided. However, the laws of Austria govern this Statement if the warranty service is provided in Albania, Armenia, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Federal Republic of Yugoslavia, Georgia, Hungary, Kazakhstan, Kirghizia, Former Yugoslav Republic of Macedonia (FYROM), Moldova, Poland, Romania, Russia, Slovak Republic, Slovenia, and Ukraine.

The following terms apply to the country specified:

EGYPT: Limitation of Liability: The following replaces item 2 in this Section:
2. as to any other actual direct damages, IBM's liability will be limited to the total amount you paid for the Machine that is the subject of the claim.

Applicability of suppliers and resellers (unchanged).

FRANCE: Limitation of Liability: The following replaces the second sentence of the first paragraph of this Section:
In such instances, regardless of the basis on which you are entitled to claim damages from IBM, IBM is liable for no more than: (items 1 and 2 unchanged).

GERMANY: The IBM Warranty for Machines: The following replaces the first sentence of the first paragraph of this Section:
The warranty for an IBM Machine covers the functionality of the Machine for its normal use and the Machine's conformity to its Specifications.

The following paragraphs are added to this Section:
The minimum warranty period for Machines is six months.

In case IBM or your reseller are unable to repair an IBM Machine, you can alternatively ask for a partial refund as far as justified by the reduced value of the unrepaired Machine or ask for a cancellation of the respective agreement for such Machine and get your money refunded.

Extent of Warranty: The second paragraph does not apply.

Warranty Service: The following is added to this Section:
During the warranty period, transportation for delivery of the failing Machine to IBM will be at IBM's expense.

Production Status: The following paragraph replaces this Section:

Each Machine is newly manufactured. It may incorporate in addition to new parts, re-used parts as well.

Limitation of Liability: The following is added to this Section:

The limitations and exclusions specified in the Statement of Warranty will not apply to damages caused by IBM with fraud or gross negligence and for express warranty.

In item 2, replace "U.S. \$100,000" with "1.000.000 DEM."

The following sentence is added to the end of the first paragraph of item 2:

IBM's liability under this item is limited to the violation of essential contractual terms in cases of ordinary negligence.

IRELAND: Extent of Warranty: The following is added to this Section:

Except as expressly provided in these terms and conditions, all statutory conditions, including all warranties implied, but without prejudice to the generality of the foregoing all warranties implied by the Sale of Goods Act 1893 or the Sale of Goods and Supply of Services Act 1980 are hereby excluded.

Limitation of Liability: The following replaces items one and two of the first paragraph of this Section:

1. death or personal injury or physical damage to your real property solely caused by IBM's negligence; and 2. the amount of any other actual direct damages, up to the greater of Irish Pounds 75,000 or 125 percent of the charges (if recurring, the 12 months' charges apply) for the Machine that is the subject of the claim or which otherwise gives rise to the claim.

Applicability of suppliers and resellers (unchanged).

The following paragraph is added at the end of this Section:

IBM's entire liability and your sole remedy, whether in contract or in tort, in respect of any default shall be limited to damages.

ITALY: Limitation of Liability: The following replaces the second sentence in the first paragraph:

In each such instance unless otherwise provided by mandatory law, IBM is liable for no more than: (item 1 unchanged) 2) as to any other actual damage arising in all situations involving non-performance by IBM pursuant to, or in any way related to the subject matter of this Statement of Warranty, IBM's liability, will be limited to the total amount you paid for the Machine that is the subject of the claim.

Applicability of suppliers and resellers (unchanged).

The following replaces the second paragraph of this Section:

Unless otherwise provided by mandatory law, IBM and your reseller are not liable for any of the following: (items 1 and 2 unchanged) 3) indirect damages, even if IBM or your reseller is informed of their possibility.

SOUTH AFRICA, NAMIBIA, BOTSWANA, LESOTHO AND SWAZILAND:

Limitation of Liability: The following is added to this Section:

IBM's entire liability to you for actual damages arising in all situations involving nonperformance by IBM in respect of the subject matter of this Statement of

Warranty will be limited to the charge paid by you for the individual Machine that is the subject of your claim from IBM.

TURKIYE: Production Status: The following replaces this Section:
IBM fulfils customer orders for IBM Machines as newly manufactured in accordance with IBM's production standards.

UNITED KINGDOM: Limitation of Liability: The following replaces items 1 and 2 of the first paragraph of this Section:

1. death or personal injury or physical damage to your real property solely caused by IBM's negligence;
2. the amount of any other actual direct damages or loss, up to the greater of Pounds Sterling 150,000 or 125 percent of the charges (if recurring, the 12 months' charges apply) for the Machine that is the subject of the claim or which otherwise gives rise to the claim.

The following item is added to this paragraph:

3. breach of IBM's obligations implied by Section 12 of the Sale of Goods Act 1979 or Section 2 of the Supply of Goods and Services Act 1982.

Applicability of suppliers and resellers (unchanged).

The following is added to the end of this Section:

IBM's entire liability and your sole remedy, whether in contract or in tort, in respect of any default will be limited to damages.

NORTH AMERICA

CANADA: Warranty Service: The following is added to this Section:
To obtain warranty service from IBM, call **1-800-565-3344**.

UNITED STATES OF AMERICA: Warranty Service: The following is added to this Section:
To obtain warranty service from IBM, call **1-800-772-2227**.

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This is a Year 2000 Readiness Disclosure.

A product is Year 2000 Ready if the product, when used in accordance with its associated documentation, is capable of correctly processing, providing and/or receiving date data within and between the 20th and 21st centuries, provided all other products (for example, software, hardware, and firmware) used with the product properly exchange date data with it.

This IBM PC hardware product has been designed to process four-digit date information correctly within and between the 20th and 21st centuries. If your IBM computer is on when the century changes, you should turn it off and then back on again once, or restart the operating system, to ensure that the internal clock resets itself for the new century.

This IBM PC product cannot prevent errors that might occur if software you use or exchange data with is not ready for the Year 2000. IBM software

that comes with this product is Year 2000 Ready. However, software from other companies might come with this IBM PC product. IBM cannot take responsibility for the readiness of that software. You should contact the software developers directly if you wish to verify readiness, understand limitations, or look for any software updates.

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Electronic emission notices

Federal Communications Commission (FCC) Statement

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

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

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

Federal Communications Commission (FCC) and telephone company requirements

1. This device complies with Part 68 of the FCC rules. A label is affixed to the device that contains, among other things, the FCC registration number, USOC, and Ringer Equivalency Number (REN) for this equipment. If these numbers are requested, provide this information to your telephone company.

Note: If the device is an internal modem, a second FCC registration label is also provided. You may attach the label to the exterior of the computer in which you install the IBM modem, or you may attach the label to the external DAA, if you have one. Place the label in a location that is easily accessible, should you need to provide the label information to the telephone company.

2. The REN is useful to determine the quantity of devices you may connect to your telephone line and still have those devices ring when your number is called. In most, but not all areas, the sum of the RENs of all devices should not exceed five (5). To be certain of the number of devices you may connect to your line, as determined by the REN,

you should call your local telephone company to determine the maximum REN for your calling area.

3. If the device causes harm to the telephone network, the telephone company may discontinue your service temporarily. If possible, they will notify you in advance; if advance notice is not practical, you will be notified as soon as possible. You will be advised of your right to file a complaint with the FCC.
4. Your telephone company may make changes in its facilities, equipment, operations, or procedures that could affect the proper operation of your equipment. If they do, you will be given advance notice to give you an opportunity to maintain uninterrupted service.
5. If you experience trouble with this product, contact your authorized reseller, or call IBM. In the United States, call IBM at **1-800-772-2227**. In Canada, call IBM at **1-800-565-3344**. You may be required to present proof of purchase.

The telephone company may ask you to disconnect the device from the network until the problem has been corrected, or until you are sure the device is not malfunctioning.

6. No customer repairs are possible to the device. If you experience trouble with the device, contact your Authorized Reseller or see the Diagnostics section of this manual for information.
7. This device may not be used on coin service provided by the telephone company. Connection to party lines is subject to state tariffs. Contact your state public utility commission or corporation commission for information.
8. When ordering network interface (NI) service from the local Exchange Carrier, specify service arrangement USOC RJ11C.

Canadian Department of Communications certification label

NOTICE: The Industry Canada label identifies certified equipment. This certification means that the equipment meets telecommunications network protective, operational and safety requirements as prescribed in the appropriate Terminal Equipment Technical Requirements documents. The Department does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations. Repairs to certified equipment should be coordinated by a representative designated by the supplier. Any repairs or alterations made by the user to

this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines, and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

Caution: Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate.

NOTICE: The Ringer Equivalence Number (REN) assigned to each terminal device provides an indication of the maximum number of terminals allowed to be connected to a telephone interface. The termination on an interface may consist of any combination of devices subject only to the requirement that the sum of the Ringer Equivalence Numbers of all the devices does not exceed 5.

Étiquette d'homologation du ministère des Communications du Canada

AVIS : L'étiquette d'Industrie Canada identifie le matériel homologué. Cette étiquette certifie que le matériel est conforme aux normes de protection, d'exploitation et de sécurité des réseaux de télécommunications, comme le prescrivent les documents concernant les exigences techniques relatives au matériel terminal. Le ministère n'assure toutefois pas que le matériel fonctionnera à la satisfaction de l'utilisateur.

Avant d'installer ce matériel, l'utilisateur doit s'assurer qu'il est permis de le raccorder aux installations de l'entreprise locale de télécommunications. Le matériel doit également être installé en suivant une méthode acceptée de raccordement. L'abonné ne doit pas oublier qu'il est possible que la conformité aux conditions énoncées ci-dessus n'empêche pas la dégradation du service dans certaines situations.

Les réparations de matériel homologué doivent être coordonnées par un représentant désigné par le fournisseur. L'entreprise de télécommunications peut demander à l'utilisateur de débrancher un appareil à la suite de réparations ou de modifications effectuées par l'utilisateur ou à cause de mauvais fonctionnement.

Pour sa propre protection, l'utilisateur doit s'assurer que tous les fils de mise à la terre de la source d'énergie électrique, des lignes téléphoniques et des canalisations d'eau métalliques, s'il y en a, sont raccordés ensemble. Cette précaution est particulièrement importante dans les régions rurales.

Avertissement : L'utilisateur ne doit pas tenter de faire ces raccordements lui-même; il doit avoir recours à un service d'inspection des installations électriques ou à un électricien, selon le cas.

AVIS : L'indice d'équivalence de la sonnerie (IES) assigné à chaque dispositif terminal indique le nombre maximal de terminaux qui peuvent être raccordés à une interface. La terminaison d'une interface téléphonique peut consister en une combinaison de quelques dispositifs, à la seule condition que la somme d'indices d'équivalence de la sonnerie de tous les dispositifs n'excède pas 5.

Power cord notice

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

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

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

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

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

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

IBM power cord part number	Used in these countries and regions
13F9940	Argentina, Australia, China (PRC), New Zealand, Papua New Guinea, Paraguay, Uruguay, Western Samoa
13F9979	Afghanistan, Algeria, Andorra, Angola, Austria, Belgium, Benin, Bulgaria, Burkina Faso, Burundi, Cameroon, Central African Rep., Chad, Czech Republic, Egypt, Finland, France, French Guiana, Germany, Greece, Guinea, Hungary, Iceland, Indonesia, Iran, Ivory Coast, Jordan, Lebanon, Luxembourg, Macau, Malagasy, Mali, Martinique, Mauritania, Mauritius, Monaco, Morocco, Mozambique, Netherlands, New Caledonia, Niger, Norway, Poland, Portugal, Romania, Senegal, Slovakia, Spain, Sudan, Sweden, Syria, Togo, Tunisia, Turkey, former USSR, Vietnam, former Yugoslavia, Zaire, Zimbabwe
13F9997	Denmark
14F0015	Bangladesh, Burma, Pakistan, South Africa, Sri Lanka
14F0033	Antigua, Bahrain, Brunei, Channel Islands, Cyprus, Dubai, Fiji, Ghana, Hong Kong, India, Iraq, Ireland, Kenya, Kuwait, Malawi, Malaysia, Malta, Nepal, Nigeria, Polynesia, Qatar, Sierra Leone, Singapore, Tanzania, Uganda, United Kingdom, Yemen, Zambia
14F0051	Liechtenstein, Switzerland
14F0069	Chile, Ethiopia, Italy, Libya, Somalia
14F0087	Israel
1838574	Thailand
62X1045	Bahamas, Barbados, Bermuda, Bolivia, Brazil, Canada, Cayman Islands, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Japan, Korea (South), Liberia, Mexico, Netherlands Antilles, Nicaragua, Panama, Peru, Philippines, Saudi Arabia, Suriname, Taiwan, Trinidad (West Indies), United States of America, Venezuela

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