

# IntelliStation Z Pro

Type 9228

## Installation Guide

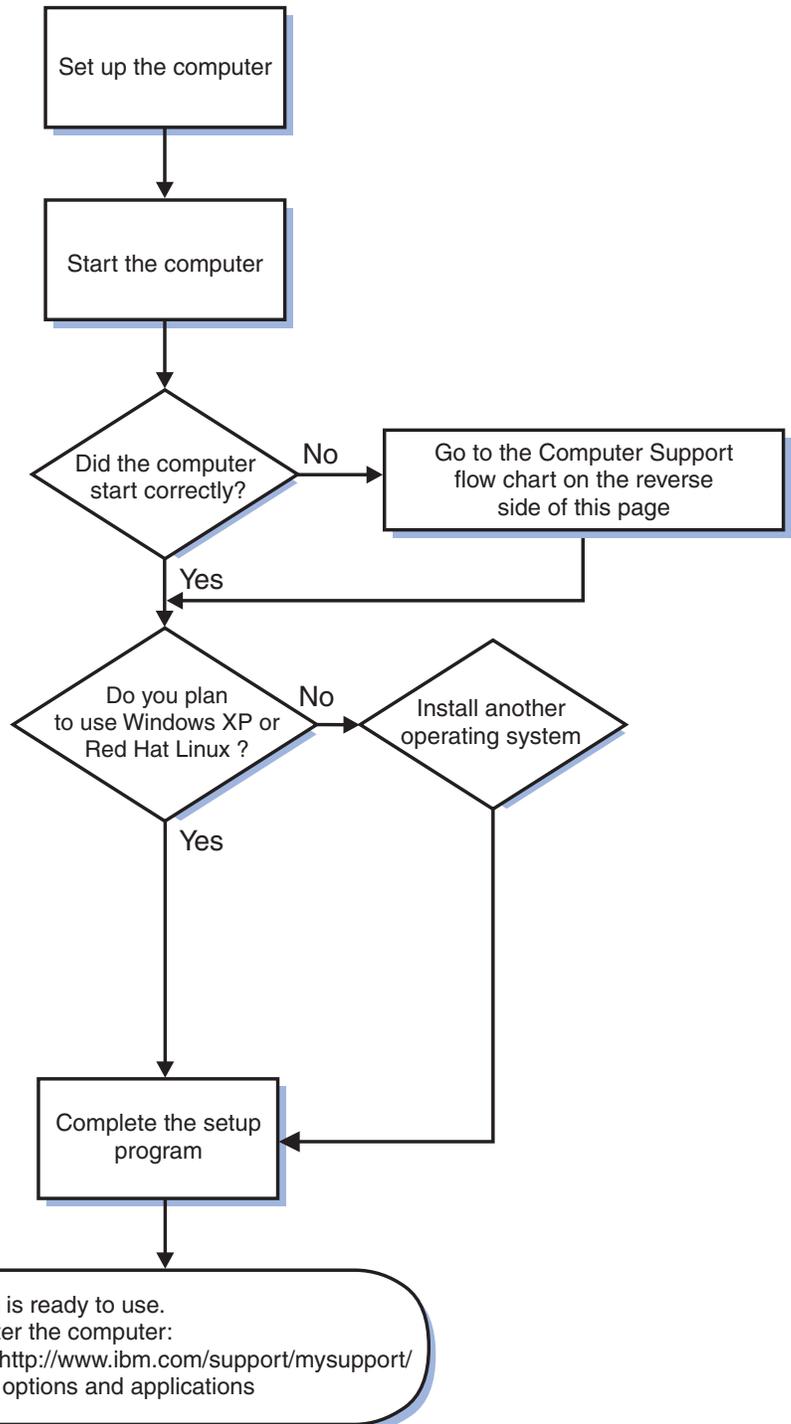
### Welcome...

Thank you for buying an IBM IntelliStation Z Pro computer.

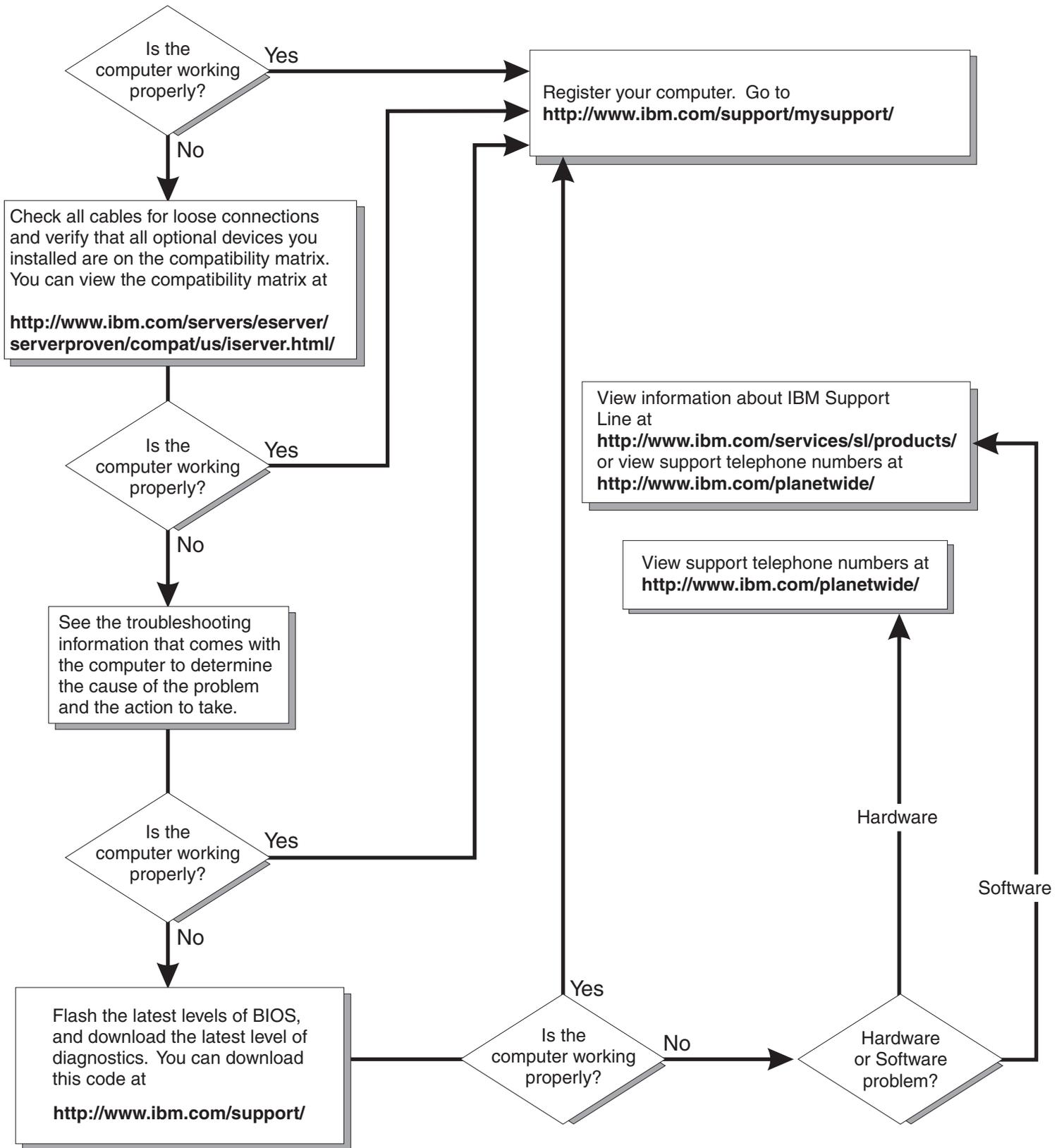
This *Installation Guide* contains information for setting up, installing options, and configuring your computer.

This document also contains information for every day use, and solving problems.

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



# Computer Support



IBM IntelliStation Z Pro  
Type 9228



# Installation Guide

**Note:**

Before using this information and the product it supports, read the general information in Appendix B, "Notices," on page 51, and the *Warranty and Support Information* documentation on the IBM *IntelliStation Documentation* CD.

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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.

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

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

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

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

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

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

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

A termék telepítése előtt olvassa el a Biztonsági előírásokat!

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

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

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

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

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

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

Перед установкой продукта прочтите инструкции по технике безопасности.

Pred inštaláciou tohto zariadenia si pečítajte Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

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

Läs säkerhetsinformationen innan du installerar den här produkten.

**Statement 1:**



**DANGER**

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

**To avoid a shock hazard:**

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

**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.

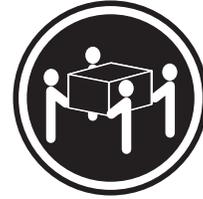
**Statement 4:**



≥ 18 kg (39.7 lb)



≥ 32 kg (70.5 lb)



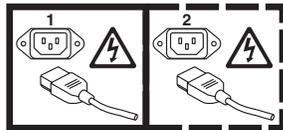
≥ 55 kg (121.2 lb)

**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.

**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.***

**Statement 26:**



**CAUTION:**

Do not place any object on top of rack-mounted devices.



**Statement 27:**



**CAUTION:**  
Hazardous moving parts are nearby.



**Statement 28:**



**CAUTION:**  
The battery is a lithium ion battery. To avoid possible explosion, do not burn the battery. Exchange it only with the IBM-approved part. Recycle or discard the battery as instructed by local regulations. In the United States, IBM has a process for collection of this battery. For information, call 1-800-426-4333. Have the IBM part number for the battery unit available when you call.

**Important:**

All caution and danger statements in this documentation begin with a number. This number is used to cross reference an English caution or danger statement with translated versions of the caution or danger statement in the *IBM Safety Information* document.

For example, if a caution statement begins with a number 1, translations for that caution statement appear in the *IBM Safety Information* document under statement 1.

Be sure to read all caution and danger statements in this documentation before performing the instructions. Read any additional safety information that comes with your server or optional device before you install the device.

**Important:**

This computer is suitable for use on an IT power distribution system, whose maximum phase to phase voltage is 240 V under any distribution fault condition.

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## Chapter 1. Introduction

This *Installation Guide* contains instructions for setting up the IBM® IntelliStation® Z Pro Type 9228 computer. This document contains information about:

- Setting up and cabling the computer
- Starting and configuring the computer
- Setting up the operating system

If firmware and documentation updates are available, you can download them from <http://www.ibm.com/support/>. The computer might have features that are not described in the documentation that comes with the computer, and the documentation might be updated occasionally to include information about those features, or technical updates might be available to provide additional information that is not included in the computer documentation. To check for updates, go to <http://www.ibm.com/support/>. For firmware updates, click **Downloads and drivers**. For documentation updates, under **Search technical support**, type 9228 and click **Search**.

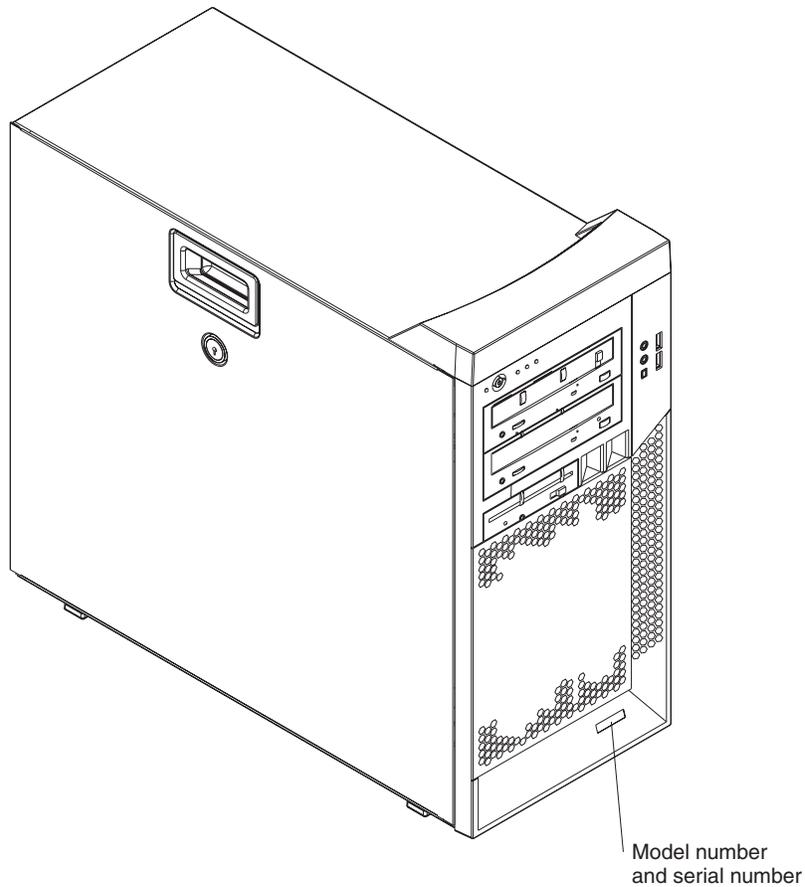
**Note:** Changes are made periodically to the IBM Web site. Procedures for locating firmware and documentation might vary slightly from what is described in this document.

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

The IBM *IntelliStation Documentation* CD is also included. This CD provides detailed information about the computer (see “The IntelliStation Documentation CD” on page 3 for more detailed information).

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

The computer model and serial number are on labels on the bottom of the computer and on the lower-right side of the bezel, as shown in the following illustration. You will need these numbers to register the computer with IBM.



**Note:** The 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 that is attached to the keys.

You can rack-mount the computer on a shelf, but you cannot rack-mount it on rails.

The computer comes with Microsoft® Windows® XP Professional or Red Hat Enterprise Linux® Workstation preinstalled (depending on the model).

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

**Note:** If you install another operating system, you might need additional software or device drivers. Some preinstalled device drivers are available on the *Device Drivers* CD. If you experience problems with the device drivers that you install from this CD, you can obtain the latest device drivers from <http://www.ibm.com/support/>.

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

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

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## The IntelliStation Documentation CD

The IBM *IntelliStation Documentation* CD contains documentation for the computer in Portable Document Format (PDF) and includes the IBM Documentation Browser to help you find information quickly.

### Hardware and software requirements

The IBM *IntelliStation Documentation* CD requires the following minimum hardware and software:

- Microsoft Windows NT<sup>®</sup> 4.0 (with Service Pack 3 or later), Windows 2000, or Red Hat Linux.
- 100 MHz microprocessor.
- 32 MB of RAM.
- Adobe Acrobat Reader 3.0 (or later) or xpdf, which comes with Linux operating systems. Acrobat Reader software is included on the CD, and you can install it when you run the Documentation Browser.

### Using the Documentation Browser

Use the Documentation Browser to browse the contents of the CD, read brief descriptions of the documents, and view documents, using Adobe Acrobat Reader or xpdf. The Documentation Browser automatically detects the regional settings in use on the computer and displays the information in the language for that region (if available). If a document is not available in the language for that region, the English-language version is displayed.

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

- If Autostart is enabled, insert the documentation CD into the CD drive. The Documentation Browser starts automatically.
- If Autostart is disabled or is not enabled for all users, use one of the following procedures:
  - If you are using a Windows operating system, insert the CD into the CD drive, and click **Start --> Run**. In the **Open** field, type  
`e:\win32.bat`  
where *e* is the drive letter of the CD drive, and click **OK**.
  - If you are using Red Hat Linux, insert the CD into the CD drive and run the following command from the /mnt/cdrom directory:  
`sh runlinux.sh`

Select the computer from the **Product** menu. The **Available Topics** list displays all the documents for the computer. Some documents might be in folders. A plus sign (+) indicates each folder or document that has additional documents under it. Click the plus sign to display the additional documents.

When you select a document, a description of the document appears under **Topic Description**. To select more than one document, press and hold the Ctrl key while you select the documents. Click **View Book** to view the selected document or documents in Acrobat Reader or xpdf. If you selected more than one document, all the selected documents are opened in Acrobat Reader or xpdf.

To search all the documents, type a word or word string in the **Search** field and click **Search**. The documents in which the word or word string appears are listed in

order of the most occurrences. Click a document to view it, and press Ctrl+F to use the Acrobat search function or press Alt+F to use the xpdf search function within the document.

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

---

## Related documentation

This *Installation Guide* provides general information about the computer, including information about features, how to configure the computer, setup instructions, installation instructions, and how to get help. In addition to this *Installation Guide*, the following documentation comes with the computer:

- *User's Guide*

This document is in Portable Document Format (PDF) on the IBM *IntelliStation Documentation* CD. It contains general information about the computer, how to install options, and how to use and configure the functions of the computer.

- *Problem Determination and Service Guide*

This document is in PDF on the IBM *IntelliStation Documentation* CD and at <http://www.ibm.com/support/>. This document contains information to help you solve problems yourself, and it contains information for service technicians.

- *Safety Information*

This document is in PDF on the IBM *IntelliStation Documentation* CD. It contains translated caution and danger statements. Each caution and danger statement that appears in the documentation has a number that you can use to locate the corresponding statement in your language in the *Safety Information* document.

- *Warranty and Support Information*

This document is in PDF on the IBM *IntelliStation Documentation* CD. It contains information about the terms of the warranty and getting services and assistance.

- Readme files on the *Device Drivers* CD  
Several readme files on the CD contain information about preinstalled device drivers. Other readme files on the CD contain information about the various adapters and devices that might be installed in or attached to the computer.
- IBM *IntelliStation Documentation* CD  
This CD contains all of the IBM IntelliStation Z Pro Type 9228 documents in Portable Document Format (PDF).

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

**Note:** Changes are made periodically to the IBM Web site. The actual procedure might vary slightly from what is described in this document.

1. Go to <http://www.ibm.com/support/>.
2. Under **Search technical support**, type 9228, and click **Search**.

---

## Notices and statements in this document

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

The following notices and statements are used in this document:

- **Note:** 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.

---

## Inventory checklist

Take an inventory of items as you unpack them to make sure that you have all of the components. If any items are missing or damaged, contact your place of purchase. The following items come with the IBM IntelliStation Z Pro Type 9228 computer:

- One keyboard
- One mouse
- One power cord
- One *Device Drivers* CD
- One IBM *IntelliStation Documentation* CD
- This *Installation Guide*
- One pigtail cable or digital-to-analog converter (depending on the model)

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

---

## Selecting a location for the computer

Make sure that 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 approximately 50 mm (2 in.) of space around the computer for proper air circulation. For information about arranging the computer and ease-of-use, see the following sections.

---

## Arranging the workspace

To get the most from the 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 comfortable 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 the monitor screen periodically using a soft cloth moistened with a nonabrasive, liquid glass cleaner.

## **Air circulation**

The computer and monitor produce heat. The computer 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 50 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 the 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 the *Problem Determination and Service Guide*.

## Features and specifications

The following table provides a summary of the features and specifications of the computer. Depending on the model, some features might not be available, or some specifications might not apply. Use the Configuration/Setup Utility program to determine the type and speed of the microprocessor.

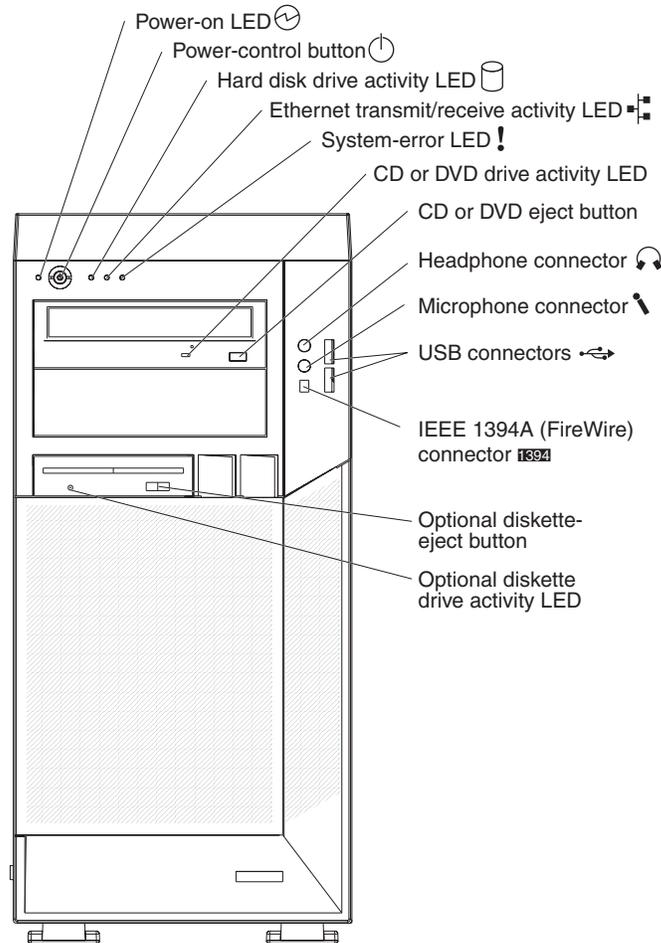
Table 1. Features and specifications

<p><b>Microprocessor:</b></p> <ul style="list-style-type: none"> <li>• Supports up to two Intel® Xeon dual-core microprocessors</li> <li>• One 4 MB Level-2 cache</li> <li>• 1333 MHz front-side bus (FSB)</li> </ul> <p><b>Memory:</b></p> <ul style="list-style-type: none"> <li>• Minimum: 1 GB</li> <li>• Maximum: 32 GB (mirroring mode 16 GB)</li> <li>• Type: PC2-5300, 667 MHz, dual-data-rate 2 (DDR2) fully-buffered error correcting code (ECC)</li> <li>• Connectors: eight dual inline memory module (DIMM) connectors</li> </ul> <p><b>Internal drives:</b></p> <ul style="list-style-type: none"> <li>• Hard disk drive: SATA or SAS</li> <li>• One of the following drives: <ul style="list-style-type: none"> <li>– DVD/CD-RW combo: IDE</li> <li>– CD-RW: IDE</li> <li>– CD-ROM: IDE</li> <li>– DVD ROM: IDE</li> <li>– Multi-burner Plus: IDE</li> </ul> </li> </ul> <p><b>Expansion bays:</b></p> <ul style="list-style-type: none"> <li>• Two half-high 5.25-inch bays (optical drive installed in one bay)</li> <li>• Four slim-high 3.5-inch internal drive bays (one hard disk drive installed)</li> <li>• One slim-high 3.5-inch drive bay (optional diskette drive)</li> </ul> <p><b>PCI expansion slots:</b></p> <ul style="list-style-type: none"> <li>• One PCI Express x16 (x16) slot</li> <li>• One PCI Express x16 (x4) slot</li> <li>• One PCI Express x8 (x4) slot</li> <li>• One PCI 32-bit/33 MHz slot</li> <li>• Two PCI-X 64-bit 133 MHz slots</li> </ul> <p><b>Power supply:</b></p> <ul style="list-style-type: none"> <li>• One 815-watt power supply</li> </ul> <p><b>Cooling:</b></p> <ul style="list-style-type: none"> <li>• Six to eight speed-controlled fans and one power-supply fan</li> </ul>	<p><b>Integrated functions:</b></p> <ul style="list-style-type: none"> <li>• Broadcom BC5752KFB 10/100/1000 Ethernet controller with RJ-45 Ethernet connector</li> <li>• One serial connector</li> <li>• Four-port Serial ATA controller</li> <li>• Two IEEE 1394A (FireWire) ports (one on rear, one on front)</li> <li>• Seven Universal Serial Bus (USB) connectors (two on front, four on rear, and one internal)</li> <li>• Keyboard connector</li> <li>• Mouse connector</li> <li>• Audio connectors <ul style="list-style-type: none"> <li>– Line out (rear)</li> <li>– Mic (front and rear)</li> <li>– Line in (rear)</li> <li>– Headphone (front)</li> </ul> </li> <li>• Single-channel IDE controller</li> </ul> <p><b>Video adapter</b> (depending on the model)</p> <ul style="list-style-type: none"> <li>• NVIDIA Quadro NVS 285 (DMS-59), PCI Express x16, with 128 MB DDR2 SDRAM and dual analog connectors, (or dual digital monitor capability with the purchase of an additional pigtail cable)</li> <li>• NVIDIA Quadro FX 550 (DVI-I), PCI Express x16, with 128 MB GDDR3 synchronous dynamic random access memory (SDRAM) and dual DVI-I connectors</li> <li>• NVIDIA Quadro FX 1500 (dual-link DVI-I), PCI Express x16, with 256 MB GDDR3 SDRAM and two dual DVI-I connectors</li> <li>• NVIDIA Quadro FX 3500 (DVI-I), PCI Express x16, with 256 MB GDDR3 SDRAM and two dual DVI-I connectors</li> <li>• NVIDIA Quadro FX 4500 (DVI-I), PCI Express x16, with 512 MB GDDR3 SDRAM and two dual DVI-I connectors</li> </ul>	<p><b>Electrical input:</b></p> <ul style="list-style-type: none"> <li>• Sine-wave input (50 or 60 Hz) required</li> <li>• Input voltage and frequency ranges automatically selected</li> <li>• Input voltage low range: <ul style="list-style-type: none"> <li>– Minimum: 100 V ac</li> <li>– Maximum: 124 V ac</li> </ul> </li> <li>• Input voltage high range: <ul style="list-style-type: none"> <li>– Minimum: 200 V ac</li> <li>– Maximum: 240 V ac</li> </ul> </li> <li>• Input kilovolt-amperes (kVA) approximately: <ul style="list-style-type: none"> <li>– Minimum: 0.03 kVA</li> <li>– Maximum: 1.24 kVA</li> </ul> </li> </ul> <p><b>Heat output:</b></p> <p>Approximate heat output in British thermal units (Btu) per hour:</p> <ul style="list-style-type: none"> <li>• Minimum configuration: 433 Btu per hour (127 watts)</li> <li>• Maximum configuration: 1948 Btu per hour (571 watts)</li> </ul> <p><b>Environment:</b></p> <ul style="list-style-type: none"> <li>• Air temperature: <ul style="list-style-type: none"> <li>– Computer on: 10° to 35°C (50° to 95°F)</li> <li>Altitude: 0 to 2134 m (7000 ft)</li> <li>– Computer off: -40° to +60°C (-40° to +140°F)</li> <li>Maximum altitude: 2133 m (7000 ft)</li> </ul> </li> <li>• Humidity (operating and storage): 8% to 80%</li> </ul> <p><b>Acoustical noise emissions:</b></p> <ul style="list-style-type: none"> <li>• Sound power, idle: 4.3 bel (with SATA hard disk drive)</li> <li>• Sound power, operating: 5.3 bel</li> </ul> <p><b>Size:</b></p> <ul style="list-style-type: none"> <li>• Height: 467.3 mm (18.4 in.)</li> <li>• Depth: 492.7 mm (19.4 in.)</li> <li>• Width: 215.9 mm (8.5 in.)</li> <li>• Weight: 18.1 kg (40 lb) to 21.8 kg (48 lb) depending upon configuration</li> </ul>
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## Controls, LEDs, and connectors

This section identifies the controls, LEDs, and front connectors on the IntelliStation Z Pro Type 9228 computer. See “Cabling the computer” on page 11 for an illustration of the connectors on the rear of the computer.



### Power-on LED

When this LED is lit, it indicates that the computer is turned on.

### Power-control button

Press this button to turn the computer on or off.

### Hard disk drive activity LED

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

### Ethernet activity LED

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

### Ethernet link status LED

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

### 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. If the system board LED is not lit, check the error log.

**CD or DVD drive activity LED**

When this LED is lit, it indicates that the CD or DVD drive is in use.

**CD or DVD eject button**

Press this button to insert a CD or DVD into or remove a CD or DVD from the CD or DVD drive.

**Headphone connector (green)**

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

**Microphone connector (pink)**

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

**USB connectors**

Use these connectors to connect USB devices to the computer, using redundant Plug and Play technology.

**IEEE 1394A (FireWire) connectors**

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

**Optional diskette-eject button**

Press this button to release a diskette from the diskette drive.

**Optional diskette drive activity LED**

When this LED is lit, it indicates that the diskette drive is in use.

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## Chapter 2. Cabling and starting the computer

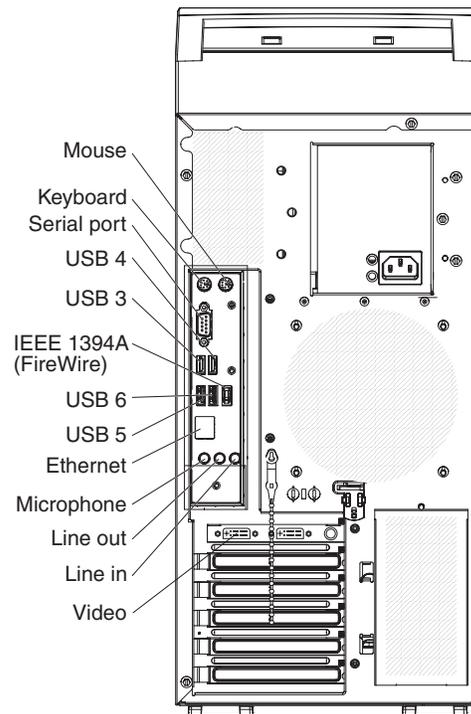
This chapter provides information about cabling, starting the computer, and completing the operating-system setup procedure.

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### Cabling the computer

If the 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 the computer, connect the power cord last.



Depending on the video adapter that is installed in the computer and the monitor you want to use, you might have to use special video cables that convert signals or provide an additional connection point for dual-monitor capability. See the *User's Guide* on the IBM *IntelliStation Documentation* CD and the documentation that comes with the 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 requests, such as a remote request to turn on the computer.

**Notes:**

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

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

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

---

## Running the operating-system setup program

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

### **Important:**

1. After turning on the computer for the first time, you must complete the operating-system setup procedure before turning off the computer; otherwise, unexpected results might occur.
2. The setup program might be slightly different from the one that is described in the operating-system documentation. Some choices do not appear because they are preset.
3. During the setup procedure, you must indicate that you accept the license agreement.
4. For Windows operating systems, the registration information is already 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 that is attached to the computer.

You will need the following information to complete the setup program in Windows operating systems:

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

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

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## Turning off the computer

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

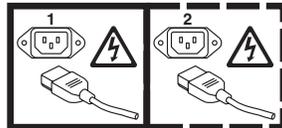
Some operating systems require an orderly shutdown before you turn off the computer. See the operating-system documentation for information about shutting down the operating system.

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

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

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

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

1. Save and close all files that you are working with.
  2. Close all open applications.
  3. Click **Red Hat Linux Main Menu Button** → **Logout** → **Shutdown**.
  4. Click **OK** to confirm.
- You can press the power-control button on the front of the computer to start an orderly shutdown of the operating system and turn off the computer, if the operating system supports this feature.

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

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



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## Chapter 3. Configuring the computer

This chapter describes how to configure software for the computer.

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### Viewing the license agreement

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

To view the license agreement in Windows XP, complete the following steps:

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

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

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### Using the built-in configuration programs

The following configuration programs are available to configure the computer:

- **Configuration/Setup Utility program**

The Configuration/Setup Utility program is part of the basic input/output system (BIOS) code in the computer. You can use this program to configure serial port assignments, change interrupt request (IRQ) settings, change the drive startup sequence, set the date and time, set passwords, and set the chassis-intrusion detector. For more information about using this utility program, see “Starting the Configuration/Setup Utility program” on page 16.

- **Boot Menu program**

The Boot Menu program is part of the BIOS code in the computer. Use it to temporarily assign a device to be first in the startup sequence, overriding the startup sequence that is set in the Configuration/Setup Utility program. For information about how to start the Boot Menu, see “Using the Boot Menu program” on page 16.

- **Broadcom NetXtreme Gigabit Ethernet Boot Agent**

The Broadcom NetXtreme Gigabit Ethernet Boot Agent is part of the BIOS code in the computer. You can use it to configure the network as a startable device, and you can customize where the network startup option appears in the startup sequence. You enable and disable the Broadcom NetXtreme Gigabit Ethernet Boot Agent from the Configuration/Setup Utility program. For information, see “Enabling the Broadcom NetXtreme Gigabit Ethernet Boot Agent” on page 16.

- **Broadcom NetXtreme Gigabit Ethernet controller configuration**

To configure the integrated Gigabit Ethernet controller, see “Configuring the Broadcom NetXtreme Gigabit Ethernet controller” on page 17.

- **LSI Logic Configuration Utility program**

Use the LSI Logic Configuration Utility program to configure the integrated SAS controller with RAID capabilities and the devices that are attached to it. For information about using this program, see “LSI Logic Configuration Utility program” on page 17.

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

The following sections provide the instructions for starting the utility programs.

## Starting the Configuration/Setup Utility program

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

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

To start the Configuration/Setup Utility program, complete the following steps:

1. Turn on the computer and watch the monitor screen. If the computer is already on when you start this procedure, you must shut down the operating system, turn off the computer, wait a few seconds until all in-use LEDs are turned off, and restart the computer.
2. When the message Press F1 for Configuration/Setup, Press F12 for Boot Menu appears on the screen during startup, press F1. (This prompt appears on the screen for only a few seconds. You must press F1 quickly.) If you have set both a user password and an administrator password, you must type the administrator password to access the full Configuration/Setup Utility menu.
3. Follow the instructions on the screen.

## Using the Boot Menu program

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

To use the Boot Menu program to change the startup sequence of the computer, complete the following steps:

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

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

## Enabling the Broadcom NetXtreme Gigabit Ethernet Boot Agent

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

To enable the Broadcom NetXtreme Gigabit Ethernet boot agent, complete the following steps:

1. From the Configuration/Setup Utility main menu, select **Devices and I/O Ports** and press Enter.
2. Select **Planar Ethernet** and use the Right Arrow (→) key to set it to **Enabled**.
3. Set the network-planar device as the first startup device under the **Startup Option → Startup Sequence Options** menu choice in the Configuration/Setup Utility program.
4. Select **Save Settings** and press Enter.

## Configuring the Broadcom NetXtreme Gigabit Ethernet controller

The Ethernet controller is integrated on the system board. It provides an interface for connecting to a 10-Mbps, 100-Mbps, or 1-Gbps network and provides full duplex (FDX) capability, which enables simultaneous transmission and reception of data on the network. If the Ethernet port in the computer supports auto-negotiation, the controller detects the data-transfer rate (10BASE-T, 100BASE-TX, or 1000BASE-T) and duplex mode (full-duplex or half-duplex) of the network and automatically operates at that rate and mode.

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

## LSI Logic Configuration Utility program

Use the LSI Logic Configuration Utility program to configure and manage redundant array of independent disks (RAID) arrays. Be sure to use these programs as described in this document.

- Use the LSI Logic Configuration Utility program to:
  - Perform a low-level format on a SAS hard disk drive
  - Set SAS protocol parameters

In addition, an LSI command-line configuration program is available from <http://www.ibm.com/support/>.

Consider the following information when using the LSI Logic Configuration Utility program to configure and manage arrays:

- The integrated SAS controller with RAID capabilities supports:
  - Integrated Mirroring (IM) with hot-spare support (also known as RAID 1)  
Use this option to create an integrated array of two disks plus an optional hot spare. All data on the primary disk can be migrated.
  - Integrated Mirroring Enhanced (IME) with hot-spare support (also known as RAID 1E)  
Use this option to create an integrated mirror enhanced array of three to eight disks, including an optional hot spare.
  - Integrated Striping (IS) (also known as RAID 0)  
Use this option to create an integrated striping array of two to eight disks. All data on the array disk will be deleted.
- Hard disk drive capacities affect how you create arrays. The drives in an array can have different capacities, but the RAID controller treats them as if they all have the capacity of the smallest hard disk drive.

- If you use an integrated SAS controller with RAID capabilities to configure a RAID 1 (mirrored) array after you have installed the operating system, you will lose access to any data or applications that were previously stored on the secondary drive of the mirrored pair.
- If you install a different type of RAID controller, see the documentation that comes with the controller for information about viewing and changing SAS settings for attached devices.

### **Using the LSI Logic Configuration Utility program**

To start the LSI Logic Configuration Utility program, complete the following steps:

1. Turn on the computer.
2. When the message <<< Press <CTRL><C> to start LSI Logic Configuration Utility >>> appears, press Ctrl+C. If an administrator password has been set, you are prompted to type the password.
3. Use the arrow keys to select a controller (channel) from the list of adapters; then, press Enter.
4. To change the settings of the selected items, follow the instructions on the screen. If you select **Raid Properties**, **SAS Topology**, or **Advanced Adapter Properties** additional screens are displayed.

See the *User's Guide* on the IBM *IntelliStation Documentation* CD for more information about the LSI Logic Configuration Utility program.

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## Chapter 4. Completing the installation

This chapter provides information to help you register the computer, record important information, and back up the application programs.

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### Recording important numbers

Record information about the computer in the following table. You will need this information when you register the computer with IBM.

<b>Product name</b>	IBM IntelliStation Z Pro
<b>Machine type</b>	9228
<b>Model number</b>	_____
<b>Serial number</b>	_____
<b>Key serial number</b>	_____
<b>Key manufacturer</b>	_____
<b>Key phone number</b>	_____

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### Creating an emergency recovery-repair diskette in Windows

**Note:** To create and use a diskette, you must add a diskette drive to the computer. To enable a USB diskette drive to work, you must disable the legacy diskette drive function in the Configuration/Setup Utility program (click **Devices and I/O Ports** → **Internal Floppy Disk**).

At the 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 the computer becomes unusable, you can use the recovery-repair diskette to access the Product Recovery program, which runs independently of the operating system and reinstalls the operating system and preinstalled software. For information about using the recovery-repair diskette, see the *Problem Determination and Service Guide* on the IBM *IntelliStation Documentation CD*.

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

If the hard disk drive on which the Product Recovery program is stored becomes damaged or if you replace the hard disk drive, contact IBM to order the IBM Product Recovery CD to recover the preinstalled operating system, application programs, and device drivers. See Appendix A, "Getting help and technical assistance," on page 49 for details.

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

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

To create a recovery-repair diskette from the c:\ibmtools directory, complete the following steps:

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

To create a recovery-repair diskette from the Product Recovery partition program on the hard disk, complete the following steps:

1. Shut down the operating system and turn off the computer.
2. Wait for at least 5 seconds; then, press and hold the F11 key while you restart the computer. When a menu appears, release the F11 key.
3. Use one of the following procedures:
  - If a menu is displayed in which you can select an operating system, use the arrow keys to select the operating system that is currently installed, press Enter, and then continue with the next step.
  - If an operating-system menu is not displayed, continue with the next step.
4. From the Product Recovery Main menu, use the arrow keys to select **System utilities**, and then press Enter.
5. Use the arrow keys to select **Create a Recovery Repair diskette**, and then press Enter.
6. Follow the instructions on the screen.

See “Creating an IBM Enhanced Diagnostics diskette or CD in Windows” for information about how to create an IBM Enhanced Diagnostics diskette.

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## Creating an IBM Enhanced Diagnostics diskette or CD in Windows

**Note:** To create and use a diskette or CD, a diskette, CD-RW, or DVD/CD-RW combo drive must be installed in the computer. To enable a USB diskette drive to work, you must disable the legacy diskette drive function in the Configuration/Setup Utility program (click **Devices and I/O Ports** → **Internal Floppy Disk**).

The IBM Enhanced Diagnostics diskette is a self-starting diagnostic diskette that is used to test hardware components on the computer. You can create only an IBM Enhanced Diagnostics diskette from the Product Recovery program. You can create an IBM Enhanced Diagnostics diskette from the Product Recovery program or a CD from the World Wide Web. Use one of the following methods to create a startable IBM Enhanced Diagnostics diskette.

To create an IBM Enhanced Diagnostics diskette from the Product Recovery program partition, complete the following steps:

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

To download the latest CD image, of the IBM Enhanced Diagnostics from the Web and create a startable IBM Enhanced Diagnostics CD, complete the following steps:

1. Go to <http://www.ibm.com>.
2. Click **Support & downloads**.
3. Click **Search technical support**.
4. In the **Enter keyword(s)** field, type diagnostics 9228, and click **Search**
5. From the "Search results" page, click the Enhanced Diagnostics item for the computer.
6. On the next page, click the CD image file for the Enhanced Diagnostics code and download it, using a writeable optional device (CD-RW or DVD/CD-RW combo drive).

For more information about using the IBM Enhanced Diagnostics program, see the *Problem Determination and Service Guide* on the IBM *IntelliStation Documentation* CD.



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## Chapter 5. Solving problems

This section provides basic troubleshooting information to help you diagnose and solve some problems that might occur with the computer.

If you cannot locate and correct the problem using the information in this section, see Appendix A, “Getting help and technical assistance,” on page 49 and the *Problem Determination and Service Guide* on the IBM *IntelliStation Documentation* CD.

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### Diagnostic tools overview

The following tools are available to help you diagnose and solve hardware-related problems:

- **POST beep codes and error messages**

The power-on self-test (POST) generates beep codes and messages to indicate the successful test completion or the detection of a problem. See “Power-on self-test (POST)” on page 24 and “POST error codes” on page 24 for information. Additional information is recorded in the system error logs. (For detailed information, see the information about error logs in the *Problem Determination and Service Guide* on the IBM *IntelliStation Documentation* CD).

- **Diagnostic programs, error codes, and error messages**

The diagnostic programs are the primary method of testing the major components of the computer. The diagnostic programs are stored on a hidden partition on the hard drive. See the *Problem Determination and Service Guide* on the IBM *IntelliStation Documentation* CD for information about the diagnostic programs

- **Troubleshooting tables**

These tables list problem symptoms and steps to correct the problems. See “Troubleshooting tables” on page 37 for information.

- **System-board error LEDs**

An LED on the system board might also be lit to help isolate an error that is indicated by the system error LED on the front of the computer. See the “System-board error LEDs” on page 48 for more information.

---

## Power-on self-test (POST)

When you turn on the computer, it performs a series of tests to check the operation of system components and some of the optional devices in the computer. This series of tests is called the power-on self-test, or POST.

If a power-on password is set, you must type the password and press Enter, when prompted, for POST to run.

If POST is completed without detecting any problems, a single beep sounds, and the computer startup is completed.

If POST detects a problem, more than one beep might sound, or an error message is displayed. See “Beep code descriptions” in the *Problem Determination and Service Guide* and “POST error codes” in this document for more information.

### POST beep codes

A beep code is a combination of short and long beeps, or a series of short beeps, separated by pauses (intervals without sound). For example, a “1-2-3” beep code is one short beep, a pause, two short beeps, a pause, and three short beeps. A beep code other than one beep indicates that the POST process has detected a problem. To determine the meaning of a beep code, see “Beep code descriptions” in the *Problem Determination and Service Guide* on the IBM *IntelliStation Documentation* CD. If no beep code sounds, see “No-beep symptoms” in the *Problem Determination and Service Guide* on the IBM *IntelliStation Documentation* CD.

### POST error codes

The following table provides an abbreviated list of the POST error codes that might appear during startup. See the *Problem Determination and Service Guide* on the IBM *IntelliStation Documentation* CD for more information about the POST error codes.

Table 2. POST error codes

Error code	Description	Action
<ul style="list-style-type: none"> <li>• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.</li> <li>• See the part listing in the <i>Problem Determination and Service Guide</i> to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).</li> <li>• If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.</li> </ul>		
062	<p>The computer failed to start on three consecutive attempts.</p> <p>All caches are disabled. Repeatedly turning the computer on and off or resetting the computer might cause this problem.</p>	<ol style="list-style-type: none"> <li>1. Run the Configuration/Setup Utility program and make sure that all settings are correct. Use the <b>Cache Control</b> selection in the <b>Advanced Setup</b> menu of the Configuration/Setup Utility program to enable the caches.</li> <li>2. Reseat the following components:               <ol style="list-style-type: none"> <li>a. Battery</li> <li>b. (Trained service technician only) Microprocessor</li> </ol> </li> <li>3. Replace the following components one at a time, in the order shown, restarting the computer each time:               <ol style="list-style-type: none"> <li>a. Battery</li> <li>b. (Trained service technician only) Microprocessor</li> <li>c. (Trained service technician only) System board</li> </ol> </li> </ol> <p><b>Note:</b> When the problem is corrected, be sure to enable the caches.</p>
101, 102, and 106	Timer tick interrupt failure.	(Trained service technician only) Replace the system board.
102	Timer 2 test failure.	(Trained service technician only) Replace the system board.
106	Diskette control error.	(Trained service technician only) Replace the system board.
129	An internal cache (L1) error occurred.	<ol style="list-style-type: none"> <li>1. (Trained service technician only) reseat the microprocessor.</li> <li>2. (Trained service technician only) reseat the optional microprocessor.</li> <li>3. Replace the following components one at a time, in the order shown, restarting the computer each time:               <ol style="list-style-type: none"> <li>a. (Trained service technician only) Microprocessor</li> <li>b. (Trained service technician only) Optional microprocessor</li> </ol> </li> </ol>
151	A real-time clock (RTC) error occurred.	<ol style="list-style-type: none"> <li>1. Run the diagnostics program.</li> <li>2. Reseat the battery.</li> <li>3. Replace the following components one at a time, in the order shown, restarting the computer each time:               <ol style="list-style-type: none"> <li>a. Battery</li> <li>b. (Trained service technician only) System board</li> </ol> </li> </ol>

Table 2. POST error codes (continued)

Error code	Description	Action
161	The real-time clock battery has failed.	<ol style="list-style-type: none"> <li>1. Run the Configuration/Setup Utility program, select <b>Load Default Settings</b>, make sure that the date and time are correct, and save the settings.</li> <li>2. Reseat the battery.</li> <li>3. Replace the following components one at a time, in the order shown, restarting the computer each time:               <ol style="list-style-type: none"> <li>a. Battery</li> <li>b. (Trained service technician only) System board</li> </ol> </li> </ol>
162	A change in the device configuration occurred. This error occurs under one or more of the following conditions: <ul style="list-style-type: none"> <li>• A new device has been installed.</li> <li>• A device has been moved to a different location or cable connection.</li> <li>• A device has been removed or disconnected from a cable.</li> <li>• A device is failing and is no longer recognized by the computer as being installed.</li> <li>• An external device is not turned on.</li> <li>• An invalid checksum is detected in the battery-backed memory.</li> </ul>	<ol style="list-style-type: none"> <li>1. Make sure that all external devices are turned on. You must turn on external devices before turning on the computer.</li> <li>2. If you did not add, remove, or change the location of a device, a device is probably failing. Running the diagnostic program might isolate the failing device. (See "Running the diagnostic programs" or "Using the enhanced diagnostics diskette or CD" in the <i>Problem Determination and Service Guide</i>).</li> <li>3. Run the Configuration/Setup Utility program, select <b>Load Default Settings</b>, and save the settings.</li> <li>4. Reseat the following components:               <ol style="list-style-type: none"> <li>a. Battery</li> <li>b. Failing device</li> </ol> </li> <li>5. Replace the following components one at a time, in the order shown, restarting the computer each time:               <ol style="list-style-type: none"> <li>a. Battery</li> <li>b. Failing device (if the device is a FRU, the device must be replaced by a trained service technician only).</li> <li>c. (Trained service technician only) System board</li> </ol> </li> </ol>
163	The time of day has not been set.	<ol style="list-style-type: none"> <li>1. Run the Configuration/Setup Utility program, select <b>Load Default Settings</b>, make sure that the date and time are correct, and save the settings.</li> <li>2. Reseat the battery.</li> <li>3. Replace the following components one at a time, in the order shown, restarting the computer each time:               <ol style="list-style-type: none"> <li>a. Battery</li> <li>b. (Trained service technician only) System board</li> </ol> </li> </ol>

Table 2. POST error codes (continued)

Error code	Description	Action
<ul style="list-style-type: none"> <li>• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.</li> <li>• See the part listing in the <i>Problem Determination and Service Guide</i> to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).</li> <li>• If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.</li> </ul>		
164	A change in the memory configuration occurred. This message might appear after you add or remove memory.	<ol style="list-style-type: none"> <li>1. If POST error message 289 also occurred, follow the actions for the 289 POST error code first.</li> <li>2. If you just installed or removed memory, run the Configuration/Setup Utility program, and save the new configuration settings.</li> <li>3. Reseat the DIMMs.</li> <li>4. Replace the following components one at a time, in the order shown, restarting the computer each time:               <ol style="list-style-type: none"> <li>a. DIMMs</li> <li>b. (Trained service technician only) System board</li> </ol> </li> </ol>
175	The electrically erasable programmable read-only memory cyclic redundancy check (EEPROM CRC) #1 is damaged.	<ol style="list-style-type: none"> <li>1. If the Remote Supervisor Adapter II is installed, make sure that the latest firmware is installed.</li> <li>2. (Trained service technician only) Replace the system board.</li> </ol>
177 and 178	A security hardware error occurred.	<ol style="list-style-type: none"> <li>1. Run the Configuration/Setup Utility program.</li> <li>2. (Trained service technician only) Replace the system board.</li> </ol>
184	The power-on password information stored in the computer has been removed.	<ol style="list-style-type: none"> <li>1. Run the Configuration/Setup Utility program, select <b>Load Default Settings</b>, and save the settings.</li> <li>2. Reseat the battery.</li> <li>3. Replace the battery.</li> <li>4. (Trained service technician only) Replace the system board.</li> </ol>
185	The drive startup sequence information is corrupted.	<ol style="list-style-type: none"> <li>1. Run the Configuration/Setup Utility program.</li> <li>2. (Trained service technician only) Replace the system board.</li> </ol>
187	The VPD serial number is not set. <b>Note:</b> The system serial number is set in the VPD EEPROM at the time of manufacturing. If the system board has been replaced, the system serial number will be invalid and must be reset.	<ol style="list-style-type: none"> <li>1. Restart the computer.</li> <li>2. Update the BIOS code to set the serial number. For information about updating the BIOS code, see the <i>Problem Determination and Service Guide</i> on the IBM <i>IntelliStation Documentation CD</i>.</li> <li>3. (Trained service technician only) Replace the system board.</li> </ol>
188	The EEPROM CRC #2 is damaged.	<ol style="list-style-type: none"> <li>1. Run the Configuration/Setup Utility program.</li> <li>2. (Trained service technician only) Replace the system board.</li> </ol>
189	An attempt has been made to access the computer with an incorrect password three times.	Restart the computer and enter the administrator password; then, run the Configuration/Setup Utility program and change the power-on password.

Table 2. POST error codes (continued)

<ul style="list-style-type: none"> <li>• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.</li> <li>• See the part listing in the <i>Problem Determination and Service Guide</i> to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).</li> <li>• If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.</li> </ul>		
Error code	Description	Action
196	Microprocessor cache mismatch	Make sure that the microprocessors are of the same type and speed.
198	Microprocessor speed mismatch	Make sure that the microprocessors are of the same type and speed.
199	Microprocessors not in recommended configurations	Make sure that the microprocessors are of the same type and speed.
201	An error occurred during the memory controller test. This error can be caused by: <ul style="list-style-type: none"> <li>• Incorrectly installed memory</li> <li>• A failing memory module</li> <li>• A system board problem</li> </ul>	<ol style="list-style-type: none"> <li>1. If you just installed memory, make sure that the new memory is correct for the computer.</li> <li>2. Reseat the DIMM.</li> <li>3. Replace the following components one at a time, in the order shown, restarting the computer each time: <ol style="list-style-type: none"> <li>a. DIMM</li> <li>b. (Trained service technician only) System board</li> </ol> </li> </ol>
229	An internal cache (L2) error occurred.	<ol style="list-style-type: none"> <li>1. (Trained service technician only) reseat the microprocessor.</li> <li>2. (Trained service technician only) reseat the optional microprocessor.</li> <li>3. Replace the following components one at a time, in the order shown, restarting the computer each time: <ol style="list-style-type: none"> <li>a. (Trained service technician only) Microprocessor</li> <li>b. (Trained service technician only) Optional microprocessor</li> </ol> </li> </ol>
289	An error occurred during POST memory tests and a DIMM was disabled.	<ol style="list-style-type: none"> <li>1. If you just installed memory, make sure that the new memory is correct for the computer.</li> <li>2. If the DIMM was disabled by the user, run the Configuration/Setup Utility program and enable the DIMM.</li> <li>3. Reseat the DIMM.</li> <li>4. Replace the DIMM.</li> </ol>

Table 2. POST error codes (continued)

<ul style="list-style-type: none"> <li>• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.</li> <li>• See the part listing in the <i>Problem Determination and Service Guide</i> to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).</li> <li>• If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.</li> </ul>		
Error code	Description	Action
301 and 303	An error occurred during the keyboard and keyboard controller test. These error messages also might be accompanied by continuous beeping.	<ol style="list-style-type: none"> <li>1. If you just connected a new mouse or other pointing device, turn off the computer and disconnect that device. Wait at least 5 seconds; then, turn on the computer. If the error message goes away, replace the device.</li> <li>2. Make sure that nothing is resting on the keyboard or pressing on a key.</li> <li>3. Make sure that no key is stuck.</li> <li>4. Reseat the keyboard cable and make sure that it is connected to the correct connector on the computer.</li> <li>5. After installing a USB keyboard, run the Configuration/Setup Utility program to enable keyboardless operation and prevent the POST error message from being displayed during startup.</li> <li>6. Run the diagnostic tests to isolate the computer component that failed.</li> <li>7. Replace the following components one at a time, in the order shown, restarting the computer each time:               <ol style="list-style-type: none"> <li>a. Keyboard</li> <li>b. (Trained service technician only) System board</li> </ol> </li> </ol>
602	An invalid diskette boot record error occurred.	<ol style="list-style-type: none"> <li>1. Reseat the diskette drive cable.</li> <li>2. Replace the following components one at a time, in the order shown, restarting the computer each time:               <ol style="list-style-type: none"> <li>a. Diskette drive cable</li> <li>b. Diskette drive</li> <li>c. (Trained service technician only) System board</li> </ol> </li> </ol>
604	An error occurred during a diskette drive test.	<ol style="list-style-type: none"> <li>1. Make sure that the Configuration/Setup Utility program correctly reflects the type of diskette drive that is installed.</li> <li>2. Reseat the diskette drive cable.</li> <li>3. Replace the following components one at a time, in the order shown, restarting the computer each time:               <ol style="list-style-type: none"> <li>a. Diskette drive cable</li> <li>b. Diskette drive</li> <li>c. (Trained service technician only) System board</li> </ol> </li> </ol>

Table 2. POST error codes (continued)

<ul style="list-style-type: none"> <li>• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.</li> <li>• See the part listing in the <i>Problem Determination and Service Guide</i> to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).</li> <li>• If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.</li> </ul>		
Error code	Description	Action
662	A diskette drive configuration error occurred.	<ol style="list-style-type: none"> <li>1. Run the Configuration/Setup Utility program and diagnostics.</li> <li>2. Reseat the diskette drive cable.</li> <li>3. Replace the following components one at a time, in the order shown, restarting the computer each time:                             <ol style="list-style-type: none"> <li>a. Diskette drive cable</li> <li>b. Diskette drive</li> <li>c. (Trained service technician only) System board</li> </ol> </li> </ol>
1162	The serial port configuration conflicts with another device in the system.	<ol style="list-style-type: none"> <li>1. Make sure that the IRQ and I/O port assignments needed by the serial port are available.</li> <li>2. If all interrupts are being used by adapters, remove an adapter to make an interrupt available to the serial port, or force other adapters to share an interrupt.</li> <li>3. Make sure that the serial port setting is correct in the Configuration/Setup Utility program. If the setting is not correct, change it and save the settings.</li> <li>4. (Trained service technician only) Replace the system board.</li> </ol>
11xx	A system board serial port 1 error occurred (xx can be any number or letter).	<ol style="list-style-type: none"> <li>1. Run the Configuration/Setup Utility program.</li> <li>2. (Trained service technician only) Replace the system board.</li> </ol>
1601	A BIOS code update is required.	<ol style="list-style-type: none"> <li>1. Download and install the latest level of the BIOS code. For information about downloading and installing the BIOS code, see the <i>Problem Determination and Service Guide</i> on the IBM IntelliStation Documentation CD.</li> <li>2. (Trained service technician only) Replace the system board.</li> </ol>
1602	The cable for the optional Remote Supervisor Adapter II is not installed.	Disconnect all computer and option power cords from the computer, wait 30 seconds, reconnect, and retry.
1762	A hard disk drive configuration error occurred.	<ol style="list-style-type: none"> <li>1. Make sure that the hard disk drive is set correctly in the Configuration/Setup Utility program.</li> <li>2. Reseat the hard disk drive cable.</li> <li>3. Replace the following components one at a time, in the order shown, restarting the computer each time:                             <ol style="list-style-type: none"> <li>a. Hard disk drive</li> <li>b. Hard disk drive cable</li> <li>c. (Trained service technician only) System board</li> </ol> </li> </ol>

Table 2. POST error codes (continued)

Error code	Description	Action
178x	An error occurred during the hard disk drive x test (x = 0 to 3).	<ol style="list-style-type: none"> <li>1. Reseat the hard disk drive x cable.</li> <li>2. Replace the following components one at a time, in the order shown, restarting the computer each time:               <ol style="list-style-type: none"> <li>a. Hard disk drive x</li> <li>b. Hard disk drive cable x</li> <li>c. (Trained service technician only) System board</li> </ol> </li> </ol>
1800	No more hardware interrupt available for the PCI adapter.	<ol style="list-style-type: none"> <li>1. Run the Configuration/Setup Utility program.</li> <li>2. Remove the adapter.</li> </ol>
1808	Unsupported PCI device is installed.	<ol style="list-style-type: none"> <li>1. Run the Configuration/Setup Utility program, select <b>Devices and I/O Ports</b>, and make sure that the device is enabled.</li> <li>2. Reseat each adapter. <b>Note:</b> If an error LED is lit on an adapter, reseat that adapter first; if no LEDs are lit, reseat each adapter one at a time, restarting the computer each time, to isolate the failing adapter.</li> <li>3. Replace the following components one at a time, in the order shown, restarting the computer each time:               <ol style="list-style-type: none"> <li>a. Failing adapter</li> <li>b. (Trained service technician only) System board</li> </ol> </li> </ol>

Table 2. POST error codes (continued)

Error code	Description	Action
1962	No valid startup devices were found. The computer cannot find the startup drive or operating system.	<ol style="list-style-type: none"> <li>1. Reseat the hard disk drive cable.</li> <li>2. Make sure that the hard disk drive you want to start from is in the startup sequence.               <ol style="list-style-type: none"> <li>a. Run the Configuration/Setup Utility program, select <b>Startup Option</b>.</li> <li>b. Check the list of startup devices in the <b>Startup Device</b> data fields. Is the drive you want to start from in the startup sequence?                   <p><b>Yes</b> Exit from this screen; then, select <b>Exit Setup</b> to exit the Configuration/Setup menu. Go to step 2c.</p> <p><b>No</b> Follow the instructions on the screen to add the drive; then, save the changes and exit the Configuration/Setup menu. Restart the computer.</p> </li> <li>c. Is an operating system installed?                   <p><b>Yes</b> Turn off the computer. Go to step 2d.</p> <p><b>No</b> Install the operating system in the computer; then, follow your operating-system instructions to shut down and restart the computer.</p> </li> <li>d. During computer startup, watch for messages indicating a hardware problem.</li> <li>e. If the error message still appears, run the diagnostics to isolate the problem.</li> </ol> </li> <li>3. Replace the following components one at a time, in the order shown, restarting the computer each time:               <ol style="list-style-type: none"> <li>a. Hard disk drive cable</li> <li>b. Hard disk drive</li> <li>c. (Trained service technician only) System board</li> </ol> </li> </ol>
2400	A video controller test failure occurred.	<ol style="list-style-type: none"> <li>1. Reseat the video adapter.</li> <li>2. Replace the following components one at a time, in the order shown, restarting the computer each time:               <ol style="list-style-type: none"> <li>a. Video adapter (if installed)</li> <li>b. (Trained service technician only) System board</li> </ol> </li> </ol>
2462	A video memory configuration error occurred.	<ol style="list-style-type: none"> <li>1. Run the Configuration/Setup Utility program and load the default settings.</li> <li>2. Reseat the video adapter.</li> <li>3. Replace the video adapter.</li> </ol>

Table 2. POST error codes (continued)

<ul style="list-style-type: none"> <li>• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.</li> <li>• See the part listing in the <i>Problem Determination and Service Guide</i> to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).</li> <li>• If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.</li> </ul>		
Error code	Description	Action
5962	An IDE CD or DVD drive configuration error occurred.	<ol style="list-style-type: none"> <li>1. Run the Configuration/Setup Utility program and load the default settings.</li> <li>2. Reseat the following components:               <ol style="list-style-type: none"> <li>a. CD or DVD drive cable</li> <li>b. Battery</li> </ol> </li> <li>3. Replace the following components one at a time, in the order shown, restarting the computer each time:               <ol style="list-style-type: none"> <li>a. CD or DVD drive</li> <li>b. CD or DVD drive cable</li> <li>c. Battery</li> <li>d. (Trained service technician only) System board</li> </ol> </li> </ol>
8603	<p>An error occurred during the mouse (pointing device) controller test. The addition or removal of a mouse, or a failing system board can cause this error.</p> <p><b>Note:</b> This error also can occur if electrical power was lost for a very brief period and then restored. In this case, turn off the computer for at least 5 seconds; then, turn it back on.</p>	<ol style="list-style-type: none"> <li>1. Reseat the mouse (pointing device) cable and make sure that it is connected to the correct connector on the computer.</li> <li>2. Complete the following steps:               <ol style="list-style-type: none"> <li>a. Turn off the computer.</li> <li>b. Disconnect the mouse (pointing device) from the computer.</li> <li>c. Turn on the computer.</li> </ol> <p>If the error message does not reappear, the mouse (pointing device) is probably failing. See the documentation that comes with the device for additional testing information.</p> </li> <li>3. Run the diagnostic tests to isolate the problem.</li> <li>4. Replace the following components one at a time, in the order shown, restarting the computer each time:               <ol style="list-style-type: none"> <li>a. Mouse (pointing device)</li> <li>b. (Trained service technician only) System board</li> </ol> </li> </ol>
00012000	A processor machine check error occurred.	<ol style="list-style-type: none"> <li>1. Update the system BIOS code. For information about updating the BIOS code, see the <i>Problem Determination and Service Guide</i> on the IBM IntelliStation Documentation CD.</li> <li>2. (Trained service technician only) Reseat the microprocessor.</li> <li>3. (Trained service technician only) Replace the microprocessor.</li> </ol>

Table 2. POST error codes (continued)

Error code	Description	Action
<ul style="list-style-type: none"> <li>Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.</li> <li>See the part listing in the <i>Problem Determination and Service Guide</i> to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).</li> <li>If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.</li> </ul>		
00019502	Microprocessor 1 failed.	<ol style="list-style-type: none"> <li>(Trained service technician only) Reseat the microprocessor.</li> <li>Replace the following components one at a time, in the order shown, restarting the computer each time:               <ol style="list-style-type: none"> <li>(Trained service technician only) Microprocessor</li> <li>(Trained service technician only) System board</li> </ol> </li> </ol>
00019xxx	Microprocessor x is not functioning.	<ol style="list-style-type: none"> <li>Verify microprocessor x is installed correctly.</li> <li>Replace the following components one at a time, in the order shown, restarting the computer each time:               <ol style="list-style-type: none"> <li>(Trained service technician only) Microprocessor x</li> <li>VRM if installed</li> <li>(Trained service technician only) System board</li> </ol> </li> </ol>
00151200	Unrecoverable error, microprocessor x reported IERR.	<ol style="list-style-type: none"> <li>(Trained service technician only) Reseat the microprocessor.</li> <li>Replace the following components one at a time, in the order shown, restarting the computer each time:               <ol style="list-style-type: none"> <li>(Trained service technician only) Microprocessor x</li> <li>VRM if installed.</li> <li>(Trained service technician only) System board</li> </ol> </li> </ol>
00180100	A PCI adapter has requested memory resources that are not available.	<ol style="list-style-type: none"> <li>Run the Configuration/Setup Utility program.</li> <li>Reseat each adapter.  <b>Note:</b> If an error LED is lit on an adapter, reseat that adapter first. If no LEDs are lit, reseat each adapter one at a time, restarting the computer each time to isolate the failing adapter.</li> <li>Replace the following components one at a time, in the order shown, restarting the computer each time:               <ol style="list-style-type: none"> <li>Failing adapter</li> <li>(Trained service technician only) System board</li> </ol> </li> </ol>

Table 2. POST error codes (continued)

<ul style="list-style-type: none"> <li>• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.</li> <li>• See the part listing in the <i>Problem Determination and Service Guide</i> to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).</li> <li>• If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.</li> </ul>		
Error code	Description	Action
00180200	No more I/O space is available for the PCI adapter.	<ol style="list-style-type: none"> <li>1. Run the Configuration/Setup Utility program.</li> <li>2. Reseat each adapter. <b>Note:</b> If an error LED is lit on an adapter, reseal that adapter first. If no LEDs are lit, reseal each adapter one at a time, restarting the computer each time to isolate the failing adapter.</li> <li>3. Replace the following components one at a time, in the order shown, restarting the computer each time:                             <ol style="list-style-type: none"> <li>a. Failing adapter</li> <li>b. (Trained service technician only) System board</li> </ol> </li> </ol>
00180300	There is no memory available above 1MB for the PCI adapter.	<ol style="list-style-type: none"> <li>1. Run the Configuration/Setup Utility program.</li> <li>2. Reseat each adapter. <b>Note:</b> If an error LED is lit on an adapter, reseal that adapter first. If no LEDs are lit, reseal each adapter one at a time, restarting the computer each time to isolate the failing adapter.</li> <li>3. Replace the following components one at a time, in the order shown, restarting the computer each time:                             <ol style="list-style-type: none"> <li>a. Failing adapter</li> <li>b. (Trained service technician only) System board</li> </ol> </li> </ol>
00180400	There is no memory available below 1MB for the PCI adapter.	<ol style="list-style-type: none"> <li>1. Run the Configuration/Setup Utility program.</li> <li>2. Reseat each adapter. <b>Note:</b> If an error LED is lit on an adapter, reseal that adapter first. If no LEDs are lit, reseal each adapter one at a time, restarting the computer each time to isolate the failing adapter.</li> <li>3. Replace the following components one at a time, in the order shown, restarting the computer each time:                             <ol style="list-style-type: none"> <li>a. Failing adapter</li> <li>b. (Trained service technician only) System board</li> </ol> </li> </ol>
00180500	PCI option read-only memory checksum error.	<ol style="list-style-type: none"> <li>1. Reseat each adapter. <b>Note:</b> If an error LED is lit on an adapter, reseal that adapter first. If no LEDs are lit, reseal each adapter one at a time, restarting the computer each time to isolate the failing adapter.</li> <li>2. Replace the following components one at a time, in the order shown, restarting the computer each time:                             <ol style="list-style-type: none"> <li>a. Failing adapter</li> <li>b. (Trained service technician only) System board</li> </ol> </li> </ol>

Table 2. POST error codes (continued)

<ul style="list-style-type: none"> <li>Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.</li> <li>See the part listing in the <i>Problem Determination and Service Guide</i> to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).</li> <li>If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.</li> </ul>		
Error code	Description	Action
00180600	PCI device built-in self test failure, PCI bridge error.	<ol style="list-style-type: none"> <li>Run the Configuration/Setup Utility program.</li> <li>Reseat each adapter. <b>Note:</b> If an error LED is lit on an adapter, reseat that adapter first. If no LEDs are lit, reseat each adapter one at a time, restarting the computer each time to isolate the failing adapter.</li> <li>Replace the following components one at a time, in the order shown, restarting the computer each time:                             <ol style="list-style-type: none"> <li>Failing adapter</li> <li>(Trained service technician only) System board</li> </ol> </li> </ol>
00180700	PCI device not responding.	<ol style="list-style-type: none"> <li>Run the Configuration/Setup Utility program, select <b>Devices and I/O Ports</b>, and make sure that the device is enabled.</li> <li>Reseat each adapter. <b>Note:</b> If an error LED is lit on an adapter, reseat that adapter first; if no LEDs are lit, reseat each adapter one at a time, restarting the computer each time, to isolate the failing adapter.</li> <li>Replace the following components one at a time, in the order shown, restarting the computer each time:                             <ol style="list-style-type: none"> <li>Failing adapter</li> <li>(Trained service technician only) System board</li> </ol> </li> </ol>
00180xxx	The PCI adapter has requested resources that are not available.	<ol style="list-style-type: none"> <li>Reorder the adapters in the PCI slots.</li> <li>Verify that the boot device is positioned early in the scan order so that it is executed by POST.</li> <li>Verify that all adapters are set correctly in the Configuration/Setup Utility program, changing memory settings if necessary.</li> <li>Remove an adapter to make more memory available to the adapters.</li> <li>Disable the adapter BIOS on the adapter (see documentation provided with the adapter).</li> <li>(Trained service technician only) Replace the system board.</li> </ol>
00181000	General PCI error.	<ol style="list-style-type: none"> <li>Replace the following components one at a time, in the order shown, restarting the computer each time:                             <ol style="list-style-type: none"> <li>The adapter</li> <li>(Trained service technician only) System board</li> </ol> </li> </ol>

Table 2. POST error codes (continued)

Error code	Description	Action
		<ul style="list-style-type: none"> <li>• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.</li> <li>• See the part listing in the <i>Problem Determination and Service Guide</i> to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).</li> <li>• If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.</li> </ul>
012980xx	Microprocessor 1 error.	<ol style="list-style-type: none"> <li>1. Verify both microprocessors have the same cache size and type, and the same clock size,</li> <li>2. Download and update the BIOS code. For information about downloading and updating the BIOS code, see the <i>Problem Determination and Service Guide</i> on the IBM <i>IntelliStation Documentation CD</i>.</li> <li>3. Replace the following components one at a time, in the order shown, restarting the computer each time:               <ol style="list-style-type: none"> <li>a. (Trained service technician only) Microprocessor 1</li> <li>b. (Trained service technician only) System board</li> </ol> </li> </ol>
012981xx	Microprocessor 2 error.	<ol style="list-style-type: none"> <li>1. Verify both microprocessors have the same cache size and type, and the same clock size,</li> <li>2. Download and update the BIOS code. For information about downloading and updating the BIOS code, see the <i>Problem Determination and Service Guide</i> on the IBM <i>IntelliStation Documentation CD</i>.</li> <li>3. Replace the following components one at a time, in the order shown, restarting the computer each time:               <ol style="list-style-type: none"> <li>a. (Trained service technician only) Microprocessor 2</li> <li>b. (Trained service technician only) System board</li> </ol> </li> </ol>
I9990650	AC power has been restored.	<ol style="list-style-type: none"> <li>1. Reseat the power cord.</li> <li>2. (Trained service technician only) Check for interruption of the external power.</li> <li>3. Replace the power cord.</li> </ol>
Other numbers	POST found an error.	Follow the instructions on the screen.

## Troubleshooting tables

Use the troubleshooting tables to find solutions to problems that have identifiable symptoms.

If you cannot find the problem in these tables, see “Running the diagnostic programs” and “Viewing the test log” in the *Problem Determination and Service Guide* on the IBM *IntelliStation Documentation CD* for information about testing the computer.

If you have just added new software or a new optional device and the computer is not working; before using the troubleshooting tables, complete the following steps:

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

## CD or DVD drive problems

<ul style="list-style-type: none"> <li>• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.</li> <li>• See the parts listing in the <i>Problem Determination and Service Guide</i> to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).</li> <li>• If an action step is preceded by “(Trained service technician),” that step must be performed only by a trained service technician.</li> </ul>	
Symptom	Action
The CD or DVD drive is not recognized.	<ol style="list-style-type: none"> <li>1. Make sure that:               <ul style="list-style-type: none"> <li>• The IDE channel to which the CD or DVD drive is attached (primary or secondary) is enabled in the Configuration/Setup Utility program.</li> <li>• All cables and jumpers are installed correctly.</li> <li>• The correct device driver is installed for the CD or DVD drive.</li> </ul> </li> <li>2. Run the CD or DVD drive diagnostic programs.</li> <li>3. Reseat the CD or DVD drive cable.</li> <li>4. Replace the following components one at a time, in the order shown, restarting the computer each time:               <ol style="list-style-type: none"> <li>a. CD or DVD drive</li> <li>b. CD or DVD drive cable</li> <li>c. (Trained service technician only) System board</li> </ol> </li> </ol>
A CD or DVD is not working correctly.	<ol style="list-style-type: none"> <li>1. Clean the CD or DVD.</li> <li>2. Run the CD or DVD drive diagnostic programs.</li> <li>3. Reseat the CD or DVD drive cable.</li> <li>4. Replace the following components one at a time, in the order shown, restarting the computer each time:               <ol style="list-style-type: none"> <li>a. CD or DVD drive</li> <li>b. CD or DVD drive cable</li> </ol> </li> </ol>
The CD or DVD drive tray is not working.	<ol style="list-style-type: none"> <li>1. Make sure that the computer is turned on.</li> <li>2. Insert the end of a straightened paper clip into the manual tray-release opening.</li> <li>3. Reseat the CD or DVD drive cable.</li> <li>4. Replace the following components one at a time, in the order shown, restarting the computer each time:               <ol style="list-style-type: none"> <li>a. CD or DVD drive</li> <li>b. CD or DVD drive cable</li> </ol> </li> </ol>

## Diskette drive problems

- Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
- See the parts listing in the *Problem Determination and Service Guide* to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).
- If an action step is preceded by “(Trained service technician),” that step must be performed only by a trained service technician.

Symptom	Action
<p>The diskette drive activity LED stays lit, or the computer bypasses the diskette drive.</p>	<ol style="list-style-type: none"> <li>1. If there is a diskette in the drive, make sure that:               <ul style="list-style-type: none"> <li>• The diskette drive is enabled in the Configuration/Setup Utility program.</li> <li>• The diskette is good and not damaged. (Try another diskette if you have one.)</li> <li>• The diskette is inserted correctly in the drive.</li> <li>• The diskette contains the necessary files to start the computer.</li> <li>• The software program is working correctly.</li> <li>• The cable is installed correctly (in the proper orientation).</li> </ul> </li> <li>2. To prevent diskette drive read/write errors, make sure that the distance between monitors and diskette drives is at least 76 mm (3 in.).</li> <li>3. Run the diskette drive diagnostic test.</li> <li>4. Reseat the diskette drive cable.</li> <li>5. Replace the following components one at a time, in the order shown, restarting the computer each time:               <ol style="list-style-type: none"> <li>a. Diskette drive cable</li> <li>b. Diskette drive</li> <li>c. (Trained service technician only) System board</li> </ol> </li> </ol>

## General problems

<ul style="list-style-type: none"> <li>• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.</li> <li>• See the parts listing in the <i>Problem Determination and Service Guide</i> to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU)</li> <li>• If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.</li> </ul>	
Symptom	Action
A cover lock is broken, an indicator LED is not working, or a similar problem has occurred.	If the part is a CRU, replace it. If the part is a FRU, the part must be replaced by a trained service technician. See the <i>Problem Determination and Service Guide</i> on the IBM <i>IntelliStation Documentation</i> CD for the parts listing.

## Hard disk drive problems

<ul style="list-style-type: none"> <li>• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.</li> <li>• See the parts listing in the <i>Problem Determination and Service Guide</i> to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).</li> <li>• If an action step is preceded by “(Trained service technician),” that step must be performed only by a trained service technician.</li> </ul>	
Symptom	Action
Not all drives are recognized by the hard disk drive diagnostic test (the Fixed Disk test).	Remove the drive that is indicated by the diagnostic tests; then, run the hard disk drive diagnostic test again. If the remaining drives are recognized, replace the drive that you removed with a new one.
The computer stops responding during the hard disk drive diagnostic test.	Remove the hard disk drive that was being tested when the computer stopped responding and run the diagnostic test again. If the hard disk drive diagnostic test runs successfully, replace the drive that you removed with a new one.
A hard disk drive was not detected while the operating system was being started.	Reseat all hard disk drives and cables; then, run the hard disk diagnostic tests again.
A hard disk drive passes the diagnostic Fixed Disk Test, but the problem remains.	Run the diagnostic SCSI Attached Disk Test (see “Starting the diagnostic programs and viewing the test log” in the <i>Problem Determination and Service Guide</i> ). <b>Note:</b> This test is not available on computers that have RAID arrays or computers that have IDE or SATA hard disk drives, that do not use the on-board mini-PCI Express adapter.

## Intermittent problems

<ul style="list-style-type: none"> <li>• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.</li> <li>• See the parts listing in the <i>Problem Determination and Service Guide</i> to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU)</li> <li>• If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.</li> </ul>	
Symptom	Action
A problem occurs only occasionally and is difficult to detect.	<p>Make sure that:</p> <ul style="list-style-type: none"> <li>• All cables and cords are connected securely to the rear of the computer and attached options.</li> <li>• When the computer is turned on, air is flowing from the front of the computer at the fan grille. If there is no airflow, the fan is not working. This can cause the computer to overheat and shut down.</li> <li>• Make sure that the SAS bus and devices are configured correctly and that the last external device in each SAS chain is terminated correctly.</li> </ul>

## Keyboard, mouse, or pointing-device problems

<ul style="list-style-type: none"> <li>• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.</li> <li>• See the parts listing in the <i>Problem Determination and Service Guide</i> to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).</li> <li>• If an action step is preceded by “(Trained service technician),” that step must be performed only by a trained service technician.</li> </ul>	
Symptom	Action
All or some keys on the keyboard do not work.	<ol style="list-style-type: none"> <li>1. Make sure that: <ul style="list-style-type: none"> <li>• The keyboard cable is securely connected to the computer, and that the keyboard and mouse cables are not reversed.</li> <li>• The computer and monitor are turned on.</li> </ul> </li> <li>2. Replace the following components one at a time, in the order shown, restarting the computer each time: <ul style="list-style-type: none"> <li>• Keyboard</li> <li>• (Trained service technician) System board</li> </ul> </li> </ol>
The mouse or pointing device does not work.	<ol style="list-style-type: none"> <li>1. Make sure that: <ul style="list-style-type: none"> <li>• The mouse or pointing-device cable is securely connected and that the keyboard and mouse cables are not reversed.</li> <li>• The mouse or pointing device drivers are installed correctly.</li> </ul> </li> <li>2. Replace the following components one at a time, in the order shown, restarting the computer each time: <ol style="list-style-type: none"> <li>a. Mouse or pointing device</li> <li>b. (Trained service technician only) System board</li> </ol> </li> </ol>

## Memory problems

<ul style="list-style-type: none"> <li>• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.</li> <li>• See the parts listing in the <i>Problem Determination and Service Guide</i> to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).</li> <li>• If an action step is preceded by “(Trained service technician),” that step must be performed only by a trained service technician.</li> </ul>	
Symptom	Action
The amount of system memory that is displayed is less than the amount of installed physical memory.	<ol style="list-style-type: none"> <li>1. Make sure that: <ul style="list-style-type: none"> <li>• The memory modules are seated correctly.</li> <li>• You have installed the correct type of memory.</li> <li>• If you changed the memory, you updated the memory configuration in the Configuration/Setup Utility program.</li> <li>• All banks of memory are enabled. The computer might have automatically disabled a memory bank when it detected a problem, or a memory bank might have been manually disabled.</li> </ul> </li> <li>2. Check the POST error log for error message 289: <ul style="list-style-type: none"> <li>• If the DIMM was disabled by a system-management interrupt (SMI), replace the DIMM.</li> <li>• If the DIMM was disabled by the user or by the POST, run the Configuration/Setup Utility program and enable the DIMM. Save the settings and restart the computer.</li> </ul> </li> <li>3. Replace the following components one at a time, in the order shown, restarting the computer each time: <ul style="list-style-type: none"> <li>• DIMM</li> <li>• (Trained service technician only) System board</li> </ul> </li> </ol>

## Microprocessor problems

<ul style="list-style-type: none"> <li>• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.</li> <li>• See the parts listing in the <i>Problem Determination and Service Guide</i> to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).</li> <li>• If an action step is preceded by “(Trained service technician),” that step must be performed only by a trained service technician.</li> </ul>	
Symptom	Action
The computer emits a continuous beep during the POST, indicating that the startup (boot) microprocessor is not working correctly.	<ol style="list-style-type: none"> <li>1. (Trained service technician only) Reseat the microprocessor.</li> <li>2. (Trained service technician only) Replace the microprocessor.</li> </ol>

## Monitor or video problems

<ul style="list-style-type: none"> <li>• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.</li> <li>• See the parts listing in the <i>Problem Determination and Service Guide</i> to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).</li> <li>• If an action step is preceded by “(Trained service technician),” that step must be performed only by a trained service technician.</li> </ul>	
Symptom	Action
The screen is blank.	<ol style="list-style-type: none"> <li>1. Make sure that: <ul style="list-style-type: none"> <li>• The computer power cord is connected to the computer and a working electrical outlet.</li> <li>• The monitor cables are connected correctly.</li> <li>• The monitor is turned on and the brightness and contrast controls are adjusted correctly.</li> </ul> <p><b>Important:</b> In some memory configurations, the 3-3-3 beep code might sound during the POST, followed by a blank monitor screen. If this occurs and the <b>Boot Fail Count</b> option in the <b>Startup Option</b> 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 to reset the CMOS values to the default configuration (the memory connector or bank of connectors enabled).</p> </li> <li>2. Make sure that damaged BIOS code is not affecting the video, (see “Recovering from a POST/BIOS update failure” in the <i>Problem Determination and Service Guide</i>).</li> <li>3. Replace the following components one at a time, in the order shown, restarting the computer each time: <ol style="list-style-type: none"> <li>a. Monitor</li> <li>b. Video adapter (if one is installed)</li> <li>c. (Trained service technician only) System board</li> </ol> </li> </ol>
Only the cursor appears.	See “Solving undetermined problems” in the <i>Problem Determination and Service Guide</i> .
The monitor works when you turn on the computer, but the screen goes blank when you start some application programs.	<ol style="list-style-type: none"> <li>1. Make sure that: <ul style="list-style-type: none"> <li>• The application program is not setting a display mode that is higher than the capability of the monitor.</li> <li>• You installed the necessary device drivers for the applications.</li> </ul> </li> <li>2. Replace the monitor.</li> </ol>

- Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
- See the parts listing in the *Problem Determination and Service Guide* to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).
- If an action step is preceded by “(Trained service technician),” that step must be performed only by a trained service technician.

Symptom	Action
<p>The monitor has screen jitters, or the screen image is wavy, unreadable, rolling, or distorted.</p>	<ol style="list-style-type: none"> <li>1. If the monitor self-tests show that 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.   <b>Attention:</b> Moving a color monitor while it is turned on might cause screen discoloration.             Move the device and the monitor at least 305 mm (12 in.) apart, and turn on the monitor.   <b>Notes:</b> <ol style="list-style-type: none"> <li>a. To prevent diskette drive read/write errors, make sure that the distance between the monitor and any external diskette drive is at least 76 mm (3 in.).</li> <li>b. Non-IBM monitor cables might cause unpredictable problems.</li> </ol> </li> <li>2. Replace the following components one at a time, in the order shown, restarting the computer each time:           <ol style="list-style-type: none"> <li>a. Monitor</li> <li>b. Video adapter (if one is installed)</li> <li>c. (Trained services technician only) System board</li> </ol> </li> </ol>
<p>Wrong characters appear on the screen.</p>	<ol style="list-style-type: none"> <li>1. If the wrong language is displayed, update the BIOS code with the correct language.</li> <li>2. Replace the following components one at a time, in the order shown, restarting the computer each time:           <ol style="list-style-type: none"> <li>a. Video adapter (if one is installed)</li> <li>b. (Trained service technician only) System board</li> </ol> </li> </ol>

## Power problems

<ul style="list-style-type: none"> <li>• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.</li> <li>• See the parts listing in the <i>Problem Determination and Service Guide</i> to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).</li> <li>• If an action step is preceded by “(Trained service technician),” that step must be performed only by a trained service technician.</li> </ul>	
Symptom	Action
The power-control button does not work, and the reset button, if supported, does work.	<ol style="list-style-type: none"> <li>1. (Trained service technician only) Reseat the power switch/LED assembly cable.</li> <li>2. Replace the following components one at a time, in the order shown, restarting the computer each time:             <ol style="list-style-type: none"> <li>a. (Trained service technician only) Power switch/LED assembly</li> <li>b. (Trained service technician only) System board</li> </ol> </li> </ol>
The computer does not start.	<ol style="list-style-type: none"> <li>1. Make sure that:             <ul style="list-style-type: none"> <li>• The power cords are correctly connected to the computer and to a working electrical outlet.</li> <li>• The type of memory that is installed is correct.</li> </ul> </li> <li>2. If you just installed an optional device, remove it, and restart the computer. If the computer now starts, you might have installed more devices than the power supply supports.</li> <li>3. Override the front panel power control button:             <ol style="list-style-type: none"> <li>a. Disconnect the computer power cords.</li> <li>b. Reconnect the power cords.</li> </ol> <p>(Trained service technician only) If the computer does not start, replace the system board.</p> </li> <li>4. See “Solving Undetermined Problems” in the <i>Problem Determination and Service Guide</i>.</li> </ol>
The computer does not turn off.	<ol style="list-style-type: none"> <li>1. Determine whether you are using an Advanced Configuration and Power Interface (ACPI) or non-ACPI operating system. If you are using a non-ACPI operating system, complete the following steps:             <ol style="list-style-type: none"> <li>a. Press Ctrl+Alt+Delete</li> <li>b. Turn off the computer by pressing the power-control button for four seconds.</li> <li>c. If the computer fails POST and the power-control button does not work, disconnect the power cord.</li> </ol> </li> <li>2. If the problem remains or if you are using an ACPI-aware operating system, the problem could be with the system board.</li> </ol>

## Serial port problems

<ul style="list-style-type: none"> <li>• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.</li> <li>• See the parts listing in the <i>Problem Determination and Service Guide</i> to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU)</li> <li>• If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.</li> </ul>	
Symptom	Action
The number of serial ports that are identified by the operating system is less than the number of installed serial ports.	<ol style="list-style-type: none"> <li>1. Make sure that: <ul style="list-style-type: none"> <li>• Each port is assigned a unique address in the Configuration/Setup Utility program and none of the serial ports are disabled.</li> <li>• The serial port adapter (if one is present) is seated correctly.</li> </ul> </li> <li>2. Replace the failing serial port adapter.</li> </ol>
A serial device does not work.	<ol style="list-style-type: none"> <li>1. Make sure that: <ul style="list-style-type: none"> <li>• The device is compatible with the computer.</li> <li>• The serial port is enabled and is assigned a unique address.</li> <li>• The device is connected to the correct connector, (see “System-board external connectors” in the <i>Problem Determination and Service Guide</i>).</li> </ul> </li> <li>2. Reseat the failing serial device.</li> <li>3. Replace the following components one at a time, in the order shown, restarting the computer each time: <ol style="list-style-type: none"> <li>a. Failing serial device</li> <li>b. (Trained service technician only) System board</li> </ol> </li> </ol>

## Software problems

<ul style="list-style-type: none"> <li>• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.</li> <li>• See the parts listing in the <i>Problem Determination and Service Guide</i> to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).</li> <li>• If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.</li> </ul>	
Symptom	Action
A suspected software problem occurred.	<ol style="list-style-type: none"> <li>1. To determine whether the problem is caused by the software, make sure that: <ul style="list-style-type: none"> <li>• The computer has the minimum memory that is needed to use the software. For memory requirements, see the information that comes with the software. If you have just installed an adapter or memory, you might have a memory-address conflict.</li> <li>• The software is designed to operate on the computer.</li> <li>• Other software works on the computer.</li> <li>• The software works on another computer.</li> </ul> </li> <li>2. If you received any error messages when using the software program, see the information that comes with the software for a description of the messages and suggested solutions to the problem.</li> <li>3. Contact the place where you purchased the software.</li> </ol>

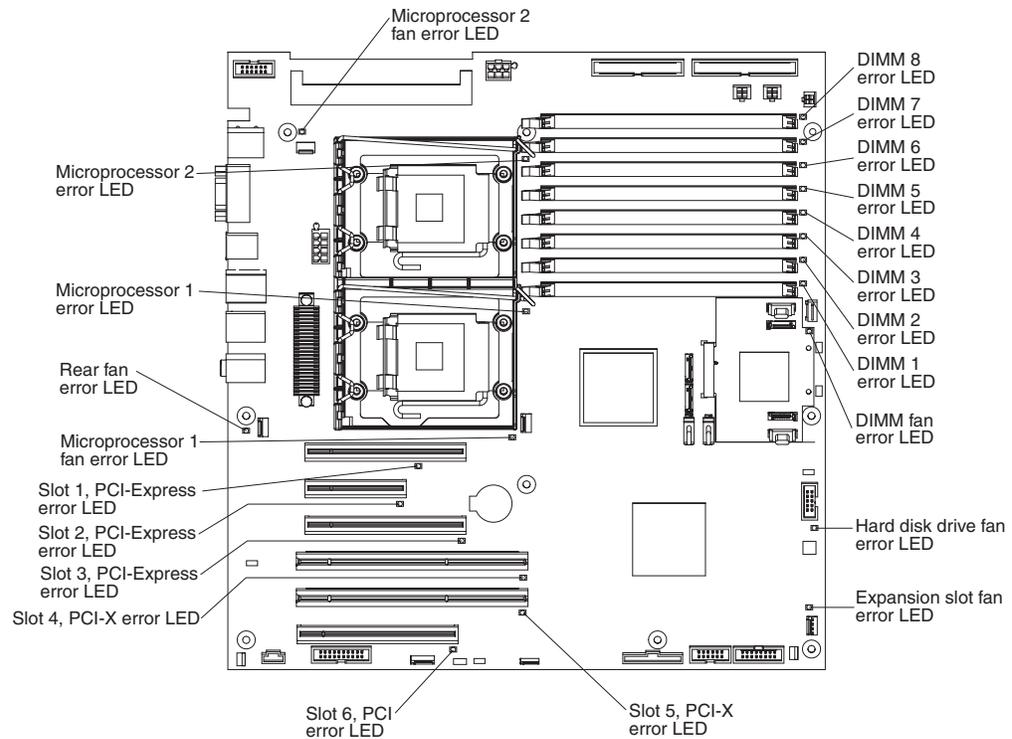
## Universal Serial Bus port problems

<ul style="list-style-type: none"> <li>• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.</li> <li>• See the parts listing in the <i>Problem Determination and Service Guide</i> to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).</li> <li>• If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.</li> </ul>	
Symptom	Action
All or some keys on the USB keyboard do not work.	<ol style="list-style-type: none"> <li>1. If you have installed a USB keyboard, run the Configuration/Setup Utility program and enable keyboardless operation to prevent the POST error message 301 from being displayed during startup.</li> <li>2. Make sure that the computer and the monitor are turned on.</li> <li>3. If a USB hub is in use, disconnect the USB device from the hub and connect it directly to the computer.</li> <li>4. Replace the following components one at a time, in the order shown, restarting the computer each time:             <ol style="list-style-type: none"> <li>a. Keyboard</li> <li>b. (Trained service technician only) System board</li> </ol> </li> </ol>
The USB mouse or USB pointing device does not work.	<ol style="list-style-type: none"> <li>1. Make sure that:             <ul style="list-style-type: none"> <li>• The mouse or pointing-device USB cable is securely connected to the computer.</li> <li>• The mouse or pointing device drivers are installed correctly.</li> <li>• Keyboardless operation has been enabled in the Configuration/Setup Utility program.</li> </ul> </li> <li>2. If a USB hub is in use, disconnect the USB device from the hub and connect it directly to the computer.</li> <li>3. Replace the following components one at a time, in the order shown, restarting the computer each time:             <ol style="list-style-type: none"> <li>a. Mouse or pointing device</li> <li>b. (Trained service technician only) System board</li> </ol> </li> </ol>
A USB device does not work.	<ol style="list-style-type: none"> <li>1. Make sure that:             <ul style="list-style-type: none"> <li>• The correct USB device driver is installed.</li> <li>• The operating system supports USB devices.</li> <li>• A standard PS/2 keyboard or mouse is not connected to the computer. If it is, a USB keyboard or mouse will not work during POST.</li> </ul> </li> <li>2. Make sure that the USB configuration options are set correctly in the Configuration/Setup Utility program menu (see the <i>User's Guide</i> for more information).</li> <li>3. If you are using a USB hub, disconnect the USB device from the hub and connect it directly to the computer.</li> </ol>
A message such as Power surge on Port USB or A USB device has exceeded the limits of its hub port is displayed on Windows operating systems.	This message indicates that a safety feature has been enabled on the computer to protect it from damage when a USB device draws too much power. If this message appears, contact the manufacturer of the USB device to see if a hardware upgrade or fix is available for the USB device.

## System-board error LEDs

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

An error LED on the system board is lit to indicate a problem with a specific component. The error LEDs remain lit until the error is cleared, this prevents spurious errors from going undetected. After a problem is cleared, the LED will not be lit the next time the computer is restarted; if the problem remains, the LED will be lit again. See "Diagnostics" in the *Problem Determination and Service Guide* on the IBM *IntelliStation Documentation CD* for additional information.



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## Appendix A. Getting help and technical assistance

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

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### 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 and any optional devices are turned on.
- Use the troubleshooting information in your system documentation, and use the diagnostic tools that come with your system. Information about diagnostic tools is in the IBM *IntelliStation Documentation CD* or *Problem Determination and Service Guide* at the IBM Support Web site.
- Go to the IBM support Web site at <http://www.ibm.com/support/> to check for technical information, hints, tips, and new device drivers or to submit a request for information.

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

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### Using the documentation

Information about your IBM system and preinstalled software, if any, or optional device is available in the documentation that comes with the product. That documentation can include printed documents, online documents, 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/support/> and follow the instructions. Also, some documents are available through the IBM Publications Center at <http://www.ibm.com/shop/publications/order/>.

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### 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 systems, optional devices, services, and support. The address for IBM System x and xSeries information is <http://www.ibm.com/systems/x/>. The address for IBM IntelliStation information is <http://www.ibm.com/intellistation/>.

You can find service information for IBM systems and optional devices at <http://www.ibm.com/support/>.

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## Software service and support

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

For more information about Support Line and other IBM services, see <http://www.ibm.com/services/>, or see <http://www.ibm.com/planetwide/> for support telephone numbers. In the U.S. and Canada, call 1-800-IBM-SERV (1-800-426-7378).

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## Hardware service and support

**Important:** When you call for service, you will be asked to provide the four-digit machine type of your system, which is \*\*\* 9228 \*\*\*.

You can receive hardware service through IBM Services or through your IBM reseller, if your reseller is authorized by IBM to provide warranty service. See <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.

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## Appendix B. Notices

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## Important notes

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

CD 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.

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注意: このマークは EU 諸国およびノルウェーにおいてのみ適用されます。

この機器には、EU 諸国に対する廃電気電子機器指令 2002/96/EC(WEEE) のラベルが貼られています。この指令は、EU 諸国に適用する使用済み機器の回収とリサイクルの骨子を定めています。このラベルは、使用済みになった時に指令に従って適正な処理をする必要があることを知らせるために種々の製品に貼られています。

**Remarque :** Cette marque s'applique uniquement aux pays de l'Union Européenne et à la Norvège.

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In accordance with the European WEEE Directive, electrical and electronic equipment (EEE) is to be collected separately and to be reused, recycled, or recovered at end of life. Users of EEE with the WEEE marking per Annex IV of the WEEE Directive, as shown above, must not dispose of end of life EEE as unsorted municipal waste, but use the collection framework available to customers for the return, recycling, and recovery of WEEE. Customer participation is important to minimize any potential effects of EEE on the environment and human health due to the potential presence of hazardous substances in EEE. For proper collection and treatment, contact your local IBM representative.

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## 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 return 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.



For Taiwan: Please recycle batteries.



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## Electronic emission notices

IBM IntelliStation Z Pro Type 9228

### Federal Communications Commission (FCC) statement

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

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

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Responsible party:

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



Tested To Comply  
With FCC Standards

FOR HOME OR OFFICE USE

### Industry Canada Class B emission compliance statement

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

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取扱説明書に従って正しい取り扱いをして下さい。

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