IBM IntelliStation M Pro
Types 6220 and 6230

IBM

# User's Guide

IBM IntelliStation M Pro
Types 6220 and 6230

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**Note:**

Before using this information and the product it supports, be sure to read the information in Appendix B, "IBM Statement of Limited Warranty Z125-4753-07 11/2002," on page 111 and Appendix C, "Notices," on page 129.

# Contents

# Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الآمنية

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

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

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

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

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

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

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

.לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות

A termék telepítése előtt olvassa el a Biztonsági előírásokat!

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

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

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

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

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

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

Перед установкой продукта прочтите инструкции по
технике безопасности.

Pred inštaláciou tohto zariadenia si pečítaje Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

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

Läs säkerhetsinformationen innan du installerar den här produkten.

**Statement 1:**

**DANGER**

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

**To avoid a shock hazard:**

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

| 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:**
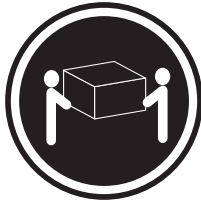


≥ 18 kg (39.7 lb)        ≥ 32 kg (70.5 lb)        ≥ 55 kg (121.2 lb)
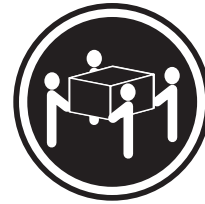
**CAUTION:**
**Use safe practices when lifting.**

**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.**
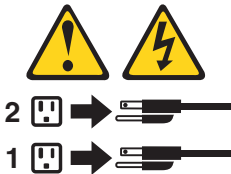
**Statement 8:**



**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.**

**Statement 23**



**CAUTION:**
**Do not place any object weighing more than 50 kg (110 lb) on top of rack-mounted devices.**



>50 kg (110 lb)

**Declaración 23**



**PRECAUCIÓN:**

**No coloque ningún objeto que pese más de 50 kg (110 libras) encima de los dispositivos montados en bastidor.**



>50 kg (110 libras)

**Hinweis 23**



**ACHTUNG:**

**Keine Gegenstände, die mehr als 50 kg wiegen, auf Rack-Einheiten ablegen.**



>50 kg

**Notice nø 23**



**ATTENTION:**

**Ne posez pas d'objet dont le poids dépasse 50 kg sur les unités montées en armoire.**



>50 kg

**Varningsmeddelande 23**



**VARNING:**

**Placera inte något föremål som väger mer än 50 kg ovanpå rackmonterade enheter.**



>50 kg

**Merknad 23**



**ADVARSEL:**

**Ikke sett gjenstander som veier mer enn 50 kg oppå enheter som er montert i et kabinett.**



>50 kg

**Avviso 23**



**ATTENZIONE:**

**Non poggiare oggetti che pesano più di 50 kg sulla parte superiore delle unità montate in rack.**



>50 kg

**Turvaohje 23**



**Varoitus:**

**Telineeseen asennettujen laitteiden päälle ei saa asettaa yli 50 kilon painoista esinettä.**



>50 kg

**Voorschrift 23**



**WAARSCHUWING:**

**Plaats geen objecten die meer dan 50 kg wegen op apparaten die in het rek zijn gemonteerd.**



>50 kg

**Forskrift 23**



**Pas på!:**

**Anbring ikke genstande, der vejer mere end 50 kg, oven på enheder, der er monteret i rack.**



>50 kg

**Instrução 23**



**CUIDADO:**

**Não coloque nenhum objeto com peso superior a 50 kg (110 lbs.) sobre dispositivos montados em rack.**



>50 kg (110 lbs)

عبارة ٢٣

⚠

تنبيه :

لا تضع أي عنصر يزن أكثر من ٥٠ كيلوجرام
(١١٠ رطل ) أعلى سطح الأجهزة.



أكبر من ٥٠ كيلوجرام (١١٠ رطل )

- Izjava br. 23



**OPREZ:**
Ne postavljajte predmete teže od 50 kg ( 110 funti ) na ormar u koji
su ugrađeni uređaji.



> 50 kg (110 lbs)

Δήλωση 23



**ΠΡΟΣΟΧΗ:**
Μην τοποθετείτε οποιοδήποτε αντικείμενο με βάρος μεγαλύτερο από 50 kg
επάνω σε συσκευές που έχουν προσαρμοσθεί σε ικρίωμα (rack).



> 50 kg

הודעה 23

זהירות:
אל תניחו שם חפץ שמשקלו יותר מ-50 ק"ג על גבי התקנים המורכבים על
מסדרי מדוורריח.
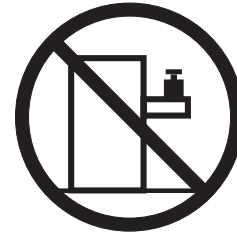
50 ק"ג

- 23. ismertető

**FIGYELEM:**
**Keretszerelésű eszközök tetejére ne helyezzen olyan tárgyat, melynek**
**súlya több, mint 50 kg (110 lbs.).**

> 50 kg (110 lbs)

- 記述 23

注意

ラック・モデルのサーバーの上に 50 Kg 以上の物を置かないで
ください。

> 50 Kg

경고문 23



주의:
서랍형 모델의 장치 상단에 50 kg(110 lbs.)이 넘는 물체를 올려
놓지 마십시오.



> 50 kg (110 lbs)

Instrukcja 23



**ZAGROŻENIE:**
**Nie należy umieszczać przedmiotów cięższych
niż 50 kg (110 funtów.)**



> 50 kg (110 funtów)

· Положение 23



**ОСТОРОЖНО:**
**Не ставьте предметы весом более 50 кг на верхнюю крышку
устройств, смонтированных на выдвижных полках.**



> 50 кг

声明 23



警告：

机柜安装的设备上面不能放置重于 50kg（110 磅）的物品。



> 50 kg (110 磅)

• Príkaz 23



VÝSTRAHA:
Neumiestňujte žiadny predmet vážiaci viac ako 50 kg (110 lbs.)
na vrch zariadenia montovaného do stojana.



> 50 kg (110 lbs)

• Navedba 23



SVARILO:
Ne postavljajte nobenega predmeta, ki je težji od 50 kg, na vrh
naprav, montiranih v stojala.



> 50 kg (110 lbs)

聲明 23



注意：
請勿將任何重量超過 50 公斤 (110 磅) 的物品置於已安裝機架的裝置上方。



> 50 公斤 (110 磅)

Instrukce 23



POZOR:
Neumísťujte nic s hmotností vyšší než 50 kg navrch zařízení
namontovaných do stojanu.



>50 kg (110 lbs)

· Инструкција 23



ПРЕДУПРЕДУВАЊЕ:
Не поставувајте предмети потешки од 50 кг. (110 lbs.) над уредите
кои се монтирани во ормари.



> 50 kg (110 lbs)

Instrução 23

**Instrução 23**
**CUIDADO:**

**Não coloque nenhum objeto com peso superior a 50 kg (110 lbs.) sobre dispositivos montados em rack.**



>50 kg (110 lbs)

**WARNING:** Handling the cord on this product or cords associated with accessories sold with this product, will expose you to lead, a chemical known to the State of California to cause cancer, and birth defects or other reproductive harm. *Wash hands after handling.*

**ADVERTENCIA:** El contacto con el cable de este producto o con cables de accesorios que se venden junto con este producto, pueden exponerle al plomo, un elemento químico que en el estado de California de los Estados Unidos está considerado como un causante de cancer y de defectos congénitos, además de otros riesgos reproductivos. *Lávese las manos después de usar el producto.*

# Chapter 1. Introducing the IntelliStation M Pro computer

The IBM® IntelliStation® M Pro Types 6220 and 6230 incorporate many of the latest advances in computing technology and can be expanded and upgraded as your needs change.

You can obtain up-to-date information about your computer and other IBM computer products at http://www.ibm.com/pc/intellistation/ .

The computer model and serial numbers for Type 6220 are on labels on the bottom of the computer and on the lower-left side of the bezel. The computer model and serial numbers for Type 6230 are on labels on the bottom of the computer and on the lower-right side of the bezel. You will need these numbers to register your computer with IBM.

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

Your computer might have features that are not described in the documentation that you received with the computer. The documentation might be updated occasionally to include information about those features, or technical updates might be available to provide additional information that is not included in your system documentation. These updates are available from the IBM Web site. Complete the following steps to check for updated documentation and technical updates:

1. Go to http://www.ibm.com/pc/support/.
2. In the **Learn** section, click **Online publications**.
3. On the "Online publications" page, in the **Brand** field, select **IntelliStation**.
4. In the **Family** field, select **IntelliStation M Pro**.
5. Click **Display documents**.

## Related publications

This *User's Guide* provides general information about your computer, including information about features, how to configure your computer, how to install options, and how to solve problems and get help. In addition to this *User's Guide*, the following documentation comes with your computer.

- *Installation Guide*
  This printed publication contains setup and installation instructions.
- *Safety Information*

  This publication is in Portable Document Format (PDF) on the IBM *IntelliStation Documentation* CD. It contains translated caution and danger statements. Each caution and danger statement that appears in the documentation has a number that you can use to locate the corresponding statement in your language in the *Safety Information* book.
- *Adaptec SCSI documentation*

  This publication is in PDF on the *Device Drivers* CD. It contains information and instructions for installing and configuring small computer system interface (SCSI) device drivers and devices.
- Readme files on the *Device Drivers* CD
  Several readme files on this CD contain information about the preinstalled device drivers. Other readme files on this CD contain information about the various adapters and devices that might be installed in or attached to your computer.
- *Hardware Maintenance Manual*

This publication is in PDF at http://www.ibm.com/pc/support/. It contains information for trained service technicians.

- IBM *IntelliStation Documentation* CD
  This CD contains all of the IBM IntelliStation M Pro Types 6220 and 6230 publications in Portable Document Format (PDF).

## Notices and statements used in this book

The caution and danger statements that appear in this book are also in the multilingual *Safety Information* book, which is on the IBM *IntelliStation Documentation* CD. Each statement is numbered for reference to the corresponding statement in the *Safety Information* book.

The following notices and statements are used in this book:

- **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.

# Features and specifications — M Pro Type 6220 (desktop model)

The following information is a summary of the features and specifications of your IntelliStation M Pro Type 6220 desktop computer. Depending on your model, some features might not be available, or some specifications might not apply.

*Table 1. Features and specifications*

**Microprocessor:**
- Intel™ Pentium® 4 processor
- 512 KB Level-2 cache
- 800 MHz front-side bus (FSB)

**Memory:**
- Minimum: 256 MB
- Maximum: 4 GB
- Type: PC2700 or PC3200
- Connectors: four dual inline memory module (DIMM) connectors

**Internal Drives:**
- Hard disk drive: IDE or SATA
- One of the following drives:
  - CD-ROM: IDE
  - DVD/CD-RW combo: IDE
  - CD-RW: IDE

**Expansion bays:**
- Two slim-high 3.5-inch drive bays (one hard disk drive installed in some models)
- One half-high 5.25-inch bay (optical drive installed in one bay)

**PCI expansion slots:**
- Three 33 MHz/32-bit PCI slots on the system board
- One Accelerated Graphic Port (AGP) slot

**Power supply:**
One 200 watts (90-240 V ac)

**Cooling:**
One or two speed-controlled fans

**Integrated functions:**
- Intel Ethernet controller on the system board with RJ-45 Ethernet connector
- Two serial ports
- One parallel port
- (Some models) two IEEE 1394 (FireWire) ports (four-pin on front, six-pin on rear)
- Dual port serial ATA controller
- Six Universal Serial Bus (USB) ports (two on front and four on rear)
- Keyboard port
- Mouse port
- Audio ports
  - Line out (front and rear)
  - Mic (front and rear)
  - Line in (rear)
- Dual-channel IDE controller

**Video adapter:** (depending on your model)
- NVIDIA Quadro NVS 280 (LFH-60), AGP 8X, with 64 MB double-data-rate (DDR) synchronous dynamic random access memory (SDRAM) video memory and dual analog connectors (or dual digital monitor capability with the purchase of an additional pigtail cable)
- NVIDIA Quadro4 580XGL (LFH-60), AGP 8X, with 64 MB DDR SDRAM video memory and dual analog connectors (or dual digital monitor capability with the purchase of an additional pigtail cable)

**Electrical input:**
- Sine-wave input (50 or 60 Hz) required
- Input voltage and frequency ranges switch selected
- Input voltage low range:
  - Minimum: 90 V ac
  - Maximum: 137 V ac
- Input voltage high range:
  - Minimum: 180 V ac
  - Maximum: 265 V ac
- Input kilovolt-amperes (kVA) approximately:
  - Minimum: 0.13 kVA
  - Maximum: 0.32 kVA

**Heat output:**
Approximate heat output in British thermal units (Btu) per hour
- Minimum configuration: 421 Btu (124 watts)
- Maximum configuration: 1050 Btu (308 watts)

**Environment:**
- Air temperature:
  - Computer on: 10° to 35°C (50° to 95°F) Altitude: 0 to 2134 m (7000 ft)
  - Computer off: -40° to +60°C (-40° to +140°F) Maximum altitude: 2133 m (7000 ft)
- Humidity (operating and storage): 8% to 80%

**Acoustical noise emissions:**
- Sound power, idle: 4.8 bel
- Sound power, operating: 4.9 bel

**Size:**
- Height: 104 mm (4.1 in.)
- Depth: 412 mm (16.2 in.)
- Width: 360 mm (14.2 in.)
- Weight: 9.1 kg (20 lb) when fully configured or 6.8 kg (15 lb) minimum

# Features and specifications — M Pro Type 6230 (tower model)

The following information is a summary of the features and specifications of your IntelliStation M Pro Type 6230 tower computer. Depending on your model, some features might not be available, or some specifications might not apply.

*Table 2. Features and specifications*

**Microprocessor:**
- Intel Pentium 4 processor
- 512 KB Level-2 cache
- 800 MHz front-side bus (FSB)

**Memory:**
- Minimum: 256 MB
- Maximum: 4 GB
- Type: PC2700 or PC3200
- Connectors: four dual inline memory module (DIMM) connectors

**Internal Drives:**
- Diskette: 1.44 MB (two mode)
- Hard disk drive: IDE, SATA, or SCSI
- One of the following drives:
  - CD-ROM: IDE
  - DVD/CD-RW combo: IDE
  - CD-RW: IDE

**Expansion bays:**
- Three slim-high 3.5-inch drive bays (one hard disk drive installed in some models)
- Two half-high 5.25-inch bays (optical drive installed in one bay)
- Two slim-high 3.5-inch removable-media drive bays (one diskette drive installed)

**PCI expansion slots:**
- Five 33 MHz/32-bit PCI slots on the system board
- One Accelerated Graphic Port (AGP) Pro 110 slot

**Power supply:**
One 340 watts (115-230 V ac)

**Cooling:**
Two speed-controlled fans

**Integrated functions:**
- Intel Ethernet controller on the system board with RJ-45 Ethernet connector
- Two serial ports
- One parallel port
- (Some models) two IEEE 1394 (FireWire) ports (four-pin on front, six-pin on rear)
- Dual port serial ATA controller
- Six Universal Serial Bus (USB) ports (two on front and four on rear)
- Keyboard port
- Mouse port
- Audio ports
  - Line out (front and rear)
  - Mic (front and rear)
  - Line in (front and rear)
- Dual-channel IDE controller

**Video adapter:** (depending on your model)
- NVIDIA Quadro NVS 280 (LFH-60), AGP 8X, with 64 MB double-data-rate (DDR) synchronous dynamic random access memory (SDRAM) video memory and dual analog connectors (or dual digital monitor capability with the purchase of an additional pigtail cable)
- NVIDIA Quadro4 580XGL (LFH-60), AGP 8X, with 64 MB DDR SDRAM video memory and dual analog connectors (or dual digital monitor capability with the purchase of an additional pigtail cable)
- NVIDIA Quadro FX 500 (DVI-I & VGA), AGP 8X, with 128 MB DDR SDRAM video memory with one DVI-I connector and one analog VGA connector
- NVIDIA Quadro4 980XGL (DVI-I), AGP 8X, with 128 MB DDR synchronous graphics random access memory (SGRAM) video memory with dual DVI-I connectors
- NVIDIA Quadro FX 1000 (DVI-I), AGP 8X, with 128 MB DDR2 SDRAM video memory with dual DVI-I connectors
- NVIDIA Quadro FX 1100 (DVI-I), AGP 8X, with 128 MB DDR SDRAM video memory with dual DVI-I connectors
- NVIDIA Quadro FX 3000 (DVI-I), AGP 8X, with 256 MB DDR SDRAM video memory with dual DVI-I connectors

**Electrical input:**
- Sine-wave input (50 or 60 Hz) required
- Input voltage and frequency ranges automatically selected
- Input voltage low range:
  - Minimum: 90 V ac
  - Maximum: 137 V ac
- Input voltage high range:
  - Minimum: 180 V ac
  - Maximum: 265 V ac
- Input kilovolt-amperes (kVA) approximately:
  - Minimum: 0.13 kVA
  - Maximum: 0.55 kVA

**Heat output:**
Approximate heat output in British thermal units (Btu) per hour
- Minimum configuration: 421 Btu (124 watts)
- Maximum configuration: 1782 Btu (523 watts)

**Environment:**
- Air temperature:
  - Computer on: 10° to 35°C (50° to 95°F) Altitude: 0 to 2134 m (7000 ft)
  - Computer off: -40° to +60°C (-40° to +140°F) Maximum altitude: 2133 m (7000 ft)
- Humidity (operating and storage): 8% to 80%

**Acoustical noise emissions:**
- Sound power, idle: 4.9 bel
- Sound power, operating: 5.0 bel

**Size:**
- Height: 438 mm (17.25 in.)
- Depth: 483 mm (19 in.)
- Width: 265 mm (6.5 in.)
- Weight: 16.3 kg (36 lb) to 20.8 kg (45.8 lb) depending upon configuration

# What your computer offers

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

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

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

- **Large system-memory capacity**

  Your computer supports up to 4.0 GB of system memory. The memory controller provides error correcting code (ECC) support for up to four industry-standard PC2700 or PC3200, 2.5 V, 184-pin, unbuffered, double-data-rate synchronous dynamic random access memory (DDR SDRAM) dual inline memory modules (DIMMs).

- **Systems-management capabilities**

  Your computer comes with features that a network administrator or file server can use to remotely manage and control your computer. Some of the features include Wake on LAN®, Remote Administration, IBM Director Agent, and System Migration Assistant. See "Managing your computer" on page 19 for more information.

- **Integrated network support**

  Your computer comes with an integrated Ethernet controller, which supports connection to a 10-Mbps, 100-Mbps, or 1-Gbps network. The computer automatically selects between 10BASE-T, 100BASE-TX, and Gigabit environments. The controller provides full-duplex (FDX) capability, which enables simultaneous transmission and reception of data on the Ethernet local area network (LAN). The controller supports Wake on LAN technology.

# Software

Your IBM IntelliStation M Pro computer comes with Microsoft Windows® XP Professional, Windows 2000 Professional Workstation,[1] or Red Hat Enterprise Linux Workstation preinstalled and a variety of software, including application programs, diagnostic tools, and device drivers.

**Important:** The software, other than the 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 13.

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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 operating system, your preinstalled software includes some or all of the following programs. Some programs might require setup and configuration before use:

- **Access IBM Message Center**

  This program displays messages about software that is preinstalled on your computer. Access IBM Message Center also provides messages about new updates available from the IBM Support Center to keep your software current.

- **Adobe Acrobat Reader**

  You can use this program to read files in Portable Document Format (PDF), including your online documentation. You can download the most current versions of Adobe Acrobat Reader for other languages and operating systems from the Adobe Web site at http://www.adobe.com.

- **Device Drivers**

  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/.

- **IBM Access Support**

  You can use this program to find tools, support, and services to help diagnose and solve common hardware and software application problems. IBM Access Support provides information and functions, including automated self-service, assisted service, and links to other tools and sources of information.

- **IBM Drive Letter Access**

  You can use this program to copy files to CD-R or CD-RW media.

- **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 a database, which enables IBM to contact you in case of a recall or other problems. Some IBM locations offer extended privileges and services to registered users.

- **IBM RecordNow**

  You can use this program to record data or audio to CD-R or CD-RW media or to create copies of existing CDs.

- **Norton AntiVirus for IBM**

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

- **Online Books**

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

- **PC-Doctor for Windows**

  This program contains diagnostic tools that you can use within your 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 103.)

- **Product Recovery Program**

  You can use this program to recover the 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 12 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 77.

**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 102.
2. The device drivers and some programs are also available at http://www.ibm/com/pc/support/ and on the *Device Drivers* CD.

## Software on CD

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

**Device drivers**
Some of the preinstalled device drivers are on the *Device Drivers* CD that comes with your computer.

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

## Software available on the World Wide Web

This section describes some of the software that is available from the IBM Web site. See to the product documentation for these tools to find out whether your operating system supports this software. Complete the following steps to get more detailed information about these tools or to download any of this software:

1. Go to http://www.ibm.com/pc/support/ and select your country.
2. Click the **Products and services** tab at the top of the page.
3. Under **Servers**, click **Intel processor-based**.
4. From the topics on the left, click **Systems Management**.
5. Scroll down and click on a product to get more details about the product. To download a product, select **Systems Management Downloads** from the Deployment and update management category.

The following software is available from the IBM Web site:

**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.

**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 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.

**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.

**Software Delivery Assistant**

> You can use Software Delivery Assistant to create an image of a single set of applications that can be deployed to different user groups while taking into account the users' application needs.

## 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 in your computer, the availability of the computer when you need it, and the ease with which you can diagnose and repair problems.

Your computer has the following RAS features:

- 24 hours a day, 7 days a week[2] customer support
- 3-year limited warranty
- Advanced Configuration and Power Interface (ACPI)
- Auto-restart initial program load (IPL) power supply
- Automatic computer restart after a power failure
- Automatic error retry or recovery
- Boot-block recovery
- Built-in, menu-driven configuration and setup programs
- Built-in, menu-driven SCSI configuration programs (some models)
- Cooling fans with speed-sensing capability
- Error codes and messages
- Error correcting code (ECC) double-data-rate (DDR) synchronous dynamic random access memory (SDRAM) with serial presence detect (SPD)
- Hard drive partition-based diagnostic programs
- Integrated Ethernet controller
- Monitoring support for temperatures, voltages, and fan speed
- Power-on self-test (POST)
- Predictive Failure Analysis® (PFA) on hard disk drives
- Processor serial number access
- Read-only memory (ROM) checksums
- Upgradeable basic input/output system (BIOS) and POST code
- Wake on LAN capability

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2. Service availability will vary by country. Response time varies; may exclude holidays.

# Chapter 2. Operating the computer

This chapter provides information about how to use your computer.

## Controls and LEDs

The following illustration shows the controls and indicators on the M Pro Type 6220 desktop computer.

Ethernet transmit/
receive activity

Ethernet link status LED

CD-ROM drive
activity LED

CD eject
button

Power-control
button

Power-on LED

Hard disk drive
activity LED

IEEE 1394 (FireWire)
connector

Microphone connector

Line out connector

USB ports

The following illustration shows the controls and indicators on the M Pro Type 6230 tower computer.

Ethernet link status LED

CD-ROM drive activity LED

CD-eject button

Diskette drive activity LED

Diskette-eject button

Hard disk drive activity LED

Power-on LED

Power-control button

Ethernet transmit/ receive activity LED

System error LED

IEEE 1394 (FireWire) connector

Microphone connector

Line out connector

USB port connector

USB port connector

Ethernet transmit/receive activity LED

**CD-ROM drive activity LED**
>When this LED is lit, it indicates that the CD-ROM drive is in use.

**CD-eject button**
>Press this button to insert a CD into or remove a CD from the CD-ROM drive.

**Diskette drive activity LED**
>When this LED is lit, it indicates that the diskette drive is in use.

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

**Hard disk drive activity LED**
>When this LED is lit, it indicates that the hard disk drive is in use.

**Power-on LED**
>When this LED is lit and not flashing, it indicates that the computer is turned on. When this LED is flashing, it indicates that the computer is off and still connected to an ac power source (standby mode).

**Power-control button**
>Press this button to turn the computer on or off.

**Ethernet transmit/receive activity LED**
>When this LED is lit, it indicates that there is activity between the computer and the network. There are two of these LEDs, one on the front and one on the rear of the computer.

**Ethernet link status LED**
>When this LED is lit, it indicates that there is an active connection on the Ethernet port. This LED is located on the rear of the computer.

**System-error LED**
> When this amber LED is lit, it indicates that a system error has occurred. An LED on the system board is also lit to help isolate the error.

**IEEE 1394 (FireWire) connectors**
> Use these connectors (four-pin on the front and six-pin on the rear) to connect FireWire devices, such as digital video cameras and external hard disk drives.

> **Note:** Some models come with the IEEE 1394 FireWire adapter installed. If your computer did not come with this adapter installed, do not install any adapter in the mini-PCI slot. It is not supported.

**Mic connector (pink)**
> Use this connector to connect a microphone to your computer when you want to record voices or other sounds on the hard disk. You can also use this connector (and a microphone) with speech recognition software.

**Line out connector (green)**
> Use this connector to send audio signals from the computer to external devices, such as speakers with built-in amplifiers, headphones, multimedia keyboards, or the audio line-in jack on a stereo system.

**USB ports**
> Use these connectors to connect USB devices to your computer, using redundant Plug and Play technology.

# Turning on the computer

When the computer is connected to an ac power source but is not turned on, the operating system does not run, and all core logic is shut down; however, the computer can respond to remote requests to turn on the computer. The power-on LED flashes to indicate that the computer is connected to an ac power source but is not turned on (standby mode).

**Notes:**
1. Turn on all external devices, such as the monitor, before turning on the computer.
2. The power-on LED on the front of the computer is lit when the computer is on and while it is being turned on.

Approximately 20 seconds after the computer is connected to ac power, the power-control button becomes active, and you can turn on the computer and start the operating system by pressing the power-control button. The computer can also be turned on in any of the following ways:

- If a power failure occurs while the computer is turned on, the computer will restart automatically when power is restored.
- When you connect your computer to power for the first time, the Wake on LAN feature can turn on the computer. If your computer was previously turned on, it must be turned off for the Wake on LAN feature to turn on the computer.

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 charts" on page 94 for an explanation of the error codes.

During startup on the Windows operating system, 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)

During startup on the Red Hat Linux operating system, the following messages might be displayed briefly:
- `Press F1 for Configuration/Setup Utility`
- `Press CTRL+A for SCSISelect Utility` (some models)

**Note:** To start the Product Recovery Program in Red Hat Linux, watch the screen until the operating system selection menu is displayed and select **IBM Preload Recovery & Diagnostics**.

To use these features, press the applicable 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 23 and "Using the SCSISelect Utility program (some models)" on page 26.

During startup, you might not see the message `Press F1 for Configuration/Setup`. If you want to see the prompt, see the instructions for displaying the prompt in "Using the Configuration/Setup Utility program" on page 23.

Use the Configuration/Setup Utility program to configure your computer with passwords, PCI adapters, and other options. The Configuration/Setup Utility menu is displayed at the top of the screen. To navigate the menu and screen items, follow the instructions on the screen.

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 19.

## Using preinstalled software

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

## Running the operating-system setup program

The 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 operating-system manual.

**Important:**
1. 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.

2. 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.

3. During the setup procedure, you must indicate that you accept the license agreement.

4. For Windows operating systems, the 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.

You will need the following information to complete the setup program:

- The documentation that comes with your computer.
- Network information from your network administrator, if your computer is being connected to a network.
- The printer model and port, if a printer is attached directly to your computer.

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

## Installing other operating systems

Your computer comes with Microsoft Windows XP Professional, Windows 2000 Professional Workstation, or Red Hat Enterprise Linux Workstation preinstalled. To install another operating system, follow the instructions in the documentation that comes with the operating system.

If you are installing an operating system other than Microsoft Windows or Red Hat Linux, follow the instructions in the readme files on the *Device Drivers* CD to install the device drivers. If you install other than a Microsoft Windows or Red Hat Linux operating system, you might need additional software or device drivers.

**Note:** If you experience problems with the device drivers installed from the *Device Drivers* CD, you can obtain the latest device drivers at http://www.ibm.com/pc/support/.

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

Additional information about operating systems is posted periodically at http://www.ibm.com/pc/support/.

## Viewing the license agreement

The IBM International License Agreement for Non-Warranted Programs is viewable from the Access IBM folder. Use of your computer signifies acceptance of this agreement.

Complete the following steps to view the license agreement in Windows XP:

1. From the Windows XP desktop, click **Start → All Programs → Access IBM**.
2. Click **IBM License Agreement**.

Complete the following steps to view the license agreement in Windows 2000:

1. From the Windows 2000 desktop, click **Start → Programs → Access IBM**.
2. Click **IBM License Agreement**.

For Red Hat Linux, when you start your computer, the License Agreement window opens. To accept the terms of the agreement, click **I Agree**. You can also view the license agreement by clicking on the **IBM License Agreement** icon on your desktop.

## Registering your computer

Registering your computer helps IBM provide better service to you. When IBM receives your registration information, the information 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.

Use one of the following methods to register your computer in Windows:

- From the Windows XP desktop, click **Start → All Programs → IBM Registration** and then follow the instructions. From the Windows 2000 desktop, click **Start → Programs → IBM Registration** and then follow the instructions. If you do not have access to the Internet, you can use the registration program that starts through the IBM Registration folder to print your registration information and provide IBM with a mailing address for future technical asistance.
- Register your computer at http://www.ibm.com/pc/register/.

For Red Hat Linux, click the **Register PC** icon on the desktop to register your computer on the World Wide Web.

## Creating an emergency recovery-repair diskette in Windows

At your earliest opportunity, create a recovery-repair diskette and an IBM Enhanced Diagnostics diskette, and store them in a safe place. In the unlikely event that your computer becomes unusable, you can use the recovery-repair diskette to access the Product Recovery program. For more information about using this diskette, see "Using the recovery-repair diskette in Windows" on page 104.

You can use one of the following methods to create a recovery-repair diskette in Windows:

- Create a diskette from the c:\ibmtools directory
- Create a diskette from the Product Recovery program partition

Complete the following steps to create a recovery-repair diskette from the c:\ibmtools directory:

1. Start your computer and operating system.
2. Use Windows Explorer to display the directory structure of your hard disk.
3. Open the c:\ibmtools folder.
4. Double-click **rrdisk.bat** and follow the instructions on the screen.

Complete the following steps to create a recovery-repair diskette from the Product Recovery program partition:

1. Shut down the operating system and turn off the computer.
2. Wait for at least 5 seconds; then, press and hold the F11 key while you restart the computer. When a menu appears, release the F11 key.
3. Use one of the following procedures:

- If a menu is displayed that gives you the opportunity to select an operating system, use the arrow keys to select the operating system that is currently installed, press Enter, and then continue with the next step.
- If an operating system menu is not displayed, continue with the next step.

4. From the Product Recovery Main menu, use the arrow keys to select **System utilities**, and then press Enter.

5. Use the arrow keys to select **Create a Recovery Repair diskette**, and then press Enter.

6. Follow the instructions on the screen.

See "Creating an IBM Enhanced Diagnostics diskette in Windows" for information about how to create an IBM Enhanced Diagnostics diskette.

## Creating an IBM Enhanced Diagnostics diskette in Windows

The *IBM Enhanced Diagnostics* diskette is a self-starting diagnostics diskette used to test hardware components on your computer. Use one of the following methods to create an IBM Enhanced Diagnostics diskette.

Complete the following steps to create a startable IBM Enhanced Diagnostics diskette from the Product Recovery program on the hard drive partition:

1. Restart your computer and watch the monitor.

2. When the message, `To start the Product Recovery Program`, Press F11 appears, quickly Press F11.

3. Select **System utilities**.

4. Next, select **Create IBM Enhanced Diagnostics Diskette**.

5. Follow the instructions on the screen.

Complete the following steps to create a startable IBM Enhanced Diagnostics diskette from the World Wide Web:

1. Go to http://www.ibm.com.

2. Click **Support & downloads**.

3. Click **Search technical support**.

4. In the **Enter keyword(s)** field, type `diagnostics 6220 or 6230`, and click **Submit**.

5. From the "Search results" page, click the Enhanced Diagnostics item for your computer.

6. On the next page, click the executable file for the Enhanced Diagnostics code to download it (be sure to download the file to a hard disk directory and not to a diskette). You can click the text file to display the readme file.

7. At a command prompt, change to the directory where the file was downloaded.

8. Insert a blank, high-density diskette into the diskette drive.

9. Type `filename x:` where `filename` is the name of the file you downloaded and `x` is the letter for the diskette drive; then, press Enter.

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

For more information, see "Using the IBM Enhanced Diagnostics diskette" on page 104.

# Using video features

Your computer has an Accelerated Graphics Port (AGP) graphics adapter that renders 2D or 3D image quality and 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 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* CD that comes with your computer and in the c:\ibmtools\drivers directory on the hard disk. Use the device-driver installation instructions if you need to reinstall the device drivers or if you need information about obtaining and installing updated device drivers. For more information about installing device drivers, see "Recovering or installing device drivers" on page 103.

# 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 in the readme files on the *Device Drivers* CD or in the c:\ibmtools\drivers\ directory on the hard disk. See your operating-system documentation for more information about monitor settings.

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

If you are using a cathode ray tube (CRT) monitor, set your monitor for the highest noninterlaced refresh rate that the monitor supports. If your monitor complies with the Video Electronics Standards Association (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 whether your monitor is DDC-compliant, see the documentation that comes 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 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, see the video adapter device-driver readme file and documentation for more information about enabling dual monitors.

# Using audio features

Your computer has an integrated audio controller that supports Sound Blaster applications. Your computer also has a single internal speaker and three types of audio connectors. Using the audio controller, you can record and play back sound and music to enhance multimedia applications. Optionally, you can connect external speakers to the line-out connector to provide 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 connectors" on page 69.

**Line in**
> This connector accepts audio signals into the computer sound system from external devices, such as the line output from a stereo, television, or a musical instrument. One line-in connector is on the rear of the computer.

**Line out**
> This connector sends audio signals from the computer to external devices, such as speakers with built-in amplifiers, headphones, multimedia keyboards, or the audio line-in jack on a stereo system. Line-out connectors are on both the front and the rear of the computer.

**Microphone**
> This connector is used to connect a microphone to your computer when you want to record voice or other sounds on the hard disk. With a microphone attached to the computer, you can also use speech recognition software. Microphone connectors are on both the front and the rear of the computer.

# Using security features

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

# Anti-intrusion features

IBM anti-intrusion features help protect against the theft of computer components, such as the microprocessor, system memory modules, or hard 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, 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 set the chassis-intrusion detector switch inside the computer to alert the network administrator each time the computer cover is removed. For more information about setting the chassis-intrusion alert, see Chapter 3, "Configuring the computer," on page 23.

# Component protection

Each component in your computer has a serial number that you can register with a security company. You can register the components individually, or you can register the entire computer. 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/support/.

# Data protection

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

- **SMART hard disk drive**

  Your computer comes with a self-monitoring and reporting technology (SMART) hard disk drive that is enabled to report potential hard disk failures. If an error is detected, a Desktop Management Interface (DMI) compliant warning message is sent to the monitor 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 built-in virus protection that can be enabled through the IBM Configuration/Setup Utility program. This built-in protection checks for viruses in the boot record only. Also, Norton AntiVirus for IBM is available 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 password to unlock the keyboard. See "Using passwords" on page 25.

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

# Updating system programs

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

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

IBM occasionally makes changes and enhancements to the system programs. When updates are released, they are available as downloadable files on the World Wide Web (see Appendix A, "Getting help and technical assistance," on page 109). You can update system programs by starting your computer using a flash update

diskette or by using the Remote Administration feature, if it is enabled. Instructions for using system programs updates are included in a readme file provided with the downloadable files.

# Managing your computer

Your computer comes with features that a network administrator or file server can use to remotely manage and control your computer. This section describes some of these network-management tools. See the product documentation for these tools to find out whether your operating system supports this software. Complete the following steps to get more detailed information about these tools or to download any of this software:

1. Go to http://www.ibm.com/pc/support/ and select your country.
2. Click the **Products and services** tab at the top of the page.
3. Under **Servers**, click **Intel processor-based**.
4. From the topics on the left, click **Systems Management**.
5. Scroll down and click on a product to get more details about the product. To download a product, select **Systems Management Downloads** from the Deployment and update management category.

Your computer supports the following system management tools:

- **IBM Director Agent**

  IBM Director Agent streamlines and automates personal computer (PC) systems management and support tasks, such as asset deployment and tracking. These utilities are available for IBM computers at no additional charge, helping to reduce total cost of ownership of networked computers. IBM Director Agent is available at http://www.ibm.com/pc/support/.

  You can use IBM Director Agent to view detailed information about your computer hardware and software, set up alerts, monitor a variety of system resources, and manage your asset security.

- **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.

- **Remote Administration**

  A network administrator can use the Remote Administration feature to remotely update the POST and BIOS code in your computer. Network-management software, such as Remote Deployment Manager, is required to take advantage of this feature.

- **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 installations can be done while the computer is not being used.

- **Software Migration Assistant**

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

- **Software Delivery Assistant**

You can use Software Delivery Assistant to create an image of a single set of applications that can be deployed to different user-groups while taking into account the users' application needs.

## Shutting down the 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 operating system and computer:

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

If you are using the preinstalled Microsoft Windows 2000 operating system, complete the following steps to shut down your operating system and computer:

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

If you are using the preinstalled Red Hat Linux operating system, complete the following steps to shut down your operating system and computer:

1. Save and close all files with which you are working.
2. Close all open applications.
3. Click **Red Hat Linux Main Menu Button → Logout → Shutdown**.
4. Click **OK** to confirm.

## Turning off the computer

When you turn off the computer and leave it connected to ac power, the computer can respond to requests, such as a remote request to turn on the computer. To remove all power from the computer, you must disconnect it from the power source.

Some operating systems require an orderly shutdown before you turn off the computer. See your operating-system documentation for information about shutting down the operating system.

**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.**
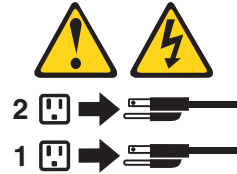
The computer can be turned off in any of the following ways:

- You can turn off your computer from the operating system. If this feature is supported by your operating system, it will turn off the computer after performing an orderly shutdown of the operating system.

  To turn off the computer from the Microsoft Windows XP operating system, click **Start → Turn Off Computer**; then, click **Turn Off**. To turn off the computer from the Microsoft Windows 2000 operating system, click **Start → Shut Down**; then, click **OK** to confirm.

  To turn off the computer from the Red Hat Linux operating system, click **Red Hat Linux Main Menu Button → Logout → Shutdown**; then, click **Yes**.

- You can press the power-control button on the front of the computer to start an orderly shutdown of the operating system and turn off the computer, if your operating system supports this feature.

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

- You can press and hold the power-control button for more than 4 seconds to cause an immediate shutdown of the computer. You can use this feature to turn off the computer if the operating system stops functioning.

# Chapter 3. Configuring the 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 in 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, set passwords, and set the chassis-intrusion detector. For information about using this utility program, see "Using the Configuration/Setup Utility program."

- **Boot Menu program**

  The Boot Menu program is part of the BIOS code in your computer. Use it to temporarily assign a device to be first in the startup sequence, overriding the startup sequence that is set in the Configuration/Setup Utility program.

- **Intel Gigabit Ethernet Utility program**

  The Intel Gigabit Ethernet Utility program is part of the BIOS code in your computer. You can use it to configure the network as a startable device, and you can customize where the network startup option appears in your startup sequence. Enable the Intel Gigabit Ethernet Utility from the Configuration/Setup Utility program. You can use the Intel Gigabit Ethernet Utility . For information, see "Enabling the Intel Gigabit Ethernet Utility program" on page 26.

- **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. For information about using this utility program, see "Using the SCSISelect Utility program (some models)" on page 26.

- **Ethernet controller configuration**

  To configure the integrated Gigabit Ethernet controller, see "Configuring the Gigabit Ethernet controller" on page 28.

## Using the Configuration/Setup Utility program

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

## Starting the Configuration/Setup Utility program

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

1. Turn on the computer and watch the monitor screen. 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.

2. When the message `Press F1 for Configuration/Setup, Press F12 for Boot Menu` appears on the screen during startup, press F1. (This prompt appears on the screen for only a few seconds. You must press F1 quickly.) If you have set both a user password and an administrator password, you must type the administrator password to access the full Configuration/Setup Utility menu.

3. Follow the instructions on the screen.

# Configuration/Setup Utility menu choices

The following choices are on the Configuration/Setup Utility main menu. You can press F1 to display help information for a selected menu item. Depending on the version of the BIOS code in your computer, some menu choices might differ slightly from these descriptions.

- **System Summary**

  Select this choice to view configuration information, including the type, speed, and cache size of the microprocessor and the amount of installed memory. When you make configuration changes through other options in the Configuration/Setup Utility program, the changes are reflected in the system summary; you cannot change settings directly in the system summary.

- **System Information**

  Select this choice to view information about your computer. When you make changes through other options in the Configuration/Setup Utility program, some of those changes are reflected in the system information; you cannot change settings directly in the system information.

  - **Product Data**

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

- **Devices and I/O Ports**

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

  Select this choice to enable or disable the integrated SCSI controller, Ethernet controllers, and standard ports (such as serial and parallel). **Enable** is the default setting for all controllers. If you disable a device, it cannot be configured, and the operating system will not be able to detect it (this is equivalent to disconnecting the device). If you disable the integrated SCSI controller and no SCSI adapter is installed, the computer will have no SCSI capability. If you disable the integrated Ethernet controller and no Ethernet adapter is installed, the computer will have no Ethernet capability.

  This choice is on the full Configuration/Setup Utility menu only.

- **Date and Time**

  Select this choice to set the date and time in the computer, in 24-hour format (hour:minute:second).

  This choice is on the Configuration/Setup Utility menu only.

- **System Security**

  Select this choice to set a user password or an administrator password. See "Using passwords" on page 25 for more information. You also can enable the chassis-intrusion detector to alert you each time the computer cover is removed.

- **Start Options**

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

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

  The startup sequence specifies the order in which the computer checks devices to find a boot record. The computer starts from the the first boot record that it finds.

You can enable a virus-detecting test that checks for changes in the boot record when the computer starts. You also can select to run POST in the quick mode or read the microprocessor serial number.

This choice is on the full Configuration/Setup Utility menu only.

- **Advanced Setup**

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

**Important:** the computer might malfunction if these options are incorrectly configured. Follow the instructions on the screen carefully.

This choice is on the full Configuration/Setup Utility menu only.

  – **Power Management Setup**

  Select this choice to enable or disable system power settings, including automatic power-on settings such as Wake on LAN.

  – **Chipset Feature**

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

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

  – **Processor Control**

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

  Select this choice to enable or disable the microprocessor cache and hyper-threading.

- **PC Health Status**

Select this choice to display the computer temperature and voltage status, and fan speeds.

- **Error Logs**

Select this choice to view or clear error logs.

  – **POST Error Log**

  Select this choice to view the three most recent error codes and messages that were generated during POST. Select **Clear event/error logs** to clear the POST error log.

- **Save Settings**

Select this choice to save the changes you have made in the settings.

- **Restore Settings**

Select this choice to cancel the changes you have made in the settings and restore the previous settings.

- **Load Default Settings**

Select this choice to cancel the changes you have made in the settings and restore the factory settings.

- **Exit Setup**

Select this choice to exit from the Configuration/Setup Utility program. If you have not saved the changes you have made in the settings, you are asked whether you want to save the changes or exit without saving them.

# Using passwords

You can use any combination of up to seven characters (A–Z, a–z, and 0–9) for the user (power-on) password or the administrator password.

If you set both a user password and an administrator password, you can type either password at the password prompt that appears as you start your computer. However, if you want to change the settings in the Configuration/Setup Utility program, you must type the administrator password to access the full Confirugation/Setup Utility menu. If you type the user password, you have access to only the limited Configuration/Setup Utility menu.

Keep a record of your password in a secure place. If you forget the user or administrator password, you can regain access to the computer through one of the following methods:

- If you have forgotten the user password and an administrator password is set, type the administrator password at the power-on prompt. Start the Configuration/Setup Utility program and change the user password.
- Remove the battery and then install the battery (see "Replacing the battery" on page 106).

# 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 first startup device 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.

# Enabling the Intel Gigabit Ethernet Utility program

The Intel Gigabit Ethernet Utility is part of the BIOS in your computer. You can use it to configure the network as a startable device, and you can customize where the network startup option appears in your startup sequence. Enable the Intel Gigabit Ethernet Utility from the Configuration/Setup Utility program.

Complete the following steps to enable the Intel Gigabit Ethernet Utility program:

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)

Use the SCSISelect Utility program to configure SCSI devices:

# Starting the SCSISelect Utility program

Complete the following steps to start the SCSISelect utility program:

1. Turn on the computer.

2. When the prompt `<<< Press <CTRL><A> for SCSISelect Utility! >>>` prompt appears, press Ctrl+A. If you have set an administrator password, you are prompted to type the password.

3. Use the arrow keys to select a choice for which you want to change settings.

4. When the prompt `Would you like to configure the SCSI controller or run the SCSI disk utility?` appears, make your selection and press Enter.

5. Use the arrow keys to select a choice from the menu.

6. Follow the instructions on the screen to change the settings of the selected items, and press Enter.

## SCSISelect menu choices

The following choices are on the SCSISelect Utility menu:

- **Configure/View SCSI Controller Settings**

  Select this choice to view or change 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:

– **SCSI Controller ID**

Select this choice to view the SCSI controller ID, which is typically 7.

– **SCSI Controller Termination**

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

– **Boot Device Configuration**

Select this choice to configure startable device parameters. You must know the SCSI ID of the device that you want to configure.

– **SCSI Device Configuration**

Select this choice to configure SCSI device parameters. You must know the SCSI ID of the device that 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**

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

• **SCSI Disk Utilities**

Select this choice to view the SCSI IDs assignments or to format a SCSI device. Select a device from the list and read the instructions on the screen carefully before making a selection.

If you press Ctrl+A before a selected drive is ready, an Unexpected SCSI Command Failure screen might appear. Restart the computer and watch the SCSISelect messages as each drive spins up. When the selected drive is ready, press Ctrl+A.

## Configuring the Gigabit Ethernet controller

The Ethernet controller is integrated on the system board. It provides an interface for connecting to a 10-Mbps, 100-Mbps, or 1-Gbps network and provides full duplex (FDX) capability, which enables simultaneous transmission and reception of data on the network. If the Ethernet port in the computer supports auto-negotiation, the controller detects the data-transfer rate (10BASE-T, 100BASE-TX, or 1000BASE-T) and duplex mode (full-duplex or half-duplex) of the network and automatically operates at that rate and mode. The Ethernet controller supports optional modes, such as teaming, priority packets, load balancing, fault tolerance, and virtual LANs, which provide better performance, security, and throughput. These modes apply to the integrated Ethernet controller and to controllers on supported Ethernet adapters.

You do not need to set any jumpers or configure the controller. However, you must install a device driver to enable the operating system to address the controller. For device drivers and information about configuring your Gigabit Ethernet controller, go to http://www.ibm.com/pc/support/

# Chapter 4. Installing options

This chapter provides instructions for installing or replacing hardware options in your computer. For a list of supported options for your computer, go to http://www.ibm.com/pc/; then, select your country and navigate to the list of options for your computer.

## Installation guidelines

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

- Read the safety information beginning on page vii, and the guidelines in "Handling static-sensitive devices." This information will help keep you safe while working with your computer and options.
- Make sure that you have an adequate number of properly grounded electrical outlets for your computer, monitor, and other devices that you will connect to the computer.
- Back up all important data before you make changes to disk drives.
- Have a small flat-blade screwdriver available.
- When you need to access the inside of the computer to install options, you might find it easier to lay the computer on its side.
- The blue color on components and labels identifies touch points, where you can grip a component, move a latch, and so on.

## 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 in it.
- There is adequate space around the computer to allow the computer cooling system to work properly. Leave approximately 50 mm (2 in.) of open space around the front and rear of the computer. Do not place objects in front of the fans. For proper cooling and airflow, replace the computer cover before turning on the computer. Operating the computer for extended periods of time (more than 30 minutes) with the computer cover removed might damage computer components.
- You have followed the cabling instructions that come with optional adapters.
- You have replaced a failed fan as soon as possible.

## Handling static-sensitive devices

**Attention:** Static electricity can damage electronic devices, and 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 damage it.

- 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 the computer without setting down the device. If it is necessary to set down the device, put it back into its static-protective package. Do not place the device on your computer cover or on a metal surface.
- Take additional care when handling devices during cold weather. Heating reduces indoor humidity and increases static electricity.

# Installing options in the M Pro Type 6220 (desktop model)

This section provides instructions for installing hardware options in the IntelliStation M Pro Type 6220.

## Major components of your computer

The following illustration shows the major components of your M Pro Type 6220 desktop computer.
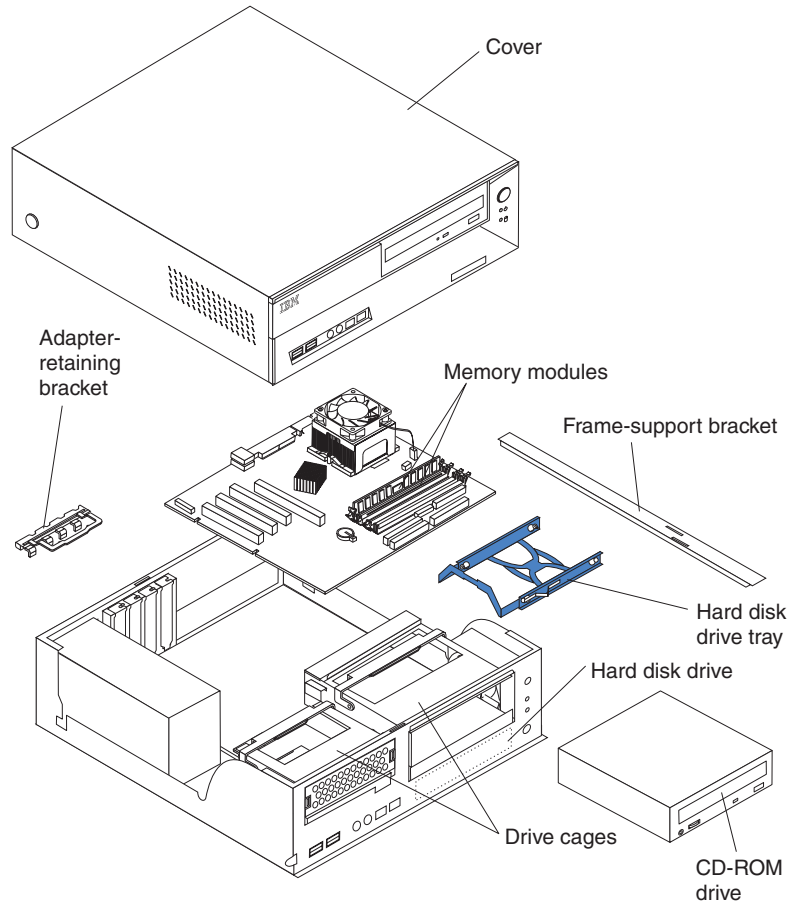
# System-board option connectors

The following illustration shows the system-board connectors for user-installable options.

Microprocessor and fan (U6)  DIMM 2  DIMM 4  DIMM 1  DIMM 3

AGP
PCI 1
PCI 2
PCI 3
Battery
Mini - PCI

# System-board internal connectors

The following illustration shows the internal connectors on the system board.

Microprocessor fan connector  Main power  Hard disk drive  Front panel  Power  Fan  Front USB  Primary IDE (PRI IDE)  Secondary IDE (SEC IDE)  Intrusion switch  Boot block jumper  Wake on LAN® connector  Serial ATA connectors

Microprocessor power  CDROM  Internal speaker connector  Rear fan  Speaker connector

Ethernet activity LED  System error LED  SCSI LED connector  Fan
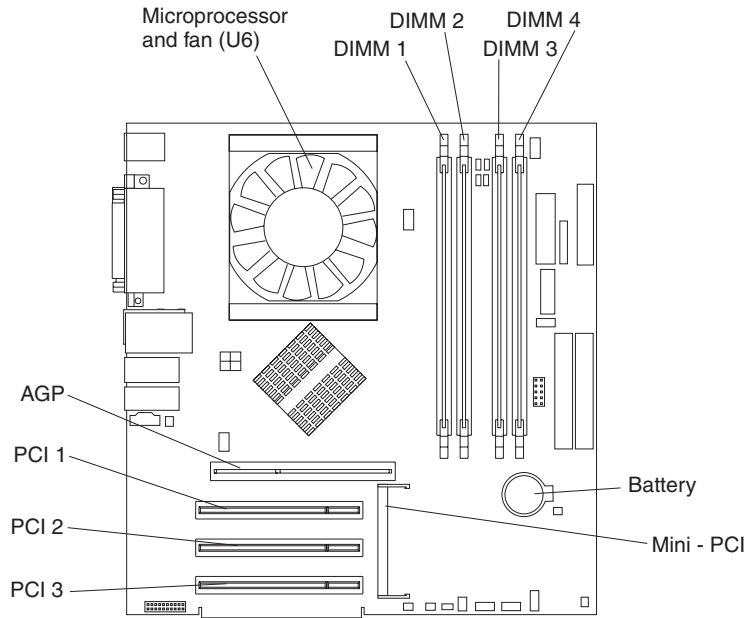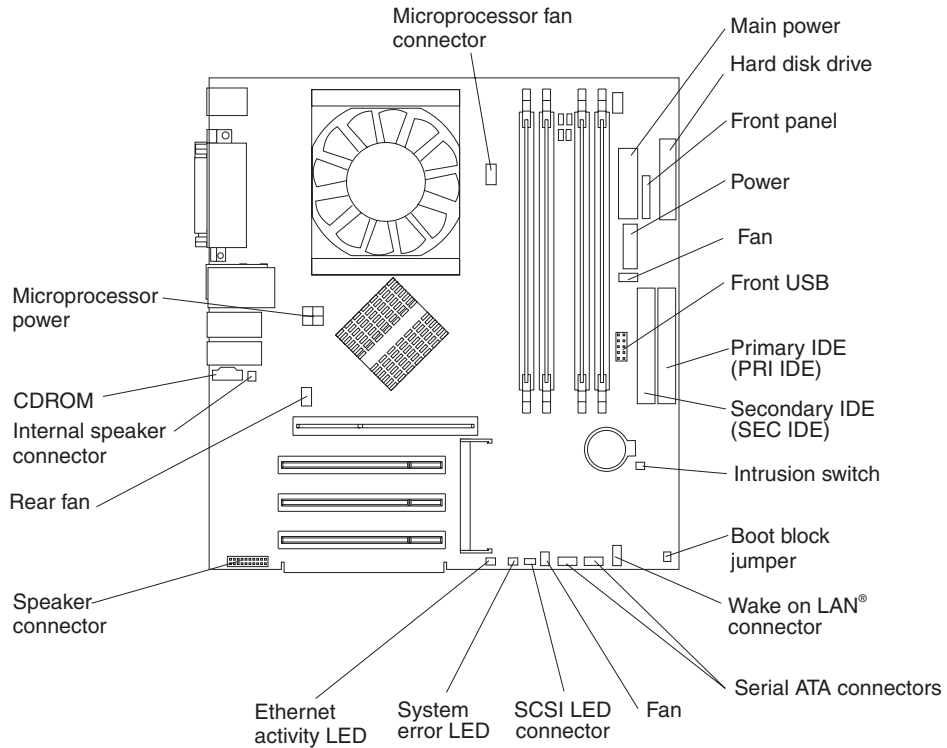
## System-board external connectors

The following illustration shows the input/output port connectors on the system board.
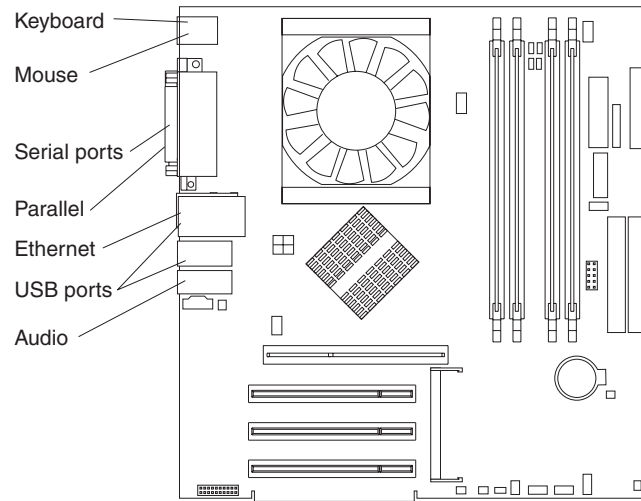


## Removing the cover

Complete the following steps to remove the computer cover:

1. Read the safety information beginning on page vii and the guidelines in "Handling static-sensitive devices" on page 29

2. Turn off the computer and all attached devices (see "Turning off the computer" on page 20); then, disconnect all power cords and external cables.

3. Press the buttons on both sides of the computer and lift the cover from the computer.
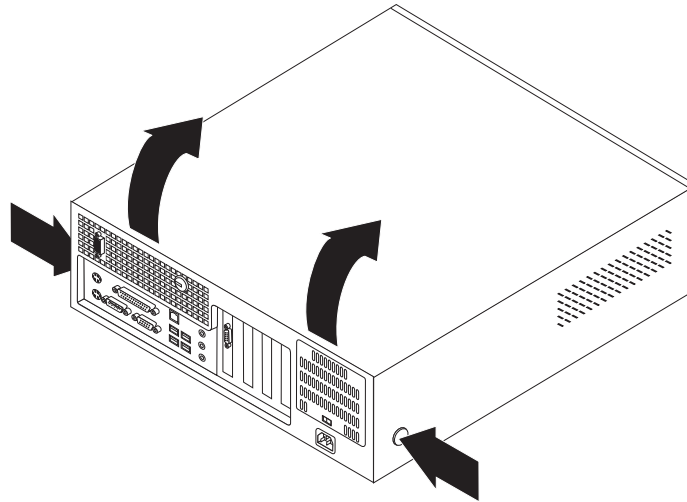


To replace the cover, see "Replacing the cover" on page 48.

## Removing and installing the support bracket

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

Complete the following steps to remove the support bracket:

1. Read the safety information beginning on page vii and the guidelines in "Handling static-sensitive devices" on page 29.
2. Turn off the computer and all attached devices (see "Turning off the computer" on page 20); then, disconnect all power cords and external cables.
3. Remove the cover (see "Removing the cover" on page 33).
4. Pivot the drive cages until the pivot locks catch the front of the chassis, holding the drive cages in place.
5. Lift the support bracket out of the computer.
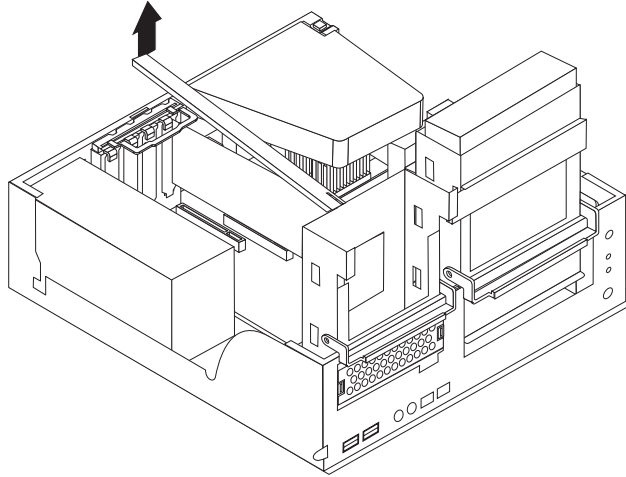


To reinstall the support bracket, reverse the previous steps.

# Working with adapters

Your computer comes with adapter connectors or slots. The Accelerated Graphics Port (AGP) video adapter is installed in the AGP slot and some models have a IEEE 1394 (FireWire) controller adapter installed in the mini-PCI slot. You can install up to three additional optional adapters in your computer in PCI slots 1 through 3.

See "System-board option connectors" on page 32 for the location of expansion slots on the system board.

## Adapter considerations

The following notes describe the types of adapters that your computer supports and other information that you must consider when installing an adapter:

- Read the documentation that comes with your operating system.
- Your computer uses a rotational interrupt technique to configure PCI adapters, which means that you can install a variety of PCI adapters that currently do not support sharing of PCI interrupts.
- Locate the documentation that comes with the adapter and follow those instructions in addition to the instructions in this section. If you need to change the switch or jumper settings on your adapter, follow the instructions that come with the adapter.
- You can install only low-profile, 32-bit adapters in PCI slots 1 through 3.
- Your computer supports 5.0 V signaling and universal PCI adapters; it does not support 3.3 V signaling adapters.
- PCI slots 1 through 3 are on PCI bus 3.

  The system scans the AGP slot, mini-PCI slot, and PCI expansion slots 1 through 3 to assign system resources. Then, the system starts the PCI devices in

the following order, if you have not changed the default startup sequence: AGP slot, mini-PCI slot, PCI expansion slot 1, system-board integrated drive electronics (IDE) or small computer system interface (SCSI) devices, and then PCI slots 2 through 3.

- Some models come with a IEEE 1394 (FireWire) adapter installed in the mini-PCI slot. If your computer did not come with a IEEE 1394 (FireWire) adapter installed, do not install any adapter in the mini-PCI slot.

- For a list of supported options for your computer, go to http://www.ibm.com/pc/; then, select your country and navigate to the list of options for your computer.

## Installing an adapter

Complete the following steps to install an adapter in your M Pro Type 6220 computer:

1. Read the safety information beginning on page vii and the guidelines in "Handling static-sensitive devices" on page 29.
2. Turn off the computer and all attached devices (see "Turning off the computer" on page 20); then, disconnect all power cords and external cables.
3. Remove the cover. See "Removing the cover" on page 33.
4. Determine which PCI slot you will use for the adapter. Review the instructions that come with the adapter for any requirements, restrictions, or cabling instructions. It might be easier to route any cables before you install the adapter.
5. Grasp the drive cage and rotate it out until the drive cage latches onto the front of the computer chassis.
6. Lift the support bracket out of the computer. See "Removing and installing the support bracket" on page 33.
7. Rotate the rear adapter-support bracket to the open (unlocked) position and remove it from the computer.
8. Remove the expansion-slot cover. From the rear of the computer, press on the slot cover. Grasp it and pull it out of the expansion slot. Store it in a safe place for future use.

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

9. Follow the instructions that come with the adapter to set jumpers or switches, if any.
10. Remove the adapter from the static-protective package, 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. Move the adapter directly from the static-protective package to the adapter slot. Avoid touching the components and gold-edge connectors on the adapter.

    **Attention:** Make sure 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.

Expansion-slot cover                Adapter-support bracket
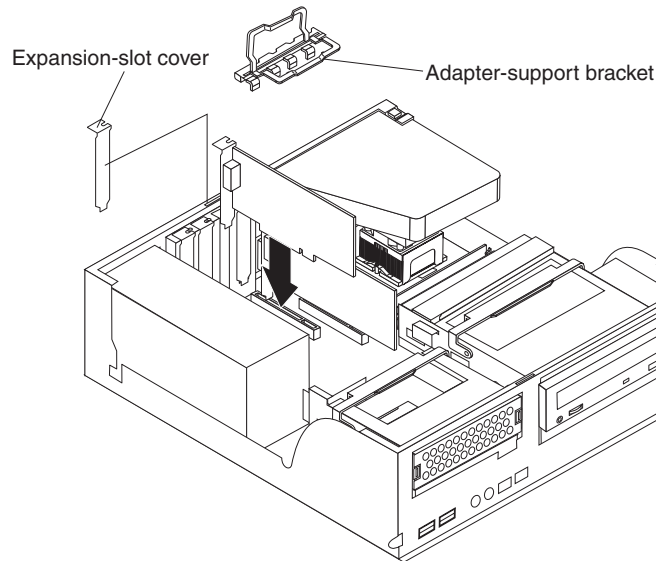
11. Connect required cables to the adapter. Route cables so that they do not block the flow of air from the fans.

12. If you have another adapter to install, repeat steps 1 through 9.

13. Reinstall the rear adapter-support bracket; then, rotate the bracket to the closed (locked) position.

14. Replace the frame-support bracket.

15. If you have other options to install, do so now; otherwise, replace the cover (see "Replacing the cover" on page 48), reconnect the external cables and power cords, and turn on the computer.

## Installing internal drives

Depending on your computer model, one or more of the following drives might be installed in your computer:
- Hard disk
- CD-ROM, CD-RW, or DVD/CD-RW combo

## Internal drive bays

Your computer M Pro Type 6220 computer comes with an IDE CD-ROM, CD-RW, or DVD/CD-RW drive in bay 2 and a hard disk drive in bay 3.



Bay 1

Bay 2

Bay 3
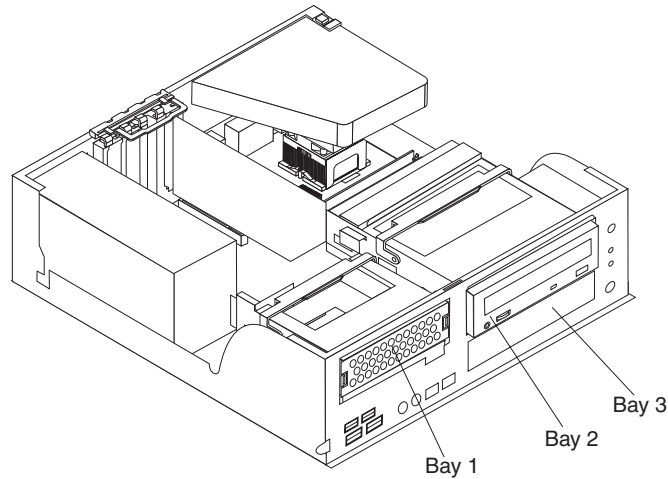
**Notes:**

1. Tape drives, CD-ROM, DVD/CD-RW, and DVD-ROM drives are examples of removable-media drives. You can install removable-media drives in bay 2 only.

2. You have two serial ATA (SATA) hard disk drive connectors on the system board. Each serial ATA drive comes with a cable.

3. You can mix and match parallel IDE or serial ATA hard disk drives in bays 1 and 3.

4. The electromagnetic interference (EMI) integrity and cooling of the computer are protected by having all bays and PCI slots covered or occupied. When you install a drive or PCI adapter, save the EMC shield and filler panel from the bay or the PCI adapter slot cover in the event you later remove the option.

5. For a complete list of supported options for your computer, go to http://www.ibm.com/pc/; then, select your country and navigate to the list of options for your computer.

## Preinstallation steps

Some of these steps are required only the first time you install a hard disk drive in a specific bay:

1. Read the safety information beginning on page vii, and the guidelines in "Handling static-sensitive devices" on page 29, and the documentation that comes with your drive.
2. Verify that you have all the cables and other equipment specified in the documentation that comes with the drive.
3. Choose the bay in which you want to install the drive.
4. Check the instructions that come with the drive to determine whether you need to set any switches or jumpers on the drive.

## Installing a hard disk drive in bay 1

Complete the following steps to install a drive in bay 1:

1. Follow the instructions in "Preinstallation steps."
2. Turn off the computer and attached devices.
3. Disconnect all power cords; then, disconnect all external cables.
4. Remove the cover and frame-support bracket. See "Removing the cover" on page 33 and "Removing and installing the support bracket" on page 33 for details.
5. Rotate the drive bay cage until the latch catches the front of the computer chassis.
6. 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.
7. Set any jumpers or switches on the drive according to the documentation that comes with the drive.
8. Slide the drive into the drive bay, and then attach the drive to the drive cage with the screws.
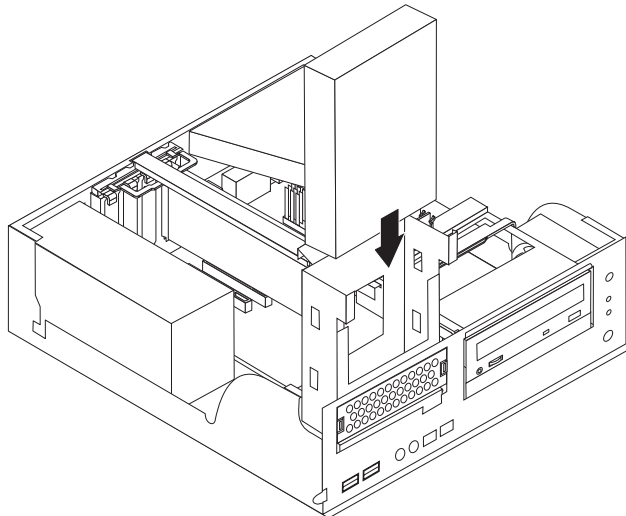
9. Connect one end of the parallel IDE or serial ATA signal cable into the back of the drive and the other end of the cable into the parallel IDE or serial ATA connector on the system board. For the location of the parallel IDE or serial ATA connectors, see "System-board internal connectors" on page 32

   **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.

10. Connect the power cable to the back of the drive. The connectors are keyed and can be inserted only one way.

11. If you have other options to install or remove, do so now.

12. Replace the cover and frame-support bracket. See "Replacing the cover" on page 48 and "Removing and installing the support bracket" on page 33 for details.

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

## Installing a drive in bay 2

Complete the following steps to install or replace a drive in bay 2:

1. Follow the instructions in "Preinstallation steps" on page 38.

2. Turn off the computer and attached devices.

3. Disconnect all power cords; then, disconnect all external cables.

4. Remove the cover and frame-support bracket. See "Removing the cover" on page 33 and "Removing and installing the support bracket" on page 33 for details.

5. Disconnect power and signal cables to the drive.

6. Rotate the hard disk drive cage and remove it from the computer.
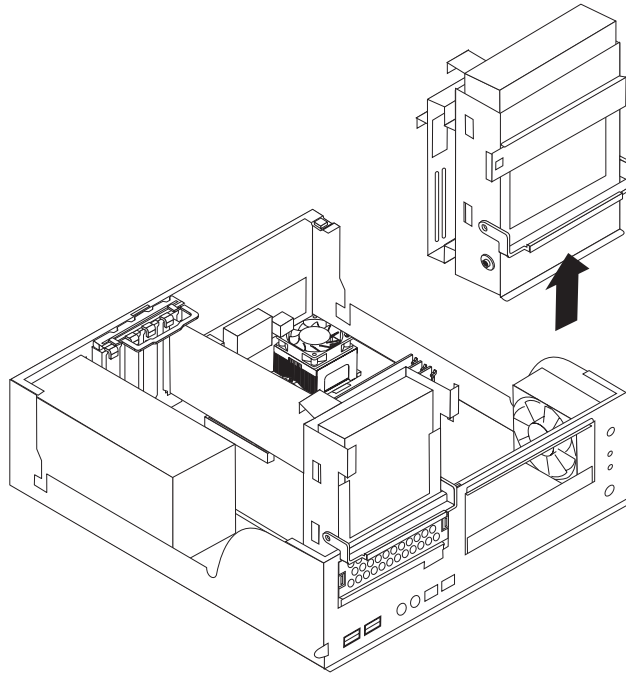
7. Remove the screws holding the drive in place.
8. Slide the drive out of the drive bay from the front of the drive bay.

**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.**

9. 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.

10. Follow the instructions that come with the drive to set jumpers or switches, if any.

11. Slide the drive into the drive bay from the front, and then attach the drive to the drive cage.
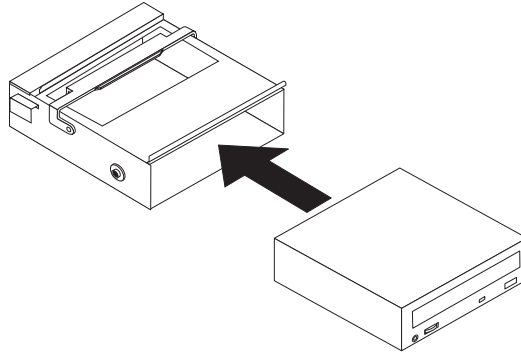
12. Place the drive cage back into the computer.
13. Connect one end of the IDE signal cable into the back of the drive and the other end of the cable into the IDE connector on the system board. For the location of the IDE connectors, see "System-board internal connectors" on page 32

   **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.
14. Connect the power cable to the back of the drive. The connectors are keyed and can be inserted only one way.
15. If you have other options to install or remove, do so now.
16. Replace the cover and frame-support bracket. See "Replacing the cover" on page 48 and "Removing and installing the support bracket" on page 33 for details.
17. Reconnect the external cables and power cords; then, turn on the attached devices and the computer.

## Installing a hard disk drive in bay 3

Complete the following steps to replace or install a hard disk drive in bay 3:

1. Follow the instructions in "Preinstallation steps" on page 38.
2. Turn off the computer and attached devices.
3. Disconnect all power cords; then, disconnect all external cables.
4. Remove the cover and frame-support bracket. See "Removing the cover" on page 33 and "Removing and installing the support bracket" on page 33 for details.
5. Disconnect the power and signal cables from both drives in the drive cage.

6. Remove the drive cage from the computer.
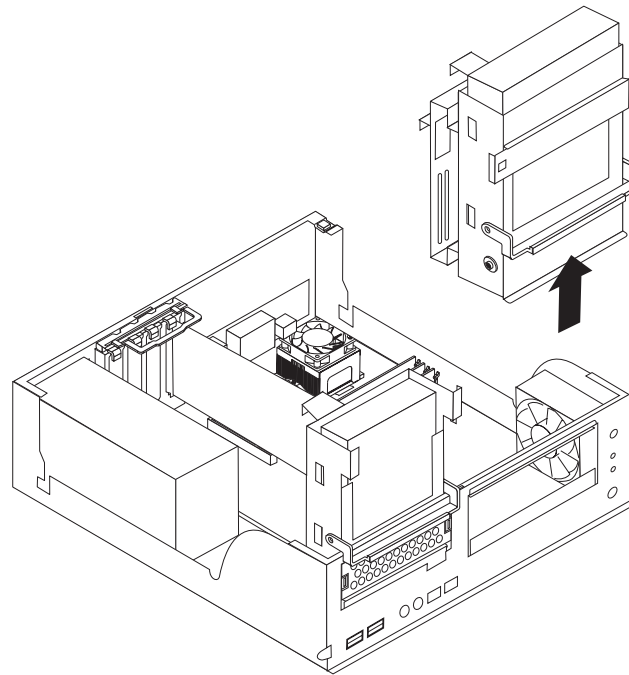


7. Slide the existing drive out of the drive bay. Remove the drive from the drive tray by gently pulling both sides of the drive tray outward until the mounting pins are disengaged from the holes on the drive; then, lift the drive out of the drive tray.

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 new drive according to the documentation that comes with the drive.

10. Attach the new drive to the drive tray. Place the drive on the drive tray and align the holes on the drive with the mounting pins on the drive tray. Gently pull both sides of the drive tray outward and insert the mounting pins into the holes on the drive.

11. Slide the drive into the drive bay until the drive snaps into place, and place the drive cage back into the computer.

    **Important:** The following illustration shows where the connectors on the parallel IDE and serial ATA (SATA) drives should be located when you install the drive in the drive tray.



Connectors on Serial ATA drive

Connectors on IDE drive
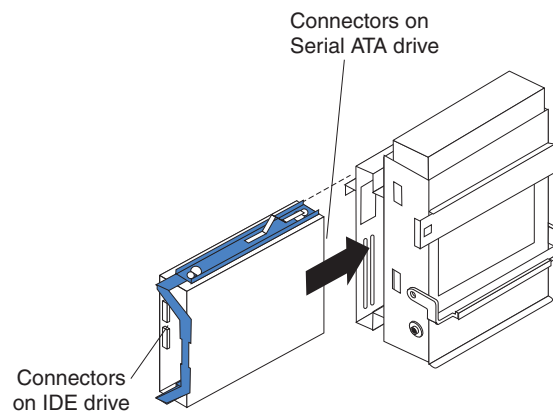
12. If you are installing a parallel IDE or serial ATA device, connect one end of the parallel IDE or serial ATA signal cable into the back of the drive and the other end of the cable into the parallel IDE or serial ATA connector on the system board. For the location of the parallel IDE or serial ATA connectors, see "System-board internal connectors" on page 32.

   **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 a 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 support bracket. See "Removing and installing the support bracket" on page 33.
16. Replace the cover. See "Replacing the cover" on page 48 for details.
17. Reconnect the external cables and power cords; then, turn on the attached devices and the computer.

## Power and signal cables for internal drives

Your computer uses cables to connect parallel IDE and serial ATA devices to the power supply and to the system board. (See "System-board internal connectors" on page 52 for the location of system-board connectors.) Review the following information before connecting power and signal cables to internal drives:

- The drives that are preinstalled in your computer come with power and signal cables attached. If you replace any drives, remember which cable is attached to which drive.
- When you install a drive, ensure that one of the drive connectors of the signal cable is connected to the drive and that the connector at the other end of the signal cable is connected to the system board.
- If you have only one IDE device on a cable, it must be set as a master device.
- If two IDE devices are used on a single cable, one must be designated as the master device and the other as the subordinate device; otherwise, the computer might not recognize some of the IDE devices. The master and subordinate 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 master device.

The following cables are provided:

- **Power cables:** Four-wire power cables connect the drives to the power supply. At the end of these cables are plastic connectors that can be attached to different drives; these connectors vary in size. You can use either a four-wire power cable or serial ATA power cable with serial ATA drives, but do not use both at the same time (use one or the other).
- **Signal cables:** Signal cables are typically flat cables, also called ribbon cables, that connect parallel IDE and serial ATA drives to the system board. Two or three types of signal cable come with your computer:
  - **IDE:** The wider IDE signal cable has three connectors. One of these connectors is attached to the drive, one is a spare, and the third is attached to the master or subordinate IDE connector on the system board. The spare connector can be used to connect additional IDE drives to your computer.

    The CD-ROM drive is attached an ATA 100 signal cable. ATA 100 signal cables are color-coded. The blue connector is attached to the system board. The black connector is attached to the master IDE device. The gray middle connector is attached to the subordinate IDE device. If you are installing an

additional hard disk drive, you must change the switch or jumper setting on the CD-ROM drive to make the drive a subordinate device, set the switch or jumper setting on the new drive to master, and change the connector used for the CD-ROM drive to the gray middle connector. The new drive will be connected to the black master IDE device connector.

– **Serial ATA:** The narrower, black signal cable has two connectors. One is attached to the serial ATA drive, and the other is attached to the connector on the system board. Each serial ATA drive comes with a cable. If you install an additional serial ATA drive, you will need an additional cable.

## Installing memory modules

The following notes describe the types of dual inline memory modules (DIMMs) that your computer supports and other information that you must consider when installing DIMMs.

**Notes:**

1. When you restart the computer after adding or removing a DIMM, the computer displays a message that the memory configuration has changed.

2. Your IntelliStation M Pro Type 6220 computer uses industry-standard, PC2700 or PC3200 double-data-rate (DDR) dual inline memory modules (DIMMs).

3. The system board contains four DIMM connectors and supports two-way memory interleaving.

4. The DIMM options available for your computer are 256 MB, 512 MB, and 1 GB memory modules . Your computer supports a minimum of 256 MB and a maximum of 4 GB of system memory.

5. The amount of usable memory will be reduced depending on the system configuration. A certain amount of memory must be reserved for system resources. The BIOS will display the total amount of installed memory and the amount of configured memory.

6. Your computer comes with either one or two 256 MB, 512 MB, or 1 GB memory DIMMs installed. If your computer has one DIMM installed, when you install an additional DIMM, it must be installed in DIMM 3 memory connector and must be the same size, speed, type, and technology as the DIMM installed in DIMM 1 memory connector. You can mix compatible DIMMs from various manufacturers. When one DIMM is installed in the computer, the computer runs as a single-channel computer. When you add a DIMM in DIMM 3 memory connector, your computer defaults to a dual-channel computer.

7. DIMMs must be installed in matched pairs. The first pair of DIMMs you install in DIMM 1 and DIMM 3 memory connectors must be the same size, speed, type, and technology. You can mix compatible DIMMs from various manufactures. If you install a second pair of DIMMs in DIMM 2 and DIMM 4 memory connectors, they do not have to be the same size, speed, type, and technology as the DIMMs installed in DIMM 1 and DIMM 3 memory connectors. However, the size, speed, type, and technology of the DIMMs you install in DIMM 2 and DIMM 4 memory connectors must match each other.

8. Install only 2.5 V, 184-pin, double-data-rate (DDR) 333 or 400, PC2700 or PC3200, unbuffered synchronous dynamic random-access memory (SDRAM) with error correcting code (ECC) DIMMs. These DIMMs must be compatible with the latest PC2700 or PC3200 SDRAM unbuffered DIMM specification. For a list of supported options for your computer, go to http://www.ibm.com/pc/; then, select your country and navigate to the list of options for your computer.

Complete the following steps to install a DIMM:

1. Read the safety information beginning on page vii and the guidelines in "Handling static-sensitive devices" on page 29.
2. Turn off the computer and all attached devices (see "Turning off the computer" on page 20); then, disconnect all power cords and external cables.
3. Remove the cover (see "Removing the cover" on page 33).
4. Remove the support bracket (see "Removing and installing the support bracket" on page 33).
5. For easier access to the memory modules, rotate the drive cage out of the computer. Grasp the drive cage and rotate it until it locks into place.
6. Locate the DIMM connectors on the system board. Determine the connectors into which you will install the DIMMs. Remember, DIMM 1 and DIMM 3 must be paired together (and must be the first pair installed) and DIMM 2 and DIMM 4 must be paired together. The following illustration shows the DIMM installation sequence.

| Memory installation sequence | |
|---|---|
| DIMMs | Slots |
| 1 DIMM | 1 |
| 2 DIMMs | 1, 3 |
| 4 DIMMs | 1, 2, 3, 4 |

7. Open the retaining clips and, if necessary, remove any existing DIMM.
8. Touch the static-protective package containing the DIMM to any unpainted metal surface on the computer. Then, remove the new DIMM from the package.
9. Gently open the retaining clip on each end of the DIMM slot. Turn the DIMM so that the pins align correctly with the connector.
10. Insert the DIMM into the connector. Firmly press the DIMM straight down into the connector by applying pressure on both ends of the DIMM simultaneously. The retaining clips snap into the locked position when the DIMM is firmly seated in the connector. If a gap exists between the DIMM and the retaining clips, the DIMM has not been correctly installed. Open the retaining clips,

remove the DIMM, then reinsert it.
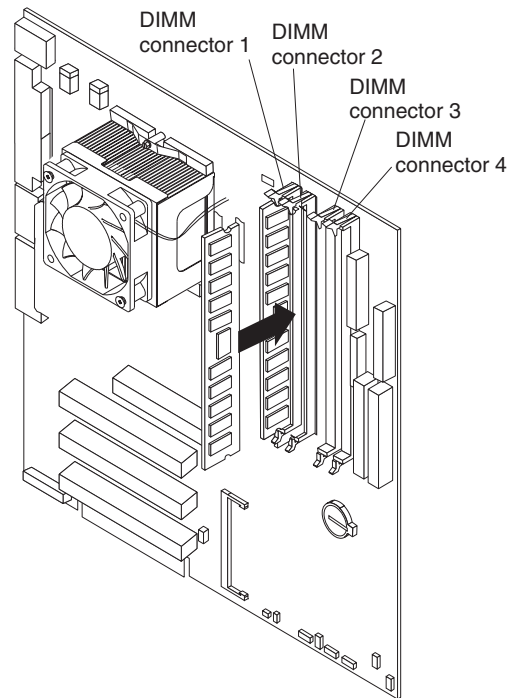


11. If you have other options to install or remove, do so now. Otherwise, rotate the drive cage back into the computer and replace the support bracket (see "Removing and installing the support bracket" on page 33).

12. Replace the cover (see "Replacing the cover" on page 48).

13. 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 hardware theft, you can add a security rope clip and cable to your computer. After you add the security cable, make sure that it does not interfere with other cables that are connected to the computer.

Before you begin, obtain the following items:
- A flat-blade screwdriver
- An adjustable wrench
- A 19 mm (0.75 in.) rope clip or wire rope (similar to National Manufacturing number 3230, stock number 176-735)
- Threaded nuts that fit the rope clip
- A security cable
- A lock, such as a combination lock or padlock

Complete the following steps to install a rope clip:

1. 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 33.

2. Use a screwdriver to remove the two metal knockouts.

3. Insert the rope clip through the rear panel; then, attach and tighten the nuts.

4. 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.



Rope clip
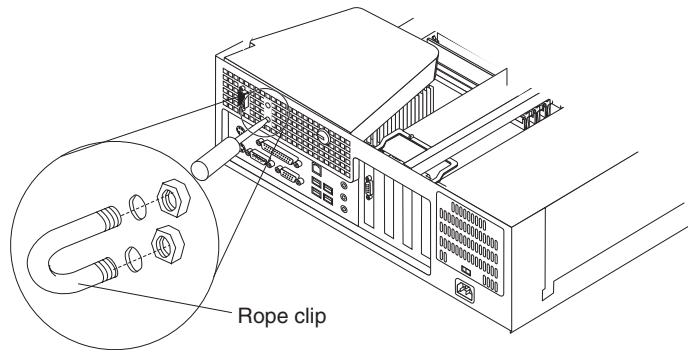
5. If you have other options to install or remove, do so now; otherwise, replace the cover.
6. Reconnect the external cables and power cords. Turn on the attached devices, and turn on the computer.

## Replacing the cover

If you removed the support bracket, reinstall it before you replace the cover. See "Removing and installing the support bracket" on page 54.

Complete the following steps to replace the cover:

1. Make sure that all cables, adapters, and other components are installed and seated correctly and that you have removed all work tools from inside the computer.
2. Install the cover by placing it over the chassis and pivoting it down over the computer until it snaps into place.
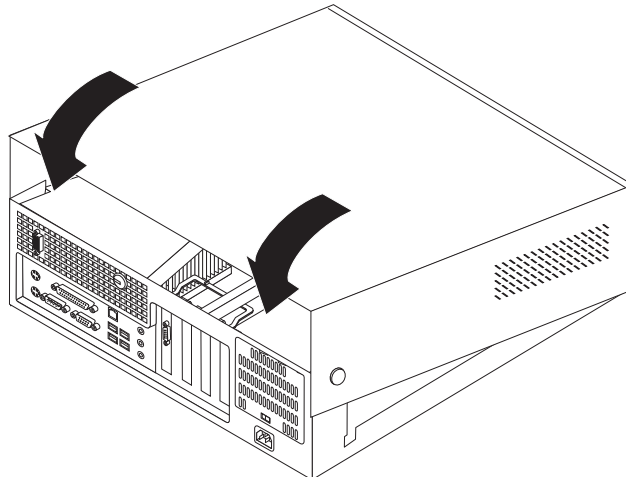
3. Reconnect the external cables and power cords. Turn on the attached devices, and turn on the computer.

# Installing options in the M Pro Type 6230 (tower model)

This section provides instructions for installing hardware options in the IntelliStation M Pro Type 6230 computer.

## Major components of your computer

The following illustration shows the major components in the M Pro Type 6230 tower computer.
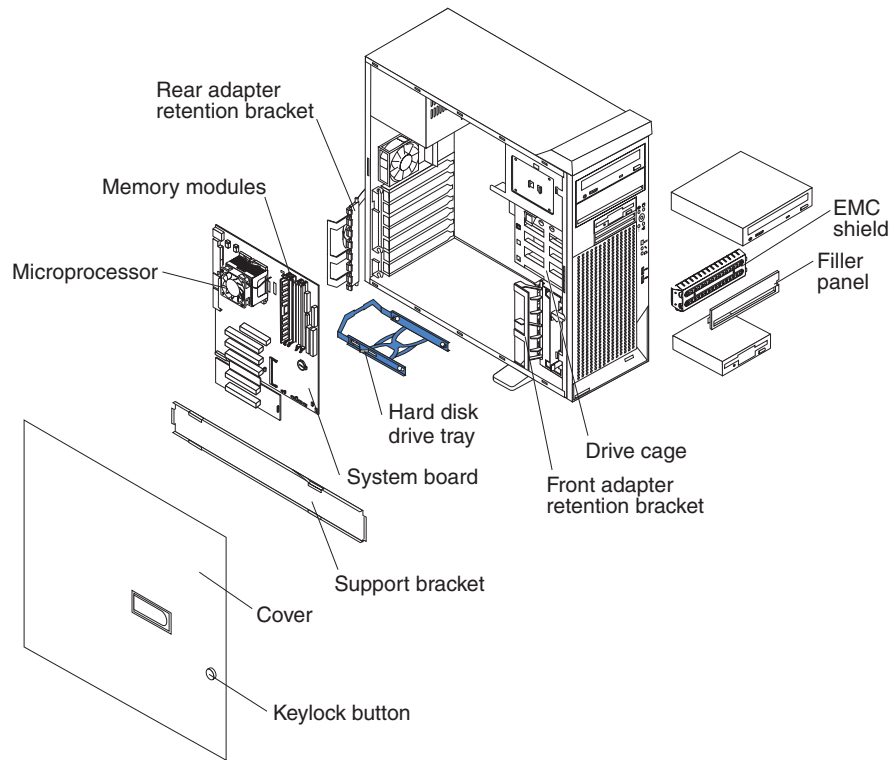
# System-board option connectors

The following illustration shows the system-board connectors for user-installable options.
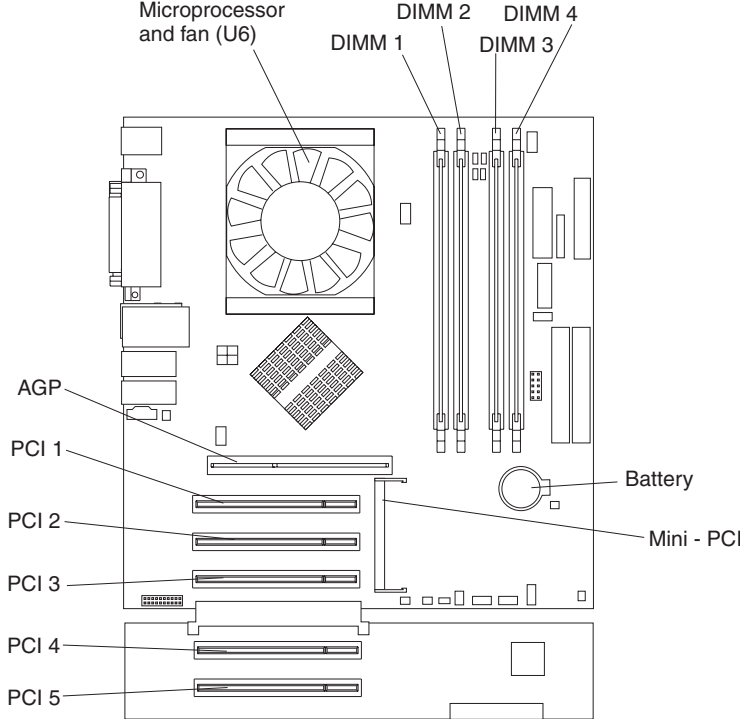
# System-board internal connectors

The following illustration shows the internal connectors on the system board.
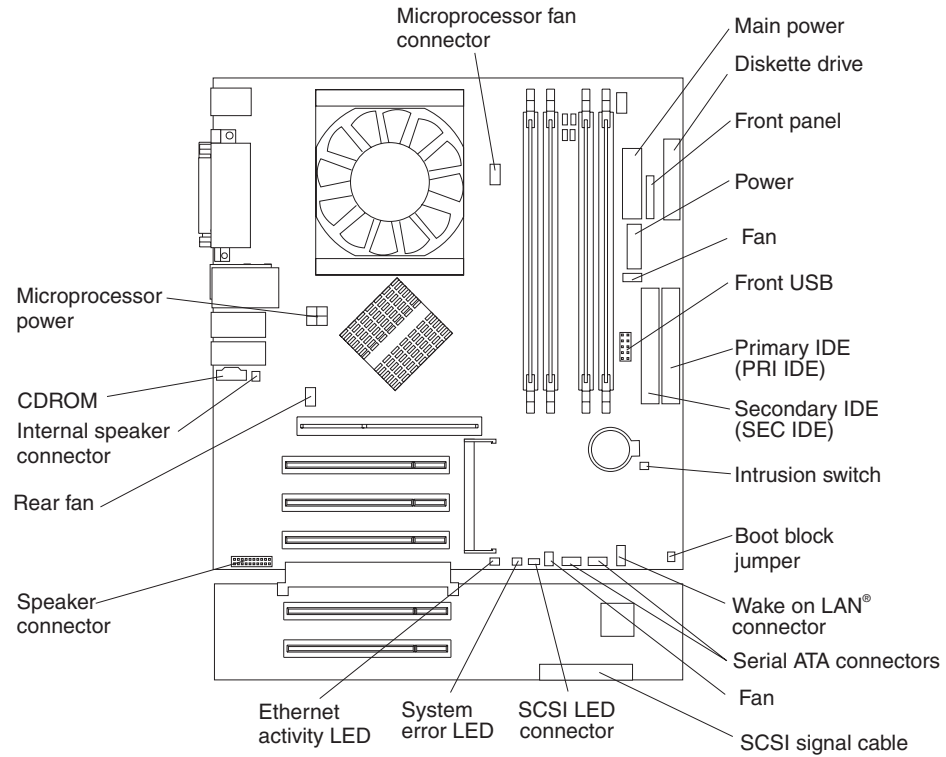


The IDE models for Type 6230 have a shorter extender card, as shown in the following illustration.



Extender card
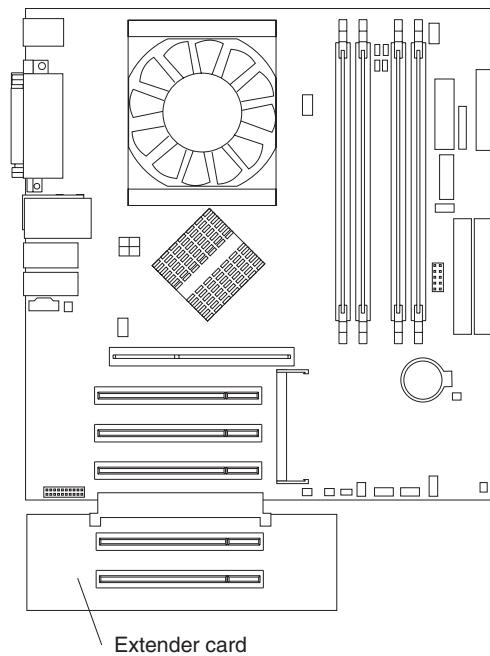
## System-board external connectors

The following illustration shows the external input/output port connectors on the system board.

Keyboard

Mouse

Serial ports

Parallel

Ethernet

USB ports

Audio
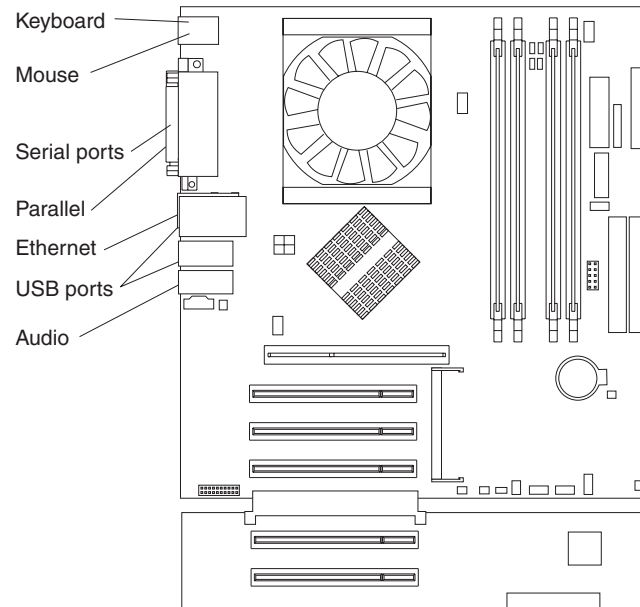
## Removing the side cover

To remove the side cover, you might find it easier to lay the computer on its side.

Complete the following steps to remove the side cover of the computer:

1. Read the safety information beginning on page vii. and the guidelines in "Handling static-sensitive devices" on page 29.
2. Turn off the computer and all attached devices (see "Turning off the computer" on page 20).
3. Disconnect all external cables and power cords.

4. Pull the cover-release latch away from the computer, and push the cover toward the rear of the computer. Lift the side cover off the computer and set it aside.
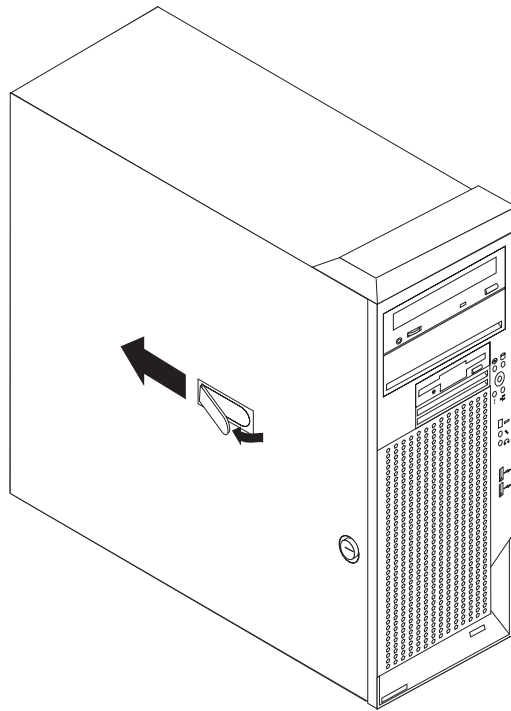


For instructions for replacing the side cover, see "Replacing the side cover" on page 68.

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

# Removing and installing the support bracket

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

Complete the following steps to remove the support bracket:

1. Read safety information beginning on page vii and the guidelines in "Handling static-sensitive devices" on page 29.
2. Remove the side cover ("Removing the side cover" on page 53).
3. Pull out on the rear end of the support bracket approximately 150 mm (6 in.).

4. Disengage the front end of the support bracket from the computer and set the bracket aside.
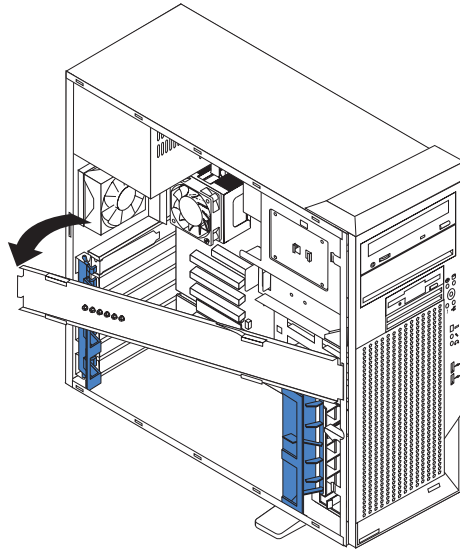
To reinstall the support bracket, reverse the previous steps.

# Working with adapters

Your computer comes with adapter connectors or slots. The Accelerated Graphics Port (AGP) video adapter is installed in the AGP slot and some models have a IEEE 1394 (FireWire) controller adapter installed in the mini-PCI slot. You can install up to five additional optional adapters in your computer in PCI slots 1 through 5.

See "System-board option connectors" on page 51 for the locations of expansion slots on the system board.

## Adapter considerations

The following notes describe the types of adapters that your computer supports and other information that you might consider when installing an adapter:

- Read the documentation that comes with your operating system.
- 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.
- Your computer comes with adapter connectors or *slots*. The Accelerated Graphics Port (AGP) video adapter is installed in the AGP slot and some models have an IEEE 1394 (FireWire) adapter installed in the mini-PCI slot. You can install up to five additional optional adapters in your computer in PCI slots 1 through 5.
- You can install only 32-bit adapters in the 32-bit PCI slots 1 through 5.
- You can install full-length adapters in all five expansion slots. None of the expansion slots are hot-plug slots.
- Your computer supports 5.0 V signaling and universal PCI adapters; it does not support 3.3 V signaling adapters.
- The system scans the AGP slot, mini-PCI slot, and PCI expansion slots 1 through 5 to assign system resources. Then, the system starts the PCI devices in the following order, if you have not changed the default startup sequence: AGP

slot, mini-PCI slot, PCI expansion slot 1, system-board integrated drive electronics (IDE) or small computer system interface (SCSI) devices, and then PCI slots 2 through 5.

- Some models come with a IEEE 1394 (FireWire) adapter installed in the mini-PCI slot. If your computer did not come with a IEEE 1394 (FireWire) adapter installed, do not install any adapter in the mini-PCI slot.
- For a list of supported options for your computer, go to http://www.ibm.com/pc/; then, select your country and navigate to the list of options for your computer.

## Installing an adapter

**Note:** The AGP Pro slot and PCI slots 1, 2, and 3 must be empty for you to access the IEEE 1394 (FireWire) adapter in the mini-PCI slot. If you are replacing the IEEE 1394 (FireWire) adapter, the optional PCI adapter and the AGP video adapter will need to be temporarily removed.

Complete the following steps to install an adapter in your computer:

1. Read the safety information beginning on page vii, and the guidelines in "Handling static-sensitive devices" on page 29.
2. Turn off the computer and all attached devices (see "Turning off the computer" on page 20).
3. Disconnect all external cables and power cords; then, remove the side cover (see "Removing the side cover" on page 53).
4. Determine which PCI slot you will use for the adapter. 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.
5. For full-length adapters, rotate the rear adapter-retention bracket to the open (unlocked) position and remove it from the computer. Rotate the front adapter-retention bracket to the open position. If you are installing a smaller adapter, remove only the rear adapter-retention bracket.
6. If there is an adapter already installed in the slot, remove it and place it on a static-protective surface.

   If the slot is empty, remove the expansion-slot cover. From the rear of the computer, press on the slot cover. Grasp it and pull it out of the expansion slot. Store it in a safe place for future use.

   **Attention:** Expansion-slot covers must be installed on all vacant slots. This maintains the electronic emissions standards of the computer and ensures proper ventilation of computer components.
7. Follow the instructions that come with the adapter to set jumpers or switches, if any.
8. Remove the adapter from the static-protective package, 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. Move the adapter directly from the static-protective package to the adapter slot. Avoid touching the components and gold-edge connectors on the adapter.

   **Attention:** Make sure 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

Expansion
slot cover

Rear
adapter
retention
bracket

Adapter

Front
adapter
retention
bracket
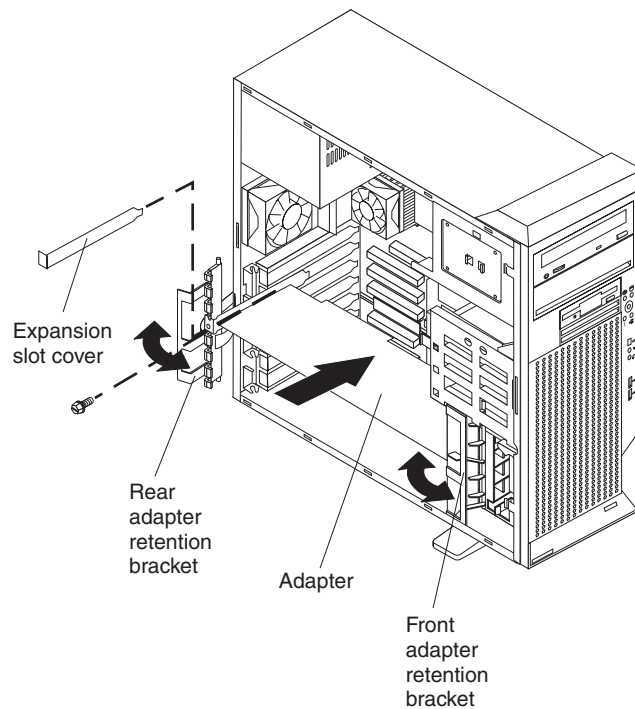
9. Connect required cables to the adapter. Route cables so that they do not block the flow of air from the fans. If you are installing an optional SCSI adapter, see "Cabling an optional SCSI adapter" on page 58 for additional information.

10. If you have another adapter to install, repeat steps 4 through 9.

11. If you have installed a full-length adapter, rotate the front adapter-support bracket to the closed (locked) position.

   **Note:** If any adapter in your computer is large or has heavy cables attached to it, you can secure the adapter with a screw: insert one backup expansion-slot screw (stored on the frame-support bracket) through the top of each adapter bracket into the screw hole and secure the adapter before proceeding to the next step. If you use a screw to secure an adapter, you will need to secure all adapters with screws. You cannot use both the screws and the retention brackets to secure an adapter. You must use one or the other.

12. Reinstall the rear adapter-retention bracket; then, rotate the bracket to the closed (locked) position.

   **Note:** The rear retention bracket rests against the computer side cover. You might find it easier to lay the computer on its side to replace the side cover.

13. If you have other options to install, do so now; otherwise, continue with step 14.

14. Replace the support bracket (see "Removing and installing the support bracket" on page 54).

15. Replace the side cover (see "Replacing the side cover" on page 68).

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

## Cabling an optional SCSI adapter

You can install an optional SCSI adapter in your computer to control the internal hard disk drives. With a SCSI adapter installed, you can configure the internal hard disk drives into disk arrays. You can also cable a SCSI adapter to external hard disk drives. See your SCSI adapter option documentation for complete instructions for installing a SCSI adapter in your computer and for additional information about SCSI adapters.

**Notes:**

1. An optional SCSI adapter is required to connect external SCSI devices.

2. The SCSI cables used by the integrated SCSI controller cannot be used with an optional SCSI adapter.

Complete the following steps to cable an optional SCSI adapter:

1. Install the SCSI adapter (see "Installing an adapter" on page 56).

2. Connect the SCSI-signal cable to the adapter and to one or more of the signal-cable connectors on 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 internal connectors" on page 52 for the location of the SCSI-LED connector.
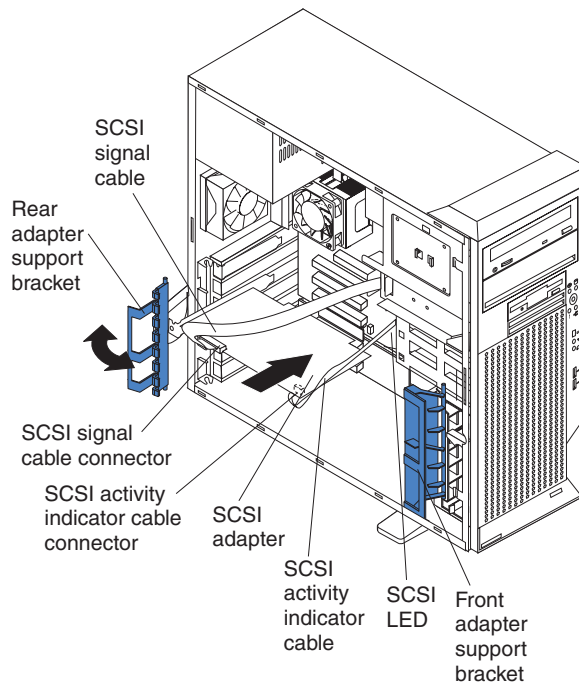


4. Complete the installation of the optional SCSI adapter.

# Installing internal drives

Depending on your computer model, one or more of the following drives might be installed in your computer:
- Diskette
- Hard disk
- CD-ROM, CD-RW, or DVD/CD-RW combo

## Internal drive bays

Your IntelliStation M Pro computer comes with an IDE CD-ROM or DVD/CD-RW drive in bay 1, a 3.5-in., 1.44 MB diskette drive in bay 3, and a hard disk drive in bay 6 or 7.
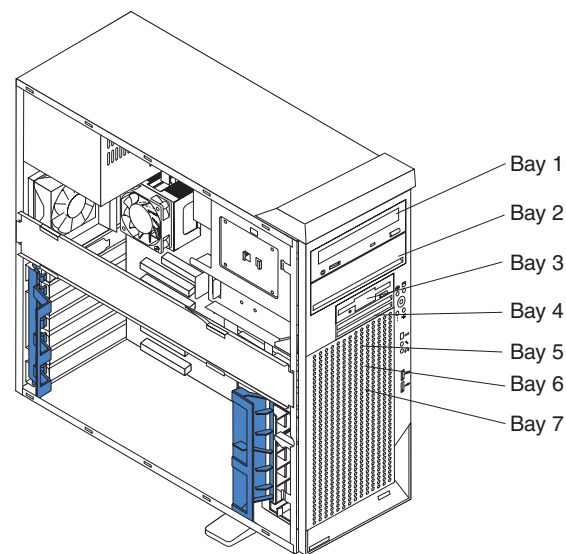


**Notes:**

1. Diskette drives, tape drives, CD-ROM, DVD/CD-RW, and DVD-ROM drives are examples of removable-media drives. You can install removable-media drives in bays 1, 2, 3, and 4 only.

2. You can install a 3.5-in. slim-high or 5.25-in. half-high removable-media drive, such as a tape backup drive, in bay 2.

3. The IntelliStation M Pro computer supports only one diskette drive.

4. To install a 3.5-in. drive in a 5.25-in. bay, you must use the 5.25-in. conversion kit, supplied with the option.

5. You have two serial ATA hard disk drive connectors on the system board.

6. You can mix and match parallel IDE and serial ATA drives in bays 2, 4, 5, 6, and 7.

7. The electromagnetic interference (EMI) integrity and cooling of the computer are protected by having all bays and PCI slots covered or occupied. When you install a drive or PCI adapter, save the EMC shield and filler panel from the bay or the PCI adapter slot cover in the event you later remove the option.

8. For a complete list of supported options for your computer, go to http://www.ibm.com/pc/; then, select your country and navigate to the list of options for your computer.

## Preinstallation steps

Some of these steps are required only the first time you install a hard disk drive in a specific bay.

1. Read the safety information beginning on page vii, the guidelines in "Handling static-sensitive devices" on page 29, and the documentation that comes with your drive.
2. Verify that you have all the cables and other equipment specified in the documentation that comes with the drive.
3. Choose the bay in which you want to install the drive.
4. Check the instructions that come with the drive to determine whether you need to set any switches or jumpers on the drive. If you are installing a SCSI device, make sure that you set the SCSI ID for that device.

## Installing a drive in bay 2 or 4

Complete the following steps to install a drive in bay 2 or 4:

1. Follow the instructions in "Preinstallation steps" on page 60.
2. Turn off the computer and all attached devices.
3. Disconnect all external cables and power cords; then, remove the side cover (see "Removing the side cover" on page 53).
4. Remove the support bracket (see "Removing and installing the support bracket" on page 54).
5. Use a screwdriver to pry the filler panel and EMC shield away from the computer.

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

**Statement 3:**



**CAUTION:**
**When laser products (such as CD-ROMs, DVD drives, fiber optic devices, or transmitters) are installed, note the following:**
- **Do not remove the covers. Removing the covers of the laser product could result in exposure to hazardous laser radiation. There are no serviceable parts inside the device.**
- **Use of controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.**



**DANGER**

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

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



6. Touch the static-protective 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.
7. Follow the instructions that come with the drive to set jumpers or switches, if any.

**Note:** You might find it easier to install the new drive into the appropriate opening on the front, and then attach the cables.

8. If you are installing a 5.25-in. drive in bay 2, push the drive into the bay; then, use the two screws to attach the drive to the drive cage. If you are installing a 3.5-in. drive in bay 2, you must attach the 5.25-in. conversion kit, supplied with your option, to the 3.5-in. drive.

9. Determine whether the drive is an IDE or SCSI device; then, connect one end of the appropriate signal cable into the back of the drive and the other end of this cable into the appropriate IDE or SCSI connector on the system board. See "Power and signal cables for internal drives" on page 63 for additional information about cabling drives and "System-board internal connectors" on page 52 for the location of IDE and SCSI connectors on the system board. If there are open connectors on the cables connecting existing IDE or SCSI drives, these cables can be used to connect the new drive.

10. Route the signal cable so that it does not block the airflow to the rear of the drives or over the microprocessor.

11. Connect the power cable to the back of the drive. The connectors are keyed and can be inserted only one way.

12. If you have other options to install or remove, do so now.

13. Replace the support bracket (see "Removing and installing the support bracket" on page 54).

14. Replace the side cover (see "Replacing the side cover" on page 68).

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

## Installing a hard disk drive in bay 5, 6, or 7

Bays 5, 6, and 7 are in the drive cage. The drive cage is behind the front of the adapter-support bracket.

**Note:** When installing options, you might find it easier to work with the computer lying on its side.

Complete the following steps to install a drive in bay 5, 6, or 7:

1. Follow the instructions in "Preinstallation steps" on page 60.

2. Turn off the computer and all attached devices (see "Turning off the computer" on page 20).

3. Disconnect all external cables and power cords; then, remove the cover (see "Removing the side cover" on page 53).

4. Remove the support bracket (see "Removing and installing the support bracket" on page 54).

5. Grasp the drive cage and rotate the cage out of the computer until it locks into place with the drive-cage retention tab and the open ends of the drive slots and installed drives are facing you. Ensure that the drive cage locks into place over the drive-cage retention tab by rotating the drive cage all the way out of

the computer.
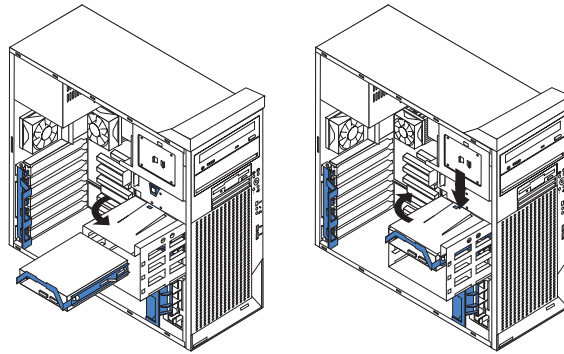


6. Slide the existing drive out of the drive bay. Remove the drive from the drive tray by gently pulling both sides of the drive tray outward until the mounting pins are disengaged from the holes on the drive; then, lift the drive out of the drive tray.

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 new drive to the drive tray. Place the drive on the drive tray and align the holes on the drive with the mounting pins on the drive tray. Gently pull both sides of the drive tray outward and insert the mounting pins into the holes on the drive.

10. Slide the drive into the drive bay until the drive snaps into place.

11. Determine whether the drive is a parallel IDE, serial ATA, or SCSI device; then, connect one end of the appropriate signal cable into the back of the drive and the other end of this cable into the appropriate parallel IDE, serial ATA, or SCSI connector on the system board. See "Power and signal cables for internal drives" for additional information about cabling drives and "System-board internal connectors" on page 52 for the location of parallel IDE, serial ATA, and SCSI connectors on the system board. If there are open connectors on the cables connecting existing parallel IDE, serial ATA, or SCSI drives, these cables can be used to connect the new drive.

12. 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. Push the drive cage outward, and press in on the drive-cage release tab; then, rotate the cage back into the computer.

15. If you have other options to install or remove, do so now.

16. Replace the support bracket (see "Removing and installing the support bracket" on page 54).

17. Replace the side cover (see "Replacing the side cover" on page 68).

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

## Power and signal cables for internal drives

Your computer uses cables to connect parallel IDE, serial ATA, and SCSI devices to the power supply and to the system board. (See "System-board internal connectors" on page 52

on page 52 for the location of system-board connectors.) Review the following information before connecting power and signal cables to internal drives:

- The drives that are preinstalled in your computer come with power and signal cables attached. If you replace any drives, remember which cable is attached to which drive.
- When you install a drive, ensure that one of the drive connectors of the signal cable is connected to the drive and that the connector at the other end of the signal cable is connected to the system board.
- If you have only one IDE device on a cable, it must be set as a master device.
- If two IDE devices are used on a single cable, one must be designated as the master device and the other as the subordinate device; otherwise, the computer might not recognize some of the IDE devices. The master and subordinate 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 master device.

The following cables are provided:

- **Power cables:** Four-wire power cables connect the drives to the power supply. At the end of these cables are plastic connectors that can be attached to different drives; these connectors vary in size. You can use either a four-wire power cable or serial ATA power cable with serial ATA drives, but do not use both at the same time (use one or the other).
- **Signal cables:** Signal cables are typically flat cables, also called ribbon cables, that connect parallel IDE, serial ATA, SCSI, and diskette drives to the system board. Two or three types of signal cable come with your computer:
    - **IDE:** The wider IDE signal cable has three connectors. One of these connectors is attached to the drive, one is a spare, and the third is attached to the master or subordinate IDE connector on the system board. The spare connector can be used to connect additional IDE drives to your computer.

      The CD-ROM drive is attached an ATA 100 signal cable. ATA 100 signal cables are color-coded. The blue connector is attached to the system board. The black connector is attached to the master IDE device. The gray middle connector is attached to the subordinate IDE device. If you are installing an additional hard disk drive, you must change the switch or jumper setting on the CD-ROM drive to make the drive a subordinate device, set the switch or jumper setting on the new drive to master, and change the connector used for the CD-ROM drive to the gray middle connector. The new drive will be connected to the black master IDE device connector.
    - **Diskette drive:** The narrower signal cable has two connectors. One is attached to the diskette drive, and the other is attached to the connector (FDD1) on the system board.
    - **Serial ATA:** The narrower, black signal cable has two connectors. One attaches to the serial ATA drive, and the other attaches to the connector on the system board. Each serial ATA drive comes with a cable. If you install an additional serial ATA drive, you will need an additional cable.
    - **SCSI:** The following cables can be used to attach SCSI devices to the integrated SCSI controller on the system board:
        - An Ultra320 twisted ribbon cable connects the internal Ultra320 SCSI hard disk drive to the SCSI connector on the system board. This cable has four additional connectors for attaching more internal SCSI devices.

- A round SCSI cable connects external SCSI devices to the integrated SCSI controller on the system board. For more information about connecting SCSI devices, see the SCSI documentation.

# Installing memory modules

The following notes describe the types of dual inline memory modules (DIMMs) that your computer supports and other information that you must consider when installing DIMMs:

**Notes:**

1. When you restart the computer after adding or removing a DIMM, the computer displays a message that the memory configuration has changed.

2. Your IntelliStation M Pro Type 6230 computer uses industry-standard PC2700 or PC3200 double-data-rate (DDR) dual inline memory modules (DIMMs).

3. The system board contains four DIMM connectors and supports two-way memory interleaving.

4. The DIMM options available for your computer are 256 MB, 512 MB, and 1 GB. Your computer supports a minimum of 256 MB and a maximum of 4 GB of system memory.

5. The amount of usable memory will be reduced depending on the system configuration. A certain amount of memory must be reserved for system resources. The BIOS code will display the total amount of installed memory and the amount of configured memory.

6. Your computer comes with either one or two 256 MB, 512 MB, or 1 GB memory DIMMs installed. If your computer has one DIMM installed, when you install an additional DIMM, it must be installed in DIMM 3 memory connector and must be the same size, speed, type, and technology as the DIMM installed in DIMM 1 memory connector. You can mix compatible DIMMs from various manufacturers. When one DIMM is installed in the computer, the computer runs as a single-channel computer. When you add a DIMM in DIMM 3 memory connector, your computer defaults to a dual-channel computer.

7. DIMMs must be installed in matched pairs. The first pair of DIMMs you install in DIMM 1 and DIMM 3 memory connectors must be the same size, speed, type, and technology. You can mix compatible DIMMs from various manufactures. If you install a second pair of DIMMs in DIMM 2 and DIMM 4 memory connectors, they do not have to be the same size, speed, type, and technology as the DIMMs installed in DIMM 1 and DIMM 3 memory connectors. However, the size, speed, type, and technology of the DIMMs you install in DIMM 2 and DIMM 4 memory connectors must match each other.

8. Install only 2.5 V, 184-pin, double-data-rate (DDR), PC2700 or PC3200, unbuffered synchronous dynamic random-access memory (SDRAM) with error correcting code (ECC) DIMMs. These DIMMs must be compatible with the latest PC2700 or PC3200 SDRAM unbuffered DIMM specification. For a list of supported options for your computer, go to http://www.ibm.com/pc/; then, select your country and navigate to the list of options for your computer.

Complete the following steps to install a DIMM:

1. Read the safety information beginning on page vii, and the guidelines in "Handling static-sensitive devices" on page 29.

2. Turn off the computer and all attached devices (see "Turning off the computer" on page 20).

3. Disconnect all external cables and power cords; then, remove the side cover (see "Removing the side cover" on page 53.)

4. Remove the side cover (see "Removing the side cover" on page 53).
5. Remove the support bracket (see "Removing and installing the support bracket" on page 54).
6. For easier access to the memory modules, rotate the drive cage out of the computer. Grasp the drive cage and rotate it until it locks into place.
7. Locate the DIMM connectors on the system board. Determine the connectors into which you will install the DIMMs. Remember, DIMM 1 and DIMM 3 must be paired together (and must be the first pair installed) and DIMM 2 and DIMM 4 must be paired together. The following illustration shows the DIMM installation sequence.

| Memory installation sequence | |
| --- | --- |
| DIMMs | Slots |
| 1 DIMM | 1 |
| 2 DIMMs | 1, 3 |
| 4 DIMMs | 1, 2, 3, 4 |

8. Open the retaining clips and, if necessary, remove any existing DIMM.
9. Touch the static-protective package containing the DIMM to any unpainted metal surface on the computer. Then, remove the new DIMM from the package.
10. Gently open the retaining clip on each end of the DIMM slot. Turn the DIMM so that the pins align correctly with the connector.
11. Insert the DIMM into the connector. Firmly press the DIMM straight down into the connector by applying pressure on both ends of the DIMM simultaneously. The retaining clips snap into the locked position when the DIMM is firmly seated in the connector. 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.
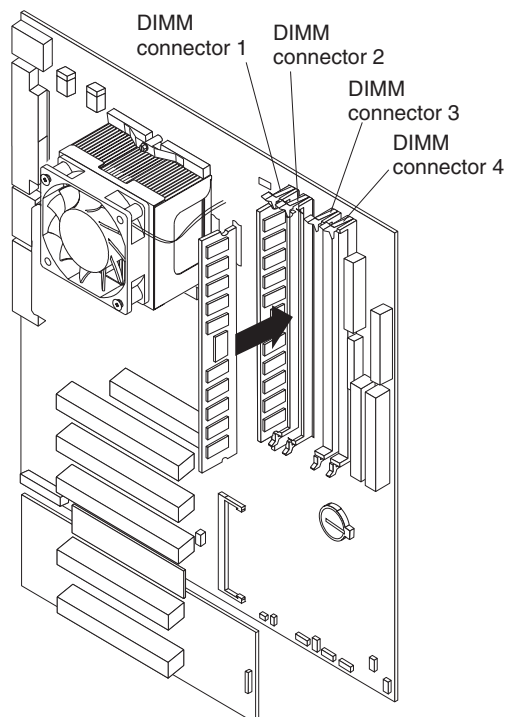
12. If you have other options to install or remove, do so now.

13. Push the drive cage outward and press in on the drive-cage release tab; then, rotate the cage back into the computer.

14. Replace the support bracket (see "Removing and installing the support bracket" on page 54).

15. Replace the side cover (see "Replacing the side cover" on page 68).

16. 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 hardware theft, you can add a security rope clip and cable to your computer. After you add the security cable, make sure that it does not interfere with other cables that are connected to the computer.

Before you begin, obtain the following items:
- A flat-blade screwdriver
- An adjustable wrench
- A 19 mm (0.75 in.) rope clip or wire rope (similar to National Manufacturing number 3230, stock number 176-735)
- Threaded nuts that fit the rope clip
- A security cable
- A lock, such as a combination lock or padlock

Complete the following steps to install a rope clip:

1. Turn off the computer and all attached devices.

2. Disconnect all external cables and power cords; then, remove the side cover. See "Removing the side cover" on page 53.

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.

Rope clip
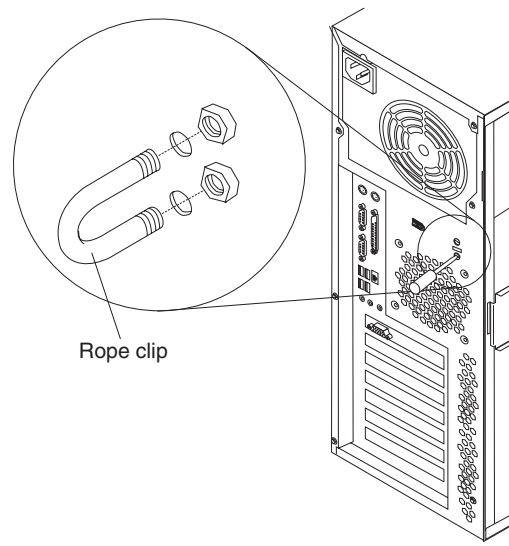
6. If you have other options to install or remove, do so now; otherwise, replace the side cover (see "Replacing the side cover").

7. Reconnect the external cables and power cords. Turn on the attached devices, and turn on the computer.

# Replacing the side cover

If you removed the support bracket, reinstall it before you replace the side cover. See "Removing and installing the support bracket" on page 54.

**Note:** The rear adapter retaining bracket rests against the computer side cover. You might find it easier to lay the computer on its side to replace the side cover.

Complete the following steps to replace the side cover:

1. Make sure that all cables, adapters, and other components are installed and seated correctly and that you have removed all work tools or parts from inside the computer.

2. Install the side cover by placing it into position on the computer. Be certain that the lip on the bottom of the cover rests on the ledge on the bottom of the chassis before rotating the cover up to the verticle position. Press down on the cover-release latch as you slide the side cover forward to lock the side cover.
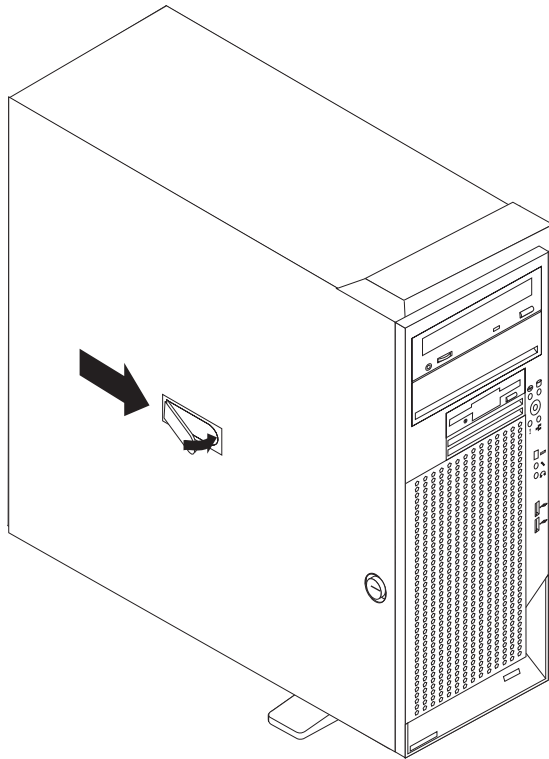
3. Reconnect the external cables and power cords to the computer; then, connect the power cords to electrical outlets.
4. Turn on the attached devices; then, turn on the computer.

## Connecting external options

You can connect a number of optional external devices to the connectors on the rear and front of the computer.

Complete the following steps to connect an external device:
1. Read the safety information beginning on page vii, the guidelines in "Handling static-sensitive devices" on page 29, and the documentation that comes with your options.
2. Turn off the computer and all attached devices (see "Turning off the computer" on page 20).
3. Follow the instructions that come with the option to prepare it for installation and to connect it to the computer.

If you are attaching a SCSI device, see "Ultra320 SCSI connector" on page 73 for SCSI ID and cabling information.

## Input/output connectors

Connect optional external devices to the connectors on the front and rear of the computer.

Your computer has the following input/output (I/O) connectors:
• One audio line in
• Two audio line out
• Two audio microphone

- One Ethernet
- Two IEEE 1394 (FireWire) (some models)
- One keyboard
- One mouse
- One parallel
- Two serial
- Six Universal Serial Bus (USB)
- One video

The following illustration shows the locations of the connectors on the M Pro Type 6220.
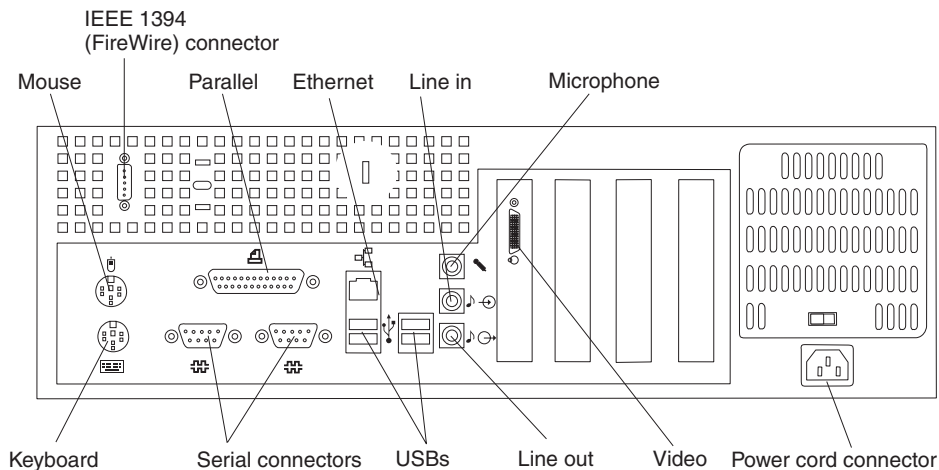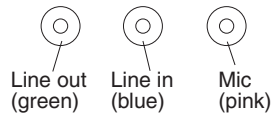


The following illustration shows the locations of the connectors on the M Pro Type 6230.
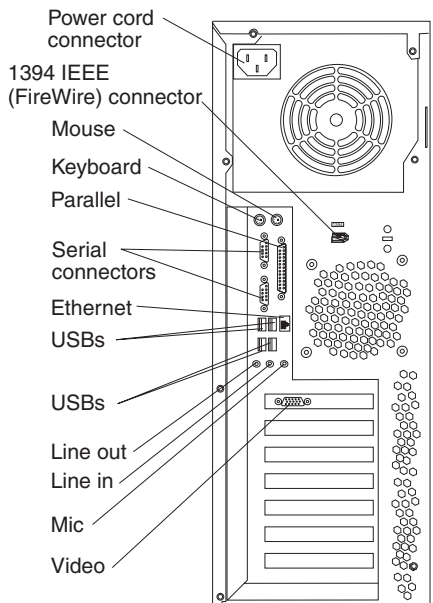


The following sections describe these connectors.

## Audio connectors

Use the audio connectors to connect external audio equipment to the computer. The following illustration shows the audio connectors.

Line out (green)  Line in (blue)  Mic (pink)

### Line in

There is one line-in connector on the rear of the computer. The computer receives audio signals through this connector from an external audio device.

### Line out

There are two line-out connectors, one on the front and one on the rear of the computer. The computer sends audio signals through this connector to powered speakers with built-in amplifiers, headphones, a multimedia keyboard, or the audio line-in connector on a stereo system. The internal speaker in the computer is disabled when a device is attached to this connector.

### Mic

There are two microphone connectors, one on the front and one on the rear of the computer. Connect a microphone to this connector to record sounds onto the hard disk or to use speech-recognition software. There are two microphone connectors, one on the front and one on the rear of the computer.

## Auxiliary-device (pointing-device) connector

There is one auxiliary-device connector on the rear of the computer. Use this connector to connect a mouse or other pointing device. The following illustration shows an auxiliary-device connector.



6  5
4  3
2  1
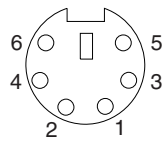
## Ethernet (RJ-45) connector

There is one Ethernet connector on the rear of the computer. Use this connector to connect the computer to a 10-Mbps, 100-Mbps, or 1000-Mbps network. The following illustration shows an Ethernet connector.



Activity LED (green)    Link LED (green)

8          1
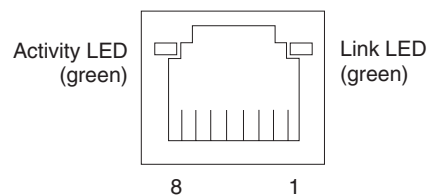
Connect a Category 3, 4, or 5 unshielded twisted-pair (UTP) cable to this connector. The 100BASE-TX and 1000BASE-T Fast Ethernet standards require Category 5 or higher cabling.

The Ethernet connector has one LED that indicates Ethernet-link status. When this LED is lit, it indicates that there is an active connection on the Ethernet port. Activity between the computer and the network is indicated by the Ethernet transmit/receive activity LEDs on the front and rear of the computer (see "Controls and LEDs" on page 9).

## IEEE 1394 (FireWire) connector (some models)

There is one 4-pin IEEE 1394 (FireWire) connector on the front of the computer and one 6-pin IEEE 1394 (FireWire) connector on the rear of the computer. Use these connectors to connect IEEE 1394 (FireWire) devices. The following illustrations show the IEEE 1394 (FireWire) connectors.
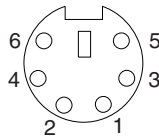
**4-pin IEEE 1394 (FireWire) connector (front)**
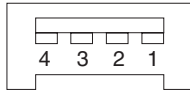


**6-pin IEEE 1394 (FireWire) connector (rear)**
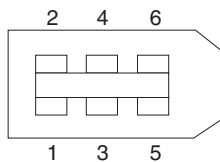


## Keyboard connector

There is one keyboard connector on the rear of the computer. Use this connector to connect a PS/2 (non-USB) keyboard. The following illustration shows a keyboard connector.



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

## Parallel connector

There is one parallel connector on the rear of the computer. Use this connector to connect a parallel device. The following illustration shows a parallel connector.
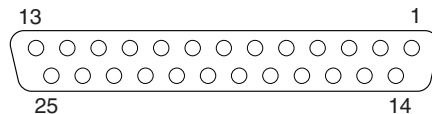


The parallel connector supports three standard Institute of Electrical and Electronics Engineers (IEEE) 1284 modes of operation: standard parallel port (SPP), enhanced parallel port (EPP), and extended capability port (ECP). If you configure the parallel port to operate in bidirectional mode, it supports the ECP and EPP modes. When the parallel connector is configured as bidirectional, use an IEEE 1284-compliant cable that does not exceed 3 meters (9.8 ft). Use the **Devices and I/O Ports** options in the IBM Configuration/Setup Utility program to configure the parallel connector as bidirectional.

## Serial connectors

There are two serial connectors on the rear of the computer. Use these connectors to connect serial devices. The following illustration shows a serial connector.
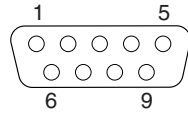


## Ultra320 SCSI connector

Your computer has an integrated SCSI controller. This single-channel controller supports an independent, Ultra320 SCSI channel that supports up to 15 SCSI devices. The SCSI connector for the channel is on the system board. The controller has the following features:

- Double-transition clocking to achieve up to 320 MBps (mgegbytes per second) data-transfer rates
- Domain name validation to negotiate compatible data-transfer speeds with each device
- Cyclic-redundancy checking (CRC) to improve data reliability
- An active terminator for SCSI bus termination

### SCSI cabling requirements

You can install four internal SCSI devices using the SCSI signal cable that comes with some computer models. If you plan to attach external SCSI devices, you must order an optional PCI SCSI adapter and external cable. To select and order the correct cables for use with external devices, contact your IBM marketing representative or authorized reseller. To receive an indication of SCSI hard-disk drive activity, you must also connect the SCSI adapter to the SCSI LED connector on the system board. See "System-board internal connectors" on page 52 for the locations of the SCSI connectors.

### Setting SCSI IDs

Each SCSI device that is 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 comes with the device for instructions for setting its SCSI ID.

## Universal Serial Bus connectors

There are six Universal Serial Bus (USB) 2.0 connectors, two on the front and four on the rear of the computer. Use the USB connectors to connect optional telephony and multimedia devices. 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 (if the device that is attached to the computer is a USB 2.0 device). If multiple USB devices are attached to the computer, the USB hub must be USB 2.0; otherwise, all USB 2.0 devices will transfer data at 12 Mbps. Using Plug and Play technology, USB devices are configured automatically. The following illustration shows a USB connector.
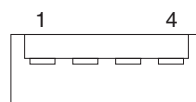


Use a 4-pin USB cable to connect an external devices to a USB connector.

If you connect a PS/2 (non-USB) keyboard to the keyboard connector, USB ports and devices are disabled during power-on self-test (POST).

If you connect a USB keyboard that has a mouse port, the keyboard emulates a mouse, and you cannot disable the mouse settings in the Configuration/Setup Utility program.
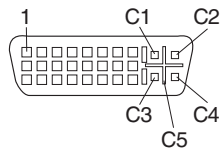
# Video connector

The Accelerated Graphics Port (AGP) adapter, which is in the AGP slot on the system board, provides the video connector. This connector is on the rear of the computer. Use the video connector to connect a monitor or other display. The following illustrations show examples of different video connectors.

**Analog video connector**
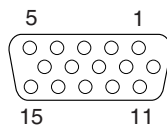
**Digital (DVI-I) video connector**

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

Some models come with a digital video interface (DVI) connector for connecting a digital monitor. If you have problems viewing information with a second monitor, see "Changing monitor settings" on page 16.

Models with the NVIDIA Quadro4 980XGL, NVIDIA Quadro FX 500, NVIDIA FX 1000, NVIDIA Quadro FX 1100, or NVIDIA Quadro FX 3000 video adapter come with a DVI-I to VGA style analog converter for each DVI-I connector.

**Attention:** To get the best performance from the NVIDIA Quardro FX 1000, NVIDIA Quadro FX 1100, and NVIDIA Quadro FX 3000 video adapters, you must connect the video adapter to the computer power supply. Otherwise, the video adapter will be operating with very limited power, resulting in a decrease in performance for some applications. You will need to use one of the disk drive power drops to connect the video adapter to the computer power supply. This means that when you install this video adapter in your computer, you have one less power drop for optional internal devices. The following illustration shows the location of the video adapter power connector:
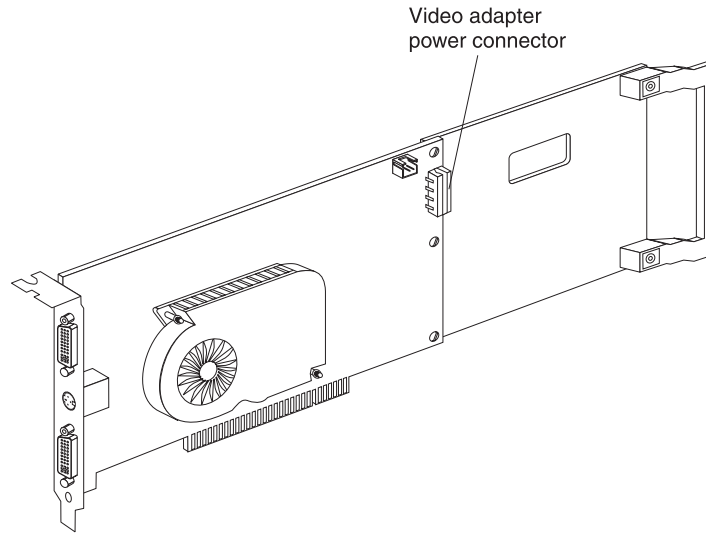


Models with the NVIDIA Quadro NVS 280 or NVIDIA Quadro4 580XGL video adapter come with a low force helical-60 (LFH-60) to dual-analog monitor pigtail cable. If you want to set up two digital monitors, you will need to purchase a separate dual-digital monitor cable.

# Chapter 5. Solving problems

This section provides basic troubleshooting information to help you diagnose and solve 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 109 for more information.

## Diagnostic tools overview

The following tools are available to help you identify and solve 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 79 for more information. Additional information is recorded in the system error logs. (For detailed information, see Error Logs under "Configuration/Setup Utility menu choices" on page 24.

- **Diagnostic programs**

  The system diagnostic programs are on a hidden partition on your computer hard disk. These programs are the primary methods of testing the major components of your computer. See "Diagnostic programs and error messages" on page 85 for more information.
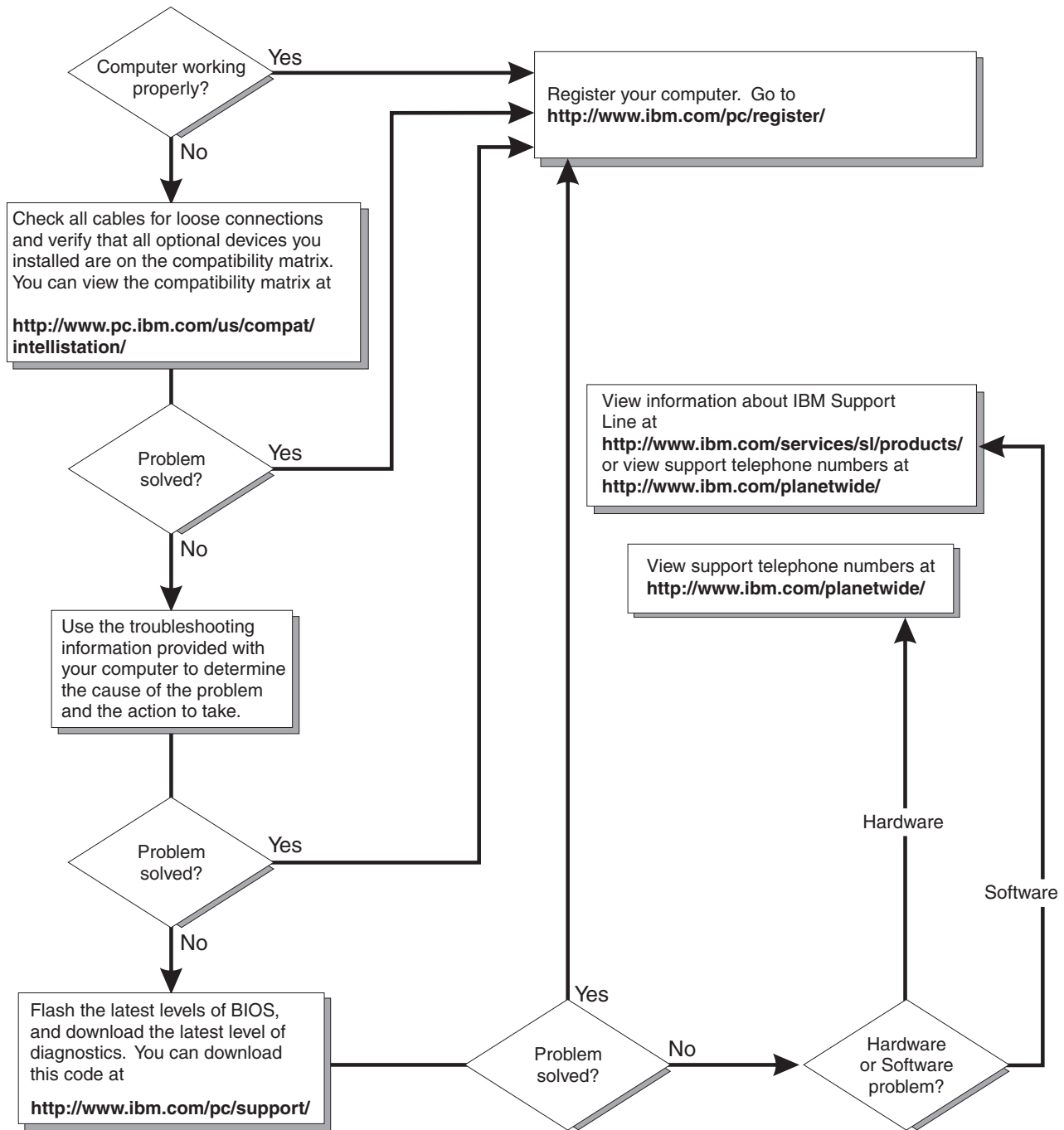
- **Troubleshooting charts**

  This charts lists problem symptoms and steps to correct each problem. See the "Troubleshooting charts" on page 94 for more information.

- **System-board error LEDs**

  An LED on the system board might also be lit to help isolate an error indicated by the system error LED on the front of the computer. See the "System-board error LEDs" on page 100 for more information.

# Computer Support

Computer working properly?

**Yes** → Register your computer. Go to **http://www.ibm.com/pc/register/**

**No**

Check all cables for loose connections and verify that all optional devices you installed are on the compatibility matrix. You can view the compatibility matrix at

**http://www.pc.ibm.com/us/compat/ intellistation/**

Problem solved?

**Yes** → Register your computer. Go to **http://www.ibm.com/pc/register/**

**No**

Use the troubleshooting information provided with your computer to determine the cause of the problem and the action to take.

Problem solved?

**Yes** → Register your computer. Go to **http://www.ibm.com/pc/register/**

**No**

Flash the latest levels of BIOS, and download the latest level of diagnostics. You can download this code at

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

Problem solved?

**Yes** → Register your computer. Go to **http://www.ibm.com/pc/register/**

**No** → Hardware or Software problem?

**Hardware** → View information about IBM Support Line at **http://www.ibm.com/services/sl/products/** or view support telephone numbers at **http://www.ibm.com/planetwide/**

**Software** → View support telephone numbers at **http://www.ibm.com/planetwide/**

# Power-on self-test (POST)

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

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

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 codes

The possible types of beep codes are:

**No beeps**

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

**Continuous beep**

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

**Beep codes for specific failures**

Beep codes indicating specific system problems are listed in the following table.

*Table 3. POST beep codes*

| Beep code | Description | Action |
|---|---|---|
|  |  | 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. |  |
| 1-3-1 | First 64 Kb RAM test has failed. | Reseat the memory modules or install a memory module. If the problem persists, call for service. |

*Table 3. 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. | |
| 2-4-1 | Screen test indicates the screen is operable. | Call for service |
| 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. | |
| 3-3-1 | A memory size mismatch has occurred. | Reseat the memory modules or install a memory module. If the problem persists, 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.<br><br>**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 persists, call for service. |

# POST error messages

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

*Table 4. POST error messages*

| POST message | Description |
|---|---|
| 062 | The computer failed to start on three consecutive attempts.<br><br>All caches are disabled. Repeatedly turning the computer on and then off or resetting the computer might cause this problem.<br>**Action:** Take the following steps to correct the problem:<br><br>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.<br>2. Install a new battery. See "Replacing the battery" on page 106 for instructions.<br><br>If the problem remains, call for service. When the problem is corrected, be sure to enable the caches. |
| 101, 102, and 106 | An error occurred during the system board and microprocessor test.<br>**Action:** Call for service. |
| 151 | A real-time clock (RTC) error occurred.<br>**Action:** Call for service. |
| 161 | The real-time clock battery has failed.<br>**Action:** Replace the battery yourself or call for service.<br><br>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. |
| 162 | A change in device configuration occurred. This error occurs under one or more of the following conditions:<br>• A new device has been installed.<br>• A device has been moved to a different location or cable connection.<br>• A device has been removed or disconnected from a cable.<br>• A device is failing and is no longer recognized by the computer as being installed.<br>• An external device is not turned on.<br>• An invalid checksum is detected in the battery-backed memory.<br><br>**Action:** Verify that all external devices are turned on. You must turn on external devices before turning on the computer.<br><br>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 103 and "Using the IBM Enhanced Diagnostics diskette" on page 104.<br><br>If the problem remains, call for service. |
| 163 | The time of day has not been set.<br>**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.<br><br>You can use the computer until the system is serviced, but any application programs that use the date and time will be affected. |

*Table 4. POST error messages (continued)*

| POST message | Description |
|---|---|
| 164 | A change in the memory configuration occurred. This message might appear after you add or remove memory.<br>**Note:** The computer can be used with decreased memory capacity.<br>**Action:** Take the following steps to correct the problem:<br>1. If POST error message 289 also occurred, follow the instructions for that error message first.<br>2. If you just installed or removed memory, run the Configuration/Setup Utility program; then, exit, saving the new configuration settings.<br><br>   If the message appears again, shut down the computer, reseat the memory modules, and restart the computer.<br><br>If the problem remains, call for service. |
| 184 | The power-on password information stored in your computer has been removed.<br>**Action:** From the Configuration/Setup Utility program main menu, select **System Security.** Then, follow the instructions on the screen.<br><br>If this information cannot be restored, call for service. |
| 187 | The VPD serial number is not set.<br>**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. |
| 189 | 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. |
| 201 | An error occurred during the memory controller test. This error can be caused by:<br>• Incorrectly installed memory<br>• A failing memory module<br>• A system board problem<br><br>**Action:** Take the following steps to correct the problem:<br>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.<br>2. If the problem remains, call for service. |
| 289 | An error occurred during POST memory tests and a failing DIMM was disabled.<br>**Note:** You can use the computer with decreased memory.<br>**Action:** Take the following steps to correct the problem:<br>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.<br>2. If the problem remains, replace the failing DIMM.<br><br>If the problem remains, call for service. |
| 294 | Mixed mode memory was detected; system is running in non-ECC memory mode.<br>**Action:** 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.<br><br>If the problem remains, call for service. |

*Table 4. POST error messages  (continued)*

| POST message | Description |
|---|---|
| 301 and 303 | An error occurred during the keyboard and keyboard controller test. These error messages also might be accompanied by continuous beeping.<br>**Action:**  Take the following steps to correct the problem:<br><br>1.  Ensure that:<br>   •  Nothing is resting on the keyboard and pressing a key.<br>   •  No key is stuck.<br>   •  The keyboard cable is connected correctly to the keyboard and to the correct connector on the computer.<br><br>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.<br><br>Running the diagnostic tests can isolate the computer component that failed, but you must have your computer serviced. If the error message remains, call for service.<br>**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. |
| 602 | Invalid diskette boot record<br>**Action:**  Take the following steps to correct the problem:<br>1.  Replace the diskette.<br>2.  If the problem remains, make sure that the diskette drive cables are correctly and securely connected.<br>3.  If the problem remains, replace the diskette drive.<br><br>If the problem remains, call for service. |
| 604 | An error occurred during a diskette drive test.<br>**Action:**  Take the following steps to correct the problem:<br>1.  Verify that the Configuration/Setup Utility program correctly reflects the type of diskette drive that you have installed.<br>2.  Run the diagnostic tests. If the diagnostic tests fail, call for service. |
| 662 | A diskette drive configuration error occurred.<br>**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.<br><br>If the problem remains, call for service. |
| 962 | A parallel port configuration error occurred.<br>**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.<br><br>If the problem remains, call for service. |
| 1162 | The serial port configuration conflicts with another device in the system.<br>**Action:**  Take the following steps to correct the problem:<br>1.  Make sure the IRQ and I/O port assignments needed by the serial port are available.<br>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. |
| 1762 | Hard disk configuration error.<br>**Action:**  Take the following steps to correct the problem:<br>1.  Make sure that the hard disk drive is set correctly in the Configuration/Setup Utility program.<br>2.  Make sure that the hard disk drive cables are correctly and securely connected.<br>3.  If the problem remains, replace the hard disk drive.<br><br>If the problem remains, call for service. |

*Table 4. POST error messages (continued)*

| POST message | Description |
|---|---|
| 1962 | No valid startup devices were found. The system cannot find the startup drive or operating system.<br>**Action:** Be sure that the drive you want to start from is in the startup sequence.<br>1. Select **Start Options** from the Configuration/Setup Utility program main menu. If you are unable to set the startup sequence, call for service.<br>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?<br>    **Yes** Exit from this screen; then, select **Exit Setup** to exit the Configuration/Setup menu. Go to step 3..<br>    **No** Follow the instructions on the screen to add the drive; then, save the changes and exit the Configuration/Setup menu. Restart the computer.<br>3. Is an operating system installed?<br>    **Yes** Turn off the computer. Go to step 4.<br>    **No** Install the operating system in your computer; then, follow your operating-system instructions to shut down and restart the computer.<br>4. During computer startup, watch for messages indicating a hardware problem.<br><br>If the same error message appears, call for service. |
| 2462 | A video memory configuration error occurred.<br>**Action:** Call for service. |
| 5962 | An IDE CD-ROM configuration error occurred.<br>**Action:** Check the signal and power cable connections to the CD-ROM drive.<br><br>If the problem remains, call for service. |
| 8603 | 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.<br>**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.<br>**Action:** Ensure that the keyboard and mouse (pointing device) are attached to the correct connectors. If they are connected correctly, use the following procedure:<br>1. Turn off the computer.<br>2. Disconnect the mouse from the computer.<br>3. Turn on the computer.<br><br>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.<br><br>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. |
| 00012000 | Processor machine check.<br>**Action:** Take the following steps to correct the problem:<br>1. Update the system BIOS code.<br>2. If the problem remains, replace the microprocessor. |
| 00180200 | A PCI adapter has requested an I/O address that is not available, or the PCI adapter might be defective.<br>**Action:** Take the following steps to correct the problem:<br>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.<br>2. If the I/O port resource settings are correct, the PCI adapter might be defective. Call for service. |
| 00180700 | *xxxxyyyy* Planar PCI device does not respond or disabled by user (where *xxxx* is the PCI vendor ID and *yyyy* is the PCI device ID).<br>**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. |

*Table 4. POST error messages  (continued)*

| POST message | Description |
|---|---|
| 01298001 | No update data is available for the processor.<br>**Action:**  Update the system BIOS code to a level that supports the microprocessors installed in the computer. |
| I9990650 | ac power has been restored.<br>**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.<br>**Action:**  Follow the instructions on the screen. |

# Diagnostic programs and error messages

The system diagnostic programs are stored on a hidden partition on your computer hard disk. These programs are the primary method of testing the major components of your computer.

You can also download the latest version of the diagnostics programs from http://www/ibm.com/pc/support/ and use the downloaded file to create an IBM Enhanced Diagnostics diskette. See "Creating an IBM Enhanced Diagnostics diskette" on page 103 for instructions.

**Note:**  When using diagnostics with a USB keyboard and mouse attached, first go into the Configuration/Setup Utility and enable USB emulation.

1. Restart the computer and press F1 to access the Configuration/Setup Utility.

2. Select **Devices and I/O Ports**.

3. Select **USB Setup**.

4. Ensure that USB Keyboard and Mouse are enabled.

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) described 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 and viewing the test log

The IBM Enhanced Diagnostics programs isolate problems from your computer hardware and software. The programs run independently of the operating system. 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.

To start the diagnostic programs in Windows operating systems, do the following:

1. Restart your computer and when the message To start the Product Recovery program displays, quickly press F11.

2. Select **System utilities**.

3. Next, select **Run diagnostics** to start the diagnostics programs.

To start the diagnostic programs in Red Hat Linux operating system, do the following:

1. Restart your computer.
2. When the operating system selection menu displays, select **IBM Preload Recovery & Diagnostics.**
3. Next, select **Run diagnostics** to start the diagnostics programs.

Complete the following steps to view the test log.

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

1. Insert the IBM Enhanced Diagnostics diskette 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.

   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.
6. Save the test log to a file on a diskette or to your hard disk.

   **Notes:**

   a. To save the test log to a diskette, you must use a diskette that you have formatted yourself; this function does not work with preformatted diskettes. If the diskette has sufficient space for the test log, the diskette may contain other data.

   b. The system maintains the test-log data while you are in the diagnostics program or until you save the test-log. The test-log is cleared when you exit the diagnostics program.

# 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 | Core Tests | Call for service. |
| | | | System board ECC | |
| 005 | Video port | Failed | Any failure message | 1. Replace the video adapter.<br>2. Call for service. |
| 011 | Serial port | | Integrated serial port | 1. Verify that the loopback plug is properly connected to the external serial port.<br>2. Verify that the cable from the external serial port is properly connected to the system board.<br>3. Call for service. |

| Code | Function | Result | Text message | Action |
|------|----------|--------|--------------|--------|
| 014 | Parallel port | | Integrated parallel port | 1. Verify that the loopback plug is connected properly to the external parallel port.<br>2. Call for service. |
| 015 | USB interface | Aborted | Can NOT test USB interface while it is in use.<br>**Note:** If you have USB devices attached, you cannot run the diagnostic program for the USB interface. | 1. Turn off the computer.<br>2. Replace the all USB devices with standard devices.<br>3. Turn on the computer.<br>4. Run the diagnostic test again. |
| | | Failed | Any failure message | Call for service. |
| 020 | PCI interface | Failed | System board | Call for service. |
| 030 | SCSI interface | Failed | SCSI adapter in slot *n* failed register/counter/power test<br><br>(where *n* is the slot number of the failing adapter) | See the information provided with the adapter for instructions.<br><br>If the problem remains, call for service. |
| 089 | Microprocessor test | Failed | Any failure message | 1. Verify that the microprocessor is installed and seated correctly.<br>2. If your computer does not have the latest level of BIOS code installed, update the BIOS code to the latest level.<br>3. If the problem remains, call for service. |
| 175 | System thermal | Failed | Fan # *n*<br><br>(where *n* is the number of the failing fan) | Replace the indicated fan. |
| | | | Temperature sensed on system board is out of range | Call for service. |
| 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 *n*<br><br>(where *n* is the number of the socket that contains the failing DIMM) | 1. Reseat the failing DIMM.<br>2. If the problem remains, replace the DIMM.<br>If the problem remains, call for service. |
| | | | Test setup error: Corrupt BIOS in ROM | If your computer does not have the latest level of BIOS code installed, update the BIOS code to the latest level.<br><br>If the problem remains, call for service. |
| | | | Test setup error: Corrupt DMI BIOS, information in BIOS is not as expected | |
| 202 | Microprocessor cache | Failed | Any failure message | 1. Verify the microprocessor is installed and seated correctly.<br>2. If your computer does not have the latest level of BIOS code installed, update the BIOS code to the latest level.<br>3. If the problem remains, call for service. |
| 206 | Diskette drive | Failed | Internal diskette drive | 1. Run the test with another diskette drive.<br>2. Verify that the cables are properly connected to the diskette drive.<br>3. Run the test again.<br>4. Call for service. |
| 215 | CD-ROM | Failed | On system board. | 1. Run the test with another CD-ROM drive.<br>2. Verify that the cables are properly connected to the CD-ROM drive.<br>3. Run the test again.<br>4. 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. |

| Code | Function | Result | Text message | Action |
|------|----------|--------|--------------|--------|
| 217 | Hard disk drive | Failed | drive # *n* (where n is the drive bay number) | 1. Check the cables and power connections to the drive. 2. Replace the hard disk drive. 3. Call for service. |
|  |  | Aborted | Could not establish drive parameters | 1. Check the cables and power connections to the drive. 2. Replace the hard disk drive. 3. Call for service. |

| Code | Function | Result | Text message | Action |
|------|----------|--------|--------------|--------|
| 264 | Magnetic tape drive | Aborted | Test setup error: No tape drive found | 1. Check the cables and power connections to the drive.<br>2. See the information provided with the tape drive.<br>3. See the error messages and text in the PC-Doctor error log for detailed information about each tape drive error.<br>4. If the problem remains, call for service. |
| | | Failed | The load/mount test failed for device *n* on adapter *m*<br><br>(where *n* is the number of the device and *m* is the adapter number)<br><br>The self-diagnostic failed for device *n* on adapter *m.*<br><br>(where *n* is the number of the device and *m* is the adapter number)<br><br>The unload/eject test failed for device *n* on adapter *m*<br><br>(where *n* is the number of the device and *m* is the adapter number)<br><br>The unload/eject push button test failed for device *n* on adapter *m*<br><br>(where *n* is the number of the device and *m* is the adapter number) | See the information provided with the tape drive.<br><br>If the problem remains, call for service.<br>**Note:** The push button test is applicable only to SCSI tape drives that have a push button. |
| | | | The Read/Write Self-diagnostic failed for device *n* on adapter *m*<br><br>(where *n* is the number of the device and *m* is the adapter number) | Insert a new tape cartridge; then, run the diagnostic test again.<br><br>See the information that is provided with the tape drive.<br><br>If the problem remains, call for service. |

| Code | Function | Result | Text message | Action |
|------|----------|--------|--------------|--------|
| 301 | Keyboard | Failed | On system-board keyboard test failed | 1. Verify that the keyboard cable is connected to the correct port (for example, verify that it is not connected to the mouse port).<br>2. If the problem remains, replace the keyboard cable.<br>3. Replace the keyboard.<br>4. Call for service. |
| 302 | Mouse | Failed | On system-board pointing device test failed. | 1. Verify that the pointing device (mouse) cable is properly connected to the correct port.<br>2. Replace the pointing device.<br>3. Call for service. |
| 305 | Video monitor | | Any message | Refer to the information that came with the monitor. |
| 405 | Ethernet | Failed | In PCI slot *n*<br><br>(where *n* is the PCI slot number in which the failing Ethernet adapter is installed) | 1. Replace the Ethernet adapter in slot *n.*<br>2. If the problem remains, call for service. |
| | | | On system board | 1. Verify that the Ethernet adapter is not disabled in the BIOS.<br>2. Call for service. |
| 415 | Modem | Failed | Any failure message | 1. Verify that the modem is present and properly connected to the computer.<br>2. Replace the modem cable.<br>3. Replace the modem.<br>4. Call for service. |

# Small computer system interface (SCSI) messages

If you receive a SCSI error message when running the SCSISelect Utility program, one or more of the following might be causing the problem:

- A failing SCSI device (adapter or drive)
- An improper SCSI configuration

- Duplicate SCSI IDs in the same SCSI chain
- An improperly installed SCSI terminator
- A defective SCSI terminator
- An improperly installed cable
- A defective cable

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

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

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

## 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**.
2. Follow the instructions on the screen. Help is available online.

## Troubleshooting charts

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

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

See "Starting the diagnostic programs and viewing the test log" on page 86 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 whether your computer is running correctly.
3. Reinstall the new software or new device.

# CD-ROM drive problems

| CD-ROM Drive symptom | Suggested action |
|---|---|
| CD-ROM drive is not recognized. | Verify that:<br>• The IDE channel to which the CD-ROM drive is attached (primary or secondary) is enabled in the Configuration/Setup Utility program.<br>• All cables and jumpers are installed correctly.<br>• The correct device driver is installed for the CD-ROM drive.<br><br>If the problem remains, call for service. |
| CD is not working properly. | Clean the CD.<br><br>If the problem remains, call for service. |
| CD-ROM drive tray is not working. (The computer must be turned on.) | Insert the end of a straightened paper clip into the manual tray-release opening.<br><br>If the problem remains, call for service. |

# Diskette drive problems

| Diskette drive symptom | Suggested action |
|---|---|
| Diskette drive activity LED stays on, or the system bypasses the diskette drive. | 1. If there is a diskette in the drive, verify that:<br>  • The diskette drive is enabled in the Configuration/Setup utility program.<br>  • The diskette is good and not damaged. (Try another diskette if you have one.)<br>  • The diskette is inserted correctly in the drive.<br>  • The diskette contains the necessary files to start the computer.<br>  • The software program is working properly.<br>  • The cable is installed correctly (in the proper orientation).<br>2. To prevent diskette drive read/write errors, be sure the distance between monitors and diskette drives is at least 76 mm (3 in.).<br><br>If the problem remains, call for service. |

# Hard disk drive problems

| Hard disk drive symptom | Suggested action |
|---|---|
| Not all drives are recognized by the hard disk drive diagnostic test (Fixed Disk test). | 1. Remove the first drive not recognized and try the hard disk drive diagnostic test again.<br>2. If the remaining drives are recognized, replace the drive you removed with a new one.<br><br>If the problem remains, call for service. |
| System stops responding during hard disk drive diagnostic test. | 1. Remove the hard disk drive being tested when the computer stopped responding and try the diagnostic test again.<br>2. If the hard disk drive diagnostic test runs successfully, replace the drive you removed with a new one.<br><br>If the problem remains, call for service. |

# General problems

| General problem symptom | Suggested action |
|---|---|
| Problems such as broken cover locks or indicator LEDs not working | Call for service. |

# Intermittent problems

| Intermittent problem symptom | Suggested action |
|---|---|
| A problem occurs only occasionally and is difficult to detect. | Verify that:<br>• All cables and cords are connected securely to the rear of the computer and attached options.<br>• When the computer is turned on, air is flowing from the rear of the computer at the fan grill. If there is no airflow, the fan is not working. This causes the computer to overheat and shut down.<br>• Ensure that the SCSI bus and devices are configured correctly and that the last external device in each SCSI chain is terminated correctly.<br><br>If the problem remains, call for service. |

# Keyboard, mouse, or pointing-device problems

| Keyboard, mouse, or pointing-device symptom | Suggested action |
|---|---|
| All or some keys on the keyboard do not work. | Verify that:<br>• The keyboard cable is securely connected to the system, and the keyboard and mouse cables are not reversed.<br>• Both the computer and the monitor are turned on.<br>• Try using another keyboard.<br><br>If the problem remains, call for service. |
| The mouse or pointing device does not work. | Verify that:<br>• The mouse or pointing-device cable is securely connected, and that the keyboard and mouse cables are not reversed.<br>• The mouse device drivers are installed correctly.<br>• Both the computer and the monitor are turned on.<br>• Try using another mouse or pointing device.<br><br>If the problem remains, call for service. |

## Memory problems

| Memory symptom | Suggested action |
|---|---|
| The amount of system memory displayed is less than the amount of physical memory installed. | 1. Verify that:<br>  • The memory modules are seated properly.<br>  • You have installed the correct type of memory.<br>  • If you changed the memory, you updated the memory configuration with the Configuration/Setup Utility program.<br>  • All banks of memory on the DIMMs are enabled. The computer might have automatically disabled a DIMM bank when it detected a problem or a DIMM bank could have been manually disabled.<br>2. Check POST error log for error message 289:<br>  • If the DIMM was disabled by a system-management interrupt (SMI), replace the DIMM.<br>  • If the DIMM was disabled by the user or by POST:<br>    a. Start the Configuration/Setup Utility program.<br>    b. Enable the DIMM.<br>    c. Save the configuration and restart the computer.<br><br>If the problem remains, call for service. |

## Microprocessor problems

| Microprocessor symptom | Suggested action |
|---|---|
| The computer emits a continuous tone during POST. (The startup (boot) microprocessor is not working properly.) | Call for service. |

## Monitor problems

| Monitor symptom | Suggested action |
|---|---|
| Testing the monitor. | See the information that comes with the monitor for adjusting and testing instructions. (Some IBM monitors have their own self-tests.) |
| The screen is blank. | Verify that:<br>• The computer power cord is plugged into the computer and a working electrical outlet.<br>• The monitor cables are connected properly.<br>• The monitor is turned on and the Brightness and Contrast controls are adjusted correctly.<br><br>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:<br>• The application program is not setting a display mode higher than the capability of the monitor.<br>• The primary monitor cable is connected to the video port or C2T device breakout cable.<br>• You installed the necessary device drivers for the applications.<br><br>If the problem remains, call for service. |

| Monitor symptom | Suggested action |
|---|---|
| The screen is wavy, unreadable, rolling, distorted, or has screen jitter. | If the monitor 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.<br><br>**Notes:**<br><br>1. To prevent diskette drive read/write errors, be sure the distance between monitors and diskette drives is at least 76 mm (3 in.).<br><br>2. Non-IBM monitor cables might cause unpredictable problems.<br><br>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.<br><br>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.<br><br>If the problem remains, call for service. |
| No video. | 1. Make sure the correct machine is selected, if applicable.<br><br>2. Make sure all cables are locked down.<br><br>If the problem remains, call for service. |

## Option problems

| Option symptom | Suggested action |
|---|---|
| An IBM option that was just installed does not work. | 1. Verify that:<br>  • The option is designed for the computer (see the ServerProven® list on the World Wide Web at http://www.ibm.com/pc/compat/).<br>  • You followed the installation instructions that came with the option.<br>  • The option is installed correctly.<br>  • You have not loosened any other installed options or cables.<br>  • You updated the configuration information in the Configuration/Setup Utility program. Whenever memory or an option is changed, you must update the configuration.<br><br>2. Replace the option you just installed.<br><br>If the problem remains, call for service. |
| An IBM option that used to work does not work now. | 1. Verify that all of the option hardware and cable connections are secure.<br><br>2. If the option comes with its own test instructions, use those instructions to test the option.<br><br>3. If the failing option is a SCSI option, verify that:<br>  • The cables for all external SCSI options are connected correctly.<br>  • The last option in each SCSI chain, or the end of the SCSI cable, is terminated correctly.<br>  • Any external SCSI option is turned on. You must turn on an external SCSI option before turning on the computer.<br><br>4. Replace the failing option.<br><br>If the problem remains, call for service. |

# Parallel port problems

| Parallel port symptom | Suggested action |
|---|---|
| A parallel device does not work. | Verify that:<br>1. The device is compatible with the computer.<br>2. The parallel port is enabled.<br><br>If the problem remains, call for service. |

# Power problems

| Power symptom | Suggested action |
|---|---|
| Power switch does not work and reset button, if supported, does work. | Call for service. |
| The computer does not turn on. | Verify that:<br>• The power cords are properly connected to the computer.<br>• The electrical outlet functions properly.<br>• The type of memory installed is correct.<br>• 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.<br><br>If the problem remains, call for service. |
| The computer does not turn off. | Verify whether you are using an ACPI or non-ACPI operating system. If you are using a non-ACPI operating system:<br>1. Press Ctrl+Alt+Delete.<br>2. Turn off the computer by holding the power-control button for 4 seconds.<br>3. If computer fails during BIOS POST and the power-control button does not work, remove the ac power cord.<br><br>If the problem remains, call for service. |

# Printer problems

| Printer symptom | Suggested action |
|---|---|
| The printer does not work. | Verify that:<br>1. The printer is turned on and is online.<br>2. The printer signal cable is connected to the correct serial or parallel port on the computer.<br>**Note:** Non-IBM printer cables might cause unpredictable results.<br>3. You have assigned the printer port correctly in your operating computer or application program.<br>4. You have assigned the printer port correctly using the Configuration/Setup Utility program.<br>5. You have run the tests described in the documentation that comes with your printer.<br><br>If the problem remains, call for service. |

# Serial port problems

| Serial port symptom | Suggested action |
| --- | --- |
| The number of serial ports identified by the operating system is less than the number of serial ports installed. | Verify that:<br>• Each port is assigned a unique address by the Configuration/Setup Utility program and none of the serial ports is disabled.<br>• The serial-port adapter, if you installed one, is seated properly.<br><br>If the problem remains, call for service. |
| A serial device does not work. | 1. Verify that:<br>  • The device is compatible with the computer.<br>  • The serial port is enabled and is assigned a unique address.<br>  • The device is connected to the correct port.<br>2. Run serial port diagnostics.<br>3. Replace the failing serial device.<br><br>If the problem remains, call for service. |

# Software problems

| Software problem symptom | Suggested action |
| --- | --- |
| Suspected software problem. | 1. To determine if problems are caused by the software, verify that:<br>  • The computer has the minimum memory needed to use the software. For memory requirements, see the information that comes with the software.<br>    **Note:** If you have just installed an adapter or memory, you might have a memory address conflict.<br>  • The software is designed to operate on the computer.<br>  • Other software works on the computer.<br>  • The software that you are using works on another computer.<br><br>  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 suggested solutions to the problem.<br>2. If you have verified these items and the problem remains, contact your software place of purchase. |

# Universal Serial Bus (USB) port problems

| Universal Serial Bus (USB) port symptom | Suggested action |
| --- | --- |
| A USB device does not work. | Verify that:<br>• You are not trying to use a USB device during POST if you have a standard (non-USB) keyboard attached to the keyboard port.<br>  **Note:** If a standard (non-USB) keyboard is attached to the keyboard port, the USB is disabled and no USB device will work during POST.<br>• The correct USB device driver is installed.<br>• The operating system supports USB devices.<br><br>If the problem remains, call for service. |

# System-board error LEDs

The following illustration shows the error LEDs on the system board.

Each error LED is lit to indicate a problem with a specific component. After a problem is corrected, the LED will not be lit the next time the computer is restarted. If the problem remains, the LED will continue to be lit. For information about how to correct the problems indicated by the error LEDs, see the "Diagnostic error message tables" on page 88.

DIMM error LEDs
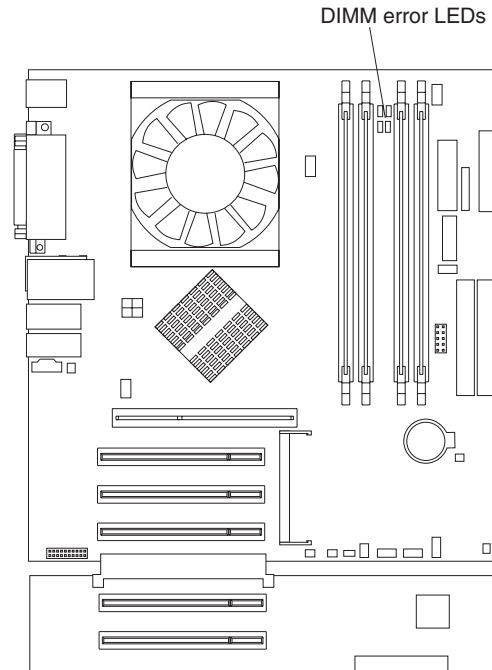
## Software error messages

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 whether 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* 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 the operating system

Your computer has the Product Recovery program on a hidden partition of the hard disk. 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; otherwise, 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 109 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 Windows 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-control 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 in Windows" on page 104.

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.
7. Restart the computer.

Complete the following steps to recover the Red Hat Linux 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-control 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 operating system menu to display; then, quickly select the following:

   `IBM Preload Recovery & Diagnostics`
4. Select the recovery options you want and follow the instructions on the screen.
5. When recovery is complete, exit from the program.
6. Your computer will restart automatically.

## Recovering or installing device drivers

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

**Notes:**
1. Before you can recover or install device drivers, your operating system must be installed on your computer.
2. Ensure that you have the documentation and software media for the device before you start recovering or installing device drivers.
3. Device drivers for IBM devices and the instructions to install them (readme.txt) are on the *Device Drivers* 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.

## Creating and using an IBM Enhanced Diagnostics diskette in Windows

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

Use one of the following methods to create an IBM Enhanced Diagnostics diskette.

Complete the following steps to create a startable IBM Enhanced Diagnostics diskette from the Product Recovery program on the hard drive partition:

1. Restart your computer and watch the monitor.
2. When the message, `To start the Product Recovery Program`, Press F11 appears, quickly Press F11.
3. Select **System utilities**.
4. Next, select **Create IBM Enhanced Diagnostics Diskette**.
5. Follow the instructions on the screen.

Complete the following steps to create a startable IBM Enhanced Diagnostics diskette from the World Wide Web:

1. Go to http://www.ibm.com.
2. Click **Support & downloads**.
3. Click **Search technical support**.
4. In the **Enter keyword(s)** field, type `diagnostics 6220 or 6230`, and click **Submit**.
5. From the "Search results" page, click the Enhanced Diagnostics item for your computer.
6. On the next page, click the executable file for the Enhanced Diagnostics code to download it (be sure to download the file to a hard disk directory and not to a diskette). You can click the text file to display the readme file.
7. At a command prompt, change to the directory where the file was downloaded.
8. Insert a blank, high-density diskette into the diskette drive.
9. Type `filename x:` where `filename` is the name of the file you downloaded and `x` is the letter for the diskette drive; then, press Enter.

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

## Using the IBM 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 Windows

In some circumstances, files on your hard disk might become damaged so that the F11 prompt is not displayed when you start 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 recovery-repair diskette in Windows" on page 14.
1. Insert the recovery-repair diskette into the diskette drive.
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 109 for details.

# Updating (flash-updating) the BIOS code on your computer

Periodically, IBM might post new levels of BIOS code on the Web. Always check the IBM Support Web site at http://www.ibm.com/pc/support/ for the latest level of BIOS code, device drivers, documentation, and hints and tips. You can use one of the following methods to update (flash) the BIOS code on your computer:

- Download the BIOS code update file directly to your hard disk.
- Download the BIOS code update file to a diskette (use an external Universal Serial Bus [USB] portable diskette drive if your computer does not have an integrated diskette drive); then, update the BIOS code on your computer.

  Contact IBM to order an optional IBM USB Portable Diskette Drive (part number 05K9276).
- Download the BIOS code update file to a CD using a writeable optional device (CD-RW drive); then, start the server with the CD in the CD-ROM drive to update the BIOS code on your computer.

One file is available for each method. The description next to each file indicates the type of medium to which you can download the file. A readme file is available with instructions for installing the BIOS code update.

Complete the following steps to download the BIOS (flash) update files:

1. Go to http://www.ibm.com/pc/support/.
2. In the **Downloads** category, click **Downloads & drivers**.
3. In the **Brand** field, select **IntelliStation**.
4. In the **Family** field, select **IntelliStation M Pro**.
5. In the **Type** field, select **6220** or **6230** and click **Continue**.
6. In the **Filter by category** field, select **BIOS (system)**.
7. Scroll down and select the applicable file for your operating system.
8. Select the file for the type of medium you want to use; then, download the file and install it.
9. Restart the computer.

See the readme file for additional infomation about how to install the image files.

# Recovering from a POST/BIOS update failure

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

1. Review the safety information beginning on page vii and "Handling static-sensitive devices" on page 29.
2. Turn off the computer and all attached devices.
3. Unplug the power cord.
4. Remove the cover and support bracket.
5. Locate the boot block recovery jumper (J6) on the system board. Remove any adapters that impede access to the jumper. The following illustration shows the

location of the boot block jumper on the system board.



Boot block
jumper (J6)
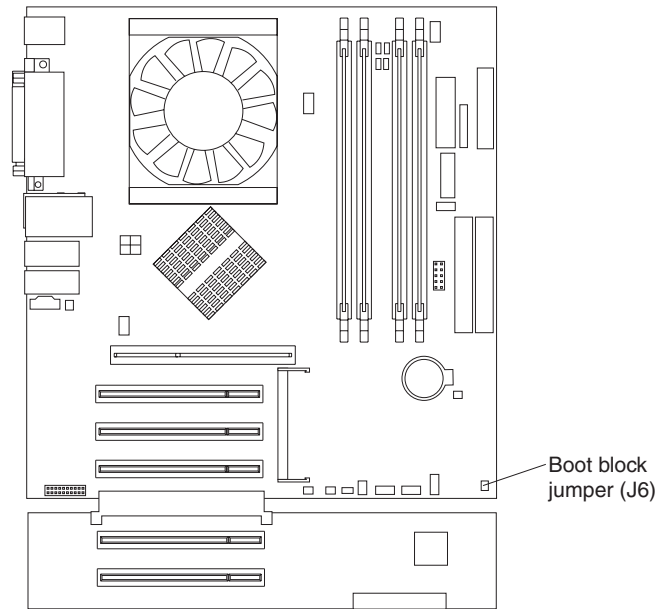
6.  Remove the boot block recovery jumper from pins 1 and 2.
7.  Replace any adapters that were removed; then, replace the support bracket and replace the cover.
8.  Connect the computer to a power source, keyboard, monitor, and mouse.
9.  Insert the POST/BIOS update (flash) diskette into the diskette drive. You can download a file to create this diskette from http://www.ibm.com/pc/support/ on the World Wide Web. For more information, see Appendix A, "Getting help and technical assistance," on page 109.
10. Turn on the computer and the monitor.
11. After the update session is completed, turn off the computer and monitor.
12. Remove the diskette from the diskette drive.
13. Disconnect all power cords; then, remove the computer cover.
14. Return the boot block recovery jumper to pins 1 and 2.
15. Replace the computer cover; then, reconnect all external cables and power cords and turn on the peripheral devices.
16. 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" 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 computer and reset the system date and time.

Complete the following steps to replace the battery:

1. Review the safety information beginning on page vii, "Installation guidelines" on page 29, and "Handling static-sensitive devices" on page 29.
2. Follow any special handling and installation instructions supplied with the replacement battery.
3. Turn off the computer and all attached devices. Disconnect all external cables and power cords; then, remove the computer cover and the support bracket. (See "Removing the side cover" on page 53 and "Removing and installing the support bracket" on page 54.)
4. Remove the battery:
   a. Use a 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.
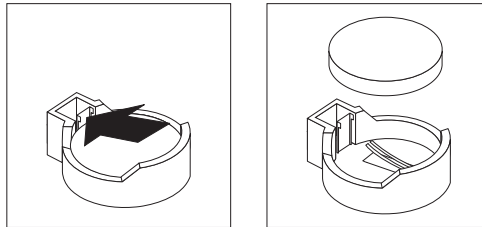
5. Insert the new battery:
   a. Tilt the battery so that you can insert it into the socket on the side opposite the battery clip.
   b. Press the battery down into the socket until it clicks into place. Make sure the battery clip holds the battery securely.
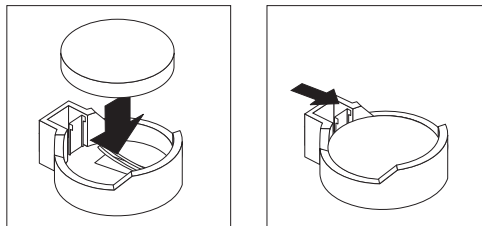
6. Replace the support bracket (see "Removing and installing the support bracket" on page 54).
7. Replace the cover and connect the cables.
8. Turn on the computer.
9. Start the Configuration/Setup Utility program and set configuration parameters.
   • Set the system date and time.
   • Set passwords 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. Information about diagnostic tools is in the *Hardware Maintenance Manual and Troubleshooting Guide* on the IBM *xSeries Documentation* CD or in the IntelliStation *Hardware Maintenance Manual* at the IBM Support Web site.
- 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 or to submit a request for information.

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.ibmlink.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/.

# 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, or in the U.S. and Canada, call 1-800-IBM-SERV (1-800-426-7378).

# 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, or in the U.S. and Canada, call 1-800-IBM-SERV (1-800-426-7378).

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. IBM Statement of Limited Warranty Z125-4753-07 11/2002

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

## Part 1 - General Terms

*This Statement of Limited Warranty includes Part 1 - General Terms, Part 2 - Country-unique Terms, and Part 3 - Warranty Information. 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. 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.* **Nothing in this Statement of Limited Warranty affects any statutory rights of consumers that cannot be waived or limited by contract.**

**What this Warranty Covers**

IBM warrants that each Machine 1) is free from defects in materials and workmanship and 2) conforms to IBM's Official Published Specifications ("Specifications") which are available on request. The warranty period for the Machine starts on the original Date of Installation and is specified in Part 3 - Warranty Information. The date on your invoice or sales receipt is the Date of Installation unless IBM or your reseller informs you otherwise. 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. Unless IBM specifies otherwise, these warranties apply only in the country or region in which you purchased the Machine.

**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. SOME STATES OR JURISDICTIONS DO NOT ALLOW THE EXCLUSION OF EXPRESS OR IMPLIED WARRANTIES, SO THE ABOVE EXCLUSION MAY NOT APPLY TO YOU. IN THAT EVENT, SUCH WARRANTIES ARE LIMITED IN DURATION TO THE WARRANTY PERIOD. NO WARRANTIES APPLY AFTER THAT PERIOD. SOME STATES OR JURISDICTIONS DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS, SO THE ABOVE LIMITATION MAY NOT APPLY TO YOU.**

**What this Warranty Does not Cover**

This warranty does not cover the following:
- any software programs, whether pre-loaded or shipped with the Machine, or installed subsequently;

- failure resulting from misuse (including but not limited to use of any Machine capacity or capability, other than that authorized by IBM in writing), accident, modification, unsuitable physical or operating environment, or improper maintenance by you;
- failure caused by a product for which IBM is not responsible; and
- any non-IBM products, including those that IBM may procure and provide with or integrate into an IBM Machine at your request.

The warranty is voided by removal or alteration of identification labels on the Machine or its parts.

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, is provided **WITHOUT WARRANTIES OF ANY KIND**.

### How to Obtain Warranty Service

If the Machine does not function as warranted during the warranty period, contact IBM or your reseller to obtain warranty service. If you do not register the Machine with IBM, you may be required to present proof of purchase as evidence of your entitlement to warranty service.

### What IBM Will Do to Correct Problems

When you call for service, you must follow the problem determination and resolution procedures that IBM specifies. A technician will attempt to make an initial diagnosis of your problem and help you resolve it over the telephone.

The type of warranty service applicable to your Machine is specified in Part 3 - Warranty Information.

You are responsible for downloading and installing designated Machine Code (microcode, basic input/output system code (called "BIOS"), utility programs, device drivers, and diagnostics delivered with an IBM Machine) and other software updates from an IBM Internet Web site or from other electronic media, and following the instructions that IBM provides.

If your problem can be resolved with a Customer Replaceable Unit ("CRU") (e.g., keyboard, mouse, speaker, memory, hard disk drive and other easily replaceable parts), IBM will ship these parts to you for replacement by you.

If the Machine does not function as warranted during the warranty period and your problem cannot be resolved over the telephone, through your application of Machine Code or software updates, or with a CRU, IBM or your reseller, if approved by IBM to provide warranty service, will either, at its discretion, 1) repair it to make it function as warranted, or 2) replace it with one that is at least functionally equivalent. If IBM is unable to do either, you may return the Machine to your place of purchase and your money will be refunded.

IBM or your reseller will also manage and install selected engineering changes that apply to the Machine.

### Exchange of a Machine or Part

When the 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.

**Your Additional Responsibilities**

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 service request procedures that IBM or your reseller provides;
   b. backup or secure all programs, data, and funds contained in the Machine;
   c. provide IBM or your reseller with sufficient, free, and safe access to your facilities to permit IBM to fulfill its obligations; and
   d. inform IBM or your reseller of changes in the Machine's location.
4. (a) ensure all information about identified or identifiable individuals (Personal Data) is deleted from the Machine (to the extent technically possible), (b) allow IBM, your reseller or an IBM supplier to process on your behalf any remaining Personal Data as IBM or your reseller considers necessary to fulfill its obligations under this Statement of Limited Warranty (which may include shipping the Machine for such processing to other IBM service locations around the world), and (c) ensure that such processing complies with any laws applicable to such Personal Data.

**Limitation of Liability**

IBM is responsible for loss of, or damage to, your Machine only 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 are responsible for any of your confidential, proprietary or personal information contained in a Machine which you return to IBM for any reason. You should remove all such information from the Machine prior to its return.

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 ("LIC").

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, ITS SUPPLIERS OR RESELLERS LIABLE FOR ANY OF THE FOLLOWING EVEN IF INFORMED OF THEIR POSSIBILITY: 1) THIRD PARTY CLAIMS AGAINST YOU FOR DAMAGES (OTHER THAN THOSE UNDER THE FIRST ITEM LISTED ABOVE); 2) LOSS OF, OR DAMAGE TO, DATA; 3) SPECIAL, INCIDENTAL, OR INDIRECT DAMAGES OR FOR ANY ECONOMIC CONSEQUENTIAL DAMAGES; OR 4) LOST PROFITS, BUSINESS REVENUE, GOODWILL OR ANTICIPATED SAVINGS. SOME STATES OR JURISDICTIONS DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU. SOME STATES OR JURISDICTIONS DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS, SO THE ABOVE LIMITATION 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 Statement of Limited Warranty, without regard to conflict of law principles.

**THESE WARRANTIES GIVE YOU SPECIFIC LEGAL RIGHTS AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM STATE TO STATE OR JURISDICTION TO JURISDICTION.**

### Jurisdiction

All of our rights, duties, and obligations are subject to the courts of the country in which you acquired the Machine.

# Part 2 - Country-unique Terms

### AMERICAS

**ARGENTINA**

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

Any litigation arising from this Statement of Limited Warranty will be settled exclusively by the Ordinary Commercial Court of the city of Buenos Aires.

**BRAZIL**

**Governing Law:** *The following is added after the first sentence:*
Any litigation arising from this Statement of Limited Warranty will be settled exclusively by the court of Rio de Janeiro, RJ.

**PERU**

**Limitation of Liability:** *The following is added at the end of this section:*

In accordance with Article 1328 of the Peruvian Civil Code the limitations and exclusions specified in this section will not apply to damages caused by IBM's willful misconduct ("dolo") or gross negligence ("culpa inexcusable").

## NORTH AMERICA

**How to Obtain 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

**Limitation of Liability:** *The following replaces item 1 of this section:*
1.  damages for bodily injury (including death) or physical harm to real property and tangible personal property caused by IBM's negligence; and

**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

**What this Warranty Covers:** *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, United States of America.

## CAMBODIA, INDONESIA, LAOS, AND VIETNAM

**Arbitration:** *The following is added under this heading:*
Disputes arising out of or in connection with this Statement of Limited Warranty shall be finally settled by arbitration which shall be held in Singapore in accordance with the Arbitration Rules of Singapore International Arbitration Center ("SIAC Rules") then in effect. The arbitration award shall be final and binding for the parties without appeal and shall be in writing and set forth the findings of fact and the conclusions of law.

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 who shall act as chairman of the proceedings. Vacancies in the post of chairman shall be filled by the president of the SIAC. 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.

All proceedings shall be conducted, including all documents presented in such proceedings, in the English language. The English language version of this Statement of Limited Warranty prevails over any other language version.

**HONG KONG S.A.R. OF CHINA AND MACAU S.A.R. OF CHINA**

**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 of China.

**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; and
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, the charge paid by you for the individual Machine that is the subject of the claim. For purposes of this item, the term "Machine" includes Machine Code and Licensed Internal Code ("LIC").

**Arbitration:** *The following is added under this heading:*

Disputes arising out of or in connection with this Statement of Limited Warranty shall be finally settled by arbitration which shall be held in Bangalore, India in accordance with the laws of India then in effect. The arbitration award shall be final and binding for the parties without appeal and shall be in writing and set forth the findings of fact and the conclusions of law.

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 who shall act as chairman of the proceedings. Vacancies in the post of chairman shall be filled by the president of the Bar Council of India. 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.

All proceedings shall be conducted, including all documents presented in such proceedings, in the English language. The English language version of this Statement of Limited Warranty prevails over any other language version.

**JAPAN**

**Governing Law:** *The following sentence is added to this section:*
Any doubts concerning this Statement of Limited Warranty will be initially resolved between us in good faith and in accordance with the principle of mutual trust.

**MALAYSIA**

**Limitation of Liability:** *The word "**SPECIAL**" in item 3 of the fifth paragraph is deleted.*

**NEW ZEALAND**

**What this Warranty Covers:** *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 "laws of the country in which you acquired the Machine" in the first sentence:*

laws of the State of New York, United States of America (except when local law requires otherwise).

**PHILIPPINES**

**Limitation of Liability:** *Item 3 in the fifth paragraph is replaced by the following:*

**SPECIAL (INCLUDING NOMINAL AND EXEMPLARY DAMAGES), MORAL, INCIDENTAL, OR INDIRECT DAMAGES FOR ANY ECONOMIC CONSEQUENTIAL DAMAGES; OR**

**Arbitration:** *The following is added under this heading:*

Disputes arising out of or in connection with this Statement of Limited Warranty shall be finally settled by arbitration which shall be held in Metro Manila, Philippines in accordance with the laws of the Philippines then in effect. The arbitration award shall be final and binding for the parties without appeal and shall be in writing and set forth the findings of fact and the conclusions of law.

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 who shall act as chairman of the proceedings. Vacancies in the post of chairman shall be filled by the president of the Philippine Dispute Resolution Center, Inc. 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.

All proceedings shall be conducted, including all documents presented in such proceedings, in the English language. The English language version of this Statement of Limited Warranty prevails over any other language version.

**SINGAPORE**

**Limitation of Liability:** *The words "***SPECIAL***" and "***ECONOMIC***" in item 3 in the fifth paragraph are deleted.*

<u>**EUROPE, MIDDLE EAST, AFRICA (EMEA)**</u>

***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.

**Hot to Obtain Warranty Service:** If you purchase a Machine in Austria, Belgium, Cyprus, Denmark, Estonia, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Monaco, Netherlands, Norway, Portugal, Spain, San Marino, Sweden, Switzerland, United Kingdom or Vatican State, 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, provided the Machine has been announced and made available by IBM in the country in which you wish to obtain service. If you purchased a Personal Computer Machine in Albania, Armenia, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Georgia, Hungary, Kazakhstan, Kyrgyzstan, 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 a 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 approved service provider. You are responsible for transportation costs for Machines located outside 50 kilometers of an IBM approved service provider.

*Add the following paragraph in* **Western Europe** *(Austria, Belgium, Cyprus, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Liechtenstein, Luxembourg, Monaco, Netherlands, Norway, Portugal, Spain, San Marino, Sweden, Switzerland, United Kingdom, Vatican State):*

The warranty for Machines acquired in Western Europe shall be valid and applicable in all Western Europe countries provided the Machines have been announced and made available in such countries.

**Governing Law:**

*The phrase "the laws of the country in which you acquired the Machine" is replaced by:*

1) "the laws of Austria" **in Albania, Armenia, Azerbaijan, Belarus, Bosnia-Herzegovina, Bulgaria, Croatia, Georgia, Hungary, Kazakhstan, Kyrgyzstan, FYR Macedonia, Moldova, Poland, Romania, Russia, Slovakia, Slovenia, Tajikistan, Turkmenistan, Ukraine, Uzbekistan, and FR Yugoslavia;** 2) "the laws of France" **in Algeria, Benin, Burkina Faso, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Congo Republic, Djibouti, Democratic Republic of Congo, Equatorial Guinea, French Guiana, French Polynesia, Gabon, Gambia, Guinea, Guinea-Bissau, Ivory Coast, Lebanon, Madagascar, Mali, Mauritania, Mauritius, Mayotte, Morocco, New Caledonia, Niger, Reunion, Senegal, Seychelles, Togo, Tunisia, Vanuatu, and Wallis & Futuna;** 3) "the laws of Finland" **in Estonia, Latvia, and Lithuania;** 4) "the laws of England" **in 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, the United Kingdom, West Bank/Gaza, Yemen, Zambia, and Zimbabwe;** and 5) "the laws of South Africa" **in South Africa, Namibia, Lesotho and Swaziland.**

**Jurisdiction:** *The following exceptions are added to this section:*

1) **In Austria** the choice of jurisdiction for all disputes arising out of this Statement of Limited Warranty and relating thereto, including its existence, will be the competent court of law in Vienna, Austria (Inner-City); 2) **in 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, West Bank/Gaza, Yemen, Zambia, and Zimbabwe** all disputes arising out of this Statement of Limited Warranty or related to its execution, including summary proceedings, will be submitted to the exclusive jurisdiction of the English courts; 3) in **Belgium** and **Luxembourg**, all disputes arising out of this Statement of Limited Warranty or related to its interpretation or its execution, the law, and the courts of the capital city, of the country of your registered office and/or commercial site location only are competent; 4) **in France, Algeria, Benin, Burkina Faso, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Congo Republic, Djibouti, Democratic Republic of Congo, Equatorial Guinea, French Guiana, French Polynesia, Gabon, Gambia, Guinea, Guinea-Bissau, Ivory Coast, Lebanon, Madagascar, Mali, Mauritania, Mauritius, Mayotte, Morocco, New Caledonia, Niger, Reunion, Senegal, Seychelles, Togo, Tunisia, Vanuatu, and Wallis & Futuna** all disputes arising out of this Statement of Limited Warranty or related to its violation or execution, including summary proceedings, will be settled exclusively by the Commercial Court of Paris; 5) **in Russia**, all disputes arising out of or in relation to the interpretation, the violation, the termination, the nullity of the execution of this Statement of Limited Warranty shall be settled by Arbitration Court of Moscow; 6) **in South Africa, Namibia, Lesotho and Swaziland**, both of us agree to submit all disputes relating to this Statement of Limited Warranty to the jurisdiction of the High Court in Johannesburg; 7) **in Turkey** all disputes arising out of or in connection with this Statement of Limited Warranty

shall be resolved by the Istanbul Central (Sultanahmet) Courts and Execution Directorates of Istanbul, the Republic of Turkey; 8) in each of the following specified countries, any legal claim arising out of this Statement of Limited Warranty will be brought before, and settled exclusively by, the competent court of a) Athens for **Greece**, b) Tel Aviv-Jaffa for **Israel**, c) Milan for **Italy**, d) Lisbon for **Portugal**, and e) Madrid for **Spain**; and 9) **in the United Kingdom**, both of us agree to submit all disputes relating to this Statement of Limited Warranty to the jurisdiction of the English courts.

**Arbitration:** *The following is added under this heading:*

**In Albania, Armenia, Azerbaijan, Belarus, Bosnia-Herzegovina, Bulgaria, Croatia, Georgia, Hungary, Kazakhstan, Kyrgyzstan, FYR Macedonia, Moldova, Poland, Romania, Russia, Slovakia, Slovenia, Tajikistan, Turkmenistan, Ukraine, Uzbekistan, and FR Yugoslavia** all disputes arising out of this Statement of Limited Warranty or related to its violation, termination or nullity will be finally settled under the Rules of Arbitration and Conciliation of the International Arbitral Center of the Federal Economic Chamber in Vienna (Vienna Rules) by three arbitrators appointed in accordance with these rules. The arbitration will be held in Vienna, Austria, and the official language of the proceedings will be English. The decision of the arbitrators will be final and binding upon both parties. Therefore, pursuant to paragraph 598 (2) of the Austrian Code of Civil Procedure, the parties expressly waive the application of paragraph 595 (1) figure 7 of the Code. IBM may, however, institute proceedings in a competent court in the country of installation.

**In Estonia, Latvia and Lithuania** all disputes arising in connection with this Statement of Limited Warranty will be finally settled in arbitration that will be held in Helsinki, Finland in accordance with the arbitration laws of Finland then in effect. Each party will appoint one arbitrator. The arbitrators will then jointly appoint the chairman. If arbitrators cannot agree on the chairman, then the Central Chamber of Commerce in Helsinki will appoint the chairman.

**EUROPEAN UNION (EU)**

*THE FOLLOWING TERMS APPLY TO ALL EU COUNTRIES:*

Consumers have legal rights under applicable national legislation governing the sale of consumer goods. Such rights are not affected by the warranties provided in this Statement of Limited Warranty.

**How to Obtain Warranty Service:** *The following is added to this section:*

To obtain warranty service from IBM in EU countries, see the telephone listing in Part 3 - Warranty Information.

You may contact IBM at the following address:
    IBM Warranty & Service Quality Dept.
    PO Box 30
    Spango Valley
    Greenock
    Scotland PA16 0AH

**AUSTRIA, DENMARK, FINLAND, GREECE, ITALY, NETHERLANDS, PORTUGAL, SPAIN, SWEDEN AND SWITZERLAND**

**Limitation of Liability:** *The following replaces the terms of this section in its entirety:*

Except as otherwise provided by mandatory law:
1.  IBM's liability for any damages and losses that may arise as a consequence of the fulfillment of its obligations under or in connection with this Statement of Limited Warranty or due to any other cause related to this Statement of Limited Warranty is limited to the compensation of only those damages and losses proved and actually arising as an immediate and direct consequence of the non-fulfillment of such obligations (if IBM is at fault) or of such cause, for a maximum amount equal to the charges you paid for the Machine. For purposes of this item, the term "Machine" includes Machine Code and Licensed Internal Code ("LIC").

    The above limitation shall not apply to damages for bodily injuries (including death) and damages to real property and tangible personal property for which IBM is legally liable.
2.  **UNDER NO CIRCUMSTANCES IS IBM, ITS SUPPLIERS OR RESELLERS LIABLE FOR ANY OF THE FOLLOWING, EVEN IF INFORMED OF THEIR POSSIBILITY: 1) LOSS OF, OR DAMAGE TO, DATA; 2) INCIDENTAL OR INDIRECT DAMAGES, OR FOR ANY ECONOMIC CONSEQUENTIAL DAMAGES; 3) LOST PROFITS, EVEN IF THEY ARISE AS AN IMMEDIATE CONSEQUENCE OF THE EVENT THAT GENERATED THE DAMAGES; OR 4) LOSS OF BUSINESS, REVENUE, GOODWILL, OR ANTICIPATED SAVINGS.**

**FRANCE AND BELGIUM**

**Limitation of Liability:** *The following replaces the terms of this section in its entirety:*

Except as otherwise provided by mandatory law:
1.  IBM's liability for any damages and losses that may arise as a consequence of the fulfillment of its obligations under or in connection with this Statement of Limited Warranty is limited to the compensation of only those damages and losses proved and actually arising as an immediate and direct consequence of the non-fulfillment of such obligations (if IBM is at fault), for a maximum amount equal to the charges you paid for the Machine that has caused the damages. For purposes of this item, the term "Machine" includes Machine Code and Licensed Internal Code ("LIC").

    The above limitation shall not apply to damages for bodily injuries (including death) and damages to real property and tangible personal property for which IBM is legally liable.
2.  **UNDER NO CIRCUMSTANCES IS IBM, ITS SUPPLIERS OR RESELLERS LIABLE FOR ANY OF THE FOLLOWING, EVEN IF INFORMED OF THEIR POSSIBILITY: 1) LOSS OF, OR DAMAGE TO, DATA; 2) INCIDENTAL OR INDIRECT DAMAGES, OR FOR ANY ECONOMIC CONSEQUENTIAL DAMAGES; 3) LOST PROFITS, EVEN IF THEY ARISE AS AN IMMEDIATE CONSEQUENCE OF THE EVENT THAT GENERATED THE DAMAGES; OR 4) LOSS OF BUSINESS, REVENUE, GOODWILL, OR ANTICIPATED SAVINGS.**

**THE FOLLOWING TERMS APPLY TO THE COUNTRY SPECIFIED:**

**AUSTRIA**

**What this Warranty Covers:** *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 warranty period for Machines is 12 months from the date of delivery. The limitation period for consumers in action for breach of warranty is the statutory period as a minimum. 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.

*The second paragraph does not apply.*

**What IBM Will Do to Correct Problems:** *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 ("LIC").

*Applicability of suppliers and resellers (unchanged).*

**FRANCE**

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

**GERMANY**

**What this Warranty Covers:** *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 twelve 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.

*The second paragraph does not apply.*

**What IBM Will Do to Correct Problems:** *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.

**HUNGARY**

**Limitation of Liability:** *The following is added at the end of this section:*

The limitation and exclusion specified herein shall not apply to liability for a breach of contract damaging life, physical well-being, or health that has been caused intentionally, by gross negligence, or by a criminal act.

The parties accept the limitations of liability as valid provisions and state that the Section 314.(2) of the Hungarian Civil Code applies as the acquisition price as well as other advantages arising out of the present Statement of Limited Warranty balance this limitation of liability.

**IRELAND**

**What this Warranty Covers:** *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 the terms of this section in its entirety:*

For the purposes of this section, a "Default" means any act, statement, omission, or negligence on the part of IBM in connection with, or in relation to, the subject matter of this Statement of Limited Warranty in respect of which IBM is legally liable to you, whether in contract or tort. A number of Defaults which together result in, or contribute to, substantially the same loss or damage will be treated as one Default occurring on the date of occurrence of the last such Default.

Circumstances may arise where, because of a Default, you are entitled to recover damages from IBM.

This section sets out the extent of IBM's liability and your sole remedy.
1. IBM will accept unlimited liability for death or personal injury caused by the negligence of IBM.
2. Subject always to the **Items for Which IBM is Not Liable** below, IBM will accept unlimited liability for physical damage to your tangible property resulting from the negligence of IBM.
3. Except as provided in items 1 and 2 above, IBM's entire liability for actual damages for any one Default will not in any event exceed the greater of 1) EUR 125,000, or 2) 125% of the amount you paid for the Machine directly relating to the Default.

**Items for Which IBM is Not Liable**

Save with respect to any liability referred to in item 1 above, under no circumstances is IBM, its suppliers or resellers liable for any of the following, even if IBM or they were informed of the possibility of such losses:
1. loss of, or damage to, data;
2. special, indirect, or consequential loss; or
3. loss of profits, business, revenue, goodwill, or anticipated savings.

**SLOVAKIA**

**Limitation of Liability:** *The following is added to the end of the last paragraph:*

The limitations apply to the extent they are not prohibited under §§ 373-386 of the Slovak Commercial Code.

**SOUTH AFRICA, NAMIBIA, BOTSWANA, LESOTHO AND SWAZILAND**

**Limitation of Liability:** *The following is added to this section:*

IBM's entire liability to you for actual damages arising in all situations involving nonperformance by IBM in respect of the subject matter of this Statement of Warranty will be limited to the charge paid by you for the individual Machine that is the subject of your claim from IBM.

**UNITED KINGDOM**

**Limitation of Liability:** *The following replaces the terms of this section in its entirety:*

For the purposes of this section, a "Default" means any act, statement, omission, or negligence on the part of IBM in connection with, or in relation to, the subject matter of this Statement of Limited Warranty in respect of which IBM is legally liable to you, whether in contract or tort. A number of Defaults which together result in, or contribute to, substantially the same loss or damage will be treated as one Default.

Circumstances may arise where, because of a Default, you are entitled to recover damages from IBM.

This section sets out the extent of IBM's liability and your sole remedy.
1. IBM will accept unlimited liability for:
   a. death or personal injury caused by the negligence of IBM; and

b. any breach of its obligations implied by Section 12 of the Sale of Goods Act 1979 or Section 2 of the Supply of Goods and Services Act 1982, or any statutory modification or re-enactment of either such Section.

2. IBM will accept unlimited liability, subject always to the **Items for Which IBM is Not Liable** below, for physical damage to your tangible property resulting from the negligence of IBM.

3. IBM's entire liability for actual damages for any one Default will not in any event, except as provided in items 1 and 2 above, exceed the greater of 1) Pounds Sterling 75,000, or 2) 125% of the total purchase price payable or the charges for the Machine directly relating to the Default.

These limits also apply to IBM's suppliers and resellers. They state the maximum for which IBM and such suppliers and resellers are collectively responsible.

**Items for Which IBM is Not Liable**

Save with respect to any liability referred to in item 1 above, under no circumstances is IBM or any of its suppliers or resellers liable for any of the following, even if IBM or they were informed of the possibility of such losses:
1. loss of, or damage to, data;
2. special, indirect, or consequential loss; or
3. loss of profits, business, revenue, goodwill, or anticipated savings.

# Part 3 - Warranty Information

This Part 3 provides information regarding the warranty applicable to your Machine, including the warranty period and type of warranty service IBM provides.

**Warranty Period**

The warranty period may vary by country or region and is specified in the table below.

**Note:** "Region" means either Hong Kong or Macau Special Administrative Region of China.

**Machine - IBM IntelliStation M Pro Types 6220 and 6230**

| Country or Region of Purchase | Warranty Period | Type of Warranty Service* |
|---|---|---|
| Worldwide | Parts - 3 years, labor - 3 years | 2 |
| * See "Types of Warranty Service" for the legend and explanations of warranty-service types. | | |

A warranty period of 3 years on parts and 1 year on labor means that IBM provides warranty service without charge for:
1. parts and labor during the first year of the warranty period; and
2. parts only, on an exchange basis, in the second and third years of the warranty period. IBM will charge you for any labor provided in performance of the repair or replacement(s) in the second and third year of the warranty period.

**Types of Warranty Service**

If required, IBM provides repair or exchange service depending on the type of warranty service specified for your Machine in the above table and as described

below. Warranty service may be provided by your reseller if approved by IBM to perform warranty service. Scheduling of service will depend upon the time of your call and is subject to parts availability. Service levels are response time objectives and are not guaranteed. The specified level of warranty service may not be available in all worldwide locations, additional charges may apply outside IBM's normal service area, contact your local IBM representative or your reseller for country and location specific information.

1. **Customer Replaceable Unit ("CRU") Service**

   IBM will ship CRU parts to you for your replacement. If IBM instructs you to return the replaced CRU, you are responsible for returning it to IBM in accordance with IBM's instructions. If you do not return the defective CRU, if IBM so instructs, within 30 days of your receipt of the replacement CRU, IBM may charge you for the replacement.

2. **On-site Service**

   IBM or your reseller will either repair or exchange the failing Machine at your location and verify its operation. You must provide suitable working area to allow disassembly and reassembly of the IBM Machine. The area must be clean, well lit and suitable for the purpose. **For some Machines, certain repairs may require sending the Machine to an IBM service center.**

3. **Courier or Depot Service\***

   You will disconnect the failing Machine for collection arranged by IBM. IBM will provide you with a shipping container for you to return your Machine to a designated service center. A courier will pick up your Machine and deliver it to the designated service center. Following its repair or exchange, IBM will arrange the return delivery of the Machine to your location. You are responsible for its installation and verification.

4. **Customer Carry-In or Mail-In Service**

   You will deliver or mail as IBM specifies (prepaid unless IBM specifies otherwise) the failing Machine suitably packaged to a location IBM designates. After IBM has repaired or exchanged the Machine, IBM will make it available for your collection or, for Mail-in Service, IBM will return it to you at IBM's expense, unless IBM specifies otherwise. You are responsible for the subsequent installation and verification of the Machine.

\* This type of service is called ThinkPad® EasyServ or EasyServ in some countries.

The IBM Machine Warranty World Wide Web site at http://www.ibm.com/servers/support/machine_warranties/ provides a worldwide overview of IBM Limited Warranty for Machines, a Glossary of IBM definitions, Frequently Asked Questions (FAQs) and Support by Product (Machine) with links to Product Support pages. **The IBM Statement of Limited Warranty is also available on this site in 29 languages.**

To obtain warranty service contact IBM or your IBM reseller. In Canada or the United States, call 1-800-IBM-SERV (426-7378). In the EU countries, see the telephone numbers below.

### EU Country Telephone List

Phone numbers are subject to change without notice.

| Austria -- 43-1-24592-5901 | Italy -- 39-02-482-9202 |
| --- | --- |
| Belgium -- 02-718-4339 | Luxembourg -- 352-360385-1 |
| Denmark -- 4520-8200 | Netherlands -- 020-514-5770 |

| | |
|---|---|
| Finland -- 358-9-4591 | Portugal -- 351-21-7915-147 |
| France -- 0238-557-450 | Spain -- 34-91-662-4916 |
| Germany -- 07032-15-4920 | Sweden -- 46-8-477-4420 |
| Greece -- 30-210-688-1220 | United Kingdom -- 01475-555-055 |
| Ireland -- 353-1-815-4000 | |

# Appendix C. Notices

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| IntelliStation | ThinkPad |
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| Predictive Failure Analysis | xSeries |

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# Important notes

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

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

When referring to processor storage, real and virtual storage, or channel volume, KB stands for approximately 1000 bytes, MB stands for approximately 1 000 000 bytes, and GB stands for approximately 1 000 000 000 bytes.

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

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

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

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

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

## Product recycling and disposal

This unit contains materials such as circuit boards, cables, electromagnetic compatibility gaskets, and connectors which may contain lead and copper/beryllium alloys that require special handling and disposal at end of life. Before this unit is disposed of, these materials must be removed and recycled or discarded according to applicable regulations. IBM offers product-return programs in several countries. For country-specific instructions, refer to the following Web site: http://www.ibm.com/ibm/environment/products/prp.shtml.

# Battery return program

This product may contain a sealed lead acid, nickel cadmium, nickel metal hydride, lithium, or lithium ion battery. Consult your user manual or service manual for specific battery information. The battery must be recycled or disposed of properly. Recycling facilities may not be available in your area. For information on disposal of batteries outside the United States, go to http://www.ibm.com/ibm/environment/products/batteryrecycle.shtml or contact your local waste disposal facility.

In the United States, IBM has established a collection process for reuse, recycling, or proper disposal of used IBM sealed lead acid, nickel cadmium, nickel metal hydride, and battery packs from IBM equipment. For information on proper disposal of these batteries, contact IBM at 1-800-426-4333. Have the IBM part number listed on the battery available prior to your call.

In the Netherlands, the following applies.



# Electronic emission notices

IBM IntelliStation M Pro Types 6220 and 6230

# Federal Communications Commission (FCC) statement

**Note:** This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- 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.

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

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

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

**FC** Tested To Comply
With FCC Standards
FOR HOME OR OFFICE USE

## Industry Canada Class B emission compliance statement

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

## Avis de conformité à la réglementation d'Industrie Canada

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

## European Union EMC Directive conformance statement

This product is in conformity with the protection requirements of EU Council Directive 89/336/EEC on the approximation of the laws of the Member States relating to electromagnetic compatibility. IBM cannot accept responsibility for any failure to satisfy the protection requirements resulting from a nonrecommended modification of the product, including the fitting of non-IBM option cards. This product has been tested and found to comply with the limits for Class B Information Technology Equipment according to CISPR 22/European Standard EN 55022. The limits for Class B equipment were derived for typical residential environments to provide reasonable protection against interference with licensed communication devices.

## Japanese Voluntary Control Council for Interference (VCCI) statement

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としていますが、この装置がラジオやテレビジョン受信機に近接して使用される
と、受信障害を引き起こすことがあります。
　取扱説明書に従って正しい取り扱いをして下さい。

## Power cords

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

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

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

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

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

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

| IBM power cord part number | Used in these countries and regions |
|---|---|
| 02K0546 | China |
| 13F9940 | Australia, Fiji, Kiribati, Nauru, New Zealand, Papua New Guinea |
| 13F9979 | Afghanistan, Albania, Algeria, Andorra, Angola, Armenia, Austria, Azerbaijan, Belarus, Belgium, Benin, Bosnia and Herzegovina, Bulgaria, Burkina Faso, Burundi, Cambodia, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Congo (Democratic Republic of), Congo (Republic of), Cote D'Ivoire (Ivory Coast), Croatia (Republic of), Czech Republic, Dahomey, Djibouti, Egypt, Equatorial Guinea, Eritrea, Estonia, Ethiopia, Finland, France, French Guiana, French Polynesia, Germany, Greece, Guadeloupe, Guinea, Guinea Bissau, Hungary, Iceland, Indonesia, Iran, Kazakhstan, Kyrgyzstan, Loas (People's Democratic Republic of), Latvia, Lebanon, Lithuania, Luxembourg, Macedonia (former Yugoslav Republic of), Madagascar, Mali, Martinique, Mauritania, Mauritius, Mayotte, Moldova (Republic of), Monaco, Mongolia, Morocco, Mozambique, Netherlands, New Caledonia, Niger, Norway, Poland, Portugal, Reunion, Romania, Russian Federation, Rwanda, Sao Tome and Principe, Saudi Arabia, Senegal, Serbia, Slovakia, Slovenia (Republic of), Somalia, Spain, Suriname, Sweden, Syrian Arab Republic, Tajikistan, Tahiti, Togo, Tunisia, Turkey, Turkmenistan, Ukraine, Upper Volta, Uzbekistan, Vanuatu, Vietnam, Wallis and Futuna, Yugoslavia (Federal Republic of), Zaire |
| 13F9997 | Denmark |
| 14F0015 | Bangladesh, Lesotho, Maceo, Maldives, Namibia, Nepal, Pakistan, Samoa, South Africa, Sri Lanka, Swaziland, Uganda |
| 14F0033 | Abu Dhabi, Bahrain, Botswana, Brunei Darussalam, Channel Islands, China (Hong Kong S.A.R.), Cyprus, Dominica, Gambia, Ghana, Grenada, Iraq, Ireland, Jordan, Kenya, Kuwait, Liberia, Malawi, Malaysia, Malta, Myanmar (Burma), Nigeria, Oman, Polynesia, Qatar, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Seychelles, Sierra Leone, Singapore, Sudan, Tanzania (United Republic of), Trinidad and Tobago, United Arab Emirates (Dubai), United Kingdom, Yemen, Zambia, Zimbabwe |
| 14F0051 | Liechtenstein, Switzerland |
| 14F0069 | Chile, Italy, Libyan Arab Jamahiriya |

| IBM power cord part number | Used in these countries and regions |
| --- | --- |
| 14F0087 | Israel |
| 1838574 | Antigua and Barbuda, Aruba, Bahamas, Barbados, Belize, Bermuda, Bolivia, Brazil, Caicos Islands, Canada, Cayman Islands, Costa Rica, Colombia, Cuba, Dominican Republic, Ecuador, El Salvador, Guam, Guatemala, Haiti, Honduras, Jamaica, Japan, Mexico, Micronesia (Federal States of), Netherlands Antilles, Nicaragua, Panama, Peru, Philippines, Taiwan, United States of America, Venezuela |
| 24P6858 | Korea (Democratic People's Republic of), Korea (Republic of) |
| 34G0232 | Japan |
| 36L8880 | Argentina, Paraguay, Uruguay |
| 49P2078 | India |
| 49P2110 | Brazil |
| 6952300 | Antigua and Barbuda, Aruba, Bahamas, Barbados, Belize, Bermuda, Bolivia, Caicos Islands, Canada, Cayman Islands, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Guam, Guatemala, Haiti, Honduras, Jamaica, Mexico, Micronesia (Federal States of), Netherlands Antilles, Nicaragua, Panama, Peru, Philippines, Saudi Arabia, Thailand, Taiwan, United States of America, Venezuela |

# Index

software *(continued)*
    problems   100
    system management   19
Software Delivery Assistant   20
specifications
    desktop (Type 6220)   3
    tower   4
starting
    diagnostic programs   86
    SCSISelect Utility program   26
starting the computer   11
static-sensitive devices, handling   29
support bracket, removing   33, 54
system
    major components   50
system board
    connectors
        external port   53
        internal cable   52
        SCSI   52, 73
    error LEDs   100
    internal connectors for Type 6220   32
    option connectors   32, 51
system management
    capabilities   5
    IBM Director Agent   19
    Remote Deployment Manager   19
    Software Delivery Assistant   20
    System Migration Assistant (SMA)   19
    Wake on LAN   19
System Migration Assistant (SMA)   19
system offerings   5
system programs
    updating   18
system reliability   29

# T

tape drive, installing   59
test log   88
test log, viewing diagnostic   88
trademarks   130
troubleshooting
    chart   94
    Ethernet controller   102
turn on computer   11
turning off
    the computer   20

# U

Ultra160 SCSI connector   73
United States electronic emission Class B notice   132
United States FCC Class B notice   132
universal serial bus (USB)
    cables   73
    connectors   73
    ports   73
Universal Serial Bus (USB) problems   100
updating
    system programs   18

using
    Boot Menu program   26
    Configuration/Setup Utility program   23
    Enhanced Diagnostics diskette   104
    IBM Configuration/Setup Utility program   23
    passwords   24, 25
    Product Recovery program   102
    recovery-repair diskette   104
    SCSISelect Utility program   26

# V

video
    device drivers   16
    DVI connector   74
    DVI connector pin-assignments   74
    features   16
    modes   16
    monitor settings   16
video controller   3, 4
    specifications   3, 4

# W

Wake on LAN   19
weight   3, 4
Windows
    registering your computer   14
working with adapters   34, 55

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