



IntelliStation E Pro

Types 6216 and 6226

User's Guide



IBM IntelliStation E Pro
Types 6216 and 6226



User's Guide

Note:

Before using this Guide and the product it supports, be sure to read the information in Appendix B, "Warranty information" on page 99, and Appendix C, "Notices" on page 111.

Second Edition (September 2002)

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Safety information

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الأمنية

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

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

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

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

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

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

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

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

A termék telepítése előtt olvassa el a Biztonsági előírásokat!

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

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

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

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

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

Перед установкой продукта прочтите инструкции по
технике безопасности.

Pred inštaláciou tohto zariadenia si pečítajte Bezpečnostné predpisy.

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

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

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

Läs säkerhetsinformationen innan du installerar den här produkten.

Statement 1:



DANGER

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

To avoid a shock hazard:

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

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

Statement 2:



CAUTION:

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

Do not:

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

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

Statement 3:



CAUTION:

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

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



DANGER

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

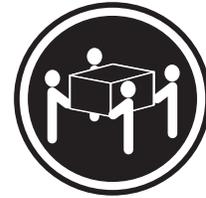
Statement 4:



≥ 18 kg (39.7 lb)



≥ 32 kg (70.5 lb)



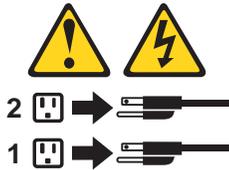
≥ 55 kg (121.2 lb)

CAUTION:
Use safe practices when lifting.

Statement 5:



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



Statement 8:



CAUTION:

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



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

Chapter 1. Introducing the IntelliStation E Pro

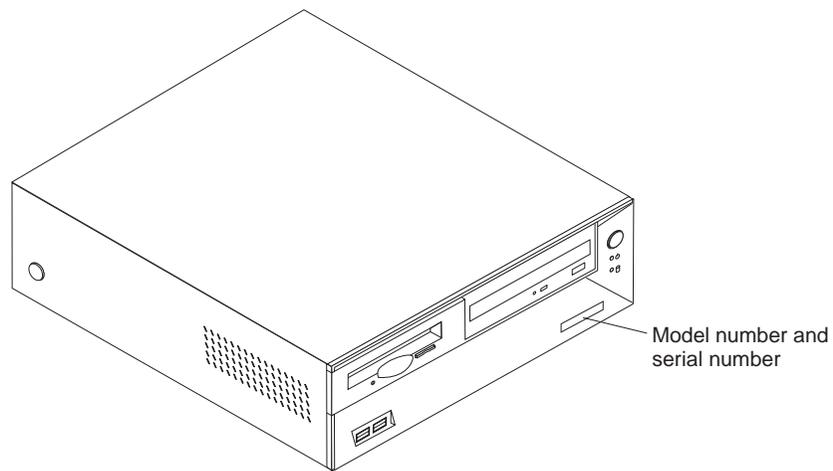
Thank you for selecting an IBM® IntelliStation® E Pro Type 6216 or Type 6226 computer. Your computer incorporates many of the latest advances in computing technology and can be expanded and upgraded as your needs change.

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

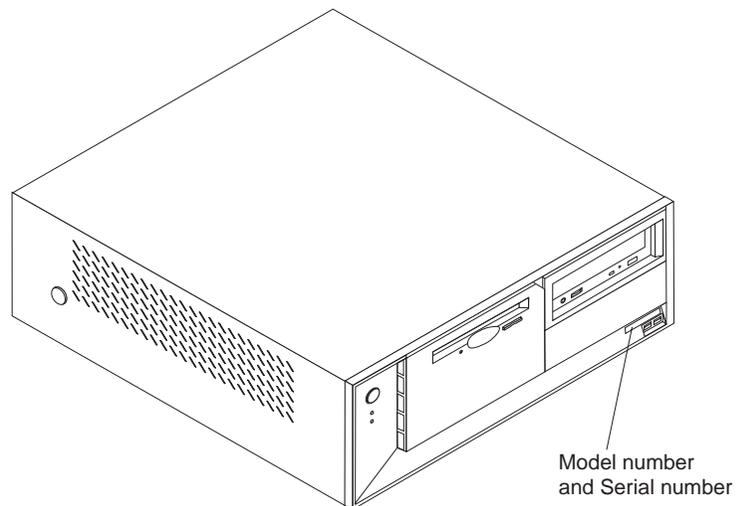
See the following illustrations for the location of the computer model and serial number labels. You will need these numbers to register your computer with IBM.

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

Type 6216:



Type 6226:



Notices and statements used in this book

The caution and danger statements used in this book also appear in the multilingual safety information book that is accessible through Access IBM and on the IBM *IntelliStation Documentation* CD. Each statement is numbered for easy reference corresponding to statements in the safety book.

The notices and statements 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. An attention notice is placed just before the instruction or situation in which damage could occur.
- **Caution:** These statements indicate situations that can be potentially hazardous to you. A caution statement is placed just before the description of a potentially hazardous procedure step or situation.
- **Danger:** These statements indicate situations that can be potentially lethal or extremely hazardous to you. A danger statement is placed just before the description of a potentially lethal or extremely hazardous procedure step or situation.

Related information

The following documentation contains additional information about your computer. Because your computer comes with IBM-preinstalled software, you might be able to view some of these documents in Access IBM. See “Using Access IBM” on page 12. The IBM documents listed below can also be found at <http://www.ibm.com/> on the World Wide Web.

- *Installation Guide*
This publication contains setup and installation instructions.
- *Hardware Maintenance Manual*
This publication contains information for trained service technicians. It can be found at <http://www.ibm.com/pc/support/> on the World Wide Web.
- README files on the *Device Drivers and IBM Enhanced Diagnostics* CD
Several README files on this CD contain information about diagnostic tools and preinstalled device drivers. Other README files on this CD contain information about the various adapters and devices that might be attached to your computer.
- Adaptec SCSI documentation
This publication, accessible through Access IBM and on the IBM *IntelliStation Documentation* CD, contains information and instructions for installing and configuring small computer system interface (SCSI) device drivers and devices.
- *Safety Information*
This publication, accessible through Access IBM and on the IBM *IntelliStation Documentation* CD, contains multilingual caution and danger statements.
- *IntelliStation Documentation* CD
This CD contains all of the publications in Portable Document Format (PDF).

Features and specifications — Type 6216

The following table provides a summary of the features and specifications of your IntelliStation E Pro Type 6216. Some features and specifications are not available on all models.

<p>Microprocessor: Supports one Intel® Pentium® 4 with 256 KB or 512 KB Level-2 cache and 400 MHz or 533 MHz front-side bus (FSB)</p> <p>Memory:</p> <ul style="list-style-type: none"> • Minimum: 256 MB • Maximum: 2.0 GB • Type: PC2100 DIMMs • Slots: two dual inline <p>Internal drives:</p> <ul style="list-style-type: none"> • Diskette: 1.44 MB (3 mode) • Hard disk drive: IDE or SCSI • One of the following: <ul style="list-style-type: none"> — CD-ROM: IDE — DVD-ROM: IDE — CD-RW: IDE <p>Expansion bays:</p> <ul style="list-style-type: none"> • One 5.25-in. bay (one CD-ROM drive installed) • Two 3.5-in. bays (one diskette drive installed, and one hard disk drive installed) <p>PCI expansion slots: Three 33 MHz/32-bit low-profile slots on the system board</p> <p>Power supply: One 160 watt (90-240 V ac)</p> <p>Video adapter: (depending on your model)</p> <ul style="list-style-type: none"> • Matrox Millennium G450 (DVI-I) with 32 MB DDR SDRAM video memory and a single DVI-I or dual analog connectors • NVIDIA Quadro4 200NVS (LFH-60) with 64 MB DDR SDRAM video memory and dual analog connectors (or dual digital monitor capability with the purchase of an additional pigtail cable) 	<p>Size and weight:</p> <ul style="list-style-type: none"> • Height: 104 mm (4.1 in.) • Depth: 412 mm (16.2 in.) • Width: 360 mm (14.2 in.) • Weight: approximately 9.1 kg (20 lb) when fully configured or 6.8 kg (15.0 lb) minimum <p>Integrated functions:</p> <ul style="list-style-type: none"> • One 10/100/1000 Ethernet controller on the system board with RJ-45 Ethernet port • Two serial ports • One parallel port • Four USB ports • Keyboard port • Mouse port • Audio ports <ul style="list-style-type: none"> — Line out — Line in — Mic • Dual-channel bus mastering IDE controller <p>Acoustical noise emissions:</p> <ul style="list-style-type: none"> • Sound power, idling: 4.9 bel maximum • Sound power, operating: 5.2 bel maximum <p>Environment:</p> <ul style="list-style-type: none"> • Air temperature: <ul style="list-style-type: none"> — Computer on: 10° to 35°C (50.0° to 95.0°F). Altitude: 0 to 2133 m (6998.0 ft) — Computer off: 10° to 43°C (50.0° to 109.4°F). Maximum altitude: 2133 m (6998.0 ft) • Humidity: <ul style="list-style-type: none"> — Computer on: 8% to 80% — Computer off: 8% to 80% 	<p>Heat output: Approximate heat output in British thermal units (Btu) per hour</p> <ul style="list-style-type: none"> • Minimum configuration: 257 Btu (75 watts) • Maximum configuration: 686 Btu (200 watts) <p>Electrical input:</p> <ul style="list-style-type: none"> • Sine-wave input (50-60 Hz) required • Input voltage low range: <ul style="list-style-type: none"> — Minimum: 90 V ac — Maximum: 137 V ac • Input voltage high range: <ul style="list-style-type: none"> — Minimum: 180 V ac — Maximum: 265 V ac • Input kilovolt-amperes (kVA) approximately: <ul style="list-style-type: none"> — Minimum: 0.08 kVA — Maximum: 0.52 kVA <p>Notes:</p> <ol style="list-style-type: none"> 1. Power consumption and heat output vary depending on the number and type of optional features installed and the power-management optional features in use. 2. These levels were measured in controlled acoustical environments according to the procedures specified by the American National Standards Institute (ANSI) S12.10 and ISO 7779 and are reported in accordance with OSO 9296. Actual sound-pressure levels in a given location might exceed the average values stated because of room reflections and other nearby noise sources. The declared sound-power levels indicate an upper limit, below which a large number of computers will operate.
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Features and specifications — Type 6226

The following table provides a summary of the features and specifications of your IntelliStation E Pro Type 6226 computer. Depending on your model, some features and specifications might not apply.

Table 1. Features and specifications

<p>Microprocessor: Supports one microprocessor</p> <p>Intel® Pentium® 4 with 256 KB or 512 KB Level-2 cache and 400 MHz or 533 MHz front-side bus (FSB)</p> <p>Memory:</p> <ul style="list-style-type: none"> • Minimum: 256 MB • Maximum: 2.0 GB • Type: PC2100 DIMMs • Slots: Two dual inline <p>Drives: (depending on your model)</p> <ul style="list-style-type: none"> • Diskette: 1.44 MB (3 mode) • CD-ROM: IDE • Hard disk drive (IDE or SCSI) <ul style="list-style-type: none"> — CD-ROM: IDE — DVD-ROM: IDE — CD-RW: IDE <p>Expansion bays: (depending on your model)</p> <ul style="list-style-type: none"> • Two 5.25-in. bay (one CD-ROM drive installed) • Two 3.5-in. bays (one diskette drive and one hard disk drive installed) <p>PCI expansion slots: Three 33 MHz/32-bit on the system board (some models come with a SCSI adapter installed)</p> <p>Power supply: One 200 watt (90-240 V ac)</p> <p>Video adapter: (depending on your model)</p> <ul style="list-style-type: none"> • Matrox Millennium G450 (DVI-I) with 32 MB DDR SDRAM video memory and a single DVI-I or dual analog connectors • NVIDIA Quadro4 200NVS (LFH-60) with 64 MB SDR SDRAM video memory and dual analog connectors (or dual digital monitor capability with the purchase of an additional pigtail cable) • ATI Fire GL8800 (DVI-I and SVGA) with 128 MB DDR SDRAM video memory, one DVI-I connector and one SVGA connector 	<p>Size and weight:</p> <ul style="list-style-type: none"> • Height: 140 mm (5.5 in.) • Depth: 425 mm (16.7 in.) • Width: 425 mm (16.7 in.) • Weight: approximately 11.4 kg (25 lb) when fully configured or 10.0 kg (22 lb) minimum <p>Integrated functions:</p> <ul style="list-style-type: none"> • One 10/100/1000 Ethernet controller on the system board with RJ-45 Ethernet connector • Two serial ports • Parallel port • Four USB ports • Keyboard port • Mouse port • Audio ports <ul style="list-style-type: none"> — Line out — Line in — Mic • Dual-channel bus mastering IDE controller <p>Acoustical noise emissions:</p> <ul style="list-style-type: none"> • Sound power, idling: 5.0 bel maximum • Sound power, operating: 5.2 bel maximum <p>Environment:</p> <ul style="list-style-type: none"> • Air temperature: <ul style="list-style-type: none"> — Computer on: 10° to 35°C (50.0° to 95.0°F). Altitude: 0 to 2133 m (6998.0 ft) — Computer off: 10° to 43°C (50.0° to 109.4°F). Maximum altitude: 2133 m (6998.0 ft) • Humidity: <ul style="list-style-type: none"> — Computer on: 8% to 80% — Computer off: 8% to 80% 	<p>Heat output: Approximate heat output in British thermal units (Btu) per hour</p> <ul style="list-style-type: none"> • Minimum configuration: 257 Btu (75 watts) • Maximum configuration: 686 Btu (200 watts) <p>Airflow: Approximately 0.68 cubic meters every three minutes (24 cubic feet every 3 minutes)</p> <p>Electrical input:</p> <ul style="list-style-type: none"> • Sine-wave input (50-60 Hz) required • Input voltage low range: <ul style="list-style-type: none"> — Minimum: 90 V ac — Maximum: 137 V ac • Input voltage high range: <ul style="list-style-type: none"> — Minimum: 180 V ac — Maximum: 265 V ac • Input kilovolt-amperes (kVA) approximately: <ul style="list-style-type: none"> — Minimum: 0.080 kVA — Maximum: 0.300 kVA <p>Notes:</p> <ol style="list-style-type: none"> 1. Power consumption and heat output vary depending on the number and type of optional features installed and the power-management optional features in use. 2. These levels were measured in controlled acoustical environments according to the procedures specified by the American National Standards Institute (ANSI) S12.10 and ISO 7779 and are reported in accordance with ISO 9296. Actual sound-pressure levels in a given location might exceed the average values stated because of room reflections and other nearby noise sources. The declared sound-power levels indicate an upper limit, below which a large number of computers will operate.
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What your IntelliStation E Pro computer offers

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

- **High-performance Accelerated Graphics Port (AGP) graphics**

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

- **Large system memory**

The memory bus in your computer supports up to 2.0 GB of system memory. The memory controller provides error code correction (ECC) support for up to two industry-standard PC2100, 3.3V, 184-pin, 266 megahertz (MHz), unregistered, double data rate (DDR), dual inline memory modules (DIMMs).

- **Systems-management capabilities**

Your computer comes with features that a network administrator or file server can use to remotely manage and control your computer. Some of the features include: Wake on LAN[®], Remote Administration, IBM Director Agent, and System Migration Assistant. See "Managing your computer" on page 16 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, 100-Mbps, or 1Gbps networks. The computer automatically selects between 10BASE-T, 100BASE-TX, and 1000BASE-TX environments. The controller provides full-duplex (FDX) capability, which enables simultaneous transmission and reception of data on the Ethernet local area network (LAN).

Software

Your IBM IntelliStation E Pro computer comes with Windows XP[®] Professional¹ preinstalled and a variety of application programs, diagnostic tools, and device drivers.

Important: The software, other than the Microsoft operating system, is licensed under the terms of the *IBM International License Agreement for Non-Warranted Programs*. Use of your computer signifies acceptance of this license agreement. For detailed instructions about viewing the license agreement, see "Viewing the license agreement" on page 12.

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

Preinstalled software

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

- **Access IBM**

This program provides a central menu of links on your desktop where you can easily access programs and utilities for many of the common tasks that you want to perform.

- **Adobe Acrobat Reader**

You can use this program to read portable document format (PDF) files, including your online documentation. You can download the most updated Adobe Acrobat Reader for other languages and operating systems from the Adobe Web site at <http://www.adobe.com/> on the World Wide Web.

- **Device drivers**

The 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.

- **IBM Product Registration**

You can use this program to register your computer with IBM. When you register your computer with IBM, information is entered into an IBM database, which enables IBM to contact you in case of a recall or other problems. Some locations offer extended privileges and services to registered users.

- **Online Books**

You can use this program to access documentation that contains detailed information about your computer.

- **IBM Update Connector™**

You can use this program to update software data from an IBM server to your computer over an active Internet connection. After it is installed, you only need to start the program to be connected to the Update Connector database. When the connection is made, Update Connector automatically determines whether available updates are appropriate and, if so, downloads and installs them at your convenience. Update Connector automatically recognizes machine types and models as well as software versions and other criteria when determining which updates to download.

- **PC-Doctor for Windows**

This program contains diagnostic tools that you can use within your Windows operating system. In addition to isolating hardware problems, these tools provide information about your computer operating environment and some software components. Support documentation is built into the help system. (See also "Creating an IBM Enhanced Diagnostics diskette" on page 90.)

- **Norton AntiVirus for IBM**

You can use this program to detect and remove viruses from your computer.

- **Product Recovery program**

You can use this program to recover the Windows XP operating system and other software programs in the event of a system failure.

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

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

See “Using preinstalled software” on page 11 for additional information about your preinstalled software. For more information about using the recovery programs and solving problems, see Chapter 5, “Solving problems” on page 69.

Important:

1. You can reinstall the device drivers and applications that come with your computer from the directories on your hard disk. For more information about recovering your computer software, see “Recovering your operating system and preinstalled software” on page 88.
2. The device drivers and some programs are also available at <http://www.ibm.com/pc/support/> on the World Wide Web and on the *Device Drivers and IBM Enhanced Diagnostics* CD.

Software on CD

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

Device Drivers and IBM Enhanced Diagnostics CD

Diagnostic test programs are stored on the *Device Drivers and IBM Enhanced Diagnostics* CD that comes with your computer. These programs contain the primary methods of testing system components. Some of the preinstalled device drivers are also stored on this CD.

Lotus SmartSuite CD

Your IntelliStation E Pro computer comes with a proof of entitlement to receive one free *Lotus SmartSuite* CD that you can install on your computer. *Lotus SmartSuite* is a package of powerful, award-winning productivity applications.

Software available on the World Wide Web

The following list contains some of the software that is available on the World Wide Web at <http://www.ibm.com/pc/software/sysmgmt/>:

IBM Director Agent

You can use IBM Director Agent to view detailed information about your hardware and software, set up alerts, monitor a variety of system resources, and manage your asset security. IBM Director Agent streamlines and automates personal computer (PC) systems management and support tasks, such as asset deployment and tracking. For more information, go to <http://www.ibm.com/pc/software/sysmgmt/> on the World Wide Web and search for IBM Director Agent.

Remote Deployment Manager

Remote Deployment Manager (RDM) is a graphical, server-based system deployment program that enables mass unattended installations of operating systems, software images, device drivers, and BIOS code updates to remote systems. When used with Wake on LAN, Remote Deployment Manager can remotely turn on your computer so that the installation can be done while the computer is being used. For more information, go to http://www.ibm.com/pc/us/eserver/xseries/systems_management/rdm.html on the World Wide Web.

System Migration Assistant

System administrators can use System Migration Assistant (SMA) to remotely transfer configurations, profile settings, printer device drivers, and files from

an IBM or non-IBM computer to supported IBM systems. For more information, go to http://www.ibm.com/pc/us/eserver/xseries/systems_management/ on the World Wide Web.

Reliability, availability, and serviceability features

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

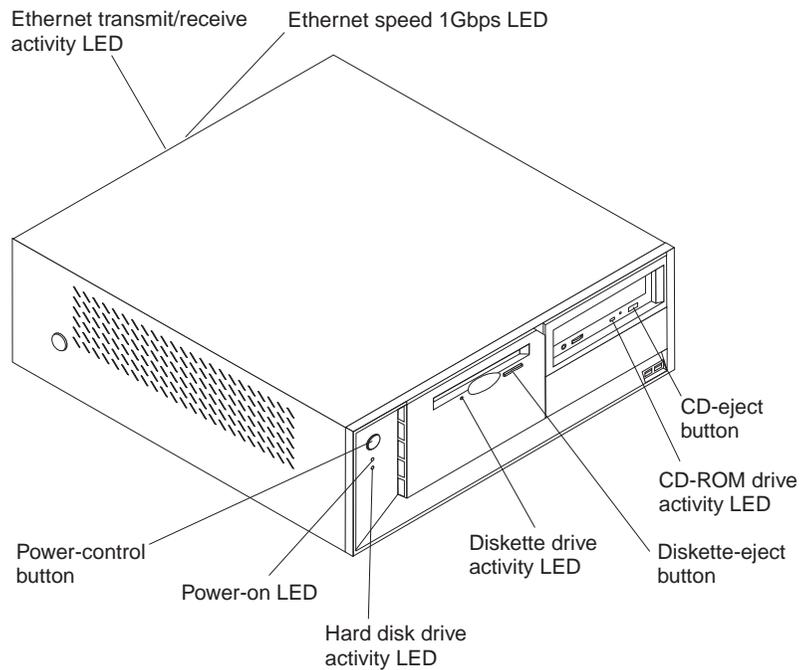
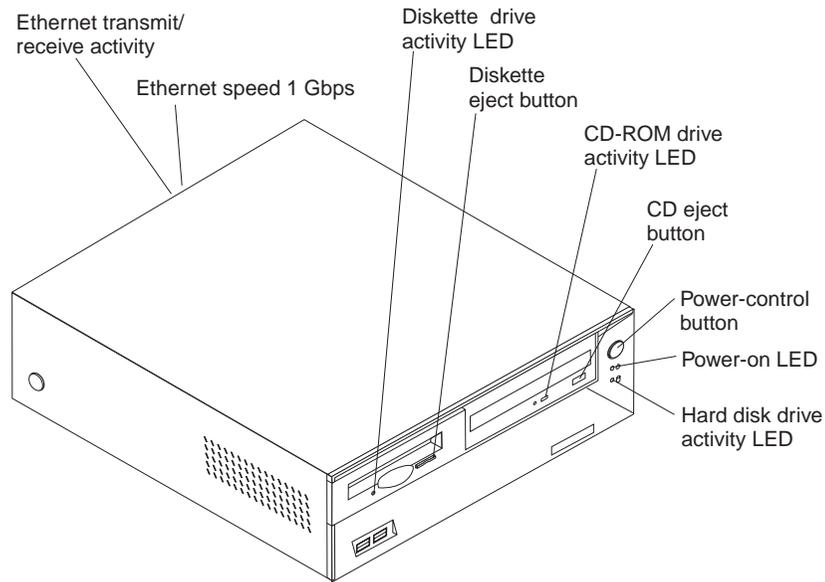
The following is an abbreviated list of the RAS features that your computer supports. Many of these features are explained in later chapters of this publication.

- Boot block recovery
- Power-on self-test (POST)
- Upgradeable basic input/output system (BIOS), diagnostics, and POST
- Error correction code (ECC) synchronous dynamic random access memory (SDRAM) with serial presence detect (SPD)
- Cyclic redundancy checking on the small computer systems interface (SCSI) data bus
- Predictive failure analysis[®] (PFA) on memory, microprocessor, hard disk drives, fans, and power supply
- Auto-restart initial program load (IPL) power supply
- Wake on LAN capability
- Error codes and messages
- Monitoring support for temperatures, voltages, and fan speed
- Cooling fans with speed-sensing capability
- Failover Ethernet support
- 3-year limited warranty
- Microprocessor built-in self-test (BIST)
- Vital product data (VPD); includes serial number information and replacement part numbers, stored in nonvolatile memory, for easier remote maintenance
- Diagnostic support of Ethernet and RAID adapters
- Read-only memory (ROM) checksums
- Nonmaskable interrupt (NMI) jumper

Chapter 2. Operating your computer

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

Computer controls and LEDs



Ethernet transmit/receive activity LED: When this green LED is on, there is activity between the computer and the network.

Ethernet speed 1 Gbps LED: When this LED is on, the Ethernet speed is 1 Gbps. When this LED is off, the Ethernet speed is 10 Mbps or 100 Mbps.

Diskette drive activity LED: When this LED is on, it indicates that the diskette drive is in use.

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

CD-ROM drive activity LED: When this LED is on, it indicates that the CD-ROM drive is in use.

CD-eject button: Press this button to release a CD from the drive.

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

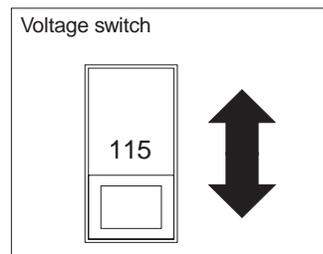
Power-on LED: This LED indicates when your computer is turned on.

Hard disk drive activity LED: When this LED is flashing, the hard disk drive is in use.

Setting the voltage-selection switch

Check the position of the voltage-selection switch beside the power cord connector. Use a ballpoint pen to slide the switch, if necessary.

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



Turning on your computer

To start your computer, turn on all peripheral devices and press the power-control button on your computer. For the location of the power-control button, see “Computer controls and LEDs” on page 9.

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

If power-on self-test (POST) detects a problem, there might be a series of beeps or no beep, and a numeric error message might appear on the screen. Write down any beep series and error code numbers with descriptions, and then see “Troubleshooting chart” on page 84 for the explanation of error codes.

During startup, the following messages might be displayed briefly:

- To start the Product Recovery Program, Press F11
- Press F1 for Configuration/Setup Utility, Press F12 for Boot Menu
- Press CTRL+A for SCSISelect Utility (some models only)

To use these features, press the appropriate function key or keys quickly. The messages appear for only a short time. For more information about these messages, see “Using the Configuration/Setup Utility program” on page 19 and “Using the SCSISelect Utility program (some models)” on page 27.

The operating system and application programs start from the hard disk drive. If your computer is attached to a network, the computer will begin attaching to any LANs and remote applications to which you have access. A network administrator can also start your computer remotely to download programs or gather information about computer performance. For more information, see “Wake on LAN” on page 16.

Using preinstalled software

This section contains information about setting up the preinstalled Microsoft operating system and describes how to use the programs that come with your computer.

Running the operating system setup program

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

Important information to know before you start:

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

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

- The Microsoft documentation that comes with your computer
- Network information (if applicable) from your network administrator
- The printer model and port, if a printer is attached directly to your computer

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

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

Installing other operating systems

Your computer comes with Microsoft Windows XP Professional preinstalled.

To install another operating system, follow the instructions in the documentation provided with the operating system. Then, follow the instructions in the README file on the *Device Drivers and IBM Enhanced Diagnostics* CD to install the device drivers.

Note: If you install another operating system, you might need additional software or device drivers. If you experience problems with the device drivers installed from the *Device Drivers 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 updates. Contact the operating system manufacturer or, if applicable, check the manufacturer's World Wide Web site to obtain the updates.

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

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, complete the following steps:

1. Double-click the **Access IBM** icon.
2. Click the **How do I...** tab. Then, click **Solve problems**.
3. Click **IBM International License Agreement**.

Using Access IBM

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

The following choices are available from the Access IBM Welcome window:

- **How do I...**
Select this choice to display information about tasks that you typically perform immediately after installing a new computer, such as personalizing your computer to fit your needs, protecting your data, upgrading your computer hardware, purchasing IBM services, purchasing IBM options, solving problems, and viewing the IBM International License Agreement.
- **Tools & Tips**
Select this choice to display information about access support, diagnostic programs, antivirus tools, configuration backup and restoration tools, and online books.
- **On the Web**
Select this choice to display information about obtaining additional information and support on the World Wide Web.

Complete the following steps to use Access IBM:

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

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:

- Click **IBM PC Registration** on the desktop, and then follow the instructions in the window. You can print the registration information and provide a mailing address if you have no Internet access.
- Register your computer at <http://www.ibm.com/pc/register/> on the World Wide Web.

Creating an emergency diskette

At your earliest opportunity, create a recovery-repair diskette and an IBM Enhanced Diagnostics diskette, and store them in a safe place. Use the following instructions to create a recovery-repair diskette. See "Creating an IBM Enhanced Diagnostics diskette" on page 90 for information about how to create an IBM Enhanced Diagnostics diskette.

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

1. In Access IBM, click **How do I...;** then, click **Protect data.**
2. Click **Creating emergency diskettes.**
3. Click **Recovery Repair diskette.**
4. Follow the instructions on the screen.

In the unlikely event that your desktop becomes unusable, the recovery-repair diskette will enable you to access the Product Recovery program. Additional information about the diskette is in Access IBM. For more information about using this diskette, see "Using the recovery-repair diskette" on page 91.

Using video features

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

Video device drivers

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

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

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

drivers. For more information about installing device drivers, see “Recovering or installing device drivers” on page 88.

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 your operating-system documentation.

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

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

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

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

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

1. Right-click the **Matrox Power Desk** icon on the desktop.
2. Click the **Settings** tab.
3. Click **Advanced**.
4. Double-click the **Dualhead** tab to enable.
5. Click **Apply**.

Using audio features

Your computer has an integrated audio controller that supports Sound Blaster applications and is compatible with the Microsoft Windows Sound System. Your computer also has a single internal speaker and three audio connectors. Using the audio controller, you can record and play back sound and music to enhance multimedia applications. Optionally, you can connect two stereo speakers to the line-out connector to enjoy improved sound with multimedia applications.

The audio connectors in your computer are 3.5 mm (0.125-in.) mini-jacks. For the location of the audio connectors, see “Input/output connector locations” on page 63.

Line-in

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

Line-out

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

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

Microphone

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

Using security features

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

Anti-intrusion features

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

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

Important: Keep the key-code number and manufacturer address and phone number in a safe place. Because locksmiths are not authorized to duplicate cover-lock keys, you must order replacement keys from the key manufacturer. You will need the key code when ordering replacement keys.

You can also set the chassis-intrusion detector switch inside the computer to alert the network system administrator each time the computer cover is removed. For more information about setting the chassis-intrusion alert, see Chapter 3, "Configuring your computer" on page 19.

Component protection

Your computer has individual component serial numbers that can be registered with a 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, go to <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, the following data-saving features have been incorporated in your computer:

SMART hard disk drive

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

Virus protection

Your computer has Norton AntiVirus for IBM installed on the hard disk.

Locking the keyboard

You can lock the keyboard so that others are unable to use it. If a user password is set using the Configuration/Setup Utility program, the keyboard is locked when you turn on the computer. You must type the correct password before the keyboard will unlock. See Setting Security Passwords in Access IBM or “Using passwords” on page 24.

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

Managing your computer

Your computer comes with features that a network administrator or file server can use to remotely manage and control your computer. 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. The following sections describe some of these network management tools. Go to <http://www.ibm.com/pc/us/software/sysmgmt/> on the World Wide Web for more information about available system management programs.

Wake on LAN

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

Broadcom NetXtreme Gigabit Ethernet Boot Agent

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

- Compliant with the Wired for Management Baseline 2.0 (WfM 2.0)
- Incorporates the software defined in the Broadcom Boot Agent specification
- Includes support for Remote Program Load (RPL) runtime and loader software (10/100/1000 Ethernet adapters only)
- Compatible with legacy boot agent environments that use BOOTP protocol
- Supported by remote installation programs such as Remote Deployment Manager (RDM) and Microsoft Remote Installation Services (RIS)

For information about configuring the Broadcom NetXtreme Gigabit Ethernet Boot Agent, see “Enabling Broadcom NetXtreme Gigabit Ethernet Boot Agent” on page 26.

Remote Deployment Manager

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

For more information or to download this software, go to http://www.ibm.com/pc/us/eserver/xseries/systems_management/rdm.html on the World Wide Web.

Software Migration Assistant

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

For more information or to download this software, go to http://www.ibm.com/pc/us/eserver/xseries/systems_management/sma.html on the World Wide Web.

Desktop Management Interface (DMI)

Desktop Management Interface (DMI) is a method for gathering information about the hardware and software in your computer. In a network environment, a network administrator can use DMI to remotely monitor and control your computer.

Shutting down your operating system

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

If you are using the preinstalled Microsoft Windows XP operating system, complete the following steps to shut down your computer:

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

Turning off your computer

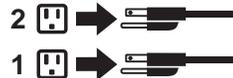
Use one of the following procedures to turn off your computer.

Statement 5:



CAUTION:

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



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

Note: After you turn off the computer, wait at least 5 seconds before you press the power control button to turn on the computer again.

- Press and hold the power-control button for more than 4 seconds to cause an immediate shutdown of the computer. You can use this feature if the operating system stops functioning.
- If you cannot use the power-control button to turn off your computer, disconnect the computer power cords from the electrical outlets.

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

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

Chapter 3. Configuring your computer

The following configuration programs are available to configure your computer:

- **Configuration/Setup Utility program**

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

- **Broadcom NetXtreme Gigabit Ethernet Boot Agent**

The Broadcom NetXtreme Gigabit Ethernet Boot Agent is part of the BIOS code that comes with your computer. You can enable the Broadcom NetXtreme Gigabit Ethernet Boot Agent from the Configuration/Setup Utility program. The Broadcom NetXtreme Gigabit Ethernet Boot Agent enables you to configure the network as a startable device, and you can customize where the network startup option appears in your startup sequence.

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

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

- **Boot Menu program**

The Boot Menu is part of the BIOS code that comes with your computer. You can use the Boot Menu program to change the startup sequence for one startup session without changing settings in the Configuration/Setup Utility program.

Using the Configuration/Setup Utility program

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

Starting the Configuration/Setup Utility program

The Configuration/Setup Utility program starts automatically when POST detects that newly installed or removed hardware is not reflected in your current configuration. A diagnostic error message is displayed. See Chapter 5, "Solving problems" on page 69 for details about POST and information about the error messages.

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

1. Turn on the computer and watch the monitor screen. If your computer is already on when you start this procedure, you must shut down the operating system, turn off the computer, wait a few seconds until all in-use LEDs go off, and restart the computer. (Do not use Ctrl+Alt+Del to restart the computer.)
2. When the message Press F1 for Configuration/Setup, Press F12 for Boot Menu appears at the bottom of the screen during startup, press F1. (This prompt appears on the screen for only a few seconds. You must press F1 quickly.)

Note: If you have set both administrator and user passwords, you must type the administrator password to access the full Configuration/Setup Utility menu.

3. Follow the instructions that appear on the screen.

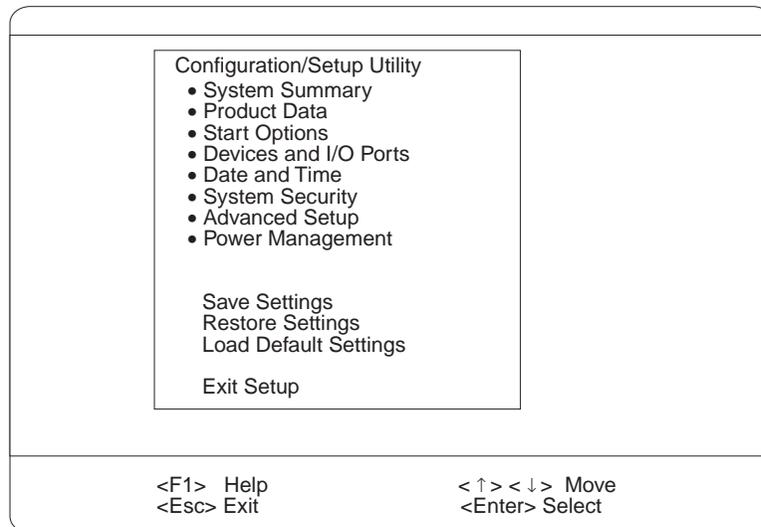
Use the Up Arrow (↑) and Down Arrow (↓) keys to select menu choices in any Configuration/Setup Utility menu. Some menu choices provide information only.

Some menu choices show fields that you can change. These fields are enclosed by square brackets. You can change the values in these fields by using Left Arrow (←) and Right Arrow (→) keys to change the value, or you can type information in the field.

To restore the current setting for a menu item, press F9. To restore the default setting for a menu item, press F10.

Configuration/Setup Utility menu choices

From the Configuration/Setup Utility main menu, you can select settings that you want to change. The Configuration/Setup Utility main menu is similar to the one shown in the following illustration:



Notes:

1. You can press F1 to display help information for a selected menu item.
2. The choices on some menus might differ slightly, depending on the BIOS version in your computer.

The following choices are available from the main menu:

- **System Summary**

This choice contains general information about your computer, such as a summary of components and computer configuration. You can view information about the type and speed of the microprocessor and the amount of memory that is installed

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

- **System Information**

Select this choice to view the machine type and model number, the computer serial number, and the revision level or issue date of the BIOS code that is stored in the flash electrically erasable programmable ROM (EEPROM).

- **Devices and I/O Ports**

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

- **Mouse**
Select this choice to enable a mouse or PS/2 pointing device.
- **Diskette Drive A**
Select this choice to set the type of diskette drive installed in your computer. You can disable the diskette drive, or you can enable various types of diskette drives.
- **Floppy Disk Controller**
Select this choice to enable or disable the diskette drive controller.
- **IDE Controller**
Select this choice to enable the primary IDE controller, the secondary IDE controller, or both IDE controllers.
- **System Board Ethernet**
Select this choice to set the system-board Ethernet controller to **Enabled** or **Disabled**.
- **System Board Ethernet PXE/DHCP**
Select this choice to enable the Broadcom NetXtreme Gigabit Ethernet Boot Agent or to enable Dynamic Host Configuration Protocol (DHCP).
- **ASF POST Function**
If you have a remote system management device or adapter installed in your computer, select this choice to enable or disable the Alert Standard Format (ASF) POST function. Enabling this function configures your computer to be managed remotely on a dedicated protocol.
- **Audio Support**
Select this choice to enable or disable audio support.
- **Serial Port Setup**
Select this choice to configure the serial ports. If you enable a port, you can set the base input/output (I/O) address and the interrupt level. If you select **Automatic**, the operating system automatically configures these settings.
- **USB Setup**
Select this choice to enable or disable the USB ports in your computer. The USB Support setting can be Enabled or Disabled. USB-device support determines whether BIOS support for USB devices will be enabled when you start the computer. You can also enable or disable support for a USB keyboard or mouse.
- **Parallel Port Setup**
Select this choice to enable or disable the parallel port in your computer. If you enable the port, you can set the base input/output (I/O) address, the interrupt, and the Parallel Port Extended Mode. If you disable the port, the operating system automatically configures these settings. If you set the Parallel Port Extended Mode to **ECP**, you can set the Extended Mode direct memory address (DMA). The parallel port address can be specified or disabled. If you need to change this setting, set the address so that it does not conflict with other hardware.

Complete the following steps to view or change the parallel-connector assignment:
 1. From the Configuration/Setup Utility menu, select **Devices and I/O Ports** and press Enter.
 2. Select **Parallel Port Setup** and press Enter.

3. Use the Left Arrow (←) and Right Arrow (→) keys to change settings and press Esc.

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

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

— IDE Hard Disk Drive 0, 1, 2, and 3

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

• Start Options

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

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

The following menu items are available in the **Start Options** menu:

— Startup Sequence

The computer uses a startup sequence to determine the order in which the computer checks devices to find a boot record. For example, you can define a startup sequence that checks for a startable diskette in the diskette drive, then checks the hard disk drive in bay 1, and then checks a network adapter.

You can also enable the computer to start from the network by enabling the Broadcom NetXtreme Gigabit Ethernet Boot Agent to customize the network as the first startable device in the startup sequence.

To change the startup sequence of your computer, complete the following steps:

1. From the Configuration/Setup Utility program, select **Start Options** and press Enter.
2. Select **Startup Sequence** and press Enter.
3. Select the device that you want to be the first startable device using the Left Arrow (←) and Right Arrow (→) keys. Then, select the devices that you want to be the second startable device and the third startable device.
4. After customizing the startup order, press Esc until you return to the main menu.
5. Select **Save Settings** and press Enter.

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

— Fast Power On Self Test

You can select **Auto** to speed up the system POST process by bypassing some testing procedures.

— Power On Logos

Select **Enabled** to display the IBM logo during POST.

— Keyboard NumLock State

Select **Enabled** to activate the keyboard numbers lock upon startup.

- **Memory Test**

This item is set to Enabled. You cannot alter this setting.

- **Configuration Table**

Select Enabled to display the preboot system configuration table.

- **Date and Time**

Select this choice to set the system date and time. The system time is in a 24-hour format (hour:minute:second).

- **System Security**

Select this choice to set an administrator password or a system owner's name. This choice appears only on the full Configuration/Setup Utility main menu.

You can set the computer to prompt you for an administrator password or user password at startup. You can also set the security on diskette and hard disk drives to protect your data from tampering.

Select **Administrator Password** to set or change an administrator password.

Attention: If an administrator password is set and then forgotten, it cannot be overridden or removed. You must replace the system board.

The administrator password provides access to all choices on the Configuration/Setup Utility main menu. You can set, change, or delete both the administrator and user passwords and enable a user to change the user password.

You must set an administrator password to set a user password. A user password grants a user access to the computer for use but denies the user access to configuration settings.

You must set a user password to set a **Password on Boot**. If this setting is enabled, the computer will require a password at startup.

If you set an administrator password and a user password, you can set your diskette drive and hard disk drive security settings to prevent tampering with important data. You can set **Floppy Drive** and **Hard Disk Drive** security settings to **Normal**, **Write Protect All Sectors**, and **Write Protect Boot Sectors**.

- **Advanced Setup**

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

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

- **Power Management**

Select this choice to enable or disable system power settings.

The following choices are available in this menu item:

- **APM BIOS Mode**

This field controls the Advanced Power Management (APM) support to your operating system. Enable APM BIOS Mode when your operating system supports APM-enabled computers.

- **IDE Hard Disk Standby Timer**

This field indicates which IRQ the Advanced Configuration and Power Interface (ACPI) uses.

- **Time to Low Power**

Select this choice to set the time that will elapse from the last keyboard or mouse activity until the computer assumes a low power sleep state.

- **Sleep Mode**
You can set this menu choice only if **Time to Low Power** is set.
- **Power Switch < 4 sec.**
You can set this to **Power Off** or **Suspend**.
- **System wake-up event**
Select this choice to control the event that occurs when the computer wakes up.
- **Serial Port Ring Detect**
Set this menu choice to Enabled to set the server to wake up when activity is detected on the serial port modem.
- **Wake Up on Alarm**
Select this choice to set the computer to wake up at a certain day or time. You can set this to **Disabled**, **Time**, and **Date/Time**.
- **Alarm Day of Month**
You can set this menu item only if you have set **Wake Up on Alarm** to **Time** or **Date/Time**. Set the day of the month for the computer to wake up.
- **Alarm Time**
You can set this menu item only if you have set **Wake Up on Alarm** to **Time** or **Date/Time**. Set the time of the day for the computer to wake up.
- **ACPI Sleep State**
Select which power level your computer uses in Standby mode. If you select **S1**, power is maintained to all devices, but all processor activity is halted. If you select **S3**, power is maintained only for the main memory. Exit from the S3 state might not be supported by all installed adapters.
- **Restart on AC/Power Failure**
This field controls whether the system will stay on after ac power is removed and then restored. Select **Power On** if you use a power strip to turn on the computer. Select **Stay Off** if you want the computer to remain off after power is restored. Select **Last State** to have the computer return to its previous state.
- **Error Logs**
Select this choice to view any errors that occur during POST.
- **Save Settings**
Select this choice to save your customized settings.
- **Restore Settings**
Select this choice to restore the previous settings.
- **Load Default Settings**
Select this choice to restore the factory settings.
- **Exit Setup**
Select this choice to exit from the Configuration/Setup Utility program.
If you have made any changes, the program will prompt you to save the changes or exit without saving the changes.

Using passwords

The **System Security** choice appears only on the full Configuration/Setup Utility menu. After you select this choice, you can implement an administrator password.

The administrator password provides access to all choices on the Configuration/Setup Utility main menu. You can set, change, or delete the administrator password.

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

The summary of the administrator password features is as follows:

- No password is required to start the system.
- Type the password to access the Configuration/Setup Utility program.
- All choices are available on the Configuration/Setup Utility main menu.

Complete the following steps to set an administrator password:

1. From the Configuration/Setup Utility main menu, select **System Security** and press Enter.
2. Select **Administrator Password** and press the Right Arrow (→) key.
3. Type the password you want to set in the **Enter Password** field and press Enter.
4. Type the password again in the **Enter Password again** field and press Enter.
5. Press Enter to **Set or Change Password**. The setting in the **Administrator Password** field changes to **Present**.
6. Press Esc until you return to the main menu.
7. Select **Save Settings** and Press Enter.

After you have set an administrator password, you can then set a user password to authorize a user to operate the computer. You must set an administrator password to set a user password.

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

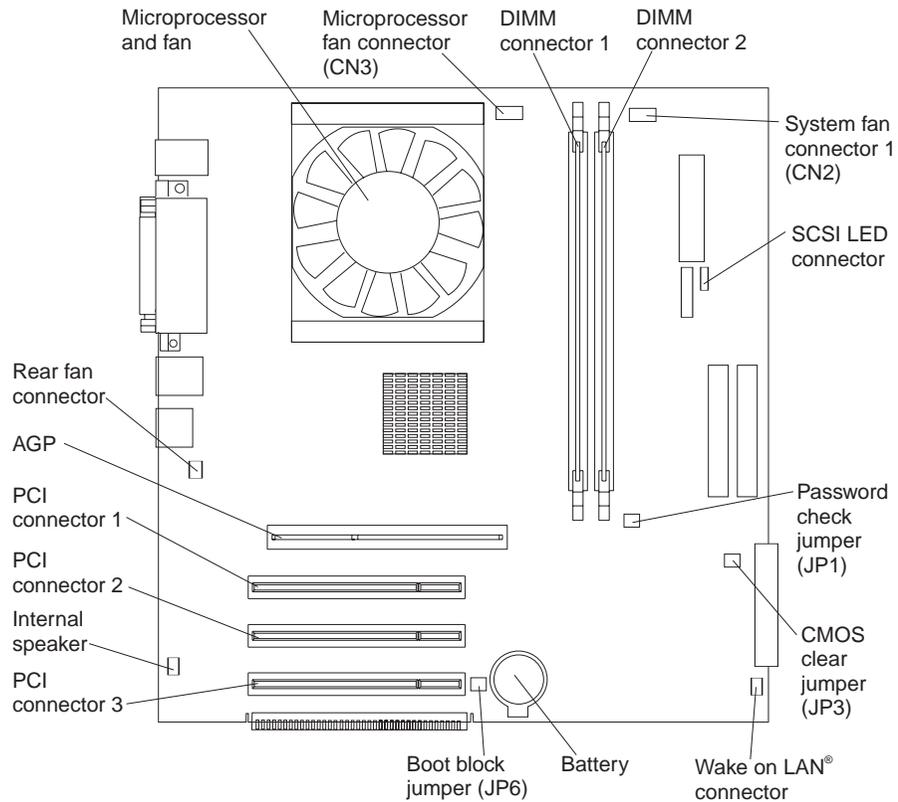
- Type the administrator password at the power-on prompt. Start the Configuration/Setup Utility program and change the user password.
- Change the position of the password check jumper as described in “Setting the password check jumper (JP1):” on page 26.
- Remove the battery and then reinstall the battery. See “Replacing the battery” on page 94 for instructions.

To set a user password, complete the following steps:

1. Set an administrator password. See the instructions on page 25.
2. Select **User Password** and press the Right Arrow key.
3. Type the password you want to set in the **Enter Password** field and press Enter.
4. Type the password again in the **Enter Password Again** field and press Enter.
5. Press Enter to **Set or Change Password**. The setting in the **User Password** field changes to **Present**.
6. Select **Save Settings** and press Enter.

If you set a user password, you can then enable **Password on Boot**. If you enable this setting, you must type a user password when you start the computer.

Setting the password check jumper (JP1): The following illustration shows the location of the password check jumper (JP1) on the system board.



Complete the following steps to set the password check jumper (JP1):

1. Review the "Safety information" on page vii.
2. Turn off the computer and peripheral devices and disconnect all external cables and power cords; then, remove the cover. See "Turning off your computer" on page 18 for instructions.
3. Move the jumper from pins 1 and 2 to pins 2 and 3. This clears the user password for one boot cycle.

Note: You can now start the computer one time without having to use the user password, but if you do not use the Configuration/Setup Utility program to change or delete the password, the next time you start the computer, the original user password will be reinstated.

4. Connect the computer to a power source, keyboard, monitor, and mouse.
5. Turn on the computer.

You can now start the Configuration/Setup Utility program and either delete the old password or set a new user password.

Enabling Broadcom NetXtreme Gigabit Ethernet Boot Agent

The Broadcom NetXtreme Gigabit Ethernet Boot Agent is part of the BIOS code that comes with your computer. You can enable the Broadcom NetXtreme Gigabit Ethernet Boot Agent from the Configuration/Setup Utility program. The Broadcom NetXtreme Gigabit Ethernet Boot Agent enables you to configure the network as a startable device, and you can customize where the network startup option appears in your startup sequence.

To enable Broadcom NetXtreme Gigabit Ethernet Boot Agent, complete the following steps:

1. From the Configuration/Setup Utility main menu, select **Devices and I/O Ports** and press Enter.
2. Select **System Board Ethernet PXE/DHCP** and use the Right Arrow (→) key to set it to Enabled.
3. Select **Save Settings** and press Enter.

Using the SCSISelect Utility program (some models)

SCSISelect is a menu-driven configuration utility program that you can use for models that come with a SCSI adapter. You can use this program to:

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

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

Starting the SCSISelect Utility program

Complete the following steps to start the SCSISelect utility program:

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

SCSISelect menu choices

The following choices appear on the SCSISelect Utility menu:

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

You can view or change the following controller settings:

— **Host Adapter SCSI ID**

Select this choice to view the SCSI controller ID, normally 7.

— **SCSI Parity Checking**

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

— **Host Adapter SCSI Termination**

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

— **Boot Device Options**

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

— **SCSI Device Configuration**

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

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

- The transfer rate for Ultra3 SCSI LVD devices is 160 MBps
- The transfer rate for Ultra2 SCSI LVD devices is 80 MBps
- The transfer rate for Fast SCSI devices is 20 MBps

— **Advanced Configuration Options**

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

• **SCSI Disk Utilities**

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

To use the utility program, select a drive from the list. Read the screens carefully before making a selection.

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

Using the Boot Menu program

The Boot Menu program is a built-in, menu-driven configuration utility program that you can use to temporarily redefine the startup sequence without changing settings in the Configuration/Setup Utility program.

Complete the following steps to use the Boot Menu program to change the startup sequence of your computer:

1. Turn off the computer.
2. Restart the computer.
3. Press F12.
4. Select the startup device.

The next time the computer is started, it returns to the startup sequence set in the Configuration/Setup Utility program.

Chapter 4. Installing options

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

Before you begin

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

- Read the handling guidelines in “Handling static-sensitive devices”, and read the safety statements in “Safety information” on page vii. These guidelines will help you work safely with your computer and options.
- Make sure that you have an adequate number of properly grounded electrical outlets for your computer, monitor, and other options that you intend to install.
- Back up all important data before you make changes to disk drives.
- Have a small, flat-blade screwdriver available.
- For a list of supported options for your computer, go to <http://www.ibm.com/pc/support/> on the World Wide Web.

System reliability considerations

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

- Each of the drive bays has a drive or a filler panel and electromagnetic compatibility (EMC) shield installed.
- Expansion-slot covers must be installed on all vacant slots. This maintains the electronic emissions standards of the computer and ensures proper ventilation of computer components.
- There is adequate space around the computer to allow the computer cooling system to work properly. Leave approximately 51 mm (2 in.) of open space around the front and rear of the computer. Do not place objects in front of the fans.
- You have followed the instructions for cabling provided with optional adapters.
- You have replaced a failed fan as soon as possible.

Handling static-sensitive devices

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

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

- Limit your movement. Movement can cause static electricity to build up around you.
- Handle the device carefully, holding it by its edges or its frame.
- Do not touch solder joints, pins, or exposed circuitry.
- Do not leave the device where others can handle and, possibly, damage the device.
- While the device is still in its static-protective package, touch it to an unpainted metal part of the computer for at least 2 seconds. (This drains static electricity from the package and from your body.)

- Remove the device from its package and install it directly into your computer without setting the device down. If it is necessary to set the device down, place it in its static-protective package. 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.

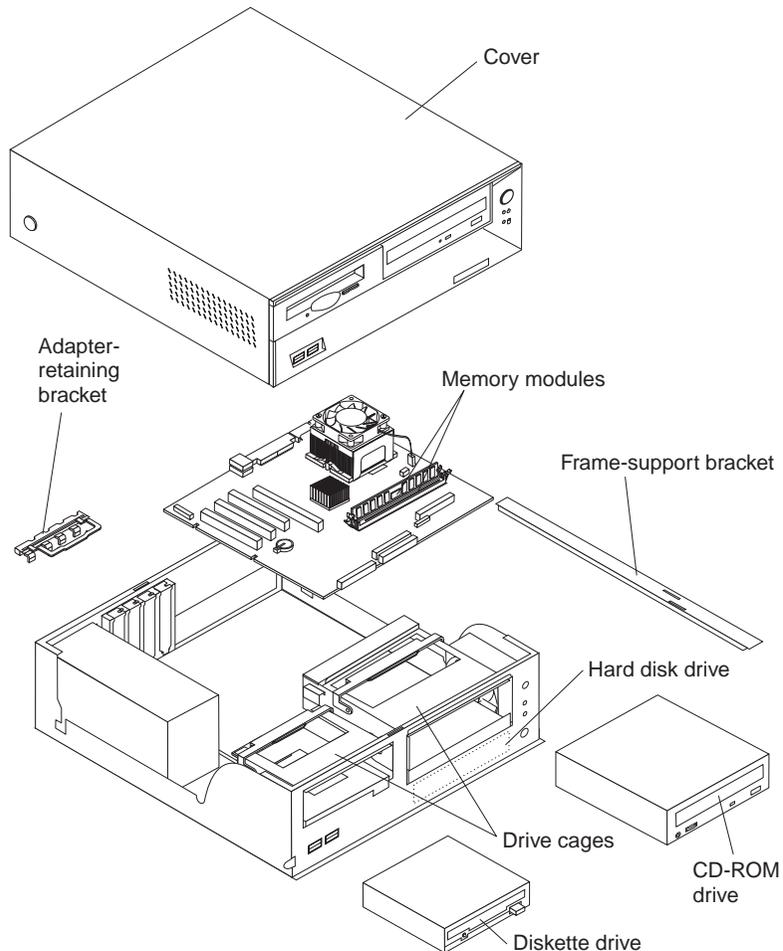
Installing options in the IntelliStation E Pro Type 6216 computer

Use the information in the following sections to install options in the IntelliStation E Pro Type 6216 computer.

Note: For instructions to install options in an IntelliStation E Pro Type 6226 computer, see “Installing options in the IntelliStation E Pro Type 6226 computer” on page 47.

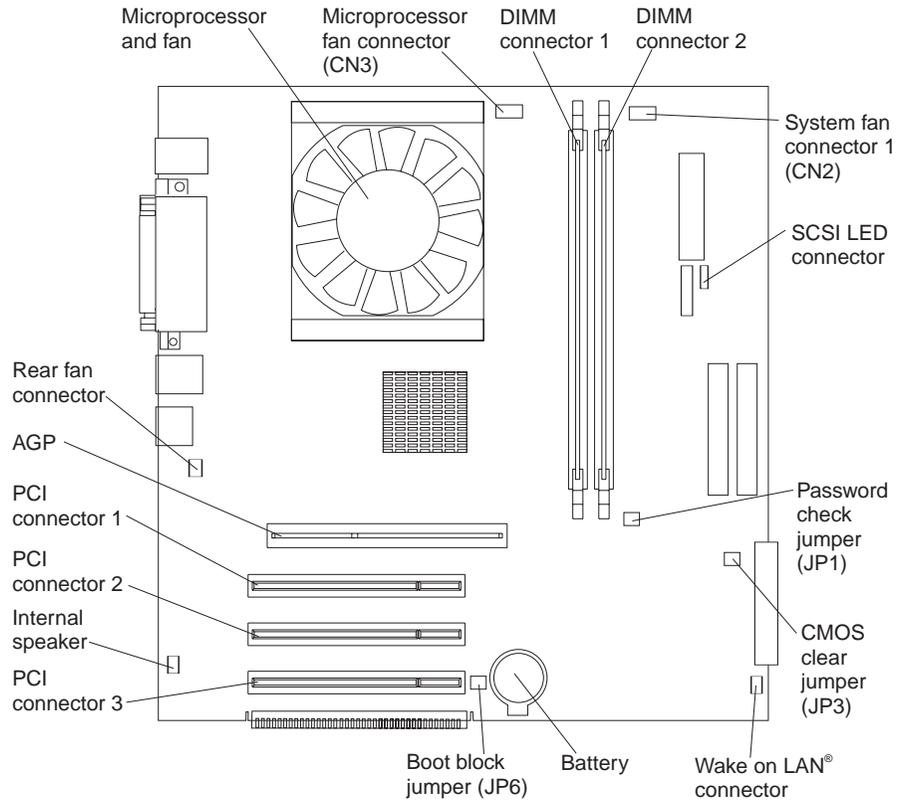
Major components of the IBM IntelliStation E Pro Type 6216 computer

The following illustration shows the locations of major components in the IntelliStation E Pro Type 6216 computer.



System board

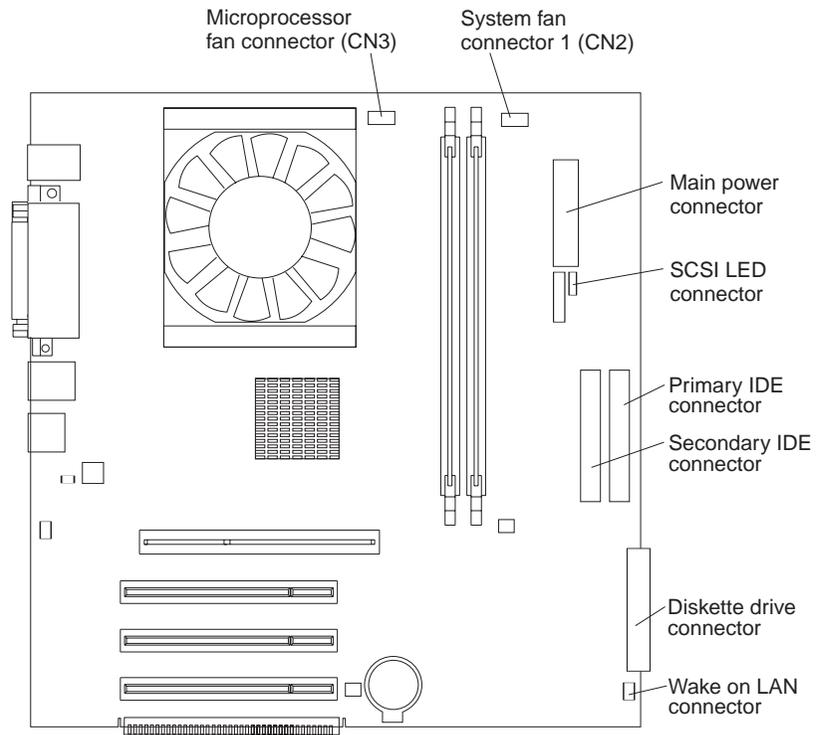
The illustrations in the following sections show various components on the system board. Depending on installed options, your system board might look slightly different.



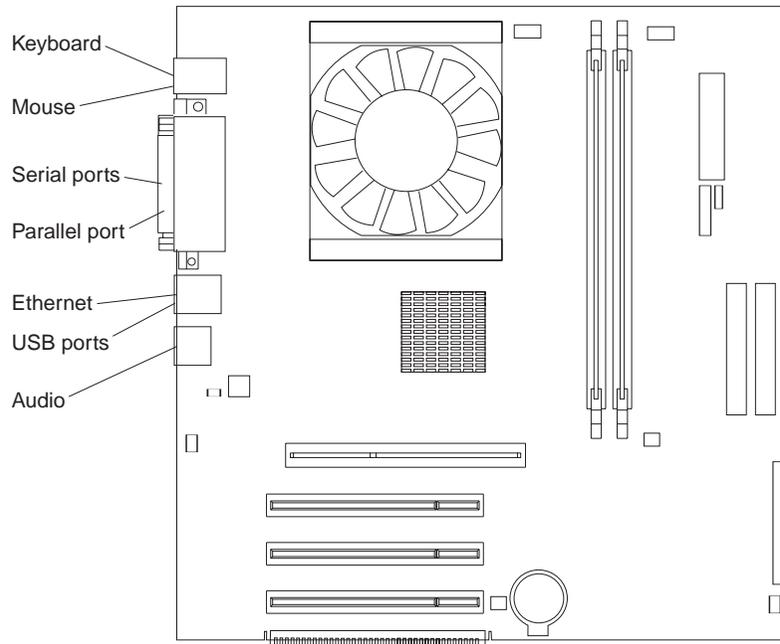
The CMOS clear jumper (JP3) can be used to clear CMOS memory in the event that a CMOS setting becomes damaged. See “Clearing CMOS” on page 94 for information on how to use the CMOS clear jumper.

The boot block jumper (JP6) is used to recover from a BIOS update failure. See “Recovering from a POST/BIOS update failure” on page 92.

System-board internal cable connectors: The following illustration identifies system-board connectors for internal cables.



System-board external cable connectors: The following illustration identifies system-board connectors for external devices.

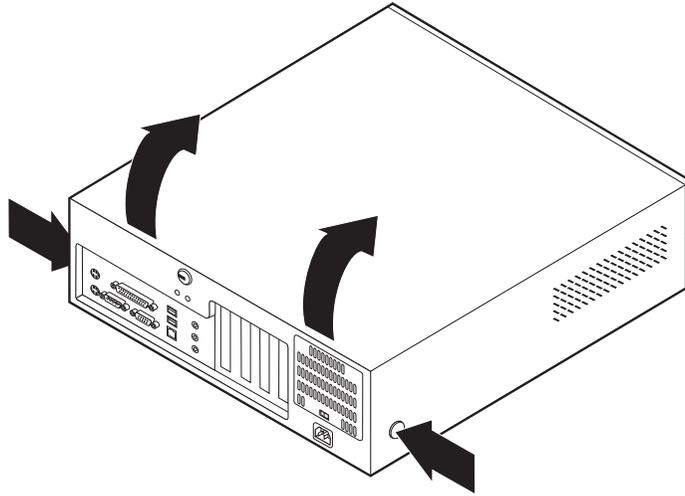


Installing options

This section contains instructions for installing options in the IBM IntelliStation E Pro Type 6216 computer.

Removing the cover: Complete the following steps to remove the cover from the IntelliStation E Pro Type 6216 computer:

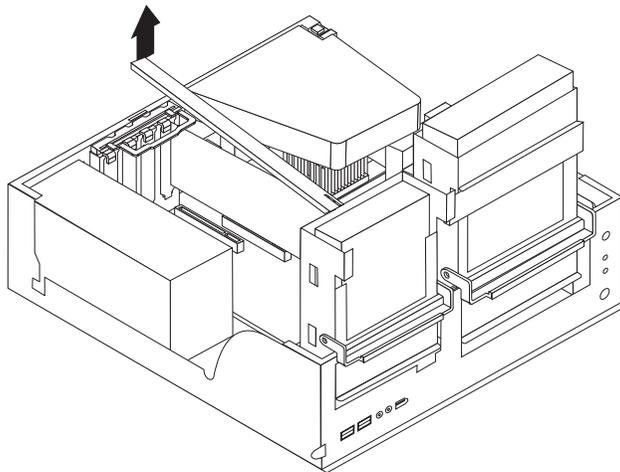
1. Review the information in “Before you begin” on page 31 and “Safety information” on page vii.
2. Turn off the computer and all attached devices.
3. Disconnect all external cables and power cords.
4. Press the buttons on both sides of the computer cover and lift the cover from the computer.



To replace the cover, see “Replacing the cover:” on page 46.

Removing the frame-support bracket: You must remove the frame-support bracket to access many of the components of the IntelliStation E Pro Type 6216 computer. To remove the frame-support bracket, complete the following steps:

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



To replace the frame-support bracket, reverse the steps.

Working with adapters: Your computer has three 32-bit, 33 MHz PCI adapter connectors or *slots* and one AGP adapter slot. The AGP video adapter is installed in the AGP slot.

See “System board” on page 33 for the location of the expansion slots on the system board.

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

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

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

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

Installing an adapter: Complete the following steps to install an adapter in the IBM IntelliStation E Pro Type 6216 computer.

Attention: When you handle static-sensitive devices, take precautions to avoid damage from static electricity. For details about 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 cover. See “Removing the cover:” on page 35.

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

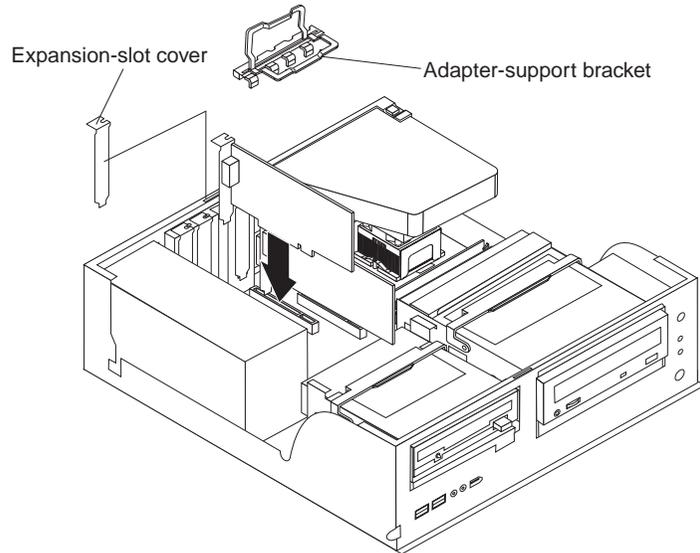
4. Rotate each drive bay cage until the drive-cage-latches catch the front of the computer chassis.
5. Lift the frame-support bracket. See “Removing the frame-support bracket:” on page 35.
6. Rotate the rear adapter-support bracket to the open (unlocked) position and remove it from the computer.
7. From the rear of the computer, press on the slot cover. Grasp the expansion-slot cover and pull it out of the expansion slot. Store it in a safe place for future use.

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

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 in its static-protective package on a hard surface. Avoid touching the components and gold-edge connectors on the adapter.

9. Set any jumpers or switches on the adapter as described by the adapter manufacturer.
10. 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.



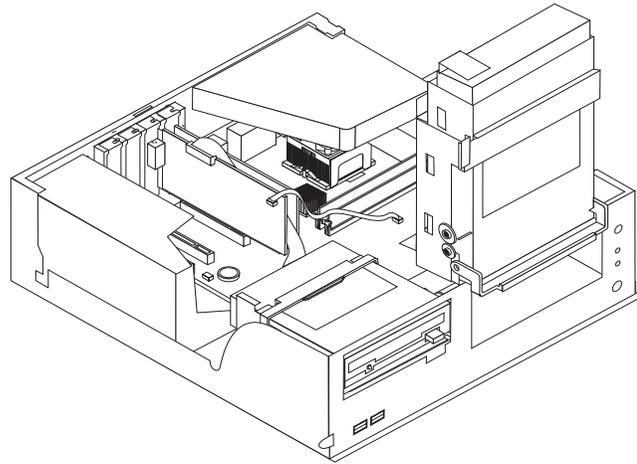
Attention: Be certain that the adapter is correctly seated in the expansion slot before you turn on the computer. Incomplete installation of an adapter might damage the system board or the adapter.

11. Connect required cables to the adapter.
12. If you have another adapter to install, repeat steps 1 through 11. If you have another option to install, do so now. Otherwise, complete the rest of the steps in this section.
13. Reinstall the rear-adapter-support bracket; then, rotate the bracket to the closed (locked) position.
14. Replace the frame-support bracket.
15. Return the drive-bay cages to their original positions in the computer.
16. Replace the top cover. See “Replacing the cover:” on page 46 for details.
17. Reconnect the external cables and power cords; then, turn on the attached devices and the computer.

Installing a SCSI adapter: Complete the following steps to install an optional SCSI adapter:

1. Complete steps 1 through 11 of “Installing an adapter:” on page 36; then, continue with step 2.
2. Connect the SCSI signal cable to the adapter and one or more of the signal cable connectors to the rear of the SCSI devices.

3. Connect the SCSI activity indicator cable to the adapter and to the SCSI LED connector on the system board. See "System board" on page 33 for the location of the SCSI LED connector.

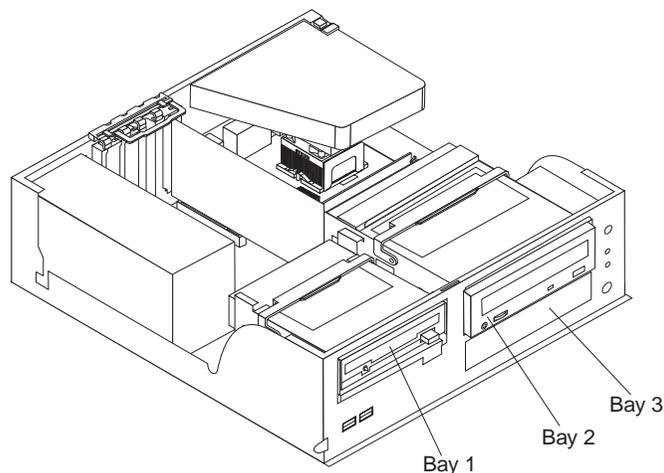


4. If you have other adapters or options to install or remove, do so now.
5. Reinstall the rear adapter-support bracket; then, rotate it to the closed (locked) position.
6. Replace the frame-support bracket.
7. Replace the cover. See "Replacing the cover:" on page 46 for details.
8. Reconnect the external cables and power cords; then, turn on the attached devices and the computer.

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

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

Internal drive bays: The IntelliStation E Pro Type 6216 computer comes with an IDE CD-ROM, DVD-ROM, or CD-RW drive in bay 1; a 3.5-in., 1.44-MB diskette drive in bay 2; and a hard disk drive installed in bay 3.



Notes:

1. The IntelliStation E Pro Type 6216 computer supports only one diskette drive.
2. The IntelliStation E Pro Type 6216 computer does not support the installation of additional internal disk drives. However, you can replace failed internal drives.
3. For a complete list of supported options for your computer, go to <http://www.ibm.com/pc/support/> on the World Wide Web.

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

1. Read “Safety information” on page vii, “Handling static-sensitive devices” on page 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.

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

- Four-wire power cables connect the drives to the power supply. At the end of these cables are plastic connectors that attach to different drives; these connectors vary in size. Also, certain power cables attach to the system board.
- Flat signal cables, also called ribbon cables, connect IDE and diskette drives to the system board. There are two sizes of ribbon cables that come with your computer:
 - The wider IDE signal cable has two connectors. One of these connectors is attached to the hard disk drive, and the other is attached to the primary or secondary IDE connector on the system board.

Note: The CD-ROM drive is attached to an ATA 33 signal cable. The hard disk drive is attached to an ATA 66 signal cable. ATA 66 signal cables are color-coded. The blue connector attaches to the system board. The black connector attaches to the primary device.
 - The narrower signal cable has two connectors, one to attach to the diskette drive, and the other to attach to the connector (FDD1) on the system board.
- SCSI signal cables connect SCSI devices to a SCSI adapter. If you have a SCSI adapter installed in your computer, the SCSI signal cable has four connectors. One of these connectors is attached to the SCSI adapter, two connectors are spares, and the fourth connector is attached to a SCSI hard disk drive.

To locate connectors on the system board, see “System-board internal cable connectors:” on page 34.

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

- The drives that are preinstalled in your computer come with power and signal cables attached. If you replace any drives, it is important to remember which cable is attached to which drive.
- When you install a drive, ensure that the drive connector at the end of the signal cable is always connected to a drive, and ensure that the drive connector at the other end is connected to the system board.
- When you replace an IDE device on a cable, it must be set as the primary device.

- If you install IDE cables with three connectors, consider the following:
 - One of the connectors attaches to the drive, one is a spare, and the third attaches to the primary or secondary IDE connector on the system board.

Note: If you install an ATA 66 or ATA 100 signal cable, ATA 66 and ATA 100 signal cables are color-coded. The blue connector attaches to the system board. The black connector attaches to the primary device. The gray middle connector attaches to the secondary device.
 - If two IDE devices are used on a single cable, one must be designated as the primary device and the other as the secondary device; otherwise, the computer might not detect some of the IDE devices. The primary and secondary designation is determined by switch or jumper settings on each IDE device.
 - If two IDE devices are on a single cable, and only one is a hard disk drive, the hard disk drive must be set as the primary device.
- You must also set the SCSI ID for any SCSI device that you install in your computer. Each SCSI device has its own methods and considerations for setting the SCSI ID. See the instructions that come with the SCSI device for details about setting the SCSI ID for the SCSI device.

Installing a CD-ROM or diskette drive: Complete the following steps to replace drives in the IBM IntelliStation E Pro Type 6216 computer:

1. Read the information in “Preinstallation steps:” on page 39.
2. Turn off the computer and attached devices, and disconnect all external cables and power cords.
3. Remove the cover. See “Removing the cover:” on page 35 for details.
4. Disconnect power and signal cables to the drive.
5. Rotate the drive bay cage of the drive that you need to replace until the latch catches the front of the computer chassis.
6. Remove the screws holding the drive in place.
7. Slide the drive out of the drive bay.

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

Statement 3:



CAUTION:

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

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



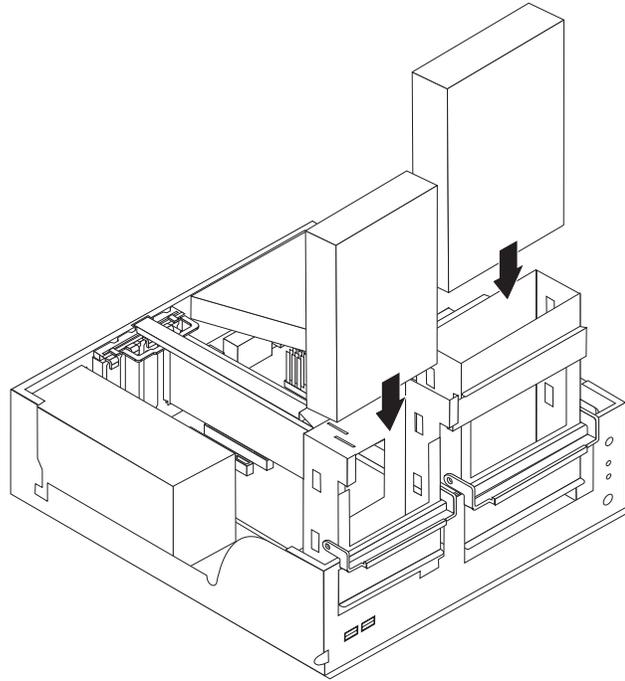
DANGER

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

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

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

10. Slide the drive into the drive bay, and then attach the drive to the drive cage.



11. Connect one end of the diskette or IDE signal cable into the back of the drive and the other end of the cable into the diskette drive or IDE connector on the system board. For the location of the diskette or IDE connectors, see “System-board internal cable connectors:” on page 34.

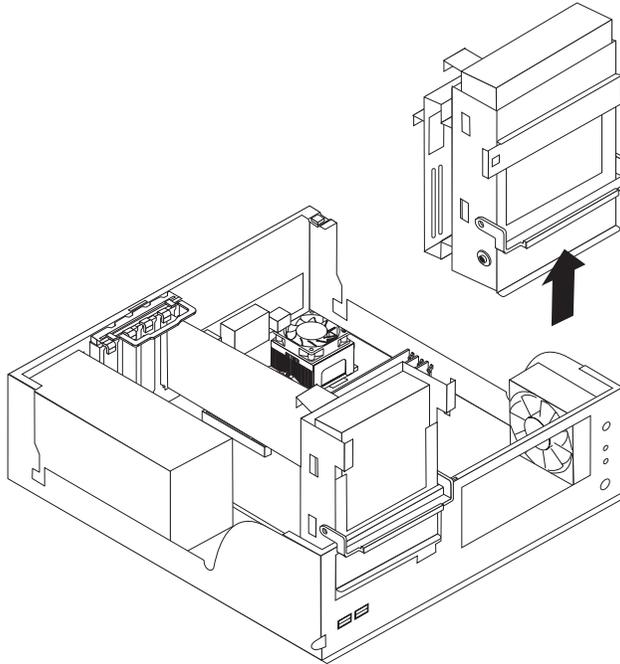
Note: Make sure to route the signal cable so that it does not block the airflow to the rear of the drives or over the microprocessor.

12. Connect the power cable to the back of the drive. The connectors are keyed and can be inserted only one way.
13. If you have other options to install or remove, do so now.
14. Replace the cover. See “Replacing the cover:” on page 46 for details.
15. Reconnect the external cables and power cords; then, turn on the attached devices and the computer.

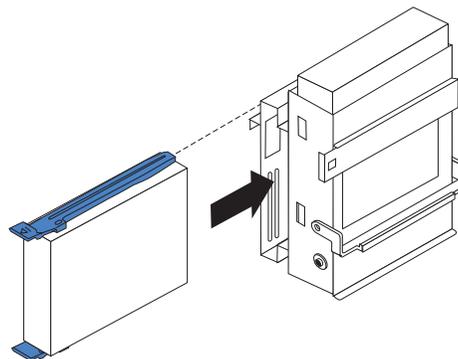
Installing a hard disk drive: Complete the following steps to replace a hard disk drive in your computer:

1. Read the information in “Preinstallation steps:” on page 39.
2. Turn off the computer and attached devices and disconnect the external cables and power cords.
3. Remove the cover and frame-support bracket. See “Removing the cover:” on page 35 and “Removing the frame-support bracket:” on page 35 for details.
4. Disconnect the power and signal cables from both drives in the drive cage.

5. Remove the hard disk drive cage from the computer.



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



11. If you are installing an IDE device, connect one end of the IDE signal cable into the back of the drive and the other end of the cable into the IDE connector on the system board. For the location of the IDE connectors, see "System-board internal cable connectors:" on page 34. If you are installing a SCSI device, connect one end of the SCSI signal cable to the device and the other end to the SCSI connector on the SCSI adapter.

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

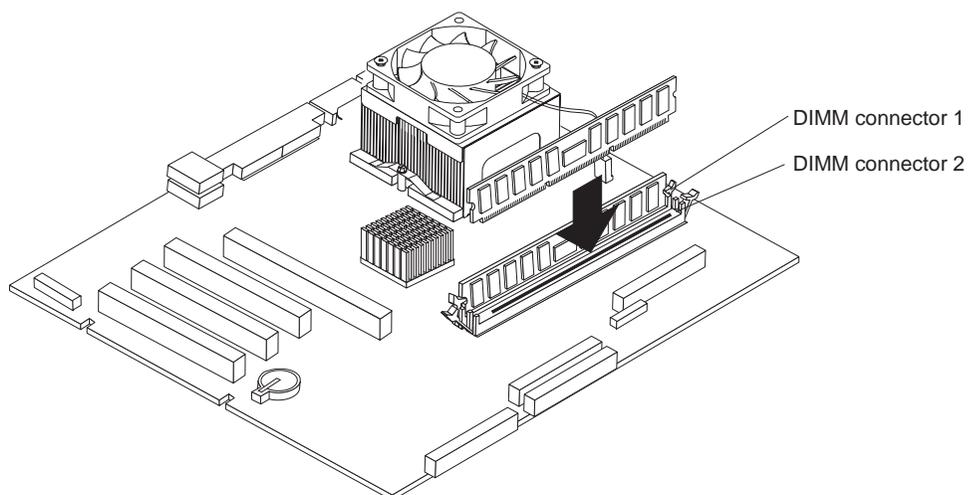
12. Connect a power cable to the back of the drive. The connectors are keyed and can be inserted only one way.
13. If you have other options to install or remove, do so now.
14. Go to the appropriate section to work with another option, or replace the cover. See “Replacing the cover:” on page 46 for details.
15. Reconnect the external cables and power cords; then, turn on the attached devices and the computer.

Installing memory modules: You can increase the amount of memory in your computer by installing memory modules. Your IntelliStation E Pro computer uses industry standard, PC2100 266 MHz DDR dual inline memory modules (DIMMs).

Complete the following steps to install a DIMM.

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

1. Review the safety precautions listed in the “Safety information” on page vii.
2. Turn off the computer and all attached devices. Disconnect all external cables and power cords; then, remove the cover. See “Removing the cover:” on page 35 or for details.
3. Lift the frame-support bracket. See “Removing the frame-support bracket:” on page 35.
4. Touch the static-protective package containing the DIMM to any unpainted metal surface on the computer. Then, remove the new DIMM from the package.
5. Gently open the retaining clip on each end of the DIMM slot. Turn the DIMM so that the pins align correctly with the connector.
6. Firmly press the DIMM straight down into the connector by applying pressure on both ends of the DIMM simultaneously. The retaining clips snap into the locked position when the DIMM is firmly seated in the connector.



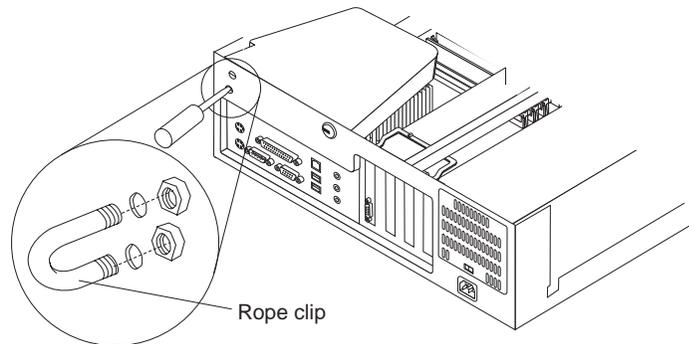
7. If there is a gap between the DIMM and the retaining clips, the DIMM has not been correctly installed. Open the retaining clips, remove the DIMM, and then reinsert it.
8. If you have other options to install or remove, do so now.

9. Replace the frame-support bracket.
10. Replace the cover. See “Replacing the cover:” on page 46.
11. Reconnect the external cables and power cords. Turn on the attached devices, and turn on the computer.

Installing a security rope clip: To help prevent theft, you can add a security rope clip and cable to your computer.

Complete the following to install the rope clip:

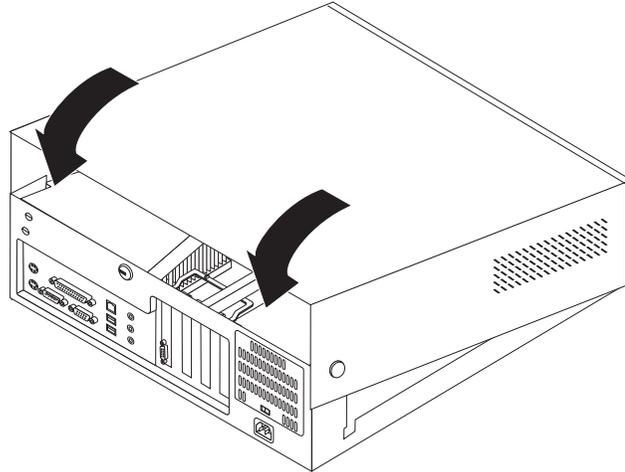
1. Review the safety precautions listed in “Safety information” on page vii.
2. Turn off the computer and all attached devices. Disconnect all external cables and power cords; then, remove the cover. See “Removing the cover:” on page 35 for details.
3. Use a screwdriver to remove the two metal knockouts.
4. Insert the rope clip through the rear panel; then, attach and tighten the nuts.
5. Thread the cable through the rope clip and around an object that is not part of or permanently secured to the building structure or foundation, and from which the cable cannot be removed. Fasten the cable ends together with a lock. After you add the security cable, make sure that it does not interfere with other cables connected to the computer.



6. Replace the cover. See “Replacing the cover:” on page 46.
7. Reconnect the external cables and power cords, and turn on the attached devices, then the computer.

Replacing the cover: Complete the following steps to replace the computer cover:

1. Clear any cables that might impede the replacement of the cover.
2. Place the cover over the chassis, and pivot it down over the computer until it snaps into place.



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

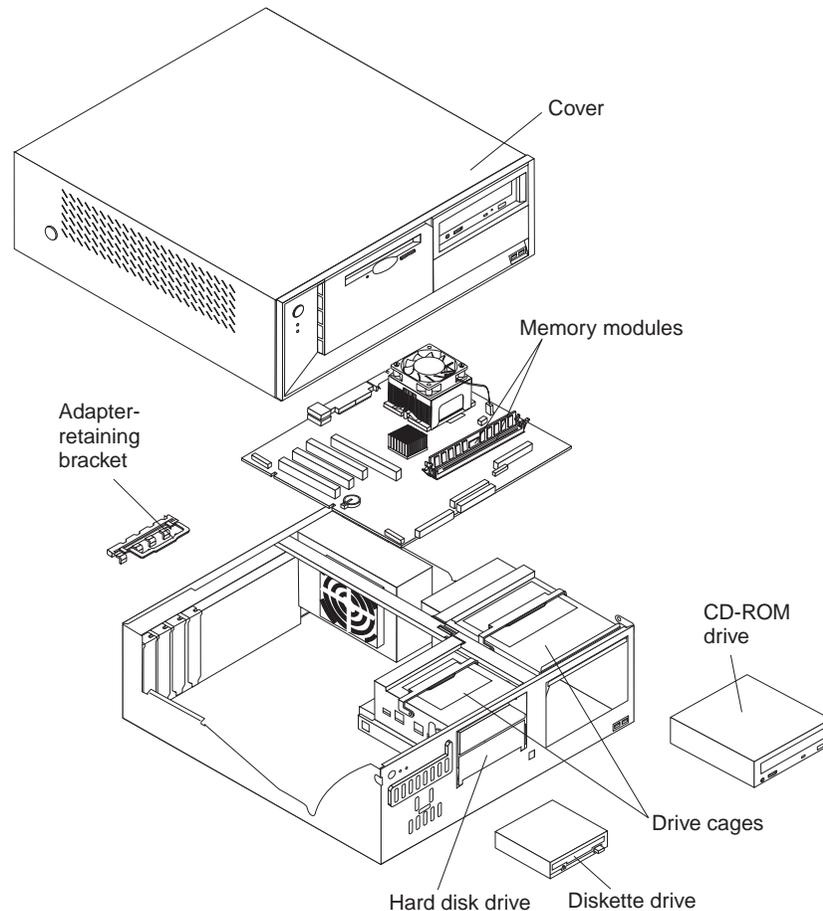
Installing options in the IntelliStation E Pro Type 6226 computer

Use the information in the following sections to install options in the IntelliStation E Pro Type 6226 computer.

Note: For instructions to install options in an IntelliStation E Pro Type 6216, see “Installing options in the IntelliStation E Pro Type 6216 computer” on page 32.

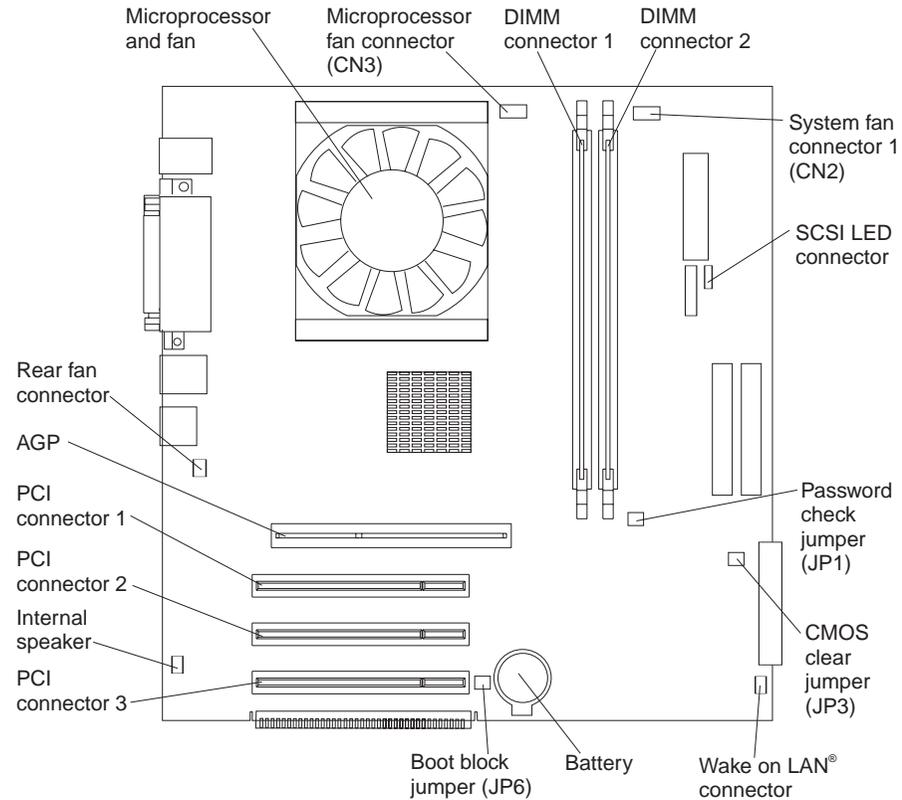
Major components of the IBM IntelliStation E Pro Type 6226 computer

The following illustration shows the locations of major components in the IntelliStation E Pro Type 6226 computer.



System board

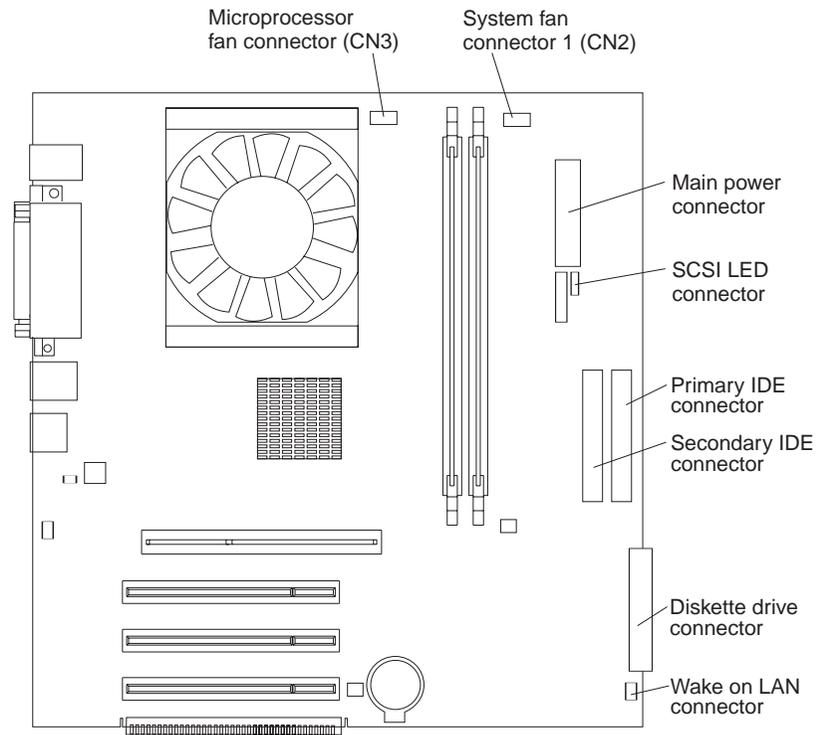
The illustrations in the following sections highlight various components on the system board. Depending on installed options, your system board might look slightly different.



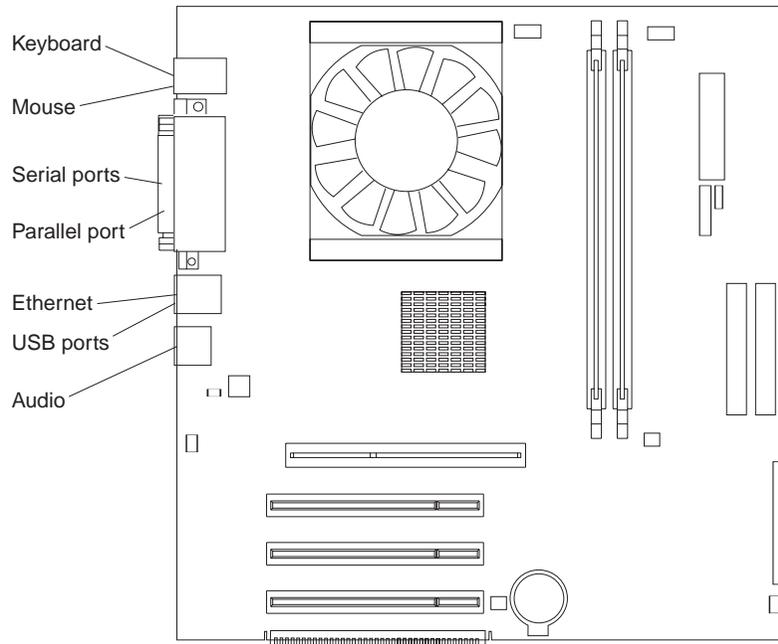
The CMOS clear jumper (JP3) can be used to clear CMOS memory in the event that a CMOS setting becomes damaged. See “Clearing CMOS” on page 94 for information on how to use the CMOS clear jumper.

The boot block jumper (JP6) is used to recover from a BIOS update failure. See “Recovering from a POST/BIOS update failure” on page 92.

System board internal cable connectors: The following illustration identifies system board connectors for internal cables.



System board external cable connectors: The following illustration identifies system board connectors for external devices.

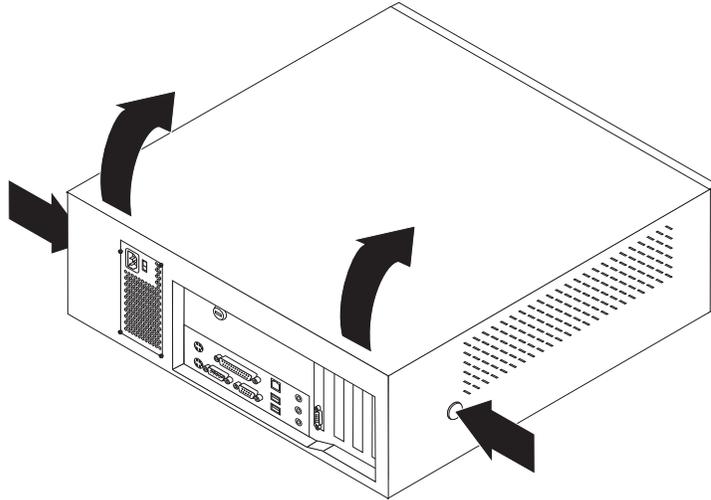


Installing options

This section contains instructions for installing options in the IBM IntelliStation E Pro Type 6226 computer.

Removing the cover: Complete the following steps to remove the cover from the IntelliStation E Pro Type 6226 computer:

1. Review the information in “Before you begin” on page 31 and “Safety information” on page vii.
2. Turn off the computer and all attached devices.
3. Disconnect all external cables and power cords.
4. Press the buttons on both sides of the computer cover and lift the cover from the computer.



To replace the cover, see “Replacing the cover:” on page 46.

Working with adapters: Your computer has three 32-bit, 33 MHz PCI adapter connectors or *slots* and one AGP slot. The AGP video adapter is installed in the AGP slot.

See “System board” on page 33 for the location of the expansion slots on the system board.

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

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

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

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

Installing an adapter: Complete the following steps to install an adapter in the IBM IntelliStation E Pro Type 6226.

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

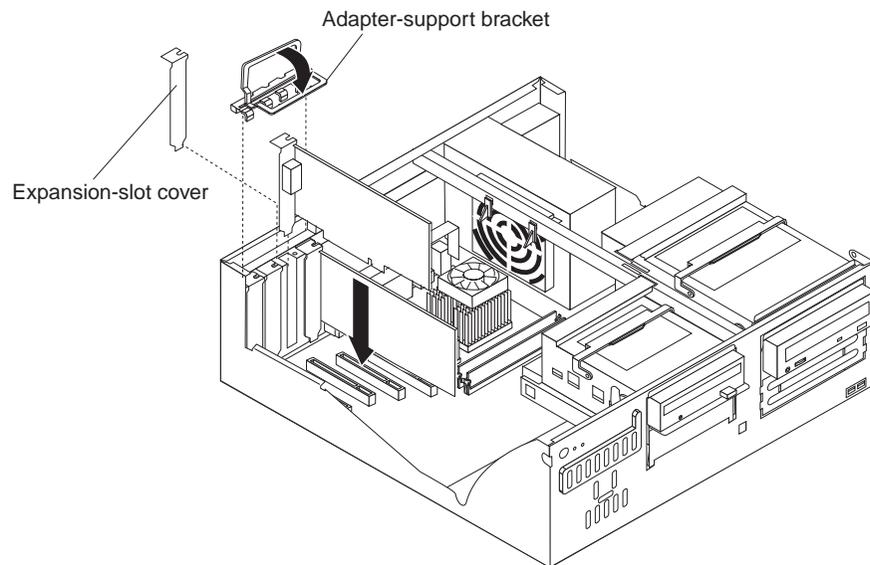
1. Review the information in “Safety information” on page vii.
2. Turn off the computer and attached devices.
3. Disconnect all external cables and power cords; then, remove the cover. See “Removing the cover:” on page 35.

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.

4. Rotate the rear adapter-support bracket to the open (unlocked) position and remove it from the computer.
5. From the rear of the computer, press on the slot cover. Grasp it and pull it out of the expansion slot. Store it in a safe place for future use.

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

6. When you are ready, remove the adapter from the static-protective package. It is best to move the adapter directly from the static-protective package to the adapter slot. If this is not possible, set the adapter down in its static-protective package on a hard surface. Avoid touching the components and gold-edge connectors on the adapter.
7. Set any jumpers or switches on the adapter as described by the adapter manufacturer.
8. 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.



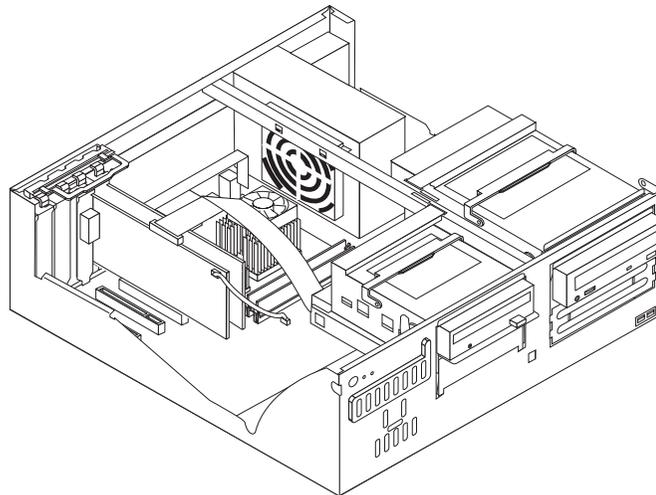
Attention: Be certain that the adapter is correctly seated in the expansion slot before you turn on the computer. Incomplete installation of an adapter might damage the system board or the adapter.

9. Connect required cables to the adapter.

10. If you have another adapter to install, repeat steps 1 through 11 on page 37. If you have another option to install, do so now. Otherwise, complete the rest of the steps in this section.
11. Reinstall the rear-adapter-support bracket; then, rotate the bracket to the closed (locked) position.
12. Return the drive-bay cages to their original positions in the computer.
13. Replace the cover. See “Replacing the cover:” on page 46 for details.
14. Reconnect the external cables and power cords; then, turn on the attached devices and the computer.

Installing a SCSI adapter: Complete the following steps to install an optional SCSI adapter:

1. Complete steps 1 through 11 of “Installing an adapter:” on page 36; then, continue with step 2.
2. Connect the SCSI signal cable to the adapter and one or more of the signal cable connectors to the rear of the SCSI devices.
3. Connect the SCSI activity indicator cable to the adapter and to the SCSI LED connector on the system board. See “System board” on page 33 for the location of the SCSI LED connector.

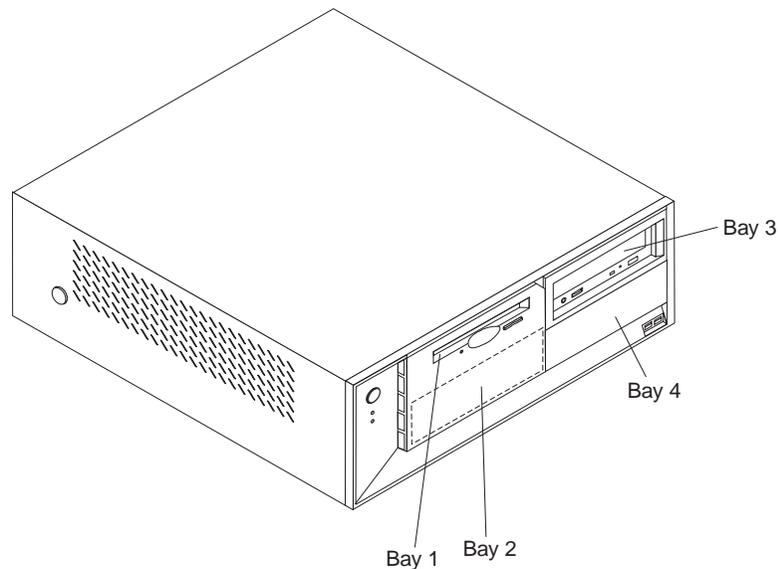


4. If you have other adapters or options to install or remove, do so now.
5. Reinstall the rear adapter support bracket; then, rotate it to the closed (locked) position.
6. Replace the cover. See “Replacing the cover:” on page 46 for details.
7. Reconnect the external cables and power cords; then, turn on the attached devices and the computer.

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

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

Internal drive bays: The IntelliStation E Pro Type 6226 computer comes with a 3.5-in., 1.44-MB diskette drive in bay 1; a hard disk drive installed in bay 2; and an IDE CD-ROM, DVD-ROM, or CD-RW drive in bay 3.



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

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

1. Read “Safety information” on page vii, “Handling static-sensitive devices” on page 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.

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

- Four-wire power cables connect the drives to the power supply. At the end of these cables are plastic connectors that attach to different drives; these connectors vary in size. Also, certain power cables attach to the system board.
- Flat signal cables, also called ribbon cables, connect IDE and diskette drives to the system board. There are two sizes of ribbon cables that come with your computer.
 - The wider IDE signal cable has two or three connectors.
 - If the cable has three connectors, one of these connectors is attached to the drive, one is a spare, and the third attaches to the primary or secondary IDE connector on the system board.
 - If the cable has two connectors, one of these connectors is attached to the hard disk drive, and the other attaches to the primary or secondary IDE connector on the system board.

Note: The CD-ROM drive is attached to an ATA 66 signal cable. The hard disk drive is attached to an ATA 100 signal cable. ATA 66 and ATA 100 signal cables are color-coded. The blue connector attaches to the system board. The black connector attaches to the primary device. If the cable has a gray middle connector, it attaches to the secondary

device. If you are installing a hard disk drive, you must change the switch setting on the CD-ROM drive to secondary and change the connector used for the CD-ROM drive to the gray middle connector.

- The narrower signal cable has two connectors, one to attach to the diskette drive, and the other to attach to the connector (FDD1) on the system board.
- SCSI signal cables connect SCSI devices to a SCSI adapter. If you have a SCSI adapter installed in your computer, the SCSI signal cable has four connectors. One of these connectors is attached to the SCSI adapter, two connectors are spares, and the fourth connector is attached to a SCSI hard disk drive.

To locate connectors on the system board, see “System-board internal cable connectors:” on page 34.

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

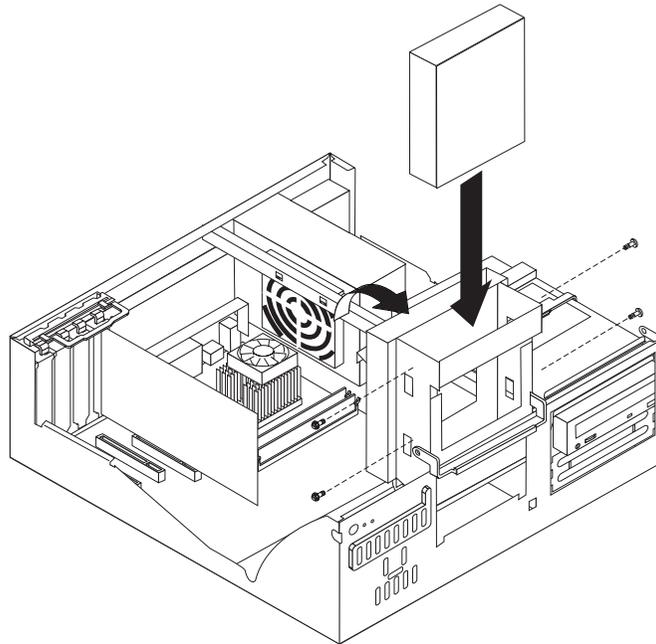
- The drives that are preinstalled in your computer come with power and signal cables attached. If you replace any drives, it is important to remember which cable is attached to which drive.
- When you install a drive, ensure that the drive connector at the end of the signal cable is always connected to a drive, and ensure that the drive connector at the other end is connected to the system board. This reduces electronic noise from the computer.
- If you have only one IDE device on a cable, it must be set as a primary device.
- If two IDE devices are used on a single cable, one must be designated as the primary device and the other as the secondary device; otherwise, the computer might not detect some of the IDE devices. The primary and secondary designation is determined by switch or jumper settings on each IDE device.
- If two IDE devices are on a single cable, and only one is a hard disk drive, the hard disk drive must be set as a primary device.
- You must also set the SCSI ID for any SCSI device that you install in your computer. Each SCSI device has its own methods and considerations for setting the SCSI ID. See the instructions that come with the SCSI device for details about setting the SCSI ID for the SCSI device.

Replacing a diskette drive in bay 1: To replace a diskette drive in the IBM IntelliStation E Pro Type 6226 computer, complete the following steps.

Note: The IntelliStation E Pro Type 6226 computer supports only one diskette drive.

1. Read the information in “Preinstallation steps:” on page 39.
2. Turn off the computer and attached devices, and disconnect all external cables and power cords.
3. Remove the cover. See “Removing the cover:” on page 35 for details.
4. Disconnect power and signal cables from the drive.
5. Rotate the diskette drive bay cage until the drive cage latch catches the front of the computer chassis.
6. Remove the screws holding the diskette drive in place and slide the diskette drive out of the rear of the bay.
7. Touch the static-protective package containing the diskette drive to any unpainted metal surface on the computer; then, remove the diskette drive from the package and place it on a static-protective surface.
8. Set any jumpers or switches on the drive according to the documentation that comes with the drive.

- Slide the drive into the drive bay through the rear of the drive cage, and then attach the diskette drive to the drive cage.

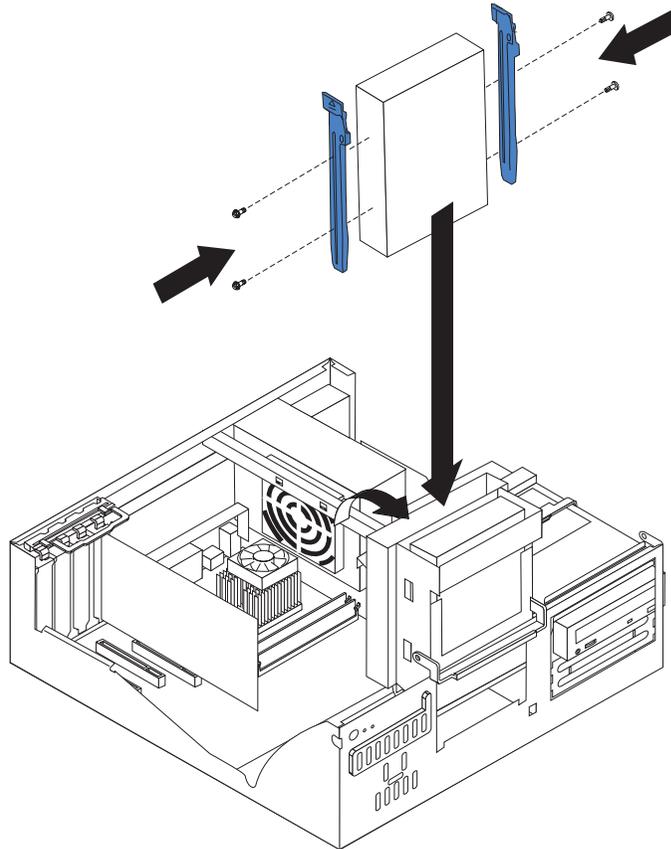


- Rotate the drive cage back into the computer chassis.
- Connect one end of the diskette or IDE signal cable into the back of the drive and the other end of the cable into the diskette or IDE connector on the system board. For the location of the diskette or IDE connectors, see "System-board internal cable connectors:" on page 34.
Note: Make sure to route the signal cable so that it does not block the airflow to the rear of the drives or over the microprocessor.
- Connect the power cable to the back of the drive. The connectors are keyed and can be inserted only one way.
- If you have other options to install or remove, do so now.
- Replace the cover. See "Replacing the cover:" on page 46 for details.
- Reconnect the external cables and power cords; then, turn on the attached devices and the computer.

Replacing a hard disk drive in bay 2: To replace a hard disk drive in the IBM IntelliStation E Pro Type 6226 computer, complete the following steps:

- Read the information in "Preinstallation steps:" on page 53.
- Turn off the computer and attached devices, and disconnect all external cables and power cords.
- Remove the cover. See "Removing the cover:" on page 35 for details.
- Disconnect power and signal cables to the failed hard disk drive.
- Rotate the drive bay cage of the drive that you need to replace until the latch catches the front of the computer chassis.
- Squeeze the sides of the rail guides on the side of the old hard disk drive and slide the drive out of the bay.
- Remove the sliding rail guides from the old hard disk drive.

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



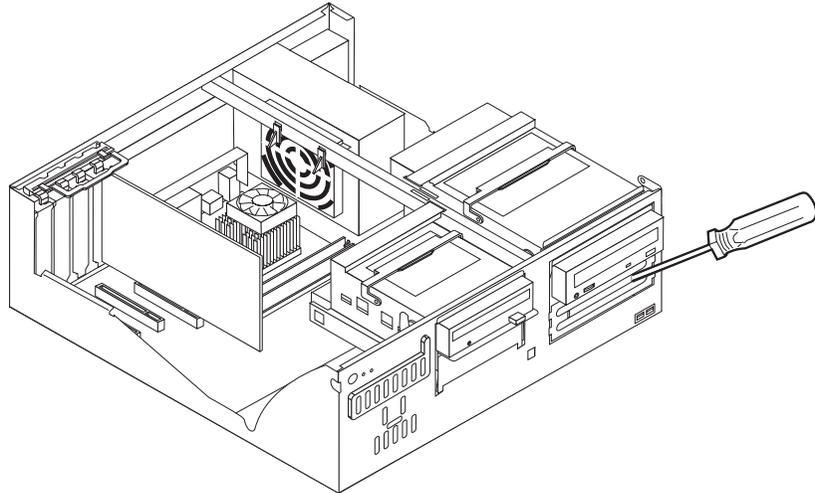
12. If you are installing an IDE device, connect one end of the IDE signal cable into the back of the drive and the other end of the cable into the IDE connector on the system board. For the location of the IDE connectors, see "System board internal cable connectors:" on page 49. If you are installing a SCSI device, connect one end of the SCSI signal cable to the device and the other end to the SCSI connector on the SCSI adapter.

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

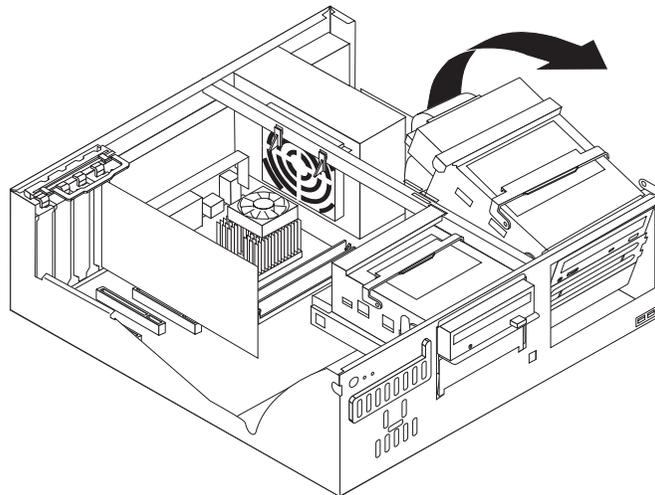
13. Connect the power cable to the back of the drive. The connectors are keyed and can be inserted only one way.
14. If you have other options to install or remove, do so now.
15. Replace the cover. See "Replacing the cover:" on page 61 for details.
16. Reconnect the external cables and power cords; then, turn on the attached devices and the computer.

Installing a drive in bays 3 or 4: To install or replace drives in bays 3 or 4 of the IBM IntelliStation E Pro Type 6226 computer, complete the following steps:

1. Read the information in “Preinstallation steps:” on page 39.
2. Turn off the computer and attached devices, and disconnect all external cables and power cords.
3. Remove the cover. See “Removing the cover:” on page 35 for details.
4. Disconnect power and signal cables to the drive.
5. If you are installing a new drive, use a screwdriver to pry the electromagnetic cover from the drive bay.



6. Rotate the drive bay cage where you want to install or replace a drive out of the computer chassis.



7. If you are replacing a drive, remove the screws holding the drive in place and slide the drive out through the front of the bay.

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

Statement 3:



CAUTION:

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

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



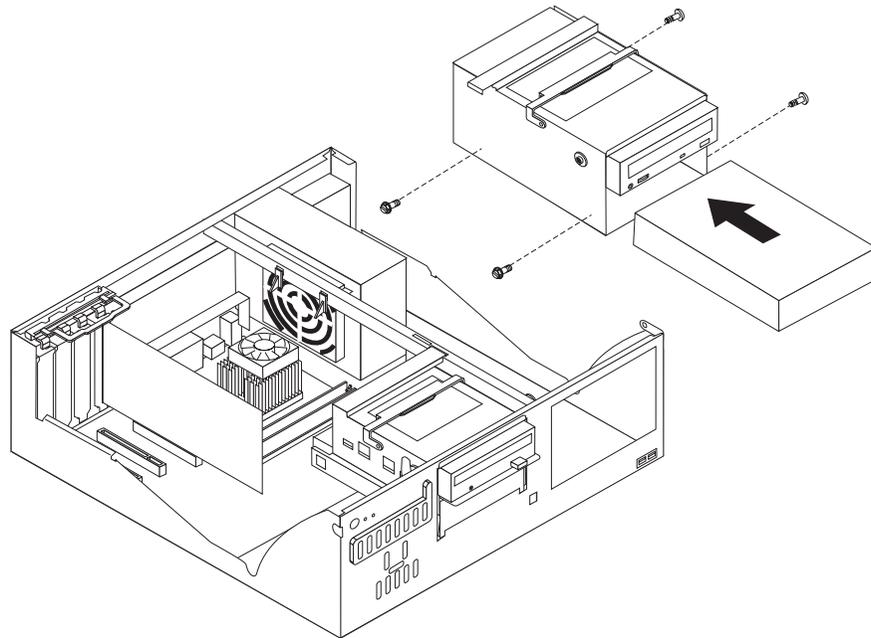
DANGER

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

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

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

- Slide the drive into the drive bay through the front, and then attach the drive to the drive cage using metal screws.



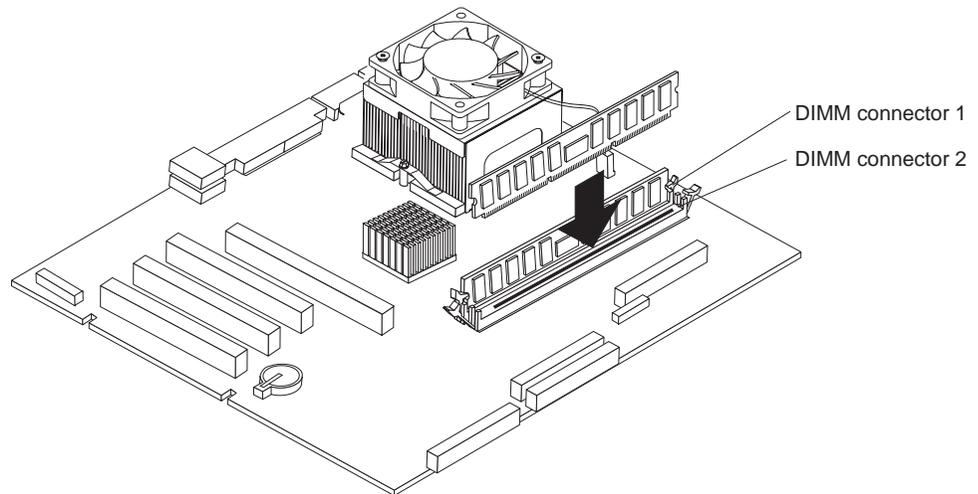
- Place the drive cage back into the computer chassis.
- If you are installing an IDE device, connect one end of the IDE signal cable into the back of the drive and the other end of the cable into the IDE connector on the system board. For the location of the IDE connectors, see “System-board internal cable connectors:” on page 34. If you are installing a SCSI device, connect one end of the SCSI cable to the device and the other end to the SCSI connector on the SCSI adapter.
Note: Make sure to route the signal cable so that it does not block the airflow to the rear of the drives or over the microprocessor.
- Connect the power cable to the back of the drive. The connectors are keyed and can be inserted only one way.
- If you have other options to install or remove, do so now.
- Replace the cover. See “Replacing the cover:” on page 46 for details.
- 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 E Pro computer uses industry standard, PC2100 266 MHz DDR dual inline memory modules (DIMMs).

Complete the following steps to install a DIMM:

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

1. Review the safety precautions listed in the “Safety information” on page vii.
2. Turn off the computer and all attached devices. Disconnect all external cables and power cords; then remove the cover. See “Removing the cover:” on page 35 for details.
3. Touch the static-protective package containing the DIMM to any unpainted metal surface on the computer. Then, remove the new DIMM from the package.
4. Gently open the retaining clip on each end of the DIMM slot. Turn the DIMM so that the pins align correctly with the connector.
5. Firmly press the DIMM straight down into the connector by applying pressure on both ends of the DIMM simultaneously. The retaining clips snap into the locked position when the DIMM is firmly seated in the connector.



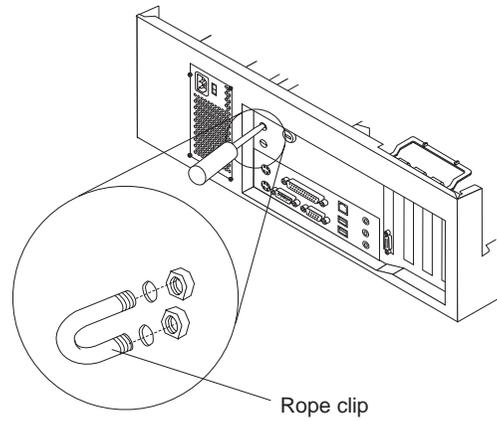
6. If there is a gap between the DIMM and the retaining clips, the DIMM has not been correctly installed. Open the retaining clips, remove the DIMM, then reinsert it.
7. If you have other options to install or remove, do so now.
8. Replace the cover. See “Replacing the cover:” on page 46.
9. Reconnect the external cables and power cords. Turn on the attached devices, and turn on the computer.

Installing a security rope clip: To help prevent theft, you can add a security rope clip and cable to your computer.

Complete the following steps to install the rope clip:

1. Review the safety precautions listed in “Safety information” on page vii.
2. Turn off the computer and all attached devices. Disconnect all external cables and power cords; then, remove the cover. See “Removing the cover:” on page 35 for details.
3. Use a screwdriver to remove the two metal knockouts.
4. Insert the rope clip through the rear panel; then, attach and tighten the nuts.

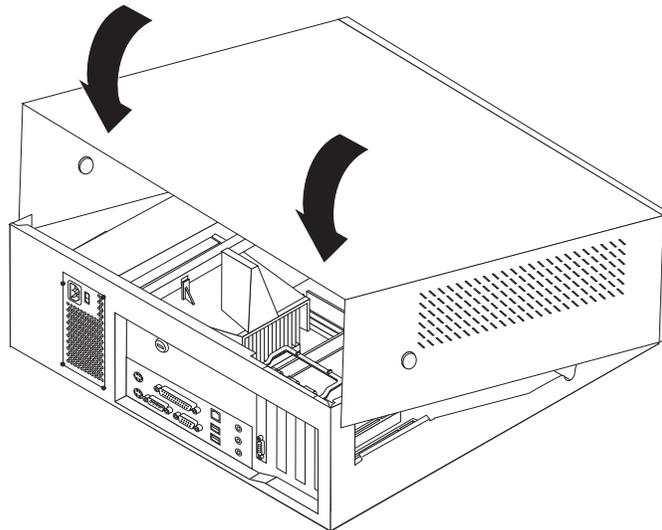
5. Thread the cable through the rope clip and around an object that is not part of or permanently secured to the building structure or foundation, and from which the cable cannot be removed. Fasten the cable ends together with a lock. After you add the security cable, make sure that it does not interfere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



6. Replace the cover. See “Replacing the cover:”.
7. Reconnect the external cables and power cords, and turn on the attached devices, then the computer.

Replacing the cover: Complete the following steps to replace the computer cover:

1. Clear any cables that might impede the replacement of the cover.
2. Place the cover over the chassis, and pivot it down over the computer until it snaps into place.



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

Connecting external options

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

Complete the following steps to attach an external device:

1. Read “Before you begin” on page 31, review the safety precautions listed in Statement 1 and Statement 5 in “Safety information” on page vii, and read the documentation that comes with your options.
2. Be sure that your computer and all attached devices are turned off.
3. Follow the instructions that come with the option to prepare it for installation and to connect it to the computer.

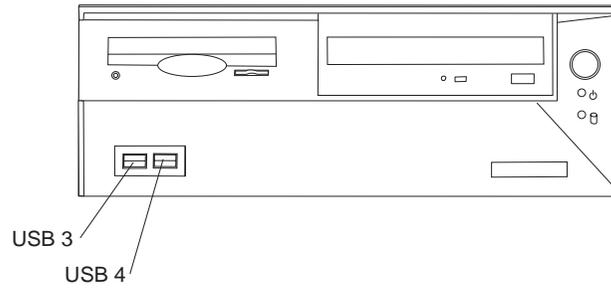
Note: If you are attaching a SCSI device, see “SCSI cabling requirements” on page 67 and “Setting SCSI IDs” on page 67 for SCSI ID and cabling information.

The following connectors are provided for attaching peripheral input/output devices to your computer:

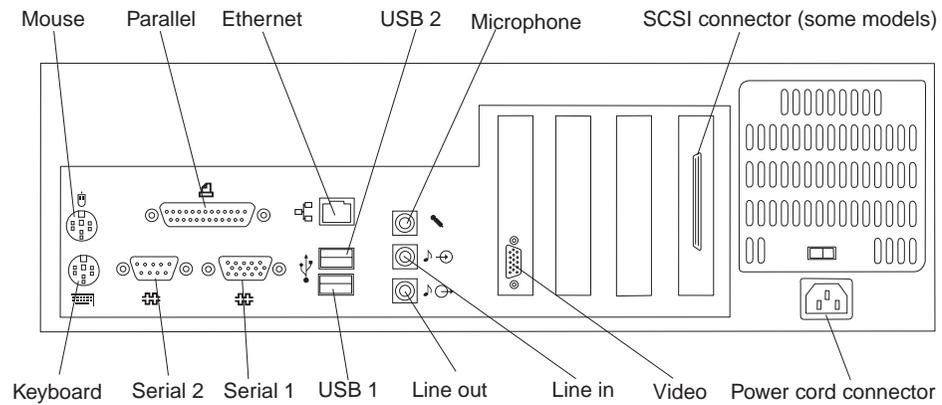
- One mouse
- One keyboard
- One parallel
- Two serial
- One Ethernet
- Four USB (two on front and two on rear)
- One line in
- One line out
- One microphone
- One video (Optional multiple connectors on some models)
- One Ultra160 SCSI (some models)

Input/output connector locations

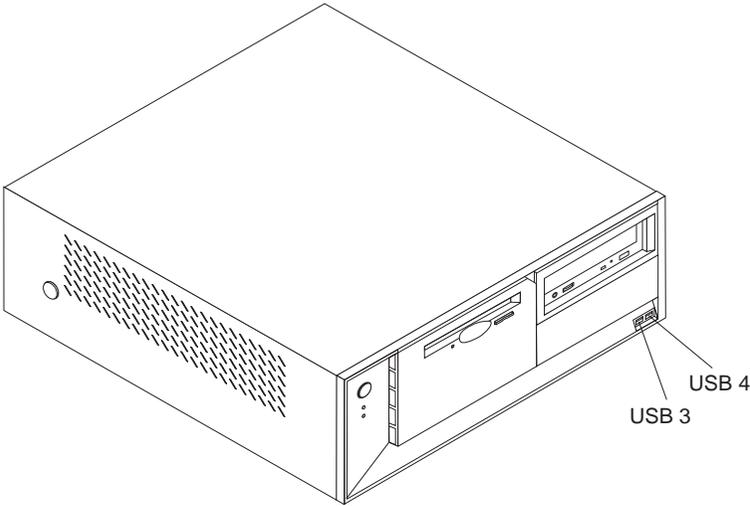
The following illustration shows the location of input/output (I/O) connectors on the front of the IntelliStation E Pro Type 6216 computer.



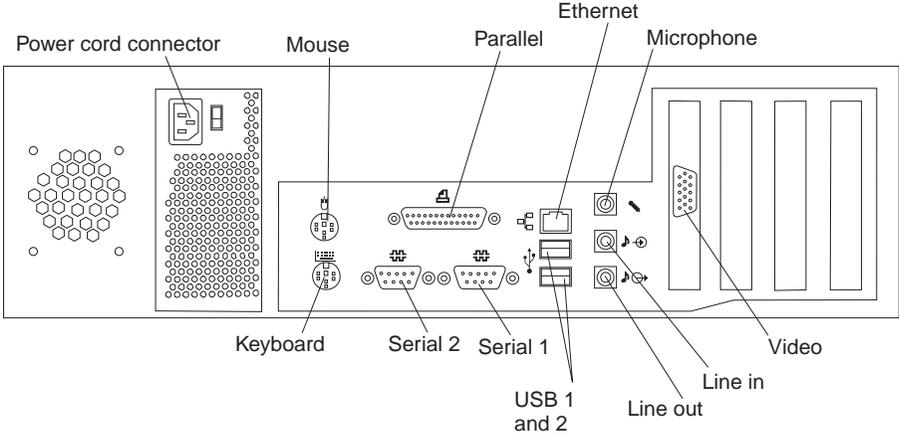
The following illustration shows the location of input/output (I/O) connectors on the rear of the IntelliStation E Pro Type 6216 computer.



The following illustration shows the location of input/output (I/O) connectors on the front of the IntelliStation E Pro Type 6226 computer.



The following illustration shows the location of input/output (I/O) connectors on the rear of the IntelliStation E Pro Type 6226 computer.



- **Video connector**

Your computer uses an AGP adapter in the AGP slot on the system board. The video connector is on the adapter and is located on the rear of your computer.

Some models come with a digital video interface (DVI) connector for connecting a digital monitor.

- **Keyboard connector**

Your computer has one keyboard connector.

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

- **Mouse connector**

Your computer has one mouse connector that supports a mouse or other pointing device. The mouse connector is on the rear of your computer.

- **Parallel connector**

There is one 25-pin, female D-shell parallel connector on the rear of your computer. This connector supports three standard Institute of Electrical and Electronics Engineers (IEEE) 1284 modes of operation: Standard Parallel Port (SPP), Enhanced Parallel Port (EPP), and Extended Capability Port (ECP).

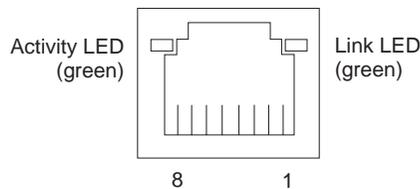
Use the Configuration/Setup Utility program to configure the parallel connector as bidirectional. With this configuration, data can be read from and written to a device. In bidirectional mode, the computer supports the ECP and EPP modes. See page 21 for instructions for configuring the parallel connector.

- **Serial connectors**

Your computer has two standard 9-pin D-shell serial connectors: serial connector 1 and serial connector 2.

- **Gigabit Ethernet connector**

Your computer comes with an integrated Gigabit Ethernet controller. This controller provides an interface for connecting to 10-Mbps, 100-Mbps, or 1-Gbps networks and provides full-duplex (FDX) capability, which enables simultaneous transmission and reception of data on the Ethernet local area network (LAN).



To access the Ethernet port, connect a Category 3, 4, or 5 unshielded twisted-pair (UTP) cable to the RJ-45 connector on the rear of your computer.

Note: The 100BASE-TX Fast Ethernet standard requires that the cabling in the network be Category 5 or higher. The 1 Gbps Fast Ethernet standard requires that the cabling in the network be Category 5e or higher.

The Ethernet (RJ-45) connector has two LEDs. The Ethernet link LED is on the left. When this LED is on, there is an active connection on the Ethernet port. The Ethernet transmit/receive activity LED is on the right. When this LED is on, there is activity between the computer and the network.

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

- **Universal Serial Bus (USB) connectors**

Your computer has four Universal Serial Bus (USB) 2.0 connectors (two on the front and two on the rear of the computer) for optional telephony and multimedia devices. USB devices are configured automatically with Plug and Play technology.

Notes:

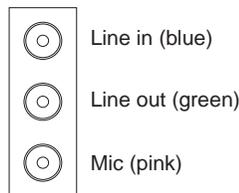
1. If you attach a standard (non-USB) keyboard to the keyboard connector, the USB connectors and devices will be disabled during the power-on self-test.
2. If you install a USB keyboard that has a mouse connector, the USB keyboard emulates a mouse. You will not be able to disable the mouse settings in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

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

USB 2.0 technology transfers data at up to 480 Mb per second (Mbps) with a maximum of 127 external devices and a maximum signal distance of 5 meters (16 ft) per segment provided that the device attached to the computer is a USB 2.0 device. If the computer has multiple USB devices attached to it, the USB hub must be USB 2.0, or all USB 2.0 devices will transfer data at 12 Mbps.

- **Audio connectors**

The audio connectors are used to attach external audio equipment to your computer.



- **Line out**

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

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

- **Line in**

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

- **Microphone**

This connector is used to connect a microphone to your computer for recording sounds on the hard-disk drive or using speech recognition software.

- **Adaptec Ultra160 SCSI connector**

Some models come with an Adaptec Ultra160 SCSI adapter that supports a SCSI internal channel that supports up to 15 SCSI devices. This configuration supports zero wait state, 32-bit memory transfers at 160 MB per second when low voltage differential (LVD) SCSI peripheral devices are attached. In addition, this adapter uses:

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

Configuring the Gigabit Ethernet controller

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

When you connect your computer to the network, the Ethernet controller automatically detects the data-transfer rate (10 Mbps, 100 Mbps, or 1 Gbps) on the network and then sets the controller to operate at the appropriate rate. In addition, if the Ethernet ports that your computer is connected to support auto-negotiation, the Gigabit Ethernet controller sets the appropriate duplex state. That is, the Ethernet controller adjusts to the network data rate, whether the data rate is standard Ethernet (10BASE-T), Fast Ethernet (100BASE-TX/1000BASE-T), half duplex (HDX), or full duplex (FDX). The controller supports half-duplex (HDX) and full-duplex (FDX) modes at both speeds.

High-performance Ethernet modes

Your Ethernet controller supports optional modes, such as teaming, load balancing, fault tolerance, and virtual LANs, which provide higher performance, security, and throughput for your computer. These modes apply to the integrated Ethernet controller and to the controllers on supported Ethernet adapters.

SCSI cabling requirements

If your computer comes with a SCSI adapter, you can install three internal SCSI devices using the SCSI signal cable that comes with it. If you plan to attach external SCSI devices, you must order an additional SCSI cable. To select and order the correct cables for use with external devices, contact your IBM reseller or IBM marketing representative. To receive an indication of SCSI hard disk drive activity, you must also connect the SCSI adapter to the SCSI LED (J35) connector on the system board. See "System board" on page 33 for the location of the internal 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. See the information that is provided with the device for instructions for setting its SCSI ID. With a SCSI adapter installed in your computer, you can use its 68-pin SCSI connector to connect different types of SCSI devices.

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

Chapter 5. Solving problems

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

If you cannot locate and correct the problem using the information in this chapter, see Appendix A, “Getting help and technical assistance” on page 97 for more information.

Diagnostic tools overview

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

- **Computer Support flowchart**

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

- **POST beep codes and error messages**

The power-on self-test generates beep codes and messages to indicate successful test completion or the detection of a problem. See “Power-on self-test (POST)” on page 71 for more information.

- **Diagnostic programs**

The system diagnostic programs are stored on the *Device Drivers 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 80 for more information.

- **Troubleshooting chart**

This chart lists problem symptoms and steps to correct the problem. See “Troubleshooting chart” on page 84 for more information.

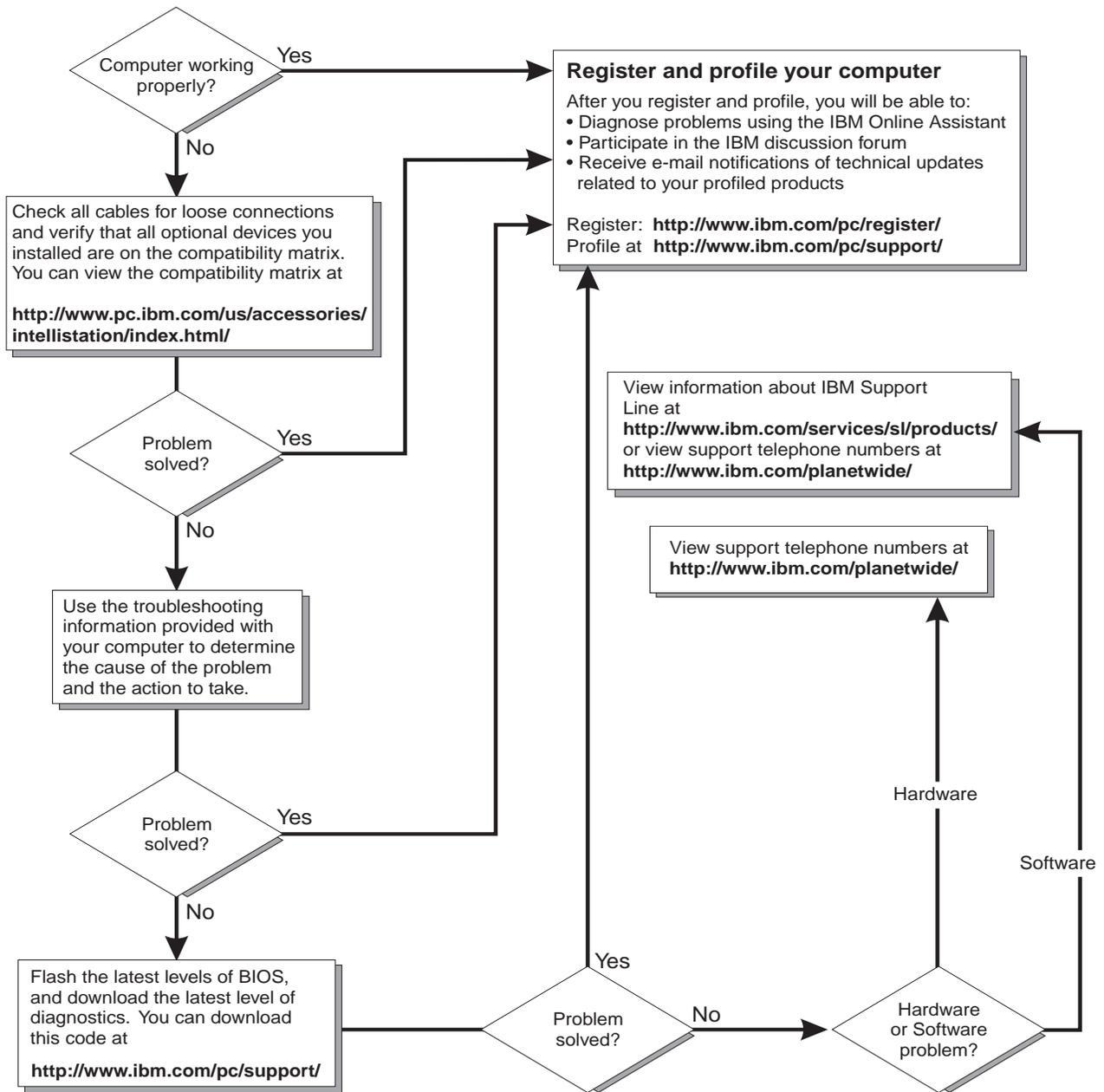
- **Customized support page**

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

The benefits of registering and profiling your IntelliStation computer 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, go to the following World Wide Web addresses:

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

Computer Support



Power-on self-test (POST)

When you turn on the computer, the power on self-test (POST) performs a series of tests to check the operation of system components and some of the installed options.

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

If POST detects a problem, more than one beep sounds and an error message appears on your screen.

Notes:

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

POST beep code descriptions

The possible types of beep codes are as follows:

No beeps

If no beep occurs after your computer completes POST, call for service.

Continuous beep

Your microprocessor has failed, or your system board or speaker subsystem might contain a failing component. If the computer continues through POST with no errors, call for service. If no video appears, the microprocessor has failed. Call for service.

POST beep codes

The following table shows the beep codes that can occur in the IntelliStation E Pro Type 6216 and Type 6226.

Table 2. POST beep codes

Beep code	Description	Action
1-1-2	Microprocessor register test has failed.	Call for service.
1-1-3	CMOS write/read test has failed.	
1-1-4	BIOS EEPROM checksum has failed.	
1-2-1	Programmable Interval Timer test has failed.	
1-2-2	DMA initialization has failed.	
1-2-3	DMA page register write/read test has failed.	
1-2-4	RAM refresh verification has failed.	Reseat the memory modules or install a memory module. If the problem remains, call for service.
1-3-1	First 640 KB RAM test has failed.	
1-3-2	First 640 KB RAM test has failed.	

Table 2. POST beep codes (continued)

Beep code	Description	Action	
2-1-1	Secondary DMA register test has failed.	Call for service.	
2-1-2	Primary DMA register test has failed.		
2-1-3	Primary interrupt mask register test has failed.		
2-1-4	Secondary interrupt mask register test has failed.		
2-2-2	Keyboard controller test has failed.		
2-2-3	CMOS power failure and checksum checks have failed.		
2-2-4	CMOS configuration information validation has failed.		
2-3-2	Screen memory test has failed.	Call for service.	
2-3-3	Screen retrace tests have failed.		
2-3-4	Search for video ROM has failed.		
2-4-1	Screen test indicates the screen is operable.		
3-1-1	Timer tick interrupt test has failed.		
3-1-2	Interval timer channel 2 test has failed.		
3-1-3	RAM test has failed above address 0FFFFH.		
3-1-4	Time-of-Day clock test has failed.		
3-2-1	Serial port test has failed.		
3-2-2	Parallel port test has failed.		
3-2-4	Comparison of CMOS memory size against actual has failed.		
3-3-1	A memory size mismatch has occurred.		Reseat the memory modules or install a memory module. If the problem remains, call for service.
3-3-2	Critical SMBUS error occurred (I2C bus has failed).		Call for service.
3-3-3	No optional memory in the system. Attention: In some memory configurations, the 3-3-3 beep code might sound during POST followed by a blank display screen. If this occurs and the Boot Fail Count feature in the Start Options of the IBM Configuration/Setup Utility program is set to Enabled (its default setting), you must restart the computer three times to force the system BIOS to reset the memory connector from Disabled to Enabled .	Reseat the memory modules or install a memory module. If the problem remains, call for service.	

POST error messages

The following table provides information about the POST error messages that can appear during startup.

POST message	Description
062	<p>The computer failed to boot on three consecutive attempts.</p> <p>All caches are disabled. Repeatedly turning the computer on and then off or resetting the computer might cause this problem.</p> <p>Action: Take the following steps to correct the problem:</p> <ol style="list-style-type: none"> 1. Start the Configuration/Setup Utility program and verify that all settings are correct. Use the Cache Control selection in the Advanced Setup menu of the Configuration/Setup Utility program to enable the caches. 2. Install a new battery. See “Replacing the battery” on page 94 for instructions. <p>If the problem remains, call for service. When the problem is corrected, be sure to enable the caches.</p>
101, 102, and 106	<p>An error occurred during the system board and microprocessor test.</p> <p>Action: Call for service.</p>
114	<p>An adapter read-only memory (ROM) error occurred.</p> <p>Action: Remove the options. If you can start the computer without the options installed, reinstall each option one at a time and retest after each is reinstalled. When an option fails, replace it.</p> <p>If you cannot isolate and correct the problem, call for service.</p>
129	<p>An error was detected in the L1 cache of one of the microprocessors.</p> <p>Action: Take the following steps to correct the problem:</p> <ol style="list-style-type: none"> 1. If you just installed a microprocessor, verify that the microprocessor is installed and seated correctly. 2. If the problem remains, call for service.
151	<p>A real-time clock (RTC) error occurred.</p> <p>Action: Call for service.</p>
161	<p>The real-time clock battery has failed.</p> <p>Action: Replace the battery yourself or call for service.</p> <p>You can use the computer until you replace the battery. However, you must run the Configuration/Setup Utility program and set the time and date and other custom settings each time you turn on the computer.</p>
162	<p>A change in device configuration occurred. This error occurs under one or more of the following conditions:</p> <ul style="list-style-type: none"> • A new device has been installed. • A device has been moved to a different location or cable connection. • A device has been removed or disconnected from a cable. • A device is failing and is no longer recognized by the computer as being installed. • An external device is not turned on. • An invalid checksum is detected in the battery-backed memory. <p>Action: Verify that all external devices are turned on. You must turn on external devices before turning on the computer.</p> <p>If you did not add, remove, or change the location of a device, a device is probably failing. Running the Diagnostic program might isolate the failing device. See “Creating an IBM Enhanced Diagnostics diskette” on page 90 and “Using the Enhanced Diagnostics diskette” on page 91.</p> <p>If the problem remains, call for service.</p>

Table 3. POST error messages

POST message	Description
163	<p>The time of day has not been set.</p> <p>Action: Set the correct date and time. If the date and time are set correctly and saved, but the 163 error message reappears, call for service.</p> <p>You can use the computer until the system is serviced, but any application programs that use the date and time will be affected.</p>
164	<p>A change in the memory configuration occurred. This message might appear after you add or remove memory.</p> <p>Note: The computer can be used with decreased memory capacity.</p> <p>Action: Take the following steps to correct the problem:</p> <ol style="list-style-type: none"> 1. If POST error message 289 also occurred, follow the instructions for that error message first. 2. If you just installed or removed memory, run the Configuration/Setup Utility program; then, exit, saving the new configuration settings. If the message appears again, shut down the computer, reseal the memory modules, and restart the computer. <p>If the problem remains, call for service.</p>
175	<p>A vital product data (VPD) error occurred.</p> <p>Action: Call for service.</p>
176, 177, and 178	<p>A security hardware error occurred.</p> <p>Action: Check for indications that someone has tampered with the computer. If no one has tampered with the computer, call for service.</p>
184	<p>The power-on password information stored in your computer has been removed.</p> <p>Action: From the Configuration/Setup Utility program main menu, select System Security. Then, follow the instructions on the screen.</p> <p>If this information cannot be restored, call for service.</p>
185	<p>A power failure damaged the stored information about the drive-startup sequence.</p> <p>Action: From the Configuration/Setup Utility program main menu, select Start Options; then, follow the instructions on the screen.</p> <p>If this information cannot be restored, call for service.</p>
186	<p>A system board or hardware error occurred.</p> <p>Action: Call for service.</p>
187	<p>The VPD serial number is not set.</p> <p>Action: The system serial number is set in the VPD EEPROM at the time of manufacturing. If the system board has been replaced, the system serial number will be invalid and should be set. From the main menu of the Configuration/Setup Utility program, select System Information, then select Product Data. If the problem remains, call for service.</p>
188	<p>A vital product data (VPD) error occurred.</p> <p>Action: Call for service.</p>
189	<p>An attempt has been made to access the computer with invalid passwords. After three incorrect attempts, the computer locks up; that is, the logon data fields are no longer available to the user.</p>

Table 3. POST error messages (continued)

POST message	Description
201	<p>An error occurred during the memory controller test. This error can be caused by:</p> <ul style="list-style-type: none"> • Incorrectly installed memory • A failing memory module • A system board problem <p>Action: Take the following steps to correct the problem:</p> <ol style="list-style-type: none"> 1. If you just installed memory, verify that the new memory is correct for your computer. Also verify that the memory is installed and seated correctly. 2. If the problem remains, call for service.
229	<p>An error was detected in the L2 cache of one of the microprocessors.</p> <p>Action: Take the following steps to correct the problem:</p> <ol style="list-style-type: none"> 1. If you just installed a microprocessor, verify that the microprocessor is installed and seated correctly. 2. If the problem remains, call for service.
289	<p>An error occurred during POST memory tests and a failing DIMM was disabled.</p> <p>Note: You can use the computer with decreased memory.</p> <p>Action: Take the following steps to correct the problem:</p> <ol style="list-style-type: none"> 1. If you just installed memory, verify that the new memory is correct for your computer. Also verify that the memory is installed and seated correctly. Start the Configuration/Setup Utility program and select Memory Settings from the Advanced Setup menu to enable the DIMM. 2. If the problem remains, replace the failing DIMM. <p>If the problem remains, call for service.</p>
301 and 303	<p>An error occurred during the keyboard and keyboard controller test. These error messages also might be accompanied by continuous beeping.</p> <p>Action: Take the following steps to correct the problem:</p> <ol style="list-style-type: none"> 1. Ensure that: <ul style="list-style-type: none"> • Nothing is resting on the keyboard and pressing a key. • No key is stuck. • The keyboard cable is connected correctly to the keyboard and to the correct connector on the computer. 2. After installing a USB keyboard, you might need to use the Configuration/Setup Utility program to enable keyboardless operation and prevent the POST error message from being displayed during startup. <p>Running the diagnostic tests can isolate the computer component that failed, but you must have your system serviced. If the error message remains, call for service.</p> <p>Note: If you just connected a new mouse or other pointing device, turn off the computer and disconnect that device. Wait at least 5 seconds; then, turn on the computer. If the error message goes away, replace the device.</p>
602	<p>Invalid diskette boot record</p> <p>Action: Take the following steps to correct the problem:</p> <ol style="list-style-type: none"> 1. Replace the diskette. 2. If the problem remains, make sure that the diskette drive cables are correctly and securely connected. 3. If the problem remains, replace the diskette drive. <p>If the problem remains, call for service.</p>

Table 3. POST error messages (continued)

POST message	Description
604	<p>An error occurred during a diskette drive test.</p> <p>Action: Take the following steps to correct the problem:</p> <ol style="list-style-type: none"> 1. Verify that the Configuration/Setup Utility program correctly reflects the type of diskette drive that you have installed. 2. Run the diagnostic tests. If the diagnostic tests fail, call for service.
662	<p>A diskette drive configuration error occurred.</p> <p>Action: If you removed a diskette drive, make sure that the diskette drive setting is correct in the Configuration/Setup Utility program. If the setting is not correct, change it.</p> <p>If the problem remains, call for service.</p>
962	<p>A parallel port configuration error occurred.</p> <p>Action: If you changed a hardware option, make sure that the parallel port setting is correct in the Configuration/Setup Utility program. If the setting is not correct, change it.</p> <p>If the problem remains, call for service.</p>
11xx	<p>An error occurred during the system-board serial port test.</p> <p>Action: If you have a serial device attached to your computer, verify that the serial cable is connected correctly. If it is, use the following procedure:</p> <ol style="list-style-type: none"> 1. Turn off the computer. 2. Disconnect the serial cable from the serial port. 3. Wait five seconds; then, turn on the computer. <p>If the POST error message does not reappear, either the serial cable or the device is probably failing. See the documentation that comes with the serial device for additional testing information.</p> <p>If the POST error message reappears, call for service.</p>
1162	<p>The serial port configuration conflicts with another device in the system.</p> <p>Action: Take the following steps to correct the problem:</p> <ol style="list-style-type: none"> 1. Make sure the IRQ and I/O port assignments needed by the serial port are available. 2. If all interrupts are being used by adapters, you might need to remove an adapter to make an interrupt available to the serial port, or force other adapters to share an interrupt.
1600	<p>The Advanced System Management processor is not functioning.</p> <p>Action: Take the following steps to correct the problem:</p> <ol style="list-style-type: none"> 1. Verify that the jumpers for the system-management processor are set correctly. 2. Disconnect the computer from all electrical sources, wait for 30 seconds, reconnect the computer to the electrical sources, and restart the computer. <p>If the problem remains, call for service.</p>
1601	<p>An Advanced System Management Flash update is needed.</p> <p>Action: Download and install the latest Advanced System Management flash update.</p>
1800	<p>A PCI adapter has requested a hardware interrupt that is not available.</p> <p>Action: Take the following steps to correct the problem:</p> <ol style="list-style-type: none"> 1. Make sure that the PCI adapter and all other adapters are set correctly in the Configuration/Setup Utility program. If the interrupt resource settings are not correct, change the settings. 2. If all interrupts are being used by other adapters, you might need to remove an adapter to make an interrupt available to the PCI adapter, or force other adapters to share an interrupt.

Table 3. POST error messages (continued)

POST message	Description
1962	<p>No valid startup devices were found. The system cannot find the startup drive or operating system.</p> <p>Action: Be sure that the drive you want to start from is in the startup sequence.</p> <ol style="list-style-type: none"> 1. Select Start Options from the Configuration/Setup Utility program main menu. If you are unable to set the startup sequence, call for service. 2. Check the list of startup devices in the Startup device data fields. Is the drive you want to start from in the startup sequence? <ul style="list-style-type: none"> Yes Exit from this screen; then, select Exit Setup to exit the Configuration/Setup menu. Go to step 3.. No Follow the instructions on the screen to add the drive; then, save the changes and exit the Configuration/Setup menu. Restart the computer. 3. Is an operating system installed? <ul style="list-style-type: none"> Yes Turn off the computer. Go to step 4.. No Install the operating system in your computer; then, follow your operating system instructions to shut down and restart the computer. 4. During computer startup, watch for messages indicating a hardware problem. <p>If the same error message appears, call for service.</p>
2400	<p>An error occurred during the testing of the video controller on the system board. This error can be caused by a failing monitor, a failing system board, or a failing video adapter (if one is installed).</p> <p>Action: Verify that the monitor is connected correctly to the video connector. If the monitor is connected correctly, call for service.</p>
2462	<p>A video memory configuration error occurred.</p> <p>Action: Make sure that the monitor cables are correctly and securely connected to the computer.</p> <p>If the problem remains, call for service.</p>
5962	<p>An IDE CD-ROM configuration error occurred.</p> <p>Action: Check the signal and power cable connections to the CD-ROM drive.</p> <p>If the problem remains, call for service.</p>
8603	<p>An error occurred during the mouse (pointing device) controller test. The addition or removal of a mouse, or a failing system board can cause this error.</p> <p>Note: This error also can occur if electrical power was lost for a very brief period and then restored. In this case, turn off the computer for at least 5 seconds; then, turn it back on.</p> <p>Action: Ensure that the keyboard and mouse (pointing device) are attached to the correct connectors. If they are connected correctly, use the following procedure:</p> <ol style="list-style-type: none"> 1. Turn off the computer. 2. Disconnect the mouse from the computer. 3. Turn on the computer. <p>If the POST error message does not reappear, the mouse is probably failing. See the documentation that comes with the mouse for additional testing information. If the problem remains, replace the mouse or pointing device.</p> <p>If the POST error message reappears, run the diagnostic tests to isolate the problem. If the diagnostic tests do not find a problem and the POST error message remains, call for service.</p>
00012000	<p>Processor machine check.</p> <p>Action: Take the following steps to correct the problem:</p> <ol style="list-style-type: none"> 1. Update the system BIOS. 2. If the problem remains, replace the microprocessor.

Table 3. POST error messages (continued)

POST message	Description
00019501	<p>The microprocessor is not functioning.</p> <p>Action: Replace the microprocessor.</p> <p>If the problem remains, call for service.</p>
00019701	<p>The microprocessor failed the built-in self test.</p> <p>Action: Replace the microprocessor.</p> <p>If the problem remains, call for service.</p>
00180100	<p>A PCI adapter has requested memory resources that are not available</p> <p>Action: Take the following steps to correct the problem:</p> <ol style="list-style-type: none"> 1. Make sure that the PCI adapter and all other adapters are set correctly in the Configuration/Setup Utility program. If the memory resource settings are not correct, change the settings. 2. If all memory resources are being used, you might need to remove an adapter to make memory available to the PCI adapter. Disabling the adapter BIOS on the adapter might correct the error. Refer to the documentation provided with the adapter.
00180200	<p>A PCI adapter has requested an I/O address that is not available, or the PCI adapter might be defective.</p> <p>Action: Take the following steps to correct the problem:</p> <ol style="list-style-type: none"> 1. Make sure that the I/O address for the PCI adapter and all other adapters are set correctly in the Configuration/Setup Utility program. 2. If the I/O port resource settings are correct, the PCI adapter might be defective. Call for service.
00180300	<p>A PCI adapter has requested a memory address that is not available, or the PCI adapter might be defective.</p> <p>Action: Take the following steps to correct the problem:</p> <ol style="list-style-type: none"> 1. Make sure that the memory address for all other adapters are set correctly in the Configuration/Setup Utility program. If the memory resource settings are not correct, change the settings. 2. If the memory resource settings are correct, the PCI adapter might be defective. Call for service.
00180400	<p>A PCI adapter has requested a memory address that is not available.</p> <p>Action: If all memory addresses are being used, you might need to remove an adapter to make memory address space available to the PCI adapter. Disabling the adapter BIOS on the adapter might correct the error. Refer to the documentation provided with the adapter.</p>
00180500	<p>A PCI adapter ROM error occurred.</p> <p>Action: Remove the PCI adapters. If you can start the computer without the adapters, reinstall each adapter one at a time and retest after each is reinstalled. When an adapter fails, replace it.</p> <p>If you cannot isolate and correct the problem, call for service.</p>
00180600	<p>A PCI-to-PCI bridge error occurred. More than one PCI bus tried to access memory below 1 MB.</p> <p>Action: Remove the PCI adapter that has the PCI bridge. If you can start the computer without the adapter, reinstall and retest the adapter. If the adapter fails, replace it.</p> <p>If you cannot isolate and correct the problem, call for service.</p>
00180700	<p>xxxxyyy Planar PCI device does not respond or disabled by user. (Where xxxx is the PCI vendor ID and yyyy is the PCI device ID.)</p> <p>Action: Start the Configuration/Setup Utility program, select Devices and I/O Ports, and make sure that the device is enabled. If the problem remains, call for service.</p>

Table 3. POST error messages (continued)

POST message	Description
00180800	An unsupported PCI device is installed. Action: Remove the PCI adapters. If you can start the computer without the adapters, reinstall each adapter one at a time and retest after each is reinstalled. When an adapter fails, replace it. If the problem remains, call for service.
00181000	PCI error. Action: Remove the PCI adapters. If you can start the computer without the adapters, reinstall each adapter one at a time and retest after each is reinstalled. When an adapter fails, replace it. If the problem remains, call for service.
01295085	The ECC checking hardware test failed. Action: Call for service.
01298001	No update data is available for the processor. Action: Update the system BIOS to a level that supports the microprocessors installed in the computer.
01298101	The update data for the microprocessor is incorrect. Action: Update the system BIOS to a level that supports the microprocessors installed in the computer.
01298200	Microprocessor speed mismatch Action: The microprocessors installed do not run at the same speed; install microprocessors with identical speeds.
I9990301	A hard disk drive error occurred. Action: Call for service.
I9990305	POST could not find an operating system. Action: Install an operating system. If you have already installed the operating system, check the drive startup sequence. If the drive sequence is correct, run the diagnostic tests to verify that the hard disk drive is functioning correctly. If there is a problem with the hard disk drive (such as a bad sector), you might need to reinstall the operating system. If you cannot reinstall the operating system, call for service.
I9990650	AC power has been restored. Action: No action is required. This message appears each time AC power is restored to the computer after an AC power loss.
Other Numbers	POST found an error. Action: Follow the instructions on the screen.

Table 3. POST error messages (continued)

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

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

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

- An improperly installed cable
- A defective cable

To solve the problem, verify that:

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

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

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

Diagnostic programs and error messages

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

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

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

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

The error code format is as follows:

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

where:

fff is the three-digit function code that indicates the function being tested when the error occurred. For example, function code 201 is for memory.

ttt is the three-digit failure code for the exact test failure. (These codes are for trained service personnel and are described in the *Hardware Maintenance Manual*.)

iii is the three-digit device ID. (These codes are for trained service personnel and are described in the *Hardware Maintenance Manual*.)

date is the date that the diagnostic test was run and the error recorded.

cc are the check digits that are used to verify the validity of the information.

text message

is the diagnostic message that indicates the reason for the problem.

Text messages

The diagnostic text message format is as follows:

Function Name: Result (test specific string)

where:

Function Name

is the name of the function being tested when the error occurred. This corresponds to the function code (fff) given in the previous list.

Result

can be one of the following:

Passed

This result occurs when the diagnostic test is completed without any errors.

Failed This result occurs when the diagnostic test discovers an error.

User Aborted

This result occurs when you stop the diagnostic test before it is complete.

Not Applicable

This result occurs when you specify a diagnostic test for a device that is not present.

Aborted

This result occurs when the test could not proceed because of the system configuration.

Warning

This result occurs when a possible problem is reported during the diagnostic test, such as when a device that is to be tested is not installed.

Test Specific String

is additional information that is used to analyze the problem.

Starting the diagnostic programs

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

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

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.

Complete the following steps to view the test log:

1. Insert the *IBM Enhanced Diagnostics* diskette or the *Device Drivers and IBM Enhanced Diagnostics* CD.
2. Shut down your operating system and restart the computer.
3. If a user password is set, the system prompts you for it. Type the password, and press Enter.
4. Run the appropriate diagnostics program and when the Diagnostic Programs screen appears, select **Utility**.
5. Select **View Test Log** from the list that appears; then follow the instructions on the screen.
6. Save the test log to a file on a diskette or to your hard disk.

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

Diagnostic error message tables

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

Important: If error messages are displayed that are not listed in the following table, make sure that your computer has the latest level of BIOS code installed.

Code	Function	Result	Text message	Action
001	Core system	Failed	System board, ECC Test	Call for service.
			System board	
005	Video port		System board	
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. Note: If you have a USB keyboard or mouse attached, you cannot run the diagnostic program for the USB interface.	1. Turn off the computer. 2. Replace the USB keyboard and mouse with a standard keyboard and mouse. 3. Turn on the computer. 4. Run the diagnostic test again.
		Failed	System board	Call for service.
020	PCI interface	Failed	System board	Call for service.
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)	See the information provided with the adapter for instructions. If the problem remains, 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 system board is out of range	
180	Status display	Failed	Any failure message	Call for service.

Code	Function	Result	Text message	Action
201	System memory	Failed	DIMM is in location DIMM <i>n</i> (where <i>n</i> is the number of the socket that contains the failing DIMM)	1. Reseat the failing DIMM. 2. If the problem remains, replace the DIMM. If the problem remains, 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 remains, 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 remains, 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.
264	Magnetic tape drive	Aborted	Test setup error: No tape drive found	Check the cable and power connections to the drive. See the information provided with the tape drive. If the problem remains, call for service.
			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)
		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)		
		Failed	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)	Insert a new tape cartridge; then, run the diagnostic test again. See the information that is provided with the tape drive. If the problem remains, call for service.

Code	Function	Result	Text message	Action
301	Keyboard	Failed	On system-board keyboard test failed	<ol style="list-style-type: none"> 1. Verify that the keyboard cable is connected. 2. If the problem remains, replace the keyboard cable. <p>If the problem remains, call for service.</p>
302	Mouse	Failed	On system-board pointing device test failed.	Replace the pointing device. If the problem remains, 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 remains, call for service.
			On system board	Call for service.

PC-Doctor for Windows

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

Complete the following steps to use PC-Doctor for Windows:

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

Troubleshooting chart

You can use the troubleshooting chart 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 table, make sure that your system has the latest levels of BIOS code installed.

See “Starting the diagnostic programs” on page 81 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, complete the following steps before using the troubleshooting chart:

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

3. Reinstall the new software or new device.

Table 4. Troubleshooting chart

Symptom	Suggested action
CD-ROM drive	Verify that:
CD-ROM drive is not recognized.	<ul style="list-style-type: none"> • The primary IDE channel is enabled in the Configuration/Setup Utility program. • All cables and jumpers are installed and set correctly. • The correct device driver is installed for the CD-ROM drive. <p>If the problem remains, call for service.</p>
Diskette drive	If there is a diskette in the drive, verify that:
Diskette drive in-use light stays on, or the system bypasses the diskette drive.	<ul style="list-style-type: none"> • The diskette drive is enabled in the Configuration/Setup Utility program. • The diskette is not damaged. (Try another diskette if you have one.) • The diskette contains the necessary files to start the computer. • Your software program is working properly. <p>If the diskette drive activity LED stays on, or the system continues to bypass the diskette drive, call for service.</p>
Other devices	Call for service.
Problems such as broken cover locks or indicator lights not working.	
Intermittent problems	Verify that:
A problem occurs only occasionally and is difficult to detect.	<ul style="list-style-type: none"> • All cables and cords are connected securely to the rear of the computer and attached options. • When the system is turned on, air is flowing from the rear of the computer at the fan grille. If there is no airflow, the fan is not working. This causes the computer to overheat and shut down. • The SCSI bus and devices are configured correctly and that the last external device in each SCSI chain is terminated correctly. <p>If the problem remains, call for service.</p>
Keyboard, mouse, or pointing-device	<ol style="list-style-type: none"> 1. Make sure that the keyboard cable is properly connected to the computer. 2. Try using another keyboard.
All or some keys on the keyboard do not work.	If the problem remains, call for service.
The mouse or pointing device does not work.	<ol style="list-style-type: none"> 1. Verify that the mouse or pointing-device cable is securely connected and the device drivers are installed correctly. 2. Try using another mouse or pointing device. <p>If the problem remains, call for service.</p>
Memory	Verify that:
The amount of memory detected is less than the amount of memory installed.	<ol style="list-style-type: none"> 1. The memory modules are seated properly. 2. You have installed the correct type of memory. 3. All installed DIMMs are enabled. The computer might have automatically disabled a DIMM bank when it detected a problem. <p>If the problem remains, call for service.</p>

Table 4. Troubleshooting chart (continued)

Symptom	Suggested action
Monitor	Some IBM monitors have their own self-tests. If you suspect a problem with your monitor, see the information that comes with the monitor for adjusting and testing instructions.
Testing the monitor.	If the problem remains, call for service.
The screen is blank.	Verify that: <ol style="list-style-type: none"> 1. The computer power cord is plugged into the computer and a working electrical outlet. 2. The monitor cables are connected properly. 3. The monitor is turned on and the brightness and contrast controls are adjusted correctly. If the problem remains, call for service.
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.	Verify that: <ol style="list-style-type: none"> 1. The primary monitor cable is connected to the video port. 2. You installed the necessary device drivers for the applications. If the problem remains, call for service.
The screen displays wavy, unreadable, rolling, distorted screen, or screen jitter.	If the self-tests show the monitor is working properly, 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>Notes:</p> <ol style="list-style-type: none"> 1. To prevent diskette drive read/write errors, be sure the distance between monitors and diskette drives is at least 76 mm (3 in.). 2. Non-IBM monitor cables might cause unpredictable results. 3. An enhanced monitor cable with additional shielding is available for the 9521 and 9527 monitors. For information about the enhanced monitor cable, contact your IBM reseller or IBM marketing representative. If the problem remains, call for service.
Wrong characters appear on the screen.	If the wrong language is displayed, update the BIOS code with the correct language. If the problem remains, call for service.
Option	Verify that:
An IBM option that was just installed does not work.	<ol style="list-style-type: none"> 1. The option is designed for the computer. Go to http://www.ibm.com/pc/support/ for option compatibility information. 2. The option is installed correctly. 3. You have not loosened any other installed options or cables. 4. You updated the configuration information in the Configuration/Setup Utility program. Whenever an option is changed, you might have to update the configuration. If the problem remains, call for service.

Table 4. Troubleshooting chart (continued)

Symptom	Suggested action
An IBM option that used to work does not work now.	<p>Verify that all of the option hardware and cable connections are secure.</p> <p>If the option comes with its own test instructions, use those instructions to test the option.</p> <p>If the failing option is a SCSI option, verify that:</p> <ol style="list-style-type: none"> 1. The cables for all external SCSI options are connected correctly. 2. The last option in each SCSI chain, or the end of the SCSI cable, is terminated correctly. 3. All external SCSI options are turned on. You must turn on external SCSI options before turning on the computer. <p>If the problem remains, call for service.</p>
Parallel port	Verify that:
A parallel device does not work.	<ol style="list-style-type: none"> 1. The device is compatible with the computer. 2. The parallel port is enabled. <p>If the problem remains, call for service.</p>
Power	Verify that:
The computer does not turn on.	<ol style="list-style-type: none"> 1. The power cables are properly connected to the computer. 2. The electrical outlet functions properly. 3. The type of memory installed is correct. 4. If you just installed an option, remove it, and restart the computer. If the computer now turns on, you might have installed more options than the power supply supports. 5. The voltage-selection switch is set correctly. <p>If the problem remains, call for service.</p>
Printer	Verify that:
The printer does not work.	<ol style="list-style-type: none"> 1. The printer is turned on and is online. 2. The printer signal cable is connected to the correct serial or parallel port on the computer. <p>Note: Non-IBM printer cables might cause unpredictable results.</p> <ol style="list-style-type: none"> 3. You have assigned the printer port correctly in your operating computer or application program. 4. You have assigned the printer port correctly using the Configuration/Setup Utility program. 5. You have run the tests described in the documentation that comes with your printer. <p>If the problem remains, call for service.</p>
Serial port	Verify that:
A serial device does not work.	<ol style="list-style-type: none"> 1. The device is compatible with the computer. 2. Run the diagnostics for the serial port. <p>If the problem still exists, call for service.</p>

Table 4. Troubleshooting chart (continued)

Symptom	Suggested action
Universal Serial Bus (USB) ports A USB device does not work.	Verify that: <ol style="list-style-type: none"> You are not trying to use a USB device during POST, if you have a standard (non-USB) keyboard attached to the keyboard port. <p>Note: If a standard (non-USB) keyboard is attached to the keyboard port, then the USB port is disabled and no USB device will work during POST.</p> <ol style="list-style-type: none"> The correct USB device driver is installed. Your operating system supports USB devices. <p>If the problem remains, call for service.</p>

Software error messages

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

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

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

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

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

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

If the problem remains, contact your place of purchase.

Troubleshooting the Ethernet controller

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

Recovering your operating system and preinstalled software

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

Recovering 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.

Notes:

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

Recovering the operating system

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

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

If your hard disk drive, including the partition where the Product Recovery program resides, becomes damaged or you replace the hard disk drive, contact IBM to order the *IBM Product Recovery* CD to recover your preinstalled operating system, application programs, and device drivers. See Appendix A, "Getting help and technical assistance" on page 97 for details.

Attention: The Product Recovery program will erase all files on drive C only. A *full recovery* will restore the operating system, device drivers, and applications.

Complete the following steps to recover the operating system.

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

1. If possible, shut down your operating system normally.
2. 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 4 seconds, unplug the power cord and wait a few seconds before reconnecting it.

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

To start the Product Recovery program, press F11.

If the DOS command prompt or the F11 prompt is not displayed, see "Using the recovery-repair diskette" on page 91.

4. Quickly press F11, and wait for the program menu.
5. Select the recovery options you want and follow the instructions on the screen.
6. When recovery is complete, exit from the program. Remove the CD from the CD-ROM or DVD-ROM drive, if you have not already done so.
7. Restart the computer.

Creating and using an IBM Enhanced Diagnostics diskette

The IBM Enhanced Diagnostics diskette is used to test hardware components on your computer. Use the following information and instructions to create and use an IBM Enhanced Diagnostics diskette.

Creating an IBM Enhanced Diagnostics diskette

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

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

Complete the following steps to create the diagnostics diskette using Access IBM:

1. From the Access IBM **Welcome** window, click **How do I...;** then, click **Protect data.**
2. Click **Creating emergency diskettes.**
3. Click **Diagnostic diskette.**
4. Follow the instructions on the screen.

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

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

where *filename* is the name of the file you downloaded from the Web, and press Enter.

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

Using the Enhanced Diagnostics diskette

Complete the following steps to start the IBM Enhanced Diagnostics diskette:

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

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

Using the recovery-repair diskette

In some circumstances, files on your hard disk might become unusable so that the F11 prompt is not displayed when you start up your computer. If you have created a recovery-repair diskette, use the following procedure to access the Product Recovery program on the hard disk. For instructions to create a recovery-repair diskette, see "Creating an emergency diskette" on page 13.

1. Insert the recovery-repair diskette.
2. Turn off your computer.
3. Turn on your computer, and follow the directions on the screen.

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

If an error message is displayed during the repair operation and the repair operation cannot be completed, you might have a problem with the Product Recovery program or the partition that contains the Product Recovery program. Use a *Product Recovery* CD to access the Product Recovery program. To obtain a *Product Recovery* CD, contact IBM. See Appendix A, "Getting help and technical assistance" on page 97 for details.

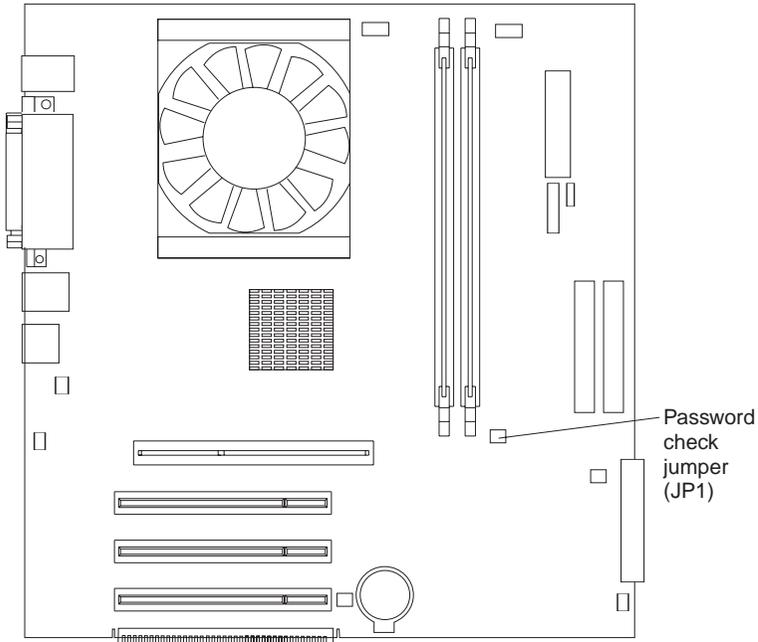
Erasing a lost or forgotten password

For more information about lost or forgotten passwords, see Access IBM.

Complete the following steps to set the password check jumper (JP1) and erase a forgotten password:

1. Review the "Safety information" on page vii.
2. Turn off the computer and all attached devices.
3. Unplug the power cord.
4. Remove the cover. See "Removing the cover:" on page 35.

5. Locate the password check jumper (JP1) on the system board, removing any adapters that impede access to the jumper.



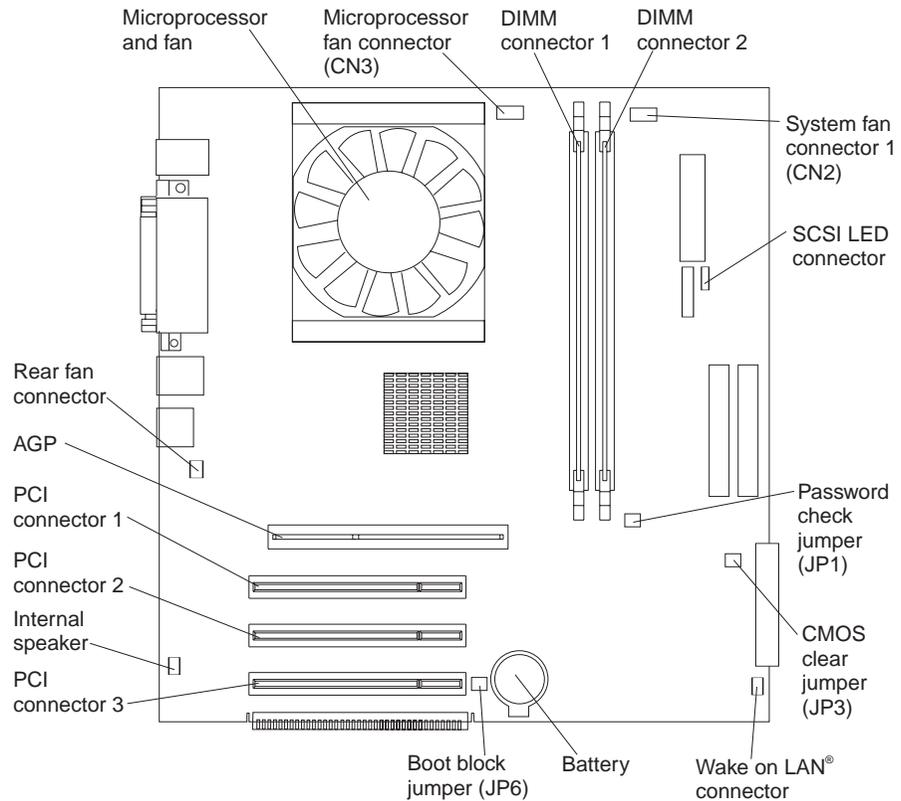
6. Move the jumper from pins 1 and 2 to pins 2 and 3.
7. Replace any adapters that were removed and replace the cover. See "Replacing the cover:" on page 46.
Note: You can now start the computer one time without having to use the user password and start the Configuration/Setup Utility program. At this time, you can either delete the old password or set a new user password. If you do not use the Configuration/Setup Utility program to change or delete the password, the next time you start the computer, the original user password will be reinstated.
8. Connect the computer to a power source, keyboard, monitor, and mouse.
9. Turn on the computer. The Configuration/Setup Utility program starts.
10. Follow the instructions to erase the existing password or create a new password.
11. Select **Save Settings** and press Enter.

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, complete the following steps:

1. Turn off the computer and all attached devices.
2. Unplug all power cords from electrical outlets and remove the computer cover. See "Removing the cover:" on page 35 and "Removing the frame-support bracket:" on page 35.

3. Locate the boot block jumper (JP6) on the system board, removing any adapters that impede access to the jumper.



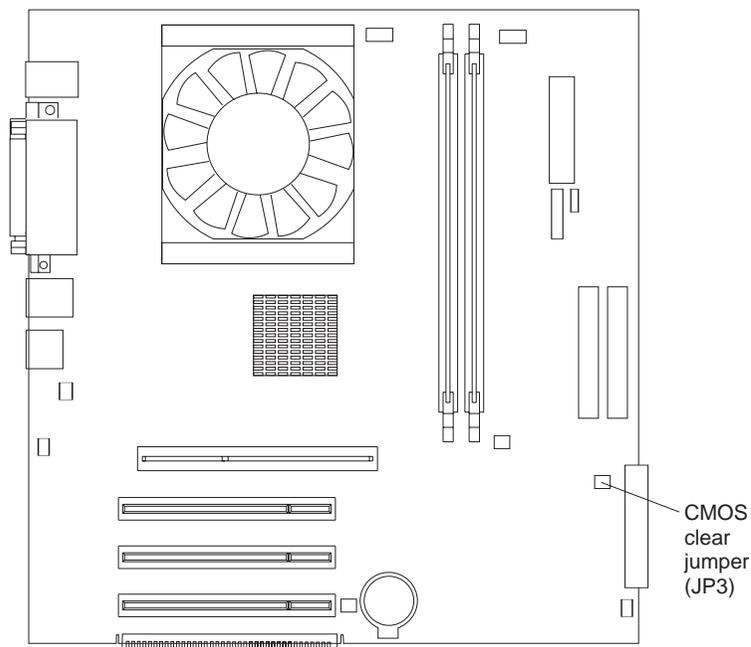
4. Move the jumper from pins 1 and 2 to pins 2 and 3.
5. Replace any adapters that were removed and replace the cover. See "Replacing the cover:" on page 46. Reconnect the power cords for the computer and monitor to electrical outlets.
6. Insert the POST/BIOS update (flash) diskette into drive A, and turn on the computer and monitor.

Note: No image will be displayed on the monitor while the flash update diskette is running. This is normal.
7. After the update session is completed, remove the diskette from the diskette drive, and turn off the computer and monitor.
8. Unplug all power cords from electrical outlets, and remove the cover.
9. Remove any adapters that impede access to the boot block jumper (JP6).
10. Replace the boot block jumper to pins 1 and 2.
11. Replace any adapters that were removed.
12. Replace the cover, and reconnect all cables that were disconnected.
13. Turn on the computer to restart the operating system.

Clearing CMOS

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

1. Turn off the computer and all attached devices.
2. Unplug all power cords from electrical outlets and remove the computer cover. See “Removing the cover:” on page 35 and “Removing the frame-support bracket:” on page 35.
3. Locate the CMOS clear jumper (JP3) on the system board, removing any adapters that impede access to the jumper.



4. Move the jumper to pins 2 and 3, wait for approximately 10 seconds; then, return the CMOS clear jumper to pins 1 and 2.
5. Replace any adapters that were removed.
6. Replace the cover, and reconnect all cables that were disconnected.
7. Turn on the computer to restart the operating system.

Replacing the battery

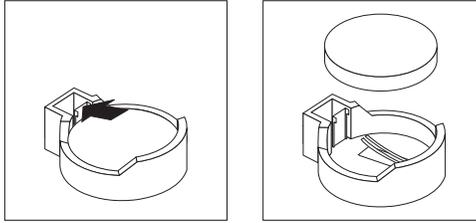
When replacing the battery, you must replace it with a lithium battery of the same type from the same manufacturer. To avoid possible danger, read and follow the information in “Safety information” on page vii.

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.

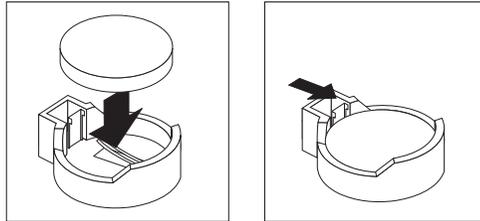
Note: After you replace the battery, you must reconfigure your system and reset the system date and time.

Complete the following steps 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. Complete the following steps to remove the battery:
 - a. Use one fingernail to press the top of the battery clip away from the battery. The battery pops up when released.
 - b. Use your thumb and index finger to lift the battery from the socket.



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



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

Appendix A. Getting help and technical assistance

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 appendix contains information about where to go for additional information about IBM and IBM products, what to do if you experience a problem with your xSeries or IntelliStation® system, and whom to call for service, if it is necessary.

Before you call

Before you call, make sure that you have taken these steps to try to solve the problem yourself:

- Check all cables to make sure that they are connected.
- Check the power switches to make sure that the system is turned on.
- Use the troubleshooting information in your system documentation, and use the diagnostic tools that come with your system.
- Go to the IBM Support Web site at <http://www.ibm.com/pc/support/> to check for technical information, hints, tips, and new device drivers.
- Use an IBM discussion forum on the IBM Web site to ask questions.

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 system and software. The information that comes with your system also describes the diagnostic tests that you can perform. Most xSeries and IntelliStation systems, operating systems, and programs come with information that contains troubleshooting procedures and explanations of error messages and error codes. If you suspect a software problem, see the information for the operating system or program.

Using the documentation

Information about your IBM xSeries or IntelliStation system and preinstalled software, if any, is available in the documentation that comes with your system. That documentation includes printed books, online books, README files, and help files. See the troubleshooting information in your system documentation for instructions for 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. Also, you can order publications through the IBM Publications Ordering System at <http://www.elink.ibm.com/public/applications/publications/cgibin/pbi.cgi>.

Getting help and information from the World Wide Web

On the World Wide Web, the IBM Web site has up-to-date information about IBM xSeries and IntelliStation products, services, and support. The address for IBM xSeries information is <http://www.ibm.com/eserver/xseries/>. The address for IBM IntelliStation information is <http://www.ibm.com/pc/intellistation/>.

You can find service 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. The support page has many sources of information and ways for you to solve problems, including:

- Diagnosing problems, using the IBM Online Assistant
- Downloading the latest device drivers and updates for your products
- Viewing Frequently Asked Questions (FAQ)
- Viewing hints and tips to help you solve problems
- Participating in IBM discussion forums
- Setting up e-mail notification of technical updates about your products

Software service and support

Through IBM Support Line, you can get telephone assistance, for a fee, with usage, configuration, and software problems with xSeries servers, IntelliStation workstations, and appliances. For information about which products are supported by Support Line in your country or region, go to <http://www.ibm.com/services/sl/products/>.

For more information about Support Line and other IBM services, go to <http://www.ibm.com/services/>, or go to <http://www.ibm.com/planetwide/> for support telephone numbers.

Hardware service and support

You can receive hardware service through IBM Integrated Technology Services or through your IBM reseller, if your reseller is authorized by IBM to provide warranty service. Go to <http://www.ibm.com/planetwide/> for support telephone numbers.

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

Appendix B. Warranty information

This section contains information about your warranty period and the service and support that are provided by your warranty.

Warranty period

The warranty period varies by machine type and country or region.

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.

Prior to on-site warranty service, you are required to go through problem determination with an IBM service specialist call center technician.

A warranty period of 3 years on parts and 1 year on labor means that IBM will provide warranty service without charge for:

1. parts and labor during the first year of the warranty period
2. parts only, on an exchange basis, in the second and third years of the warranty period. IBM will charge you for any labor it provides in performance of the repair or replacement.

The IBM Machine Warranties Web site at http://www.ibm.com/servers/support/machine_warranties/ contains a worldwide overview of the IBM Statement of Limited Warranty for IBM Machines, a glossary of terms used in the Statement of Limited Warranty, Frequently Asked Questions (FAQ), and links to Product Support Web pages. The IBM Statement of Limited Warranty is available from this Web site in 29 languages in Portable Document Format (PDF).

Machine - IBM IntelliStation E Pro Types 6216 and 6226

Country or region	Warranty period	Service delivery method
Worldwide	3 years	On-site

Problem determination

Prior to on-site warranty service, you are required to go through problem determination with an IBM service specialist call center technician. The service specialist will run diagnostic tests on the hardware and check the software.

Running diagnostics: The IBM service specialist will help you determine whether your equipment is functioning as specified. It might be necessary to isolate the failing xSeries, Netfinity®, or IntelliStation system; IBM component; or both from any active production environment to run diagnostics and perform defect-isolation programs. You are responsible for making the system, IBM component, or both available for running diagnostics and defect-isolation programs.

Checking software: The IBM service specialist will help you ensure that the correct BIOS code, firmware, device drivers, and other supporting IBM software are installed and correctly configured. It might be necessary to manually gather information about the relevant software levels or run IBM-approved utility programs to gather this information. It might be necessary to isolate the failing system from any

active production environment to gather this information. You are responsible, with assistance from the service specialist, for gathering this information. The IBM Statement of Limited Warranty does not include on-site assistance with this activity.

Warranty service and support

With the original purchase of an IBM xSeries or IntelliStation system, you have access to extensive service and 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.
- **Customer replaceable units (CRUs)** - Some parts of IBM xSeries and IntelliStation systems are designated as customer replaceable units. IBM ships CRUs to you for replacement by you. CRUs include keyboards, monitors, memory, diskette drives, hard disk drives, and mice (this list is not inclusive of all CRUs).

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 software problem sources.
- Installation of customer replaceable units (CRUs).
- Installation and configuration of BIOS code, firmware, or device drivers that are designated as customer installable.

See the 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.

Please have the following information ready when you call:

- The machine type and model of your IBM hardware product (if available)
- Serial numbers of your IBM hardware products
- A description of the problem
- The exact wording of any error messages
- Hardware and software configuration information

International Warranty Service

If you travel with your xSeries or IntelliStation system or relocate it to a country or region where your system is sold and serviced by IBM or IBM resellers authorized to perform warranty service, International Warranty Service (IWS) is available during the warranty period. Eligible IBM systems are identified by their four-digit machine types.

You can obtain IWS through the service delivery method (such as depot, carry-in, or on-site) provided in the servicing country or region. Service methods and procedures

vary by country or region, and some service or parts might not be available in all countries and regions. Service centers in certain countries or regions might not be able to service all models of a particular machine type. In addition, some countries or regions might have fees and restrictions that apply at the time of service.

To determine whether your system is eligible for IWS, go to <http://www.ibm.com/pc/support/> and click **Warranty lookup**.

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, contact your IBM marketing representative.

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:

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IBM IntelliStation E Pro Types 6216 and 6226

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- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult an IBM authorized dealer or service representative for help.

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Responsible party:

International Business Machines Corporation
New Orchard Road
Armonk, NY 10504
Telephone: 1-919-543-2193

 Tested To Comply
With FCC Standards
FOR HOME OR OFFICE USE

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

Avis de conformité à la réglementation d'Industrie Canada

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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.

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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
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Part Number: 02R2935

Printed in the United States of America.

02R2935

