



IntelliStation E Pro

Types 6204 and 6214

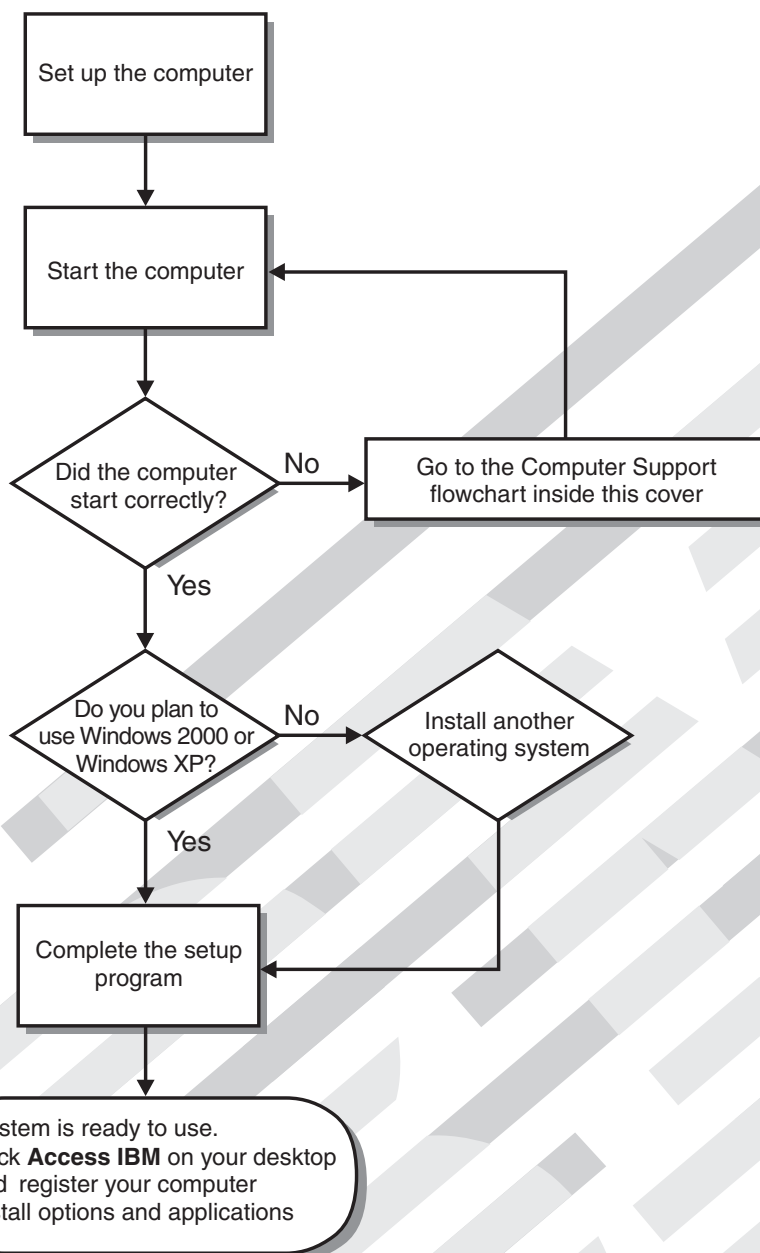
User's Guide

Welcome...

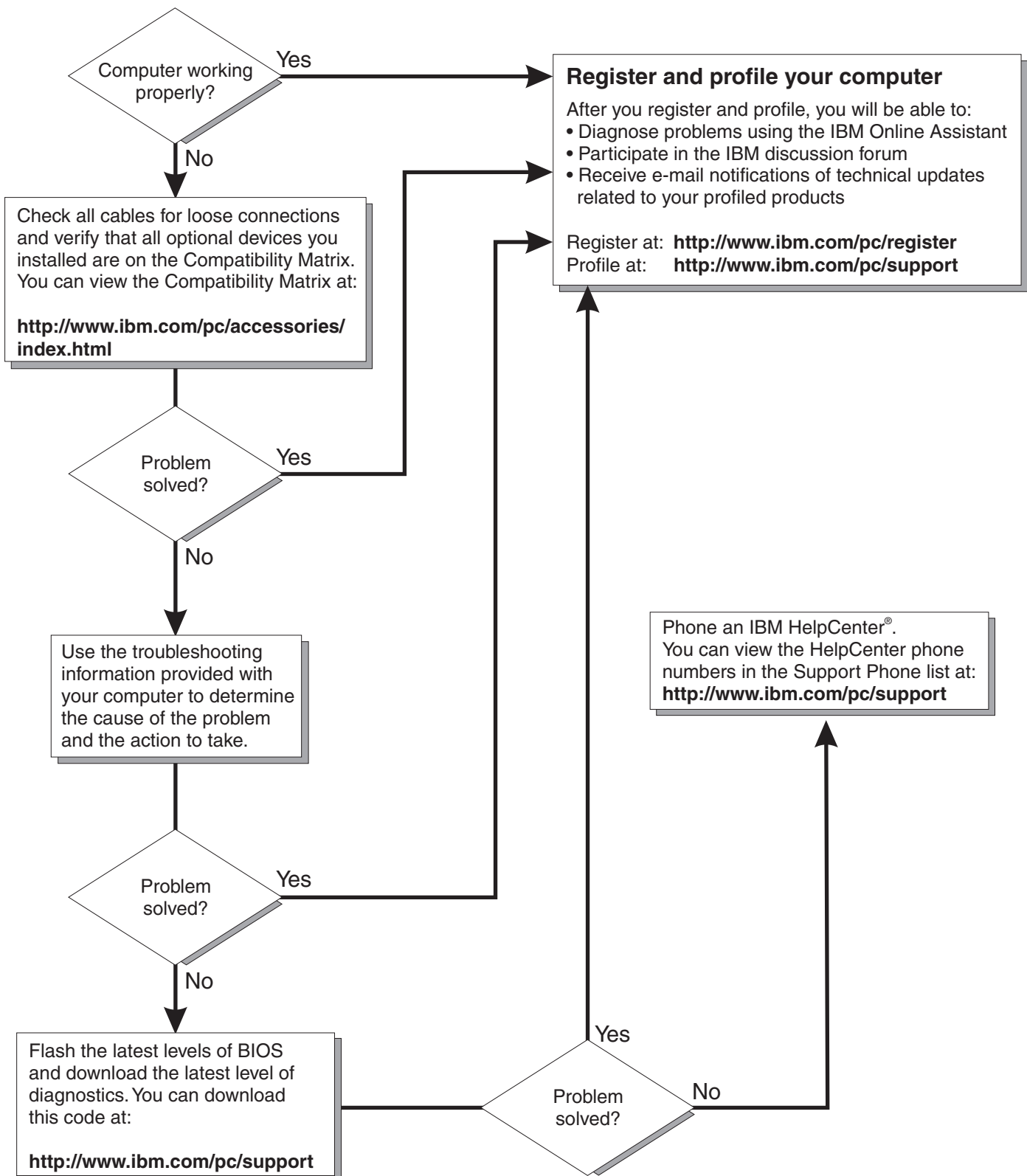
Thank you for buying an IBM IntelliStation E Pro computer.

This *User's Guide* contains information for setting up, installing options, and preparing applications to run on your computer. This book also contains information regarding everyday use and solving problems.

You can find the most current information about your computer at <http://www.ibm.com/pc/support/> on the IBM Web site.



Computer Support



IBM IntelliStation E Pro
Types 6204 and 6214



User's Guide

Note:

Before using this information and the product it supports, be sure to read the general information in Appendix E, "Warranty information," on page 125 and Appendix F, "Notices," on page 135.

Second Edition (March 2002)

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Safety information

Before installing this product, read the Safety Information.

مج، يجب قراءة دات السلامة

Antes de instalar este produto, leia as Informações de Segurança.

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

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

Ennen kuin asennat tämän tuotteen, lue turvaohjeet kohdasta Safety Information.

Avant d'installer ce produit, lisez les consignes de sécurité.

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

Πριν εγκαταστήσετε το προϊόν αυτό, διαβάστε τις πληροφορίες ασφάλειας (safety information).

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

A termék telepítése előtt olvassa el a Biztonsági előírásokat!

Prima di installare questo prodotto, leggere le Informazioni sulla Sicurezza.

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

Пред да се инсталира овој продукт, прочитајте информацијата за безбедност.

Les sikkerhetsinformasjonen (Safety Information) før du installerer dette produktet.

Przed zainstalowaniem tego produktu, należy zapoznać się z książką "Informacje dotyczące bezpieczeństwa" (Safety Information).

Перед установкой продукта прочтите инструкции по технике безопасности.

Pred inštaláciou tohto zariadenia si pečítajte Bezpečnostné predpisy.

Antes de instalar este produto, leia as Informações sobre Segurança.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

Antes de instalar este producto, lea la información de seguridad.

Läs säkerhetsinformationen innan du installerar den här produkten.

Statement 1



DANGER

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

To avoid a shock hazard:

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

To connect:

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

To disconnect:

1. Turn everything OFF.
2. First, remove power cords from outlet.
3. Remove signal cables from connectors.
4. Remove all cables from devices.

Statement 2

CAUTION:



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

Do not:

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

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

Statement 3



CAUTION:

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

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



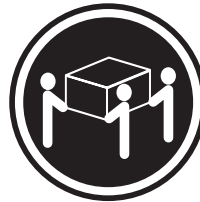
DANGER

Some laser products contain an embedded Class 3A or Class 3B laser diode. Note the following. Laser radiation when open. Do not stare into

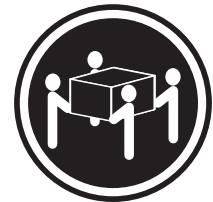
Statement 4



≥18 kg (39.7 lbs)



≥32 kg (70.5 lbs)



≥55 kg (121.2 lbs)

CAUTION:

Use safe practices when lifting.

Statement 5



CAUTION:

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



Statement 8



CAUTION:

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



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

Preface

This book will help you become familiar with your IBM® IntelliStation® E Pro computer and its many features. This book describes how to set up, configure, operate, maintain, and install options in your computer. Information about software, problem solving, and getting help are also included.

Related information

The following documentation contains additional information about your computer. Because your computer comes with IBM-preinstalled software, you might be able to view some of these documents in Access IBM. See “Using Access IBM” on page 16. The IBM documents listed below can also be found at <http://www.ibm.com> on the World Wide Web.

- *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.
- README files on the *Device Driver and IBM Enhanced Diagnostics CD*
Several README files on this CD contain diagnostic tools and preinstalled device drivers. Other README files on this CD contain information about the various adapters and devices that might be attached to your computer.
- Adaptec SCSI documentation
This publication, accessible through Access IBM, contains information and instructions for installing and configuring small computer systems interface (SCSI) device drivers and devices.
- *Safety Information*
This publication, accessible through Access IBM, contains multilingual caution and danger statements.

Notices and statements used in this book

The caution and danger statements used in this book appear in the multilingual Safety Information book. Each statement is numbered for easy reference to the corresponding statements in the safety book.

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

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

Chapter 1. Introducing the IntelliStation E Pro

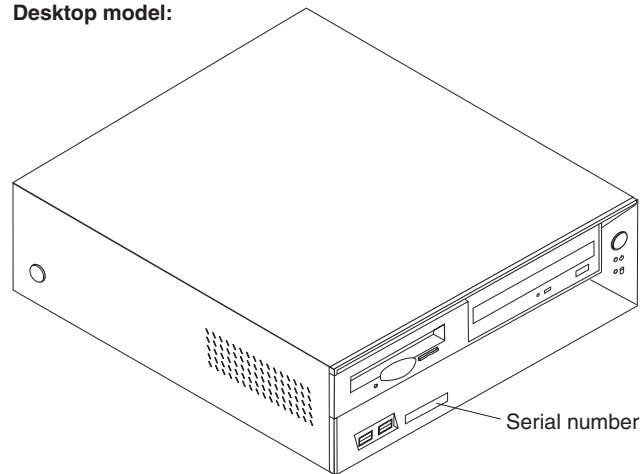
Thank you for selecting an IBM IntelliStation E Pro computer. Your computer incorporates many of the latest advances in computing technology and can be expanded and upgraded as your needs change.

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

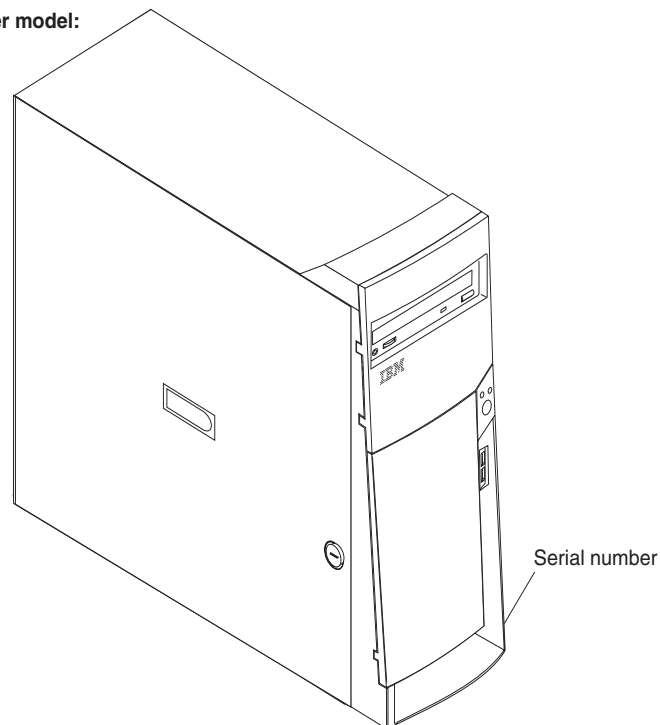
Refer to the following illustrations for the location of the computer model and serial number labels. You will need these numbers to register your computer with IBM.

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

Desktop model:



Tower model:



Features and specifications for the desktop model

The following table provides a summary of the features and specifications. Some features and specifications are not available on all models.

<p>Microprocessor: Intel® Pentium® 4 with 256 KB or 512 KB Level-2 cache</p> <p>Memory:</p> <ul style="list-style-type: none"> • Minimum: 128 MB • Maximum: 1.0 GB • Type: PC133 error-correcting code (ECC) DIMMs • Slots: three dual inline (two slots supported) <p>Internal drives:</p> <ul style="list-style-type: none"> • Hard disk drive: IDE or SCSI • One of the following: <ul style="list-style-type: none"> — CD-ROM: IDE — DVD-ROM: IDE — CD-RW: IDE <p>Expansion bays:</p> <ul style="list-style-type: none"> • Two 5.25-in. bays (one CD-ROM drive installed, one hard disk drive installed) • One 3.5-in. bay (one diskette drive installed) <p>PCI expansion slots: Three 33 MHz/32-bit low-profile slots on the system board</p> <p>Power supply: 160 watt (90-240 V ac)</p> <p>Video adapters:</p> <ul style="list-style-type: none"> • NVIDIA Quadro2 EX AGP adapter with 32 MB video memory • Matrox Millennium G450 (DVI-I) with 32 MB DDR SDRAM video memory and a single DVI-I or dual analog connector • NVIDIA Quadro4 200NVS (LFH-60) with 64 MB SDR SDRAM video memory and dual analog connectors (or dual digital monitor capability with the purchase of an additional pig-tail cable) 	<p>Size and weight:</p> <ul style="list-style-type: none"> • Height: 104 mm (4.1 in.) • Depth: 412 mm (16.2 in.) • Width: 360 mm (14.2 in.) • Weight: approximately 9.1 kg (20 lb) when fully configured or 6.8 kg (15.0 lb) minimum <p>Integrated functions:</p> <ul style="list-style-type: none"> • 10BASE-T/100BASE-TX Ethernet controller on the system board with RJ-45 Ethernet port • Two serial ports • One parallel port • Four USB ports (two front, two rear) • Keyboard port • Mouse port • Audio ports <ul style="list-style-type: none"> — Line out — Line in — Mic • Dual-channel bus mastering IDE controller <p>Acoustical noise emissions:</p> <ul style="list-style-type: none"> • Sound power, idling: 5.1 bel maximum • Sound power, operating: 5.2 bel maximum 	<p>Environment:</p> <ul style="list-style-type: none"> • Air temperature: <ul style="list-style-type: none"> — Computer on: 10° to 35° C (50.0° to 95.0° F). Altitude: 0 to 2133 m (6998.0 ft) — Computer off: 10° to 43° C (50.0° to 109.4° F). Maximum altitude: 2133 m (6998.0 ft) • Humidity: <ul style="list-style-type: none"> — Computer on: 8% to 80% — Computer off: 8% to 80% <p>Heat output: Approximate heat output in British thermal units (Btu) per hour</p> <ul style="list-style-type: none"> • Minimum configuration: 257 Btu (75 watts) • Maximum configuration: 686 Btu (200 watts) <p>Electrical input:</p> <ul style="list-style-type: none"> • Sine-wave input (50-60 Hz) required • Input voltage low range: <ul style="list-style-type: none"> — Minimum: 90 V ac — Maximum: 137 V ac • Input voltage high range: <ul style="list-style-type: none"> — Minimum: 180 V ac — Maximum: 265 V ac • Input kilovolt-amperes (kVA) approximately: <ul style="list-style-type: none"> — Minimum: 0.08 kVA — Maximum: 0.52 kVA
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Features and specifications for the tower model

The following table provides a summary of the features and specifications. Some features and specifications are not available on all models.

<p>Microprocessor:</p> <ul style="list-style-type: none"> Intel Pentium 4 with 256 KB or 512 KB Level-2 cache <p>Memory:</p> <ul style="list-style-type: none"> Minimum: 128 MB Maximum: 1.5 GB Type: PC133 error-correcting code (ECC) DIMMs Slots: three dual inline <p>Internal drives:</p> <ul style="list-style-type: none"> Hard disk drive: IDE or SCSI One of the following: <ul style="list-style-type: none"> CD-ROM: IDE DVD-ROM: IDE CD-RW: IDE <p>Expansion bays:</p> <ul style="list-style-type: none"> Two 5.25-in. bays (1 CD-ROM drive installed) Five 3.5-in. bays (1 diskette drive installed) <p>PCI expansion slots:</p> <ul style="list-style-type: none"> Three 33 MHz/32-bit slots on the system board Two 33 MHz/32-bit slots on the adapter extender card <p>Power supply:</p> <p>340 watt (90-240 V ac)</p>	<p>Video adapter: (depending on your model)</p> <ul style="list-style-type: none"> Matrox G450 AGP adapter with 16 MB SDRAM video memory Matrox Millennium G450 (DVI-I) with 32 MB DDR SDRAM video memory and a single DVI-I or dual analog connector NVIDIA Quadro2 Pro AGP adapter with 64 MB SDRAM video memory NVIDIA Quadro4 200NVS (LFH-60) with 64 MB SDR SDRAM video memory and dual analog connectors (or dual digital monitor capability with the purchase of an additional pig-tail cable) ATI Fire GL8800 (DVI-I and VGA) with 128 MB DDR SGRAM video memory with one analog and one DVI-I connector <p>Size and weight:</p> <ul style="list-style-type: none"> Height: 445 mm (17.5 in.) Depth: 498 mm (19.6 in.) Width: 165 mm (6.5 in.) Weight: approximately 19.5 kg (43 lb) when fully configured or 15.9 kg (35 lb) minimum <p>Integrated functions:</p> <ul style="list-style-type: none"> 10BASE-T/100BASE-TX Ethernet controller on the system board with RJ-45 Ethernet port Two serial ports One parallel port Four USB ports (two front, two rear) Keyboard port Mouse port Audio ports <ul style="list-style-type: none"> Line out Line in Mic Dual-channel bus mastering IDE controller 	<p>Acoustical noise emissions:</p> <ul style="list-style-type: none"> Sound power, idling: 5.1 bel maximum Sound power, operating: 5.2 bel maximum <p>Environment:</p> <ul style="list-style-type: none"> Air temperature: <ul style="list-style-type: none"> Computer on: 10° to 35° C (50.0° to 95.0° F). Altitude: 0 to 2133 m (6998.0.7 ft) Computer off: 10° to 43° C (50.0° to 109.4° F). Maximum altitude: 2133 m (6998.0 ft) Humidity: <ul style="list-style-type: none"> Computer on: 8% to 80% Computer off: 8% to 80% <p>Heat output:</p> <p>Approximate heat output in British thermal units (Btu) per hour</p> <ul style="list-style-type: none"> Minimum configuration: 257 Btu (75 watts) Maximum configuration: 1455 Btu (425 watts) <p>Electrical input:</p> <ul style="list-style-type: none"> Sine-wave input (50-60 Hz) required Input voltage low range: <ul style="list-style-type: none"> Minimum: 90 V ac Maximum: 137 V ac Input voltage high range: <ul style="list-style-type: none"> Minimum: 180 V ac Maximum: 265 V ac Input kilovolt-amperes (kVA) approximately: <ul style="list-style-type: none"> Minimum: 0.08 kVA Maximum: 0.52 kVA
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Inventory checklist

Take an inventory of items as you unpack them to ensure that you have all of the components. If any items are missing or damaged, contact your place of purchase. The following is a list of items shipped with your IBM IntelliStation E Pro computer:

- One keyboard
- One mouse
- One power cord (9-ft line cord)
- One compact disc with device drivers
- This *User's Guide*

Software

Your IBM IntelliStation E Pro computer comes with either Microsoft® Windows® 2000 Professional Workstation¹ or Windows XP® Professional preinstalled and a variety of software, including application programs, diagnostic tools, and device drivers. Some software is preinstalled on your computer, and some software is on the *Software Selections* CD and on the *Device Drivers and IBM Enhanced Diagnostics* CD that come with your computer.

Important

The software, other than the Microsoft operating system, is licensed under the terms of the *IBM International License Agreement for Non-Warranted Programs*. Use of your computer signifies acceptance of this license agreement. For detailed instructions about viewing the license agreement, see Appendix D, "Viewing the license agreement," on page 123.

Preinstalled software

In addition to the Microsoft operating system, your preinstalled software includes the following programs:

- **Access IBM** provides links to selected IBM Web sites and the IBM Assistant, a help system for many tasks. Access IBM also provides shortcuts to help accomplish many of these tasks. Double-click the Access IBM icon on the desktop to display the Access IBM menu. If this icon is not on your desktop, find Access IBM in the **Start** menu.
- **Adobe Acrobat Reader** is used to display portable document format (PDF) files. You can download the most current versions of Adobe Acrobat Reader for other languages and operating systems from the Adobe Web site at <http://www.adobe.com> on the World Wide Web.
- **ConfigSafe** is a comprehensive configuration tracking and recovery tool. It provides features that you can use to restore your system if your computer becomes damaged, unusable, or unstartable.
- **IBM Backup and Restore** provides a link to the Web site from which you can download the IBM Backup and Restore program. The program creates and stores a backup image of the primary partition (drive C) of your hard disk drive. You can recover this backup image in the event that drive C becomes damaged or unusable.

¹The Microsoft Certificate of Authenticity is your assurance that the Windows software in your computer is legally licensed from Microsoft Corporation.

- **IBM Product Registration** program can be used to register your computer with IBM. When you register your computer with IBM, information is entered into an IBM database, which enables IBM to contact you in case of a recall or other severe problem. In addition, some locations offer extended privileges and services to registered users.
- **Online Books** enables you to access documentation that contains detailed information about your computer.
- **PC-Doctor for Windows** is a program to help you locate and resolve some problems that might occur with your computer.
- **Device drivers** for factory-installed features are preinstalled on your computer. The latest device drivers are also available at <http://www.ibm.com/pc/support> on the World Wide Web.
- **Product Recovery Program** enables you to recover your operating system, applications, and device drivers, if necessary.

Important

The Product Recovery Program is on a hidden, hard disk drive partition. Do not delete or otherwise destroy this partition.

You must have Internet access to use some of these programs. For more information about connecting to the Internet, refer to the operating system documentation that comes with your computer.

See Chapter 3, “Operating your computer,” on page 19 for additional information about your preinstalled software. For more information about using the recovery programs and solving problems, see Chapter 6, “Solving problems,” on page 81.

Important:

1. You can reinstall the device drivers and applications that come with your computer from the directories on your hard disk drive. For more information about recovering your computer software, see “Recovering your operating system and preinstalled software” on page 104.
2. The device drivers and some programs are also available at <http://www.ibm.com/pc/support> on the World Wide Web and on the *Device Drivers and IBM Enhanced Diagnostics* CD.

Software Selections CD

The *Software Selections* CD contains application programs and support software for use with your computer, such as:

- IBM Update Connector™ is used to download software programs and software updates from the IBM Web site. Update Connector can automatically determine when your computer needs available updates and can install them at your option.
- Norton AntiVirus for IBM is used to detect and remove viruses from your computer.
- Tivoli® Management Agent can be used by a network administrator to gather information about your computer and monitor its operation.
- IBM Universal Manageability (UM) Services streamline and automate personal computer (PC) systems management and support tasks, such as asset deployment and tracking.

Device Driver and IBM Enhanced Diagnostics CD

The diagnostic test programs are stored on the *Device Drivers and IBM Enhanced Diagnostics* CD. These programs provide the primary methods of testing system components. Some of the preinstalled device drivers are also stored on this CD.

Other software

Lotus SmartSuite contains a package of powerful, award-winning productivity applications and everything you need to access the Internet. Your computer comes with either a Lotus SmartSuite CD or a proof of entitlement to receive one free CD-ROM version of Lotus SmartSuite. To install your SmartSuite package, insert the Lotus SmartSuite CD into your CD-ROM drive, or contact your network administrator for assistance.

What your computer offers

Your computer takes advantage of advancements in data storage, memory, systems management, and network environments. Your computer includes:

- High performance accelerated graphics port (AGP) graphics
Your computer comes with an AGP graphics adapter installed. This high-performance adapter supports high resolutions and includes many performance-enhancing features for your operating-system environment.
- Large system memory
Depending on the model, your computer supports a maximum of either 1.0 GB or 1.5 GB of system memory. The memory controller provides error code correction (ECC) support for up to three industry-standard PC133, 3.3V, 168-pin, 133 Megahertz (MHz), unregistered, synchronous dynamic random access memory (SDRAM) dual inline memory modules (DIMMs).
- Systems-management capabilities
Your computer comes with features that a network administrator or file server can use to remotely manage and control your computer. Some of the features include: Wake on LAN[®], Remote Administration, and System Migration Assistant. See “Managing your computer on a network” on page 21 for more information.
- Integrated network environment support
Your computer comes with an Ethernet controller on the system board. This Ethernet controller has an interface for connecting to 10-Mbps or 100-Mbps networks. The computer automatically selects between 10BASE-T and 100BASE-TX environments. The controller provides full-duplex (FDX) capability, which enables simultaneous transmission and reception of data on the Ethernet local area network (LAN).

Reliability, availability, and serviceability features

Three important computer design features are reliability, availability, and serviceability (RAS). The RAS features help to ensure the integrity of the data that is stored on your computer, the availability of the computer when you need it, and the ease with which you can diagnose and repair problems.

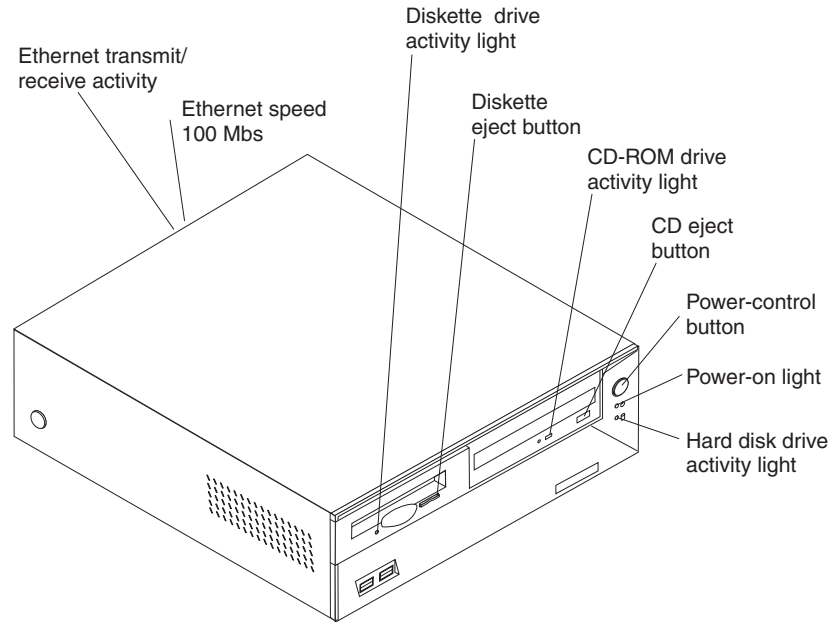
The following is an abbreviated list of the RAS features that your computer supports. Many of these features are explained in later chapters of this publication.

- Reliability features
 - Boot block recovery
 - Cooling fans with speed-sensing capability
 - Error code correction (ECC) front-side buses (FSBs)
 - ECC L2 cache and system memory
 - Parity checking on the small computer system interface (SCSI) bus
 - Advanced configuration and power interface (ACPI)
 - Power-on self-test (POST)
 - Synchronous dynamic random access memory (SDRAM) with serial presence detect (SPD)
- Availability features
 - Advanced Desktop Management Interface (DMI) features
 - Auto-restart initial program load (IPL) power supply
 - Automatic error retry or recovery
 - Automatic computer restart after power failure
 - Built-in, menu-driven configuration and setup programs
 - Built-in, menu-driven SCSI configuration programs (some models)
 - Monitoring support for temperatures, voltages, and fan speed
 - Upgradable basic input/output system (BIOS), diagnostics, and POST
 - Wake on LAN (WOL) capability
- Serviceability features
 - 24 hours a day, 7 days a week Customer support
 - 3-year warranty
 - Adaptec built-in self-test (BIST)
 - Preinstalled Ethernet adapter
 - CD-ROM-based diagnostics programs
 - Diagnostic support of Ethernet adapters
 - Error codes and messages
 - Processor serial number access
 - Read-only memory (ROM) checksums
 - Vital product data (VPD); includes serial number information and replacement part numbers, stored in nonvolatile memory, for easier remote maintenance

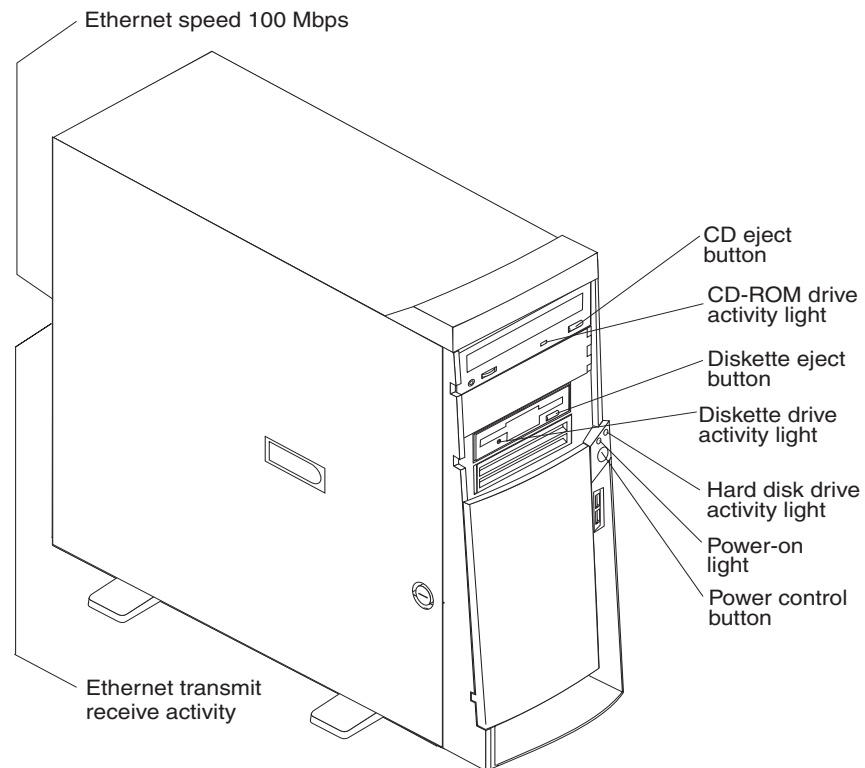
Computer controls and indicators

This section identifies the controls and indicators of the tower and desktop models.

Note: Some models come with a DVD-ROM or a CD-RW. If so, the control buttons and indicator lights might be in a different location than shown here.



Note: The front bezel door is not shown here so that the drive bays are visible.



CD-ROM drive eject button: opens and closes the CD tray.

CD-ROM drive activity light: indicates when the CD-ROM drive is in use.

Diskette drive activity light: indicates when the diskette drive is in use.

Diskette drive eject button: releases a diskette from the drive.

Ethernet speed 100 Mbps: when this light is on, the Ethernet speed is 100 Mbps. When this light is off, the Ethernet speed is 10 Mbps.

Ethernet transmit/receive activity: when this light is on, there is activity between the computer and the network.

Power-control button: enables you to turn the computer on or off manually.

Power-on light: indicates when your computer is turned on.

Hard disk drive activity light: indicates when the hard disk drive is in use.

Chapter 2. Setting up your computer

This chapter provides information about setting up your computer and preparing it to run your applications.

Read the “Safety information” on page vii before setting up your computer.

You will need the following items:

- 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.

Selecting a location for your computer

Make sure you have an adequate number of properly grounded electrical outlets for the computer, monitor, and any other devices. Select a location for the computer where it will remain dry. Leave about 50 mm (2 in.) of space around the computer for proper air circulation. For information on arranging your computer and ease-of-use, see the following sections.

Arranging your workspace

To get the most from your computer, arrange both 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 can also affect the way you arrange your workspace.

Comfort

The following guidelines will help you decide what working position suits you best.

Choose a chair to reduce fatigue from sitting in the same position for long periods. 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. 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 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 lighting changes throughout the day.

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

Dust compounds problems associated with glare. 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 fan pulls in fresh air and forces out hot air. The monitor lets hot air escape through vents. Blocking the air vents can cause overheating, possibly resulting in 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 device power cords and cables might determine the final placement of your computer.

When arranging your work space:

- 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 accidentally dislodged.

For more information about power cords, see “Power cords” on page 138.

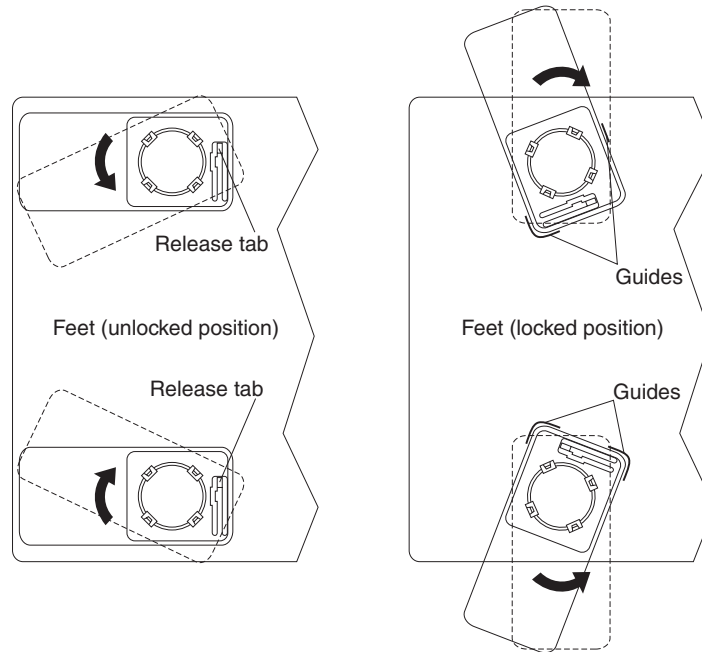
Moving the stabilizing feet

The four feet attached to the bottom of the tower model computer provide additional stability when the feet are placed in the stabilizing position.

Complete the following steps to place the feet in the stabilizing position.

1. Place the computer on its side.
2. Locate the release tab inside a foot; then, lift up on the tab.
3. Rotate the foot inward to the unlocked position; then, remove the foot from the computer.
4. Align the post in the center of the foot with the hole on the bottom of the computer and place the foot between the guides indicated on the computer.

5. Rotate the foot outward until the foot locks into place.



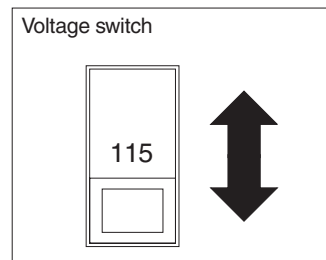
6. Complete steps 2 on page 12 through 5. for each foot.

Note: When you need to access the inside of the computer to install options, you might find it easier to lay the computer on its side. If you do so, make sure that the feet are in the non-stabilizing position. Otherwise, the feet might break off the computer because of the weight of the computer.

Setting the voltage-selection switch

If you have a desktop model, check the position of the voltage-selection switch located beside the power cord connector. Use a ballpoint pen to slide the switch, if necessary.

- If the voltage supply range in your location is 90-137 V ac, set the switch to 115 V.
- If the voltage supply range in your location is 180-265 V ac, set the switch to 230 V.

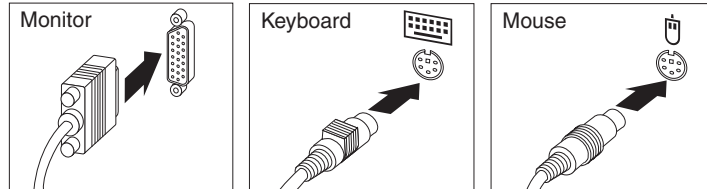


Connecting computer cables

Use the following steps to set up your computer. Look for the small icons on the following pages, and on the back of your computer.

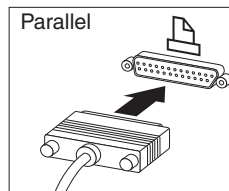
Your computer connector panel has color-coded connectors. If the cables use the color-code conventions on your computer, match the color of the cable end with the color of the connector. For example, match a blue cable end with a blue panel connector, a red cable end with a red panel connector, and so on.

1. Connect the monitor cable to the monitor connector. Tighten the screws; then, connect the keyboard cable to the keyboard connector, and connect the mouse cable to the mouse connector.

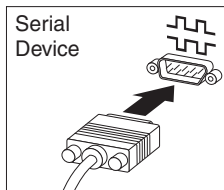


2. Connect any additional devices you have.

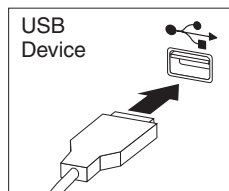
- Connect a printer or parallel device to the parallel connector.



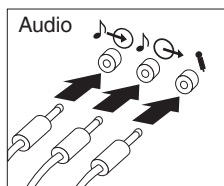
- Connect a serial device or external modem to the serial connector.



- Connect Universal Serial Bus (USB) devices to either of the USB connectors.



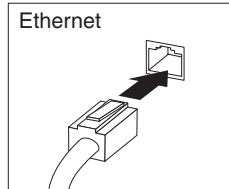
- Connect optional devices, such as speakers, microphones, or headphones, for models with an audio device. From left to right or top to bottom, depending on your model, the audio connectors are Line in, Line out, and Mic.



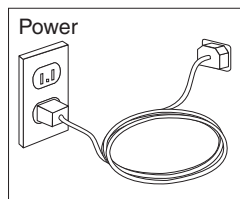
- Connect the Ethernet cable to the RJ-45 Ethernet connector.

Important:

To operate the computer within FCC Class A limits, use a category 5 Ethernet cable.



3. Connect the power cord to the power connector located on the rear of the computer. If there is a label covering the power connector, remove it.



4. Connect the power cords into properly grounded electrical outlets.

Note: When the power cord is first plugged in, the computer might turn on for a few seconds, then turn off. This is normal.

Recording important numbers

Locate the serial, model, and type numbers. Record this information in Appendix C, "Computer records," on page 121. You will need these numbers when communicating with IBM about your computer.

Running the operating system setup program

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

Important information to know before you start:

- The setup program might be slightly different from the one described in your operating-system manual. Some choices do not appear because they are preset.
- During the setup procedure, you must indicate that you accept the license agreement.
- The Microsoft registration information will already be displayed in the registration field. If the Product ID number is not already displayed, you must type it. The Product ID is on a label attached to the computer.

To complete the setup program, you will need the following information.

- The Microsoft documentation that comes with your computer.
- Network information (if applicable) from your network administrator.

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

Important

After turning on your computer for the first time, you must complete the operating system setup procedure before turning off your computer; otherwise, unexpected results might occur.

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

Registering your computer

Registering your computer helps IBM provide better service to you. When IBM receives your registration information, it is placed into a central technical support database. If you need technical assistance, the technical support representative will have information about your computer. In addition, comments about your computer are reviewed by a team dedicated to customer satisfaction and are taken into consideration in making improvements to IBM computers. To register your computer, use one of the following methods:

- Register through Access IBM. In Access IBM, click **Get started**. Click **Registering your IBM Computer**, and then follow the instructions in the window. (See “Using Access IBM” for further information.)
- If you have Windows 2000 Professional Workstation, click the **IBM Register** icon on the desktop and follow the directions.
- Register your computer at <http://www.ibm.com/pc/register> on the World Wide Web.

Note: The Register program that starts through Access IBM or the IBM Registration icon will enable you to print the registration information and provide a mailing address in the event no Internet access is available.

Using Access IBM

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

The choices available from the Access IBM main menu are as follows:

- **About your computer**

Select this choice to display information about tasks that are typically performed immediately after installing a new computer, personalizing your computer to fit your needs, protecting your data, upgrading your computer hardware, purchasing IBM services, purchasing IBM options, solving problems, and viewing the IBM International License Agreement.

- **Tools & Tips**

Select this choice to display information about access support, diagnostic programs, data backup and recovery tools, AntiVirus tools, data transfer tools, configuration backup and restoration tools, and online books.

- **On the Web**

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

Complete the following steps to use Access IBM.

1. Double-click the **Access IBM** icon on the Windows desktop. If the **Access IBM** icon is not available on your desktop, click **Start** → **Programs** → **Access IBM**.
2. Click one of the categories listed on the menu (for example, Get Started).
3. Click a topic.

Installing other operating systems

Your computer comes with Microsoft Windows 2000 or Microsoft Windows XP preinstalled.

To install another operating system, follow the instructions in the documentation provided with the operating system and any updates. Then, follow the instructions in the README file on the *Device Driver and IBM Enhanced Diagnostics* CD to install the support software.

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

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

Additional information about operating systems is posted periodically at <http://www.ibm.com/pc/support> on the World Wide Web.

Product Recovery Program

The Product Recovery Program reinstalls your computer operating system and preinstalled software. It is on the hidden partition on the hard disk. The Product Recovery Program runs independently of the operating system.

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

If your hard disk drive, including the partition where the Product Recovery Program resides, becomes damaged or you replace the hard disk drive, contact IBM to order the *IBM Product Recovery* CD to recover your preinstalled operating system, application programs and device drivers. See "Getting information, help, and service" on page 110 for details.

Creating emergency diskettes

At your earliest opportunity, create a Recovery Repair diskette, a Norton AntiVirus Rescue diskette, and an IBM Enhanced Diagnostics diskette, and store them in a safe place. Use the following sections to help you create a Recovery Repair diskette and a Norton AntiVirus Rescue diskette. See "Creating an IBM Enhanced Diagnostics diskette" on page 85 for information on how to create an IBM Enhanced Diagnostics diskette.

Creating a Recovery Repair diskette

In the unlikely event that your desktop becomes unusable, the Recovery Repair diskette will enable you to access the Product Recovery Program. Additional information about the diskette is in Access IBM. For more information about using this diskette, refer to “Using the Recovery Repair diskette” on page 105.

Do the following to create the Recovery Repair diskette:

1. From the Access IBM menu, click **Protect data**.
2. Click **Creating emergency diskettes**.
3. Click **Recovery Repair diskette**.
4. Follow the instructions on the screen.

Creating a Norton AntiVirus Rescue diskette

The Norton AntiVirus program periodically checks your drives for computer viruses. Additional information about creating and using the diskette is in Access IBM.

Do the following to create the Norton AntiVirus Rescue diskettes:

1. From the Access IBM menu, click **Protect data**.
2. Click **Creating emergency diskettes**.
3. Click **Norton AntiVirus Rescue Disks**.
4. Follow the instructions on the screen.

Chapter 3. Operating your computer

This chapter provides information for the day-to-day use of your computer.

Turning on your computer

Do the following to start your computer:

1. Turn on all peripheral devices first.
2. Press the power-control button on your computer. For the location of the power-control button, see “Computer controls and indicators” on page 8.

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

If power-on self-test (POST) detects a problem, there might be a series of beeps or no beep, and a numeric error message might appear on the screen. Write down any beep series and error code numbers with descriptions, then see “Troubleshooting charts” on page 90 for the explanation of error codes.

During startup, the following messages might be displayed briefly:

- To start the Product Recovery Program, Press F11
- Hit <F2> if you want to run SETUP
- Press CTRL+A for SCSISelect Utility (some models only)

To use these features, press the appropriate function key or keys quickly. The messages appear for only seconds. For more information about these messages, see “Using the IBM Setup Utility program” on page 27 and “Using the SCSISelect Utility program (some models)” on page 32.

During startup, you might not see Hit <F2> if you want to run SETUP. If you want to see the prompt, see instructions for displaying the prompt in “Using the IBM Setup Utility program” on page 27.

The IBM Setup Utility program will help you configure your computer with passwords, PCI adapter configuration, and other options. The IBM Setup Utility menu is displayed at the top of the screen. To navigate the menu and screen items, follow the directions on the right of the screen.

The operating system and application programs initiate from the hard disk drive. If your computer is attached to a network, the computer will begin attaching to any LANs and remote applications to which you have access. A network administrator can also “wake up” your computer (start it remotely) to download programs or gather information about computer performance. For more information see, “Wake on LAN” on page 21.

Using video features

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

Video device drivers

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

Device drivers for the graphics adapter and a README file with instructions for installing the device drivers are provided on the *Device Driver and IBM Enhanced Diagnostics* CD that comes with your computer and in the IBMTOOLS\DRIVERS directory on the hard disk drive.

You can use the device driver installation instructions if you need to reinstall the device drivers or if you need information on obtaining and installing updated device drivers. For more information about installing device drivers, see “Recovering or installing device drivers” on page 104.

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 README files on the *Device Driver and IBM Enhanced Diagnostics* CD or on the hard disk drive in the drivers directory that comes with your computer. See your operating system documentation for more information on monitor settings.

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

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

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

If you have a dual-monitor video adapter and you connect both monitors, you will be prompted at the first startup afterwards to enable the Multi-head option, which enables you to use both monitors. Click **Yes** to enable the option and use both monitors.

Note: If you click **No** at the prompt, but want to use both monitors, you will need to enable the multi-head option through the video adapter settings. For the Matrox Millennium G450 video adapter, for example, you can enable the option using the following procedure:

- If you have Windows 2000:
 1. Right-click the Matrox PowerDesk icon on the right-hand portion of the Windows 2000 task bar, and select **Display properties**.
 2. Click **Settings** → **Advanced** → **Dualhead** → **Enable dualhead** → **Apply**.
 3. If asked if you would like to keep this setting, click **Yes**.

- If you have Windows XP Professional:
 1. Click **Settings** → **Start** → **Control Panel** → **Appearance and Themes** → **Display**.
 2. Click **Advanced** → **Dualhead** → **Enable dualhead** → **Apply**.
 3. If asked if you would like to keep this setting, click **Yes**.

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 to enhance multimedia applications. Optionally, you can connect two stereo speakers to the Line out connector to enjoy improved sound with multimedia applications.

The audio connectors in your computer are 3.5 mm (0.125-in.) mini-jacks. For the location of the audio connectors, refer to “Input/output connectors” on page 75.

Line in

This connector accepts external devices, such as line output from a stereo, television, or a musical instrument.

Line out

This connector is used to send audio signals from the computer to external devices, such as speakers, headphones, or the audio line-in jack on a stereo system.

Note: The internal speaker on the computer is disabled when any devices are attached to this connector.

Microphone

This connector accepts a microphone to record voice or other sounds on the hard disk. With a microphone attached, you can also use speech recognition software.

Managing your computer on a network

Your computer comes with features that a network administrator or file server can use to remotely manage and control your computer. The following sections describe some of these network management tools.

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

Go to <http://www.ibm.com/pc/us/software/sysmgmt/> on the World Wide Web for more information about available system management programs.

Wake on LAN

A network administrator can use the Wake on LAN™ feature to turn on your computer from a remote location. When the Wake on LAN feature is used with network

management software, many functions, such as data transfers, software updates, and POST or BIOS updates can be performed on many computers simultaneously.

Intel Boot Agent

The Intel Boot Agent is a software program that enables your computer to startup using a program code image supplied by a remote server. The features of Intel Boot Agent are as follows:

- Compliant with the Wired for Management Baseline 2.0 (WfM 2.0)
- Incorporates the software defined in the PXE Boot Agent specification
- Includes support for Remote Program Load (RPL) runtime and loader software (10/100 adapters only)
- Compatible with legacy boot agent environments that use BOOTP protocol
- Supported by remote installation programs such as LCCM and Microsoft RIS

For information about configuring the Intel Boot Agent, see “Using the Intel Boot Agent Utility program” on page 33.

LANClient Control Manager (LCCM)

LANClient Control Manager (LCCM) is a graphical, server-based program that performs mass unattended installations of operating systems, software, device drivers, and BIOS code updates to remote systems. Used with the Wake on LAN feature, LCCM can remotely turn on your computer, so that the installation can be done while the computer is not being used.

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

System Migration Assistant

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

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

Desktop Management Interface

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

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

Important

Record the key-code number along with the manufacturer address and phone number in the space provided in “Appendix C. Computer Records”. Because locksmiths are not authorized to duplicate cover-lock keys, you must order replacement keys from the key manufacturer. You will need the key code when ordering replacement keys.

You can also set the chassis-intrusion detector switch inside the computer to alert the network system administrator each time the computer cover is removed. For more information about setting the chassis-intrusion alert, see Chapter 4, “Configuring your computer,” on page 27.

Component protection

Your computer has individual component serial numbers that can be registered with a third-party security company. You can also register the entire system. By registering computer components, you can improve the chances of identifying the components if they are ever stolen and recovered. For more information about component registration, see the IBM support page at <http://www.ibm.com/pc/us/desktop/assetid/> on the World Wide Web.

Data protection

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

SMART hard disk drive

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

SMART Reaction

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

Virus protection

Your computer has built-in virus protection that can be enabled through the IBM Setup Utility program. This built-in protection checks for viruses in only the boot record. Also, Norton AntiVirus for IBM is installed on the hard disk and on the IBM *Software Selections* CD.

Locking the keyboard

You can lock the keyboard so that others are unable to use it. If a user password is set using the IBM Setup Utility program, the keyboard is locked when you turn on the computer. You must type the correct password before the keyboard will unlock. See *Setting Security Passwords in Access IBM* or “Security” on page 29.

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

Shutting down your operating system

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

If you have Windows 2000, do the following to shut down your computer:

1. Save and close all files with which you are working.
2. Close all open applications.
3. Click the Windows **Start** button.
4. Click **Shut Down**; then click **OK** to confirm.

If you have Windows XP Professional, do the following to shut down your computer:

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

Turning off your computer

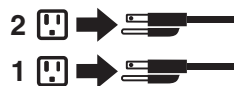
You can turn off your computer as follows:

Statement 5



CAUTION:

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



- Press the power control button on the front of the computer. This starts orderly shutdown of the operating system, if this feature is supported by your operating system, and places the computer in standby mode.
Note: After you turn off the computer, wait at least 5 seconds before you press the power control button to turn on the computer again.
- Press and hold the power control button for more than 4 seconds to cause an immediate shutdown of the computer and place the computer in standby mode. You can use this feature if the operating system stops functioning.
- If you cannot use the power control button to turn off your computer, disconnect the computer power cords from the electrical outlets.

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

Important

In some circumstances, your computer might not turn off immediately when you press the power control button. If this happens, press and hold the power-control button until the computer turns off.

Chapter 4. Configuring your computer

The following configuration programs are available to configure your computer:

- **IBM Setup Utility program**

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

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

The Intel Boot Agent Utility program is part of the BIOS code that comes with your computer. You can use this program to change network startup protocols and startup order and to set menu wait times.

Using the IBM Setup Utility program

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

Starting the IBM Setup Utility program

The IBM Setup Utility program starts automatically when POST detects that newly installed or removed hardware is not reflected in your current configuration. A diagnostic error message is displayed. See “Power-on self-test (POST)” on page 83 for details about POST and “Diagnostic error message tables” on page 87 for information about the error messages.

To start the IBM Setup Utility program:

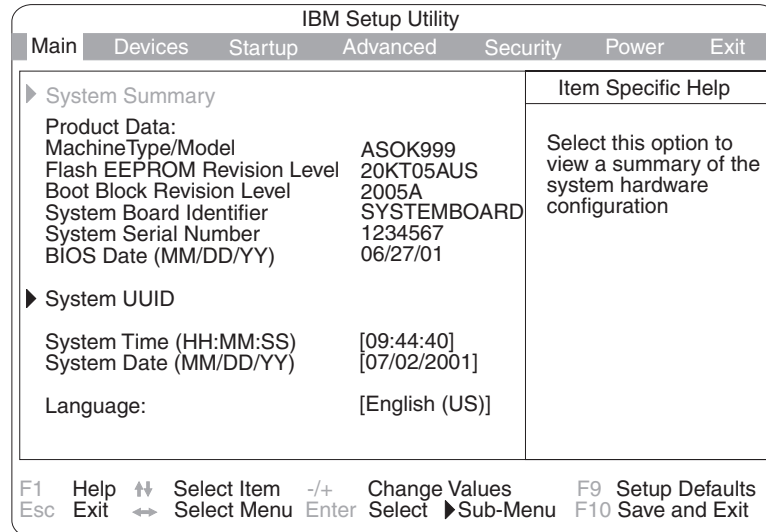
1. Turn on the computer and watch the monitor screen. If your computer is already on when you start this procedure, you must shut down the operating system, turn off the computer, wait a few seconds until all in-use lights go off, and restart the computer. (Do not use Ctrl+Alt+Del to restart the computer.)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

Note: If you have set both user and administrator passwords, you must type the administrator password to access the full IBM Setup Utility menu.
3. Follow the instructions that appear on the screen.

Use the left and right arrow keys to select menu choices on the menu bar at the top of the screen. To change a setting on an item, select the item, and press Enter to activate a setting selection dialogue box. Use the up and down arrow keys to select the desired setting, and press Enter again.

IBM Setup Utility main menu choices

The IBM Setup Utility main menu appears at the top of the IBM Setup Utility program screen. Using the items of this menu, you can select settings that you want to change. Item specific Help information for each menu item appears on the right hand side of the IBM Setup Utility program screen. Select the item to view this information. The choices on some menus might differ slightly, depending on the BIOS version on your computer.



The following sections provide descriptions of the main menu choices.

Main

This choice is automatically selected when the IBM Setup Utility program starts. Here, you can view general information about your computer, such as a summary of components and computer configuration.

The type and speed of the microprocessor, the amount of memory that is installed, the machine type and model number, the computer serial number, and the revision level or issue date of the BIOS code that is stored in the flash electronically erasable programmable ROM (EEPROM), appears under System Summary on this menu choice. You can also view the language that your computer is set to display.

Changes that you make to configuration settings appear on this summary screen. You cannot edit the fields of the configuration and system information, but you can set the system date and time. The system time is in a 24-hour format: hour:minute:second.

Devices

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

PS/2 Mouse: Select this choice to set whether a PS/2 pointing device is installed.

Diskette Drive A: Select this choice to set the type of diskette drive installed in your computer. You can disable the diskette drive, or you can enable various types of diskette drives.

Serial Port Setup: Select this choice to configure your computer serial ports. If the port is set to Enabled, you can set the base input/output (I/O) address and the interrupt. If the port is set to Automatic, the operating system automatically configures these settings.

USB Setup: Select this choice to configure the USB ports in your computer. The USB Support setting can be Enabled or Disabled. USB device support determines whether BIOS support for USB devices will be enabled when you startup the computer.

Parallel Port Setup: Select this choice to configure the parallel port of your computer. If the port is set to Enabled, you can set the base input/output (I/O) address, the interrupt, and the direct memory address (DMA). If the port is set to Automatic, the operating system automatically configures these settings.

Video Setup: Select this choice to view the Video Setup menu. Select Active Video determines which video mode will be active when you startup your computer. You can select PCI, AGP, or Integrated in the menu. If the selected video is not available, the computer will select a default video.

IDE Drives Setup: Select this choice to view or change the settings for IDE drives 0, 1, 2, or 3. You can set each drive for Compatible or High Performance. If an IDE device attached to the system board IDE controller does not function properly or causes other IDE devices attached to the same controller to function improperly, set this field to the Compatible mode.

Audio Setup: Select this choice to enable or disable Audio Support.

Network Setup: Select this choice to set the system board Ethernet controller to Enabled or Disabled. You can also enable Intel Boot Agent and PXE base code. The menu also displays the MAC address for the computer.

Startup

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

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

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

You can enable a virus-detection test that checks for changes in the master boot record at startup.

Advanced

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

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

Security

This choice appears at the top of the IBM Setup Utility screen. Select this choice to set several security features, including adapter ROM security, security profile by device, remote administration, and password protection. When you select Set Passwords in the Security menu, you can implement either user password protection or administrator password protection.

Adapter ROM Security: Set the field for this choice to Yes to lock the keyboard during adapter ROM initialization. Use this setting with an administrator password to prevent the use of adapter ROM based utilities.

Security Profile by Device: Select this menu choice to control the level of security for bootable devices.

Remote Administration: Select this choice to enable Remote Administration and Network Boot Integrity Services (BIS) protocol. Enable Remote Administration to run utilities, such as the POST/BIOS Update Utility, without having to type an administrator password.

Select whether to use the network Boot Integrity Services (BIS) protocol prior to startup from the network. Before allowing a network startup, BIS ensures that the startup image is valid and is authorized for your computer.

Set Passwords: Select this choice to set user and administrator passwords and to set password protocols for updating the BIOS code and authorizing password changes.

User password: After you set a user password, you can enable the unattended-start mode. This locks the keyboard and mouse, but enables the computer to start the operating system. The keyboard and mouse remain locked until you type the correct password.

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

- If an administrator password is set, type the administrator password at the power-on prompt. Start the IBM Setup Utility program and change the user password.
- Change the position of the CMOS recovery jumper. See “Erasing a lost or forgotten password (clearing CMOS)” on page 106.
- Remove the battery and then install the battery.

Administrator password: Select this choice to set an administrator password. The administrator password provides access to all choices on the IBM Setup Utility main menu. You can set, change, or delete both the administrator and user passwords and enable a user to change the user password.

Attention: If you set an administrator password and then forget it, you cannot override or remove it. You must replace the system board.

The following table provides a summary of the password features.

Table 1. Power-on and administrator password features.

Type of password	Results
User password	<ul style="list-style-type: none"> • Type the password to complete the system startup. • A limited set of choices are available on the IBM Setup Utility main menu.
Administrator password	<ul style="list-style-type: none"> • No password is required to start the system. • Type the password to access the IBM Setup Utility program. • All choices are available on the IBM Setup Utility main menu.
Administrator <i>and</i> user password	<ul style="list-style-type: none"> • You can type either password to complete the system startup. • The administrator password provides access to all choices on the IBM Setup Utility main menu. You can set, change, or delete both the administrator and user passwords, and enable you to change the user password. • The user password provides access to a limited set of choices on the IBM Setup Utility main menu. This limited access might include changing or deleting the power-on password.

Power

Select this choice to enable or disable system power settings.

ACPI BIOS IRQ: This field controls what IRQ the Advanced Configuration and Power Interface (ACPI) uses.

ACPI Standby Mode: Select which power level your computer uses in standby mode. If S1 is selected, power is maintained to all devices, but all processor activity is halted. If S3 is selected, power is maintained only for the main memory. Exit from the S3 state might not be supported by all installed adapters.

APM BIOS Mode: This field controls the Advanced Power Management (APM) support to your operating system. Enable this setting when your operating system supports APM-enabled computers. When this option is set to disabled, all APM BIOS support is disabled.

Power Savings: Maximum power savings conserves the greatest amount of system power. Maximum performance conserves power but optimizes the performance of the computer. To alter these settings, choose Customized. To turn off power management, choose Disabled.

After Power Failure: This field controls whether the system will stay on after ac power is removed and then restored. Select Power On if you use a power strip to turn on the computer. Select Stay Off if you want the computer to remain off after power is restored. Select Last State to have the computer return to its previous state.

Low Power Entry and Exit Activity Monitor: Select this choice to set up the system activities that will be monitored for automatic power management.

Automatic Power On: Select this choice to control Automatic Power On when your computer is unattended. You can set the Wake on LAN feature, Serial Port A Ring Detect, PCI Modem Ring Detect, Wake Up on Alarm, and PCI Wakeup.

Exit

When you finish viewing or changing settings, select **Exit** from the menu bar at the top of the IBM Setup Utility screen, then select **Save and exit the Setup Utility** and press

Enter. If you do not want to save your changes, select **Exit the Setup Utility without saving** and press Enter.

If you want to save a change, but you do not want to leave the IBM Setup Utility program, select **Save Settings** and press Enter.

You can select Restore Settings to load previous values for all Setup items, or you can **Load Default Settings** for the computer.

Using the SCSISelect Utility program (some models)

SCSISelect is a built-in, menu-driven configuration utility program that you can use for models that come with a SCSI adapter to:

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

The following sections provide the instructions needed to start the SCSISelect Utility program and descriptions of the menu choices available.

Starting the SCSISelect Utility program

To start the SCSISelect utility program:

1. Turn on the computer.
2. When the <<< Press <CTRL><A> for SCSISelect™ Utility! >>> prompt appears, press Ctrl+A.
Note: If an administrator password has been set, a prompt appears asking you to type the password to start the SCSISelect Utility program.
3. When the Would you like to configure the host adapter or run the SCSI disk utility? question appears, make your selection and press Enter.
4. Use the arrow keys to select a choice from the menu.
 - Press Esc to return to the previous menu.
 - Press the F5 key to switch between color and monochrome modes (if your monitor permits).
5. Follow the instructions on the screen to change the settings of the selected items, and press Enter.

SCSISelect menu choices

The following choices appear on the SCSISelect Utility menu:

- **Configure/View Host Adapter Settings**
Select this choice to view or change the SCSI controller settings. To reset the SCSI controller to its default values, press F6; then, follow the instructions that appear on the screen.

You can view or change the following controller settings:

- **Host Adapter SCSI ID**
Select this choice to view the SCSI controller ID, normally 7.
- **SCSI Parity Checking**
Select this choice to view the assigned value of **Enabled**.
- **Host Adapter SCSI Termination**
Select this choice to view the assigned value of **Enabled**.
- **Boot Device Options**
Select this choice to configure startable device parameters. Before you can make updates, you must know the ID of the device for which you want to configure parameters.
- **SCSI Device Configuration**
Select this choice to configure SCSI device parameters. Before you can make updates, you must know the ID of the device whose parameters you want to configure.
Note: The Maximum Sync Transfer Rate represents the transfer rate for Ultra SCSI devices.
 - The transfer rate for Ultra3 SCSI LVD devices is 160 MBps
 - The transfer rate for Ultra2 SCSI LVD devices is 80 MBps
 - The transfer rate for Fast SCSI devices is 20 MBps
- **Advanced Configuration Options**
Select this choice to view or change the settings for advanced configuration options.
- **SCSI Disk Utilities**
Select this choice to view the SCSI IDs that are assigned to each device or to format a SCSI device.
To use the utility program, select a drive from the list. Read the screens carefully before making a selection.
Note: If you press Ctrl+A before the selected drives are ready, an Unexpected SCSI Command Failure screen might appear. Restart the computer and watch the SCSISelect messages as each drive spins up. After the drive that you want to view or format spins up, press Ctrl+A.

Using the Intel Boot Agent Utility program

The Intel Boot Agent Utility program is a built-in, menu-driven configuration utility program that you can use to customize the network and startup protocols of your computer through an operating system independent configuration program contained within the adapter flash ROM.

Attention: If you change the startup order using the Intel Boot Agent Utility program, startup sequence settings in the IBM Setup Utility program might not function properly.

Starting the Intel Boot Agent Utility program

To start the Intel Boot Agent Utility program:

1. Turn on the computer.
2. When the Initializing Intel (R) Boot Agent Version X.X.XX PXE 2.0 Build XXX (WfM 2.0) prompt appears, press Ctrl+S.
Note: By default, you will have 2 seconds after the prompt appears on the screen to press Ctrl+S.
3. Use the arrow keys or press Enter to select a choice from the menu.
 - Press Esc to return to the previous menu.
 - Press the F4 key to exit.
4. Follow the instructions on the screen to change the settings of the selected items, and then press Enter.

Intel Boot Agent Utility menu choices

The following choices appear on the Intel Boot Agent Utility menu:

- **Network Boot Protocol**
PXE is the default value for this menu item. Use this setting for WfM-compatible network management programs, such as Windows 2000 RIS, and Linux. Select RPL for legacy-style remote startup.
- **Boot Order**
Attention: If you change the startup order using the PXE Boot Agent Utility program, startup sequence settings in the IBM Setup Utility program might not function properly.
Select this choice to change the order in which startup devices are queried.
 - Try local drives first, and then network (default)
 - Try network only
 - Try local drives only
 - Try network first, then local drives**Note:** This option is not supported on this product. To change the startup order, use the IBM Setup Utility program. See “Starting the IBM Setup Utility program” on page 27 for more information.
- **Show Setup Prompt**
Select this choice to either display the PXE setup prompt or disable it. The default setting is **Disable**.
When this choice is enabled, Press Ctrl+S to enter the setup menu appears on the screen under the initializing prompt.
- **Setup Menu Wait Time**
Select this choice to set the amount of time (in seconds) that the system will pause during initialization for a Ctrl+S input.
 - 0 seconds
 - 2 seconds (default)
 - 3 seconds
 - 5 seconds
 - 8 seconds

- **Legacy OS wake up support**

Select this choice to enable or disable a non-Windows operating system to use the adapter remote wake up capability. The default setting is Disabled.

Notes:

1. Use the default setting for Advanced Configuration and Power Interface (ACPI) aware operating systems, such as Windows 2000 and Windows XP.
2. If your computer is running a non-ACPI operating system, you must set this selection to enable it to use the Wake-on-LAN support.
3. When using a non-ACPI operating system, do not send a wake up packet to the computer while it is turned on. If a wake up packet has been sent while the computer is on, you might be unable to turn the computer off. See “Troubleshooting charts” on page 90 for more information.

Chapter 5. Installing options

This chapter provides instructions to help you install or replace options on your computer. For a list of supported options for your computer, go to <http://www.ibm.com/pc/support> on the World Wide Web.

Before you begin

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

- Read the handling guidelines in “Handling static-sensitive devices”, and read the safety statements in “Safety information” on page vii. These guidelines will help you work safely with your computer and options.
- Make sure that you have an adequate number of properly grounded electrical outlets for your computer, monitor, and other options that you intend to install.
- Back up all important data before you make changes to disk drives.
- Have a small, flat-blade screwdriver available.
- Before accessing the inside of the tower model computer, rotate the two front stabilizing feet a quarter turn in towards the computer, so they do not break. Before placing the computer in an upright position, rotate the two front feet a quarter turn outward from the computer. See “Moving the stabilizing feet” on page 12.
- For a list of supported options for your computer, refer to <http://www.ibm.com/pc/support> on the World Wide Web.

System reliability considerations

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

- Each of the drive bays has a drive or a filler panel and electromagnetic compatibility (EMC) shield installed.
- There is adequate space around the computer to allow the computer cooling system to work properly. Leave approximately 51 mm (2 in.) of open space around the front and rear of the computer. Do not place objects in front of the fans.
- You have followed the instructions for cabling provided with optional adapters.
- You have replaced a failed fan as soon as possible.

Handling static-sensitive devices

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

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

- Limit your movement. Movement can cause static electricity to build up around you.
- Handle the device carefully, holding it by its edges or its frame.
- Do not touch solder joints, pins, or exposed circuitry.
- Do not leave the device where others can handle and, possibly, damage the device.

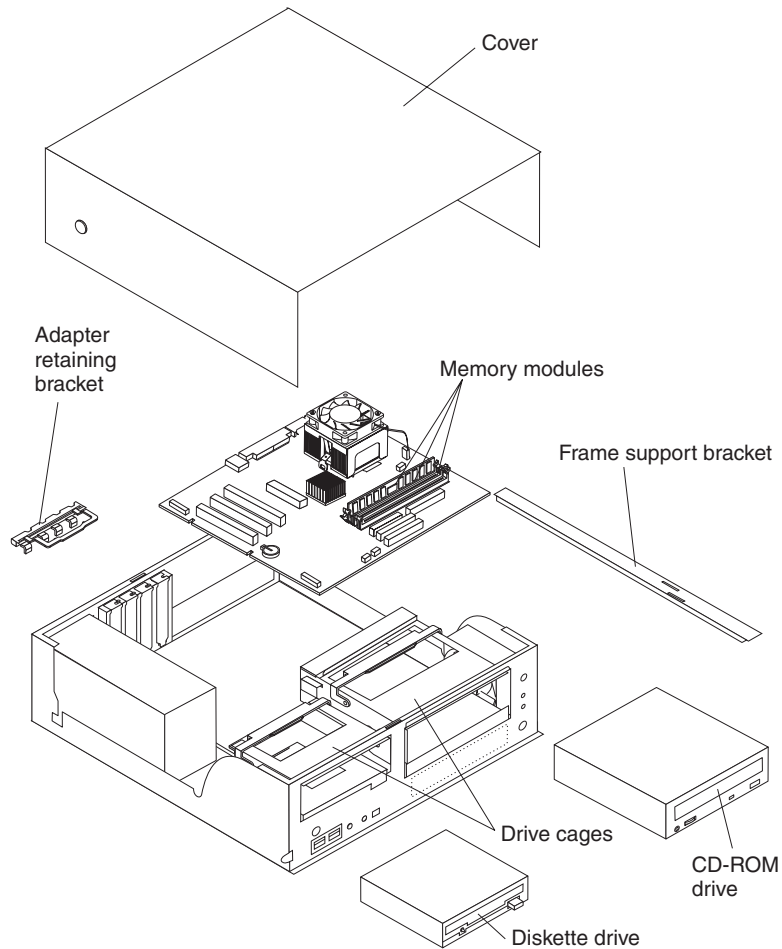
- While the device is still in its static-protective package, touch it to an unpainted metal part of the computer for at least two seconds. (This drains static electricity from the package and from your body.)
- Remove the device from its package and install it directly into your computer without setting the device down. If it is necessary to set the device down, place it in its static-protective package. (If your device is an adapter, place it component side up.) Do not place the device on your computer cover or on a metal table.
- Take additional care when handling devices during cold weather. Heating reduces indoor humidity and increases static electricity.

Desktop model

Use the information in the following sections to install options in the desktop model computer.

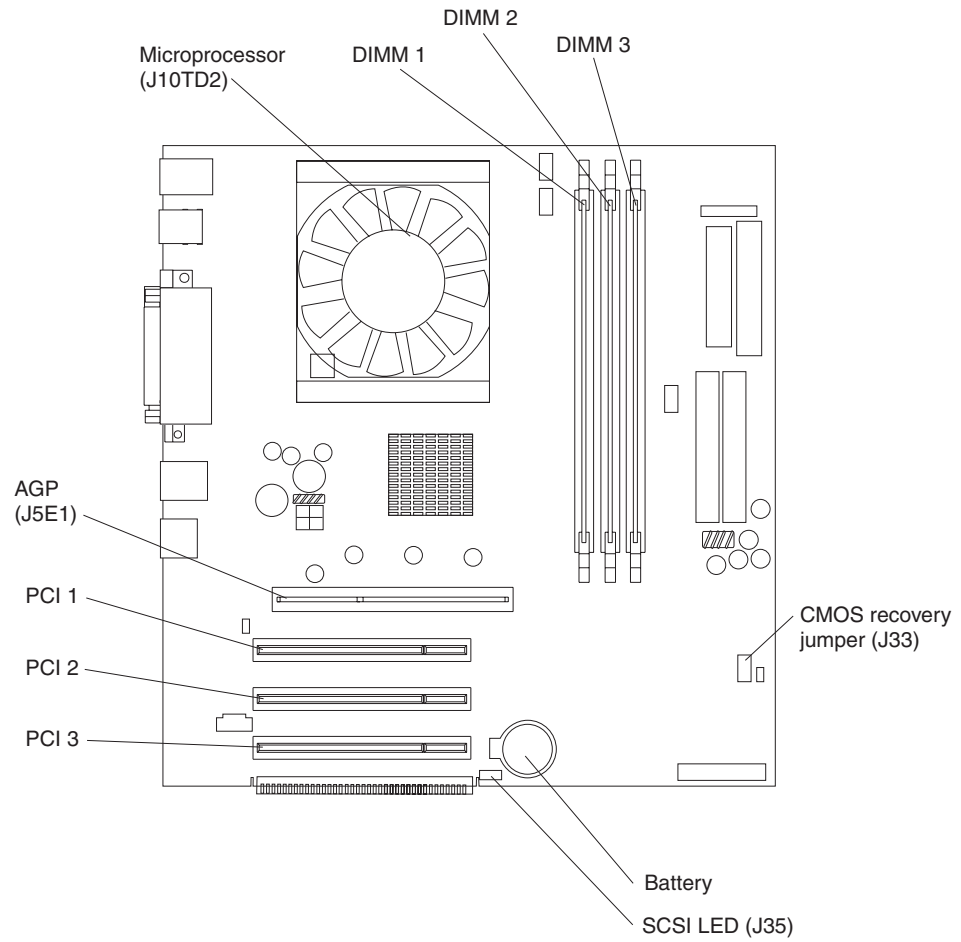
Major components of the desktop model

The following illustration shows the locations of major components in the desktop model computer.



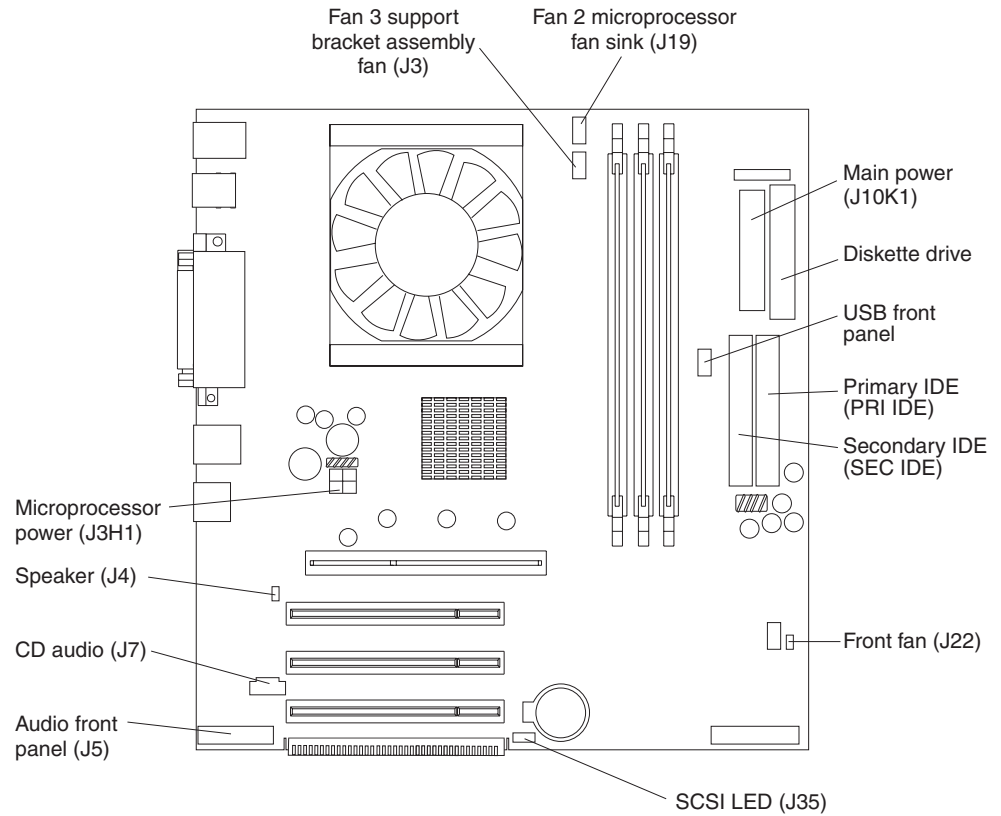
System board

The illustrations in the following sections highlight various components on the system board. Depending on installed options, your system board might look slightly different.



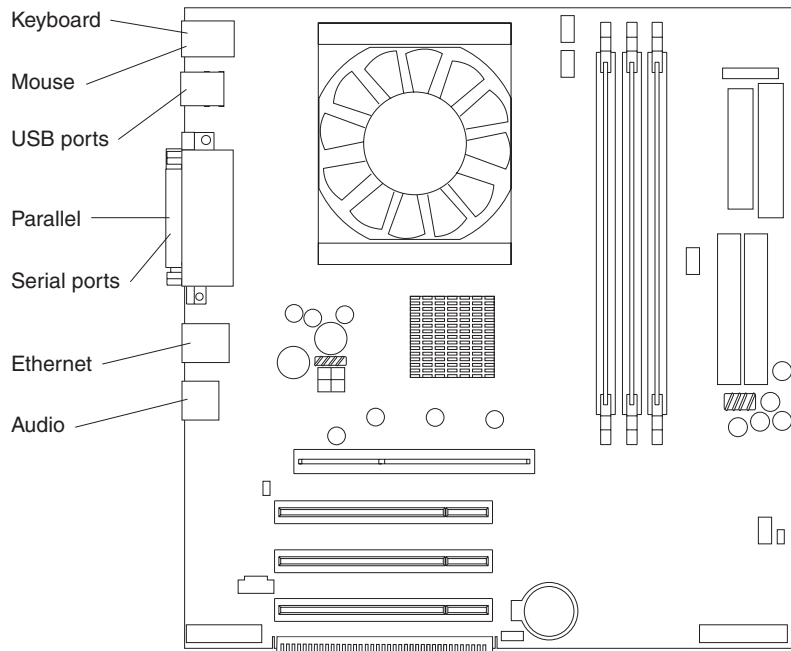
System board internal cable connectors

The following illustration identifies system board connectors for internal cables.



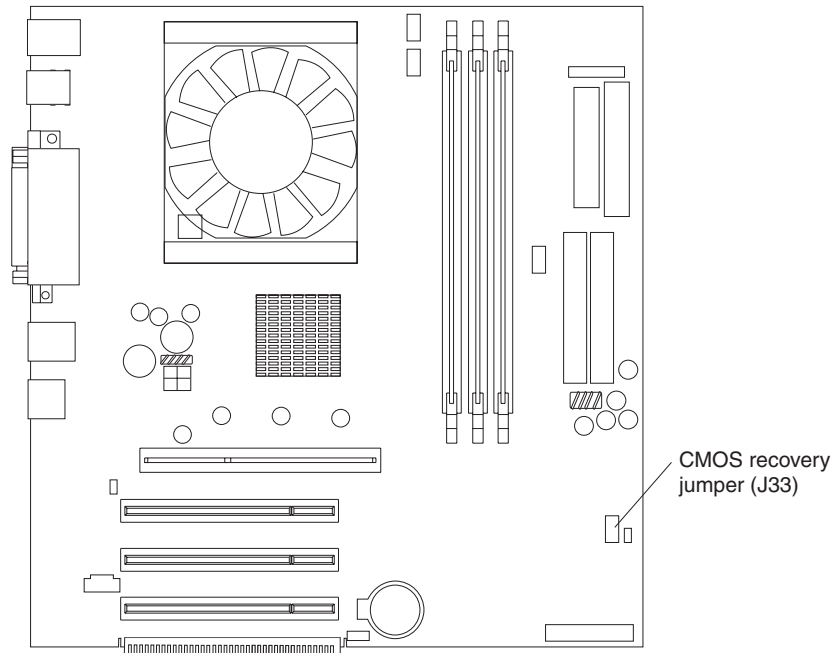
System board external cable connectors

The following illustration identifies system board connectors for external devices.



CMOS recovery jumper

The following illustration identifies the CMOS recovery jumper on the system board.



The CMOS recovery jumper can be used to clear CMOS memory in the event you lose your user password. See “Erasing a lost or forgotten password (clearing CMOS)” on page 106 for information on how to use the CMOS recovery jumper.

This jumper is also used to recover from a BIOS failure. See “Recovering from a POST/BIOS update failure” on page 108.

Installing options in a desktop model

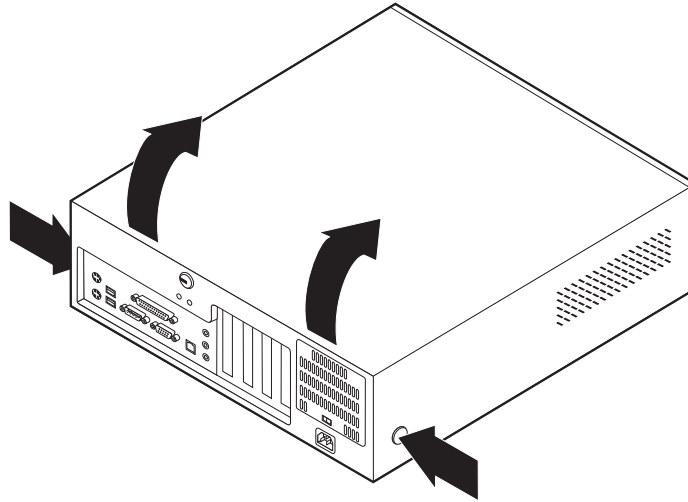
This section provides instructions for installing options in a desktop model.

Removing the cover

To remove the cover from the desktop model computer, do the following:

1. Review the information in “Before you begin” on page 37 and “Safety information” on page vii.
2. Turn off the computer and all attached devices.
3. Disconnect all external cables and power cords.

4. Press the buttons on either side of the computer cover and lift the cover from the computer.

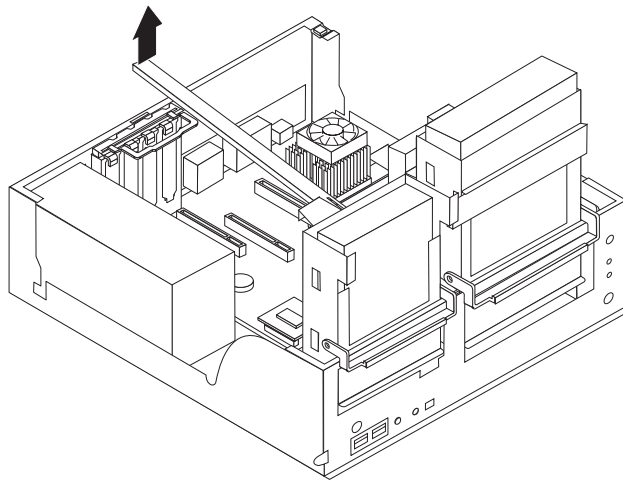


To replace the cover, see “Replacing the cover” on page 53.

Removing the frame support bracket

You must remove the frame support bracket to access many of the components of the desktop model computer. To remove the frame support bracket, perform the following steps:

1. Pivot the drive cages until the pivot locks catch the front of the desktop chassis, holding the drive cages in place.
2. Lift the frame support bracket out of the computer.

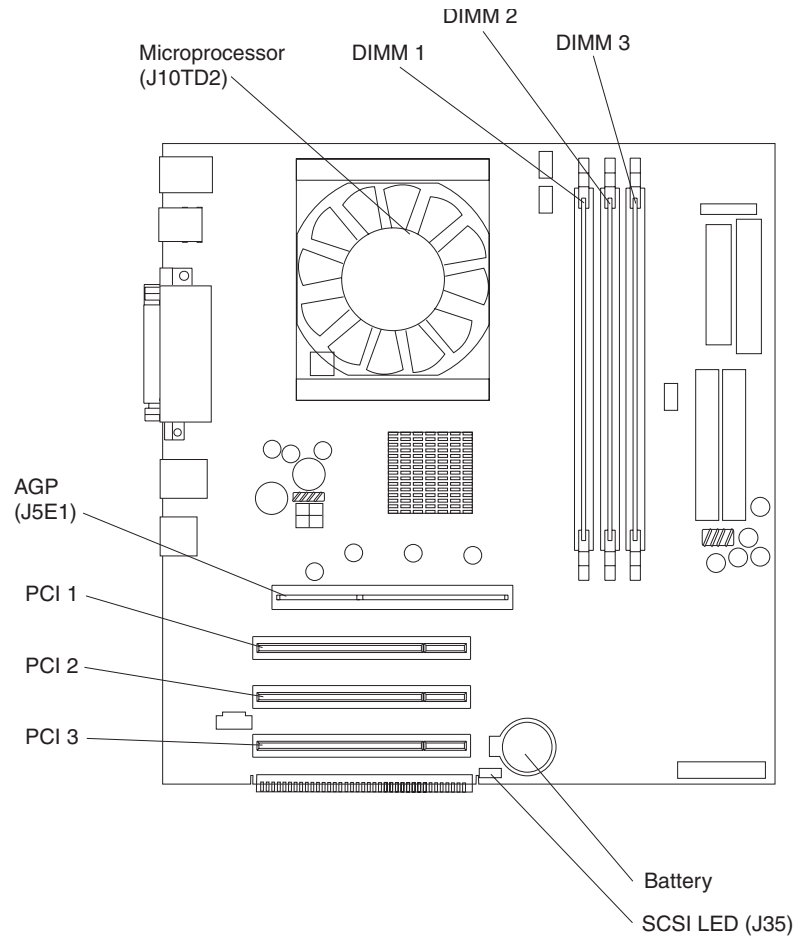


To replace the frame support bracket, reverse the steps.

Working with adapters

Your computer comes with adapter connectors or *slots*. The AGP video adapter is installed in the AGP slot. You can install up to three low-profile PCI adapters in PCI slots 1 through 3. All PCI slots are 32-bit, 33 MHz slots.

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



Adapter considerations: Before you install adapters, review the following:

- Locate the documentation that comes with the adapter and follow those instructions in addition to the instructions provided in this chapter. If you need to change the switch or jumper settings on your adapter, follow the instructions that come with the adapter.
- You can install low-profile adapters in all three PCI slots.
- Your computer supports 5.0V and universal PCI adapters; it does not support 3.3V adapters.
- Your computer uses a rotational interrupt technique to configure PCI adapters. Because of this technique, you can install a variety of PCI adapters that currently do not support PCI interrupt sharing.
- PCI slots 1 through 3 are on PCI bus 0.

The system scans the AGP slot and PCI expansion slots 1 through 3 to assign system resources; then the system starts the PCI devices in the following order: PCI expansion slots 1 and 2, system board integrated drive electronics (IDE) or SCSI devices, and then PCI expansion slot 3.

Note: To change the startup sequence for PCI devices, start the IBM Setup Utility program, select Startup from the main menu, select Startup Sequence, and select Second device (SCSI) to designate the adapter startup sequence. See Chapter 4, “Configuring your computer,” on page 27 for details on using the IBM Setup Utility program.

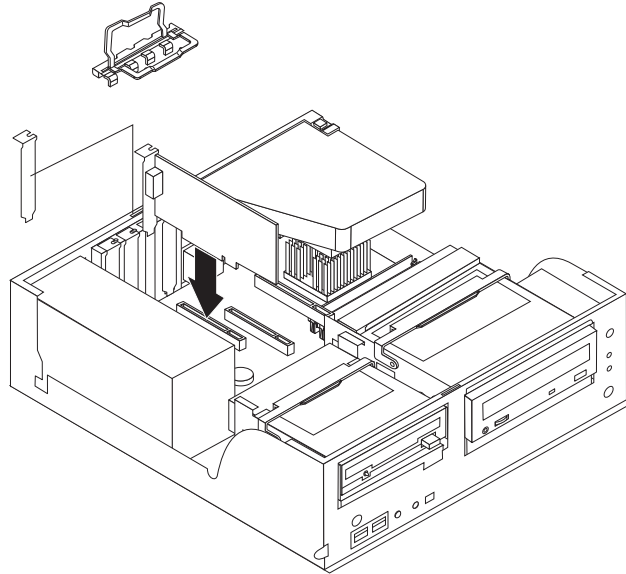
- For a list of supported options for your computer, refer to <http://www.ibm.com/pc/support> on the World Wide Web.

Installing an adapter: Do the following to install an adapter in the desktop model:

Attention: When you handle static-sensitive devices, take precautions to avoid damage from static electricity. For details on handling these devices, see “Handling static-sensitive devices” on page 37.

1. Review the information in “Safety information” on page vii.
2. Turn off the computer and attached devices.
3. Disconnect all external cables and power cords; then remove the cover. See “Removing the cover” on page 41.
4. Determine which PCI slot you will use for the adapter.
Note: Check the instructions that come with the adapter for any requirements, restrictions, or cabling instructions. It might be easier to route any cables before you install the adapter.
5. Rotate each drive bay cage until the drive cage latches catch the front of the computer chassis.
6. Lift the frame support bracket. See “Removing the frame support bracket” on page 42.
7. Rotate the rear adapter support bracket to the open (unlocked) position and remove it from the computer.
8. Remove the expansion-slot cover. From the rear of the computer, press on the slot cover. Grasp it and pull it out of the expansion slot. Store it in a safe place for future use.
Attention: Expansion-slot covers must be installed on all vacant slots. This maintains the electronic emissions standards of the computer and ensures proper ventilation of computer components.
9. Set any jumpers or switches on the adapter or system board as described by the adapter manufacturer.
10. When you are ready, remove the adapter from the static-protective package. It is best to move the adapter directly from the static-protective package to the adapter slot. If this is not possible, set the adapter down in its static-protective package on a hard surface. Avoid touching the components and gold-edge connectors on the adapter.

11. To install the adapter, carefully grasp the adapter by the top edge or upper corners, and align it with the expansion slot guides; then press the adapter *firmly* into the expansion slot.



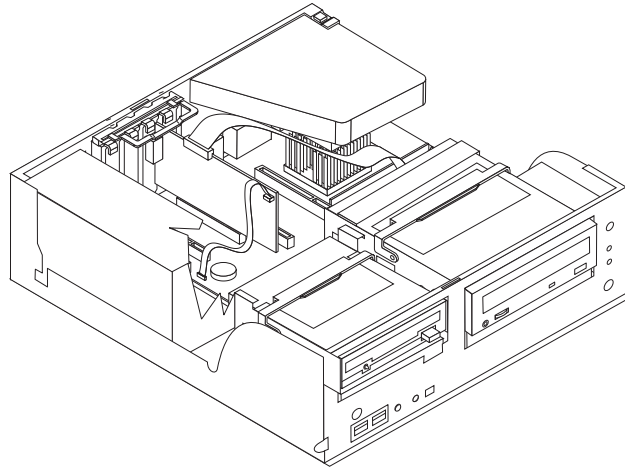
Attention: Be certain that the adapter is correctly seated in the expansion slot before you turn on the computer. Incomplete installation of an adapter might damage the system board or the adapter.

12. Connect required cables to the adapter.
13. If you have another adapter, repeat steps 1 through 12. If you have another option to install, do so now. Otherwise, complete the rest of the steps in this section.
14. Reinstall the rear adapter support bracket; then rotate the bracket to the closed (locked) position.
15. Replace the frame support bracket.
16. Return the drive bay cages to their original positions in the computer.
17. Replace the top cover, see “Replacing the cover” on page 53 for details.
18. Reconnect the external cables and power cords; then turn on the attached devices and the computer.

Installing a SCSI adapter : Do the following to install an optional SCSI adapter:

1. If you do not have a preinstalled SCSI adapter, complete steps 1 through 12 of “Installing an adapter” on page 44; then, continue with step 2.
2. Connect the SCSI signal cable to the adapter and one or more of the signal cable connectors to the rear of the SCSI devices.

3. Connect the SCSI activity indicator cable to the adapter and to the SCSI LED connector (J35) on the system board. See “System board” on page 39 for the location of the SCSI LED connector.



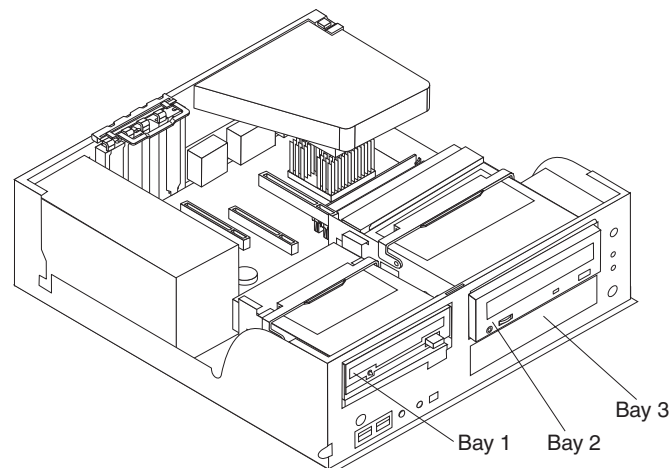
4. If you have other adapters or options to install or remove, do so now.
5. Reinstall the rear adapter support bracket; then rotate it to the closed (locked) position.
6. Replace the frame support bracket.
7. Replace the cover. See “Replacing the cover” on page 53 for details.
8. Reconnect the external cables and power cords; then turn on the attached devices and the computer.

Installing internal drives

Different types of drives enable your computer to read various types of media and store data in different formats. Your computer comes with the following drives preinstalled:

- Diskette
- Hard disk
- CD-ROM or DVD-ROM

Internal drive bays: The desktop model IntelliStation E Pro computer comes with an IDE CD-ROM or DVD-ROM drive in bay 1, a 3.5-in., 1.44-MB diskette drive in bay 2, and a hard disk drive installed in bay 3.



Notes:

1. The IntelliStation E Pro computer supports only one diskette drive.
2. The IntelliStation E Pro Type 6204 does not support the installation of additional internal disk drives. However, you can replace failed internal drives.
3. For a complete list of supported options for your computer, refer to <http://www.ibm.com/pc/support/> on the World Wide Web.

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

1. Read “Safety information” on page vii, “Handling static-sensitive devices” on page 37, and the documentation that comes with your drive.
2. Choose the bay in which you want to install the drive.
3. Check the instructions that come with the drive to see if you need to set any switches or jumpers on the drive. If you are installing a SCSI device, be sure to set the SCSI ID for that device.

Installing a CD-ROM or diskette drive: To replace drives in the desktop model computer, do the following:

1. Read the information in “Preinstallation steps”.
2. Turn off the computer and attached devices, and disconnect all external cables and power cords.
3. Remove the cover. See “Removing the cover” on page 41 for details.
4. Disconnect power and signal cables to the drive.
5. Rotate the drive bay cage of the drive that you need to replace until the latch catches the front of the computer chassis.
6. Remove the screws holding the drive in place.
7. Slide the drive out of the drive bay.

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

Statement 3**CAUTION:**

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

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

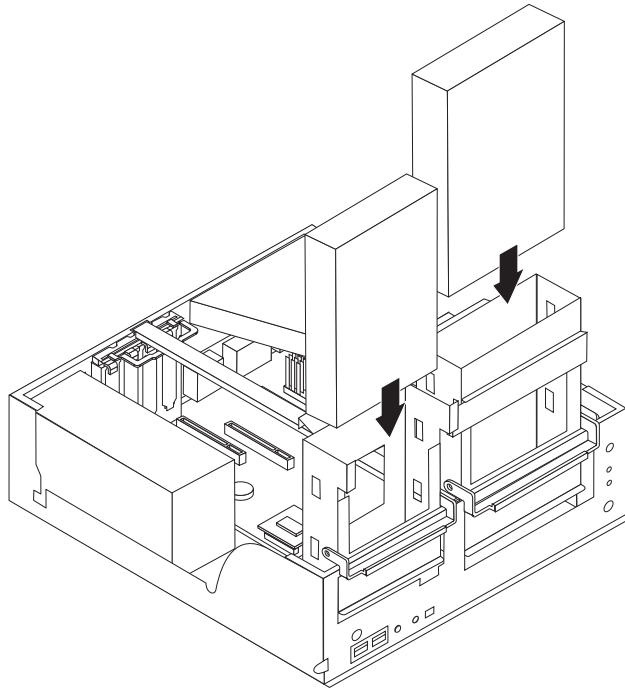


DANGER

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

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

8. Touch the static-protective bag containing the drive to any unpainted metal surface on the computer; then remove the drive from the bag and place it on a static-protective surface.
9. Set any jumpers or switches on the drive according to the documentation that comes with the drive.
10. Slide the drive into the drive bay, and then attach the drive to the drive cage.

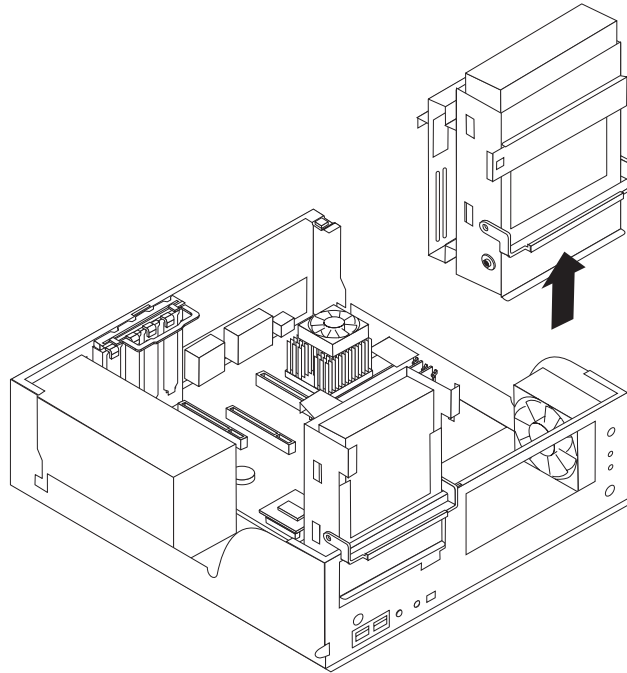


11. Connect one end of the diskette or IDE signal cable into the back of the drive and the other end of the cable into the diskette or IDE connector on the system board. For the location of the diskette or IDE connectors, see “System board internal cable connectors” on page 40.
Note: Make sure to route the signal cable so that it does not block the air flow to the rear of the drives or over the microprocessor.
12. Connect the power cable to the back of the drive. The connectors are keyed and can be inserted only one way.
13. If you have other options to install or remove, do so now.
14. Replace the cover. See “Replacing the cover” on page 53 for details.
15. Reconnect the external cables and power cords; then turn on the attached devices and the computer.

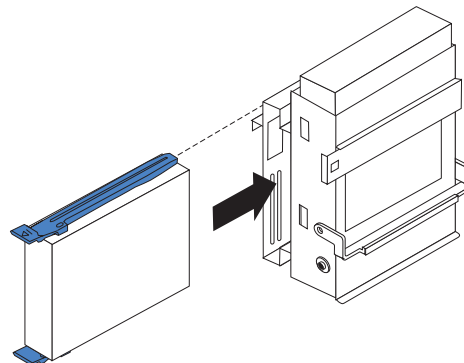
Installing a hard disk drive: To replace a hard disk drive in the desktop model computer, do the following:

1. Read the information in “Preinstallation steps” on page 47.

2. Turn off the computer and attached devices and disconnect the external cables and power cords.
3. Remove the cover and frame support bracket. See “Removing the cover” on page 41 and “Removing the frame support bracket” on page 42 for details.
4. Disconnect the power and signal cables from both drives in the drive cage.
5. Remove the hard disk drive cage from the computer.



6. Slide the drive out of the drive bay.
7. Touch the static-protective bag containing the drive to any unpainted metal surface on the computer; then remove the drive from the bag and place it on a static-protective surface.
8. Set any jumpers or switches on the drive according to the documentation that comes with the drive.
9. Attach the sliding rails to the sides of the hard disk drive using screws from the old hard disk drive.
10. Slide the drive into the drive bay until the drive snaps into place, and replace the drive cage.



11. Connect one end of the IDE signal cable into the back of the drive and the other end of the cable into the IDE connector on the system board. For the location of the IDE connectors, see “System board internal cable connectors” on page 40.
Note: Make sure to route the signal cable so that it does not block the air flow to the rear of the drives or over the microprocessor.
12. Connect a power cable to the back of the drive. The connectors are keyed and can be inserted only one way.
13. If you have other options to install or remove, do so now.
14. Go to the appropriate section to work with another option, or replace the cover. See “Replacing the cover” on page 53 for details.
15. Reconnect the external cables and power cords; then turn on the attached devices and the computer.

Power and signal cables for internal drives: Your computer uses cables to connect IDE devices to the power supply and to the system board. The following cables are provided:

- Four-wire power cables connect the drives to the power supply. At the end of these cables are plastic connectors that attach to different drives; these connectors vary in size. Also, certain power cables attach to the system board.
 - Flat signal cables, also called ribbon cables, connect IDE and diskette drives to the system board. There are two sizes of ribbon cables that come with your computer.
 - The wider IDE signal cable has two or three connectors.
 - If the cable has three connectors, one of these connectors is attached to the drive, one is a spare, and the third attaches to the primary or secondary IDE connector on the system board.
 - If the cable has two connectors, one of these connectors is attached to the hard disk drive, and the other attaches to the primary or secondary IDE connector on the system board.
- Note:** The CD-ROM drive will have an ATA 66 signal cable. ATA 66 signal cables are color-coded. The blue connector attaches to the system board. The black connector attaches to the primary device. The gray middle connector attaches to the secondary device. If you are installing a hard disk drive, you must change the switch setting on the CD-ROM drive to secondary and change the connector used for the CD-ROM drive to the gray middle connector.
- The narrower signal cable has two connectors, one to attach to the diskette drive, and the other to attach to the connector (FDD1) on the system board.

To locate connectors on the system board, see “System board internal cable connectors” on page 40.

Review the following information before connecting power and signal cables to internal drives:

- The drives that are preinstalled in your computer come with power and signal cables attached. If you replace any drives, 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, and 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 device and the other as the secondary device; otherwise, the computer

might not detect some of the IDE devices. The primary and secondary designation is determined by switch or jumper settings on each IDE device.

- If two IDE devices are on a single cable, and only one is a hard disk drive, the hard disk drive must be set as a primary device.
- If you have only one IDE device on a cable, it must be set as a primary device.

Installing memory modules

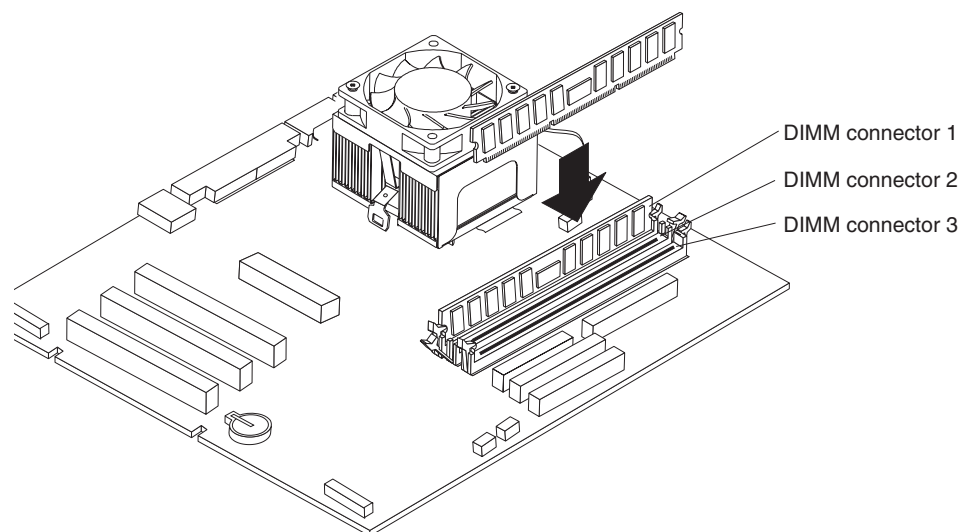
Adding memory to your computer is an easy way to make programs run faster. You can increase the amount of memory in your computer by installing memory modules. Your IntelliStation E Pro computer uses industry-standard, dual inline memory modules (DIMMs).

Note: The desktop model does not support installing memory in DIMM connector 3.

Do the following to install a DIMM:

Attention: When handling static-sensitive devices, take precautions to avoid damage from static electricity. For details on handling these devices, see “Handling static-sensitive devices” on page 37.

1. Review the safety precautions listed in the “Safety information” on page vii.
2. Turn off the computer and all attached devices. Disconnect all external cables and power cords; then remove the cover. See “Removing the cover” on page 41 or for details.
3. Lift the frame support bracket. See “Removing the frame support bracket” on page 42.
4. Touch the static-protective package containing the DIMM to any unpainted metal surface on the computer. Then remove the new DIMM from the package.
5. Gently open the retaining clip on each end of the DIMM slot. Turn the DIMM so that the pins align correctly with the connector.
6. Insert the DIMM into the connector. Firmly press the DIMM straight down into the connector by applying pressure on both ends of the DIMM simultaneously. The retaining clips snap into the locked position when the DIMM is firmly seated in the connector.



7. If a gap exists between the DIMM and the retaining clips, the DIMM has not been correctly installed. Open the retaining clips, remove the DIMM, then reinsert it.
8. If you have other options to install or remove, do so now.

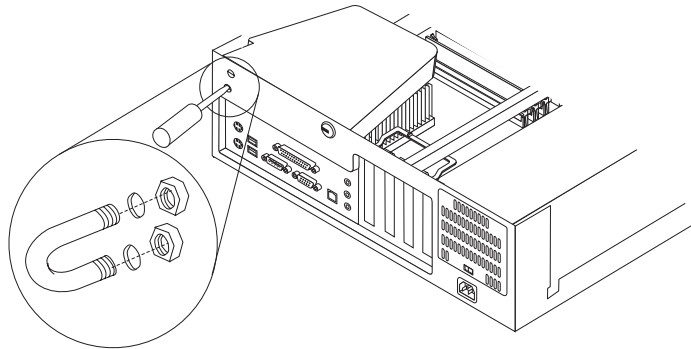
9. Replace the frame support bracket.
10. Replace the cover. See “Replacing the cover” on page 53.
11. Reconnect the external cables and power cords. Turn on the attached devices, and turn on the computer.

Installing a security U-bolt

To help prevent theft, you can add a security U-bolt and cable to your computer.

Do the following to install the U-bolt:

1. Review the safety precautions listed in “Safety information” on page vii.
2. Turn off the computer and all attached devices. Disconnect all external cables and power cords; then remove the cover. See “Removing the cover” on page 41 or “Removing the side cover” on page 58 for details.
3. Use a screwdriver to remove the two metal knockouts.
4. Insert the U-bolt through the rear panel; then attach and tighten the nuts.
5. Thread the cable through the U-bolt and around an object that is not part of or permanently secured to the building structure or foundation, and from which the cable cannot be removed. Fasten the cable ends together with a lock. After you add the security cable, make sure that it does not interfere with other cables connected to the computer.

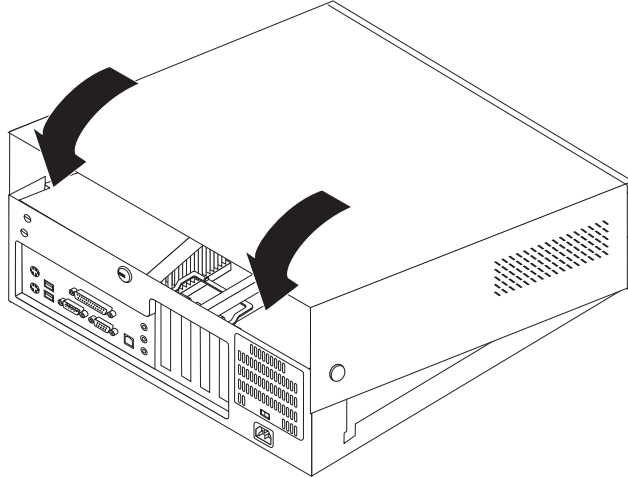


6. Reconnect the external cables and power cords, and turn on the attached devices, then the computer.

Replacing the cover

Do the following to replace the computer cover:

1. Clear any cables that might impede the replacement of the cover.
2. Install the side cover by placing it into position on the computer, with the notches on the underside of the cover matching up to the holes along the sides of the computer. Press down on the cover release latch button as you close the cover release latch to lock the cover.



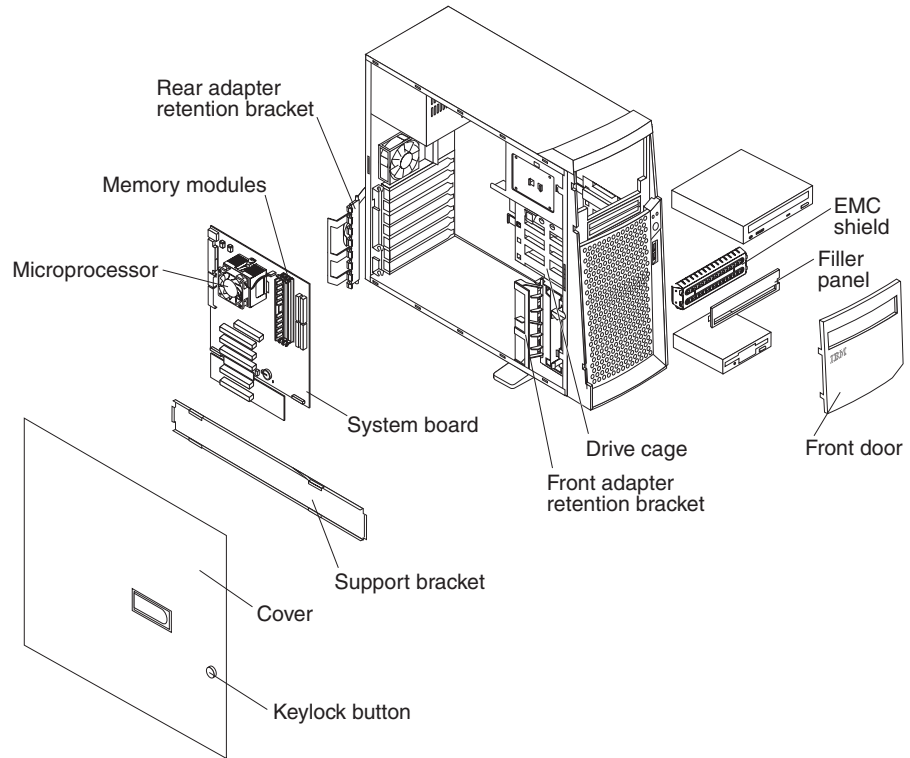
3. Reconnect the external cables and power cords to the computer; then connect the power cords to electrical outlets.
4. Turn on the attached devices; then turn on the computer.

Tower model

Use the information in the following sections to install options in the tower model computer.

Major components of the tower model

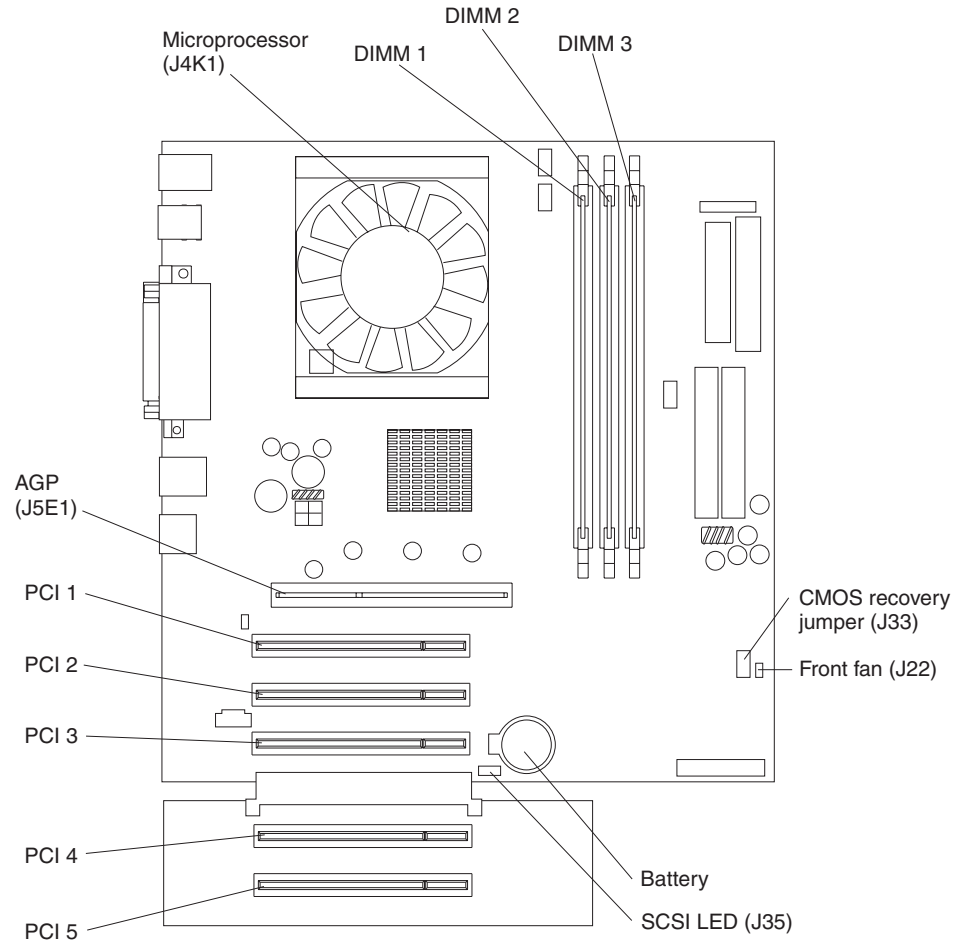
The following illustration shows the locations of major components in the tower model computer.



System and PCI extender boards

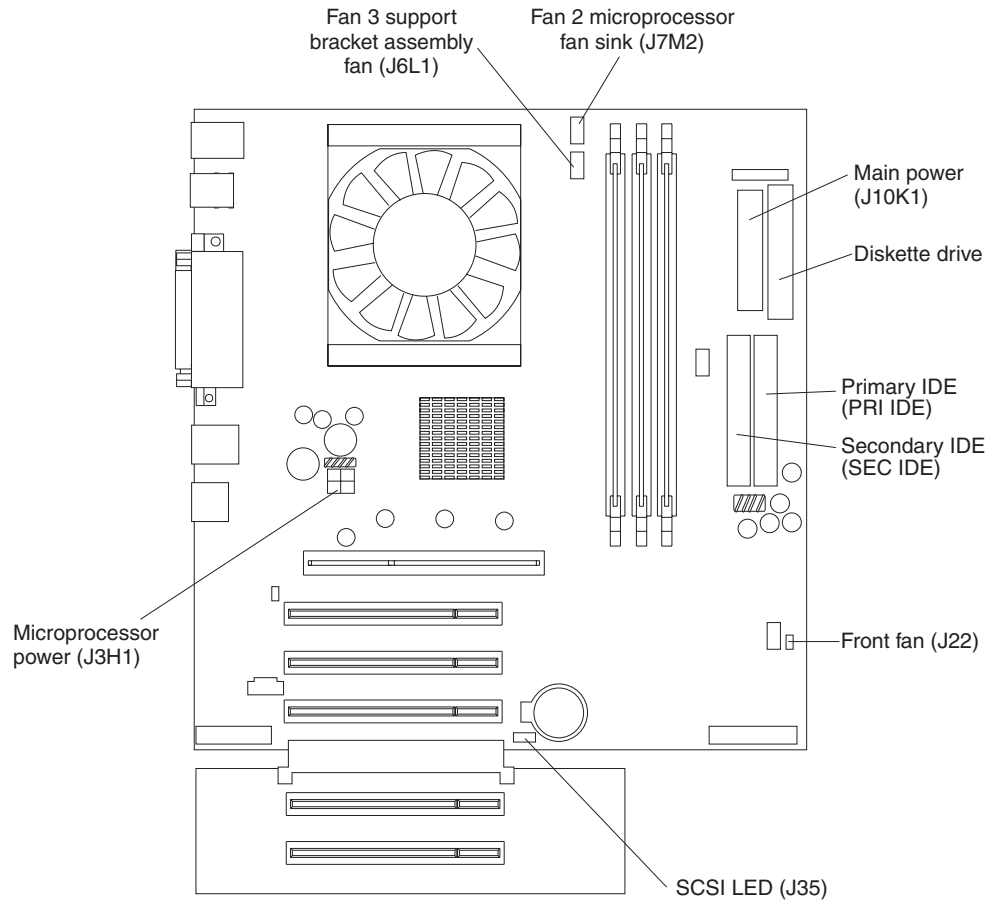
The illustrations in the following sections highlight various components on the system board.

This illustration identifies parts of the system board. Depending on installed options, your system board might look slightly different.



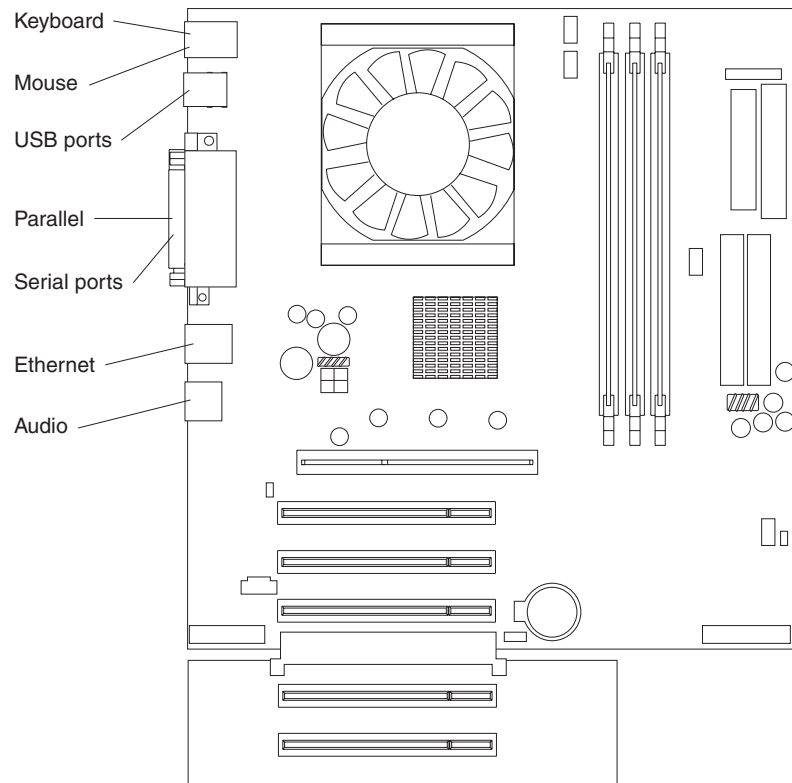
System board internal cable connectors

The following illustration identifies system board connectors for internal cables.



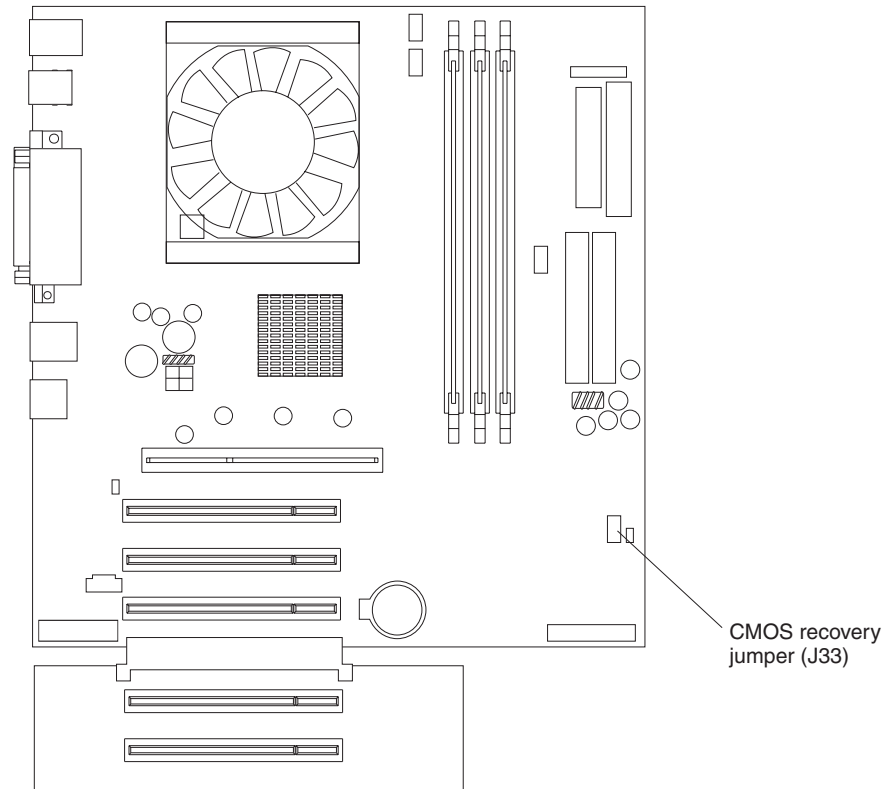
System board external connectors

The following illustration identifies system board connectors for external cables.



CMOS recovery jumper

The following illustration identifies the CMOS recovery jumper on the system board.



The CMOS recovery jumper can be used to clear CMOS memory in the event you lose your user password. See “Erasing a lost or forgotten password (clearing CMOS)” on page 106 for information on how to use the CMOS jumper.

This jumper is also used to recover from a BIOS failure. See “Recovering from a POST/BIOS update failure” on page 108.

Installing options in a tower model

This section provides instructions for installing options in a tower model.

Removing the side cover

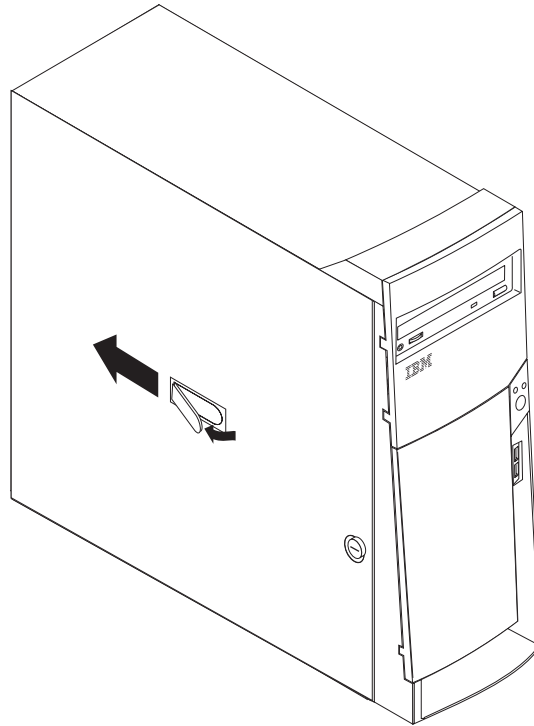
The following information describes how to remove the side cover.

Note: To remove the side cover, you might find it easier to lay the computer on its side. If you do, move the stabilizing feet so that they do not break. See “Moving the stabilizing feet” on page 12.

Do the following to remove the side cover of the computer:

1. Review the information in “Before you begin” on page 37 and “Safety information” on page vii.
2. Turn off the computer and all attached devices.
3. Disconnect all external cables and power cords.

4. Pull the cover release latch away from the computer, and push the cover toward the rear of the computer.



To replace the side cover, see “Replacing the cover” on page 73.

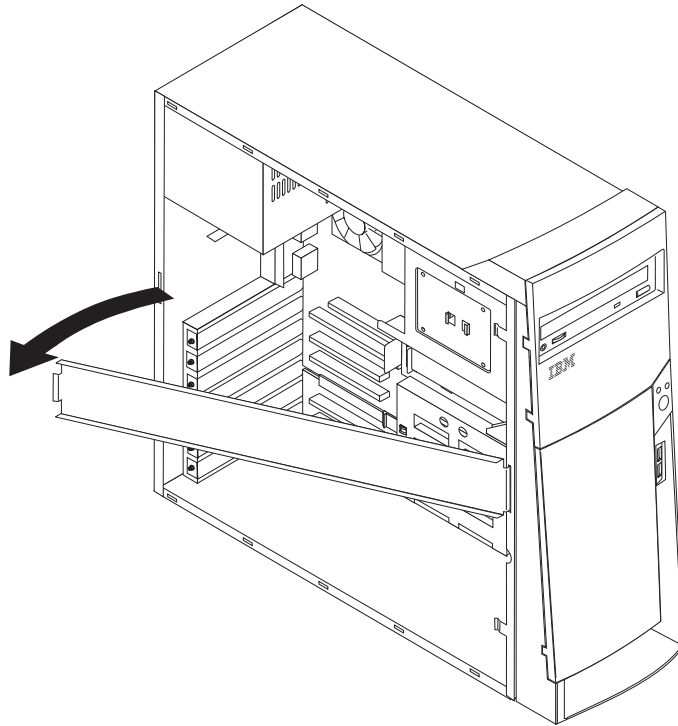
Attention: For proper cooling and airflow, replace the cover before turning on the computer. Operating the computer with the cover removed might damage computer components.

Removing the support bracket

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

Do the following to remove the support bracket:

1. Pull out on the rear end of the support bracket approximately 150 mm (6 in.).
2. Pull the rear end of the support bracket away from the computer and place the bracket aside.

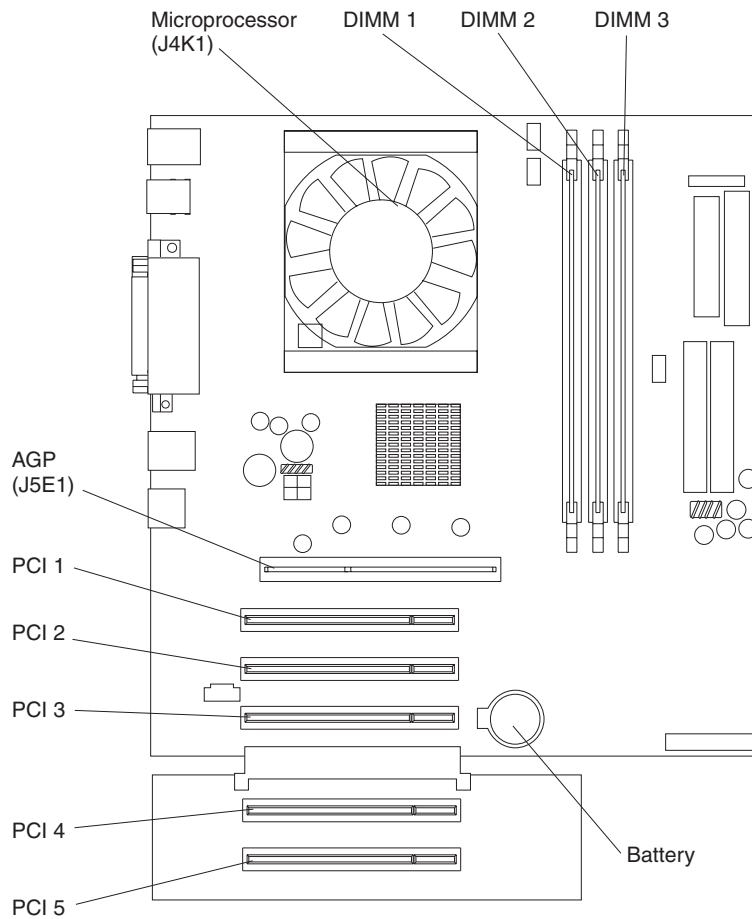


To reinstall the support bracket, reverse the previous steps.

Working with adapters

Your computer comes with adapter connectors or *slots*. The AGP video adapter is installed in the AGP slot. You can install up to five PCI adapters in PCI slots 1 through 5. All PCI slots are 32-bit, 33 MHz slots.

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



Adapter considerations: Before you install adapters, review the following:

- Follow the instructions that come with the adapter in addition to the instructions in this chapter. If you need to change the switch or jumper settings on your adapter, follow the instructions that come with the adapter.
- You can install full-length adapters in all five PCI slots.
- Your computer supports 5.0V and universal PCI adapters; it does not support 3.3V adapters.
- Your computer uses a rotational interrupt technique to configure PCI adapters. Because of this technique, you can install a variety of PCI adapters that currently do not support sharing of PCI interrupts.
- PCI slots 1 through 5 are on PCI bus 0.

The system scans the AGP slot and PCI expansion slots 1 through 5 to assign system resources. Then, the system starts the PCI devices in the following order, if you have not changed the default startup sequence: PCI expansion slots 1 and 2, system board integrated drive electronics (IDE) or SCSI devices, and then PCI expansion slots 3 through 5.

- For a list of supported options for your computer, refer to <http://www.ibm.com/pc/support/> on the World Wide Web.

Installing an adapter: Do the following to install an adapter in the tower model:

Attention: When you handle static-sensitive devices, take precautions to avoid damage from static electricity. For details on handling these devices, see “Handling static-sensitive devices” on page 37.

1. Review the information in “Safety information” on page vii.
2. Turn off the computer and all attached devices.
3. Disconnect all external cables and power cords; then remove the side cover. See “Removing the side cover” on page 58.
4. Determine which PCI slot you will use for the adapter.

Note: Check the instructions that come with the adapter for any requirements, restrictions, or cabling instructions. It might be easier to route any cables before you install the adapter.

5. For full-length adapters, rotate the rear adapter-retention bracket to the open (unlocked) position and remove it from the computer. Rotate the front adapter-retention bracket to the open position. If you are installing a smaller adapter, remove only the rear adapter-retention bracket.
6. Remove the expansion-slot cover. From the rear of the computer, press on the slot cover. Grasp it and pull it out of the expansion slot. Store it in a safe place for future use.

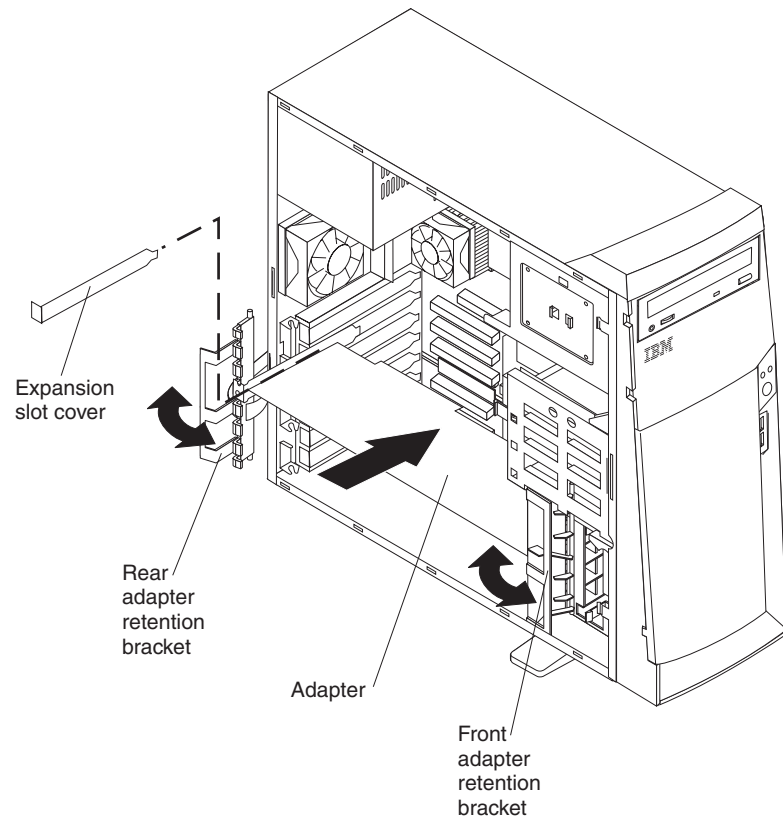
Attention: Expansion-slot covers must be installed on all vacant slots. This maintains the electronic emissions standards of the computer and ensures proper ventilation of computer components.

7. Set any jumpers or switches on the adapter or system board as described by the adapter manufacturer.

8. Remove the adapter from the static-protective package, and carefully grasp the adapter by the top edge or upper corners, and align it with the expansion slot guides; then press the adapter *firmly* into the expansion slot.

Note: It is best to move the adapter directly from the static-protective package to the adapter slot. If this is not possible, set the adapter down on its static-protective package on a hard surface. Avoid touching the components and gold-edge connectors on the adapter.

Attention: Be certain that the adapter is correctly seated in the expansion slot before you turn on the computer. Incomplete installation of an adapter might damage the system board or the adapter.

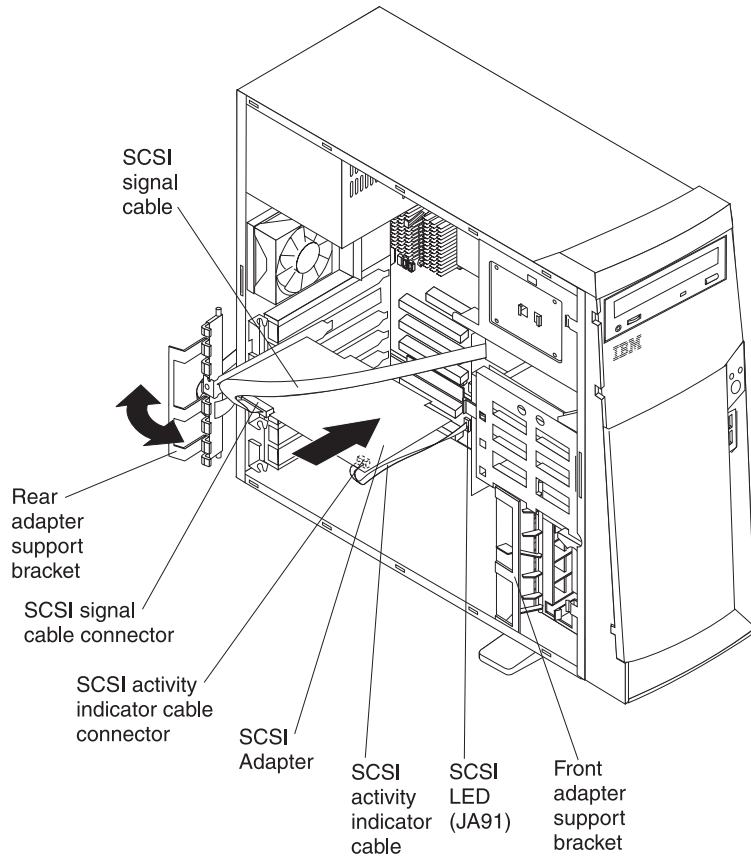


9. Connect required cables to the adapter. Route cables so that they do not block the flow of air from the fans.
10. If you have another adapter to install, repeat steps 1 through 10. If you have another option to install, do so now.
11. If you have installed a full-length adapter, rotate the front adapter support bracket to the closed (locked) position.
12. Reinstall the rear adapter support bracket; then rotate the bracket to the closed (locked) position.

Note: The rear retaining bracket rests against the computer cover. You might find it easier to lay the computer on its side to replace the cover.
13. Replace the support bracket.
14. Replace the side cover. See “Replacing the cover” on page 73 for details.
15. Reconnect the external cables and power cords; then turn on the attached devices and the computer.

Installing a SCSI adapter: Some models do not come with SCSI adapters. Do the following to install an optional SCSI adapter:

1. If you do not have a preinstalled SCSI adapter, complete steps 1. through 9. of “Installing an adapter” on page 62.
2. Connect the SCSI signal cable to the adapter and one or more of the signal cable connectors to the rear of the SCSI devices.
3. Connect the SCSI activity indicator cable to the adapter and to the SCSI LED connector (J35) on the system board. See “System board” on page 39 for the location of the SCSI LED connector.



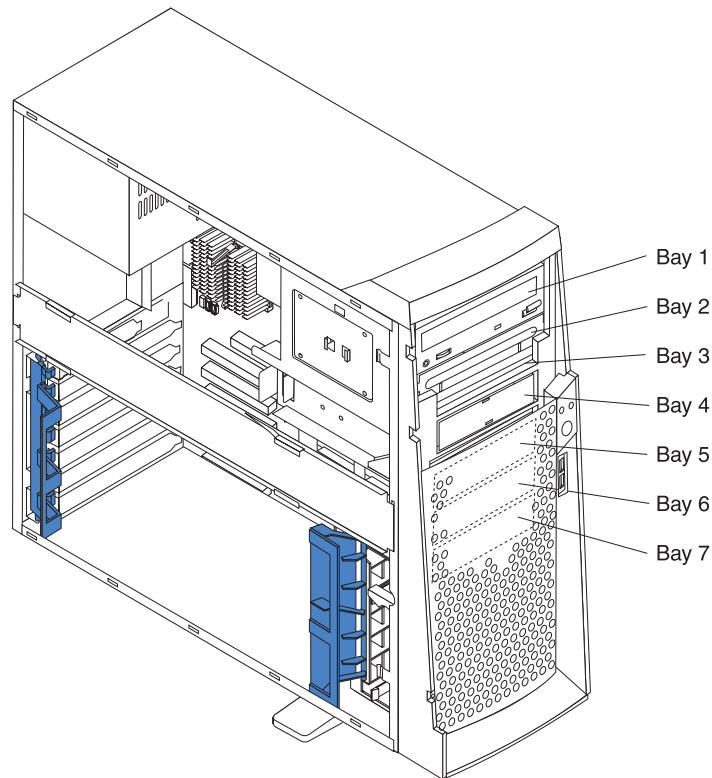
4. If you have other adapters or options to install or remove, do so now.
5. Rotate the front adapter-support bracket to the closed (locked) position.
6. Reinstall the rear adapter-support bracket; then rotate it to the closed (locked) position.
7. Replace the support bracket.
8. Replace the cover, see “Replacing the cover” on page 73 for details.
9. Reconnect the external cables and power cords; then turn on the attached devices and the computer.

Installing internal drives

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

- Diskette
- Hard disk
- CD-ROM or DVD-ROM

Internal drive bays: The tower model IntelliStation E Pro tower model comes with an IDE CD-ROM or DVD-ROM drive in bay 1, a 3.5-in., 1.44 MB diskette drive in bay 3, and a hard disk drive installed in bay 4.



Notes:

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

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

1. Read “Safety information” on page vii, “Handling static-sensitive devices” on page 37, and the documentation that comes with your drive.
2. Choose the bay in which you want to install the drive.
3. Check the instructions that come with the drive to see if you need to set any switches or jumpers on the drive. If you are installing a SCSI device, be sure to set the SCSI ID for that device.

Installing a drive in bay 2 or 4: Do the following to install a drive in bay 2 or 4:

Attention: When handling static-sensitive devices, take precautions to avoid damage from static electricity. For details on handling these devices, see “Handling static-sensitive devices” on page 37.

1. Read the information in “Preinstallation steps”.
2. Turn off the computer and attached devices and disconnect the external cables and power cords.
3. Remove the side cover. See “Removing the side cover” on page 58 for details.
4. Remove the support bracket. See “Removing the support bracket” on page 59.
5. Use a screwdriver to pry the filler panel and EMC shield away from the computer.

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

Statement 3



CAUTION:

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

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



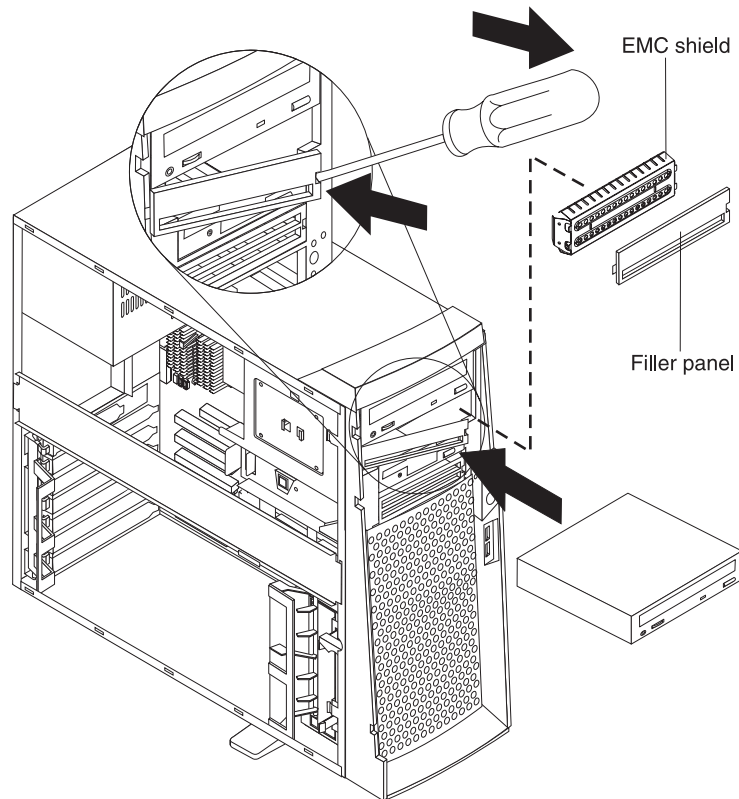
DANGER

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

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

6. Touch the static-protective bag containing the drive to any unpainted metal surface on the computer; then remove the drive from the bag and place it on a static-protective surface.
7. Set any jumpers or switches on the drive according to the documentation that comes with the drive.
8. You might find it easier to install the new drive into the appropriate opening on the front, and then attach the cables.
9. If you are installing a 5.25-in. drive in bay 2, push the drive into the bay; then use the two screws to attach the drive to the drive cage.
10. If you are installing a 3.5-in. drive in bay 2, you must attach the 5.25-in conversion kit, supplied with your option, to the 3.5-in. drive.

Note: You can install only a 3.5-in. device in bay 4.



11. If the drive is an IDE device, connect one end of the IDE signal cable into the back of the drive and the other end of the cable into the IDE connector on the system board. For the location of the IDE connectors, see “System board internal cable connectors” on page 40. If the drive is a SCSI device, connect one end of the SCSI signal cable into the back of the drive and the other end of the cable into the 68-pin connector on the SCSI adapter.

Note: Route the signal cable so that it does not block the air flow to the rear of the drives or over the microprocessor.

12. Connect the power cable to the back of the drive. The connectors are keyed and can be inserted only one way.
13. If you have other options to install or remove, do so now.
14. Replace the support bracket.
15. Replace the side cover. See “Replacing the cover” on page 73 for details.

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

Installing a hard disk drive in bay 5, 6, or 7: Bays 5, 6, and 7 are in the drive cage. The drive cage is located just above the front adapter-support bracket.

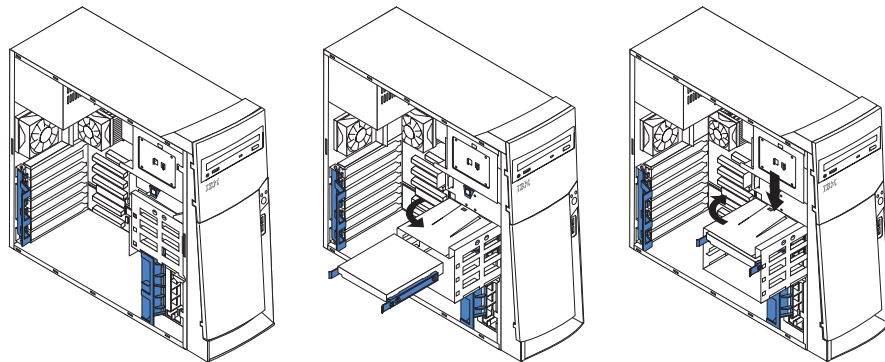
Note: You might find it useful to work with the computer laying on its side.

To install a drive in bay 5, 6, or 7, do the following:

1. Read the information in “Preinstallation steps” on page 66.
2. Turn off the computer and all attached devices. Disconnect all external cables and power cords; then remove the cover. See “Removing the side cover” on page 58 for details.
3. Remove the support bracket.
4. If your computer has hard disk drives preinstalled in the drive cage, disconnect the power and signal cables from the rear of the drives.
5. Grasp the drive cage and rotate the cage out (middle view) of the computer until it locks into place with the drive-cage retention tab. The open ends of the drive slots and installed drives will face you.

Note: Ensure that the drive cage locks into place over the drive-cage retention tab by pressing the drive cage all the way up.

6. Attach the guide rails to the side of the drive using the screws provided. If you obtained your optional drive from IBM, the guide rails are blue plastic.
7. Slide the drive into the drive cage until the plastic tabs on the drive guide rails lock into place in the drive cage. Clear any cables that might impede the replacement of the drive cage.
8. Lift the drive cage up, and press in on the drive-cage release tab; then rotate the cage back into the computer (right view).



9. Connect the power and signal cables to the rear of each drive.
Note: Route the signal cable so that it does not block the air flow to the rear of the drives or over the microprocessor.
10. If you have other options to install or remove, do so now.
11. Replace the support bracket.
12. Replace the side cover. See “Replacing the cover” on page 73 for details.
13. Reconnect the external cables and power cords; then turn on the attached devices and the computer.

Power and signal cables for internal drives: Your computer uses cables to connect IDE and SCSI devices to the power supply and to the system board. The following cables are provided:

- Four-wire power cables connect the drives to the power supply. At the end of these cables are plastic connectors that attach to different drives; these connectors vary in size. Also, certain power cables attach to the system board.
- Flat signal cables, also called ribbon cables, connect IDE, SCSI, and diskette drives to the system board. Two or three sizes of ribbon cables come with your computer.
 - The wider IDE signal cable has two or three connectors.
 - If the cable has three connectors, one of these connectors is attached to the drive, one is a spare, and the third attaches to the primary or secondary IDE connector on the system board.
 - If the cable has two connectors, one of these connectors is attached to the hard disk drive, and the other attaches to the primary or secondary IDE connector on the system board.
 - Note:** The CD-ROM drive is attached an ATA 66 signal cable. ATA 66 signal cables are color-coded. The blue connector attaches to the system board. The black connector attaches to the primary device. The gray middle connector attaches to the secondary device. If you are installing a hard disk drive, you must change the switch or jumper setting on the CD-ROM drive to secondary and change the connector used for the CD-ROM drive to the gray middle connector.
 - The narrower signal cable has two connectors, one to attach to the diskette drive, and the other to attach to the connector (FDD1) on the system board.
 - If your computer comes with a SCSI adapter and SCSI hard disk drive, the following cables can be used to attach SCSI devices to the SCSI host adapter:
 - An Ultra160 twisted ribbon cable connects the internal Ultra160 SCSI hard disk drive to the SCSI connector on the SCSI adapter. This cable has five additional connectors for attaching more internal SCSI devices.
 - A round SCSI cable connects external SCSI devices to the SCSI adapter so that you can add external SCSI devices. For more information about connecting SCSI devices, see the SCSI documentation on the *Software Selections* CD that comes with your computer.

To locate connectors on the system board, see “System board internal cable connectors” on page 40.

Review the following information before connecting power and signal cables to internal drives:

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

- If you have only one IDE device on a cable, it must be set as a primary device.

Installing memory modules

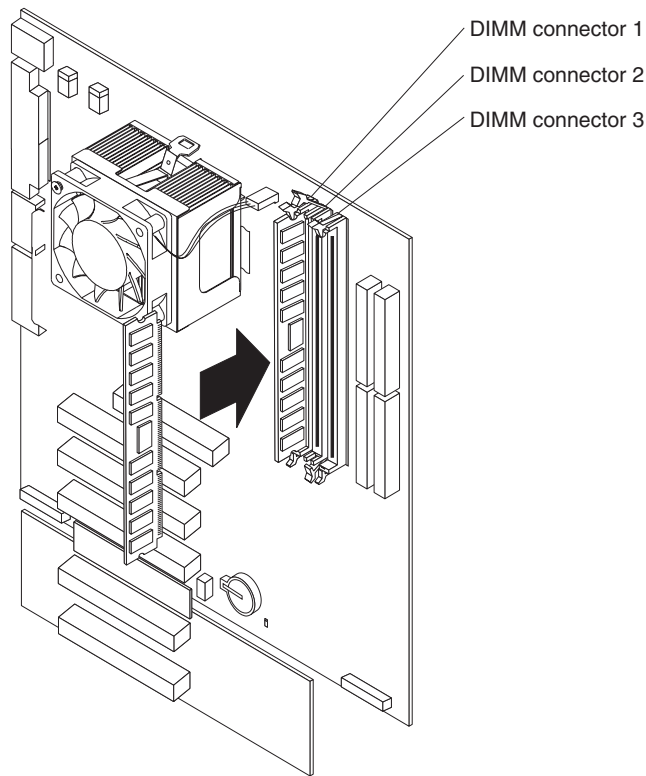
Adding memory to your computer is an easy way to make programs run faster. You can increase the amount of memory in your computer by installing memory modules. Your IntelliStation E Pro computer uses industry-standard dual inline memory modules (DIMMs).

Do the following to install a DIMM:

Attention: When handling static-sensitive devices, take precautions to avoid damage from static electricity. For details on handling these devices, see “Handling static-sensitive devices” on page 37.

1. Review the safety precautions listed in the “Safety information” on page vii.
2. Turn off the computer and all attached devices. Disconnect all external cables and power cords; then remove the cover. See “Removing the side cover” on page 58 for details.
3. Remove the support bracket. See “Removing the support bracket” on page 59.
4. Touch the static-protective package containing the DIMM to any unpainted metal surface on the computer. Then remove the new DIMM from the package.
5. Open the retaining clips and, if necessary, remove any existing DIMM.
6. Gently open the retaining clip on each end of the DIMM slot. Turn the DIMM so that the pins align correctly with the connector.

7. Insert the DIMM into the connector. Firmly press the DIMM straight down into the connector by applying pressure on both ends of the DIMM simultaneously. The retaining clips snap into the locked position when the DIMM is firmly seated in the connector.



8. If a gap exists between the DIMM and the retaining clips, the DIMM has not been correctly installed. Open the retaining clips, remove the DIMM, then reinsert it.
9. If you have other options to install or remove, do so now.
10. Replace the support bracket.
11. Replace the side cover. See “Replacing the cover” on page 73.
12. Reconnect the external cables and power cords. Turn on the attached devices, and turn on the computer.

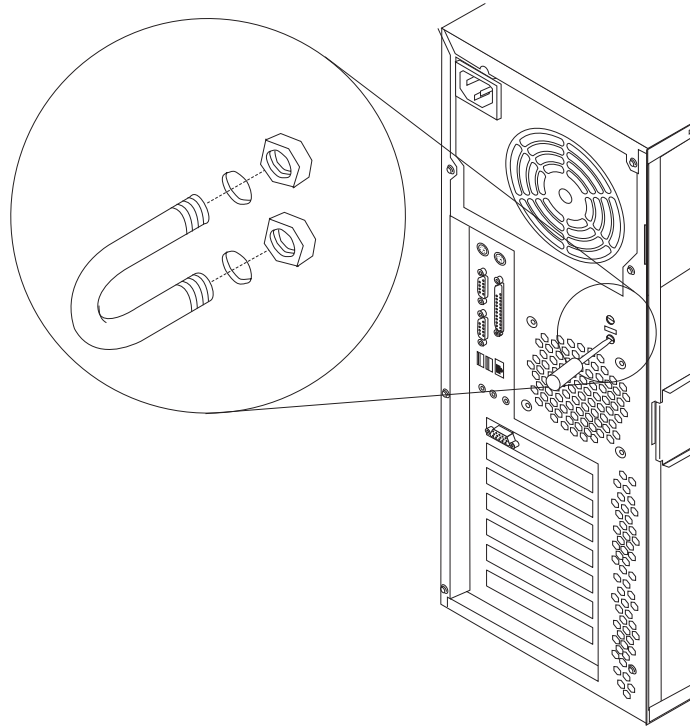
Installing a security U-bolt

To help prevent theft, you can add a security U-bolt and cable to your computer. This section discusses how to install a security U-bolt.

Do the following to install the U-bolt:

1. Review the safety precautions listed in “Safety information” on page vii.
2. Turn off the computer and all attached devices. Disconnect all external cables and power cords; then remove the cover. See “Removing the side cover” on page 58 for details.
3. Use a screwdriver to remove the two metal knockouts.
4. Insert the U-bolt through the rear panel; then attach and tighten the nuts.

5. Thread the cable through the U-bolt and around an object that is not part of or permanently secured to the building structure or foundation, and from which the cable cannot be removed. Fasten the cable ends together with a lock. After you add the security cable, be certain it does not interfere with other cables connected to the computer.



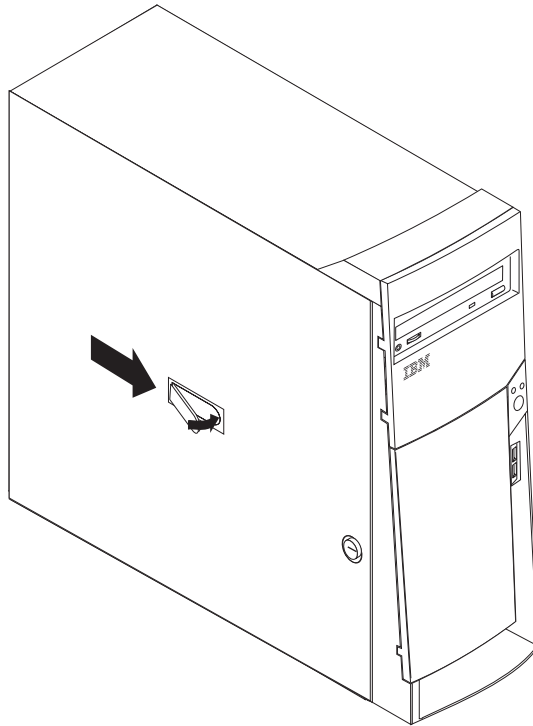
6. Reconnect the external cables and power cords, and turn on the attached devices, and then the computer.

Replacing the cover

Do the following to replace the cover of the tower model:

Note: If you removed the support bracket, reinstall it before you replace the cover. See “Removing the support bracket” on page 59 for details.

1. Clear any cables that might impede the replacement of the cover.
2. Install the side cover by placing it into position on the computer. Be certain the notches on the underside of the cover match up to the holes along the sides of the computer. Press down on the cover release latch button as you close the cover release latch to lock the cover.



3. If you have not done so already, make sure that the two front stabilizing feet are rotated outward so that they properly support the computer. Rotate each individual foot outward 90 degrees.
4. Reconnect the external cables and power cords to the computer; then connect the power cords to electrical outlets.
5. Turn on the attached devices; then turn on the computer.

Connecting external options

You can connect a number of optional external devices to the connectors on the rear and front of the computer. If your computer comes with a SCSI adapter installed, you can attach a SCSI storage expansion enclosure to your computer.

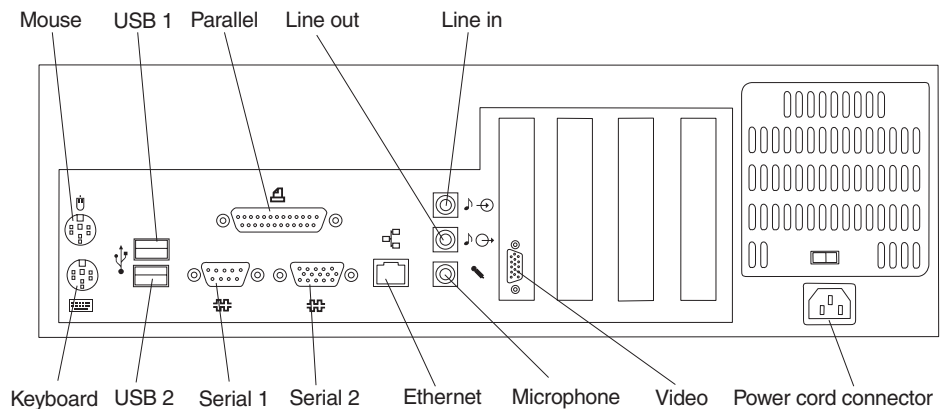
To attach an external device:

1. Read “Before you begin” on page 37, review the safety precautions listed in Statement 1 and Statement 5 in “Safety information” on page vii, and read the documentation that comes with your options.
2. Be sure that your computer and all attached devices are turned off.
3. Follow the instructions that come with the option to prepare it for installation and to connect it to the computer.

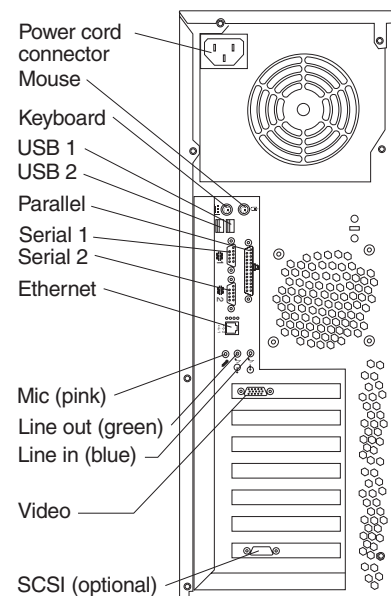
Note: If you are attaching a SCSI device, see “Ultra160 SCSI connector” on page 78 for SCSI ID and cabling information.

Input/output connector locations

Desktop model:



Tower model:



Input/output connectors

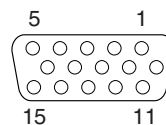
This section provides pin and other information about the input/output connectors on the rear of your computer. Refer to “Computer controls and indicators” on page 8. These connectors are:

- One mouse
- One keyboard
- One parallel
- Two serial
- One Ethernet
- Two USB
- Line in
- Line out
- Microphone
- One video (Optional multiple connectors on some models)
- One Ultra160 SCSI (some models)

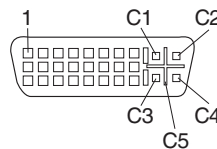
Video connector

Your computer uses an AGP adapter located in the AGP slot on the system board. The video connector is on the adapter and is located on the rear of your computer. See “Input/output connectors” for the location of this connector.

Analog video connector:



Digital (DVI-I) video connector:



Low Force Helical-60 (LFH-60) video connector:



Some models come with an AGP adapter that has dual video connectors or cables. If you have problems viewing information with a second monitor, see “Changing monitor settings” on page 20.

Models with the Fire GL 8800 video adapter come with digital-to-analog converters for each DVI-I connector.

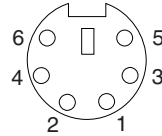
Models that come with the Matrox G450 DVI-I video adapter come with a DVI-I to dual analog monitor pig tail cable.

Models that come with the NVIDIA Quadro4 200NVS video adapter come with the LFH-60 to dual analog monitor pig-tail cable. If you want to set up two digital monitors, you need to purchase a separate dual-digital monitor pig tail cable.

Keyboard connector

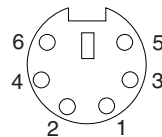
Your computer has one keyboard connector. See “Input/output connectors” on page 75 for its location.

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



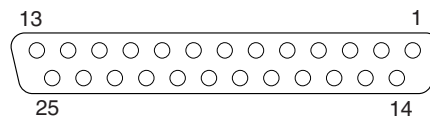
Mouse connector

Your computer has one mouse connector that supports a mouse or other pointing device. The mouse connector is located on the rear of your computer. For the location, see “Input/output connectors” on page 75.



Parallel connector

Your computer has one 25-pin, female D-shell parallel connector on the rear panel. See “Input/output connectors” on page 75 for the location of this connector. This connector supports three standard Institute of Electrical and Electronics Engineers (IEEE) 1284 modes of operation: standard parallel port (SPP), enhanced parallel port (EPP), and extended capability port (ECP).



Use the IBM Setup Utility program to configure the parallel connector as bidirectional. With this configuration, data can be read from and written to a device. In bidirectional mode, the computer supports the ECP and EPP modes.

Do the following to view or change the parallel-connector assignment:

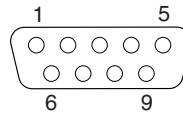
1. Restart the computer.
2. Press and hold the F1 key to launch the IBM Setup Utility program.
3. On the IBM Setup Utility menu, use the cursor keys on the keyboard to select **Devices**→**Parallel Port**.

Note: When you configure the parallel connector as bidirectional, use an IEEE 1284-compliant cable. The cable must not exceed 3 meters (9.8 ft).

4. Follow the instructions on the screen to save your changes and exit from the IBM Setup Utility menu.

Serial connectors

Your computer has two standard 9-pin D-shell serial connectors: Serial connector 1 and Serial connector 2. See “Input/output connectors” on page 75 for their location.



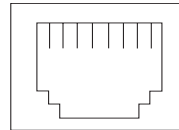
Ethernet connector

Your computer comes with an integrated Ethernet controller. This controller provides an interface for connecting to 10-Mbps or 100-Mbps networks and provides full-duplex capability, which enables simultaneous transmission and reception of data on an Ethernet local area network (LAN).

To access the Ethernet connector, attach a Category 3, 4, or 5 unshielded twisted-pair (UTP) cable to the RJ-45 connector on the rear of your computer, see “Input/output connectors” on page 75.

Important

To operate the computer within FCC Class A or Class B limits, use a category 5 Ethernet cable.



Universal Serial Bus connectors

Your computer has two Universal Serial Bus (USB) connectors for optional telephony and multimedia devices. USB devices configure automatically with Plug and Play technology.

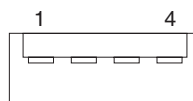
Notes:

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

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

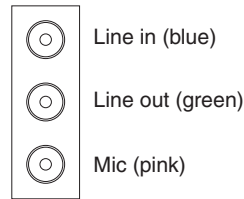
USB technology transfers data at up to 12 megabits per second (Mbps) with a maximum of 127 external devices and a maximum signal distance of 5 meters (16 ft) per segment.

USB connectors: See “Input/output connectors” on page 75 for the location of the USB connectors.



Audio connectors

The audio connectors are used to connect external audio equipment to your computer. See “Input/output connectors” on page 75 for the location of these connectors.



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

Note: The internal speaker in your computer is disabled when any device is attached to this connector.

Line in: This connector is used to accept audio signals from external devices, such as line output from external audio equipment into the computer sound system.

Microphone: This connector is used to connect a microphone to your computer when you want to record sounds on the hard-disk drive or use speech recognition software.

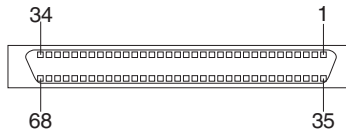
Ultra160 SCSI connector

Some computer models come with a SCSI adapter, which supports an Ultra160 SCSI internal channel in a full-featured PCI 2.1-/2.2-compliant bus master package. This configuration supports zero wait state, 32-bit memory transfers at 160 MB per second, when low voltage differential (LVD) SCSI peripherals are attached. This channel supports up to 15 SCSI devices. In addition, this adapter uses:

- Double-transition clocking to achieve high transfer rates
- Domain name validation to negotiate compatible data transfer speeds with each device
- Cyclic-redundancy checking for improved data reliability

SCSI cabling requirements: If your computer comes with a SCSI adapter, you can install five internal or external SCSI devices using the SCSI signal cable that comes with your computer. If you plan to attach external SCSI devices, you must order an additional SCSI cable. To select and order the correct cables for use with external devices, contact your IBM reseller or IBM marketing representative. To receive an indication of SCSI hard-disk drive activity, you must also connect the SCSI adapter to the SCSI LED (J35) connector on the system board. See “System board” on page 39 for the location of the SCSI connector.

Setting SCSI IDs: Each SCSI device connected to a SCSI controller must have a unique SCSI ID. This ID enables the SCSI controller to identify the device and ensure that different devices on the same SCSI channel do not attempt to transfer data simultaneously. SCSI devices that are connected to different SCSI channels can have duplicate SCSI IDs. Refer to the information that is provided with the device for instructions on setting its SCSI ID. With a SCSI adapter installed in your computer, you can use its 68-pin SCSI connector to connect different types of SCSI devices.



To install SCSI devices, you must have an optional PCI SCSI adapter installed. Refer to the information that is provided with the device for instructions to set its SCSI ID.

Chapter 6. Solving problems

This section provides basic troubleshooting information to help you resolve some problems that might occur. See the Computer Support flowchart on the following page for further information.

If you cannot locate and correct the problem using the information in this chapter, refer to “Getting information, help, and service” on page 110 for more information.

Diagnostic tools overview

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

- **Computer Support flowchart**

The Computer Support flowchart on the following page will help you determine how to access help from IBM and register your computer.

- **POST beep codes and error messages**

The power-on self-test generates beep codes and messages to indicate successful test completion or the detection of a problem. See “Power-on self-test (POST)” on page 83 for more information.

- **Diagnostic programs**

The system diagnostic programs are stored on the *Device Driver and IBM Enhanced Diagnostics* CD. These Programs are the primary methods of testing the major components of your computer. See “Diagnostic programs and error messages” on page 84 for more information.

- **Troubleshooting charts**

These charts list problem symptoms and steps to correct the problems. See the “Troubleshooting charts” on page 90 for more information.

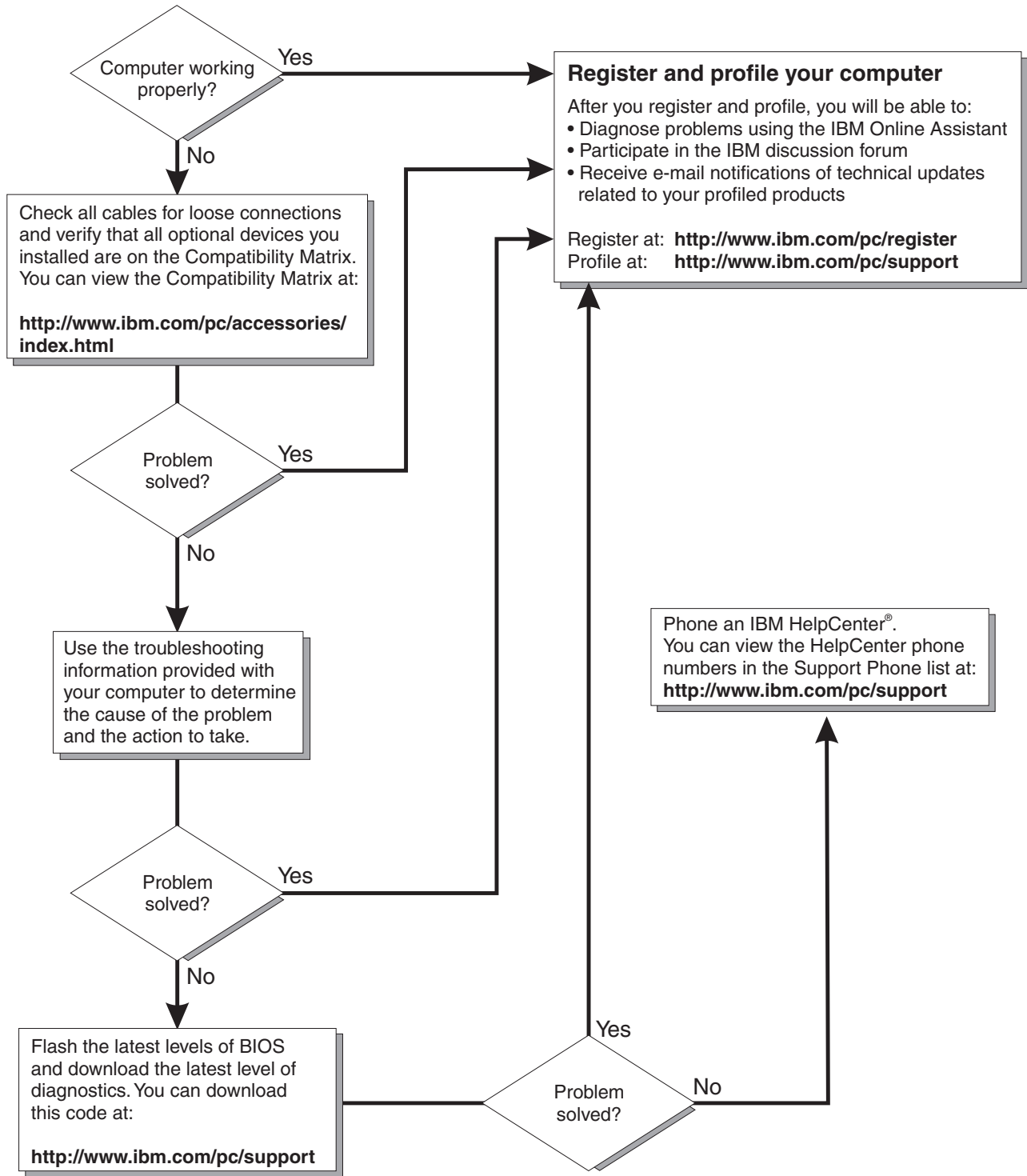
- **Customized support page**

On the World Wide Web you can create a customized support page specifically for your computer, including frequently asked questions, parts information, technical hints and tips, and downloadable files. You can also choose to receive electronic mail (e-mail) notifications whenever new information becomes available about your registered products.

The benefits of registering and profiling your IntelliStation include using the IBM Online Assistant to diagnose problems and participating in the IBM discussion forum. For more detailed information about registering and creating a customized profile for your IBM products, visit the following World Wide Web addresses:

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

Computer Support



Power-on self-test (POST)

When you turn on the computer, the Power On Self-Test (POST) performs a series of tests to check the operation of system components and some of the installed options.

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

Notes:

1. If you have a user password set, you must type the password and press Enter, when prompted, before the operating system will load.
2. A single problem might cause several error messages. When this occurs, work to correct the cause of the first error message. After you correct the cause of the first error message, the other error messages usually will resolve the next time you run the test.

The possible types of beep codes are as follows:

Repeating long beeps

Indicate a memory error. Ensure that all DIMMs are correctly installed.

One long beep and two short beeps

Indicate a video error. The BIOS cannot initialize the video screen to display any additional information. Ensure that the video adapter is correctly installed.

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

If your computer has an Ultra160 SCSI adapter installed and you receive a SCSI error message when running the SCSISelect Utility program, one or more of the following might be causing the problem:

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

To solve the problem, verify that:

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

If you have verified these items and the problem persists, run the diagnostic programs to obtain additional information about the failing device. If the error remains or recurs, call for service.

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

Diagnostic programs and error messages

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

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

Sometimes the first error to occur causes additional errors. In this case, the computer displays more than one error message. Always follow the suggested action instructions for the *first* error message that appears.

The following sections contain the error codes that might be displayed in the detailed test log and summary log, when running the diagnostic programs.

The error code format is as follows:

fff-ttt-iii-date-cc-text message

where:

fff	is the three-digit function code that indicates the function being tested when the error occurred. For example, function code 201 is for memory.
ttt	is the three-digit failure code for the exact test failure. (These codes are for trained service personnel and are described in the <i>Hardware Maintenance Manual</i> .)
iii	is the three-digit device ID. (These codes are for trained service personnel and are described in the <i>Hardware Maintenance Manual</i> .)
date	is the date that the diagnostic test was run and the error recorded.
cc	are the check digits that are used to verify the validity of the information.
text message	is the diagnostic message that indicates the reason for the problem.

Text messages

The diagnostic text message format is as follows:

Function Name: Result (test specific string)

where:

Function Name	is the name of the function being tested when the error occurred. This corresponds to the function code (fff) given in the previous list.				
Result	can be one of the following: <table><tr><td>Passed</td><td>This result occurs when the diagnostic test completes without any errors.</td></tr><tr><td>Failed</td><td>This result occurs when the diagnostic test discovers an error.</td></tr></table>	Passed	This result occurs when the diagnostic test completes without any errors.	Failed	This result occurs when the diagnostic test discovers an error.
Passed	This result occurs when the diagnostic test completes without any errors.				
Failed	This result occurs when the diagnostic test discovers an error.				

User Aborted	This result occurs when you stop the diagnostic test before it is complete.
Not Applicable	This result occurs when you specify a diagnostic test for a device that is not present.
Aborted	This result occurs when the test could not proceed because of the system configuration.
Warning	This result occurs when a possible problem is reported during the diagnostic test, such as when a device that is to be tested is not installed.

Test Specific String is additional information that is used to analyze the problem.

Starting the diagnostic programs

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

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

Using the Device Driver and IBM Enhanced Diagnostics CD

Be certain that your computer will start up with the CD-ROM drive as the first startup device. If not, use the IBM Setup Utility to change your first startup device. For information on how to use the IBM Setup Utility, see Access IBM, or refer to “Using the IBM Setup Utility program” on page 27.

Do the following to run the *Device Driver and IBM Enhanced Diagnostics* CD:

1. Insert the *Device Drivers and Enhanced Diagnostics* CD into the CD-ROM drive.
2. Turn off your computer and any attached devices.
3. Turn on all attached devices; then turn on your computer.
4. Follow the instructions on the screen.
5. When you finish running the IBM Enhanced Diagnostics and Utilities program, exit from the Program and remove the CD from the drive.
6. If you used the IBM Setup Utility to change the first startup device, restore it to the original setting.

Creating an IBM Enhanced Diagnostics diskette

The IBM Enhanced Diagnostics diskette is used to test hardware components on your computer.

You can create an *IBM Enhanced Diagnostics* diskette one of three ways:

- Create a diskette using Access IBM
- Download a program image from the World Wide Web
- Create a diskette from the Product Recovery Program

Do the following to create the diagnostics diskette using Access IBM:

1. From the Access IBM menu, click **Protect data**.
2. Click **Creating emergency diskettes**.
3. Click **Diagnostic diskette**.
4. Follow the instructions on the screen.

To create a startable *IBM Enhanced Diagnostics* diskette from the World Wide Web:

1. Go to <http://www.ibm.com/pc/support/> on the World Wide Web.
2. Download the diagnostics file for your computer to a hard disk drive directory (not to a diskette).
3. Go to a DOS prompt and change to the directory where the file was downloaded.
4. Insert a blank high-density diskette in diskette drive A.
5. Type *filename a:*
where *filename* is the name of the file you downloaded from the Web, and press Enter.

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

To create an *IBM Enhanced Diagnostics* diskette from the Product Recovery Program:

1. Shut down the operating system and restart the computer.
2. When the Prompt, To start the Product Recovery Program, press F11 is displayed, press F11.
3. From the main menu, select **System Utilities**.
4. Select **Create a diagnostic diskette**.

Using the Enhanced diagnostics diskette

Do the following to start the *IBM Enhanced Diagnostics* diskette:

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

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

Viewing the test log

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

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

Do the following to view the test log:

1. Insert the *IBM Enhanced Diagnostics* diskette or the *Device Drivers and IBM Enhanced Diagnostics* CD.
2. Shut down your operating system and restart the computer.
3. If a user password is set, the system prompts you for it. Type the password, and press Enter.

4. Run the appropriate diagnostics program and when the Diagnostic Programs screen appears, select **Utility**.
5. Select **View Test Log** from the list that appears; then follow the instructions on the screen.
6. Save the test log to a file on a diskette or to your hard disk.

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

Diagnostic error message tables

The following tables provide descriptions of the error messages that might be listed in the test log after you run the diagnostic programs.

Important

If diagnostic error messages are displayed that are not listed in the following table, make sure that your computer has the latest levels of BIOS code and diagnostics installed.

Table 2. Diagnostic error messages.

Code	Text message	Detection	Action
135	Fan failure	An expected fan is not present or is not rotating.	Accept the new fan configuration in Setup. If the problem persists, call for service.
162	Configuration error — default configuration used.	CMOS has a bad checksum and/or CRC.	Reload default settings.
164	Memory size error	System RAM size is less than expected.	Ensure that the DIMM is properly seated. 1. Reseat the failing DIMM. 2. If the problem remains, replace the DIMM. If the problem persists, call for service.
166	Boot Block Checksum Error	The Boot Block Recovery segment of the Flash part has a bad checksum.	If your computer does not have the latest level BIOS code installed, update the BIOS code to the latest level.
167	No Process BIOS Update Found	No microcode update image exists for the current microprocessor.	
175	Primary Copy of Secure Data is Damaged.	Refer to “Security” on page 29.	Refer to “Security” on page 29.
176	The System has been tampered with		
179	Boot Integrity Services Segment Error	The BIS area checksum is invalid.	If your computer does not have the latest level BIOS code installed, update the BIOS code to the latest level.

Table 2. Diagnostic error messages.

Code	Text message	Detection	Action
184	Asset Control Antenna not Detected	No antenna detected with AssetCare enabled.	Auto-configure and request (accept User password if no Administrator password set).
186	Security Hardware Control Logic Error	Refer to "Security" on page 29.	Refer to "Security" on page 29.
190	System security: Invalid Remote Change Requested		
191	System security: IBM Embedded Security Hardware Reset.		
193	System security: IBM Embedded Security Hardware Removed		
195	System security: Asset ID Antenna has been installed	AssetID antenna added.	Refer to AssetID antenna configuration matrix.
196	System Tampered Cleared	Refer to "Security" on page 29.	Refer to "Security" on page 29.
201	Memory Error	Failure in Enhanced POST memory test, or the SPD indicates an installed DIMM is not supported.	<p>If your computer does not have the latest level BIOS code installed, update the BIOS code to the latest level.</p> <p>Ensure that the DIMM is properly seated.</p> <ol style="list-style-type: none"> 1. Reseat the failing DIMM. 2. If the problem remains, replace the DIMM. <p>If the problem persists, call for service.</p>
210	Stuck key	When in POST, a stuck key has been detected.	Correct the stuck key.
211	Keyboard error	No keyboard has been detected.	<ol style="list-style-type: none"> 1. Verify that the keyboard cable is connected. 2. If the problem remains, replace the keyboard cable. <p>If the problem persists, call for service.</p>
250	System battery is dead Replace and run SETUP	Bit 7 or RTC Status Register D is set, indicating the RTP lost power.	Replace the battery. See "Replacing the battery" on page 108.

Table 2. Diagnostic error messages.

Code	Text message	Detection	Action
270	Real-time clock error	An RTC update cycle does not occur within the expected time frame.	Reset the correct time and date.
271	Check date and time settings	RTC time and/or date values out of range.	
662	Configuration Change Has Occurred	A diskette drive has been added or removed when in Enhanced POST or when password is set.	Restore the original hardware, accept the new configuration in the IBM Setup Utility program, or set the Diskette Drive A: option correctly.
1762		If Enhanced POST, Enhanced Security, or any password is set, when a hard disk has been added or removed.	Accept the new configuration in the IBM Setup Utility program or correct the hardware problem.
1780	Hard Disk Error	A hard disk failed diagnostics.	Replace the failing hard disk drive. If the problem persists, call for service.
1781			
1782			
1783			
1800	PCI/PnP Error! No hardware interrupt available	Cannot assign interrupt resource because all are used.	Correct resource shortage by removing, disabling, or rearranging devices.
1801	PCI/PnP Error! Not enough space available to shadow ROM	Cannot initialize option ROM because address space is full.	
1802	PCI/PnP Error! Not enough I/O space available	Cannot assign I/O resource because all are used.	
1803	PCI/PnP Error! Not enough memory space available	Cannot assign memory resource because all address space is full.	
1804	PCI/PnP Error! Not enough real memory space available.	Cannot assign memory resource because all address space is full.	
1805	PCI/PnP Error! Adapter ROM Checksum Error.	PCI option ROM checksum is invalid.	Remove the device and correct the checksum.
1962	No operating system found. Press F1 to repeat boot sequence.	No device in the boot sequence has a valid boot record or boot vector.	Press F1 and attempt to cycle through the startup sequence. If you do not press F1, automatically attempt to cycle through the startup sequence every 5 seconds.
5962	Configuration Change Has Occurred	If Enhanced POST, Enhanced Security, or any password has been set, when an ATAPI drive has been installed or removed.	Accept the new configuration in the IBM Setup Utility program, or correct the hardware problem.

Table 2. Diagnostic error messages.

Code	Text message	Detection	Action
8603	Pointing Device Error	No mouse has been detected. Does not display in Legacy Free mode or when Keyboardless Operation Mode is enabled.	Replace the pointing device. If the problem persists, call for service.
(Virus Warning)	Warning! The boot sector has changed. If you just enabled virus detection, then this change is expected. If not, then a boot-sector virus may be present. You should run a virus identification program to determine if your system is infected.	The boot record on the hard disk has changed since the last boot.	<p>Select one of the following options:</p> <ul style="list-style-type: none"> • Change is expected. • Change is not expected. <p>If you select expected, then the boot sector checksum is updated to reflect the current device; otherwise, the current checksum remains.</p>

Other diagnostic programs

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

Do the following to use PC-Doctor for Windows:

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

Troubleshooting charts

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

Important

If diagnostic error messages are displayed that are not listed in the following tables, make sure that your system has the latest levels of BIOS code and diagnostics installed.

See “Starting the diagnostic programs” on page 85 to test the computer. If you have run the diagnostic test programs or if running the tests does not detect the problem, call for service.

Look for the symptom in the left column of the chart. Instructions and probable solutions to the problem are in the right column. If you have just added new software or a new option and your system is not working, do the following before using the troubleshooting charts:

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

Table 3. Troubleshooting charts.

Symptom	Suggested action
CD-ROM drive	Verify that:
CD-ROM drive is not recognized.	<ol style="list-style-type: none"> 1. The primary IDE channel is enabled in the IBM Setup Utility program. 2. All cables and jumpers are installed correctly. 3. The correct device driver is installed for the CD-ROM drive. <p>If the problem persists, call for service.</p>
Diskette drive	If there is a diskette in the drive, verify that:
Diskette drive in-use light stays on, or the system bypasses the diskette drive.	<ol style="list-style-type: none"> 1. The diskette drive is enabled in the IBM Setup Utility program. 2. The diskette is not damaged. (Try another diskette if you have one.) 3. The diskette contains the necessary files to start the computer. 4. Your software program is working properly. <p>If the diskette drive in-use light stays on, or the system continues to bypass the diskette drive, call for service.</p>
Expansion enclosure	Verify that:
The SCSI expansion enclosure used to work, but does not work now.	<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. You must turn on external SCSI options before turning on the computer. <p>For more information, see your SCSI and expansion enclosure documentation.</p>
Other devices	Call for service.
Problems such as broken cover locks or indicator lights not working.	
Intermittent problems	Verify that:
A problem occurs only occasionally and is difficult to detect.	<ol style="list-style-type: none"> 1. All cables and cords are connected securely to the rear of the computer and attached options. 2. When the system is turned on, air is flowing from the rear of the computer at the fan grille. If there is no air flow, the fan is not working. This causes the computer to overheat and shut down. 3. The SCSI bus and devices are configured correctly and that the last external device in each SCSI chain is terminated correctly. <p>If the problem persists, call for service.</p>

Table 3. Troubleshooting charts.

Symptom	Suggested action
Keyboard, mouse, or pointing-device	<ol style="list-style-type: none"> 1. Make sure that the keyboard cable is properly connected to the computer. 2. Try using another keyboard.
All or some keys on the keyboard do not work.	If the problem persists, call for service.
The mouse or pointing device does not work.	<ol style="list-style-type: none"> 1. Verify that the mouse or pointing-device cable is securely connected and the device drivers are installed correctly. 2. Try using another mouse or pointing device. <p>If the problem persists, call for service.</p>
Memory	Verify that:
The amount of memory detected is less than the amount of memory installed.	<ol style="list-style-type: none"> 1. The memory modules are seated properly. 2. You have installed the correct type of memory. 3. All installed DIMMs are enabled. The computer might have automatically disabled a DIMM bank when it detected a problem. <p>If the problem persists, call for service.</p>
Monitor	Some IBM monitors have their own self-tests. If you suspect a problem with your monitor, refer to the information that comes with the monitor for adjusting and testing instructions.
Testing the monitor.	If the problem persists, call for service.
The screen is blank.	<p>Verify that:</p> <ol style="list-style-type: none"> 1. The computer power cord is plugged into the computer and a working electrical outlet. 2. The monitor cables are connected properly. 3. The monitor is turned on and the brightness and contrast controls are adjusted correctly. <p>If the problem persists, call for service.</p>
Only the cursor appears.	Call for service.
The monitor works when you turn on the computer, but goes blank when you start some application programs.	<p>Verify that:</p> <ol style="list-style-type: none"> 1. The primary monitor cable is connected to the video port. 2. You installed the necessary device drivers for the applications. <p>If the problem persists, call for service.</p>
The screen displays wavy, unreadable, rolling, distorted screen, or screen jitter.	<p>If the self-tests show the monitor is OK, consider the location of the monitor. Magnetic fields around other devices (such as transformers, appliances, fluorescent lights, and other monitors) can cause screen jitter or wavy, unreadable, rolling, or distorted screen images. If this happens, turn off the monitor. (Moving a color monitor while it is turned on might cause screen discoloration.) Then move the device and the monitor at least 305 mm (12 in.) apart. Turn on the monitor.</p> <p>Notes:</p> <ol style="list-style-type: none"> 1. To prevent diskette drive read/write errors, be sure the distance between monitors and diskette drives is at least 76 mm (3 in.). 2. Non-IBM monitor cables might cause unpredictable results. 3. An enhanced monitor cable with additional shielding is available for the 9521 and 9527 monitors. For information about the enhanced monitor cable, see your IBM reseller or IBM marketing representative. <p>If the problem persists, call for service.</p>

Table 3. Troubleshooting charts.

Symptom	Suggested action
Wrong characters appear on the screen.	<p>If the wrong language is displayed, update the BIOS code with the correct language.</p> <p>If the problem persists, call for service.</p>
Option	<p>Verify that:</p> <ol style="list-style-type: none"> 1. The option is designed for the computer. Refer to http://www.ibm.com/pc/support for option compatibility information. 2. The option is installed correctly. 3. You have not loosened any other installed options or cables. 4. You updated the configuration information in the IBM Setup Utility program. Whenever an option is changed, you might have to update the configuration. <p>If the problem persists, call for service.</p>
An IBM option that was just installed does not work.	
An IBM option that used to work does not work now.	<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. You must turn on external SCSI options before turning on the computer. <p>If the problem persists, call for service.</p>
Parallel port	<p>Verify that:</p> <ol style="list-style-type: none"> 1. The device is compatible with the computer. 2. The parallel port is enabled. <p>If the problem persists, call for service.</p>
A parallel device does not work.	
Power	<p>Verify that:</p> <ol style="list-style-type: none"> 1. The power cables are properly connected to the computer. 2. The electrical outlet functions properly. 3. The type of memory installed is correct. 4. If you just installed an option, remove it, and restart the computer. If the computer now turns on, you might have installed more options than the power supply supports. 5. The voltage-selection switch is set correctly. <p>If the problem persists, call for service.</p>
The computer does not turn on.	

Table 3. Troubleshooting charts.

Symptom	Suggested action
Printer	Verify that:
The printer does not work.	<ol style="list-style-type: none"> 1. The printer is turned on and is online. 2. The printer signal cable is connected to the correct serial or parallel port on the computer. Note: Non-IBM printer cables might cause unpredictable results. 3. You have assigned the printer port correctly in your operating computer or application program. 4. You have assigned the printer port correctly using the IBM Setup Utility program. 5. You have run the tests described in the documentation that comes with your printer. <p>If the problem persists, call for service.</p>
Serial port	
A serial device does not work.	<p>Verify that:</p> <ol style="list-style-type: none"> 1. The device is compatible with the computer. 2. Run the diagnostics for the serial port. <p>If the problem still exists, call for service.</p>
Universal Serial Bus (USB) ports	Verify that:
A USB device does not work.	<ol style="list-style-type: none"> 1. You are not trying to use a USB device during POST, if you have a standard (non-USB) keyboard attached to the keyboard port. Note: If a standard (non-USB) keyboard is attached to the keyboard port, then the USB port is disabled and no USB device will work during POST. 2. The correct USB device driver is installed. 3. Your operating system supports USB devices. <p>If the problem persists, call for service.</p>

Software error messages

These messages appear if a problem or conflict is detected by the application program, the operating computer, or both. Error messages for operating system and other software problems are typically 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.

To determine if problems are caused by the software, verify that:

1. Your computer has the minimum memory requirements needed to use the software. For memory requirements, see the information that comes with the software.

Note: If you have just installed an adapter or memory, you might have a memory address conflict.

2. The software is designed to operate on your computer.
3. Other software works on your computer.
4. The software that you are using works on another computer.

If you received any error messages when using the software program, see the information that comes with the software for a description of the messages and solutions to the problem.

If the problem remains, contact your place of purchase.

Troubleshooting the Ethernet controller

This section provides troubleshooting information for problems that might occur with the 10/100 Mbps Ethernet controller.

Network connection problems

If the Ethernet controller cannot connect to the network, check the following:

- Make sure that the cable is installed correctly.

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

If you set the Ethernet controller to operate at 100 Mbps, you must use Category 5 cabling.

If you directly connect two workstations (without a hub), or if you are not using a hub with X ports, use a crossover cable.

Note: To determine whether a hub has an X port, check the port label. If the label contains an X, the hub has an X port.

- Determine if the hub supports auto-negotiation. If not, try configuring the integrated Ethernet controller manually to match the speed and duplex mode of the hub.
- Check the LAN activity light on the rear of the computer. The LAN activity light illuminates when the Ethernet controller sends or receives data over the Ethernet network. If the LAN activity light is off, make sure that the hub and network are operating and that the correct device drivers are loaded.
- Make sure that you are using the correct device drivers, supplied with your computer.
- Check for operating system-specific causes for the problem.
- Make sure that the device drivers on your computer and the server are using the same protocol.
- Test the Ethernet controller.

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

Ethernet controller troubleshooting chart

You can use the following troubleshooting chart to find solutions to 10/100 Mbps Ethernet controller problems that have definite symptoms.

Table 4. Ethernet troubleshooting chart.

Ethernet controller problem	Suggested Action
The computer stops running when loading device drivers.	<p>The PCI BIOS IRQ settings are incorrect.</p> <p>Check the following:</p> <ul style="list-style-type: none"> • Determine if the IRQ setting assigned to the Ethernet controller is also assigned to another device in the IBM Setup Utility program. <p>Although interrupt sharing is possible for PCI devices, some devices do not function well when they share an interrupt with a dissimilar PCI device. Try changing the IRQ assigned to the Ethernet controller or the other device.</p> <ul style="list-style-type: none"> • Make sure that you are using the most recent device driver available from the World Wide Web. • Run the network diagnostic program. <p>If the problem persists, call for service.</p>
The LAN activity light does not light.	<p>Check the following:</p> <ul style="list-style-type: none"> • Make sure that you have loaded the network device drivers. • The network might be idle. Try sending data from this workstation. • Run diagnostics on the LEDs. • The function of this LED can be changed by device driver load parameters. If necessary, remove any LED parameter settings when you load the device drivers.
Data is incorrect.	<p>Check the following:</p> <ul style="list-style-type: none"> • Make sure that you are using Category 5 cables when operating the computer at 100 Mbps. • Make sure that the cables do not run close to noise-inducing sources like fluorescent lights.
The Ethernet controller stopped working when another adapter was added to the computer.	<p>Check the following:</p> <ul style="list-style-type: none"> • Make sure that the cable is connected to the Ethernet controller. • Make sure that your PCI computer BIOS code is current. • Reseat the adapter. • Determine if the IRQ setting assigned to the Ethernet adapter is also assigned to another device in the IBM Setup Utility program. <p>Although interrupt sharing is possible for PCI devices, some devices do not function well when they share an interrupt with a dissimilar PCI device. Try changing the IRQ assigned to the Ethernet adapter or the other device.</p> <p>If the problem persists, call for service.</p>
The Ethernet controller stopped working without apparent cause.	<p>Check the following:</p> <ul style="list-style-type: none"> • Run diagnostics for the Ethernet controller. • Try a different connector on the hub. • Reinstall the device drivers. Refer to your operating system documentation and to "Recovering or installing device drivers" on page 104 in this publication. <p>If the problem remains, call for service.</p>

Ethernet controller messages

The integrated Ethernet controller might display messages from the following device drivers:

- Novell NetWare or IntraNetWare computer open data-link interface (ODI)
- Network driver interface specification (NDIS) adapter for level 4.0 (Windows NT)

Novell NetWare or IntraNetWare computer ODI driver teaming messages

This section provides explanations of the error messages for the Novell NetWare or IntraNetWare computer ODI driver, and suggested actions to resolve each problem.

Table 5. NetWare driver messages for the Ethernet controller.

Message	Description
Couldn't allocate resources.	<p>Explanation: An unknown error has occurred when trying to allocate needed resources for the AFT Module.</p> <p>Action:</p> <ul style="list-style-type: none"> • Check the computer configuration. If the problem persists, contact your network administrator. • Verify that the Ethernet controller is enabled. If the Ethernet controller is enabled, run the diagnostic programs.
AFT group for primary adapter in slot <i>nnn</i> already exists.	<p>Explanation: An attempt was made to rebind an adapter already in an AFT group.</p> <p>Action: Check the AFT slot numbers for existing AFT teams. If the problem persists, contact your network administrator</p>
Error locating device control table (DCT) addresses in internal table. Make sure that you have loaded LAN drivers after loading AFT.NLM.	<p>Explanation: The bind command was entered prior to loading the device driver. The device driver must be loaded after loading AFT.NLM, but before any bind command can be issued.</p> <p>Action: Load the driver for the supported adapter and try loading the AFT module again. If the problem persists, contact your network administrator.</p>
Insufficient number of arguments specified.	<p>Explanation: The appropriate or expected number of parameters was not entered in a command.</p> <p>Action: Check the parameters required for the given command. If the problem persists, contact your network administrator.</p>
Duplicate slot numbers detected.	<p>Explanation: An attempt has been made to bind the same slot number more than once.</p> <p>Action: Check the slot numbers entered during the bind. Adapter slot numbers must be valid and unique. If the problem persists, contact your network administrator.</p>
'xxx' is not supported for AFT team.	<p>Explanation: A bind command has been issued for adapters not supported by AFT.NLM.</p> <p>Action: Make sure that you attempt to bind only adapters supported by AFT.NLM.</p>
Primary and Secondary adapters do not match. AFT group is not created.	<p>Explanation: A bind command was entered for an adapter team that is a combination of computer and client adapters. An AFT team must be a grouping of the same classification of adapter.</p> <p>Action: Verify that all the adapters bound in a team are of the same classification.</p>
Requested number of Secondary cards are not found.	<p>Explanation: The number of adapters specified in the bind command could not be located.</p> <p>Action: Verify the numbers and slot locations of the adapters to be bound. If the problem persists, contact your network administrator.</p>

Table 5. NetWare driver messages for the Ethernet controller.

Message	Description
Failed to create AFT group. Make sure that the drivers for supported adapters are loaded, primary adapter is bound to protocols, and secondary adapter is not bound to any protocols.	<p>Explanation: Binding of protocol failed. Protocol is either not bound to any adapter or is bound to more than one adapter in the group.</p> <p>Action: Ensure that the protocol is bound to only one adapter in an AFT team.</p>
Error identifying slot numbers for the specified board names.	<p>Explanation: The mapping between the board name entered and the slot number for an adapter could not be established.</p> <p>Action: Check the board name for the adapter before issuing the bind command. If the problem persists, contact your network administrator</p>
Can't unbind specified slot from AFT group. Make sure that the slot you specified is for the primary adapter in an AFT group.	<p>Explanation: The number entered in the unbind command was not the primary adapter in an AFT group.</p> <p>Action: Reissue the unbind command and specify the slot number for the primary adapter</p>
LAN adapter at slot <i>nnnn</i> (Port 0xaa) failed to reset. Check the state of the adapter.	<p>Explanation: The adapter that you specified could not be initialized.</p> <p>Action:</p> <ol style="list-style-type: none"> 1. Load the driver for the supported adapter. 2. Check that the adapter is seated properly in the slot and try loading the AFT module again. <p>If the problem persists, contact your network administrator.</p>
AFT is not supported on this version of NetWare.	<p>Explanation: The NetWare on your computer is not a version supported by AFT.</p> <p>Action: Load and bind AFT only on supported versions of NetWare (currently version 4.11 and above).</p>
Failed to allocate resources tags.	<p>Explanation: An unknown error has occurred when trying to allocate needed resources for the AFT module.</p> <p>Action: Check computer configuration. If the problem persists, contact your network administrator.</p>
Please unload all LAN drivers before unloading AFT.NLM.	<p>Explanation: An attempt was made to unload the AFT.NLM module before unloading the adapter driver.</p> <p>Action: Unload the adapter driver before unloading the AFT module.</p>

NDIS 4.0 (Windows 2000 and XP) Event Viewer messages

This section contains the error messages for the NDIS 4.0 drivers. The explanation and recommended action are included with each message.

Table 6. NDIS (Windows 2000 or Windows XP) Event Viewer messages for the Ethernet controller.

Error code (hex)	Description
0x00	<p>Explanation: The driver could not register the specified interrupt.</p> <p>Action: Contact your network administrator.</p>
0x01	<p>Explanation: One of the PCI adapters did not get the required resources.</p> <p>Action: Contact your network administrator.</p>

Table 6. NDIS (Windows 2000 or Windows XP) Event Viewer messages for the Ethernet controller.

Error code (hex)	Description
0x02	<p>Explanation: Bad node address (multicast address).</p> <p>Action: Make sure the locally administered address is valid, if one is specified. The address can not be a multicast address.</p>
0x03	<p>Explanation: Failed self-test.</p> <p>Action: Make sure a cable is attached to the Ethernet connector. If the problem persists, call for service.</p>
0x0D	<p>Explanation: Could not allocate enough memory for transmit queues.</p> <p>Action:</p> <ul style="list-style-type: none"> • If you have Windows 2000, do the following: <ol style="list-style-type: none"> 1. From the Windows 2000 desktop, click Start→Control Panel→Networks→Adapters. 2. Select your IBM Ethernet adapter from the list. 3. Click Properties→Advanced. 4. Lower the resource values that apply to the transmit queue. • If you have Windows XP Professional, do the following: <ol style="list-style-type: none"> 1. Click Start→Control Panel→Network Connections→Local Area Connection. 2. Select your IBM Ethernet adapter from the list. 3. Click Properties→Advanced. 4. Lower the resource values that apply to the transmit queue.
0x0E	<p>Explanation: Could not allocate enough memory for receive queue.</p> <p>Action:</p> <ul style="list-style-type: none"> • If you have Windows 2000, do the following: <ol style="list-style-type: none"> 1. From the Windows 2000 desktop, click Start→Control Panel→Networks→Adapters. 2. Select your IBM Ethernet adapter from the list. 3. Click Properties→Advanced. 4. Lower the resource values that apply to the transmit queue. • If you have Windows XP Professional, do the following: <ol style="list-style-type: none"> 1. Click Start→Control Panel→Network Connections→Local Area Connection. 2. Select your IBM Ethernet adapter from the list. 3. Click Properties→Advanced. 4. Lower the resource values that apply to the transmit queue.

Table 6. NDIS (Windows 2000 or Windows XP) Event Viewer messages for the Ethernet controller.

Error code (hex)	Description
0x0F	<p>Explanation: Could not allocate enough memory for other structures.</p> <p>Action:</p> <ul style="list-style-type: none"> • If you have Windows 2000, do the following: <ol style="list-style-type: none"> 1. From the Windows 2000 desktop, click Start→Control Panel→Networks→Adapters. 2. Select your IBM Ethernet adapter from the list. 3. Click Properties→Advanced. 4. Lower the resource values that apply to the transmit queue. • If you have Windows XP Professional, do the following: <ol style="list-style-type: none"> 1. Click Start→Control Panel→Network Connections→Local Area Connection. 2. Select your IBM Ethernet adapter from the list. 3. Click Properties→Advanced. 4. Lower the resource values that apply to the transmit queue.
0x10	<p>Explanation: Did not find any Ethernet controllers.</p> <p>Action: Contact your network administrator.</p>
0x11	<p>Explanation: Multiple Ethernet controllers found, but none matched the required ID.</p> <p>Action: Contact your network administrator.</p>
0x13	<p>Explanation: Did not find any Ethernet controllers that matched the required subven/subdev.</p> <p>Action: Contact your network administrator.</p>
0x16	<p>Explanation: Single adapter found, but multiple instances tried to load.</p> <p>Action: Contact your network administrator.</p>
0x17	<p>Explanation: Slot parameter not specified in the registry.</p> <p>Action: Call for service.</p>
All other 4-character hexadecimal codes	<p>Action: Call for service.</p>

Ethernet teaming messages

This section displays the messages associated with Ethernet teaming.

Table 7. NDIS (Windows 2000 or Windows XP) driver teaming messages for the Ethernet controller.

Event ID	Type	Description
01	Error	<p>Explanation: Team name and physical adapter name are the same. This is an invalid configuration.</p> <p>Action: Reconfigure the adapter team by double-clicking the PROSet icon in the control panel.</p>
02	Error	<p>Explanation: Unable to allocate required resources.</p> <p>Action: Free some memory resources and restart.</p>

Table 7. NDIS (Windows 2000 or Windows XP) driver teaming messages for the Ethernet controller.

Event ID	Type	Description
03	Error	Explanation: Unable to read required registry parameters. Action: Reconfigure the adapter team by double-clicking the PROSet icon in the control panel.
04	Error	Explanation: Unable to bind to physical adapter. Action: Reconfigure the adapter team by double-clicking the PROSet icon in the control panel.
05	Error	Explanation: Unable to initialize an adapter team. Action: Reconfigure the adapter team by double-clicking the PROSet icon in the control panel.
06	Informational	Explanation: Team <i>nn</i> . Primary adapter is initialized. Action: None.
07	Informational	Explanation: Team <i>nn</i> . Secondary adapter is initialized. Action: None.
08	Informational	Explanation: Team <i>nn</i> . Team is initialized. Action: None.
09	Informational	Explanation: Team <i>nn</i> . Virtual adapter is initialized. Action: None.
10	Informational	Explanation: Team <i>nn</i> . Primary adapter is switching over. Action: None.
11	Warning	Explanation: Team <i>nn</i> . Adapter link down. Action: Make sure the adapter is functioning properly.
12	Informational	Explanation: Team <i>nn</i> . Secondary adapter took over. Action: None.
13	Warning	Explanation: Team <i>nn</i> . Secondary adapter is deactivated from the team. Action: Make sure the secondary adapter is functioning properly and that the adapter cable is securely connected to the LAN.
14	Informational	Explanation: Team <i>nn</i> . Secondary adapter has rejoined the team. Action: None.
15	Informational	Explanation: Team <i>nn</i> . Secondary adapter link is working. Action: None.
16	Error	Explanation: Team <i>nn</i> . The last adapter has lost its link. Network connection has been lost. Action: Shut down the computer and replace the adapters; then restart the computer to reestablish the connection.
17	Informational	Explanation: Team <i>nn</i> . An adapter has reestablished the link. Network connection has been restored. Action: None.

Table 7. NDIS (Windows 2000 or Windows XP) driver teaming messages for the Ethernet controller.

Event ID	Type	Description
18	Informational	Explanation: Team <i>nn</i> . Preferred primary adapter has been detected. Action: None.
19	Informational	Explanation: Team <i>nn</i> . Preferred secondary adapter has been detected. Action: None.
20	Informational	Explanation: Team <i>nn</i> . Preferred primary adapter took over. Action: None.
21	Informational	Explanation: Team <i>nn</i> . Preferred secondary adapter took over. Action: None.
22	Warning	Explanation: Team <i>nn</i> . Primary adapter does not sense any probes. Possible reason: partitioned team. Action: Make sure the cables of the adapter team are connected to the same LAN segment. Reconfigure the team if necessary.
23	Error	Explanation: A virtual adapter failed to initialize. Action: Make sure the cable to the adapter is connected to the LAN. Reconfigure if necessary.
24	Error	Explanation: Adapter failed to join because it lacked IPSec TaskOffLoad capabilities. Action: Replace adapter.
25	Error	Explanation: Adapter failed to join because it lacked TCP CheckSum TaskOffLoad capabilities. Action: Replace adapter.
26	Error	Explanation: Adapter failed to join because it lacked TCP LargeSend TaskOffLoad capabilities. Action: Replace adapter.
27	Error	Explanation: Adapter failed to join because of insufficient PnP capabilities. Action: Reconfigure the adapters.
28	Error	Explanation: Adapter failed to join because MaxFrameSize too small. Action: Replace adapter.
29	Error	Explanation: Adapter failed to join because MulticastList too small. Action: Replace adapter.
30	Informational	Explanation: <i>nn</i> has successfully joined to team configuration. Action: None
31	Informational	Explanation: <i>nn</i> has successfully removed from team configuration. Action: None
32	Warning	Explanation: An illegal loopback situation has occurred on the adapter in device <i>nn</i> . Action: Check the configuration to verify that all adapters in the team are connected to 802.3ad compliant switch ports.

Table 7. NDIS (Windows 2000 or Windows XP) driver teaming messages for the Ethernet controller.

Event ID	Type	Description
33	Warning	<p>Explanation: No 802.3ad response from the link partner of any adapters in the team.</p> <p>Action: Check the configuration to verify that all adapters in the team are connected to 802.3ad compliant switch ports.</p>
34	Warning	<p>Explanation: More than one Link Aggregation Group was found. Only one group will be functional within the team.</p> <p>Action: None.</p>
35	Warning	<p>Explanation: Initializing team nn with xx missing adapters.</p> <p>Action: Check the configuration to verify that all the adapters are present and functioning.</p>
36	Error	<p>Explanation: Initializing Team nn failed. Not all base drivers have the correct MAC address. ANS will not load.</p> <p>Action: Reconfigure the adapters and reassign MAC addresses.</p>

Intel Boot Agent messages

The Intel Boot Agent might display one or more of the following messages during initialization:

Table 8. Intel Boot Agent messages.

Message	Description
Information messages	
This option has been locked and cannot be changed.	<p>Explanation: This message appears when you try to change a configuration setting that has been locked by your system administrator. This message can appear either from within the PROSet's Boot Agent tab when operating in Windows 2000 or Windows XP or from the configuration setup menu when operating in a stand-alone environment.</p> <p>Action: If you think you should be able to change the configuration setting, consult your system administrator.</p>
Adapter-related error messages	
PXE-04: The LAN adapter is not functioning correctly or the wrong Boot Agent is installed. The Boot Agent cannot continue.	<p>Explanation: The Boot Agent was unable to read one or more of the adapter PCI configuration registers. The adapter might be misconfigured, or the wrong Boot Agent image might be installed on the adapter. The Boot Agent will return control to the BIOS and not attempt to remote boot.</p> <p>Action: Try to update the flash image. If this does not solve the problem, contact your system administrator or IBM.</p>
PXE-05: The LAN adapter's configuration is corrupted or has not been initialized. The Boot Agent cannot continue.	<p>Explanation: The Boot Agent determined that the adapter EEPROM checksum is incorrect. The agent will return control to the BIOS and not attempt to remote boot.</p> <p>Action: Try to update the flash image. If this does not solve the problem, contact your system administrator or IBM.</p>

Table 8. Intel Boot Agent messages.

Message	Description
Media test failure, check cable.	<p>Explanation: The adapter did not detect a viable network connection.</p> <p>Action: Verify that a network cable has been plugged into the Ethernet connector.</p>

Recovering your operating system and preinstalled software

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

Notes:

1. The Product Recovery Program is provided on the computer hard disk drive to assist with software recovery.
2. The recovery process replaces all information stored on drive C. If possible, back up your data files before starting this process.

Recovering or installing device drivers

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

On some IBM computers, device drivers are located in the C:\IBMTOOLS\DRIVERS directory. Other device drivers are on the software media that come with individual devices.

Notes:

1. Before you can recover or install device drivers, your operating system must be installed on your computer.
2. Before you start recovering or installing device drivers, make sure that you have the documentation and software media for the device.
3. Device drivers for IBM devices and the instructions to install them (README.TXT) are located on the *Device Drivers and IBM Enhanced Diagnostics CD* and in the C:\IBMTOOLS\DRIVERS directory.
4. The latest device drivers are also available at <http://www.ibm.com/pc/support/> on the World Wide Web.

Recovering the operating system

Your computer has the Product Recovery Program on a hidden partition of the hard disk drive. If the hard disk drive becomes damaged or you replace the hard disk drive, contact IBM to order the *IBM Product Recovery CD* to recover your operating system, applications, and device drivers.

Performing a partial or full recovery

Attention: The Product Recovery program will erase all files on drive C only. A *full recovery* will restore the operating system, device drivers, and applications. A *partial recovery* will restore your operating system and device drivers without restoring applications.

Important

If you are recovering your operating system from a *Product Recovery* CD and you have more than one CD, always start with *Product Recovery CD 1*.

Do the following to recover the operating system:

1. If you are recovering your software using a *Product Recovery* CD, insert the CD into the CD-ROM or DVD-ROM drive. If you are using the Product Recovery Program on the hard disk drive, continue to the next step.
2. If possible, shut down your operating system normally.
3. If your computer is still on, turn it off.
Note: If the computer will not turn off after you hold down the power button for at least four seconds, unplug the power cord and wait a few seconds before reconnecting it.
4. Turn on your computer. Wait for the prompt:
To start the Product Recovery program, press F11.
Quickly press F11. The prompt displays for only a few seconds. Wait for the Program menu.
If the DOS command prompt or the F11 prompt is not displayed, See “Using the Recovery Repair diskette”.
5. You might have a choice of operating systems to recover. Select the operating system you want.
6. Select the recovery options you want and follow the instructions on the screen.
7. When recovery is complete, exit from the program. If necessary, remove the CD from the CD-ROM or DVD-ROM drive.
8. Restart the computer.

Using the Recovery Repair diskette

In some circumstances, files on your hard disk might become unusable so that the F11 prompt is not displayed when you start up your computer. Using the following procedure, you will be able to access the Product Recovery Program on the hard disk drive.

1. Insert the *Recovery Repair* diskette.
2. Turn off your computer.
3. Turn on your computer, and follow the directions on the screen.

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

If an error message is displayed during the repair operation and the repair operation cannot be completed, you might have a problem with the Product Recovery Program or the partition that contains the Product Recovery Program. Use a Product Recovery CD to access the Product Recovery Program. To obtain a Product Recovery CD, contact IBM to order a Product Recovery CD for your computer. See “Getting information, help, and service” on page 110 for details.

Using ConfigSafe and the Save Our System (SOS) feature

Before making any changes to your computer configuration, use ConfigSafe to take a snapshot of your current operating system configuration. ConfigSafe automatically takes a snapshot of your operating system configuration the first time you start your

computer. ConfigSafe can be used as a troubleshooting tool, especially if problems occur after installing a new application or option. ConfigSafe can take regular snapshots of the computer configuration on a schedule of your choosing. You can use the snapshot feature to restore configuration settings.

If 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 IBM HelpCenter®. The IBM technical support representative will use the information in this report to help you.

To use ConfigSafe, do one of the following:

- If you have Windows 2000 Professional:
 1. From the Windows desktop, click **Start** → **ConfigSafe** → **ConfigSafe**.
 2. Follow the instructions on the screen.
 3. When finished, exit from ConfigSafe.
- If you have Windows XP Professional:
 1. Click **Start** → **Access IBM** → **Data backup and restore** → **Configuration backup-and-restore**.
 2. Click the shortcut button after the description of ConfigSafe.
 3. Follow the instructions on the screen.

ConfigSafe has an SOS feature that can be used in DOS if your Windows desktop becomes unusable. Do the following to use the SOS feature of ConfigSafe:

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

Note: If the problem is not resolved, repeat these steps selecting a different saved configuration. If the problem cannot be solved with a saved configuration, see “Getting information, help, and service” on page 110.

ConfigSafe has an online help system.

Erasing a lost or forgotten password (clearing CMOS)

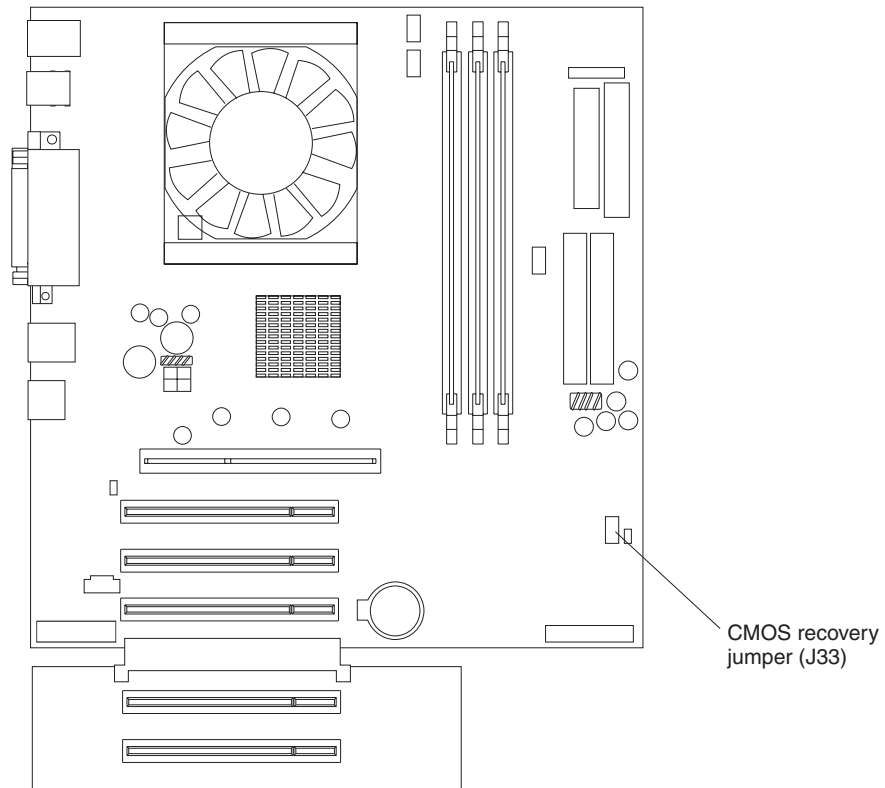
This section applies to lost or forgotten passwords. For more information about lost or forgotten passwords, see Access IBM.

To set the CMOS recovery jumper and erase a forgotten password:

1. Review the “Safety information” on page vii.
2. Turn off the computer and all attached devices.
3. Unplug the power cord.
4. Remove the cover. See “Removing the cover” on page 41 or “Removing the side cover” on page 58.

5. Locate the clear CMOS/recovery jumper on the system board, removing any adapters that impede access to the jumper. See “System board” on page 39 or “System and PCI extender boards” on page 55 for the location of the jumper.

Note: The following illustration shows the IntelliStation E Pro system board with the PCI extender card. The desktop model does not have this extender card, but it is otherwise identical to the illustration.



6. Move the jumper from pins 1 and 2 to the maintenance, or configure position (pins 2 and 3).
7. Replace any adapters that were removed and replace the cover. For the desktop model, see “Replacing the cover” on page 53. For the tower model, see “Replacing the cover” on page 73

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

8. Connect the computer to a power source, keyboard, monitor, and mouse.
9. Turn on the computer. The IBM Setup Utility is displayed.
10. Follow the instructions to erase the existing password or create a new password.
11. Select **Save and exit the Setup Utility** and press Enter.

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

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 correctly. If this happens, perform the following procedure:

1. Turn off the computer and all attached devices.
2. Unplug all power cords from electrical outlets and remove the computer cover. For the desktop model, see “Removing the cover” on page 41. For the tower model, see “Removing the side cover” on page 58 and “Removing the support bracket” on page 59.
3. Locate the clear CMOS recovery jumper on the system board, removing any adapters that impede access to the jumper. See “CMOS recovery jumper” on page 41 for the location of the CMOS recovery jumper.
4. Move the jumper to the adjacent pair of jumper pins.
5. Replace any adapters that were removed and replace the cover. See “Replacing the cover” on page 73. Reconnect the power cords for the computer and monitor to electrical outlets.
6. Insert the POST/BIOS update (flash) diskette into drive A, and turn on the computer and monitor.
7. After the update session completes, remove the diskette from the diskette drive, and turn off the computer and monitor.
8. Unplug all power cords from electrical outlets, and remove the cover.
9. Remove any adapters that impede access to the CMOS recovery jumper.
10. Replace the clear CMOS recovery jumper to its original position.
11. Replace any adapters that were removed.
12. Replace the cover, and reconnect all cables that were disconnected.
13. Turn on the computer to restart the operating system.

Replacing the battery

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

Statement 2



CAUTION:

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

Do not:

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

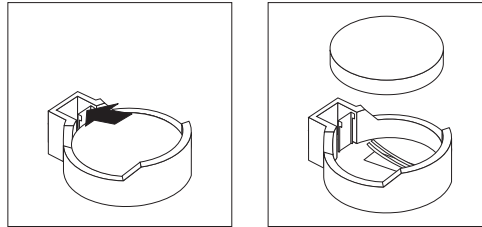
Dispose of the battery as required by local ordinances or regulations.

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

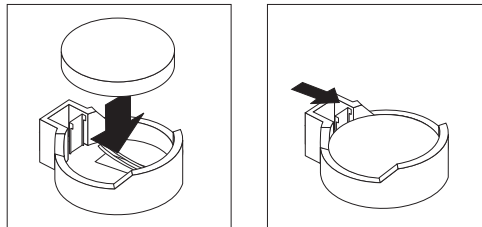
Note: After you replace the battery, you must reconfigure your system and reset the system date and time.

Do the following to replace the battery:

1. Follow any special handling and installation instructions supplied with the replacement battery.
2. Turn off the computer and all attached devices. Disconnect all external cables and power cords; then remove the computer cover.
3. Do the following to remove the battery:
 - a. Use one fingernail to press the top of the battery clip away from the battery. The battery pops up when released.
 - b. Use your thumb and index finger to lift the battery from the socket.



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



5. Replace the cover and connect the cables.
6. Turn on the system.
7. Start the Configuration/Setup Utility program and set configuration parameters.
 - Set the system date and time.
 - Set passwords if necessary.
 - Save the configuration.

Getting information, help, and service

If you need help, service, or technical assistance or just want more information about IBM products, you will find a wide variety of sources available from IBM to assist you. This section contains information about where to go for additional information about IBM and IBM products, what to do if you experience a problem with your computer, and whom to call for service should it be necessary.

Getting information

Information about your IBM computer and preinstalled software, if any, is available in the documentation that comes with your computer. That documentation includes printed books, online books, README files, and help files. In addition, information about IBM products is available on the World Wide Web and through the IBM Automated Fax System.

Using the World Wide Web

On the World Wide Web, the IBM 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, at <http://www.ibm.com/pc/support/>.

If you click **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. In addition, you can choose to receive e-mail notifications whenever new information becomes available about your registered products.

You also can order publications through the IBM Publications Ordering System at <http://www.elink.ibm.com/public/applications/publications/cgibin/pbi.cgi>.

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. In the U.S. and Canada, to access the IBM Automated Fax System, call 1-800-426-3395.

Getting help and service

If you have a problem with your computer, you will find a wide variety of sources available to help you.

Using the documentation and diagnostic programs

Many computer problems can be solved without outside assistance. If you experience a problem with your computer, the first place to start is the troubleshooting information in your computer documentation. If you suspect a software problem, see the documentation, including README files and online help, that comes with the operating system or application program.

Most IBM computers and servers come with a set of diagnostic programs that you can use to help you identify hardware problems. See the troubleshooting information in your computer documentation for instructions on using the diagnostic programs.

The troubleshooting information or the diagnostic programs might tell you that you need additional or updated device drivers or other software. IBM maintains pages on the World Wide Web where you can get the latest technical information and download device drivers and updates. To access these pages, go to <http://www.ibm.com/pc/support/> and follow the instructions.

Calling for service

If you have tried to correct the problem yourself and still need help, during the warranty period, you can get help and information by telephone through the IBM PC HelpCenter®. 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 selected Engineering Changes (ECs) available that apply to your hardware.

The following items are not covered:

- Replacement or use of non-IBM parts or nonwarranted IBM parts. All warranted parts contain a 7-character identification in the format IBM FRU XXXXXXX.
- 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 Statement of Limited Warranty for a full explanation of IBM warranty terms. Be sure to retain your proof of purchase to obtain warranty service.

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 a.m. to 6 p.m.

Note: Response times vary; may exclude some holidays.

If possible, be at your computer when you call. Please have the following information ready:

- 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

Telephone numbers

Phone numbers are subject to change without notice. For the most up-to-date phone numbers, go to <http://www.ibm.com/pc/support/> and click **Support Phone List**.

Country		Telephone number
Austria	Österreich	01-24 592 5901
Belgium - Dutch	Belgie	02-210 9820
Belgium - French	Belgique	02-210 9800
Canada	Toronto only	416-383-3344
Canada	Canada - all other	1-800-565-3344
Denmark	Danmark	45 20 82 00
Finland	Suomi	09-459 6960
France	France	02 38 55 74 50
Germany	Deutschland	07032-1549 201
Ireland	Ireland	01-815 9200
Italy	Italia	02-7031 6101
Luxembourg	Luxembourg	298-977 5063
Netherlands	Nederland	020-514 5770
Norway	Norge	66 81 11 00
Portugal	Portugal	21-791 51 47
Spain	España	91-662 49 16
Sweden	Sverige	08-477 4420
Switzerland	Schweiz/Suisse/Svizzera	0583-33-09-00
United Kingdom	United Kingdom	01475-555 055
U.S.A. and Puerto Rico	U.S.A. and Puerto Rico	1-800-772-2227

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

Other services

IBM Update Connector™ is a remote communication tool that you can use with some IBM computers to communicate with the HelpCenter. Update Connector enables you to receive and download updates for some of the software that might come with your computer.

If you travel with your computer or relocate it to a country where your IntelliStation machine type is sold, your computer might be eligible for International Warranty Service, which automatically entitles you to obtain warranty service throughout the warranty period. Service will be performed by IBM or by IBM resellers who are authorized to perform warranty service.

Service methods and procedures vary by country, and some services might not be available in all countries. International Warranty Service is delivered through the method of service (such as depot, carry-in, or on-site service) that is provided in the servicing country. Service centers in certain countries might not be able to service all models of a particular machine type. In some countries, fees and restrictions might apply at the time of service.

To determine whether your computer is eligible for International Warranty Service and to view a list of the countries where service is available, go to <http://www.ibm.com/pc/support/>, and click **Warranty Lookup**. Eligible IBM computers are identified by their four-digit machine types. For more information about International Warranty Service, see Service Announcement 601-034 at <http://www.ibm.com/>. Click **Support & downloads**, click **Announcement letters**, and click **Announcements search**. In the **Search by letter number only** field, type 601-034, and click **Search**.

IBM Integrated Technology Services offers a broad range of information technology support, implementation, and management services. For more information about these services, refer to the Integrated Technology Services Web site at <http://www.ibm.com/services/its/>.

For technical assistance with the installation of, or questions related to, Service Packs for your preinstalled Microsoft® Windows® product, refer to the Microsoft Product Support Services Web site at <http://support.microsoft.com/directory/>, or you can contact the IBM HelpCenter. Some fees might apply.

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 service name might vary by country or region.

For more information about these services, see the online information.

Appendix A. Using the Software Selections CD

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

Important:

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

Notes:

1. The *Software Selections CD* does not contain operating systems. Before you can use the CD, your operating system must be installed.
2. Not all software is available for all operating systems. See the *Software Selections CD* to find out which programs are available for your operating system.

Features of the Software Selections CD

The *Software Selections CD* contains application programs and support software for use with your computer.

You can use the CD to:

- Install software products directly from the CD on models equipped with a CD-ROM drive.
- Create an image of the *Software Selections CD* on your hard disk drive or on a LAN disk and install the software products from that image.

The *Software Selections CD* is easy to use and automates installation procedures for most programs. It also has a help system that describes the features of the CD.

The programs 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 about how to view this license agreement, see Appendix D, "Viewing the license agreement," on page 123.

Starting the Software Selections CD

To use the *Software Selections CD*, insert the CD into your CD-ROM drive. The Software Selections program starts automatically if the auto-run feature is enabled.

If the auto-run feature is disabled in your computer, you can use the *Software Selections CD* by using any of the following options:

- Complete the following steps to start from the desktop:
 1. Place the *Software Selections CD* in the CD-ROM drive.
 2. Click the **Software Selections** icon on the Windows desktop.
 3. The Software Selections menu appears.
- Complete the following steps to start from Access IBM:
 1. Double-click the **Access IBM** icon; then, click **Customize** → **Installing additional software**.
 2. You will be prompted to insert the *Software Selections CD* in the CD-ROM drive. The Software Selections main menu appears after you insert the CD into the CD-ROM drive and close the drive tray.

After a program is installed, you can access it by clicking **Start** → **Programs** and selecting it from the menu. For most programs, support documentation is built into the online Help system; for some, online documentation is also provided.

Installing software using the Software Selections CD

Complete the following steps to use the *Software Selections* CD to install software programs:

1. In the Software Selections menu, click the check box next to each software program you want to install.
2. After selecting the programs, 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 clear your selections.
3. To complete the installation, follow the instructions on the screen.

After a program is installed, you can access it by clicking **Start** → **Programs** and selecting it from the menu. For most programs, support documentation is included in the online help system; for some, online documentation (such as a README file) is also provided.

Appendix B. Caring for your computer

This chapter provides information to help maintain your computer on a day-to-day basis to ensure proper computer operation.

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.

Attention

Be certain 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.

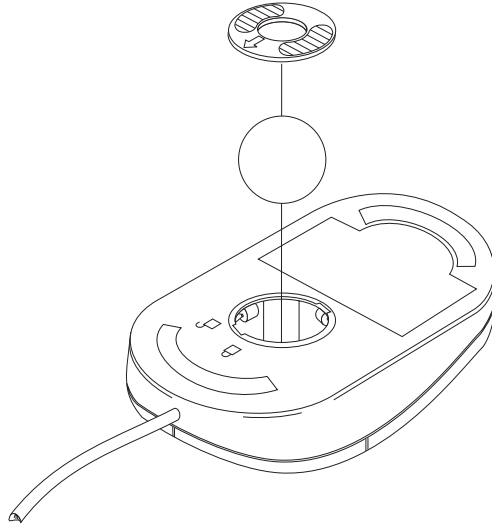
To clean the screen surface, wipe it gently with a soft, dry cloth, or blow on the screen to remove grit and other loose particles. Then use a soft cloth moistened with a nonabrasive liquid glass cleaner.

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 turning the retainer ring to the unlocked position.



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 turning the ring to the locked position.
8. Reconnect the mouse cable to the computer.

Moving your computer

Statement 4



≥ 18 kg (39.7 lb)



≥ 32 kg (70.5 lb)



≥ 55 kg (121.2 lb)

CAUTION:
Use safe practices when lifting.

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. Refer to 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.

Appendix C. Computer records

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

Serial numbers and keys

Record and retain the following information.

Product Name	IntelliStation E Pro
Model/Type (M/T)	
Serial Number (S/N)	
Key manufacturer address, phone number and key code number	

The model and type (M/T) numbers and the serial number (S/N) are located on a label near the bottom front bezel of your computer.

Appendix D. Viewing the license agreement

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

- If you have Windows 2000 Professional, do the following:
 1. Double-click the **Access IBM** icon.
 2. In the Access IBM window, click **Solve problems**.
 3. Click **IBM International License Agreement**.
- If you have Windows XP Professional, do the following:
 1. Click **Start**.
 2. Click **Access IBM**.
 3. Click **IBM International License Agreement**.

Appendix E. Warranty information

This appendix contains the warranty period for your product, information about obtaining warranty service and support, and the IBM Statement of Limited Warranty.

Warranty period

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

Machine - IntelliStation E Pro Types 6204 and 6214

Warranty period - Three years

Warranty service and support

With the original purchase of an IBM server product, you have access to extensive support. During the IBM Machine warranty period, you may call IBM or your reseller for problem-determination assistance under the terms of the IBM Statement of Limited Warranty.

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, either on-site or at an IBM service center as determined by IBM.
- **Engineering Change management** - Occasionally, there might be changes that are required after a product has been shipped from IBM. In those instances, IBM will make Engineering Changes (ECs) available that apply to your hardware.

The following items are not covered under warranty service:

- Replacement or use of non-IBM parts. All IBM parts contain a 7-character identification in the format IBM FRU XXXXXXX.
- Identification of non-IBM software problem sources.
- Installation of customer replaceable units (CRUs).
- Installation and configuration of machine code or licensed internal code that is designated as customer installable.

If you do not register your server with IBM, you might be required to present proof of purchase to obtain warranty service.

Before you call for service

You can solve many problems without outside assistance by following the troubleshooting procedures that IBM provides in the online help or in the publications that are provided with your server and software.

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

If you suspect a software problem, refer to the information for the operating system or application program.

Calling for service

Please have the following information ready:

- Machine type, model, and serial number
- Description of the problem
- Exact wording of any error messages
- Hardware and software configuration information

To find the telephone number for the HelpCenter nearest you, see “Telephone numbers” on page 112.

IBM Statement of Limited Warranty Z125-4753-06 8/2000

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 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 Limited 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.

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 ("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.

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.

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.

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Items Not Covered by Warranty: IBM does not warrant uninterrupted or error-free operation of a Machine. 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 a Machine, contact IBM or your reseller. If you do not register your Machine with IBM, you may be required to present proof of purchase.

During the warranty period, IBM or your reseller, if approved by IBM to provide warranty service, provides without charge certain types of repair and exchange service 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. At its discretion, IBM or your reseller will 1) either repair or exchange the failing Machine and 2) provide the service either at your location or a service center. IBM or your reseller will also manage and install selected engineering changes that apply to the Machine.

Some parts of IBM Machines are designated as Customer Replaceable Units (called "CRUs"), e.g., keyboards, memory, or hard disk drives. IBM ships CRUs to you for replacement by you. You must return all defective CRUs to IBM within 30 days of your receipt of the replacement CRU. You are responsible for downloading designated Machine Code and Licensed Internal Code updates from an IBM Internet Web site or from other electronic media, and following the instructions that IBM provides.

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. 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.

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), except for any liability that cannot be waived or limited by applicable laws, 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 charges (if recurring, 12 months' charges apply) for the Machine that is subject of the claim. For purposes

of this item, the term "Machine" includes Machine Code and Licensed Internal Code.

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, LOST PROFITS OR LOST 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.

Governing Law: Both you and IBM consent to the application of the laws of the country in which you acquired the Machine to govern, interpret, and enforce all of your and IBM's rights, duties, and obligations arising from, or relating in any manner to, the subject matter of this Agreement, without regard to conflict of law principles.

Part 2 - Country-unique Terms

AMERICAS

BRAZIL

Governing Law: *The following is added after the first sentence:*

Any litigation arising from this Agreement will be settled exclusively by the court of Rio de Janeiro.

NORTH AMERICA

Warranty Service: *The following is added to this Section:*

To obtain warranty service from IBM in Canada or the United States, call 1-800-IBM-SERV (426-7378).

CANADA

Governing Law: *The following replaces "laws of the country in which you acquired the Machine" in the first sentence:*

laws in the Province of Ontario.

UNITED STATES

Governing Law: *The following replaces "laws of the country in which you acquired the Machine" in the first sentence:*

laws of the State of New York.

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 similar legislation and are only limited to the extent permitted by the applicable legislation.

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 or other similar legislation, 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.

Governing Law: *The following replaces "laws of the country in which you acquired the Machine" in the first sentence:*
laws of the State or Territory.

CAMBODIA, LAOS, AND VIETNAM

Governing Law: *The following replaces "laws of the country in which you acquired the Machine" in the first sentence:*
laws of the State of New York.

The following is added to this Section:

Disputes and differences arising out of or in connection with this Agreement shall be finally settled by arbitration which shall be held in Singapore in accordance with the rules of the International Chamber of Commerce (ICC). The arbitrator or arbitrators designated in conformity with those rules shall have the power to rule on their own competence and on the validity of the Agreement to submit to arbitration. The arbitration award shall be final and binding for the parties without appeal and the arbitral award shall be in writing and set forth the findings of fact and the conclusions of law.

All proceedings shall be conducted, including all documents presented in such proceedings, in the English language. The number of arbitrators shall be three, with each side to the dispute being entitled to appoint one arbitrator.

The two arbitrators appointed by the parties shall appoint a third arbitrator before proceeding upon the reference. The third arbitrator shall act as chairman of the proceedings. Vacancies in the post of chairman shall be filled by the president of the ICC. Other vacancies shall be filled by the respective nominating party. Proceedings shall continue from the stage they were at when the vacancy occurred.

If one of the parties refuses or otherwise fails to appoint an arbitrator within 30 days of the date the other party appoints its, the first appointed arbitrator shall be the sole arbitrator, provided that the arbitrator was validly and properly appointed.

The English language version of this Agreement prevails over any other language version.

HONG KONG AND MACAU

Governing Law: *The following replaces "laws of the country in which you acquired the Machine" in the first sentence:*
laws of Hong Kong Special Administrative Region.

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

Limited Warranty, IBM's liability will be limited to the charge paid by you for the individual Machine that is the subject of the claim.

JAPAN

Governing Law: *The following sentence is added to this Section:*

Any doubts concerning this Agreement will be initially resolved between us in good faith and in accordance with the principle of mutual trust.

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.

PEOPLE'S REPUBLIC OF CHINA (PRC)

Governing Law: *The following replaces this Section:*

Both you and IBM consent to the application of the laws of the State of New York (except when local law requires otherwise) to govern, interpret, and enforce all your and IBM's rights, duties, and obligations arising from, or relating in any manner to, the subject matter of this Agreement, without regard to conflict of law principles.

Any disputes arising from or in connection with this Agreement will first be resolved by friendly negotiations, failing which either of us has the right to submit the dispute to the China International Economic and Trade Arbitration Commission in Beijing, the PRC, for arbitration in accordance with its arbitration rules in force at the time. The arbitration tribunal will consist of three arbitrators. The language to be used therein will be English and Chinese. An arbitral award will be final and binding on all the parties, and will be enforceable under the Convention on the Recognition and Enforcement of Foreign Arbitral Awards (1958).

The arbitration fee will be borne by the losing party unless otherwise determined by the arbitral award.

During the course of arbitration, this Agreement will continue to be performed except for the part which the parties are disputing and which is undergoing arbitration.

EUROPE, MIDDLE EAST, AFRICA (EMEA)

THE FOLLOWING TERMS APPLY TO ALL EMEA COUNTRIES:

The terms of this Statement of Limited Warranty apply to Machines purchased from IBM or an IBM reseller.

Warranty Service: If you purchase 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 purchase 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.

If you purchase an IBM Machine in a Middle Eastern or African country, you may obtain warranty service for that Machine from the IBM entity within the country of purchase, if that IBM entity provides warranty service in that country, or from an IBM reseller, approved by IBM to perform warranty service on that Machine in that country. Warranty service in Africa is available within 50 kilometers of an IBM authorized service provider. You are responsible for transportation costs for Machines located outside 50 kilometers of an IBM authorized service provider.

Governing Law: The applicable laws that govern, interpret and enforce rights, duties, and obligations of each of us arising from, or relating in any manner to, the subject matter of this Statement, without regard to conflict of laws principles, as well as Country-unique terms and competent court for this Statement are those of the country in which the warranty service is being provided, except that in 1) Albania, Bosnia-Herzegovina, Bulgaria, Croatia, Hungary, Former Yugoslav Republic of Macedonia, Romania, Slovakia, Slovenia, Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan, the laws of Austria apply; 2) Estonia, Latvia, and Lithuania, the laws of Finland apply; 3) Algeria, Benin, Burkina Faso, Cameroon, Cape Verde, Central African Republic, Chad, Congo, Djibouti, Democratic Republic of Congo, Equatorial Guinea, France, Gabon, Gambia, Guinea, Guinea-Bissau, Ivory Coast, Lebanon, Mali, Mauritania, Morocco, Niger, Senegal, Togo, and Tunisia, this Agreement will be construed and the legal relations between the parties will be determined in accordance with the French laws and all disputes arising out of this Agreement or related to its violation or execution, including summary proceedings, will be settled exclusively by the Commercial Court of Paris; 4) Angola, Bahrain, Botswana, Burundi, Egypt, Eritrea, Ethiopia, Ghana, Jordan, Kenya, Kuwait, Liberia, Malawi, Malta, Mozambique, Nigeria, Oman, Pakistan, Qatar, Rwanda, Sao Tome, Saudi Arabia, Sierra Leone, Somalia, Tanzania, Uganda, United Arab Emirates, United Kingdom, West Bank/Gaza, Yemen, Zambia, and Zimbabwe, this Agreement will be governed by English Law and disputes relating to it will be submitted to the exclusive jurisdiction of the English courts; and 5) in Greece, Israel, Italy, Portugal, and Spain any legal claim arising out of this Statement will be brought before, and finally settled by, the competent court of Athens, Tel Aviv, Milan, Lisbon, and Madrid, respectively.

THE FOLLOWING TERMS APPLY TO THE COUNTRY SPECIFIED:

AUSTRIA AND 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 is 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.

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

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

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

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

EGYPT

Limitation of Liability: *The following replaces item 2 in this Section:*

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. For purposes of this item, the term "Machine" includes Machine Code and Licensed Internal Code.

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).*

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 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:

1. *(unchanged)*
2. as to any other actual damage arising in all situations involving nonperformance 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 third 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.

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 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 shall be limited to damages.

Appendix F. Notices

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HelpWare	TechConnect
IBM	Tivoli
IntelliStation	Update Connector
Predictive Failure Analysis	Wake on LAN

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Important notes

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

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

When referring to processor storage, real and virtual storage, or channel volume, KB stands for approximately 1000 bytes, MB stands for approximately 1000000 bytes, and GB stands for approximately 1000000000 bytes.

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

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

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

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

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

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

Electronic emission notices

Federal Communications Commission (FCC) statement

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

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

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

Industry Canada Class A emission compliance statement

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

Avis de conformité à la réglementation d'Industrie Canada

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

Australia and New Zealand Class A statement

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

United Kingdom telecommunications safety requirement

Notice to Customers

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

European Union EMC Directive conformance statement

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

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

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

Taiwan electrical emission statement

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

Japanese Voluntary Control Council for Interference (VCCI) statement

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

Power cords

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

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

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

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

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

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

IBM power cord part number	Used in these countries and regions
13F9940	Argentina, Australia, China (PRC), New Zealand, Papua New Guinea, Paraguay, Uruguay, Western Samoa
13F9979	Afghanistan, Algeria, Andorra, Angola, Austria, Belgium, Benin, Bulgaria, Burkina Faso, Burundi, Cameroon, Central African Rep., Chad, China (Macau S.A.R.), Czech Republic, Egypt, Finland, France, French Guiana, Germany, Greece, Guinea, Hungary, Iceland, Indonesia, Iran, Ivory Coast, Jordan, Lebanon, Luxembourg, Malagasy, Mali, Martinique, Mauritania, Mauritius, Monaco, Morocco, Mozambique, Netherlands, New Caledonia, Niger, Norway, Poland, Portugal, Romania, Senegal, Slovakia, Spain, Sudan, Sweden, Syria, Togo, Tunisia, Turkey, former USSR, Vietnam, former Yugoslavia, Zaire, Zimbabwe
13F9997	Denmark
14F0015	Bangladesh, Burma, Pakistan, South Africa, Sri Lanka
14F0033	Antigua, Bahrain, Brunei, Channel Islands, China (Hong Kong S.A.R.), Cyprus, Dubai, Fiji, Ghana, India, Iraq, Ireland, Kenya, Kuwait, Malawi, Malaysia, Malta, Nepal, Nigeria, Polynesia, Qatar, Sierra Leone, Singapore, Tanzania, Uganda, United Kingdom, Yemen, Zambia
14F0051	Liechtenstein, Switzerland
14F0069	Chile, Ethiopia, Italy, Libya, Somalia
14F0087	Israel
1838574	Thailand
6952301	Bahamas, Barbados, Bermuda, Bolivia, Brazil, Canada, Cayman Islands, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Japan, Korea (South), Liberia, Mexico, Netherlands Antilles, Nicaragua, Panama, Peru, Philippines, Saudi Arabia, Suriname, Taiwan, Trinidad (West Indies), United States of America, Venezuela

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