



IntelliStation Z Pro

Type 6221

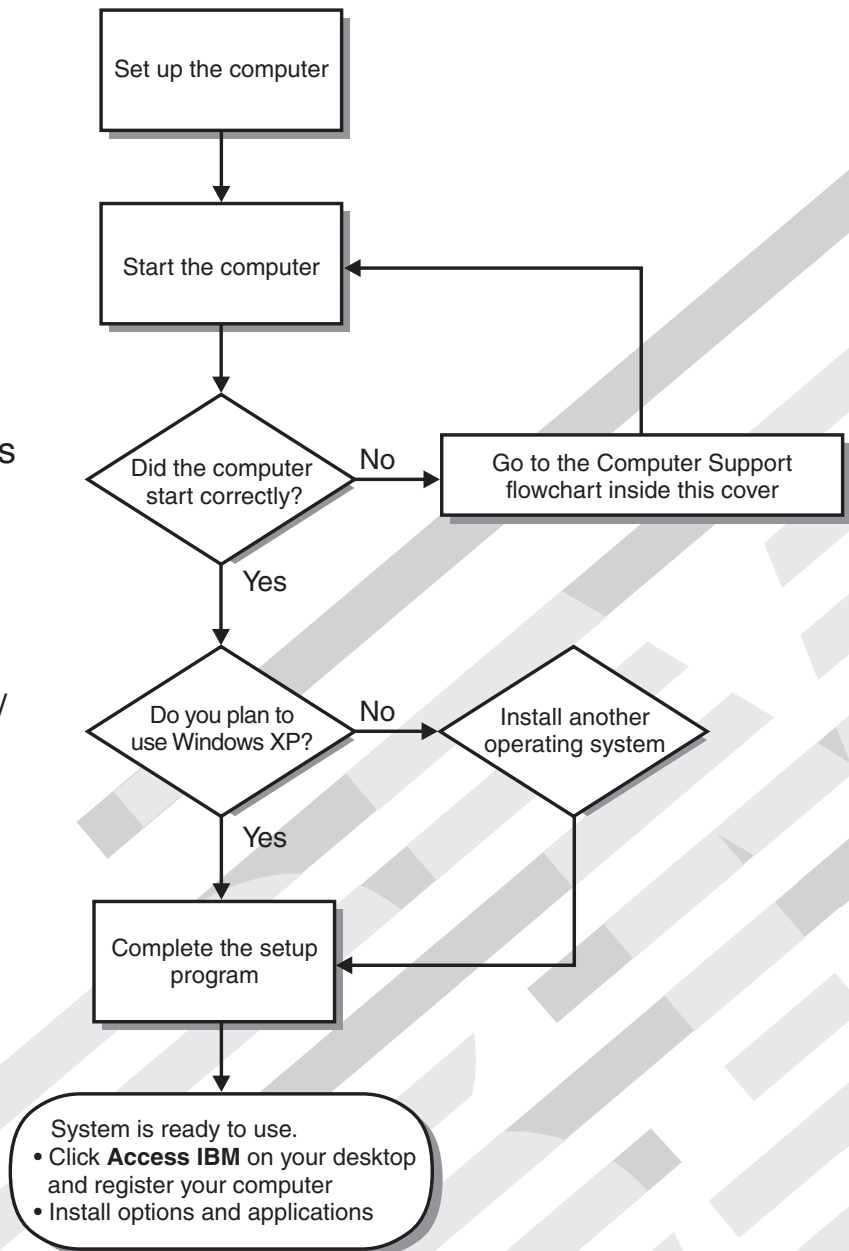
Installation Guide

Welcome...

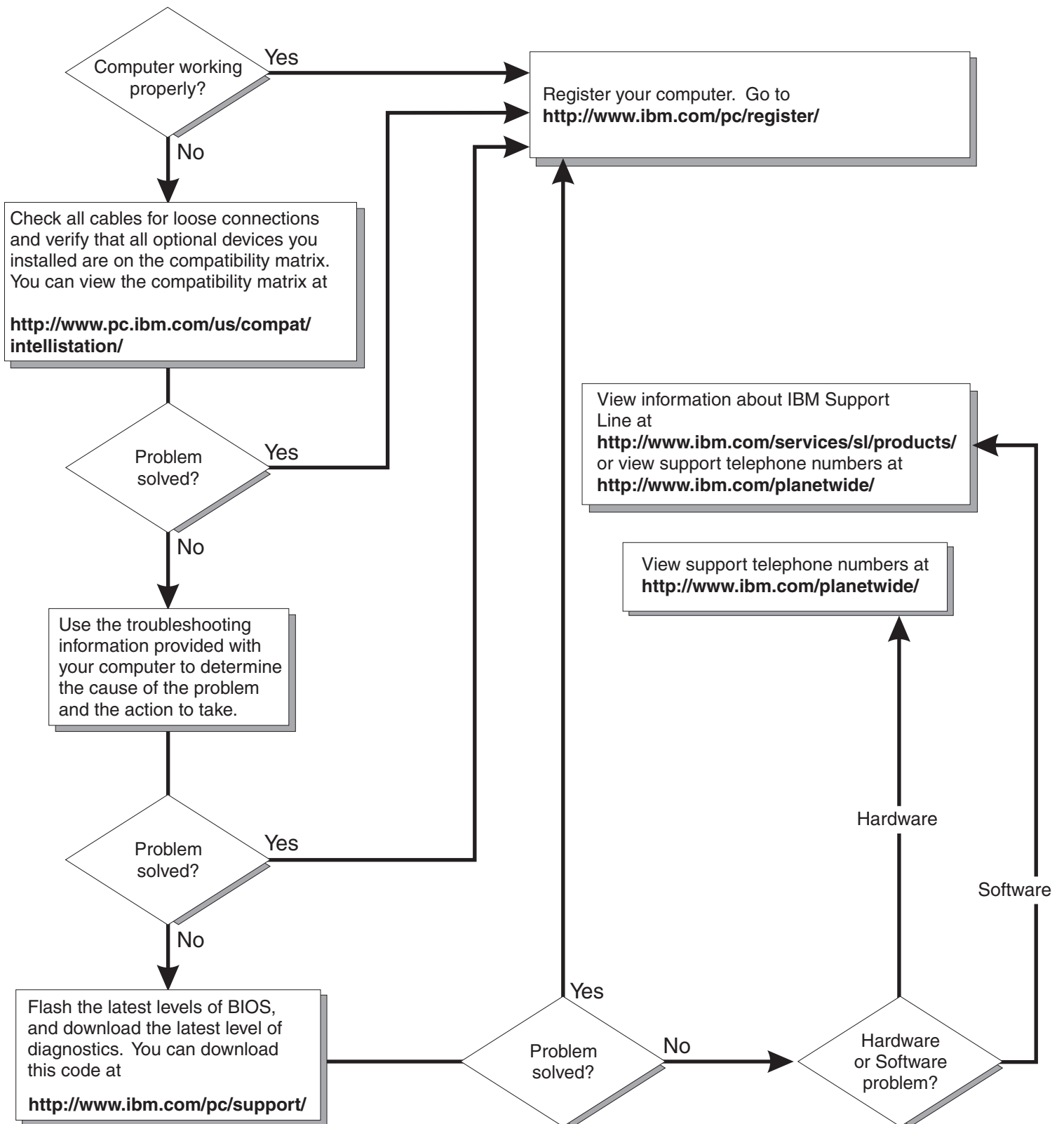
Thank you for buying an IBM IntelliStation Z Pro computer.

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

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



Computer Support



IBM IntelliStation Z Pro
Type 6221



Installation Guide

Note:

Before using this information and the product it supports, read the general information in “IBM Statement of Limited Warranty Z125-4753-07 11/2002” on page 61, and “Notices” on page 77..

Fourth (October 2003)

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Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الأمنية

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

在安裝本產品之前，請仔細閱讀 **Safety Information**
(安全信息)。

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

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

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

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

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

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

A termék telepítése előtt olvassa el a Biztonsági előírásokat!

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

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

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

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

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

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

Перед установкой продукта прочтите инструкции по
технике безопасности.

Pred inštaláciou tohto zariadenia si pečítajte Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

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

Läs säkerhetsinformationen innan du installerar den här produkten.

Statement 1



Danger

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

To avoid a shock hazard:

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

To connect:

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

To disconnect:

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

Statement 2



CAUTION:

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

Do not:

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

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

Statement 3



CAUTION:

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

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



Danger

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

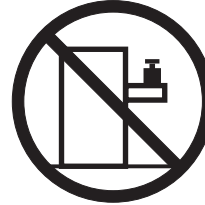


> 50 kg

הודעה 23



זהירות:
אל תניחו שום חפץ שמשקלו יותר מ-50 ק"ג על גבי התקנים המורכבים על
מסדי מרווידיים.



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:

Neumíst'ujte 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



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. Introduction

Thank you for purchasing an IBM® IntelliStation® Z Pro computer. This *Installation Guide* provides the information that is needed to:

- Set up and cable your computer
- Start and configure your computer
- Set up your operating system

Packaged with the *Installation Guide* is the *Device Drivers and IBM Enhanced Diagnostics* CD, which contains device drivers and hardware-specific support software.

The IBM *IntelliStation Documentation* CD is also included. This CD provides detailed information about your computer. See “About your documentation CD” on page 2 for more information.

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

The computer model and serial numbers 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: Your computer keys cannot be duplicated by locksmiths. If you lose them, order replacement keys from the key manufacturer. The key serial number and the telephone number of the manufacturer are on a tag attached to the keys.

If you plan to install your computer in a rack, you need to purchase a *Tower-to-Rack Conversion Kit*. For a list of supported options for your computer, go to <http://www.ibm.com/pc/> on the World Wide Web; then, select your country and navigate to the list of options for your computer.

Your computer comes with Microsoft® Windows® XP preinstalled.

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

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

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

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

The latest version of this publication is available from the IBM Web site. Go to <http://www.ibm.com/> and click **Support & downloads**. In the **Technical support** keyword search field, type 6221 and click **Go**. A list of publications for your computer is displayed.

About your documentation CD

Your IBM system comes with a documentation CD, which contains documentation for your system in Portable Document Format (PDF) and includes the IBM Documentation Browser to help you find information quickly.

In addition to the documentation CD, your system comes with an *Installation Guide*, which contains basic installation instructions for your system. If your system is rack-optimized, it also comes with *Rack Installation Instructions*, which contains a rack-installation template and basic instructions for installing your system into a rack.

System requirements

To run the documentation CD, your system must have the following minimum hardware and software:

- Microsoft Windows NT[®] 4.0 (with Service Pack 3 or later), Windows 98, or Windows 2000.
- 100 MHz Intel Pentium[®] microprocessor.
- 32 MB RAM.
- Adobe Acrobat Reader 3.0 or later. Adobe Acrobat Reader software is included on the documentation CD, and you can install it when you run the IBM Documentation Browser.

Starting the IBM Documentation Browser

Use one of the following procedures to start the Documentation Browser:

- If Autostart is enabled, insert the documentation CD into your CD-ROM drive. The Documentation Browser will start automatically.
- If Autostart is disabled, insert the documentation CD into your CD-ROM drive; then, click **start** → **Run**. In the **Open** field, type
`e:\win32.bat`
where *e* is the drive letter of your CD-ROM drive, and click **OK**.

Using the IBM Documentation Browser

Use the IBM Documentation Browser to browse the contents of the documentation CD, select from a list of available topics, see brief descriptions of the selected topics, and view selected topics using Adobe Acrobat Reader. The Documentation Browser automatically detects the regional settings in use on your system and presents the information in the language for that region (if available). If a topic is not available in a particular language, the English version is displayed.

Click **Help** for detailed information about using the IBM Documentation Browser.

Complete the following steps to use the Documentation Browser:

1. Select your product from the **Product** drop-down list.

The **Topics** list appears. It lists all topics that pertain to the selected product. Topics are in folders or under other topics. A plus sign (+) appears beside each folder or topic that has additional topics under it. Click the plus sign to display the additional topics.

2. Click a topic to select it.

When you select a topic, a description of the topic contents appears in the **Description** field.

Note: To select multiple topics, press and hold down the Ctrl key while selecting your topics.

3. View selected topics.

Click **View Book**. Adobe Acrobat Reader starts, and the selected topics are displayed.

Using the search feature

Complete the following steps to use the Documentation Browser search feature:

1. Type a key word in the **Search** field.
2. Click **Search**. The topics containing the search word are listed in order based on the number of occurrences.
3. Click a file to open it.
4. Press Ctrl+F and use the Adobe Acrobat search function to search within the file.

Notices and statements used in this book

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

The notice and statement definitions are:

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

Related publications

The following documentation contains additional information about your computer. Because your computer comes with IBM-preinstalled software, you might be able to view some of these documents in Access IBM. See “Using Access IBM” on page 37. The following IBM documents can also be found at <http://www.ibm.com/> on the World Wide Web.

- *User's Guide*
This publication contains detailed information about your computer and how to use and configure the functions of the computer.
- *Hardware Maintenance Manual*
This publication contains information for trained service technicians. It can be found at <http://www.ibm.com/pc/support/> on the World Wide Web.
- Readme files on the *Device Drivers and IBM Enhanced Diagnostics* CD
Several readme files on this CD contain diagnostic tools and preinstalled device drivers. Other readme files on this CD contain information about the various adapters and devices that might be installed in or attached to your computer.
- *Safety Information book*
This publication, accessible through Access IBM, contains multilingual caution and danger statements.

Inventory checklist

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

- One keyboard
- One mouse
- One power cord (9-ft line cord)
- One power-control button shield
- Dual-analog monitor pigtail cable (some models)
- One *Device Drivers and IBM Enhanced Diagnostics* CD
- One *IBM IntelliStation Documentation* CD
- This *Installation Guide*

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

Features and specifications

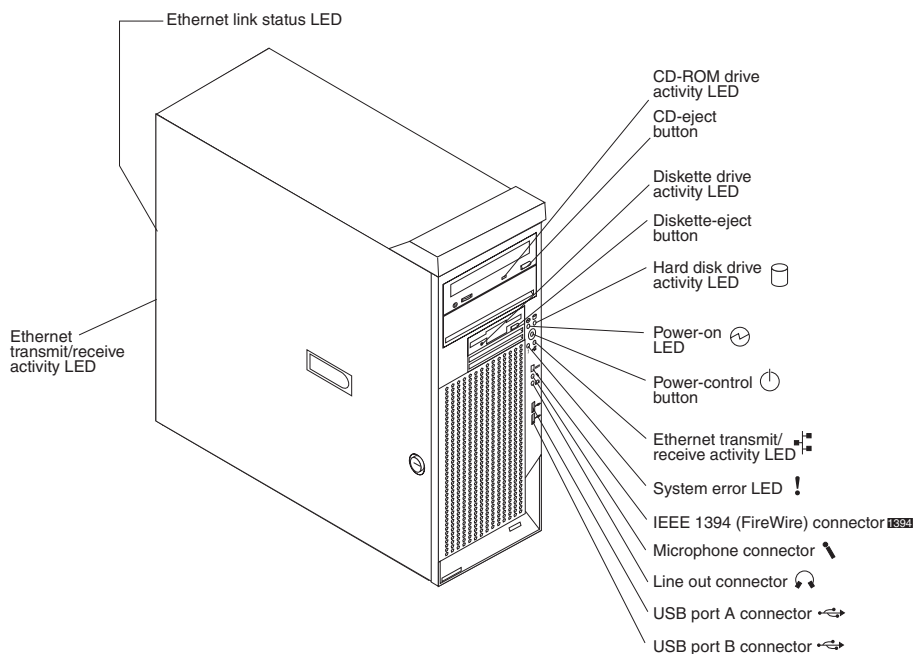
The following table provides a summary of the features and specifications of your IntelliStation Z Pro Type 6221 computer. Some features are not available on all models.

Note: You can use the Configuration/Setup Utility program in your computer to determine the specific type of microprocessor on your system board.

Table 1. Features and specifications

<p>Microprocessor:</p> <ul style="list-style-type: none"> • Intel Xeon Processor • 512 KB Level-2 cache • 533 MHz front-side bus (FSB) • Support for up to two microprocessors <p>Memory:</p> <ul style="list-style-type: none"> • Minimum: 256 MB • Maximum: 8 GB • Type: PC2100, double-data-rate (DDR) • Connectors: four dual inline memory module (DIMM) connectors, two-way interleaved <p>Internal Drives:</p> <ul style="list-style-type: none"> • Diskette: 1.44 MB (two mode) • Hard disk drive: IDE or SCSI • One of the following optical drives: <ul style="list-style-type: none"> – CD-ROM: IDE – DVD/CD-RW combo: IDE – CD-RW: IDE <p>Expansion bays:</p> <ul style="list-style-type: none"> • Three slim-high, 3.5-inch drive bays (one hard disk drive installed in some models) • Two 5.25-inch bays (optical drive installed in one bay) • One 3.5-inch removable-media drive bay (diskette drive installed) <p>Electrical input:</p> <ul style="list-style-type: none"> • Sine-wave input (50 or 60 Hz) required • Input voltage and frequency ranges automatically selected • Input voltage low range: <ul style="list-style-type: none"> – Minimum: 100 V ac – Maximum: 127 V ac • Input voltage high range: <ul style="list-style-type: none"> – Minimum: 200 V ac – Maximum: 240 V ac • Input kilovolt-amperes (kVA) approximately: <ul style="list-style-type: none"> – Minimum: 0.15 kVA – Maximum: 0.80 kVA 	<p>Integrated functions:</p> <ul style="list-style-type: none"> • Broadcom 5703 10/100/1000 Ethernet controller on the system board with RJ-45 Ethernet port • Two serial ports • One parallel port • (Some models) Two IEEE 1394 (FireWire) ports (four-pin on front, six-pin on rear) • Integrated SCSI controller with RAID capabilities and two Ultra 320 SCSI ports (one internal, one optional external) • Four Universal Serial Bus (USB) v2.0 ports (two on front and two on rear of enclosure) • Keyboard port • Mouse port • Audio ports <ul style="list-style-type: none"> – Line out (front and rear) – Mic (front and rear) – Line in (rear) • ATA-100 dual-channel IDE controller <p>PCI expansion slots:</p> <ul style="list-style-type: none"> • Four PCI-X 100 MHz/64-bit • One PCI 33 MHz/32-bit <p>Power supply:</p> <p>One 425 watt output (115-230 V ac)</p> <p>Cooling:</p> <p>Two speed-controlled system fans</p> <p>Heat output:</p> <p>Approximate heat output in British thermal units (Btu) per hour</p> <ul style="list-style-type: none"> • Minimum configuration: 341 Btu/hour (100 watts) • Maximum configuration: 2082 Btu/hour (607 watts) <p>Environment:</p> <ul style="list-style-type: none"> • Air temperature: <ul style="list-style-type: none"> – 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% 	<p>Video adapter: Accelerated graphics port (AGP) Pro 50 video with one of the following:</p> <ul style="list-style-type: none"> • Matrox Millennium G450 (DVI-I) 4X with 32 MB double-data-rate (DDR) synchronous dynamic random access memory (SDRAM) video memory and a single DVI-I or dual analog connectors (or dual VGA monitor capability with the pigtail cable that came with the system) • NVIDIA Quadro4 280NVS (LFH-60), AGP 8X, with 64 MB double-data-rate (DDR) SDRAM video memory and dual analog connectors (or dual digital monitor capability with the purchase of an additional pigtail cable) • NVIDIA Quadro4 980XGL (DVI-I), AGP 8X, with 128 MB double-data-rate (DDR) SDRAM video memory and 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 3000 (DVI-I), AGP 8X, with 256 MB DDR SDRAM video memory with dual DVI-I connectors • 3DLabs Wildcat4 7110 (DVI-I), AGP 8X, with 128 MB texture buffer DDR SDRAM video memory and 128 MB frame buffer video memory, and dual DVI-I connectors <p>Acoustical noise emissions:</p> <ul style="list-style-type: none"> • Sound power, idle: 5.3 bel maximum • Sound power, operating: 5.6 bel maximum <p>Size:</p> <ul style="list-style-type: none"> • Height: 438 mm (17.25 in.) • Depth: 483 mm (19 in.) • Width: 165 mm (6.5 in.) • Weight: 16.3 kg (36 lb) to 20.8 kg (45.8 lb) depending upon configuration
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Controls and indicators



CD-eject button

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

CD-ROM drive activity LED

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

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.

Ethernet link status LED

This LED is on the Ethernet connector on the back of the computer. When this LED is lit, it indicates that there is an active connection on the Ethernet port.

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 Ethernet transmit/receive activity LEDs: one on the front bezel and the other on the Ethernet connector on the rear of the computer.

Hard disk drive activity LED

When this LED is flashing, it indicates that a hard disk drive is in use.

IEEE 1394 (FireWire) connector (some models)

This connector is used to connect IEEE 1394 devices to your computer.

Line-out connector (green)

This connector sends stereo audio signals from the computer to external devices, such as speakers with built-in amplifiers, headphones, or the audio line-in jack on a stereo system.

Microphone connector (pink)

This connector is used to connect a microphone to record voice or other sounds on the hard disk. You can also use this connector (and a microphone) with speech recognition software.

Power-control button

Press this button to turn the computer on and off manually. You can install a circular disk, called the power-control button shield, over the power-control button to prevent accidental manual power-off. This disk is provided with your computer.

Power-on LED

When this LED is lit and does not flash, 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).

System error LED

When this LED is lit, it indicates that a system error has occurred. An LED on the system board might also be lit to help isolate the error. See “System-board error LEDs” on page 57 for additional information. Detailed troubleshooting information is in the *User's Guide* on the IBM *IntelliStation Documentation CD*.

USB ports

Use these automatically configured ports to connect universal serial bus (USB) v2.0 devices to your computer, using Plug and Play technology.

Chapter 2. Installing the hardware

This chapter provides instructions to help you install the hardware and options in your computer. This section is for all users, but is written with the experienced user in mind. If you need more detailed installation information for options, see the *User's Guide* on the IBM *IntelliStation Documentation CD*.

Selecting a location for your computer

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

Arranging your workspace

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

Comfort

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

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

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

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

Glare and lighting

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

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

Dust compounds problems associated with glare. Clean your monitor screen periodically using a soft cloth moistened with a nonabrasive, liquid glass cleaner.

Air circulation

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

Electrical outlets and cable lengths

The location of electrical outlets and the length of device power cords and cables might determine the final placement of your computer.

When arranging your work space:

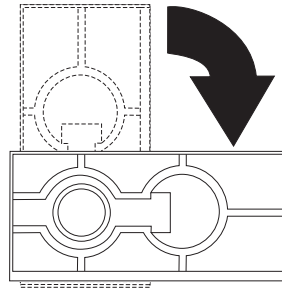
- Avoid the use of extension cords. Whenever possible, plug the computer power cord directly into an electrical outlet.
- Keep power cords and cables neatly routed away from walkways and other areas where they might be accidentally dislodged.

For more information about power cords, see “Power cords” on page 81.

Moving the stabilizing feet

The two front feet on the bottom of the computer rotate (if your model has rotating feet) 90 degrees to provide additional stability.

When installing options in the computer, you might find it easier to lay the computer on its side. If you do so, rotate the feet in towards the computer, so they do not break off due to the weight of the computer.



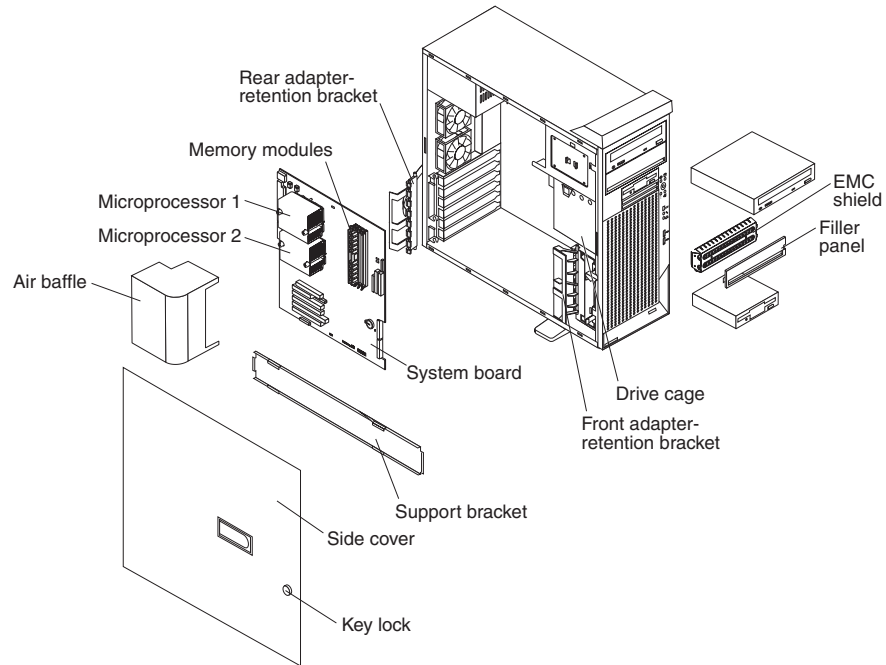
Installing options

This section contains instructions that will help you to install hardware options in your IntelliStation Z Pro computer. This section is for all users, but it is written with the experienced user in mind. If you need more detailed installation information, see the *User's Guide* on the IBM *IntelliStation Documentation CD*.

If you have no options to install, continue with “Cabling the computer” on page 33.

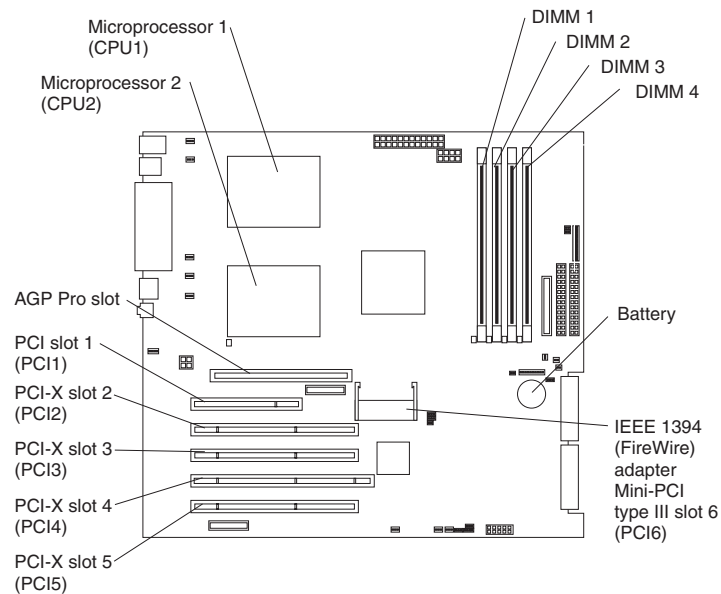
Major components of your computer

The following illustration shows the major components in the computer.



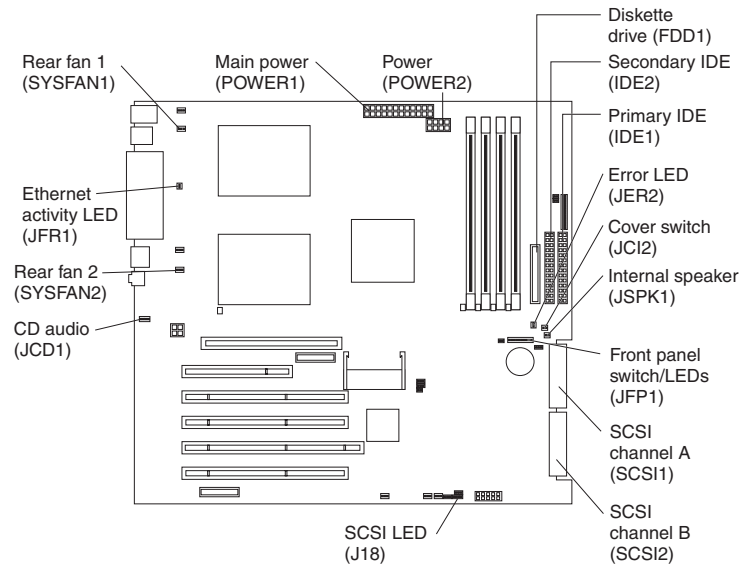
System-board option connectors

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



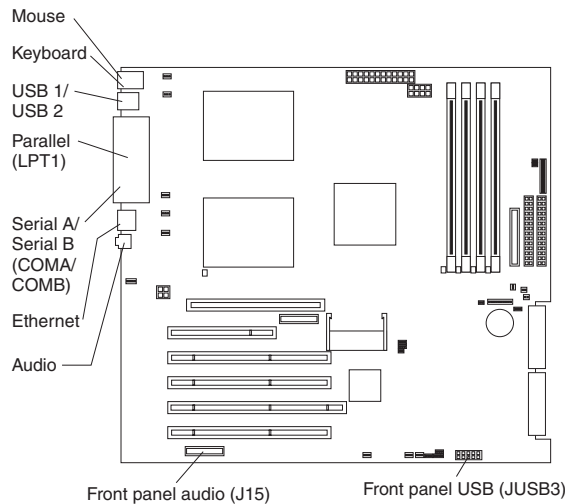
System-board internal connectors

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



System-board external connectors

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



Installation guidelines

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

- Review the safety information beginning on page v and the guidelines in “Handling static-sensitive devices”. These guidelines will help you work safely with your computer and options.
- Make sure that you have an adequate number of properly grounded electrical outlets for your computer, monitor, and other 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. Before laying the computer on its side, rotate the two front stabilizing feet (if your model has rotating feet) a quarter turn inward toward the computer, so that they do not break. Before returning the computer to an upright position, rotate the front stabilizing feet a quarter turn outward from the computer. See “Moving the stabilizing feet” on page 10 for more information.
- The blue color on components and labels identifies touch points where you can grip a component, move a latch, and so on.
- For a list of supported options for your computer, go to <http://www.ibm.com/pc/> on the World Wide Web; then, select your country and navigate to the list of options for your computer.

System reliability considerations

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

- Each of the drive bays has a drive or a filler panel and electromagnetic compatibility (EMC) shield installed.
- There is adequate space around the computer to allow the computer cooling system to work properly. Leave approximately 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 (over 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.
- Do not remove the air baffle when the computer is operational. Operating the computer without the air baffle might cause the microprocessor to overheat.
- Microprocessor socket 2 always contains either a microprocessor baffle or a microprocessor and heatsink.

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 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.

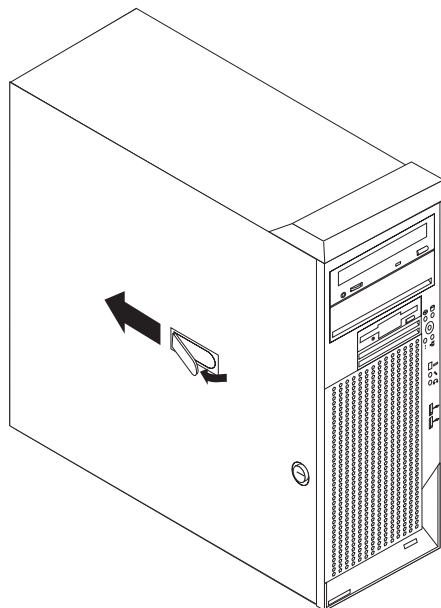
- Do not touch solder joints, pins, or exposed circuitry.
- Do not leave the device where others can handle and damage it.
- While the device is still in its static-protective package, touch it to an unpainted metal part of the computer for at least 2 seconds. This drains static electricity from the 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.

Removing the side cover

To remove the side cover, you might find it easier to lay the computer on its side. If you do, move the stabilizing feet (if your model has rotating feet) so that they do not break (see “Moving the stabilizing feet” on page 10).

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

1. Review the “Installation guidelines” on page 13.
2. Turn off the computer and all attached devices (see “Turning off the computer” on page 35); then, disconnect all power cords and external cables.
3. Unlock the side cover; then, pull the cover release latch away from the computer, and push the side cover toward the rear of the computer. Lift the side cover off the computer and set it aside.



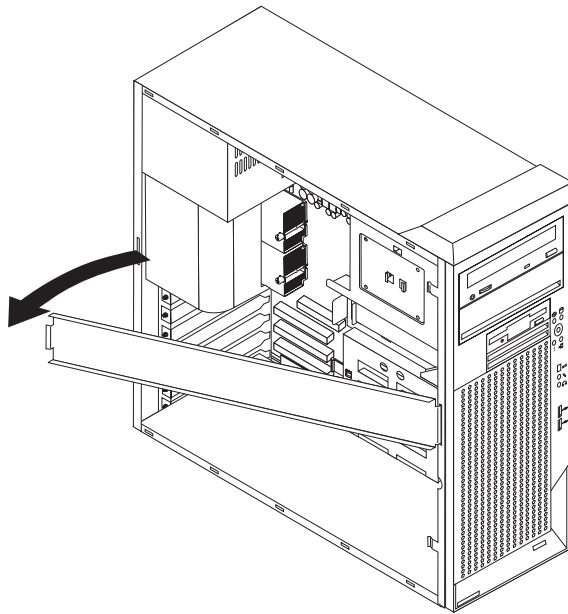
Attention: For proper cooling and airflow, replace the side cover before turning on the computer. Operating the computer with the cover removed might damage computer components.

Removing and installing the support bracket

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

Complete the following steps to remove the support bracket:

1. Review the “Installation guidelines” on page 13.
2. Turn off the computer and all attached devices (see “Turning off the computer” on page 35); then, disconnect all power cords and external cables.
3. Remove the side cover (see “Removing the side cover” on page 14).
4. Pull out on the rear end of the support bracket approximately 150 mm (6 in.).
5. Disengage the front end of the support bracket from the computer and set the bracket aside.



6. Continue with the option installation or removal procedure.

To reinstall the support bracket, reverse the previous steps.

Working with adapters

Your computer comes with adapter connectors or *slots*. The AGP video adapter is installed in the AGP Pro slot, and some models have an IEEE 1394 (FireWire) adapter installed in mini-PCI slot 6 (PCI6). You can install up to five additional optional adapters in your computer in PCI slot 1 (PCI1) and PCI-X slots 2 through 5 (PCI2 through PCI5).

See “System-board option connectors” on page 11 for the locations of expansion slots on the system board.

Adapter considerations

Before you install an adapter, review the following information:

- 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.
- You can install only a 32-bit adapter in the 32-bit PCI slot 1; 64-bit adapters can be installed only in the 64-bit PCI-X slots 2 through 5.
- You can install full-length adapters in all five expansion slots; however, full-length, double-width adapters will not fit in slot 5 and are not supported. None of the expansion slots are hot-plug.
- The 32-bit PCI slot 1 supports 5.0 V signaling PCI adapters; it does not support 3.3 V signaling adapters or 64-bit adapters.
- The 64-bit PCI-X slots 2 through 5 support 3.3 V signaling PCI or PCI-X adapters; they do not support 5.0 V signaling adapters.
- The PCI bus configuration is as follows:
 - The 32-bit PCI slot 1 and mini-PCI slot 6 (for the IEEE 1394 controller) are on the 33 MHz PCI bus.

Note: If your computer did not come with a IEEE 1394 (FireWire) adapter installed in mini-PCI slot 6, do not install an adapter in this slot. It is not supported.
 - The 64-bit PCI-X slots 2 and 3 and the integrated Ethernet controller are on the 100 MHz PCI-X bus, channel A.
 - The 64-bit PCI-X slots 4 and 5 and the integrated SCSI controller with RAID capabilities are on the 100 MHz PCI bus, channel B. If an optional ServeRAID-5i controller is installed, it overrides the standard functionality of the integrated SCSI controller with RAID capabilities and forces PCI-X slots 4 and 5 to 66 MHz.
- The optional ServeRAID-5i controller can be installed only in PCI-X slot 4 and must use the 3-U bracket that comes preinstalled on the controller.
- To provide failover protection, an optional Ethernet adapter can be installed only in PCI-X slots 2 through 5.
- Installing an optional RAID adapter in your computer will require that you reload the operating system and applications that came pre-installed on your computer.
- The system scans the AGP slot, mini-PCI slot 6, PCI expansion slot 1, and PCI-X expansion slots 2 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 6, PCI expansion slot 1, system-board

integrated drive electronics (IDE) or small computer system interface (SCSI) devices (including optional ServeRAID-5i controller), and then PCI-X expansion slots 2 through 5.

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

Installing an adapter

Note: You can install an optional ServeRAID-5i controller only in PCI-X slot 4. Slot 4 is the only PCI-X slot that supports the ServeRAID-5i controller requirements. Install the ServeRAID-5i controller using the 3-U bracket that comes preinstalled on the controller. See the documentation that comes with the ServeRAID-5i controller for additional information.

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

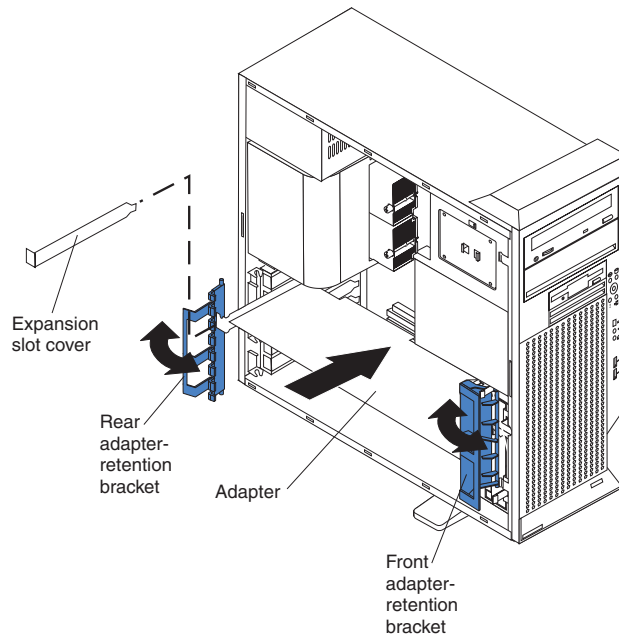
1. Review the “Installation guidelines” on page 13 and “Handling static-sensitive devices” on page 13.
2. Turn off the computer and all attached devices (see “Turning off the computer” on page 35); then, disconnect all power cords and external cables.
3. Remove the side cover (see “Removing the side cover” on page 14).
4. Determine which 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. Rotate the rear adapter-retention bracket to the open (unlocked) position and remove it from the computer. Rotate the front adapter-retention bracket to the open position. If you are installing a smaller adapter, remove only the rear adapter-retention bracket.
6. Remove the expansion-slot cover. From the rear of the computer, press on the slot cover. Grasp it and pull it out of the expansion slot. Store it in a safe place for future use.

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

7. Set any jumpers or switches on the adapter or system board according to the documentation that comes with the adapter.

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

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.



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 19 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.
12. Reinstall the rear adapter-retention bracket; then, rotate the bracket to the closed (locked) position.

Note: If any adapters in your computer are large or have heavy cables attached to them, you can remove the rear adapter-retention bracket and secure all of the adapters with expansion-slot screws. The expansion-slot screws are stored on the back of the computer next to slot 1.

13. If you have other options to install, do so now; otherwise, go to “Completing the installation” on page 31.

Cabling an optional SCSI adapter

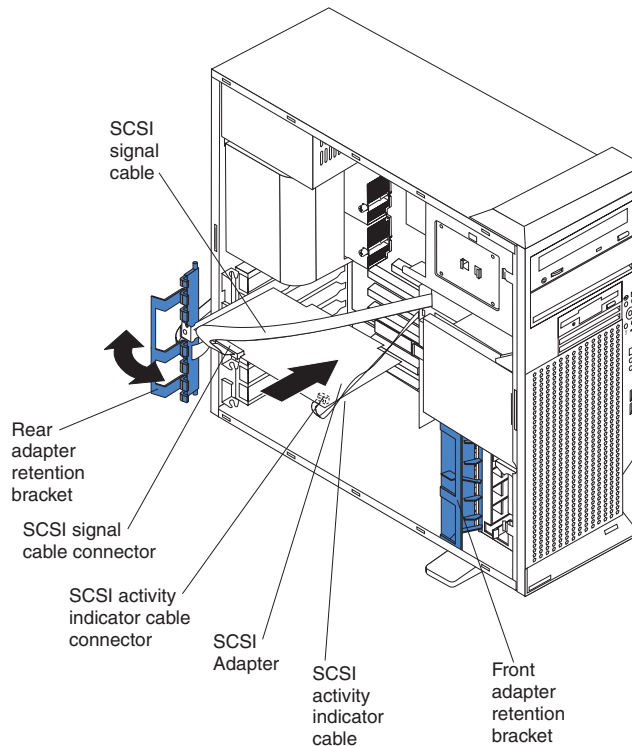
You can install an optional SCSI adapter in your computer to control the internal hard disk drives. With a SCSI adapter installed you can configure the internal hard disk drives into disk arrays. You can also cable a SCSI adapter to external hard disk drives. See your SCSI adapter option documentation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

Notes:

1. The information in this section does not apply to the ServeRAID-5i controller, which uses the integrated SCSI controller with RAID capabilities on the system board.
2. An optional SCSI adapter or cable option is required to connect external SCSI devices.

Complete the following steps to cable an optional SCSI adapter:

1. Install the SCSI adapter (see “Installing an adapter” on page 17).
2. Connect the SCSI-signal cable to the adapter and to one or more of the signal-cable connectors to the rear of the SCSI devices.
3. Connect the SCSI-activity-indicator cable to the adapter and to the SCSI-LED connector (J18) on the system board. See “System-board internal connectors” on page 12 for the location of the SCSI-LED connector.



4. Complete the installation of the optional SCSI adapter.

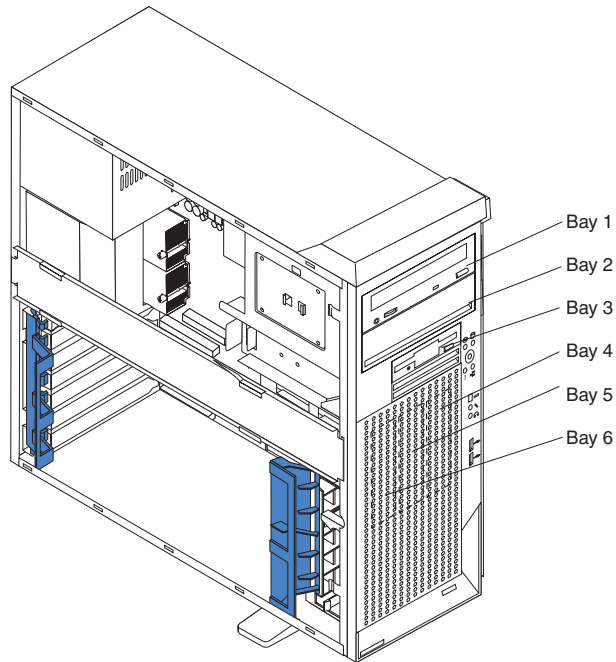
Installing internal drives

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

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

Internal drive bays

Your IntelliStation Z Pro computer comes with an IDE CD-ROM, CD-RW, or DVD/CD-RW combo drive in bay 1, a 3.5-in., 1.44 MB diskette drive in bay 3, and a hard disk drive installed in bay 4.



Notes:

1. Diskette drives, tape drives, CD-ROM, DVD/CD-RW, and DVD-ROM drives are examples of removable-media drives. You can install removable-media drives in bays 1, 2, and 3 only.
2. The integrated IDE controller in your computer supports the connection of up to four IDE devices.
3. You can install a 3.5-in. slim-high or 5.25-in. half-high removable-media drive, such as a tape backup, CD-RW, or DVD drive, in bay 2.
4. The IntelliStation Z Pro computer supports only one diskette drive.
5. 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.
6. The electromagnetic interference (EMI) integrity and cooling of the computer are protected by having all bays and PCI slots covered or occupied. When you install a drive or PCI adapter, save the EMC shield and filler panel from the bay or the PCI adapter slot cover in the event you later remove the option.
7. For a complete list of supported options for your computer, go to <http://www.ibm.com/pc/> on the World Wide Web; then, select your country and navigate to the list of options for your computer.

Preinstallation steps

Some of these steps are required only during the initial installation of an internal drive.

1. Review the safety information beginning on page v, “Installation guidelines” on page 13, 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 see if you need to set any switches or jumpers on the drive. If you are installing a SCSI device, be sure to set the SCSI ID for that device.

Installing a drive in bay 2

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

1. Follow the instructions in “Preinstallation steps” on page 21.
2. Turn off the computer and all attached devices (see “Turning off the computer” on page 35); then, disconnect all power cords and external cables.
3. Remove the side cover (see “Removing the side cover” on page 14).
4. Remove the support bracket (see “Removing and installing the support bracket” on page 15).
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:

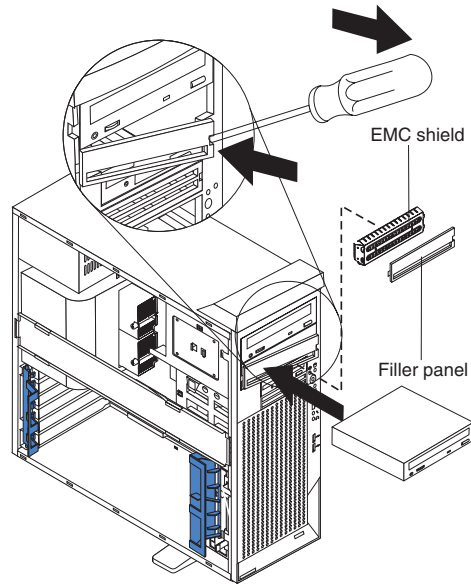
When laser products (such as CD-ROMs, DVD drives, fiber optic devices, or transmitters) are installed, note the following:

- **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. Set any jumpers or switches on the drive according to the documentation that comes with the drive.

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 make sure that the other end of this cable is connected into the appropriate IDE or SCSI connector on the system board. See “Power and signal cables for internal drives” on page 24 for additional information about cabling drives and “System-board internal connectors” on page 12 for the location of IDE and SCSI connectors on the system board. If there are open connectors on the cables connecting an existing IDE drive, this cable can be used to connect the new drive. The 3-connector SCSI cable that comes with your computer cannot be used to connect a SCSI drive in bay 2.
10. Route the signal cable so that it does not block the air flow to the rear of the drives, or over the microprocessor and memory.
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; otherwise replace the support bracket and then go to “Completing the installation” on page 31.

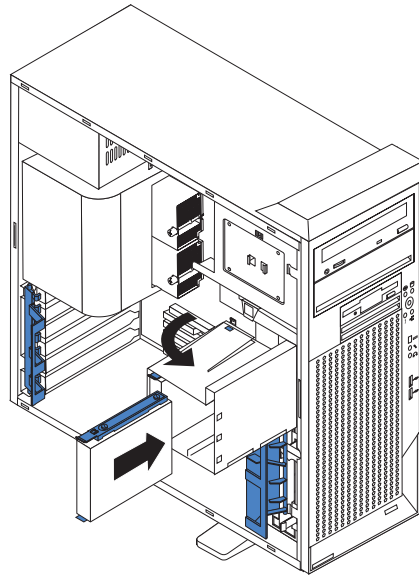
Installing a hard disk drive in bay 4, 5, or 6

Bays 4, 5, and 6 are in the drive cage. The drive cage is behind the front of the adapter-support bracket.

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

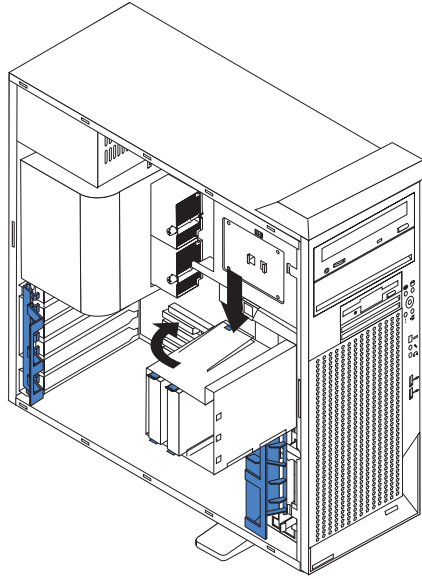
Complete the following steps to install a drive in bay 4, 5, or 6:

1. Follow the instructions in “Preinstallation steps” on page 21.
2. Turn off the computer and all attached devices (see “Turning off the computer” on page 35); then, disconnect all power cords and external cables.
3. Remove the side cover (see “Removing the side cover” on page 14).
4. Remove the support bracket (see “Removing and installing the support bracket” on page 15).
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. Attach the blue guide rails to the side of the drive using the screws that are provided.
7. Slide the drive into the drive cage until the plastic tabs on the drive guide rails lock into place in the drive cage. Clear any cables that might impede the replacement of the drive cage.
8. 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 make sure that the other end of this cable is connected into the appropriate IDE or SCSI connector on the system board. See “Power and signal cables for internal drives” on page 24 for additional information about cabling drives and “System-board internal connectors” on page 12 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.
9. Route the signal cable so that it does not block the air flow to the rear of the drives or over the microprocessor and memory.
10. Connect the power cable to the back of the drive. The connectors are keyed and can be inserted only one way.

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



12. If you have other options to install or remove, do so now; otherwise replace the support bracket (see “Removing and installing the support bracket” on page 15) and then go to “Completing the installation” on page 31.

Power and signal cables for internal drives

Your computer uses cables to connect IDE and SCSI devices to the power supply and to the system board. (See “System-board internal connectors” on page 12 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.
- The computer has two IDE buses, primary and secondary. Each of these buses supports up to two IDE devices. The primary IDE bus uses connector IDE1 on the system board and the secondary IDE bus uses connector IDE2.
- 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.
- **Signal cables:** Signal cables are typically flat cables, also called ribbon cables, that connect IDE, 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 primary or secondary 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 to 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.
- **SCSI:** A round SCSI cable connects SCSI devices to the integrated SCSI controller with RAID capabilities on the system board. For more information about connecting SCSI devices, see the SCSI documentation.

Installing memory modules

Adding memory to your computer is an easy way to make programs run faster. You can increase the amount of memory in your computer by installing memory modules. Your IntelliStation Z Pro computer uses industry-standard PC2100 double-data-rate (DDR) dual inline memory modules (DIMMs).

Notes:

1. The system board contains four DIMM connectors and supports two-way memory interleaving.
2. The DIMM options available for your computer are 128 MB, 256 MB, 512 MB, 1 GB, and 2 GB. Your computer supports a minimum of 256 MB and a maximum of 8 GB of system memory.
3. 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.
4. Your computer comes with two 256 MB or 512 MB DIMMs (for a total of 512 MB or 1024 MB) installed in the DIMM 3 and DIMM 4 memory connectors. When you install additional DIMMs, be sure to install them as a pair in DIMM connectors 1 and 2.
5. DIMMs must be installed in matched pairs. The first pair of DIMMs you install in DIMM 3 and DIMM 4 memory connectors must be the same size, speed, type, and technology. You can mix compatible DIMMs from various manufacturers. If you install a second pair of DIMMs in DIMM 1 and DIMM 2 memory connectors, they do not have to be the same size, speed, type, and technology as the DIMMs you installed in DIMM 3 and DIMM 4 memory connectors. However, the size, speed, type, and technology of the DIMMs you install in DIMM 1 and DIMM 2 memory connectors must match each other.
6. Install only 133 MHz (memory bus), 2.5 V, 184-pin, double-data-rate (DDR), PC2100, registered synchronous dynamic random-access memory (SDRAM) with error correcting code (ECC) DIMMs. These DIMMs must be compatible with the latest PC2100 SDRAM Registered DIMM specification. For a list of

supported options for your computer, go to <http://www.ibm.com/pc/> on the World Wide Web; then, select your country and navigate to the list of options for your computer.

7. Your computer supports Chipkill™ memory if the DIMMs are all type x4 and are 256 MB or larger. Using any 128 MB DIMMs or DIMMs that are not type x4 on your computer disables Chipkill memory.

Complete the following steps to install a DIMM:

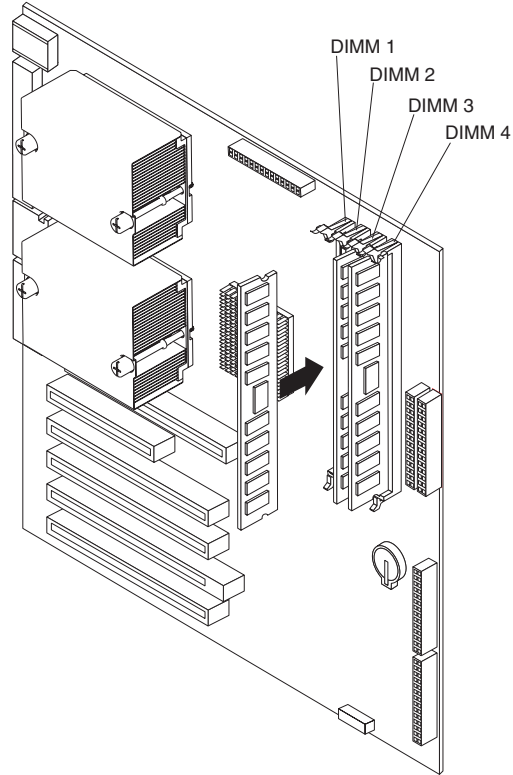
1. Review the safety information beginning on page v, “Installation guidelines” on page 13, and “Handling static-sensitive devices” on page 13.
2. Turn off the computer and all attached devices (see “Turning off the computer” on page 35); then, disconnect all power cords and external cables.
3. Remove the side cover (see “Removing the side cover” on page 14).
4. Remove the support bracket (see “Removing and installing the support bracket” on page 15).
5. You might find it easier to install memory modules if you rotate the drive cage out of the computer. Grasp the drive cage and rotate until it locks into place. See the illustration on page 23 for additional information.
6. Locate the DIMM connectors on the system board. Determine the connectors into which you will install the DIMMs. Install the DIMMs in the order shown in the following table.

Table 2. DIMM installation sequence

Installation order	DIMM connectors	Diagnostic reference
First	DIMM 3 and DIMM 4	Bank 2
Second	DIMM 1 and DIMM 2	Bank 1

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 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.



11. If you have other options to install or remove, do so now; otherwise rotate the cage back into the computer, replace the support bracket (see “Removing and installing the support bracket” on page 15), and go to “Completing the installation” on page 31.

Installing an additional microprocessor

Your computer comes with one microprocessor installed on the system board. Your computer supports up to two microprocessors. With two microprocessors, your computer can operate as a symmetric multiprocessing (SMP) computer. With SMP, certain operating systems and application programs can distribute the processing load among the microprocessors.

Before you begin:

- Thoroughly review the documentation that comes with the microprocessor to determine the required BIOS update. The latest level of BIOS code for your computer is available through the World Wide Web. See the *User's Guide* on the IBM *IntelliStation Documentation* CD for the World Wide Web addresses.
- (Optional) Obtain an SMP-capable operating system. For a list of supported operating systems and other options for your computer, go to <http://www.ibm.com/pc/> on the World Wide Web; then, select your country and navigate to the list of options for your computer.

Attention: To ensure proper computer operation when you install an additional microprocessor, use microprocessors that have the same cache size and type, and the same clock speed. Microprocessor internal and external clock frequencies must be identical. You can use the Configuration/Setup Utility program in your computer to determine the specific type of microprocessor on your system board.

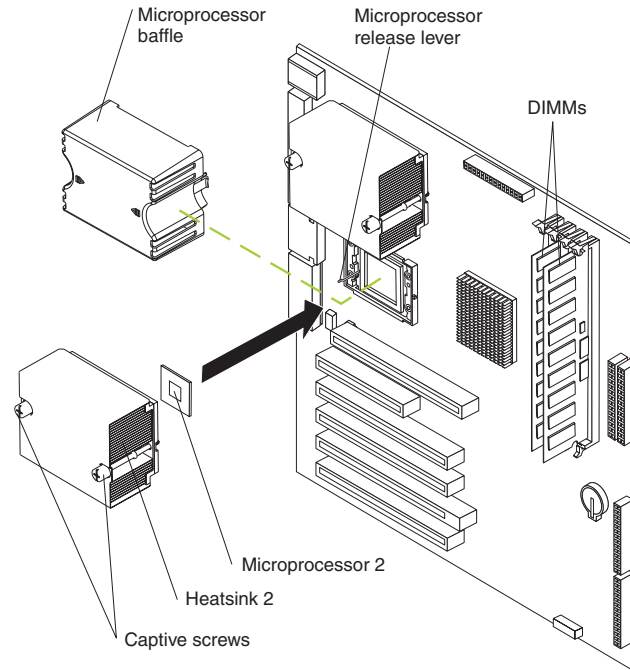
Important: A microprocessor must always be installed in socket CPU1 of the system board.

Notes:

1. To order additional microprocessor options, contact your IBM marketing representative or authorized reseller.
2. Terminator cards are not required for empty microprocessor sockets. However, for airflow, an empty microprocessor socket must contain a microprocessor baffle.
3. The microprocessor speeds are automatically set for this computer; therefore, you do not need to set any microprocessor frequency-selection jumpers or switches.
4. If you need to replace a microprocessor, call for service.
5. For additional illustrations of the system-board components, see "System-board option connectors" on page 11..

The Microsoft Windows XP operating system that comes preinstalled on your computer automatically configures itself when an additional microprocessor is installed. Other operating systems might need to be manually configured to support an additional microprocessor. See the *User's Guide* on the IBM *IntelliStation Documentation* CD for instructions.

Complete the following steps to install an additional microprocessor.



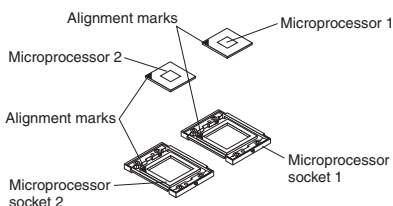
1. Review the “Installation guidelines” on page 13 and “Handling static-sensitive devices” on page 13.
2. Turn off the computer and all attached devices (see “Turning off the computer” on page 35); then, disconnect all power cords and external cables.
3. Remove the side cover (see “Removing the side cover” on page 14).
4. Remove the support bracket (“Removing and installing the support bracket” on page 15).
5. Remove the air baffle by unhooking it from its retaining tabs and lifting it off the chassis.
6. Locate the second microprocessor socket (connector CPU2) on the system board.
7. Remove the microprocessor baffle from the second microprocessor socket.
8. If the second microprocessor socket is covered with protective film, peel and remove the film.
9. Install the microprocessor:
 - a. Touch the static-protective package containing the new microprocessor to any *unpainted* metal surface on the computer; then, remove the microprocessor from the package.
 - b. Rotate the locking lever on the microprocessor socket from its closed and locked position until it stops or clicks in the fully open position (approximately 135° angle).

Attention: You must ensure that the locking lever on the microprocessor socket is in the fully open position before you insert the microprocessor in the socket. Failure to do so might result in permanent damage to the microprocessor, microprocessor socket, and system board.

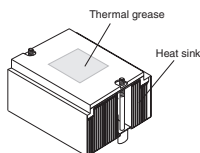
 - c. Center the microprocessor over the microprocessor socket. Align the triangle on the corner of the microprocessor with the triangle on the corner of the socket and carefully press the microprocessor into the socket.

Attention:

- 1) Do not use excessive force when pressing the microprocessor into the socket.
- 2) Make sure that the microprocessor is oriented and aligned correctly with pin number 1 in the socket before you try to close the lever. The following illustration shows the alignment marks for both microprocessors and sockets.



- d. Carefully close the lever to secure the microprocessor in the socket.
10. Install the heat sink on the microprocessor.



- a. Remove the plastic cover from the bottom of the heat sink.
Attention: Do not set the heat sink down after you remove the plastic cover and do not touch the thermal grease on the bottom of the heat sink. Touching the thermal grease will contaminate it. If the thermal grease on the microprocessor or heat sink becomes contaminated, contact your service technician.
 - b. Align and place the heat sink on top of the microprocessor, grease side down, in the retention bracket. Press firmly on the heat sink.
Attention: Alternate the tightening of the two captive screws to prevent damage to the microprocessor. Ensure that the screws are completely tightened (until they stop); otherwise, damage to the microprocessor will occur.
 - c. Secure the heat sink to the microprocessor by tightening the captive screws. Alternate between the two captive screws in the heat sink while tightening them.
11. Install the air baffle.
12. If you have other options to install or remove, do so now; otherwise, replace the support bracket and go to “Completing the installation” on page 31.

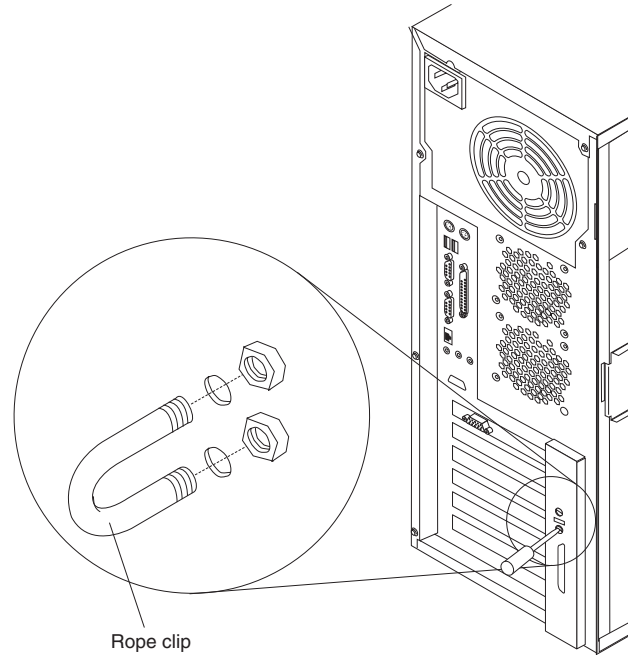
Installing a security rope clip

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

Complete the following steps to install a rope clip:

1. Turn off the computer and all attached devices (see “Turning off the computer” on page 35); then, disconnect all power cords and external cables.
2. Remove the side cover (see “Removing the side cover” on page 14).
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 a 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, be certain it does not interfere with other cables connected to the computer.



6. If you have other options to install or remove, do so now; otherwise, go to “Completing the installation”.

Completing the installation

To complete your installation, you must reinstall the side cover, connect all the cables and, for certain options, run the Configuration/Setup Utility program. Follow the instructions in this section.

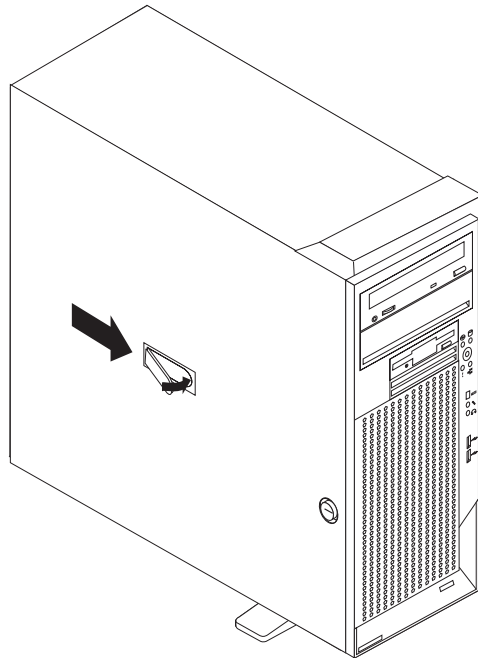
Replacing the side cover

If you removed the support bracket, reinstall it before you replace the side cover. See “Removing and installing the support bracket” on page 15.

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. Before installing the cover, check that all cables, adapters, and other components are installed and seated correctly and that you have not left loose tools or parts inside the computer.
2. Place the bottom lip of the side cover over the bottom edge of the computer chassis.
3. Rotate the side cover to a vertical position, inserting the tabs at the top of the side cover into the matching slots in the computer chassis.
4. Slide the side cover forward until it locks in place. Press down on the cover-release-latch button as you close the cover-release latch to lock the side cover.



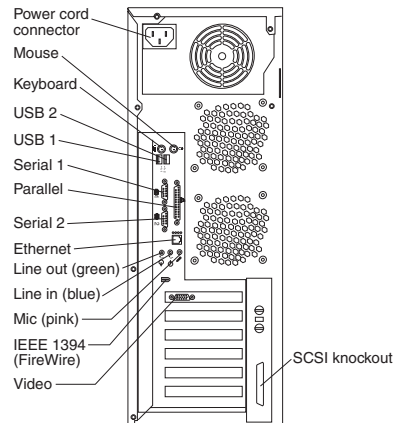
5. If you have not done so already, make sure that the two front stabilizing feet (if your model has rotating feet) are rotated outward so that they properly support the computer. Rotate each foot outward 90 degrees (see “Moving the stabilizing feet” on page 10).

Cabling the computer

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

Attention: To prevent damage to equipment, the power cord should be connected last.

The following illustration shows the input/output (I/O) connectors on the rear of the computer.



Depending on the video adapter installed in your computer and the monitor you want to use, you might need to use special video cables that convert signals or provide an additional connection point for dual-monitor operation. See the *User's Guide* on the IBM *IntelliStation Documentation* CD or the documentation that comes with your monitor for additional information.

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 powering-up.
3. You can install a circular disk over the power-control button to prevent accidental manual power-off. This disk, known as the power-control button shield, comes with your computer.

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 plug in your computer for the first time, Wake on LAN[®] can turn on the computer.
- If your computer was previously turned on, it must be properly turned off for the Wake on LAN feature to turn on the computer.

Running the operating system setup program

If you are starting your computer for the first time, the Microsoft Windows setup program runs automatically when you start the computer. The program will prompt you to make choices or type information. If you need more detailed information than is provided in this *Installation Guide*, see your Microsoft 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. The Microsoft registration information will already be displayed in the registration field. If the Product ID number is not already displayed, you must type it. The Product ID is on a label attached to the computer.

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

- The Microsoft 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 finishes and the computer restarts, the Windows desktop opens. Your computer is ready for use.

Turning off the computer

When you turn off the computer and leave it connected to ac power, the computer can respond to remote requests 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, select **Turn Off**.
- You can press the power-control button on the front of the computer. If this feature is supported by your operating system, it will turn off the computer after performing an orderly shutdown of the operating system.

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.
- The computer can turn itself off as an automatic response to a critical system failure.

Chapter 3. Installing software

This chapter describes how to install and configure software for your IBM IntelliStation Z Pro Type 6221 computer.

Viewing the license agreement

The IBM International License Agreement for Non-Warranted Programs is viewable through Access IBM. Use of your computer signifies acceptance of this agreement. Complete the following steps to view the license agreement:

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

Using Access IBM

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

The choices available from the Access IBM Welcome window are:

- **How do I...**

Select this choice to display information about tasks that are typically performed immediately after you install a new computer, such as personalizing your computer to fit your needs, protecting your data, using recovery tools, upgrading your computer hardware, purchasing IBM services, purchasing IBM options, solving problems, and viewing the IBM International License Agreement for Non-Warranted Programs.

- **Tools & Tips**

Select this choice to display information about Access Support, AntiVirus tools, data backup and restore tools, configuration backup and restoration tools, diagnostic programs, data migration tools, help, online books, system information and personalization, and updates.

- **On the Web**

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

Complete the following steps to use Access IBM:

1. Double-click the **Access IBM** icon on the Windows desktop. If the **Access IBM** icon is not available on your desktop, click **start** → **All Programs** → **IBM Information** → **Access IBM**.
2. Click one of the tabs on the Access IBM Welcome window (for example, **How do I...**).
3. Click a topic.

Using the built-in configuration programs

The following configuration programs are provided with your computer:

- **Configuration/Setup Utility**

This program is part of the basic input/output system (BIOS) code that comes with your computer. You can use this program to configure serial- and parallel-connector assignments, change the drive startup sequence, set the date and time, and set passwords. For more information about how to start this utility, see “Starting the Configuration/Setup Utility program”.

- **LSI Logic Configuration Utility**

With the built-in LSI Logic Configuration Utility program, you can configure the integrated SCSI controller and the devices that are attached to it. For information about how to start this utility, see “Starting the LSI Logic Configuration Utility program”.

- **ServeRAID Manager**

The ServeRAID™ programs come with your computer. If your computer has a ServeRAID controller installed, you must use the ServeRAID Configuration program to define and configure your disk-array subsystem *before* you install your operating system. See “Using ServeRAID Manager” on page 39 for more information.

Note: See the *User's Guide* on the IBM *IntelliStation Documentation CD* for detailed instructions for using the configuration programs.

Starting the Configuration/Setup Utility program

Configuration/Setup is a menu-driven utility that is part of the BIOS code that comes with your computer. You can use it to:

- Configure serial connector assignments
- Change the drive startup sequence
- Enable USB keyboard and mouse support
- Resolve configuration conflicts
- Set the date and time
- Set passwords

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

1. Turn on the computer and watch the monitor screen.
2. When the message Press F1 for Configuration/Setup appears, press the F1 key.
3. Follow the instructions that appear on the screen.

Starting the LSI Logic Configuration Utility program

LSI Logic Configuration Utility is a built-in, menu-driven configuration program that you can use to:

- Perform a low-level format of a SCSI hard disk drive
- Set a SCSI device scan order
- Set a SCSI ID for a controller

The following section provides the instructions needed to start the LSI Logic Configuration Utility program. See the *User's Guide* on the IBM *IntelliStation Documentation* CD for more detailed information about the LSI Logic Configuration Utility.

Notes:

1. The integrated SCSI controller with RAID capabilities in your computer supports redundant array of independent disks (RAID). You can use the LSI Logic Configuration Utility program built into your computer to configure RAID level 1 for a single pair of attached devices.
2. If your computer has a RAID adapter installed, use the configuration method supplied with the RAID adapter to view or change SCSI settings for attached devices.

Complete the following steps to start the LSI Logic Configuration utility program:

1. Turn on the computer.
2. When the <<< Press <CTRL><C> to start LSI Logic Configuration Utility >>> prompt appears, press Ctrl+C.

Note: If an administrator password has been set, a prompt appears asking you to type the password to start the LSI Logic Configuration Utility program.

3. Use the arrow keys to select a choice (channel) from the screen, then press Enter.
4. Follow the instructions on the resulting screen to change the settings of the selected items; then, press Enter. The **Device Properties** and **Mirroring Properties** choices produce additional screens of parameters to review or change.

Using ServeRAID Manager

You can use the ServeRAID Manager program, provided on the *IBM ServeRAID Support CD*, to:

- Configure a redundant array of independent disks (RAID)
- Restore a SCSI hard disk to factory-default settings, erasing all data
- View your RAID configuration and associated devices
- Monitor operation of your RAID controllers

The ServeRAID Manager program operates in two ways:

- Startable-CD mode
- As an installed software program

The following sections provide instructions for running ServeRAID Manager in startable-CD mode to configure your integrated SCSI controller with RAID capabilities and perform an initial RAID configuration on your computer. See the ServeRAID documentation on the *IBM ServeRAID Support CD* for additional information about RAID technology and instructions for using ServeRAID Manager to configure your integrated SCSI controller with RAID capabilities.

Attention:

1. When setting up RAID mirroring, you must set the hard disk drive containing the operating system as the primary drive. Failure to do so will erase the operating system and applications that came pre-installed on your computer.
2. Installing an optional RAID adapter in your computer will require that you reload the operating system and applications.

Notes:

1. The integrated SCSI controller with RAID capabilities in your computer supports only RAID level 1. Installing an optional ServeRAID-5i controller provides additional RAID levels.
2. If you install a different type of RAID adapter in your computer, use the configuration method supplied with the RAID adapter to view or change SCSI settings for attached devices.

Before you install your operating system, you must configure the controller that is attached to the hard disk drives. You must use the configuration program on the *IBM ServeRAID Support* CD to configure the integrated SCSI controller with RAID capabilities or to configure an optional IBM ServeRAID controller.

Notes:

1. You cannot use the *ServerGuide™ Setup and Installation* CD to configure the optional controllers.
2. To update the firmware and BIOS for an optional ServeRAID controller, you must use the *IBM ServeRAID Support* CD that comes with the ServeRAID option.

Using ServeRAID Manager in startable-CD mode

The information in this section focuses on using the ServeRAID Manager program in Startable CD mode to configure your controller. For information about installing ServeRAID Manager, see the documentation on the IBM ServeRAID Support CD.

When you run the ServeRAID Manager program from the startable IBM ServeRAID Support CD, you are using startable-CD mode, in which you can configure your controller *before* you install your operating system.

To run the ServeRAID Manager program in startable-CD mode, turn on the computer; then, insert the *IBM ServeRAID Support* CD into the CD-ROM drive. If the ServeRAID Manager program detects an unconfigured controller and ready drives, the program automatically starts the Configuration wizard, and a window similar to that shown in Figure 1 on page 41 opens.

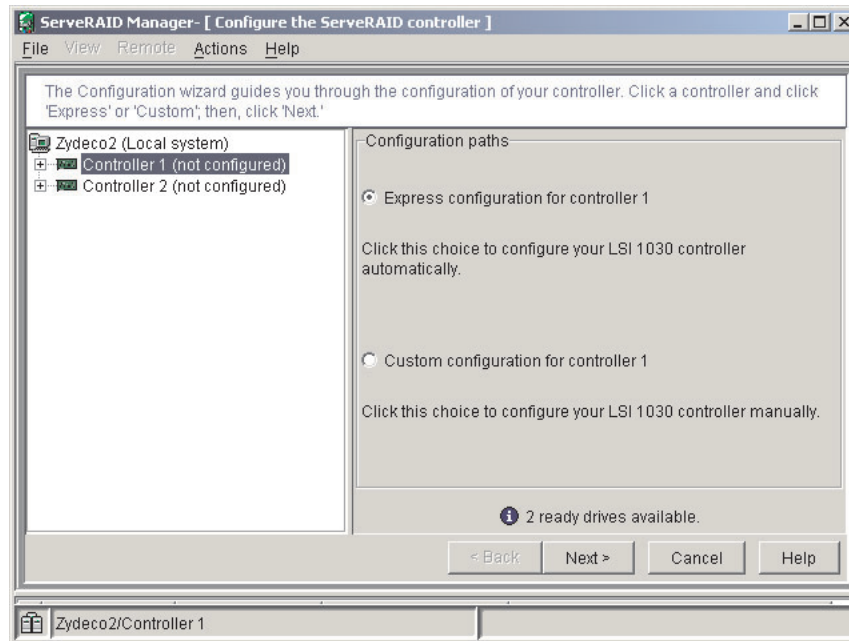


Figure 1. "Configuration wizard" window

Configuring the controller: You can use the Configuration wizard to configure your controller. The Configuration wizard provides two configuration options: Express and Custom. Express configuration automatically configures your controller, and you can use Custom configuration to configure your controller manually.

Note: If the integrated RAID controller has two channels, it will appear in the ServeRAID Manager tree as two controller objects. However, you can configure only one array and one RAID level-1 logical drive.

Using Express configuration: Express configuration automatically configures your controller. It creates an array by grouping together the first two physical drives that appear in the ServeRAID Manager tree, and it creates a RAID level-1 logical drive.

Complete the following steps to use Express configuration:

1. In the ServeRAID Manager tree, click the controller.
2. Click **Express configuration**.
3. Click **Next**. The "Configuration summary" window opens.
4. Review the information that is displayed in the "Configuration summary" window. To change the configuration, click **Modify arrays**.

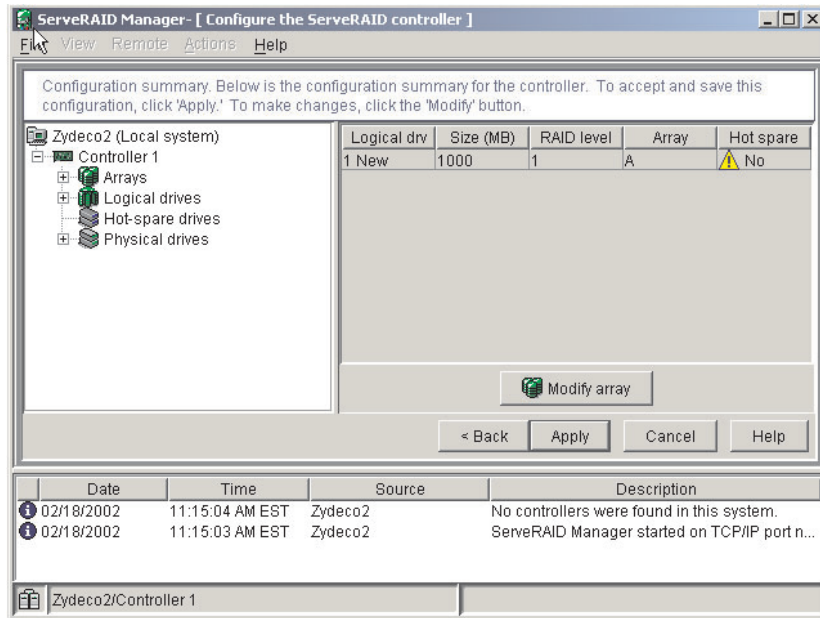


Figure 2. "Configuration summary" window

5. Click **Apply**; then, click **Yes** when asked if you want to apply the new configuration. The configuration is saved in the controller and in the physical drives.
6. Exit from the ServeRAID Manager program and remove the CD from the CD-ROM drive.
7. Restart the computer.

Using Custom configuration: To configure your controller manually, select Custom configuration. Using Custom configuration, you can select which two physical drives you want to configure and create a hot-spare drive.

Complete the following steps to use Custom configuration:

1. In the ServeRAID Manager tree, click the controller.
2. Click **Custom configuration**.
3. Click **Next**. The “Create arrays” window opens.

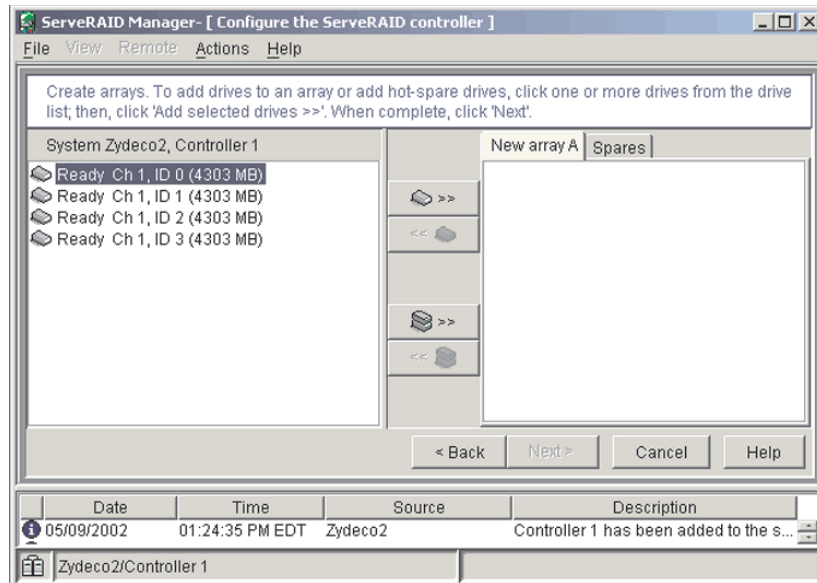






Figure 3. “Create arrays” window

4. From the list of ready drives, select the two drives you want to move to the array.
5. Click   (Add selected drives) to add the drives to the array.
6. Complete the following steps if you want to configure a hot-spare drive:
 - a. Click the **Spares** tab.
 - b. Select the physical drive you want to designate as the hot-spare drive; then, click   (Add selected drives).

7. Click **Next**. The “Configuration summary” window opens.

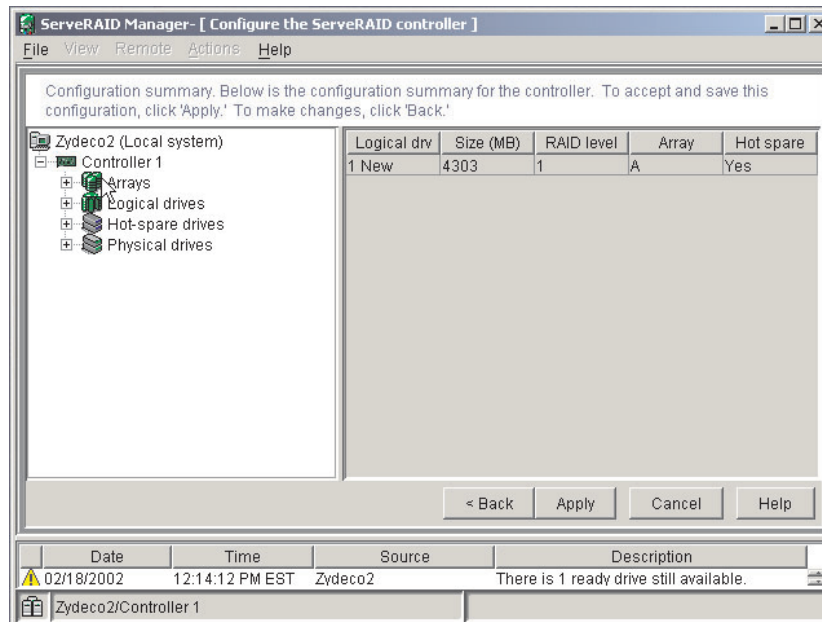


Figure 4. “Configuration summary” window

8. Review the information that is displayed in the “Configuration summary” window. To change the configuration, click **Back**.
9. Click **Apply**; then, click **Yes** when asked if you want to apply the new configuration. The configuration is saved in the controller and in the physical drives.
10. Exit from the ServeRAID Manager program, and remove the CD from the CD-ROM drive.
11. Restart the computer.

Viewing your configuration

You can use ServeRAID Manager to view information about RAID controllers and the RAID subsystem (such as arrays, logical drives, hot-spare drives, and physical drives).

To view information, expand the ServeRAID Manager tree; then, click the relevant tree object. Detailed information about the selected device appears in the right pane.

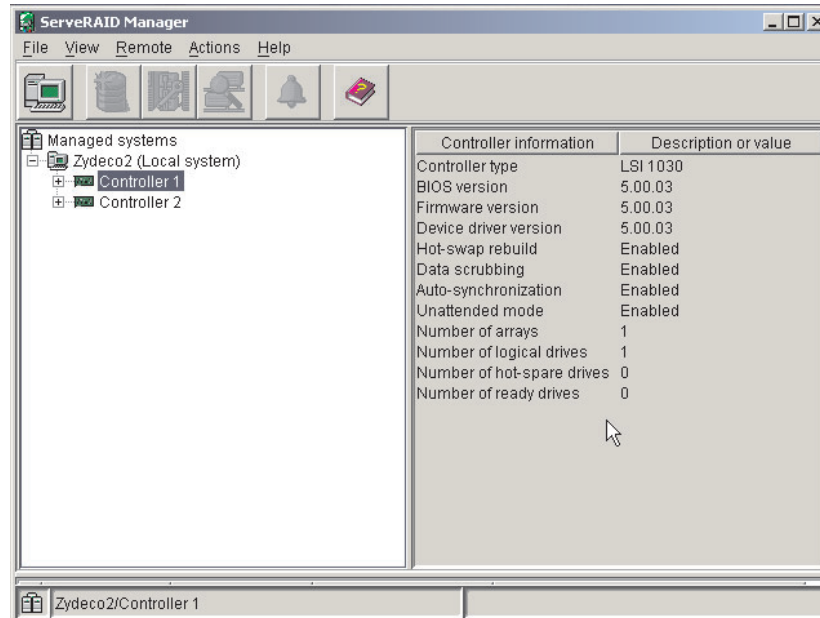


Figure 5. ServeRAID Manager window

To display available actions for an item, click the item in the ServeRAID Manager tree and click **Actions**.

Getting assistance

For more information about ServeRAID Manager, see the online help system. To

start the help system, either click  (Information about this window) on the toolbar or select an item from the **Help** menu.

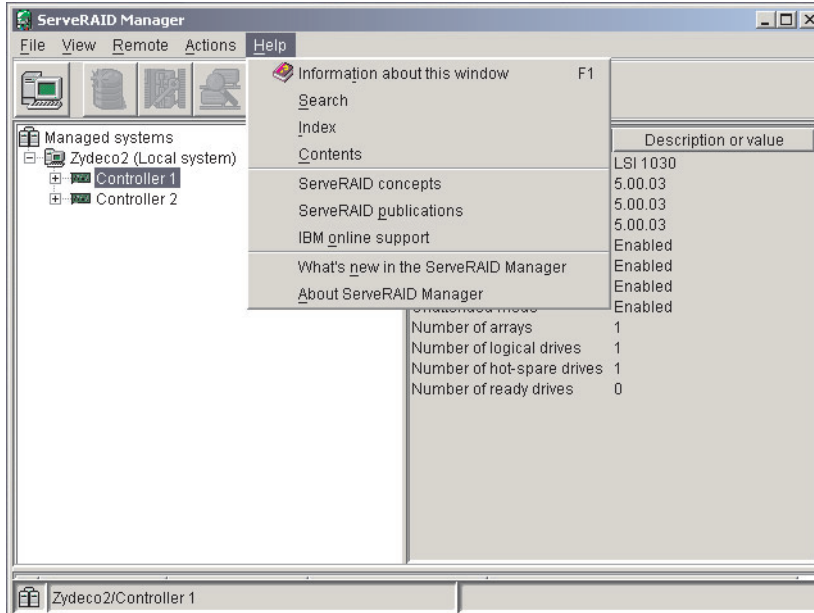


Figure 6. ServeRAID Manager help menu

The help system (ServeRAID Assist) will open within the ServeRAID Manager interface.

To learn more about the ServeRAID Manager tree objects and the actions that apply to them, select a tree object and click **Actions** → **Hints and tips**. ServeRAID Assist will start, and information about the tree object will appear in the right pane of ServeRAID Manager.

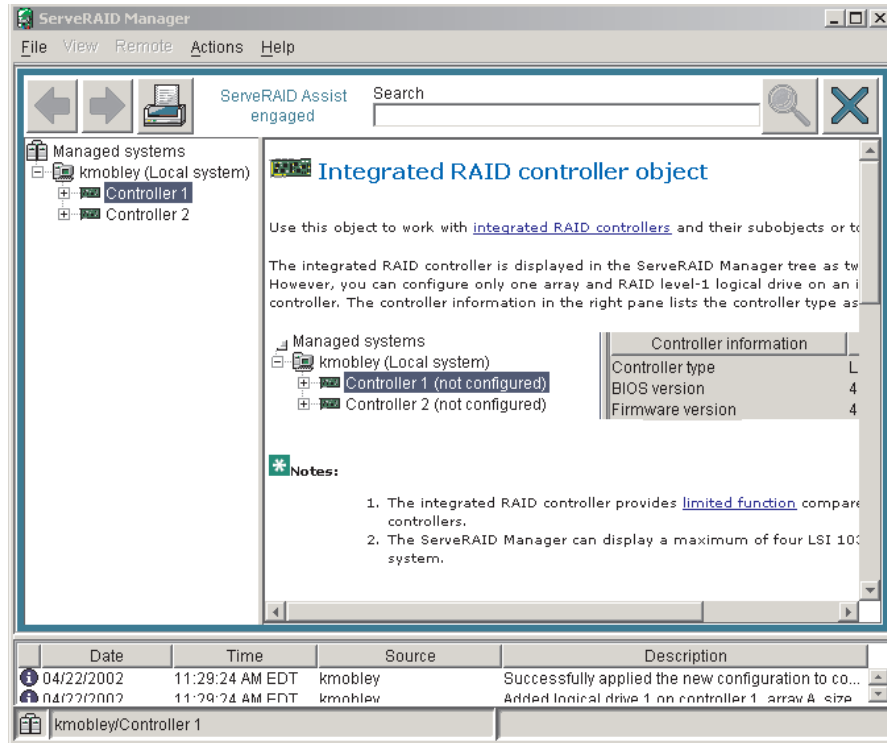


Figure 7. Hints and tips feature

Chapter 4. Completing the installation

This chapter contains information to help you register your computer, record important information in case of emergency, and prepare emergency utilities.

Registering your computer

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

- Double-click the **IBM Registration** icon on the Windows desktop, and then follow the instructions.
- Register your computer through Access IBM:
 1. Click **start**.
 2. Click **Access IBM**.
 3. Click **How do I...**
 4. Click **Get started**.
 5. Click **Registering your IBM Computer**, and then follow the instructions in the window.
- Register your computer at <http://www.ibm.com/pc/register/> on the World Wide Web.

Note: If you use the registration program that starts through Access IBM or the **IBM Registration** icon on the Windows desktop, you can print the registration information and provide a mailing address if you do not have access to the Internet.

Recording important numbers

Locate the serial, model, and type numbers. Record this information in the following table. You will need these numbers when communicating with IBM about your computer.

Record your product information in this table.	
Product name	_____
Machine type	_____
Model number	_____
Serial number	_____
Key serial number	_____
Key manufacturer	_____
Key phone number	_____

Creating an emergency recovery-repair diskette

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 desktop becomes unusable, you can use the recovery-repair diskette to access the Product Recovery program. Additional information about the diskette is in Access IBM. For more information about using this diskette, see the *User's Guide* on the IBM *IntelliStation Documentation* CD.

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

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

Creating an IBM Enhanced Diagnostics diskette

The IBM Enhanced Diagnostics diskette is a self-starting diagnostic diskette used to test hardware components on your computer.

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

1. From the Access IBM tabs, select the **How do I...** tab; then, click **Protect data**.
2. From the **Protect data** tab, click **Creating emergency diskettes → Diagnostic diskette**. A help panel card with instructions for creating a diagnostic diskette appears.
3. Follow the instructions on the screen to create the diskette.

You can also download the diagnostic program image from the IBM Web site, at <http://www.ibm.com/pc/support> on the World Wide Web, or use the *Device Drivers and IBM Enhanced Diagnostics* CD. For more information, see the *User's Guide* on the IBM *IntelliStation Documentation* CD.

Chapter 5. Solving problems

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

If you cannot locate and correct the problem using the information in this section, see “Getting help and technical assistance” on page 59 and “Solving problems” in the *User’s Guide* on the IBM *IntelliStation Documentation* CD.

Diagnostic tools overview

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

- **POST beep codes and error messages**

The power-on self-test (POST) indicates the detection of a problem. See “Power-on self-test (POST)” on page 52 and “POST error messages” on page 52 for information.

- **Diagnostic programs and error messages**

The diagnostic programs are provided on the *Device Drivers and IBM Enhanced Diagnostics* CD. These programs test the major components of your computer.

Note: See “Solving problems” in the *User’s Guide* on the IBM *IntelliStation Documentation* CD for information about the diagnostic programs.

- **Troubleshooting charts**

These charts list problem symptoms and steps to correct the problems. See the “Troubleshooting charts” on page 53 for 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 57 for more information.

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 might sound, an error message might appear on your screen, or both.

Notes:

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

POST beep codes

The possible types of beep codes are:

No beeps

No beep codes indicates that your computer successfully completed POST without finding any errors.

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 *User's Guide* on the IBM *IntelliStation Documentation CD*.

POST error messages

The following table provides an abbreviated list of the error messages that might appear during POST.

Note: See the *User's Guide* on the IBM *IntelliStation Documentation CD* for more information about the POST error messages.

POST message	Failing device or problem found	Suggested action
162	Change in device configuration	Verify that your optional devices are turned on and installed correctly.
163	Time of day has not been set	Set the correct date and time.
164	Change in memory configuration	Verify that your memory is installed properly; then, restart the computer and run the Configuration/Setup Utility program.
201	Memory error	Verify that your memory is fully seated and installed properly.

POST message	Failing device or problem found	Suggested action
289	Failing DIMM was disabled	Verify that your memory is correct for your computer and that it is installed properly.
301 and 303	Keyboard and keyboard controller	Ensure that the keyboard cable is connected and nothing is resting on the keyboard keys.
11xx	Serial port error	Verify that the serial cable is connected correctly.
1162	Serial port configuration error	Start the Configuration/Setup Utility program and ensure that the IRQ and I/O port assignments needed by the serial port are available.
1601	BIOS code update needed	Download and install the latest level of system BIOS code.
1800	PCI adapter hardware interrupt	Start the Configuration/Setup Utility program and verify that the interrupt resource settings are correct.
2400 and 2462	Video adapter and memory	Call for service.
00180xxx	A PCI adapter requested a resource that is not available	Start the Configuration/Setup Utility program and ensure that the resources needed by the PCI adapter are available.
012980xx and 012981xx	Data for microprocessor	Download and install the latest level of system BIOS code.
I9990305	POST could not find an operating system	Install your operating system.

Troubleshooting charts

Notes:

1. See "Solving Problems" in the *User's Guide* on the IBM *IntelliStation Documentation* CD for more detailed troubleshooting charts.
2. If you cannot find the problem in the troubleshooting chart, run the diagnostic programs. If you have run the diagnostic test programs, or if running the tests does not detect the problem, call for service.

CD-ROM drive problems

CD-ROM Drive symptom	Suggested action
CD-ROM drive is not recognized.	Verify that: <ul style="list-style-type: none"> • The IDE channel to which the CD-ROM drive is attached (primary or secondary) is enabled in the Configuration/Setup Utility program. • All cables and jumpers are installed correctly. • The correct device driver is installed for the CD-ROM drive. If the problem remains, call for service.
CD is not working properly.	Clean the CD. 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. 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.	<ol style="list-style-type: none"> If there is a diskette in the drive, verify that: <ul style="list-style-type: none"> The diskette drive is enabled in the Configuration/Setup utility program. The diskette is good and not damaged. (Try another diskette if you have one.) The diskette is inserted correctly in the drive. The diskette contains the necessary files to start the computer. The software program is working properly. The cable is installed correctly (in the proper orientation). To prevent diskette drive read/write errors, be sure the distance between monitors and diskette drives is at least 76 mm (3 in.). <p>If the problem remains, call for service.</p>

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).	<ol style="list-style-type: none"> Remove the first drive not recognized and try the hard disk drive diagnostic test again. If the remaining drives are recognized, replace the drive you removed with a new one. <p>If the problem remains, call for service.</p>

Keyboard, mouse, or pointing-device problems

Keyboard, mouse, or pointing-device symptom	Suggested action
All or some keys on the keyboard do not work.	<p>Verify that:</p> <ul style="list-style-type: none"> The keyboard cable is securely connected to the system, and the keyboard and mouse cables are not reversed. Both the computer and the monitor are turned on. Try using another keyboard. <p>If the problem remains, call for service.</p>
The mouse or pointing device does not work.	<p>Verify that:</p> <ul style="list-style-type: none"> The mouse or pointing-device cable is securely connected, and that the keyboard and mouse cables are not reversed. The mouse device drivers are installed correctly. Both the computer and the monitor are turned on. Try using another mouse or pointing device. <p>If the problem remains, call for service.</p>

Memory problems

Memory symptom	Suggested action
The amount of system memory displayed is less than the amount of physical memory installed.	<ol style="list-style-type: none"> Verify that: <ul style="list-style-type: none"> The memory modules are seated properly. You have installed the correct type of memory. If you changed the memory, you updated the memory configuration with the Configuration/Setup Utility program. 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. Check POST error log for error message 289: <ul style="list-style-type: none"> If the DIMM was disabled by a system-management interrupt (SMI), replace the DIMM. If the DIMM was disabled by the user or by POST: <ol style="list-style-type: none"> Start the Configuration/Setup Utility program. Enable the DIMM. Save the configuration and restart the computer. <p>If the problem remains, call for service.</p>

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
The screen is blank.	<p>Verify that:</p> <ul style="list-style-type: none"> The computer power cord is plugged into the computer and a working electrical outlet. The monitor cables are connected properly. The monitor is turned on and the Brightness and Contrast controls are adjusted correctly. If the computers are C2T chained together, verify that: <ul style="list-style-type: none"> The C2T chain cables are securely connected to the computers. The C2T breakout cable is connected properly. A computer that is turned on is selected. <p>Important: 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 Configuration/Setup Utility program is set to Enabled (its default setting), you must restart the computer three times to force the system BIOS code to reset the CMOS values to the default configuration (memory connector or bank of connectors enabled).</p> <p>If the problem remains, call for service.</p>
Only the cursor appears.	Call for service.

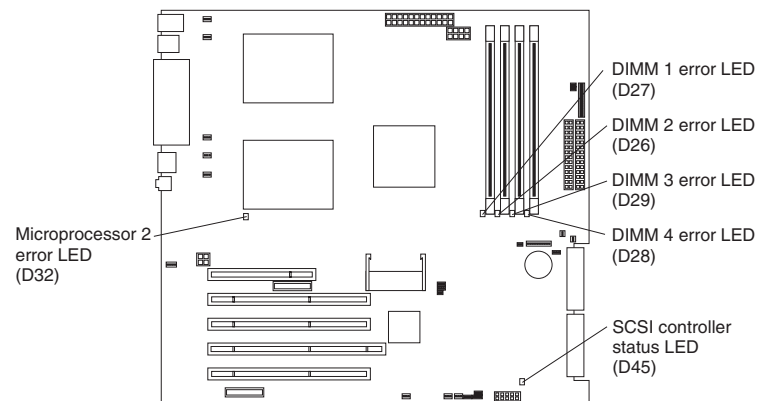
Monitor symptom	Suggested action
The screen is wavy, unreadable, rolling, distorted, or has screen jitter.	<p>If the monitor self-tests show the monitor is working properly, consider the location of the monitor. Magnetic fields around other devices (such as transformers, appliances, fluorescent lights, 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.</p> <p>Notes:</p> <ol style="list-style-type: none"> 1. To prevent diskette drive read/write errors, be sure the distance between monitors and diskette drives is at least 76 mm (3 in.). 2. Non-IBM monitor cables might cause unpredictable problems. 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. <p>If the problem remains, call for service.</p>
Wrong characters appear on the screen.	<p>If the wrong language is displayed, update the BIOS code with the correct language.</p> <p>If the problem remains, call for service.</p>
No video.	<ol style="list-style-type: none"> 1. Make sure the correct machine is selected, if applicable. 2. Make sure all cables are locked down. <p>If the problem remains, call for service.</p>

Power problems

Power symptom	Suggested action
The computer does not turn on.	<p>Verify that:</p> <ul style="list-style-type: none"> • The power cords are properly connected to the computer. • The electrical outlet functions properly. • The type of memory installed is correct. • 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. <p>If the problem remains, call for service.</p>

System-board error LEDs

The following illustration shows the location of the LEDs on the system board. You might need to refer to this illustration when solving problems with the computer.



Each error LED turns on to indicate a problem with a specific component. After a problem is corrected, its LED will not turn on the next time the computer is restarted; if the problem remains, the LED will turn on again. See the “Solving problems” in the *User’s Guide* on the IBM *IntelliStation Documentation* CD for additional information.

Product Recovery program

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

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

If your hard disk drive, including the partition where the Product Recovery Program resides, becomes damaged or you replace the hard disk drive, contact IBM to order the *IBM Product Recovery* CD to recover your preinstalled operating system, application programs and device drivers. See “Getting help and technical assistance” on page 59 for details.

Getting help and technical assistance

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

Before you call

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

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

You can solve many problems without outside assistance by following the troubleshooting procedures that IBM provides in the online help or in the publications that are provided with your system and software. The information that comes with your system also describes the diagnostic tests that you can perform. Most xSeries and IntelliStation systems, operating systems, and programs come with information that contains troubleshooting procedures and explanations of error messages and error codes. If you suspect a software problem, see the information for the operating system or program.

Using the documentation

Information about your IBM xSeries or IntelliStation system and preinstalled software, if any, is available in the documentation that comes with your system. That documentation includes printed books, online books, README files, and help files. See the troubleshooting information in your system documentation for instructions for using the diagnostic programs. The troubleshooting information or the diagnostic programs might tell you that you need additional or updated device drivers or other software. IBM maintains pages on the World Wide Web where you can get the latest technical information and download device drivers and updates. To access these pages, go to <http://www.ibm.com/pc/support/> and follow the instructions. Also, you can order publications through the IBM Publications Ordering System at <http://www.elink.ibm.com/public/applications/publications/cgibin/pbi.cgi>.

Getting help and information from the World Wide Web

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

You can find service information for your IBM products, including supported options, at <http://www.ibm.com/pc/support/>.

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. 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.

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

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.*

EUROPE, MIDDLE EAST, AFRICA (EMEA)

THE FOLLOWING TERMS APPLY TO ALL EMEA COUNTRIES:

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

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 Z Pro Type 6221

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	

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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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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. Information on product recycling offerings can be found on IBM's Internet site at <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

Federal Communications Commission (FCC) statement

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

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

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

Industry Canada Class A emission compliance statement

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

Avis de conformité à la réglementation d'Industrie Canada

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

Australia and New Zealand Class A statement

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

United Kingdom telecommunications safety requirement

Notice to Customers

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

European Union EMC Directive conformance statement

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

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

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

Taiwanese Class A warning statement

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

Chinese Class A warning statement

声 明
此为 A 级产品。在生活环境中，
该产品可能会造成无线电干扰。
在这种情况下，可能需要用户对其
干扰采取切实可行的措施。

Japanese Voluntary Control Council for Interference (VCCI) statement

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に
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引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求
されることがあります。

Power cords

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

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

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

For units intended to be operated at 230 volts (U.S. use): Use a UL-listed and CSA-certified cord set consisting of a minimum 18 AWG, Type SVT or SJT,

three-conductor cord, a maximum of 15 feet in length and a tandem blade, grounding-type attachment plug rated 15 amperes, 250 volts.

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

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

IBM power cord part number	Used in these countries and regions
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
14F0087	Israel

IBM power cord part number	Used in these countries and regions
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

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Part Number: 88P9048

Printed in U.S.A.

(1P) P/N: 88P9048

