



# IntelliStation M Pro

Type 6849

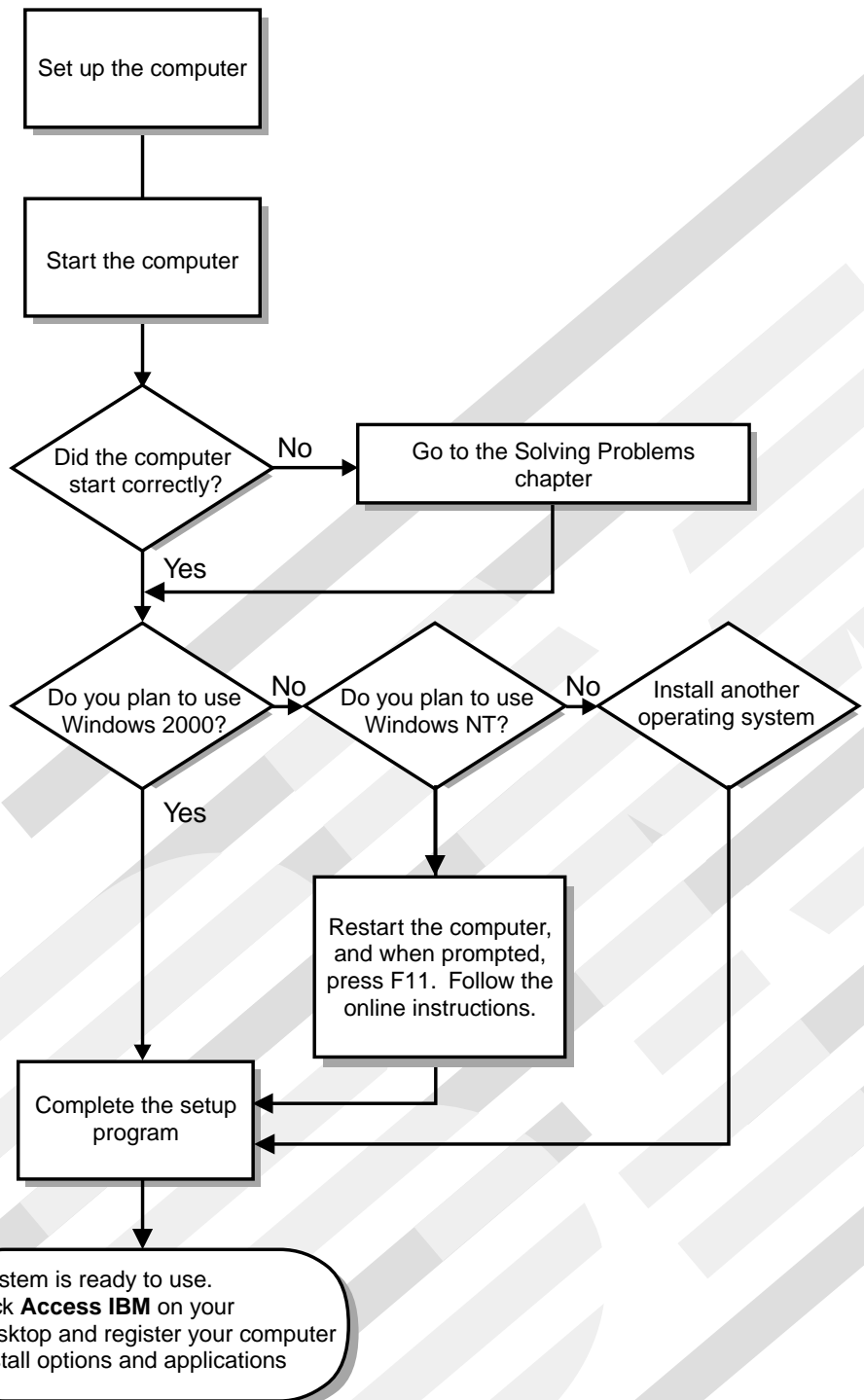
## User's Guide

### Welcome...

Thank you for buying an IBM IntelliStation E Pro computer.

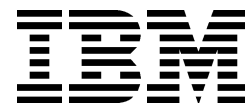
This *User's Guide* contains information for setting up, installing options, and preparing to run applications for your computer. This book also contains information for every day use, and solving problems.

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





IBM® IntelliStation® M Pro  
Type 6849



# User's Guide

**Note:**

Before using this information and the product it supports, be sure to read the general information in Appendix D, "Warranty information," on page 89 and Appendix E, "Notices," on page 99.

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# Safety Information

Before installing this product, read the Safety Information.

مجب، 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).

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

Перед установкой продукта прочтите инструкции по технике безопасности.

Pred inštaláciou tohto zariadenia si pečítajte Bezpečnostné predpisy.

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.**
- **Connect and disconnect cables as described in the following table when installing, moving, or opening covers on this product or attached devices.**

<p>To connect:</p> <ol style="list-style-type: none"><li>1. Turn everything OFF.</li><li>2. First, attach all cables to devices.</li><li>3. Attach signal cables to connectors.</li><li>4. Attach power cords to outlet.</li><li>5. Turn device ON.</li></ol>	<p>To disconnect:</p> <ol style="list-style-type: none"><li>1. Turn everything OFF.</li><li>2. First, remove power cords from outlet.</li><li>3. Remove signal cables from connectors.</li><li>4. Remove all cables from devices.</li></ol>
---	---

## Statement 2

### CAUTION:



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

#### Do not:

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

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

## Statement 3



### CAUTION:

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

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



### Danger

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

Class 1 Laser Product

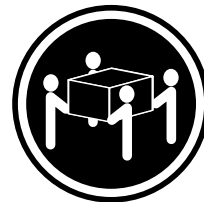
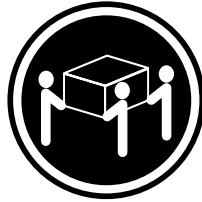
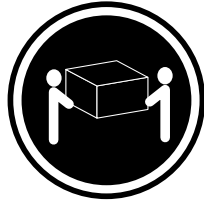
Laser Klasse 1

Laser Klass 1

Luokan 1 Laserlaite

Appareil À Laser de Classe 1

**Statement 4**



≥18 kg (39.7 lbs)

≥32 kg (70.5 lbs)

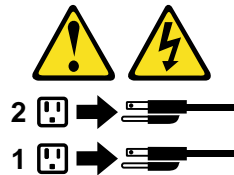
≥55 kg (121.2 lbs)

**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.

---

## Lithium battery notice

#### CAUTION:

Danger of explosion if battery is incorrectly replaced.

When replacing the battery, use only IBM Part Number 33F8354 or an equivalent type battery recommended by the manufacturer. The battery contains lithium and can explode if not properly used, handled, or disposed of.

#### *Do not:*

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

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

---

## Modem safety information

To reduce the risk of fire, electrical shock, or injury when using telephone equipment, always follow basic safety precautions, such as:

- Never install telephone wiring during a lightning storm.
- Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations.
- Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.
- Use caution when installing or modifying telephone lines.
- Avoid using a telephone (other than a cordless type) during an electrical storm. There may be a remote risk of electric shock from lightning.

- Do not use the telephone to report a gas leak in the vicinity of the leak.

---

## Laser compliance statement

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

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

**CAUTION:**

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

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

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

**DANGER**

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





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## Preface

This book will help you become familiar with your IBM® IntelliStation® M Pro Type 6849 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.

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## Related Information

The following documentation contains additional information about your computer. If your computer comes with IBM-preinstalled software, you might be able to view these documents in Access IBM. See “Using Access IBM” on page 13. 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. Type the machine type/model number (type model) into the **Quick Path** field and then click **Go**. Click **Online publications** and then click **Hardware Maintenance Manuals**.
- *Device Driver and IBM Enhanced Diagnostics CD*  
This CD contains diagnostic tools and preinstalled device drivers. Several README files on this CD contain information about the various adapters and devices that might be components of your computer.
- Adaptec SCSI documentation  
This documentation, included on the *Software Selections CD*, contains information and instructions for installing and configuring small computer systems interface (SCSI) device drivers and devices.
- *Software Selections CD*  
This CD contains most of the preinstalled software.

---

## Notices used in this book

Notices for hardware and software use and safety are placed throughout this *User Guide*.

The notice definitions, from helpful aids to essential safety practices, are as follows:

- **Notes:** These notices provide important tips, guidance, or advice.
- **Important:** These notices provide information or advice that might help you avoid inconvenient or problem situations.
- **Attention:** These notices indicate potential damage to programs, devices, or data if procedures are not followed closely.
- **Caution:** These notices indicate potentially hazardous situations if procedures are not followed closely.
- **Danger:** These notices indicate situations that can be potentially lethal or extremely hazardous to you if procedures are not followed closely.

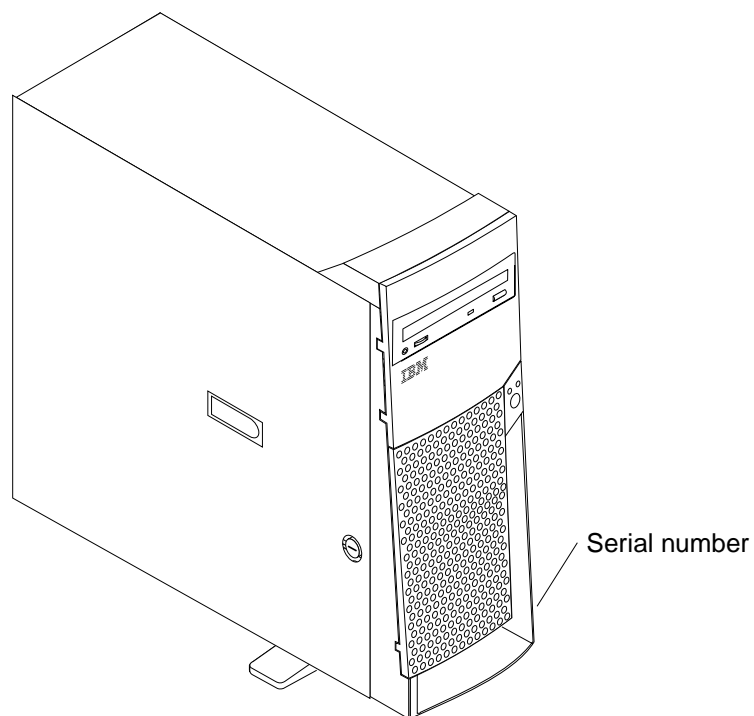


## Chapter 1. Introducing the IntelliStation M Pro

Thank you for selecting an IBM IntelliStation M Pro Professional Workstation. Your computer incorporates many of the latest advances in computing technology, making it easy to expand and upgrade as your needs change.

Your IBM IntelliStation M Pro computer comes with a three-year limited warranty and IBM Computer Start Up Support. If you have access to the World Wide Web, you can obtain up-to-date information about your IntelliStation M Pro model and other IBM computer products at <http://www.ibm.com/pc/us/intellistation/>.

Your computer model and serial numbers are located on labels on the bottom of the lower right side of the machine. You will need these numbers when you register your computer with IBM and to record in Appendix B, "Computer records," on page 85.



## IntelliStation M Pro features and specifications

The following table provides a summary of the features and specifications. Some features and specifications might not apply.

<p><b>Microprocessor:</b></p> <ul style="list-style-type: none"> <li>• Intel® Pentium® 4 with 256 KB Level-2 cache</li> </ul> <p><b>Memory:</b></p> <ul style="list-style-type: none"> <li>• Minimum: 128 MB</li> <li>• Maximum: 2.0 GB</li> <li>• Type: PC600 or PC800 Rambus RIMMs only</li> <li>• Slots: 4 dual inline</li> </ul> <p><b>Internal Drives:</b></p> <ul style="list-style-type: none"> <li>• Hard disk drive: IDE/SCSI</li> <li>• CD-ROM: IDE</li> </ul> <p>One of the following:</p> <ul style="list-style-type: none"> <li>• CD-ROM: IDE</li> <li>• DVD-ROM: IDE</li> <li>• CD-RW: IDE</li> </ul> <p><b>Expansion bays:</b></p> <ul style="list-style-type: none"> <li>• Two 5.25-in. bays (1 CD-ROM drive installed)</li> <li>• Five 3.5-in. bays (1 diskette drive installed)</li> </ul> <p><b>PCI expansion slots:</b></p> <ul style="list-style-type: none"> <li>• Five 33 MHz/32-bit slots on the system board</li> </ul> <p><b>Power supply:</b></p> <p>340 watt (90-240 V ac)</p>	<p><b>Video Adapter:</b> (depending on your model)</p> <ul style="list-style-type: none"> <li>• Matrox Millennium G450 with 16 MB SDRAM video memory</li> <li>• NVidia Quadro2 MXR with 32 MB SDRAM video memory</li> <li>• NVidia Quadro2 Pro with 64 MB DDR SDRAM video memory</li> <li>• Fire GL2 (DVI-D and VGA) with 64 MB DDR SGRAM video memory</li> <li>• Fire GL4 (dual DVI-I) with 128 MB DDR SGRAM video memory</li> </ul> <p><b>Size and weight:</b></p> <ul style="list-style-type: none"> <li>• Height: 470 mm (18.5 in.)</li> <li>• Depth: 508 mm (19.9 in.)</li> <li>• Width: 165 mm (6.5 in.)</li> <li>• Weight: approximately 19.5 Kg (43 lb.) when fully configured or 15.9 Kg (35 lb.) minimum</li> </ul> <p><b>Integrated functions:</b></p> <ul style="list-style-type: none"> <li>• 10BASE-T/100BASE-TX Ethernet controller on the system board with RJ45 Ethernet port</li> <li>• Two serial ports</li> <li>• One parallel port</li> <li>• Two USB ports</li> <li>• Keyboard port</li> <li>• Mouse port</li> <li>• Audio ports <ul style="list-style-type: none"> <li>— Line out</li> <li>— Line in</li> <li>— Mic</li> </ul> </li> <li>• Dual-channel bus mastering IDE controller</li> </ul> <p><b>Acoustical noise emissions:</b></p> <ul style="list-style-type: none"> <li>• Sound power, idling: 5.1 bel maximum</li> <li>• Sound power, operating: 5.2 bel maximum</li> </ul>	<p><b>Environment:</b></p> <ul style="list-style-type: none"> <li>• Air temperature: <ul style="list-style-type: none"> <li>— Computer on: 10° to 35° C (50.0° to 95.0° F). Altitude: 0 to 914 m (2998.7 ft.)</li> <li>— Computer on: 10° to 32° C (50.0° to 89.6° F). Altitude: 914 m (2998.7 ft.) to 2133 m (6998.0 ft.)</li> <li>— Computer off: 10° to 43° C (50.0° to 109.4° F). Maximum altitude: 2133 m (6998.0 ft.)</li> </ul> </li> <li>• Humidity: <ul style="list-style-type: none"> <li>— Computer on: 8% to 80%</li> <li>— Computer off: 8% to 80%</li> </ul> </li> </ul> <p><b>Heat output:</b></p> <p>Approximate heat output in British Thermal Units (Btu) per hour</p> <ul style="list-style-type: none"> <li>• Minimum configuration: 341 Btu (100 watts)</li> <li>• Maximum configuration: 1604 Btu (470 watts)</li> </ul> <p><b>Electrical input:</b></p> <ul style="list-style-type: none"> <li>• Sine-wave input (50-60 Hz) required</li> <li>• Input voltage low range: <ul style="list-style-type: none"> <li>— Minimum: 90 V ac</li> <li>— Maximum: 137 V ac</li> </ul> </li> <li>• Input voltage high range: <ul style="list-style-type: none"> <li>— Minimum: 180 V ac</li> <li>— Maximum: 265 V ac</li> </ul> </li> <li>• Input kilovolt-amperes (kVA) approximately: <ul style="list-style-type: none"> <li>— Minimum: 0.08 kVA</li> <li>— Maximum: 0.52 kVA</li> </ul> </li> </ul>
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Table 1. Features and Specifications.

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## Software

Your IBM IntelliStation comes with either Microsoft® Windows® 2000 Professional or Windows NT® Workstation preinstalled. Through the Product Recovery Program, you have the option of installing either operating system.

A variety of software, application programs, diagnostic tools, and device drivers are included. Some of the software is preinstalled. Other software tools are on the CDs included 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. Refer to

## Preinstalled software

In addition to the Microsoft operating system, your preinstalled software includes other programs.

- **Access IBM** is a desktop interface that enables you to easily find help and other information about your computer.
- **ConfigSafe** is a comprehensive configuration tracking and recovery tool. ConfigSafe periodically takes snapshots of your system configuration. You can use ConfigSafe to restore your system to its last usable state if your desktop becomes damaged, unusable, or otherwise unstartable.
- **Adobe Acrobat Reader** is used to read portable document format (PDF) files, including your online documentation. The most updated Adobe Acrobat Reader for other languages and operating systems can be downloaded from the Adobe Web site at <http://www.adobe.com>.
- **PC-Doctor for Windows** is a diagnostic tool designed to be used with Windows. Support documentation is built into the Help system.
- **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.
- The **Product Recovery Program** is a software recovery tool that enables you to recover your operating system, applications, and device drivers, if necessary. You can choose to recover either Windows NT or Windows 2000 Professional.

### Important

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

See “Software Selections CD” for more information about preinstalled software.

## Software Selections CD

Software and documentation are provided on the *Software Selections CD*. You can install or uninstall software and documentation, and create an image of the CD on your computer desktop.

The following list describes some of the software programs provided on the *Software Selections CD*. Your preinstalled software may be slightly different.

Norton AntiVirus for IBM	Use Norton AntiVirus for IBM to detect and remove viruses from your computer.
Netscape Communicator	Use Netscape Communicator to navigate your company intranet or the World Wide Web. Netscape Communicator provides a full suite of Internet functions, including e-mail, threaded discussion groups (newsgroups), and support for the latest features on the World Wide Web.
IBM Update Connector™	Use IBM Update Connector 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.
Tivoli® Management Agent	A network administrator can use this program to gather information about your computer and monitor its operation.

## Device Drivers and IBM Enhanced Diagnostics CD

Diagnostic test programs and device drivers are stored on the *Device Drivers and IBM Enhanced Diagnostics CD*. These test programs provide the primary method of testing system components.

## Other software

*Lotus® SmartSuite*, a package of award-winning productivity applications, contains powerful applications and everything you need to access the Internet. Your computer comes with a *Lotus SmartSuite* proof of entitlement to receive one free CD-ROM version of Lotus SmartSuite. When you receive 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, and memory management. Your computer combines:

- High performance AGP graphics
- Large system memory

The memory bus in your computer supports up to 2 gigabytes (GB)<sup>1</sup> of system memory. The memory controller provides error code correction (ECC) support for up to four industry-standard Rambus dynamic random access memory (RDRAM) Rambus in-line memory modules (RIMMs).

- Systems-management capabilities

Your computer comes with network and power management tools. See “Managing your computer on a network” on page 19 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

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1. One Gigabyte is equal to 1,000,000,000 bytes.

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 of the most important features in computer design 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 the later chapters of this publication.

- Reliability features
  - Boot block recovery
  - Cooling fans with speed-sensing capability
  - Customer upgradable basic input/output system (BIOS)
  - Error code correction (ECC) front-side buses (FSBs)
  - ECC L2 cache
  - ECC memory
  - Parity checking on the small computer system interface (SCSI) and peripheral component interconnect (PCI) buses
  - Advanced configuration and power interface (ACPI)
  - Power-on self-test (POST)
  - Rambus dynamic random access memory (RDRAM) with serial presence detect (SPD)
- Availability features
  - Advanced desktop management interface (DMI) features
  - Alert on LAN™ capability
    - Chassis intrusion
    - Operating system (OS) suspensions<sup>2</sup>
  - Auto-restart initial program load (IPL) power supply
  - Automatic error retry or recovery
  - Automatic computer restart
  - Automatic restart after power failure
  - Built-in, menu-driven configuration programs
  - Built-in, menu-driven SCSI configuration programs (some models)
  - Built-in, menu-driven setup programs
  - Menu-driven diagnostic programs on compact disc read-only memory (CD-ROM)
  - Monitoring support for temperatures, voltages, and fan speed
  - Standard advanced system management (ASM) PCI adapter provides control for remote system management
  - Upgradable BIOS, diagnostics ASM PCI adapter microcode, and POST
  - Wake on LAN® (WOL) capability
- Serviceability features
  - 24/7 customer support
  - 3-year warranty
  - Adaptec built-in self-test (BIST)
  - Alert on LAN with onboard Ethernet
  - CD-ROM-based diagnostics
  - Diagnostic support of Ethernet adapters

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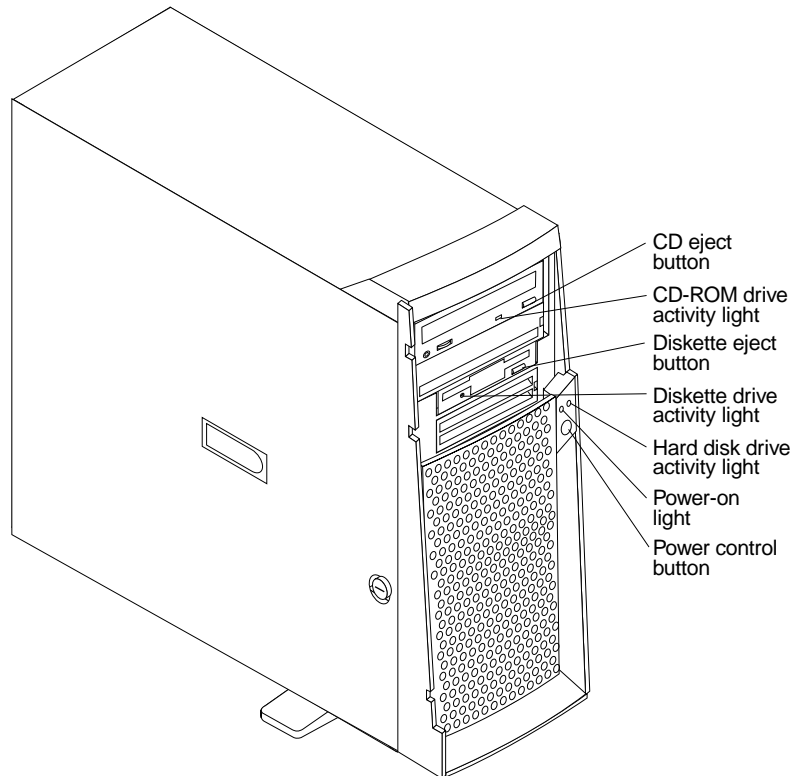
2. Or unresponsive operating systems

- 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

The following illustration identifies the controls and indicators on the computer.



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

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

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

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

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



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## Chapter 2. Setting up your computer

This chapter provides information about selecting and arranging a work space, setting up your computer, and preparing it to run your applications.

---

### Before you begin

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

You will need the following:

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

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

---

### 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.

The following sections describe arranging your computer for comfort and ease-of-use.

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### Arranging your work space

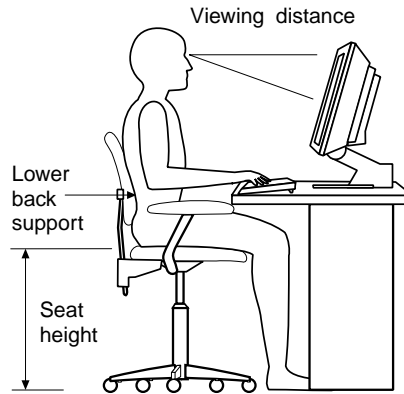
Arrange both the equipment and your work area to suit you. Light sources, air circulation, and the location of electrical outlets can affect how you arrange your work space.

### 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.

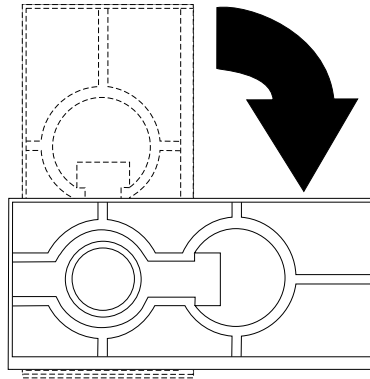
For more information about power cords, see “Connecting computer cables” on page 10 below and “Power cords” on page 102.

---

## Moving the stabilizing feet

The two front feet attached to the bottom of your computer rotate outward 90 degrees to provide additional stability when the computer is upright.

To access the inside of the computer, you might find it easier to lay the computer on its side. Before laying the computer on its side, rotate the feet inward so the weight of the computer does not break them.

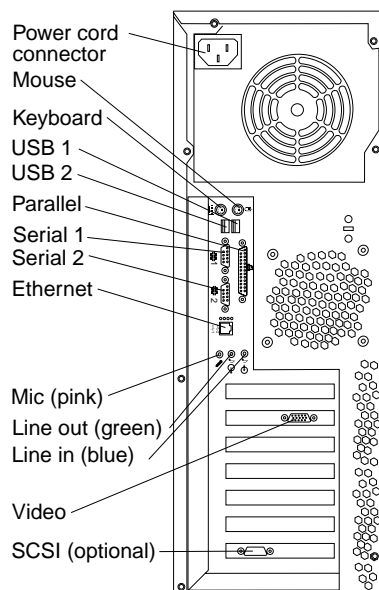


When you are finished and have reinstalled the side cover, turn the two front stabilizing feet a quarter turn outward and set the computer carefully back on its feet.

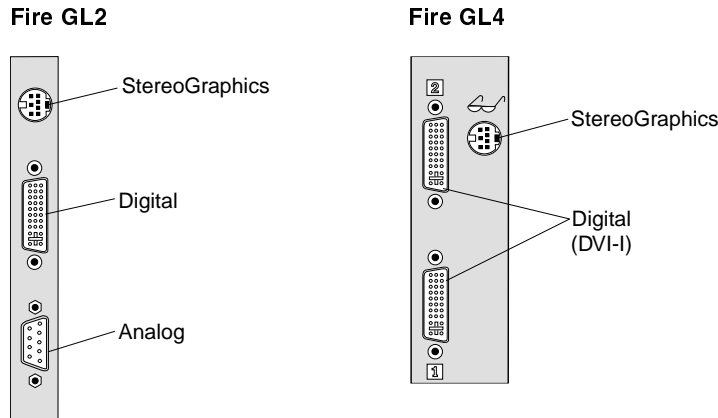
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## Input/Output connector locations

The following illustration shows the input/output connectors and the expansion slots on the rear of the computer. For pin assignments and more details about these connectors, see “Input/Output connector descriptions” on page 46.



The following illustration shows the video connectors on models with a Fire GL video adapter.



Note that the Fire GL4 adapter occupies the AGP slot and the adjacent PCI slot.

If your software application supports it, the StereoGraphics connector on a Fire GL video adapter is used for 3-D glasses or goggles.

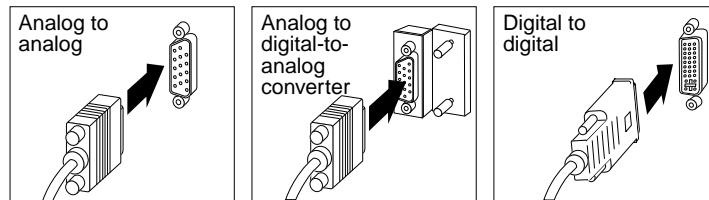
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## Connecting computer cables

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.

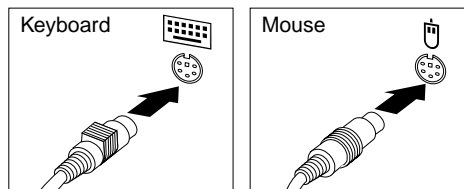
If your computer cables and connector panel have color-coded connectors, match the color of the cable end with the color of the connector. For example, match a blue cable end with a blue connector, a red cable end with a red connector, and so on.

1. Connect the monitor cable and tighten the screws.



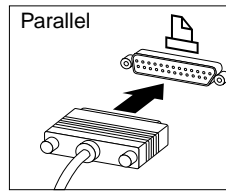
**Attention:** On the Fire GL4 video adapter, the first or only monitor must be connected to the bottom connector (connector number 1).

2. Connect the keyboard and mouse cables.

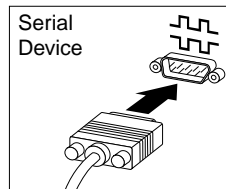


**Note:** If your computer has Windows NT and a ScrollPoint<sup>®</sup> mouse, the ScrollPoint function might not be enabled when you start the computer the first time. Shut down and restart the computer to enable the ScrollPoint function.

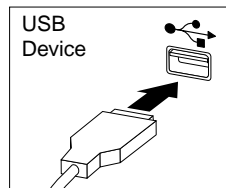
3. Connect any additional devices you might have.
- Connect a printer or parallel device to the parallel connector.



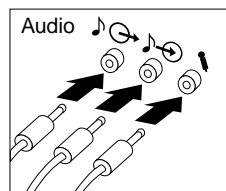
- Connect a serial device or external modem to the serial connector.



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



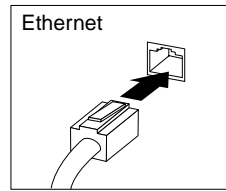
- Connect optional devices, such as speakers, microphones, or headphones.



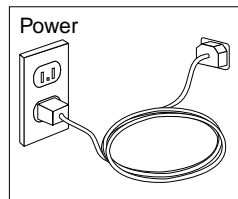
**Important**

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

- Connect the Ethernet cable to the RJ45 Ethernet connector.



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



5. Connect all other power cords into properly grounded electrical outlets.

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

---

## Starting your computer the first time

Do the following to start your computer.

1. Turn on all peripheral devices, such as printers, scanners, external SCSI devices, and so on, 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 6.

If you experience any problems during startup, such as numeric error codes or a series of beeps, see Chapter 6, “Solving problems,” on page 51 and “Getting information, help, and service” on page 78 for more information.

During start up, a message might be displayed to prompt you to press a function key to start other programs. These other programs might include the BIOS Setup Utility and SCSISelect Utility. See “Using the BIOS Setup Utility program” on page 23 and “Using the SCSISelect Utility program” on page 24 for information on these programs.

## 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 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 entered into the registration field. If the Product ID number is not already entered, 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 came 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, select **Get started**. Click **Registering your IBM Computer**, and then follow the instructions in the window. (See “Using Access IBM” for further information.)
- 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 modem or Internet access is available.

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## Using Access IBM

Your Windows Desktop provides an Access IBM icon. Access IBM provides an interface through which you can quickly access information or perform specific tasks.

The Access IBM program provides links to selected IBM Web sites and IBM Assistant, a help system for many end-user tasks such as getting started, viewing documentation, customizing, upgrading, maintaining, and solving problems. Shortcuts are also provided to help accomplish many of these tasks. You can also view the IBM International License Agreement for Non-Warranted Programs, which applies to:

- All software preinstalled by IBM on the hard disk drive that does not have its own license agreement
- Software on the *Software Selections CD*
- Software on the *Device Driver and IBM Enhanced Diagnostics CD*

- View the *IBM International License Agreement for Non-Warranted Programs*

Your use of these programs indicates the acceptance of the license agreement.

---

## Installing other operating systems

If you install another operating system, you might need additional software or device drivers. Drivers for devices that came with your computer are available on the *Device Driver and IBM Enhanced Diagnostics CD*. You can obtain the latest device drivers at <http://www.ibm.com/pc/support> on the World Wide Web.

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

To install an operating system, follow the instructions in the documentation provided with the operating system CDs or diskettes. Additional information about operating systems is posted periodically on the IBM Web site at <http://www.ibm.com/pc/support>.

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## Using the Product Recovery Program

The Product Recovery Program is preinstalled on the hard disk that comes with your IBM computer. The Product Recovery Program is designed to be hidden from view to protect it from accidental damage.

If you are using FDISK, NT Disk Administrator, 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, see "Ordering replacing Product Recovery Program CDs" on page 81.

---

## Creating emergency diskettes

At your earliest opportunity, create the following diskettes. Store them in a safe place.

### Creating a recovery repair diskette

It is important that you create this diskette. In the unlikely event your desktop becomes unusable, the emergency repair diskette will enable you to access the Product Recovery Program. Additional information about the diskette is in Access IBM. To see how to use this diskette, refer to "Using the Recovery Repair diskette" on page 74.

Do the following to create the Recovery Repair diskette:

1. From the Access IBM menu, select **Maintain**.
2. Click **Creating emergency diskettes**.
3. 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, select **Maintain**.
2. Click **Creating emergency diskettes**.
3. Follow the instructions on the screen.

## Creating an IBM Enhanced Diagnostics diskette

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

Do the following to create the diagnostics diskette:

1. From the Access IBM menu, select **Maintain**.
2. Click **Creating emergency diskettes**.
3. Follow the instructions on the screen.

You can also download the diagnostic program image from the IBM Web site at <http://www.ibm.com/pc/support>. See “Using the Enhanced diagnostics diskette” on page 56.

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## Recording important numbers

Locate the serial, model, and type numbers. Record this information in Appendix B, “Computer records,” on page 85. You will need these numbers when communicating with IBM about your computer.

---

## Shutting down

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.

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. Select **Shut Down**; then, click **OK** to confirm.

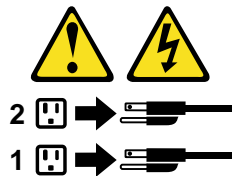
### Important

In some circumstances, your new 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.



### 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.



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## Chapter 3. Operating Your Computer

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

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### Starting your computer

If you are starting your computer for the first time, see “Starting your computer the first time” on page 12. After you review that section, return to this page for further instructions.

What you see and hear when you start up your computer depends on the features installed and the settings in the BIOS 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 60 for the explanation of error codes.

During start up, 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 “Starting your computer the first time” on page 12.

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 BIOS Setup Utility program” on page 23.

The BIOS Setup Utility program will help you configure your computer with passwords, PCI adapter configuration, as well as other options. The BIOS 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 19.

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### Using video features

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

### Video device drivers

To take full advantage of the graphics adapter in your computer, some operating systems and application programs require custom software, 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. If your computer has IBM-preinstalled software, video device drivers are installed in the IBMTOOLS/DRIVERS/VIDEO directory.

**Note:** Video device drivers for the Fire GLx video adapters are in the IBM-TOOLS/DRIVER/VIDEO/FIREGL2 and FIREGL4 directories respectively.

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.

See “Getting information, help, and service” on page 78 for more information.

## Changing monitor settings

To get the best possible image on your screen and to reduce flicker, you might need to reset the resolution and refresh rate of your monitor. You can view and change monitor settings through your operating system using the instructions provided in the README files on the *Device Driver and IBM Enhanced Diagnostics CD* (in the video device driver) 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. The information that comes with your monitor usually includes resolution and screen refresh rates that your monitor supports. 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. If you need additional information, contact the manufacturer of the monitor.

To minimize screen flicker and jitter, set your monitor for the highest non interlaced 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 have a dual-monitor video adapter and you connect both monitors but the second monitor doesn't work, do the following:

1. Go to **Start**→**Settings**→**Control Panel**
2. Double-click **Display Properties**→**Settings**→**Display Type**.
3. Enable the **Multi-head** option.
4. Close all Control Panel windows.

---

## 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 applica-

tions. 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 (1/8-in.) mini-jacks. For the location of the audio connectors, refer to “Input/Output connector locations” on page 9.

## 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 powered speakers with built-in amplifiers, 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.

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

---

## 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 Wake on LAN to turn on your computer from a remote location. When Wake on LAN is used with network management software, many functions, such as data transfers, software updates, and POST or BIOS updates can be performed on many computers simultaneously.

**Note:** If the computer power cord is plugged into a surge protector or power strip, use the computer power switch and not the surge protector or power strip switch. Otherwise, the Wake on LAN feature will not work.

## Alert on LAN

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

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

## Remote Program Load or Dynamic Host Configuration Protocol

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

DHCP is a protocol that lets network administrators centrally manage and automate the assignment of Internet Protocol (IP) addresses on a network.

## 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 updates to remote systems. Used with Wake on LAN, LCCM can remotely turn on your computer, which means that installation can be done while the computer is not being used. You can download LCCM at no additional charge (Internet access fees excepted).

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

## System Migration Assistant

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

For more information or to download this software visit <http://www.ibm.com/pc/us/software/sysgmt/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, your computer has several anti-intrusion and other security features.

### 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”. You will need the key code when ordering replacement keys. You must order replacement keys from the key manufacturer because locksmiths are not authorized to duplicate cover-lock keys.

If enabled, the chassis-intrusion detector switch inside the computer alerts the network system administrator each time the computer cover is removed. This detector is enabled after you set a supervisor password in the BIOS Setup Utility program. When this feature is enabled and the cover is removed, a 176 POST error message displays on the computer screen the next time the computer is turned on. You must type the correct supervisor password to start up the computer. For information on setting passwords, see **Setting Security Passwords** in Access IBM. If your computer uses the Alert on LAN feature, and your network administrator uses Intel LANDesk® Desktop Manager or IBM LANClient Manager, the network administrator console is notified that the computer cover has been removed. For more information, see “Alert on LAN” on page 19 and contact your network administrator.

## 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.

### IBM security solutions

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

- Data protection
- Locked keyboard

### 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

Norton AntiVirus for IBM is installed on the hard disk of computers that have preinstalled software. Norton AntiVirus is available on the IBM *Software Selections CD*.

## Locking the keyboard

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

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

---

## Shutting down

When you are ready to turn off the computer, always use the shutdown procedure in “Shutting down” on page 16 to save data and prevent damage to your applications.

### 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

These configuration programs are provided with your computer:

- **BIOS Setup Utility program**

This program is part of the BIOS code that comes with your computer. Among the tasks for this program are, configure parallel port assignments, change the device startup sequence, set the date and time, and set passwords.

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

With the built-in SCSISelect Utility program, you can configure the devices that are attached to the optional SCSI adapter. See “Using the SCSISelect Utility program” on page 24 for more information.

The sections in this chapter give an overview of these two programs.

---

### Using the BIOS Setup Utility program

This section provides the instructions for starting and using the BIOS Setup Utility program.

#### Starting the BIOS Setup Utility program

The prompt, Hit <F2> if you want to run SETUP, might not be displayed when you start your computer. Do the following to start the BIOS Setup Utility program:

1. If your computer is already on when you start this procedure, shut down the operating system, turn off the computer, and wait a few seconds until all in-use lights turn off.
2. Turn on the power. Immediately press and hold down the F1 or F2 key until you see either the BIOS Setup Utility menu or a password prompt.

If you have set neither a supervisor nor a user password, the BIOS Setup Utility menu opens on the screen. If you have set a password, the BIOS Setup Utility menu will not open until you type your password and press Enter.

#### After the BIOS Setup Utility program is started

Once the BIOS Setup Utility is started, help information and instructions for using the keyboard are displayed on the right side of the screen. You can find more information about using the BIOS Setup Utility by using Access IBM.

To display the Hit <F2> if you want to run SETUP prompt every time you start your computer, do the following from within the BIOS Setup Utility:

1. Select **Boot** from the main menu across the top of the screen.
2. Set **Quiet Boot** to **[Disabled]**.
3. Set **Intel® Rapid BIOS Boot** to **[Disabled]**.
4. Select **Exit** from the menu.
5. Select **Exit Saving Changes**.

The next time you start the computer, Hit <F2> if you want to run SETUP will be displayed.

---

## Using the SCSISelect Utility program

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

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

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

### Starting the SCSISelect Utility program

Do the following 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.
3. When the prompt, Would you like to configure the host adapter or run the SCSI disk utilities?, is displayed, make your selection, and then press Enter.
4. Use the arrow keys to make a selection from the menu.
  - Press Esc to exit the SCSISelect Utility program.
  - 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; then press Enter.

### Selections available from the SCSISelect menu

The following selections appear on the SCSISelect Utility menu:

- **Configure/View Host Adapter Settings**

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

You can view or change the following controller settings:

- **Host Adapter SCSI ID**

Use this selection to view the SCSI controller identification (ID), usually 7.

- **SCSI Parity Checking**

Use this selection to view the assigned value of *Enabled*.

- **Host Adapter SCSI Termination**

Use this selection to view the assigned value of *Automatic*.

- **Boot Device Options**

Use this selection to configure startable-device parameters. To make changes, you must know the ID of the device you want to configure.

- **SCSI Device Configuration**

Use this selection to configure SCSI-device parameters. To make changes, you must know the ID of the device you want to configure.

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

- The transfer rate for Ultra 160 low voltage differential (LVD) devices is 160.0.

- The transfer rate for Ultra2 SCSI LVD devices is 80.0.
- The transfer rate for Fast SCSI devices is 20.0.

— **Advanced Configuration Options**

Use this selection to view or change the settings such as enabling support for large hard disk drives and support for drives with Ultra SCSI speeds.

• **SCSI Disk Utilities**

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

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

**Note:** If you press Ctrl+A before the selected drives are ready, an Unexpected SCSI Command Failure screen might appear. Restart the computer and watch the SCSISelect messages as each drive starts. After the drive that you want to view or format starts, press Ctrl+A.



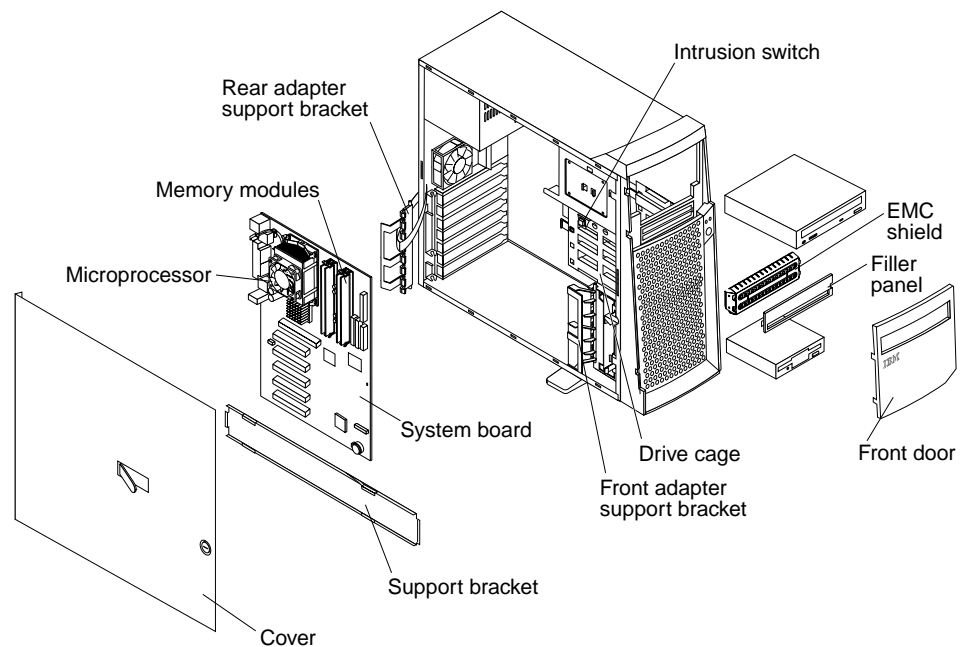
## Chapter 5. Installing Options

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

### Major components of the IntelliStation M Pro Type 6849

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

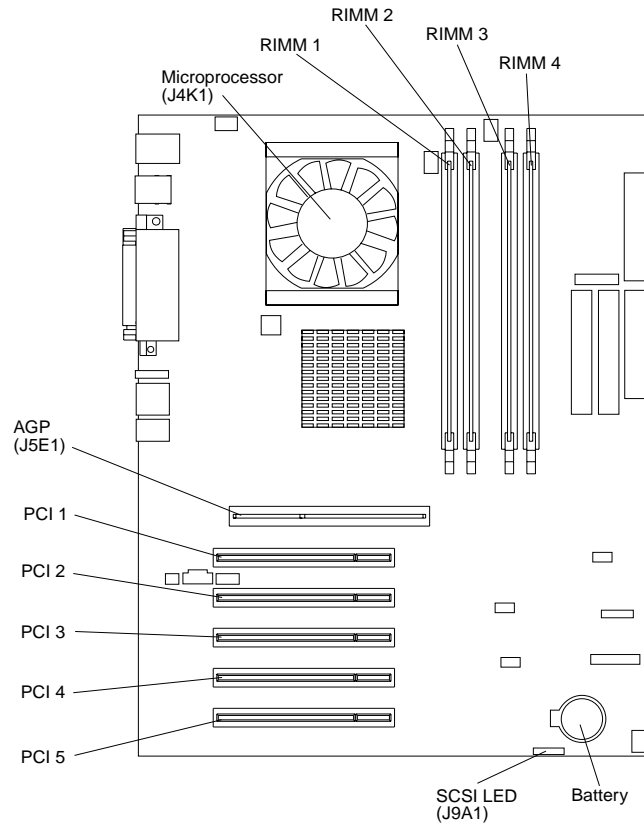
The following illustration shows the locations of major components in your computer.



## System board

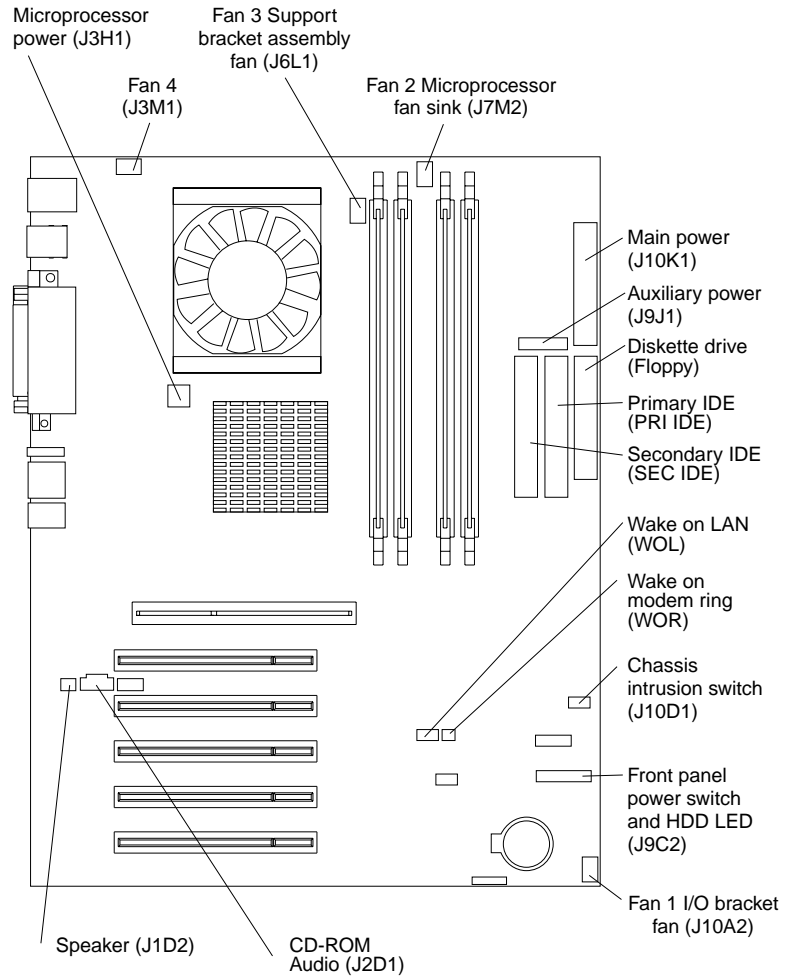
The illustrations in the following sections highlight various components on the system board.

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



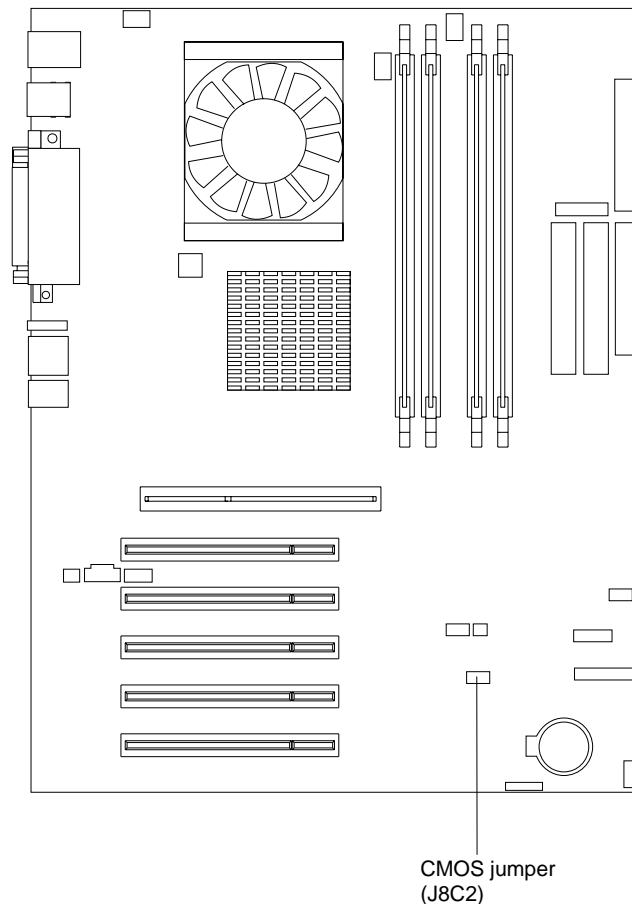
# Internal cable connectors

The following illustration identifies system board connectors for internal 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. The above illustration shows the location of the CMOS recovery jumper. See “Erasing a lost or forgotten password (clearing CMOS)” on page 74 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 76.

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## Installing adapters-before you begin

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

- Read the handling guidelines in “Handling static-sensitive devices” on page 31, and read the safety statements in “Safety Information” on page vii. These guidelines will help you work safely with your computer and options.
- Back up all important data before you install or remove adapters.
- Make sure that you have an adequate number of properly grounded electrical outlets for your computer, monitor, and other peripheral devices.
- Before accessing the inside of the 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 9.



- Have a small, flat-blade screwdriver available.
- 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, be certain of the following:

- 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 about 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 movements. Movement can cause static electricity to build up around you and the components with which you are working.
- 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 it.
- While the device is still in its anti-static package, touch it to an unpainted metal part of the computer for at least two seconds. (This safely discharges the 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 on 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.

## Safety information

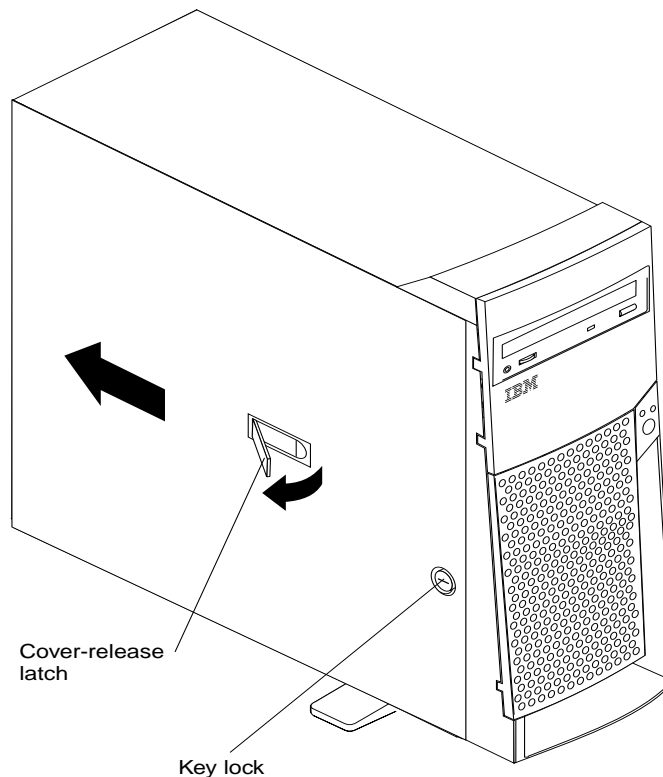
Before installing an option, read the “Safety Information” on page vii.

---

## Removing the side cover

The following information describes how to remove the side cover.

**Note:** To remove the cover, you might find it easier to lay the computer on its side. The illustrations in this document might differ slightly from your hardware.



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

1. Review the information in “Installing adapters-before you begin” on page 30 and “Safety Information” on page vii.
2. Turn off the computer and all attached devices.
3. Disconnect all external cables and power cords.
4. Unlock the computer cover, if necessary.
5. While pressing on the top blue button, pull out the cover-release latch and lock it into an upright position. This action will slide the cover toward the rear of the computer about 12.7 mm (0.5 in.). Then, remove the cover from the computer.

To replace the side cover, see “Replacing the cover” on page 44.

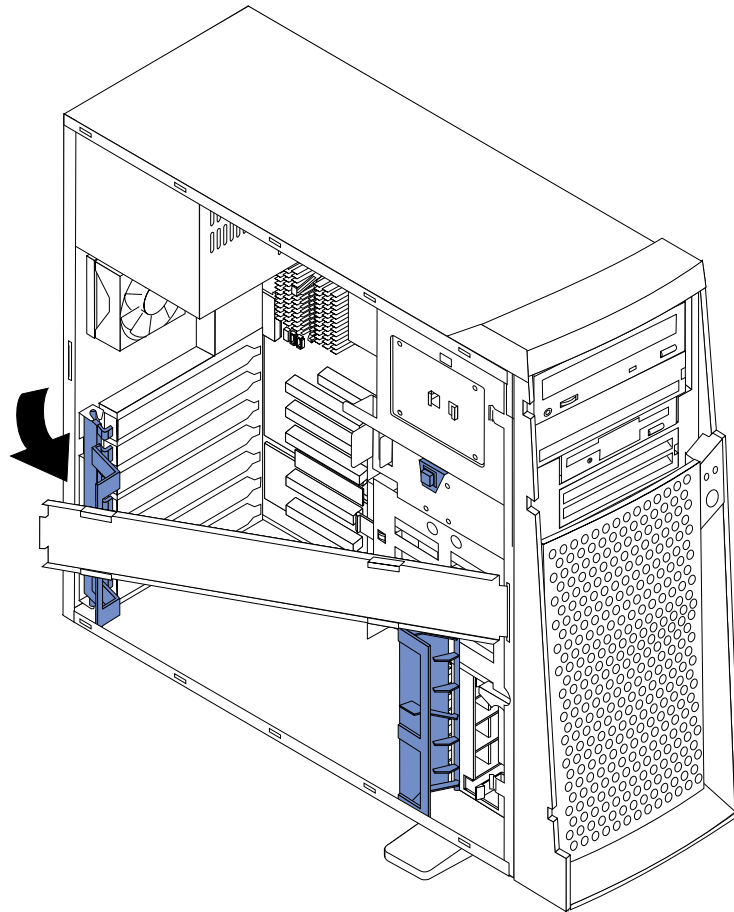
### Attention

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, 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, about 152.4 mm (6 in.), on the end of the support bracket located at the rear of the computer.
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.

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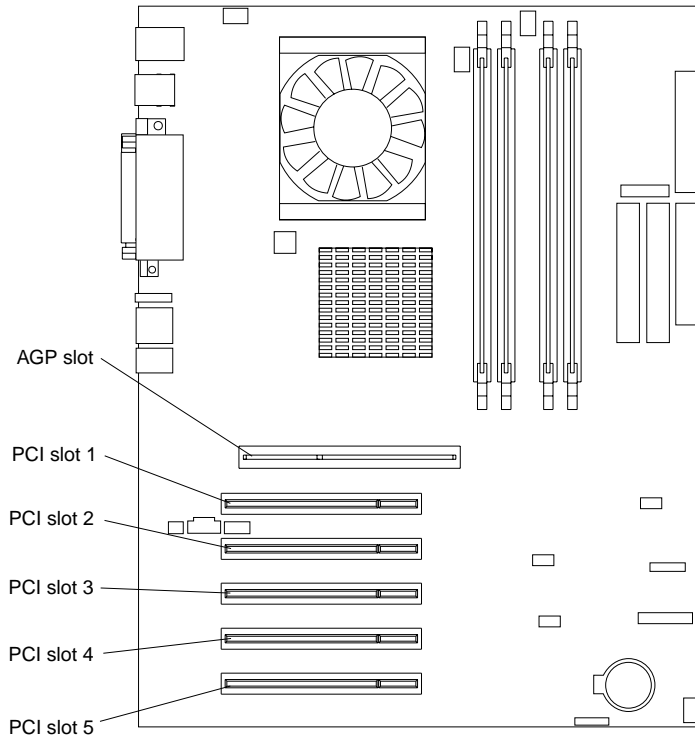
## Working with adapters

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.

**Note:** Because of its width, the Fire GL4 video adapter requires both the AGP slot and the adjacent PCI slot. If your model contains a Fire GL4 video adapter, you can install up to four PCI adapters in PCI slots 2 through 5.

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

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

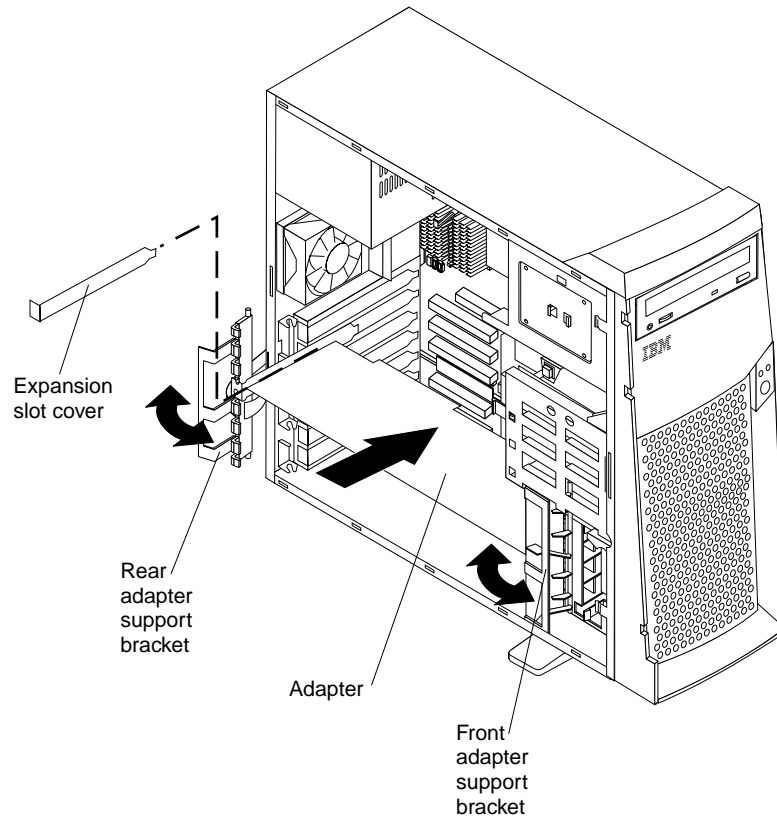


## Adapter considerations

Before you install adapters, understand 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 5 PCI slots.
- Your computer supports 5.0V and universal PCI adapters; it does not support 3.3V adapters.
- 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:

**Attention:** When you handle ESD-sensitive devices, take precautions to avoid damage from static electricity. For details on handling these devices, see “Handling static-sensitive devices” on page 31.

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 side cover. See “Removing the side cover” on page 32.
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 support bracket to the open (unlocked) position and remove it from the computer. Rotate the front adapter support bracket to the open position. If you are installing a smaller adapter, remove only the rear support 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 electromagnetic 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. 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 on its static-protective package on a hard surface. Avoid touching the components and gold-edge connectors on the adapter.
9. 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

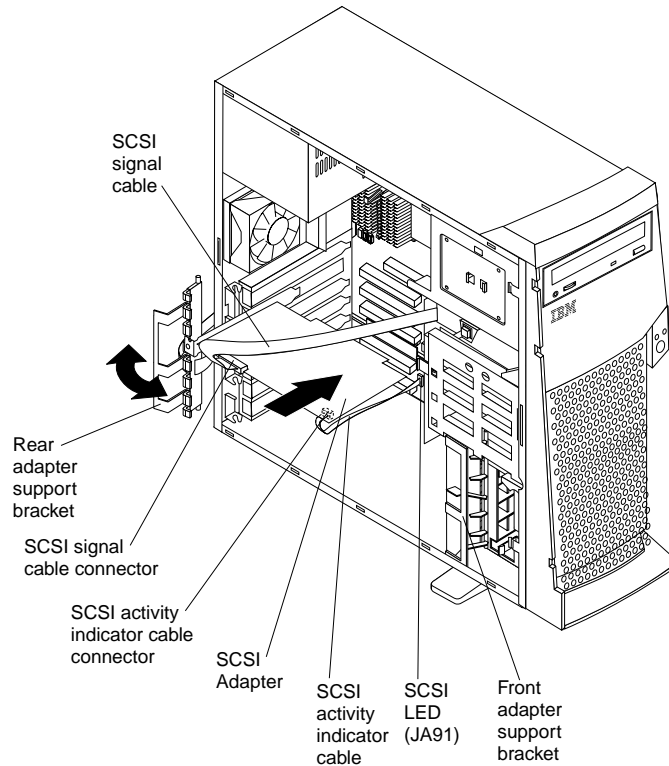
Be certain that the adapter is correctly seated in the expansion slot before you turn on the computer. Incomplete installation of an adapter might damage the system board or the adapter.

10. Connect required cables to the adapter. Route cables so that they do not block the flow of air from the fans.
11. If you have another adapter, repeat steps 1 - 10. If you have another option to install, go to that section heading. Otherwise, complete the rest of the steps in this section.
12. If you have installed a full-length adapter, rotate the front adapter support bracket to the closed (locked) position.
13. Reinstall the rear adapter support bracket; then rotate the bracket to the closed (locked) position.  
**Note:** The rear retaining bracket sits against the computer cover. You might find it easier to lay the computer on its side to replace the cover.
14. Replace the support bracket.
15. Replace the side cover, see “Replacing the cover” on page 44 for details.
16. Reconnect the external cables and power cords; then turn on the attached devices and the computer.

## Installing an optional SCSI adapter

Some models come without 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 10 of “Installing an adapter” on page 35. Continue with step 2 of this procedure.



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 (JA91) on the system board, see “System board” on page 28 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 44 for details.
9. Reconnect the external cables and power cords; then turn on the attached devices and then computer.

---

## Installing internal drives

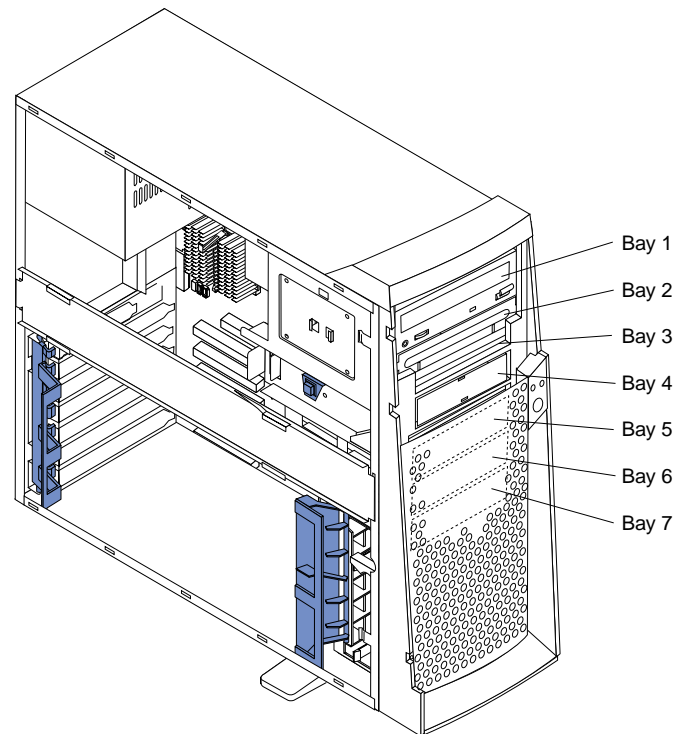
Depending on your computer model, you might have one or more of the following drives installed.

- Diskette
- Hard disk
- CD- or DVD-ROM
- Jaz or Zip
- Tape

## Internal drive bays

Your IntelliStation M 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 3, and a hard disk drive installed in bay 5.

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



### Notes:

1. Diskette drives, tape drives, and 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 M Pro computer supports only one diskette drive, which uses 1.44 MB diskettes.
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 (all bays)

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.

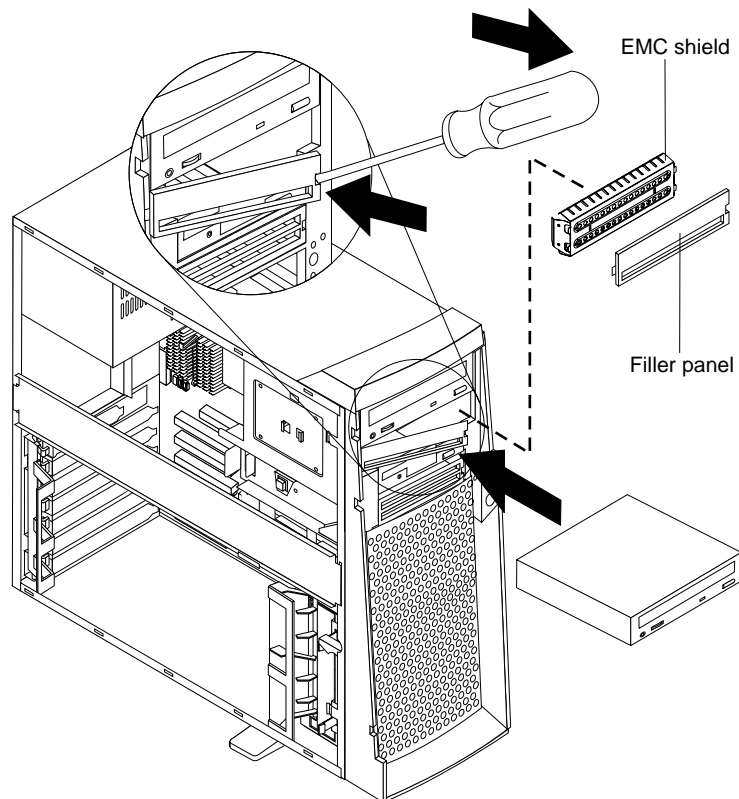
1. Read “Safety Information” on page vii, “Handling static-sensitive devices” on page 31, and the documentation that comes with your drive.
2. Choose the bay in which you want to install the drive.
3. Check the instructions that come with the drive to see if you need to set any switches or jumpers on 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.



1. Read the information in “Preinstallation steps (all bays)” on page 38.
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 32 for details).
4. Remove the support bracket see “Removing the support bracket” on page 33.
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.

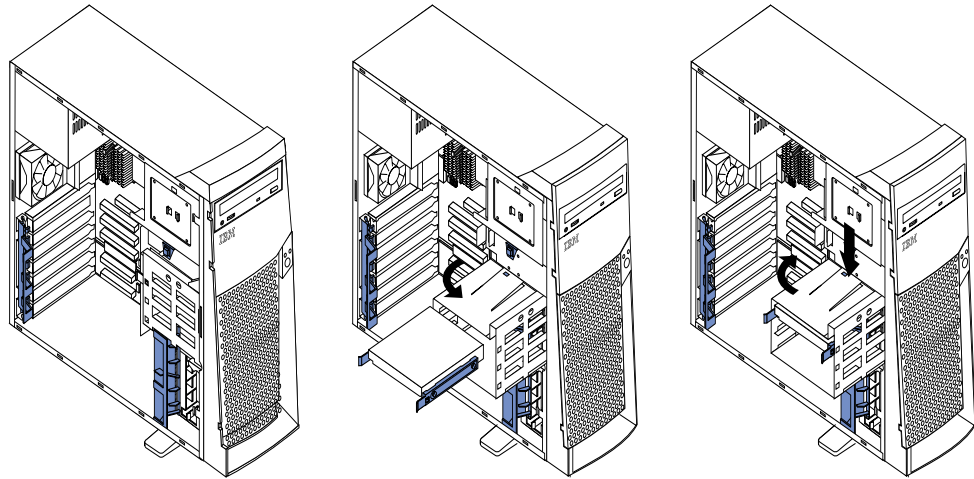
**DANGER**

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

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 machine front, 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 “Internal cable connectors” on page 29. 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 SCSI adapter.  
**Note:** Make sure to route the SCSI 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. Replace the support bracket.
15. Go to the appropriate section to work with another option, or replace the side cover, see “Replacing the cover” on page 44 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

You might find it useful to work with the computer laying on its side. Bays 5, 6, and 7 are in the drive cage. The drive cage is located just above the front adapter support bracket. Refer to the following illustration as you work with the drive cage.



1. Read the information in “Preinstallation steps (all bays)” on page 38.
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 32 for details).
3. Remove the support bracket.
4. Access the drive cage.
  - a. If your computer has hard disk drives preinstalled in the drive cage, disconnect the power and signal cables from the rear of the drives.
  - b. Grasp the drive cage and rotate the cage out (middle view above) 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.
5. 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.
6. Slide the drive into the drive cage until the plastic tabs on the drive guide rails lock into place in the drive cage.
7. Lift the drive cage up, and press in on the drive cage release tab; then rotate the cage back into the computer (right view above).
 

**Note:** Clear any cables that might impede the replacement of the drive cage.
8. 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.
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 44 for details.
12. Reconnect the external cables and power cords; then turn on the attached devices and the computer.

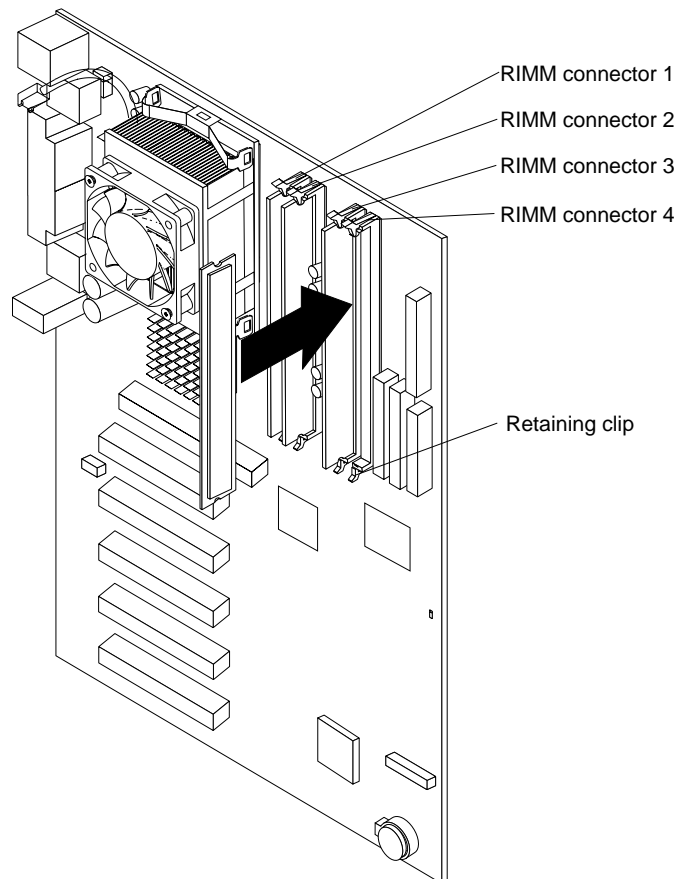
## Installing memory modules

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 M Pro computer uses industry-standard, RAMBUS in-line memory modules (RIMMs).

### Notes:

1. Any connector that does not have a RIMM installed must have a continuity RIMM (C-RIMM), a module that looks like a RIMM but has no memory on it. A C-RIMM is used to continue the connection on a RIMM connector that does not have memory installed.
2. Install only ECC RIMMs to enable ECC. If you use ECC and non-ECC memory together, it will function as non-ECC memory.
3. RIMM connectors do not support dual inline memory modules (DIMMs).
4. Use only PC600 or PC800 RIMMs.  
**Note:** If you use PC600 and PC800 RIMMs together, all memory will function at the speed of the slowest RIMM.
5. Your IntelliStation M Pro computer supports 128 MB, 256 MB, and 512 MB RIMMs. Your computer supports a minimum of 128 MB and a maximum of 2.0 GB of system memory. Go to <http://www.ibm.com/pc/support> for a list of memory modules to use with your computer.
6. RIMMs must be installed in matched pairs (same type and capacity). RIMM 1 and 2 are a pair; RIMM 3 and 4 are a pair.

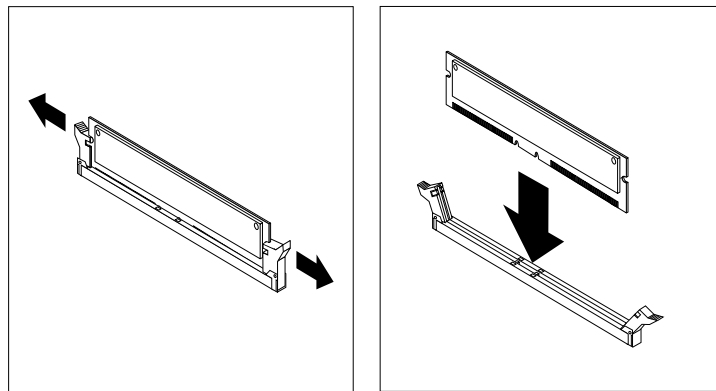
**Note:** The illustrations in this document might differ slightly from your hardware.



Do the following to install a RIMM or C-RIMM:

**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 31.

1. Review the safety precautions listed in the “Safety information” on page 31.
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 32 for details).
3. Remove the support bracket.
4. Touch the static-protective package containing the RIMM to any unpainted metal surface on the computer. Then remove the new RIMM from the package.
5. Open the retaining clips and, if necessary, remove any existing RIMM or C-RIMM:
6. Gently open the retaining clip on each end of the RIMM slot. Turn the RIMM so that the pins align correctly with the connector.



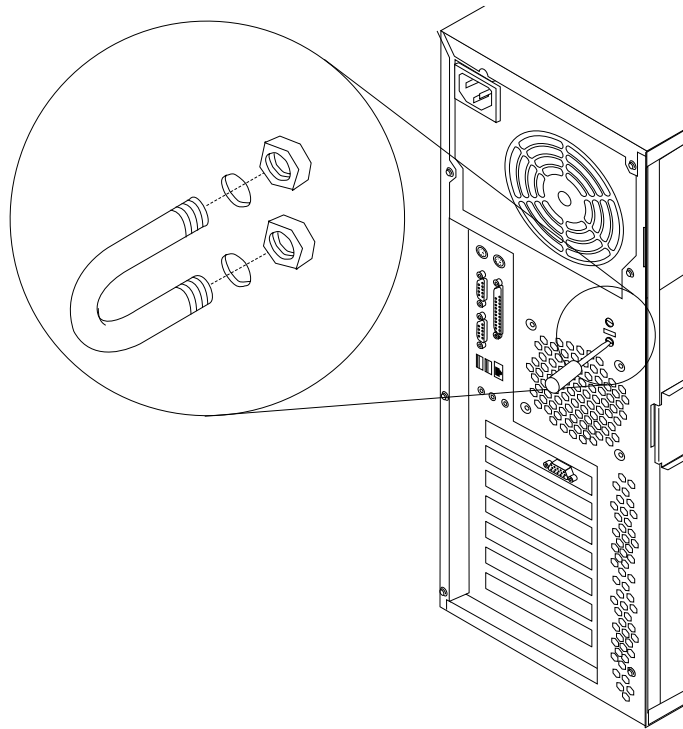
7. Insert the RIMM into the connector by aligning the RIMM edges with the slots at each end of the RIMM connector. Firmly press the RIMM straight down into the connector by applying pressure on both ends of the RIMM simultaneously. The retaining clips snap into the locked position when the RIMM is firmly seated in the connector.
8. If a gap exists between the RIMM and the retaining clips, the RIMM has not been correctly installed. Open the retaining clips, remove the RIMM, then reinsert it.
9. If you have other options to install or remove, go to the appropriate section. Otherwise, finish the installation with the steps below.
10. Replace the support bracket.
11. Replace the side cover, see “Replacing the cover” on page 44.
12. Reconnect the external cables and power cords. Turn on the attached devices, then 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.

**Note:** Your computer might look different slightly different than the one shown.



Do the following to install the U-bolt:

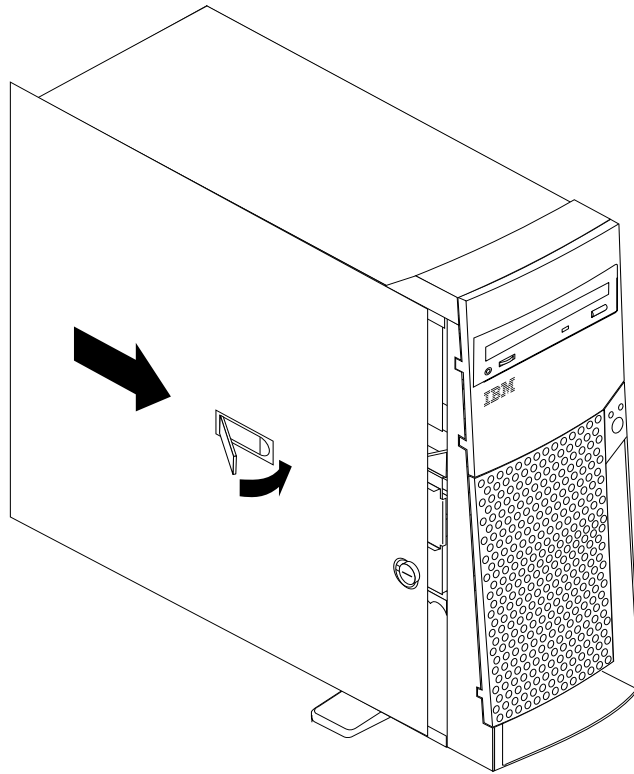
1. Review the safety precautions listed in “Safety Information” on page vii.
2. Turn off the computer and all attached devices. Disconnect all external cables and power cords; then remove the cover (see “Removing the side cover” on page 32 for details).
3. Use a screwdriver to remove the two metal knockouts.
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, then the computer.

---

## Replacing the cover

The following information describes replacing the cover. The following illustration might differ slightly from your hardware.

**Note:** Because of the placement of the adapter support brackets, you might find it easier to lay the computer on its side with the cover lock facing you.



**Note:** If you removed the support bracket, reinstall it before you replace the cover. See “Removing the support bracket” on page 33 for details.

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. 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 devices

You can attach several external devices to your computer.

### Installation procedure

To attach an external device:

1. Be sure your computer and all attached devices are turned off.
2. Read “Installing adapters-before you begin” on page 30 and the documentation that comes with your options.

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

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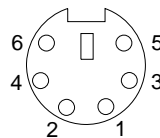
## Input/Output connector descriptions

This section provides pin and other information about the I/O connectors on the rear of your computer. Refer to “Input/Output connector locations” on page 9. These connectors include the following:

- 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 Ultra 3/160 SCSI (some models)

### Mouse connector

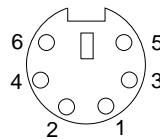
Your computer has one mouse connector that supports a mouse or other pointing device. The mouse connector is located on the rear of your computer, see “Input/Output connector locations” on page 9.



### Keyboard connector

Your computer has one keyboard connector. See “Input/Output connector locations” on page 9 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).



### Parallel connector

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

#### Viewing or changing the connector assignments

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

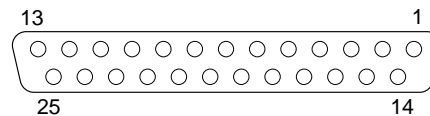


Do the following to view or change the parallel-connector assignment:

1. Restart the computer.
2. Press and hold the F2 key to launch the BIOS Setup Utility.
3. On the BIOS Setup Utility menu, use the cursor keys on the keyboard to select **Advanced**→**Peripheral Configuration**→**Parallel Port**.  
**Note:** When you configure the parallel connector as bi-directional, 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 BIOS Setup Utility menu.

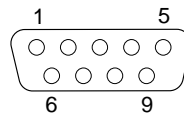
### Parallel connector

There is a 25-pin, female D-shell parallel connector on the rear of your computer, see “Input/Output connector locations” on page 9 for the location of this connector.



### Serial connectors

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



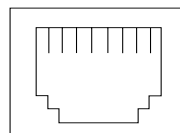
### Ethernet connector

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 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 connector locations” on page 9.

#### 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, which configure automatically when you use any USB device. USB is a serial interface standard for telephony and multimedia devices. It uses Plug and Play technology to determine the type of device attached to the connector.

### Notes:

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

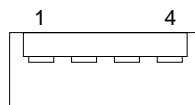
## USB cables

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 five meters (16 ft) per segment.

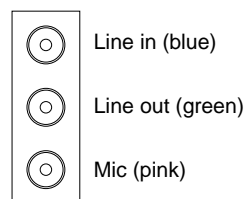
## USB connectors

See “Input/Output connector locations” on page 9 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 connector locations” on page 9 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 a stereo, television, or musical instrument into the computer sound system.

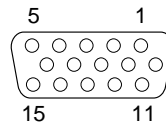
## Microphone

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

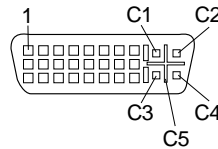
## Video connector

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 connector locations” on page 9 for the location of this connector.

### Analog video connector:



### Digital (DVI-I) video connector:



Models with the Fire GL4 video adapter come with a digital-to-analog converter for each DVI-I connector.

Some models come with an AGP adapter that has dual video connectors. If you have problems viewing information with a second monitor, see “Changing monitor settings” on page 18.

**Attention:** On the Fire GL4 video adapter, the first or only monitor must be connected to the bottom connector (connector number 1).

## Ultra 3/160 SCSI connector

Some computer models come with a SCSI adapter, which supports an Ultra 3/160/MB 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 Mbytes/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, instead of the usual parity checking, to significantly improve data reliability

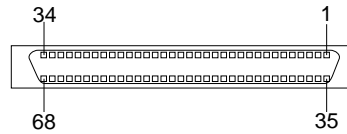
### SCSI cabling requirements

You can install five internal 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 (JA91) connector on the system board. See “System board” on page 28 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 to set 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 external SCSI devices, you must have an optional SCSI PCI 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 78 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 “POST” on page 53 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 54 for more information.

- **Troubleshooting charts**

These charts list problem symptoms and steps to correct the problems. See the “Troubleshooting charts” on page 60 for more information.

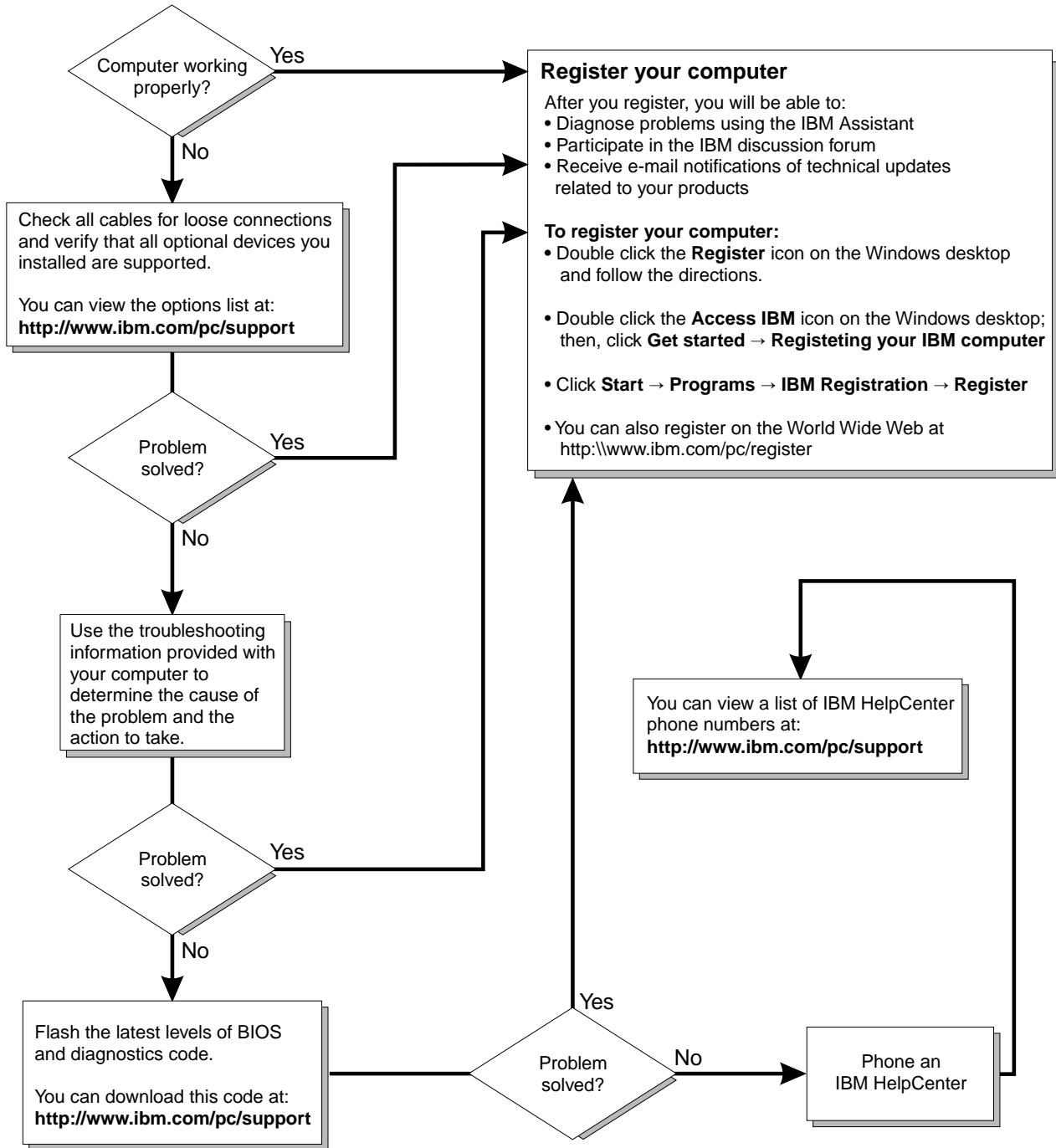
- **Customized support page**

On the World Wide Web you can create your own 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



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## 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.

## POST beep code descriptions

The possible types of beep codes are as follows:

**Repeating long beeps**

Indicate a memory error. Ensure that all RIMMs and C-RIMMs 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 messages (some models)

The following table lists actions to take if you receive any error message.

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

You will get these messages only when running the SCSISelect Utility.

SCSI Messages	Description
All	<p>One or more of the following might be causing the problem.</p> <ul style="list-style-type: none"> <li>• A failing SCSI device (adapter or drive)</li> <li>• An improper SCSI configuration</li> <li>• Duplicate SCSI IDs in the same SCSI chain</li> <li>• An improperly installed SCSI terminator</li> <li>• A defective SCSI terminator</li> <li>• An improperly installed cable</li> <li>• A defective cable</li> </ul> <p><b>Action:</b></p> <p>Verify that:</p> <ul style="list-style-type: none"> <li>• The external SCSI devices are turned on. External SCSI devices must be turned on <i>before</i> the computer.</li> <li>• The cables for all external SCSI devices are connected correctly.</li> <li>• The last device in each SCSI chain is terminated properly.</li> <li>• The SCSI devices are configured correctly.</li> </ul> <p>If the above items are correct, run the diagnostic programs to obtain additional information about the failing device. If the error remains or recurs, call for service.</p>

Table 2. SCSI messages.

---

## 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 089 is for the microprocessor.



<b>fff</b>	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> .)
<b>iii</b>	is the three-digit device ID. (These codes are for trained service personnel and are described in the <i>Hardware Maintenance Manual</i> .)
<b>date</b>	is the date that the diagnostic test was run and the error recorded.
<b>cc</b>	are the check digits that are used to verify the validity of the information.
<b>text message</b>	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:

**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 will 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 from <http://www.ibm.com/pc/support> on the World Wide Web.

## Using the Device Driver and IBM Enhanced Diagnostics CD

Be certain your computer will start up with the CD-ROM drive as the 1st Boot Device. If not, use the BIOS Setup Utility to change your 1st Boot Device. For information on how to use the BIOS Setup Utility, see Access IBM on your desktop, or refer to “Using the BIOS Setup Utility program” on page 23.

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

1. Turn off your computer and any attached devices.
2. Insert the *Device Drivers and Enhanced Diagnostics CD* into the CD-ROM drive.
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 the program and remove the CD from the drive.
6. If you used the BIOS Setup Utility to change the 1st Boot Device, restore it to the original setting.

## Creating an IBM Enhanced Diagnostics diskette

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

- download a program image from the World Wide Web
- create a diskette from the Product Recovery Program

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

1. Go to the following World Wide Web site: <http://www.ibm.com/pc/support/>
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 in the following, and then press Enter: *filename a:*  
where *filename* is the name of the file you downloaded from the Web.

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 appears, press F11 quickly.
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 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 Enhanced Diagnostics diskette or the *Device Drivers and IBM Enhanced Diagnostics CD*.
2. If the computer is on, shut down your operating system and restart the computer.
3. If a user password is set, the system prompts you for it. Type in the correct password; then, 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. You can save the test log to a file on a diskette or to your hard disk drive.

**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 tables, make sure that your system has the latest levels of BIOS and diagnostics installed.

Code	Function	Result	Text message	Action
001	Core system	Failed	Processor board, ECC Test	Call for service.
			System board	
005	Video port		Processor and system boards	
011	Serial port		Integrated serial port	
014	Parallel port		Integrated parallel port	
015	USB interface	Aborted	Can NOT test USB interface while it is in use. <b>Note:</b> If you have a USB keyboard or mouse attached, you cannot run the diagnostic program for the USB interface.	<ol style="list-style-type: none"> <li>1. Turn off the computer.</li> <li>2. Replace the USB keyboard and mouse with a standard keyboard and mouse.</li> <li>3. Turn on the computer.</li> <li>4. Run the diagnostic test again.</li> </ol>
		Failed	System board	Call for service.
020	PCI interface	Failed	System board	Call for service.

Code	Function	Result	Text message	Action
030	SCSI interface	Failed	SCSI adapter in slot <i>n</i> failed register/counter/ power test  (where <i>n</i> is the slot number of the failing adapter)	Refer to the information provided with the adapter for instructions.  If the problem persists, call for service.
			SCSI controller on system board failed register/counter/power test	Call for service.
175	System thermal	Failed	Fan # <i>n</i>  (where <i>n</i> is the number of the failing fan)	Replace the indicated fan.
			Temperature sensed on processor board is out of range	Call for service.
180	Status display	Failed	Any failure message	Call for service.
201	System memory	Failed	RIMM is in location RIMM <i>n</i>  (where <i>n</i> is the number of the socket that contains the failing RIMM)	1. Reseat the failing RIMM.  2. If the problem remains, replace the RIMM.  If the problem persists, call for service.
			Test setup error: Corrupt BIOS in ROM	If your computer does not have the latest level BIOS installed, update the BIOS to the latest level.  If the problem persists, call for service.
			Test setup error: Corrupt DMI BIOS, information in BIOS is not as expected	
206	Diskette drive	Failed	Internal diskette drive bay	Call for service.
215	CD-ROM	Failed	On system board.	Call for service.
		Aborted	The CD-ROM drive is not present.	Verify that the cables are properly connected to the CD-ROM drive. If the problem persists, call for service.
217	Hard disk drive	Failed	BIOS drive # <i>n</i> (where <i>n</i> is the drive bay number)	Call for service.

Code	Function	Result	Text message	Action
264	Magnetic tape drive	Aborted	Test setup error: No tape drive found	<p>Check the cable and power connections to the drive.</p> <p>Refer to the information provided with the tape drive.</p> <p>If the problem persists, call for service.</p>
		Failed	The load/mount test failed for device <i>n</i> on adapter <i>m</i> (where <i>n</i> is the number of the device and <i>m</i> is the adapter number)	<p>Refer to the information provided with the tape drive.</p> <p>If the problem persists, call for service.</p> <p><b>Note:</b> The push button test is applicable only to SCSI tape drives that have a push button.</p>
			The self-diagnostic failed for device <i>n</i> on adapter <i>m</i> . (where <i>n</i> is the number of the device and <i>m</i> is the adapter number)	
			The unload/eject test failed for device <i>n</i> on adapter <i>m</i> (where <i>n</i> is the number of the device and <i>m</i> is the adapter number)	
			The unload/eject push button test failed for device <i>n</i> on adapter <i>m</i> (where <i>n</i> is the number of the device and <i>m</i> is the adapter number)	
The Read/Write Self-diagnostic failed for device <i>n</i> on adapter <i>m</i> (where <i>n</i> is the number of the device and <i>m</i> is the adapter number)	<p>Insert a new tape cartridge; then, run the diagnostic test again.</p> <p>Refer to the information that is provided with the tape drive.</p> <p>If the problem persists, call for service.</p>			
301	Keyboard	Failed	On system-board keyboard test failed	<ol style="list-style-type: none"> <li>1. Verify that the keyboard cable is connected.</li> <li>2. If the problem remains, replace the keyboard cable.</li> </ol> <p>If the problem persists, call for service.</p>
302	Mouse	Failed	On system-board pointing device test failed.	Replace the pointing device. If the problem persists, call for service.
305	Video monitor		Any message	Refer to the information that came with the monitor.
405	Ethernet	Failed	In PCI slot <i>n</i> (where <i>n</i> is the PCI slot number in which the failing Ethernet adapter is installed)	Replace the Ethernet adapter in slot <i>n</i> . If the problem persists, call for service.
			On system board	Call for service.

Code	Function	Result	Text message	Action
415	Analog/digital modem	Not applicable	No modem was detected	1. Verify that the modem is properly attached to the system.  If the problem persists, call for service.
			PCI modem detected, but not enabled	1. Change the configuration to enable the modem.  2. If the problem remains, replace the modem.  If the problem persists, call for service.
		Failed	Modem reset failed	Replace the modem.  If the problem persists, call for service.
			No dial tone detected	1. Make sure that the phone line attached to the modem has a dial tone. (Connect a phone to the line and listen, if necessary.) If there is no tone, have the phone line serviced.  2. If the problem remains, replace the modem.  If the problem persists, call for service.

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## 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 in isolating operating system and device driver problems.

### PC-Doctor for Windows

Do the following to use PC-Doctor for Windows:

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

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## 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 and diagnostics installed.

See “Starting the diagnostic programs” on page 55 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:

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

Symptom	Suggested action
<b>CD-ROM drive</b>	Verify that:
CD-ROM drive is not recognized.	<ol style="list-style-type: none"> <li>1. The primary IDE channel is enabled in the BIOS Setup Utility program.</li> <li>2. All cables and jumpers are installed correctly.</li> <li>3. The correct device driver is installed for the CD-ROM drive.</li> </ol>
<b>Diskette drive</b>	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"> <li>1. The diskette drive is enabled in the BIOS Setup Utility program.</li> <li>2. The diskette is good and not damaged. (Try another diskette if you have one.)</li> <li>3. The diskette contains the necessary files to start the computer.</li> <li>4. Your software program is OK.</li> </ol> <p>If the diskette drive in-use light stays on, or the system continues to bypass the diskette drive, call for service.</p>
<b>Expansion enclosure</b>	Verify that:
The SCSI expansion enclosure used to work, but does not work now.	<ol style="list-style-type: none"> <li>1. The cables for all external SCSI options are connected correctly.</li> <li>2. The last option in each SCSI chain, or the end of the SCSI cable, is terminated correctly.</li> <li>3. Any external SCSI option is turned on. You must turn on an external SCSI option before turning on the system.</li> </ol> <p>For more information, see your SCSI and expansion enclosure documentation.</p>
<b>Other devices</b>	Call for service.
Problems such as broken cover locks or indicator lights not working.	

Table 3. Troubleshooting charts.

Symptom	Suggested action
<b>Intermittent problems</b>	Verify that:
A problem occurs only occasionally and is difficult to detect.	<ol style="list-style-type: none"> <li>1. All cables and cords are connected securely to the rear of the computer and attached options.</li> <li>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.</li> <li>3. Ensure that the SCSI bus and devices are configured correctly and that the last external device in each SCSI chain is terminated correctly.</li> </ol> <p>If the problem persists, call for service.</p>
<b>Keyboard, mouse, or pointing-device</b>	<ol style="list-style-type: none"> <li>1. Make sure that the keyboard cable is properly connected to the computer.</li> <li>2. Make sure that the computer and the monitor are turned on.</li> </ol>
All or some keys on the keyboard do not work.	<ol style="list-style-type: none"> <li>3. Try using another keyboard.</li> </ol> <p>If the problem persists, call for service.</p>
The mouse or pointing device does not work.	<ol style="list-style-type: none"> <li>1. Verify that the mouse or pointing-device cable is securely connected and the device drivers are installed correctly.</li> <li>2. Try using another mouse or pointing device.</li> </ol> <p>If the problem persists, call for service.</p>
<b>Memory</b>	Verify that:
The amount of memory detected is less than the amount of memory installed.	<ol style="list-style-type: none"> <li>1. The memory modules are seated properly.</li> <li>2. You have installed the correct type of memory.</li> <li>3. All installed RIMMs are enabled. The computer might have automatically disabled a RIMM bank when it detected a problem.</li> </ol> <p>If the problem persists, call for service.</p>
<b>Monitor</b>	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.	<p>If the problem persists, call for service.</p>
The screen is blank.	<p>Verify that:</p> <ol style="list-style-type: none"> <li>1. The computer power cord is plugged into the computer and a working electrical outlet.</li> <li>2. The monitor cables are connected properly.</li> <li>3. The monitor is turned on and the brightness and contrast controls are adjusted correctly.</li> </ol> <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"> <li>1. The primary monitor cable is connected to the video port.</li> <li>2. You installed the necessary device drivers for the applications.</li> </ol> <p>If the problem persists, call for service.</p>

Table 3. Troubleshooting charts.



Symptom	Suggested action
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><b>Notes:</b></p> <ol style="list-style-type: none"> <li>To prevent diskette drive read/write errors, be sure the distance between monitors and diskette drives is at least 76 mm (3 in.).</li> <li>Non-IBM monitor cables might cause unpredictable problems.</li> <li>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.</li> </ol> <p>If the problem persists, call for service.</p>
Wrong characters appear on the screen.	<p>If the wrong language is displayed, update the BIOS with the correct language.</p> <p>If the problem persists, call for service.</p>
<b>Option</b>	Verify that:
An IBM option that was just installed does not work.	<ol style="list-style-type: none"> <li>The option is designed for the computer. Refer to <a href="http://www.ibm.com/pc/support">http://www.ibm.com/pc/support</a> for option compatibility information.</li> <li>You followed the installation instructions that came with the option.</li> <li>The option is installed correctly.</li> <li>You have not loosened any other installed options or cables.</li> <li>You updated the configuration information in the BIOS Setup Utility program. Whenever an option is changed, you might have to update the configuration.</li> </ol> <p>If the problem persists, call for service.</p>
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"> <li>The cables for all external SCSI options are connected correctly.</li> <li>The last option in each SCSI chain, or the end of the SCSI cable, is terminated correctly.</li> <li>All external SCSI options are turned on. You must turn on external SCSI options before turning on the computer.</li> </ol> <p>If the problem persists, call for service.</p>
<b>Parallel port</b>	Verify that:
A parallel device does not work.	<ol style="list-style-type: none"> <li>The device is compatible with the computer.</li> <li>The parallel port is enabled.</li> </ol> <p>If the problem persists, call for service.</p>

Table 3. Troubleshooting charts.

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

Table 3. Troubleshooting charts.

## 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.

Symptom	Suggested action
<b>Software</b>	To determine if problems are caused by the software, verify that:
Suspected software problem.	<ol style="list-style-type: none"> <li>1. Your computer has the minimum memory requirements needed to use the software. For memory requirements, refer to the information that comes with the software. <b>Note:</b> If you have just installed an adapter or memory, you might have a memory address conflict.</li> <li>2. The software is designed to operate on your computer.</li> <li>3. Other software works on your computer.</li> <li>4. The software that you are using works on another computer.</li> </ol> <p>If you received any error messages when using the software program, refer to the information that comes with the software for a description of the messages and solutions to the problem.</p> <p>If the items above are correct and the problem remains, contact your place of purchase.</p>

## 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 the client and computer 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.

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"> <li>• Determine if the IRQ setting assigned to the Ethernet controller is also assigned to another device in the BIOS Setup Utility program.</li> </ul> <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. For example, for NetWare Versions 3 and 4 it is recommended that disk controllers not share IRQ settings with LAN controllers.</p> <ul style="list-style-type: none"> <li>• Make sure that you are using the most recent device driver available from the World Wide Web.</li> <li>• Run the network diagnostic program.</li> </ul> <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"> <li>• Make sure that you have loaded the network device drivers.</li> <li>• The network might be idle. Try sending data from this workstation.</li> <li>• Run diagnostics on the LEDs.</li> <li>• 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.</li> </ul>
Data is incorrect.	<p>Check the following:</p> <ul style="list-style-type: none"> <li>• Make sure that you are using Category 5 cables when operating the computer at 100 Mbps.</li> <li>• Make sure that the cables do not run close to noise-inducing sources like fluorescent lights.</li> </ul>
The Ethernet controller stopped working when another adapter was added to the computer.	<p>Check the following:</p> <ul style="list-style-type: none"> <li>• Make sure that the cable is connected to the Ethernet controller.</li> <li>• Make sure that your PCI computer BIOS is current.</li> <li>• Reseat the adapter.</li> <li>• Determine if the IRQ setting assigned to the Ethernet adapter is also assigned to another device in the BIOS Setup Utility program.</li> </ul> <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>

Table 4. Ethernet troubleshooting chart.

Ethernet controller problem	Suggested Action
The Ethernet controller stopped working without apparent cause.	Check the following: <ul style="list-style-type: none"> <li>• Run diagnostics for the Ethernet controller.</li> <li>• Try a different connector on the hub.</li> <li>• Reinstall the device drivers. Refer to your operating system documentation and to “Recovering or installing device drivers” on page 72 in this publication.</li> </ul> If the problem remains, call for service.

Table 4. Ethernet troubleshooting chart.

## 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.

Message	Description
Couldn't allocate resources.	<p><b>Explanation:</b> An unknown error has occurred when trying to allocate needed resources for the AFT Module.</p> <p><b>Action:</b></p> <ul style="list-style-type: none"> <li>• Check the computer configuration. If the problem persists, contact your network administrator.</li> <li>• Verify that the Ethernet controller is enabled. If the Ethernet controller is enabled, run the diagnostic programs.</li> </ul>
AFT group for primary adapter in slot <i>nnn</i> already exists.	<p><b>Explanation:</b> An attempt was made to rebind an adapter already in an AFT group.</p> <p><b>Action:</b> 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><b>Explanation:</b> 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><b>Action:</b> 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><b>Explanation:</b> The appropriate or expected number of parameters was not entered in a command.</p> <p><b>Action:</b> Check the parameters required for the given command. If the problem persists, contact your network administrator.</p>
Duplicate slot numbers detected.	<p><b>Explanation:</b> An attempt has been made to bind the same slot number more than once.</p> <p><b>Action:</b> 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>

Table 5. NetWare driver messages for the Ethernet controller.

Message	Description
'xxx' is not supported for AFT team.	<p><b>Explanation:</b> A bind command has been issued for adapters not supported by AFT.NLM.</p> <p><b>Action:</b> 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><b>Explanation:</b> 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><b>Action:</b> Verify that all the adapters bound in a team are of the same classification.</p>
Requested number of Secondary cards are not found.	<p><b>Explanation:</b> The number of adapters specified in the bind command could not be located.</p> <p><b>Action:</b> Verify the numbers and slot locations of the adapters to be bound. If the problem persists, contact your network administrator.</p>
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><b>Explanation:</b> 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><b>Action:</b> Ensure that the protocol is bound to only adapter in an AFT team.</p>
Error identifying slot numbers for the specified board names.	<p><b>Explanation:</b> The mapping between the board name entered and the slot number for an adapter could not be established.</p> <p><b>Action:</b> 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><b>Explanation:</b> The number entered in the unbind command was not the primary adapter in an AFT group.</p> <p><b>Action:</b> Reissue the unbind command and specify the slot number for the primary adapter</p>
LAN adapter at slot <i>nnnn</i> (Port <i>0xaa</i> ) failed to reset. Check the state of the adapter.	<p><b>Explanation:</b> The adapter that you specified could not be initialized.</p> <p><b>Action:</b></p> <ol style="list-style-type: none"> <li>1. Load the driver for the supported adapter.</li> <li>2. Check that the adapter is seated properly in the slot and try loading the AFT module again.</li> </ol> <p>If the problem persists, contact your network administrator.</p>
AFT is not supported on this version of NetWare.	<p><b>Explanation:</b> The NetWare on your computer is not a version supported by AFT.</p> <p><b>Action:</b> Load and bind AFT only on supported versions of NetWare (currently version 4.11 and above).</p>
Failed to allocate resources tags.	<p><b>Explanation:</b> An unknown error has occurred when trying to allocate needed resources for the AFT module.</p> <p><b>Action:</b> Check computer configuration. If the problem persists, contact your network administrator.</p>
Please unload all LAN drivers before unloading AFT.NLM.	<p><b>Explanation:</b> An attempt was made to unload the AFT.NLM module before unloading the adapter driver.</p> <p><b>Action:</b> Unload the adapter driver before unloading the AFT module.</p>

Table 5. NetWare driver messages for the Ethernet controller.

## NDIS 4.0 (Windows NT and 2000) driver messages

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

Error code (hex)	Description
0x00	<b>Explanation:</b> The driver could not register the specified interrupt. <b>Action:</b> Contact your network administrator.
0x01	<b>Explanation:</b> One of the PCI cards did not get the required resources. <b>Action:</b> Contact your network administrator.
0x02	<b>Explanation:</b> Bad node address (multicast address). <b>Action:</b> Make sure the locally administered address is valid, if one is specified. The address can not be a multicast address.
0x03	<b>Explanation:</b> Failed self-test. <b>Action:</b> Make sure a cable is attached to the Ethernet connector. If the problem persists, call for service.
0x0D	<b>Explanation:</b> Could not allocate enough memory for transmit queues. <b>Action:</b> <ol style="list-style-type: none"> <li>1. From the Windows NT desktop, select <b>Start</b>→<b>Control Panel</b>→<b>Networks</b>→<b>Adapters</b>.</li> <li>2. Select your IBM Ethernet adapter from the list.</li> <li>3. Select <b>Properties</b>→<b>Advanced</b>.</li> <li>4. Lower the resource values that apply to the transmit queue.</li> </ol>
0x0E	<b>Explanation:</b> Could not allocate enough memory for receive queue. <b>Action:</b> <ol style="list-style-type: none"> <li>1. From the Windows NT desktop, select <b>Start</b> →<b>Control Panel</b>→<b>Networks</b>→<b>Adapters</b>.</li> <li>2. Select your IBM Ethernet adapter from the list.</li> <li>3. Select <b>Properties</b>→<b>Advanced</b>.</li> <li>4. Lower the resource values that apply to the receive queue.</li> </ol>
0x0F	<b>Explanation:</b> Could not allocate enough memory for other structures. <b>Action:</b> <ol style="list-style-type: none"> <li>1. From the Windows NT desktop, select <b>Start</b>→<b>Control Panel</b>→<b>Networks</b>→<b>Adapters</b>.</li> <li>2. Select your IBM Ethernet adapter from the list.</li> <li>3. Select <b>Properties</b>→<b>Advanced</b>.</li> <li>4. Lower the value for the resource named in the message.</li> </ol>
0x10	<b>Explanation:</b> Did not find any Ethernet controllers. <b>Action:</b> Contact your network administrator.
0x11	<b>Explanation:</b> Multiple Ethernet controllers found, but none matched the required ID. <b>Action:</b> Contact your network administrator.
0x13	<b>Explanation:</b> Did not find any Ethernet controllers that matched the required subven/subdev. <b>Action:</b> Contact your network administrator.

Table 6. NDIS (Windows NT or Windows 2000) driver messages for the Ethernet controller.

Error code (hex)	Description
0x16	<p><b>Explanation:</b> Single adapter found, but multiple instances tried to load.</p> <p><b>Action:</b> Contact your network administrator.</p>
0x17	<p><b>Explanation:</b> Slot parameter not specified in the registry.</p> <p><b>Action:</b> Call for service.</p>
All other 4-character hexadecimal codes	<p><b>Action:</b> Call for service.</p>

Table 6. NDIS (Windows NT or Windows 2000) driver messages for the Ethernet controller.



## Ethernet teaming messages

This section displays the messages associated with Ethernet teaming.

Event ID	Type	Description
01	Error	<b>Explanation:</b> Team Name and physical adapter name are the same. This is an invalid configuration. <b>Action:</b> Reconfigure the adapter team by double-clicking the <b>PROSet</b> icon in the control panel.
02	Error	<b>Explanation:</b> Unable to allocate required resources. <b>Action:</b> Free some memory resources and restart.
03	Error	<b>Explanation:</b> Unable to read required registry parameters. <b>Action:</b> Reconfigure the adapter team by double-clicking the <b>PROSet</b> icon in the control panel.
04	Error	<b>Explanation:</b> Unable to bind to physical adapter. <b>Action:</b> Reconfigure the adapter team by double-clicking the <b>PROSet</b> icon in the control panel.
05	Error	<b>Explanation:</b> Unable to initialize an adapter team. <b>Action:</b> Reconfigure the adapter team by double-clicking the <b>PROSet</b> icon in the control panel.
06	Informational	<b>Explanation:</b> Team <i>nn</i> . Primary adapter is initialized. <b>Action:</b> None.
07	Informational	<b>Explanation:</b> Team <i>nn</i> . Secondary adapter is initialized. <b>Action:</b> None.
08	Informational	<b>Explanation:</b> Team <i>nn</i> . Virtual adapter or Team is initialized. <b>Action:</b> None.
09	Informational	<b>Explanation:</b> Team <i>nn</i> . Primary adapter is switching over. <b>Action:</b> None.
10	Warning	<b>Explanation:</b> Team <i>nn</i> . Adapter link down. <b>Action:</b> Make sure the adapter is functioning properly.
11	Informational	<b>Explanation:</b> Team <i>nn</i> . Secondary adapter took over. <b>Action:</b> None.
12	Warning	<b>Explanation:</b> Team <i>nn</i> . Secondary adapter is deactivated from the Team. <b>Action:</b> Make sure the secondary adapter is functioning properly and that the adapter cable is securely connected to the LAN.
13	Informational	<b>Explanation:</b> Team <i>nn</i> . Secondary adapter has rejoined the Team. <b>Action:</b> None.
14	Informational	<b>Explanation:</b> Team <i>nn</i> . Secondary adapter link is working. <b>Action:</b> None.

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

Event ID	Type	Description
15	Error	<b>Explanation:</b> Team <i>nn</i> . The last adapter has lost its link. Network connection has been lost. <b>Action:</b> Shut down the computer and replace the adapters; then, restart the computer to reestablish the connection.
16	Informational	<b>Explanation:</b> Team <i>nn</i> . An adapter has reestablished the link. Network connection has been restored. <b>Action:</b> None.
17	Informational	<b>Explanation:</b> Team <i>nn</i> . Preferred primary adapter has been detected. <b>Action:</b> None.
18	Informational	<b>Explanation:</b> Team <i>nn</i> . Preferred secondary adapter has been detected. <b>Action:</b> None.
19	Informational	<b>Explanation:</b> Team <i>nn</i> . Preferred primary adapter took over. <b>Action:</b> None.
20	Informational	<b>Explanation:</b> Team <i>nn</i> . Preferred secondary adapter took over. <b>Action:</b> None.
21	Warning	<b>Explanation:</b> Team <i>nn</i> . Primary adapter does not sense any Probes. Possible reason: partitioned Team. <b>Action:</b> Make sure the cables of the adapter team are connected to the same LAN segment. Reconfigure the team if necessary.

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

## Recovering your operating system and preinstalled software

This section contains instructions for recovering BIOS, 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 the C:\ drive. 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 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 on the World Wide Web at <http://www.ibm.com/pc/support>.

## Recovering the operating system

Your IBM computer has the Product Recovery program on a hidden partition of the hard disk drive.

### Performing a partial or full recovery

#### Attention

The Product Recovery program will erase all files on the C drive 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 drive and continue at the next step. If you are using the Product Recovery Program on the hard disk drive, continue at 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 you are unable to see the DOS command prompt or the F11 prompt, See "Using the Recovery Repair diskette" on page 74
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 the program. If necessary, remove the CD from the CD-ROM drive.
8. Restart the computer.

**Note:** If you recover Windows NT Workstation, the hard disk must be partitioned before all hard disk drive space is available. For information on how to partition the remainder of your hard disk, go to Access IBM.

## Using the Recovery Repair diskette

In some circumstances, files on your hard disk might become unusable so that you do not see the F11 prompt 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. Turn off your computer and insert the Recovery Repair diskette.
2. Turn on your computer and follow the directions on the screen.

## Using ConfigSafe

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 on a regular schedule of your choosing of the computer configuration. 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 the following:

1. From the Windows desktop, press **Start -->ConfigSafe-->ConfigSafe**.
2. Follow the instructions on the screen.
3. When finished, exit ConfigSafe.

### ConfigSafe save our system (SOS) feature

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`
3. Press Enter.
4. Type `sos`
5. Press Enter.
6. Select the most recent configuration dated before the start of the problem. Press Enter.
7. Restart the computer.

**Note:** If the problem does not resolve, 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 78.

ConfigSafe has an online Help system. Look for the pull-down menu for online Help at the top of the screen.

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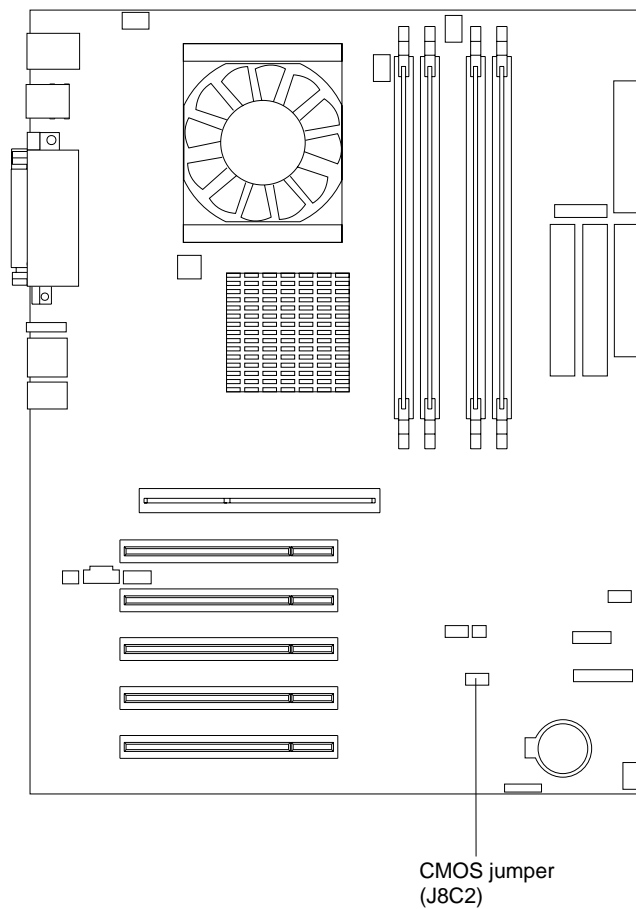
## Erasing a lost or forgotten password (clearing CMOS)

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

To erase a forgotten password:

1. Turn off the computer and all attached devices.
2. Unplug the power cord.
3. Remove the cover. See “Removing the side cover” on page 32.
4. See the illustration below for the CMOS jumper location.
5. Move the jumper from the standard position on pins 1 and 2 to the maintenance, or configure position (pins 2 and 3).
6. Replace the cover and connecting the power cord. See “Replacing the cover” on page 44 and “Connecting computer cables” on page 10.
7. Once you restart the computer, the BIOS Setup Utility screen is displayed.
8. In the maintenance screen, you can clear CMOS settings.
9. Press Esc.
10. Select **Exit** from the menu.
11. Select **Exit Saving Changes**.
12. Follow the directions on the screen.

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



---

## Recovering from a POST/BIOS update failure

If power to 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 to recover:

1. Using another computer, open the config.sys file on the BIOS flash diskette, with a text editor.
2. Find the line:  
`shell = flash2.exe`
3. Change this line to:  
`shell = flash2.exe /U`
4. Save this file to the diskette. Now you can use this BIOS flash diskette to update your computer.
5. Turn off your computer and all attached devices, such as printers, monitors, and external drives.
6. Unplug all power cords from electrical outlets, and remove the cover. See “Removing the side cover” on page 32.
7. Locate the CMOS jumper on the system board, removing any adapters that impede access to the jumper. See the system board label inside your computer for the location of the jumper. See also the illustration in “Erasing a lost or forgotten password (clearing CMOS)” on page 74.
8. Remove the jumper from the system board.
9. Replace the cover. See “Replacing the cover” on page 44. Reconnect the power cords for the computer and monitor to electrical outlets.
10. Insert the BIOS update (flash) diskette into drive A, and turn on the computer and monitor.
11. After the update session is completed, remove the diskette from the diskette drive, and turn off the computer and monitor.
12. Unplug the power cords from electrical outlets.
13. Unplug all power cords from electrical outlets, and remove the cover. See “Removing the side cover” on page 32.
14. Remove any adapters that impede access the BIOS Configuration jumper.
15. Replace the Clear CMOS/Recovery jumper to its original position.
16. Replace any adapters that were removed.
17. Replace the cover, see “Replacing the cover” on page 44, and reconnect all cables that were disconnected.
18. Turn on the computer to restart the operating system.
19. Restore the config.sys file on the diskette back to:  
`shell = flash2.exe`

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## Replacing the battery

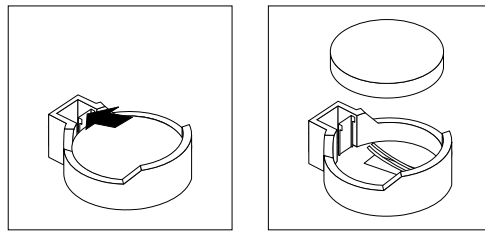
When replacing the battery, you must replace it with a lithium battery of the same type from the same manufacturer. To avoid possible danger, read and follow the information in “Lithium battery notice” on page xii.

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.

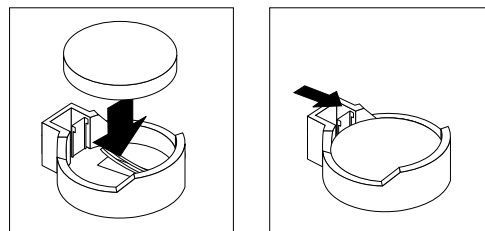
**Note:** After you replace the battery, you must reconfigure your system and reset the system date and time.

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 BIOS Setup Utility program and set configuration parameters.
  - Set the system date and time.
  - Set passwords if necessary.
  - Save the configuration.

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## 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 Help-Center®. 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 9:00 a.m. to 6:00 p.m.

**Note:** Response time will vary depending on the number and complexity of incoming calls.

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	01-24 592 590 1
Belgium - Dutch	Belgie	02-210 9820

Country		Telephone number
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	09-22 931 840
France	France	02 38 55 74 50
Germany	Deutschland	07032-1549 201
Ireland	Ireland	01-815 9200
Italy	Italia	02-4827-5040
Luxembourg	Luxembourg	298-977 5063
Netherlands	Nederland	020-514 5770
Norway	Norge	23 05 32 40
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.

With some computer models, you can register for International Warranty Service. If you travel with your computer or need to move it to another country or region, you might be able to receive an International Warranty Service Certificate that is honored virtually worldwide, wherever IBM or IBM resellers sell and service IBM IntelliStation products. The service level is based on the standard method of service delivery for IBM IntelliStation products in the servicing country or region.

For more information or to register for International Warranty Service:

- In the U.S. or Canada, call 1-800-497-7426.
- In Europe, call 44-1475-893638 (Greenock, U.K.).
- In Australia and New Zealand, call 61-2-9354-4171.
- In all other countries, contact your IBM reseller or IBM marketing representative.

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 Sup-

port 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.

## **Ordering replacing Product Recovery Program CDs**

For the most recent information on ordering a replacement *Product Recovery* CD for your computer, see the IBM personal computing support Web page at <http://www.ibm.com/pc/support>.



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## Appendix A. Caring for your computer

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

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### Taking care of your computer

This section provides guidelines for the proper handling and care of your computer.

#### Basics

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

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

#### Cleaning your computer

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

##### Caution

Be 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 non-abrasive liquid glass cleaner.

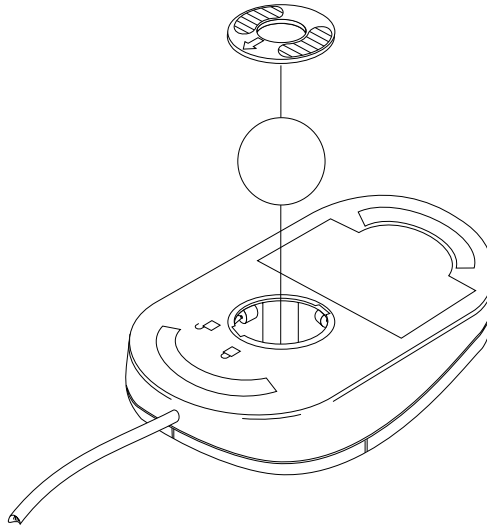
#### Mouse

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.

## Cleaning tape drives

To ensure proper operation of a tape backup drive, use a dry process cleaning cartridge to clean the tape head two hours after you first use a new data cartridge. Clean the tape head once a month, or after each eight hours of continuous read/write operations, whichever occurs first. For complete details about the tape backup drive, refer to the documentation that comes with your tape drive option.

## Moving your computer

Take the following precautions before moving your computer.

1. Back up all files and data from the hard disk.  
Operating systems can vary in the way they perform backup procedures. 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.

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## Appendix B. Computer records

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

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### Serial numbers and keys

Record and retain the following information.

Product Name	IntelliStation M 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.





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## Appendix C. 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 the following:

1. Double-click the **Access IBM** icon.
2. In the Access IBM window, select **Solve problems**.
3. Click **IBM International License Agreement**.



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## Appendix D. 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.

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### 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.

<b>Machine</b> - IntelliStation M Pro Type 6849
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<b>Warranty period</b> - Three years
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### Warranty service and support

With the original purchase of an IBM 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 computer 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 computer 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 computer 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" in the "Getting information, help, and service" chapter.

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

This warranty statement consists of two parts: Part 1 and Part 2. Be sure to read Part 1 and the country-unique terms in Part 2 that apply to your country or region.

### 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.

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

#### Items Not Covered by Warranty

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

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 non-performance 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 E. Notices

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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 1000000 bytes, and GB stands for 1000000000 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）の基準に基づくクラスA情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

---

## Power cords

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



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

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

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

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

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

IBM power cord part number	Used in these countries and regions
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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