Installing Options in Your IntelliStation Z Pro

Professional Workstation (Type 6865)

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Professional Workstation (Type 6865)

IBM

Note

Before using this information and the product it supports, be sure to read the general information under Appendix B, "Notices" on page 52.

Read Me First

This publication is available in Adobe® .PDF format on the *Ready-to-Configure Utility Program CD* that comes with your computer as well as on the World Wide Web at:

`http://www3.pc.ibm.com/support?page=IBM+IntelliStation`

First Edition (September 1998)

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Contents

Safety Information

DANGER

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.

⚠ DANGER:

Electrical current from power, telephone, and communication cables is hazardous. To avoid shock hazard, connect and disconnect cables as shown below when installing, moving or opening the covers of this product or attached devices. The power cord must be used with a properly grounded outlet.

To Connect	To Disconnect
Turn everything OFF.	Turn everything OFF.
First, attach all cables to devices.[1]	First, remove power cord from outlet.[2]
Attach signal cables to receptacles.	Remove signal cables from receptacles.
Attach power cord to outlet.	Remove all cables from devices.
Turn device ON.	
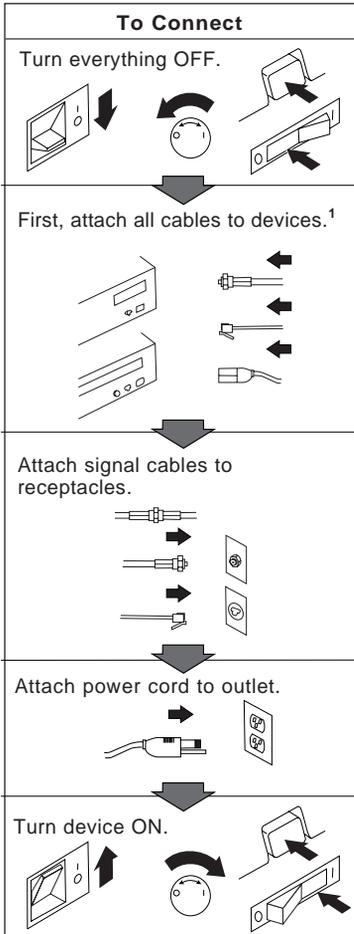
[1] In the U.K., by law, the telephone cable must be connected after the power cord.
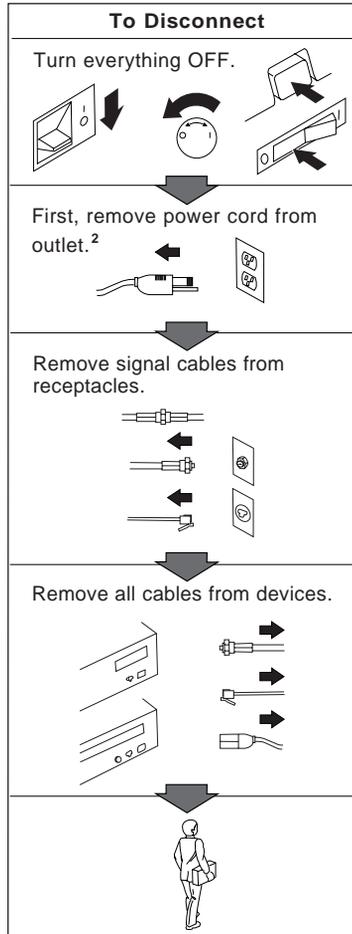
[2] In the U.K., by law, the power cord must be disconnected after the telephone line cable.

Lithium Battery Notice

CAUTION:
Danger of explosion if battery is incorrectly replaced.

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

Do not:

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

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

ATTENTION
Danger d'explosion en cas de remplacement incorrect de la batterie.

Remplacer uniquement par une batterie IBM de type 33F8354 ou d'un type équivalent recommandé par le fabricant. La batterie contient du lithium et peut exploser en cas de mauvaise utilisation, de mauvaise manipulation ou de mise au rebut inappropriée.

Ne pas :

- **Lancer ou plonger dans l'eau**
- **Chauffer à plus de 100°C (212°F)**
- **Réparer ou désassembler**

Mettre au rebut les batteries usagées conformément aux règlements locaux.

Laser Compliance Statement

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

When a CD-ROM drive is installed, note the following.

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

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

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

DANGER

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

About This Book

Thank you for selecting an IBM IntelliStation Z Pro.
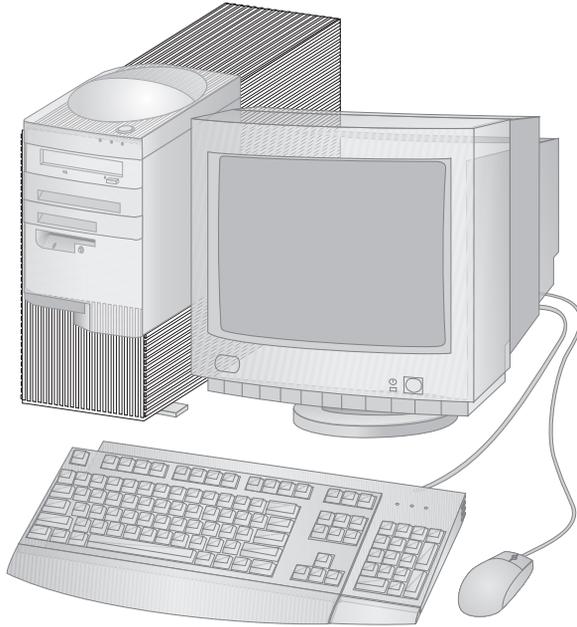
This book provides instructions for installing, removing, and replacing most options. Also, this book contains information to help you decide which options to add to your computer.

Note
The illustrations in this publication might be slightly different from your hardware.

How This Book Is Organized

This book contains the following sections and appendixes:

- Chapter 1, "Overview" provides an introduction to the options and features for your computer. Safety precautions and handling techniques are discussed along with the required tools you will need to install and remove options.

- Chapter 2, "Preparing to Install and Remove Options" provides instructions for removing the cover and cables and information about locating the components you want to work with.

- Chapter 3, "Working with Options on the System Board" provides instructions for locating, accessing, and working with options on the system board.

- Chapter 4, "Working with Adapters" provides instructions for installing adapters.

- Chapter 5, "Working with Internal Drives" provides instructions for installing drives.

- Chapter 6, "Installing a Security U-bolt" provides instructions for installing a security U-bolt and cable.

- Chapter 7, "Completing the Installation" provides instructions for reassembling your computer after you have finished installing options. Information about using the Configuration/Setup Utility program is also provided.

- Appendix A, "Interrupt and DMA Resources" contains the default interrupt and direct memory access (DMA) resources for your computer.

- Appendix B, "Notices" contains IBM notices and trademark information.

Related Information

The following documentation and README files, together with this book, contain information about your computer.

- *IntelliStation Z Pro User Guide*
  This publication contains the following:

    - Instructions for configuring, operating, and maintaining your computer
    - Information on diagnosing and solving computer problems and how to get help and service
    - Warranty information

- *Understanding Your IntelliStation Z Pro*
  This online publication (provided on the *Ready-to-Configure Utility Program CD* that comes with your computer) includes general information about using personal computers and in-depth information about the specific features of your computer.

- *About Your Software*
  This publication (provided only with computers that have IBM-preinstalled software) contains information about the preinstalled software package.

- Intergraph PCI graphics adapter README file
  This file on the *Ready-to-Configure Utility Program CD* contains instructions for installing device drivers for the Intergraph PCI adapter installed in some models.

- Matrox AGP graphics adapter README File
  This file on the *Ready-to-Configure Utility Program CD* contains instructions for installing device drivers for the Matrox AGP Adapter installed in some models.

- IBM Audio Feature README file
  This file on the *Ready-to-Configure Utility Program CD* contains instructions for installing device drivers for the integrated Crystal 4235 audio controller.

- Ethernet README file
  This file on the *Ready-to-Configure Utility Program CD* contains instructions for installing device drivers for the integrated Ethernet controller.

- *Adaptec SCSI Documentation*
  This online documentation is provided on the *Ready-to-Configure Utility Program CD* that comes with your computer. It contains information on configuring the Adaptec SCSI adapter and instructions for installing and configuring SCSI devices.

- *Your Ready-to-Configure Utility Program CD*
  This publication contains information about the *Ready-to-Configure Utility Program CD* that comes with your computer. The publication also contains instructions for starting the CD.

The following publications contain more information about your computer.

- *Hardware Maintenance Manual*
  This publication contains information for trained service technicians. It can be found on the World Wide Web at:

  `http://www3.pc.ibm.com/support?page=IBM+IntelliStation`

  It can also be ordered from IBM. To purchase a copy refer to the section on "Ordering Publications" in the "Getting Help, Service, and Information" chapter in *IntelliStation Z Pro User Guide*.

- *Technical Information Manual*
  This publication contains information for individuals who want to know more about the technical aspects of their computer. It can be found on the World Wide Web at:

  `http://www3.pc.ibm.com/support?page=IBM+IntelliStation`

Chapter 1. Overview

Important:
This publication is also available in Adobe .PDF format on the World Wide Web at:

`http://www3.pc.ibm.com/support?page=IBM+IntelliStation`

Adding hardware options to your computer is an easy way to increase its capabilities. Instructions for removing, installing, and replacing options and features are included in this book. When adding an option, use these instructions along with the instructions that come with the option. If you have installed options before, you might be able to perform some activities without detailed instructions.

This section provides a brief introduction to the options and features that are discussed in this book. It also includes important information about required tools, electrical safety, and static-sensitive devices.

Refer to the *IntelliStation Z Pro User Guide* for general information on the use, operation, and maintenance of your computer. The *IntelliStation Z Pro User Guide* also contains information to help you solve problems and get repair service or other technical assistance.

Available Options and Features

The following are some of the available options and features that are discussed in this book:

- System board components
    - System memory, called dual in-line memory modules (DIMMs)
    - Microprocessor upgrades
- Adapters
    - Accelerated Graphics Port (AGP) adapters
    - Industry standard architecture (ISA) adapters
    - Peripheral component interconnect (PCI) adapters
- Internal drives
    - Diskette drives
    - CD-ROM drives
    - Tape drives
    - EIDE hard disk drives
    - SCSI hard disk drives
- Asset Security
    - Asset ID
    - Cover lock
    - Security U-bolt

The following are some other available options and features for your computer. For more information, refer to the documentation that comes with the optional hardware.

- For enhanced graphics performance, optional graphics accelerators can be installed to work with the preinstalled graphics adapter.

- To help with power management, you can add a modem and have your computer start when a ring is detected by the modem. Using an internal modem, you can use the Configuration/Setup Utility program to enable Modem Ring Detect, or using an external modem, you can enable Serial Port Ring Detect. For more information, see the *IntelliStation Z Pro User Guide.*

For the latest information about available options:

- Look on the following World Wide Web pages:

  ```
  http://www.pc.ibm.com/us/options/
  http://www3.pc.ibm.com/support?page=IBM+IntelliStation
  ```

- Within the United States, call 1-800-IBM-2YOU (1-800-426-2968), your IBM reseller, or IBM marketing representative.

- Within Canada, call 1-800-565-3344 or 1-800-465-7999.

- Outside the United States and Canada, contact your IBM reseller or IBM marketing representative.

Tools Required

To install or remove options in your computer, you will need a flat-head screwdriver. Any additional tools needed depend on the specific option and are noted in the instructions that come with the option.

Electrical Safety

CAUTION:
**Electrical current from power, telephone, and communication cables can be
hazardous. To avoid any shock hazard, disconnect all power cords and cables as
described in the following information.**

For your safety, always do the following *before* removing the cover:

1. Shut down all programs as described in your operating-system documentation.

2. Turn the computer and any attached devices off, such as printers, monitors, and
   external drives.

   Note:
   Computer users in the United Kingdom who have a modem or fax machine
   attached to their computer must disconnect the telephone line from the
   computer *before* unplugging any power cords (also known as power cables).
   When the computer is reassembled, users must reconnect the telephone line *after*
   plugging in the power cords.

3. Unplug all power cords from electrical outlets.

4. Disconnect all communication cables from external receptacles.

5. Disconnect all cables and power cords from the back of the computer.

   Note:
   Do not reconnect any cables or power cords until you reassemble the computer
   and put the cover back on.

CAUTION:
**Never remove the cover on the power supply. If you have a problem with the
power supply, have your computer serviced.**

Handling Static-Sensitive Devices

Have you ever walked across a carpeted floor, then touched an object and received a small electrical shock? That's static electricity, and although harmless to you, it can seriously damage computer components and options.

Important:
When you add an option, do *not* open the static-protective package containing the option until you are instructed to do so.

When you handle options and other computer components, take these precautions to avoid static electricity damage:

- Limit your movement. Movement can cause static electricity to build up around you.

- Always handle components carefully. Handle adapters and memory-modules by the edges. Never touch any exposed circuitry.

- Prevent others from touching components.

- When you are installing a new option, touch the static-protective package containing the option to a metal expansion-slot cover or other unpainted metal surface on the computer for at least two seconds. This reduces static electricity in the package and your body.

- When possible, remove the option and install it directly in the computer without setting the option down. When this is not possible, place the static-protective package that the option came in on a smooth, level surface and place the option on it.

- Do not place the option on the computer cover or other metal surface.

# Chapter 2. Preparing to Install and Remove Options

This section provides instructions for accessing and locating the options you want to install or remove.

Using the Stabilizing Feet

The four feet attached to the bottom cover rotate 90° to provide additional stability for your computer.

When you need to access the inside of the computer, you might find it easier to place the computer on its side. If you do so, rotate the feet inward so they do not break off due to the weight of the computer.

When you are finished installing options and have reinstalled the side cover, turn the four stabilizing feet a quarter turn outward and place the computer carefully back on its feet.
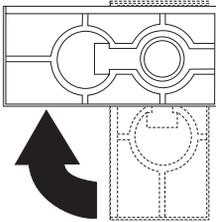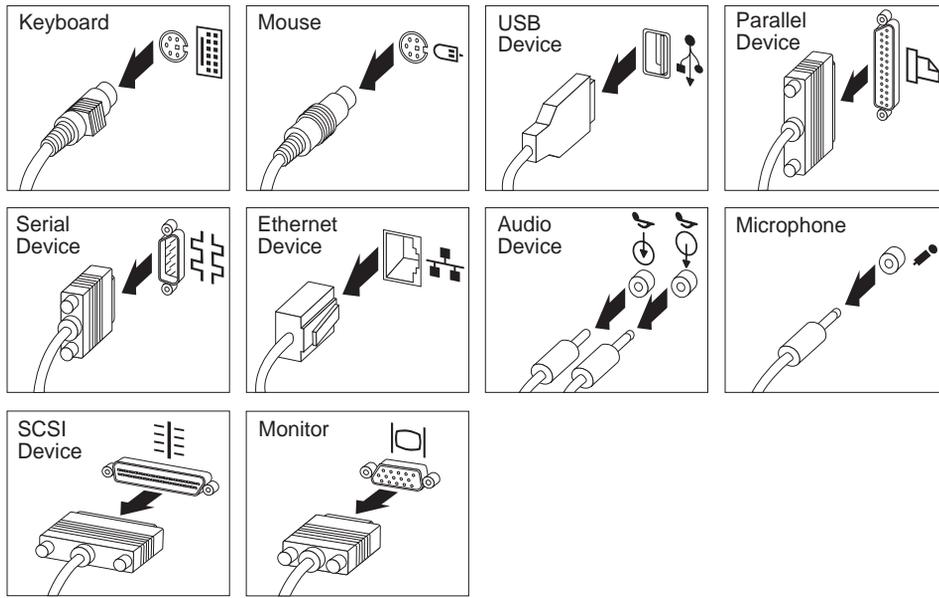
Disconnecting Cables and Removing the Cover

DANGER

> **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.**

Before you begin:

- Read "Electrical Safety" on page 4 and "Handling Static-Sensitive Devices" on page 5.
- Remove any media (diskettes, compact discs, or tapes) from the drives, and then turn off all attached devices and the computer.

1 Touch the rear of the bare metal frame to dissipate any static electricity from your body.

2 Unplug all power cords from electrical outlets.

3 If you have a modem or fax machine attached to your computer, disconnect the telephone line from the wall outlet and the computer.

4 Disconnect all cables attached to the computer; this includes power cords, input/output (I/O) cables, and any other cables connected to the computer.

Keyboard	Mouse	USB Device	Parallel Device
Serial Device	Ethernet Device	Audio Device	Microphone
SCSI Device	Monitor		

5 If necessary, unlock the computer cover.

6 Pull out on the cover release tab at the rear of the side cover and slide the cover toward the front of the computer.

Cover-Release Tab
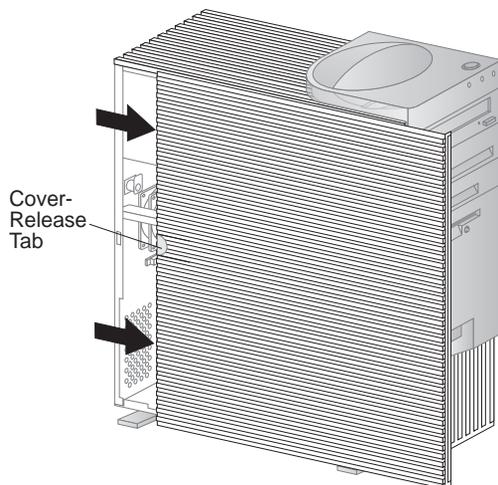
Locating Components

The following information helps you locate components and serves as a reference when you need to install options or connect input/output devices.

Your computer comes with the following adapters and devices preinstalled:

- A graphics adapter
- A SCSI adapter
- A CD-ROM drive in drive bay 1
- A diskette drive in drive bay 4
- A SCSI hard disk drive in the lower drive bracket (normally drive bay 7).

For more information on drive bays, see "Internal Drives" on page 29.

The following illustrations will help you locate the various components in your computer. For information on removing the cover, see Chapter 2, "Preparing to Install and Remove Options" on page 6.

External View

1	Power switch
2	Power-on light
3	Hard disk drive light
4	Client LAN light
5	Bay 1, CD-ROM drive
6	CD-ROM eject button
7	CD-ROM emergency eject
8	Bay 2
9	Bay 3
10	Bay 4, 3.5" diskette drive
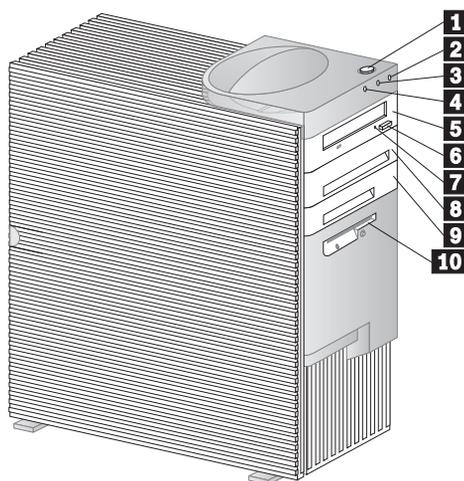
Internal View

For information on removing the cover, see Chapter 2, "Preparing to Install and Remove Options" on page 6.

1	Upper drive bracket (bays 1-4)
2	Lower drive bracket (bays 5-7)
3	System board
4	Expansion adapter
5	Expansion slots
6	Microprocessor
7	Power supply
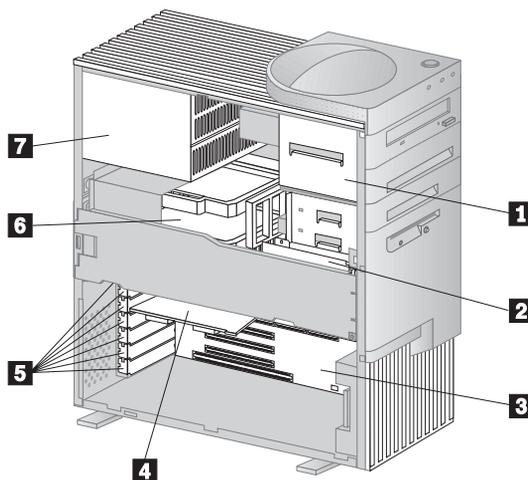
Input/Output Connectors

Input/output (I/O) connectors provide ports for transferring information into and out of your computer. You can connect a variety of I/O devices to your computer, including a monitor, keyboard, mouse, and printer. For more information on the ports and their specific technologies, see *Understanding Your IntelliStation Z Pro.*

At the rear of your computer is a panel that provides access to I/O connectors. Adapters installed in expansion slots might also provide I/O connectors. Depending on your computer model, the monitor connector might be located in a different slot than shown.
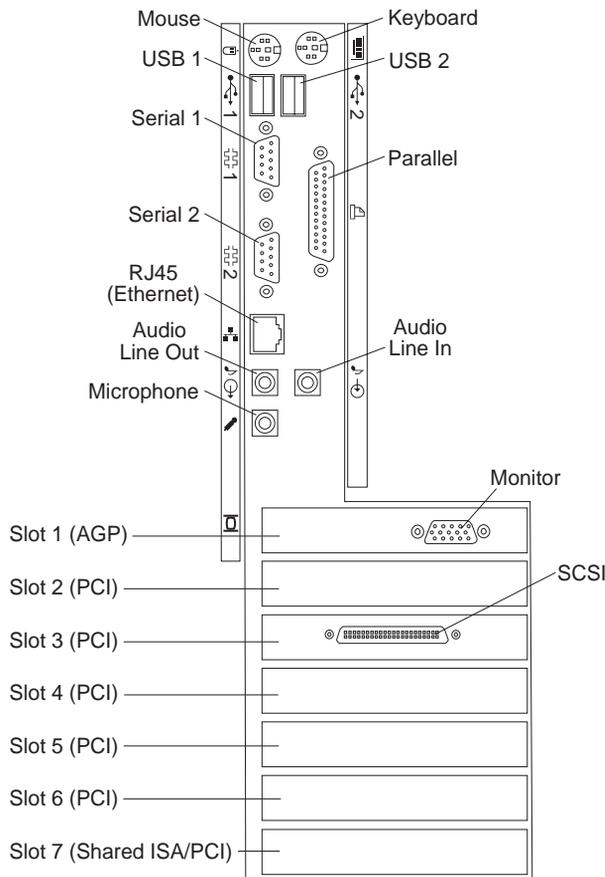
Chapter 3. Working with Options on the System Board

This section provides information to help you to identify components on the system board. It also provides instructions for installing, removing, and replacing system board options. For information about expansion adapters, see Chapter 4, "Working with Adapters" on page 22.

Identifying Parts on the System Board

The system board, also called the *planar* or *motherboard*, is the main circuit board in your computer. It provides basic computer functions and supports a variety of devices that are preinstalled by IBM or that you can install later.
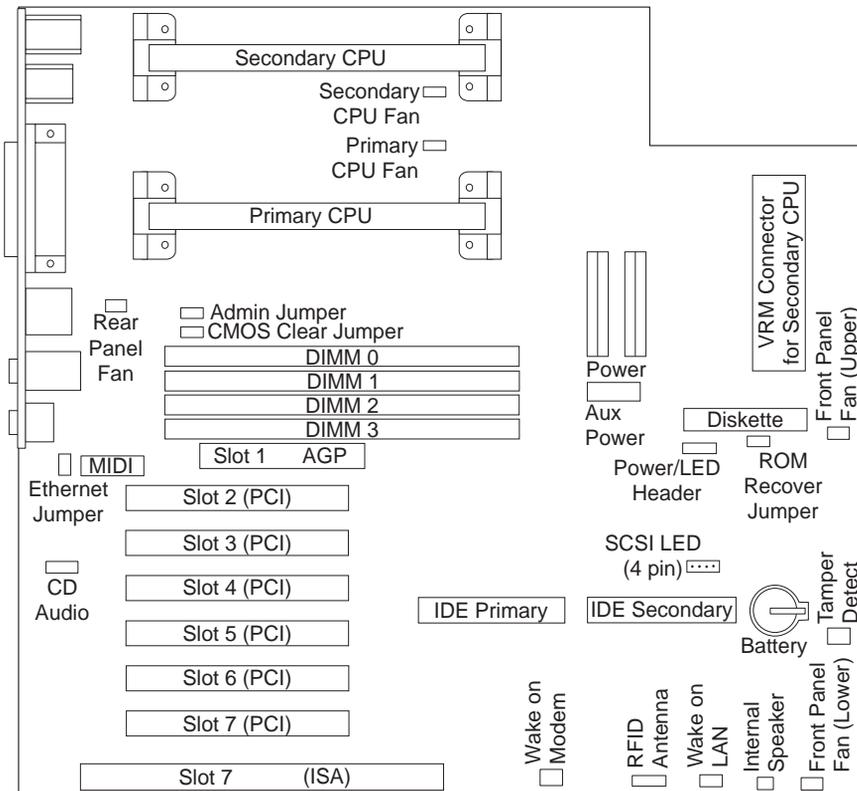
Note:
An illustration of the system board and additional information is provided on a label located inside the computer.

Accessing the System Board

To access the system board, it helps to place the computer on its side on a table. You might need to remove some parts that impede your access to components on the system board. When disconnecting cables, it is important to note where they attach, so you can correctly reattach them later.

For information on removing the computer cover, see Chapter 2, "Preparing to Install and Remove Options" on page 6.

Working with System Memory

You can add memory to your computer to increase system performance. Your computer has four connectors for installing memory modules that provide up to a maximum of 2048 MB (2 GB).

Your computer uses *dual inline memory modules (DIMMs)*. The IBM-installed DIMMs that come with your computer are registered, static dynamic random access memory (SDRAM) with error correcting code (ECC).

When installing or replacing DIMMs, the following rules apply:

- Use only 3.3 V, 100 MHz, registered, SDRAM DIMMs with ECC
- Use only 128, 256, or 512 DIMMs.

Note:
To locate the memory connectors on the system board, see "Identifying Parts on the System Board" on page 12.

Memory Configuration

When you are adding or removing memory, any sequence of DIMM sizes is allowed. A basic rule to follow is to fill each system memory connector sequentially, starting at *DIMM socket 1.*

The following table shows some possible memory configurations for your computer; this table and additional information can be found on a label located inside your computer. Again, alternate configurations are possible.

Note:
Values in the following table are represented in megabytes (MB).

Memory Configurations

| Total Memory (MB)	DIMM 1 (MB)	DIMM 2 (MB)	DIMM 3 (MB)	DIMM 4 (MB)
128	128	0	0	0
256	256	0	0	0
256	128	128	0	0
384	128	128	128	0
512	128	128	128	128
512	256	256	0	0
512	512	0	0	0
768	256	256	128	128
768	256	256	256	0
768	512	256	0	0
1024 (1 GB)	256	256	256	256
1024	512	256	256	0
1024	512	512	0	0
1280	512	256	256	256
1536	512	512	512	0
1664	512	512	512	128
1792	512	512	512	256
2048 (2 GB)	512	512	512	512

Installing and Removing a DIMM

Before you begin:

- Read "Electrical Safety" on page 4 and "Handling Static-Sensitive Devices" on page 5.
- Read the instructions that come with the new system memory.
- Turn the computer and all other connected devices off.
- Disconnect all cables attached to the computer and remove the computer cover (see Chapter 2, "Preparing to Install and Remove Options" on page 6).
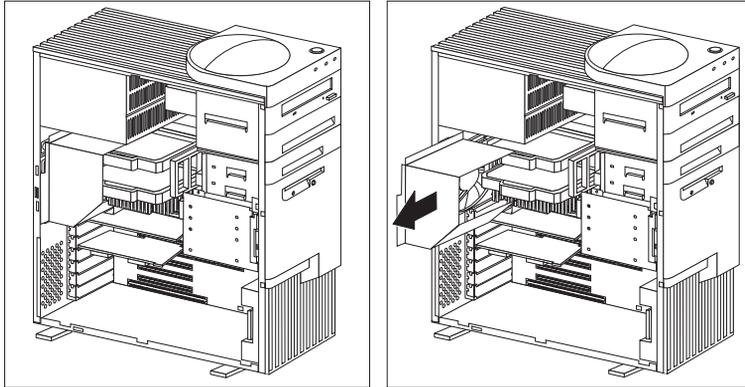- Read "Accessing the System Board" on page 13.

Note:
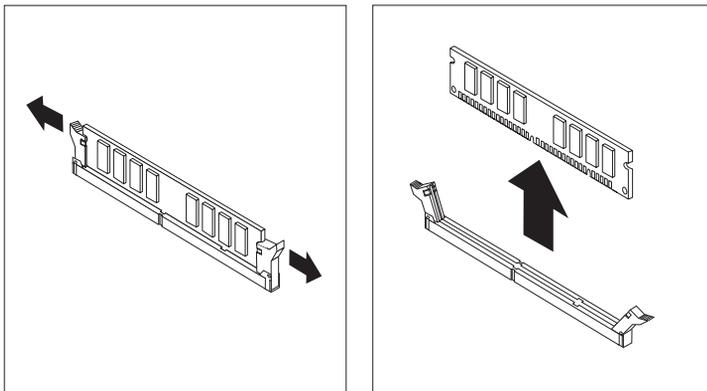For more information, see "Memory Configuration" on page 14.

To Install a DIMM

1 Note the position of the metal cover and the air baffle so that they can be reinstalled later. Remove the metal cover and the air baffle to gain access to the DIMM sockets.
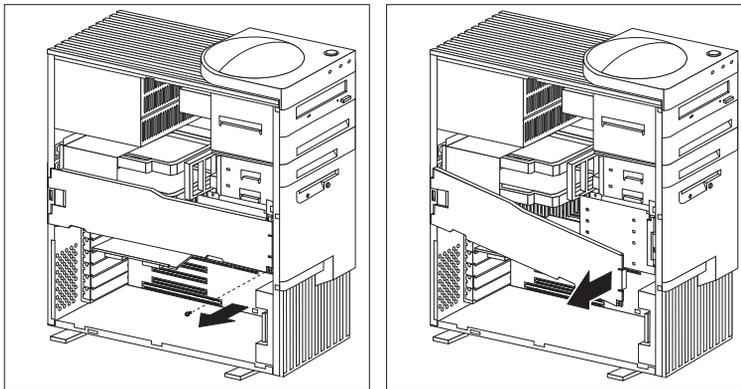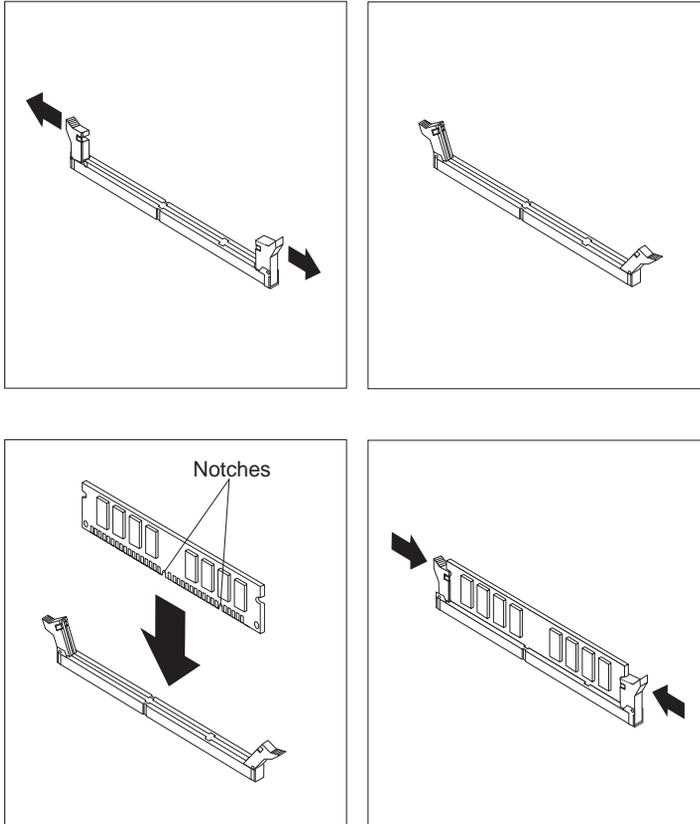
2 If you are replacing a DIMM that is already installed, remove the DIMM and place it a static-protective package.

3 Read any instructions that come with the new system memory.

4 Install the DIMM straight into the connector until the retaining clips pop closed.

Notches

5 Reinstall the air baffle.

6 Reinstall the metal cover.

What to do next:

- To work with another option, go to the appropriate section.
- To complete the installation, go to Chapter 7, "Completing the Installation" on page 41.

## Installing a Second Microprocessor

Important
Be sure to perform a backup of the hard disk before you add a second microprocessor.

1 Note the position of the metal cover and the air baffle so that they can be reinstalled later. Remove the metal cover and the air baffle to gain access to the microprocessor sockets.
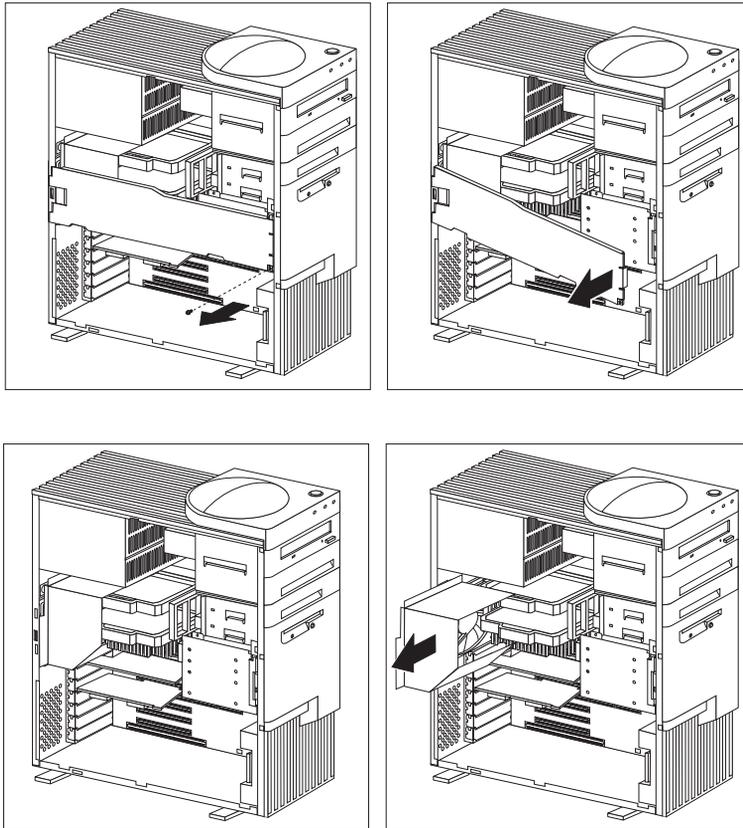

**2** Read the instructions that come with the new microprocessor.

3 Loosen the two screws holding the retainer for the terminator card in the secondary microprocessor socket. See "Identifying Parts on the System Board" on page 12.

4 Lift the retainer off.

Terminator

Retainer
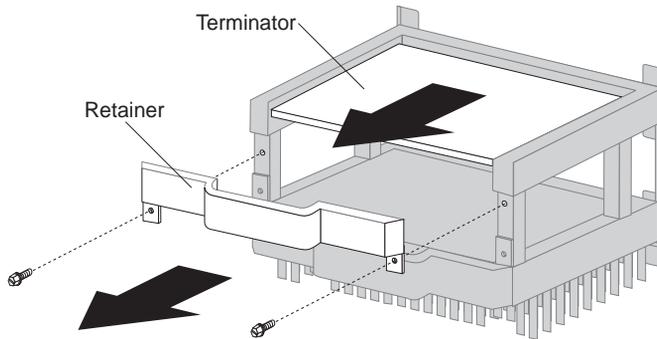
5 Remove the terminator card from the secondary microprocessor socket.

6 Remove the microprocessor from its static-protective package and insert it into the guides. Push the microprocessor into the socket until it is properly seated.

Secondary
Processor
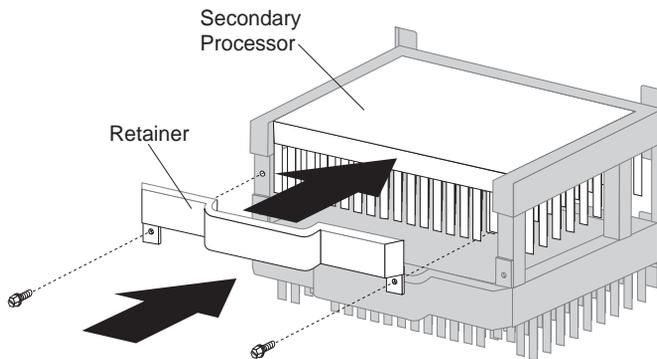
Retainer

7 Reinstall the retainer and tighten the two screws.

8 To gain access to the voltage regulator module (VRM) socket on the system board, remove the lower drive bracket and set it out of the way. Disconnect cables to the drives only if necessary.
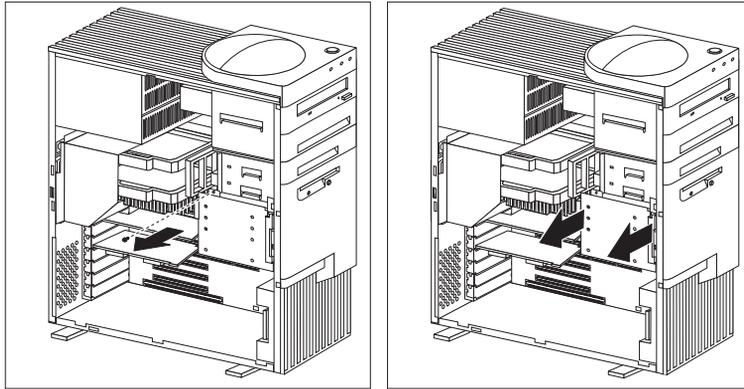
9 Install the VRM module supplied with the microprocessor. See "Identifying Parts on the System Board" on page 12 for the location of the VRM socket.

10 Reinstall the lower drive bracket.
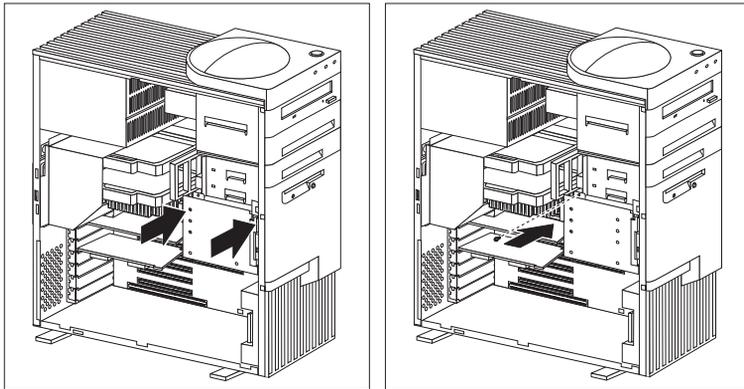
11 Reinstall the air baffle.

12 Reinstall the metal cover.

Notes:

1. If you add a second microprocessor that runs at a different speed than the primary microprocessor, both will run at the speed of the slowest one.

2. The Configuration/Setup Utility program runs automatically after the computer is restarted. Then, when Windows NT starts, the second microprocessor will be recognized.

What to do next:

- To work with another option, go to the appropriate section.
- To complete the installation, go to Chapter 7, "Completing the Installation" on page 41.

Chapter 4. Working with Adapters

This section provides information and instructions for installing and removing adapters.

When installing or removing adapters, you must resolve any resource conflicts that are created as a result. For example, if you install an ISA legacy adapter, you might need to manually configure the adapter by setting a variety of switches on the adapter and by using the Configuration/Setup Utility program.

Many adapters now use *Plug and Play* technology which enables the computer to automatically configure the adapter, provided that the required resources are available. Refer to the instructions that come with your adapter to determine if it is Plug and Play. For more information, see "Adapter Configuration" on page 24.

Adapter Slots

Your computer system board has expansion slots used to connect adapters to the industry standard architecture (ISA) and peripheral component interconnect (PCI) buses. Slot 1 is designed for an Accelerated Graphics Port (AGP) adapter. In summary, there is one AGP slot, five dedicated PCI slots, and one shared slot for either an ISA or a PCI card.

This illustration shows the location of expansion slots. Your computer comes with a preinstalled graphics adapter and an Adaptec SCSI adapter.
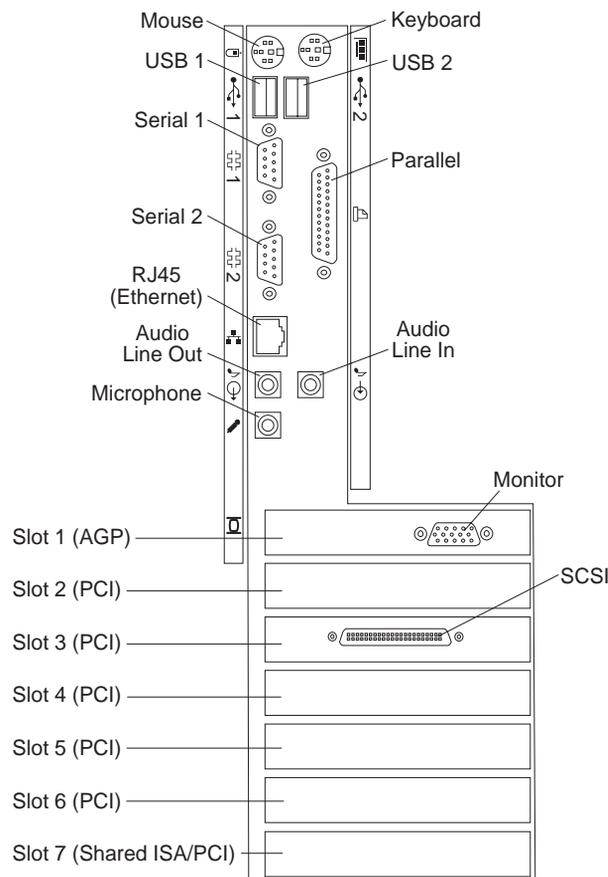
Adapter Configuration

Along with the documentation that comes with your adapter, use the following information to help with adapter configuration.

Plug and Play Adapters

Plug and Play is a configuration method that makes expanding your computer easier. Support for Plug and Play is built into the system board of your computer.

If an adapter is Plug and Play, then there are no switches or jumpers that must be set on the adapter. A Plug and Play adapter comes with configuration specifications set in memory that provides installation information to the computer during startup. When you install or remove Plug and Play adapters, this information is interpreted by the *basic input/output system (BIOS)*, which supports Plug and Play technology. If the required resources are available, then the BIOS software automatically configures the adapter using resources *not* already used by other devices.

Adapters designed for PCI slots are *Plug and Play* devices. Most ISA adapters are not *Plug and Play* and are referred to as *legacy* adapters. See "Legacy Adapters" on page 25.

Note:
See the *IntelliStation Z Pro User Guide* for information on error messages resulting from resource conflicts.

Legacy Adapters

Adapters that are not Plug and Play are known as *legacy* adapters. If you install a legacy adapter, you must manually configure it by setting switches or jumpers on the adapter and by reserving its resources using the Configuration/Setup Utility program.

In the Configuration/Setup Utility program, the ISA Legacy Resources screen shows the computer resources that are typically required by adapters:

- Memory resources
- I/O port resources
- DMA resources
- Interrupt resources

From the appropriate screens, you can select available resources for the adapter you are installing. Resources not being used by ISA legacy adapters are listed as [**Available**]. You must set the resources used by the newly installed ISA legacy adapter to [**ISA Resource**]. This notifies the Plug and Play software that these resources are in use.

Just as you change system resources for installed adapters, you must also change resources when you remove an ISA legacy adapter. If you remove a legacy adapter, change the resources it formerly used to [**Available**]. This allows the Plug and Play software to automatically use these resources for future configurations, or you can use these resources for future manual configurations.

Note:
Refer to the documentation that comes with the adapter for information on required system resources.

For information on configuring ISA legacy adapters, see "Configuring an ISA Legacy Adapter" on page 48 or refer to the *IntelliStation Z Pro User Guide.*

For information about error messages from resource conflicts, see the solving problems chapter in the *IntelliStation Z Pro User Guide.*
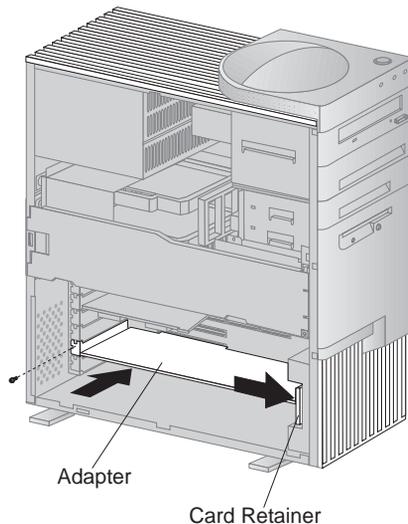
Installing Adapters

Before you begin:

- Read "Electrical Safety" on page 4 and "Handling Static-Sensitive Devices" on page 5.
- Read the instructions that come with the new adapter.
- Turn the computer and all other connected devices off.
- Disconnect all cables attached to the computer and remove the computer cover (see Chapter 2, "Preparing to Install and Remove Options" on page 6).

1 Review the instructions that come with the adapter to determine if it must be installed in an AGP, ISA, or PCI expansion slot.

2 Remove the access clip on the rear frame by sliding it upward approximately 12 mm (0.5 in) then slide it to the right until it comes off.

3 Remove the screw and slot cover for the appropriate expansion slot.

Access Clip

Expansion Slot Cover
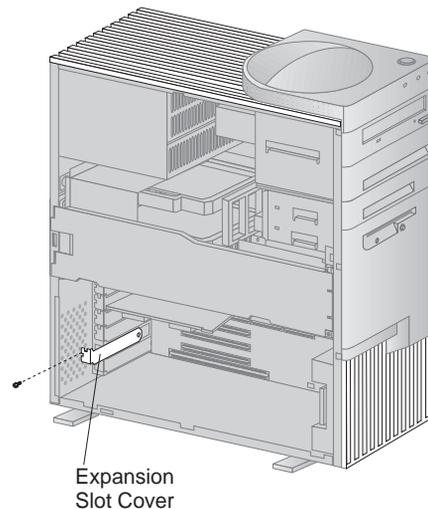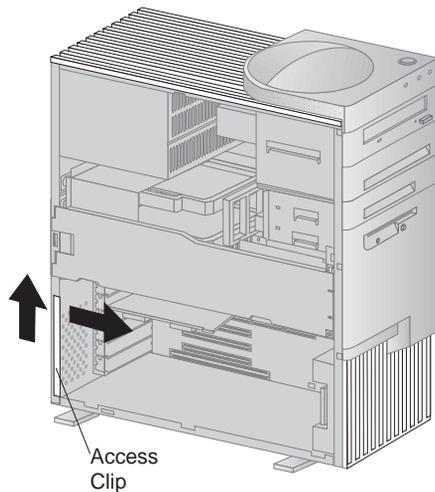
4 Remove the adapter from its static-protective package.

5 For full length adapters or adapters with extenders, push the card retainer toward the front of the computer until it latches into a position where you can insert the adapter into the guides. Then install the adapter into the appropriate slot on the system board. When the adapter is fully seated, release the retainer by pushing inward on the latch. Make sure the retainer holds the adapter securely in place.

> **Note:** AGP graphics adapters must be installed in the top expansion slot (slot 1).

Adapter

Card Retainer

6 Install the screw that secures the adapter.

7 Replace the access clip by sliding it onto the rear frame until it latches into position.

Note:
Adapters require system resources. If you add an ISA legacy adapter, you must use the Configuration/Setup Utility program to set some previously [**Available**] resources to [**ISA Resource**]. Refer to the information that comes with your adapter and see "Legacy Adapters" on page 25.

What to do next:

- To work with another option, go to the appropriate section.
- To complete the installation, go to Chapter 7, "Completing the Installation" on page 41.

Chapter 5. Working with Internal Drives

This section provides information and instructions for installing and removing internal drives.

When you are installing an internal drive, it is important to note what kind of drive you can install in each bay and the height restrictions imposed by each drive bay. Also, it is important to correctly connect the internal drive cables to the installed drive. For more information, see "Internal Drives" on page 29.

Internal Drives

Internal drives are devices that your computer uses to read and store data. You can add drives to your computer to increase storage capacity and to enable your computer to read other types of media. Some of the different drives available for your computer are:
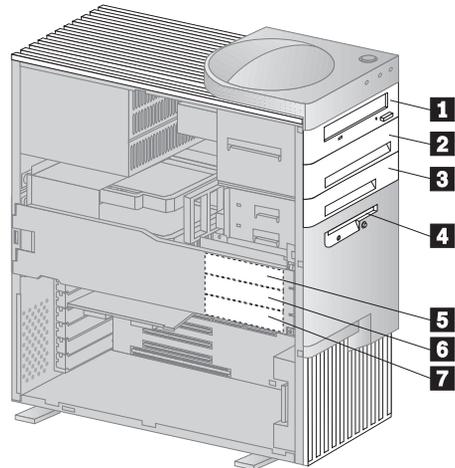
- Diskette drives
- Hard disk drives
- Tape drives
- CD-ROM drives

Internal drives are installed in *bays*. Within this book, the bays are referred to as bay 1, bay 2, and so on.

Your computer comes with the following IBM-installed drives:

- A CD-ROM drive in bay 1.
- A 3.5-inch diskette drive in bay 4.
- A 3.5-inch hard disk drive in bay 7.

1 Bay 1 (CD-ROM drive)
2 Bay 2 (5.25-inch or 3.5-inch drive)
3 Bay 3 (3.5-inch drive)
4 Bay 4 (diskette drive)
5 Bay 5 (3.5-inch drive)
6 Bay 6 (3.5-inch drive)
7 Bay 7 (3.5-inch drive)

Drive Specifications

The following table describes some of the drives you can install in each bay and their height requirements.

Bay	Drives
1 - **Max Height=41.3mm (1.6 in.)**	CD-ROM drive 3.5-inch or 5.25-inch diskette drive 3.5-inch or 5.25-inch tape backup drive 3.5-inch or 5.25-inch hard disk drive
2 - **Max Height=41.3mm (1.6 in.)**	CD-ROM drive 3.5-inch or 5.25-inch diskette drive 3.5-inch or 5.25-inch tape backup drive 3.5-inch or 5.25-inch hard disk drive
3 - **Max Height=25.4mm (1.0 in.)**	3.5-inch hard disk drive 3.5-inch diskette drive 3.5-inch tape backup drive
4 - **Max Height=25.4mm (1.0 in.)**	3.5-inch diskette drive
5 - **Max Height=41.3mm (1.6 in.)**	3.5-inch hard disk drive
6 - **Max Height=25.4mm (1.6 in.)**	3.5-inch hard disk drive
7 - **Max Height=25.4mm (1.6 in.)**	3.5-inch hard disk drive

Notes:

1. Drives that are greater than 41.3 mm (1.6 in.) high cannot be installed.

2. Install removable media (diskettes, tapes, or CDs) drives in the accessible bays: bays 1, 2, 3, or 4.

3. If a 41.3 mm (1.6 in.) drive is installed in either bay 5, 6, or bay 7, these bays are limited to two drives.

4. To properly mount a 3.5-inch drive into bay 1 or 2 (5.25-inch bays), you must use a 3.5-inch conversion bracket. Your computer comes with the conversion bracket preinstalled in bay 2.

Power and Signal Cables

Your computer uses cables to connect integrated drive electronics (IDE) and SCSI drives to the power supply and system board. The following cables are provided:

- Four-wire *power cables* connect most drives to the power supply. At the end of these cables are plastic connectors that attach to different drives; these connectors vary in size. Also, certain power cables attach to the system board.

- Flat *signal cables* for connecting IDE and diskette drives to the system board; signal cables are sometimes called *ribbon cables*. There are two sizes of ribbon signal cables that come with your computer:

    - The wider signal cable has three connectors. One of these connectors is attached to the CD-ROM drive, one is a spare, and the third attaches to the primary IDE connector on the system board.

    - The narrower signal cable has two connectors for attaching the diskette drive to the diskette-drive connector on the system board.

The 2940U2W is a single-channel Ultra-2 adapter with 2 ports. Port 1 is designed to be used with Ultra-2 SCSI devices. Port 2 has both a 68-pin and a 50-pin connector to support internal Ultra SCSI and other legacy SCSI devices.

If your computer is equipped with an internal Ultra-2 SCSI hard disk drive, an Ultra-2 ribbon cable connects the drive to the Adaptec 2940U2W SCSI adapter. This cable also has additional connectors for attaching more internal SCSI devices.

For more information on connecting SCSI devices, see the *Adaptec SCSI Documentation* on the *Ready-to-Configure Utility Program CD* that comes with your computer.

Note:
To locate connectors on the system board, see "Identifying Parts on the System Board" on page 12.

The following are some important points to remember when connecting power and signal cables to internal drives:

- The diskette drive, hard disk drive, and CD-ROM drive that are preinstalled in your computer come with power and signal cables attached. If you replace any drives, it is important to remember which cable is attached to which drive.

- When you install a drive, ensure that the drive connector at the end of the signal cable is always connected to a drive; also, ensure that the drive connector at the other end is connected to the system board. This reduces electronic noise from the computer.

- If two IDE devices are used on a single cable, one must be designated as the primary or master device and the other a secondary or subordinate device; otherwise, some of the IDE devices might not be recognized by the system. The primary or secondary designation is determined by switch or jumper settings on each IDE device.

- To optimize performance when installing more than two IDE hard disk drives, be sure to attach IDE hard disk drives with faster data transfer speeds (Mode 1 or higher) to the primary hard disk drive signal cable (hard disk drives 0 and 1).

- To install more than two IDE hard disk drives, you must purchase an additional signal cable. The cable must meet the following specifications:
  - Maximum length: 0.46 meters (18 inches)
  - Wire size: 28 AWG
  - Cable capacitive loading: 200 pF maximum

- If you want to install more than one diskette drive, you must purchase a four-wire, Y-cable that provides two power connectors.

- To attach an external drive, you must install an appropriate adapter in the computer.

For help in selecting drives, cables, and other options for your computer, do one of the following:

- Within the United States, call 1-800-IBM-2YOU (1-800-426-2968), your IBM reseller, or your IBM marketing representative.

- Within Canada, call 1-800-565-3344 or 1-800-465-7999.

- Outside the United States and Canada, contact your IBM reseller or IBM marketing representative.

Drive Bays

- Drive bays 1, 4, and 7 come with drives preinstalled.

- Drive bays 2 and 3 have a bay panel and static shield installed.

- Drive bay 2 has a preinstalled 3.5-inch conversion bracket. You must remove it to install a 5.25-inch drive.

- In the lower drive bracket (bays 5, 6, and 7), when a 25.4mm (1.6-in.) high drive is installed, there is room for only one additional drive to be installed.

- If you remove a drive which has removable media from a bay and you do not intend to install a new drive immediately, reinstall the static shield and bay panel for that bay.

To install a drive in bays 1 through 4, go to "Installing Drives in Bays 1 through 4" on page 34.

To install a drive in bays 5 through 7, go to "Installing a drive in bays 5 through 7" on page 36.

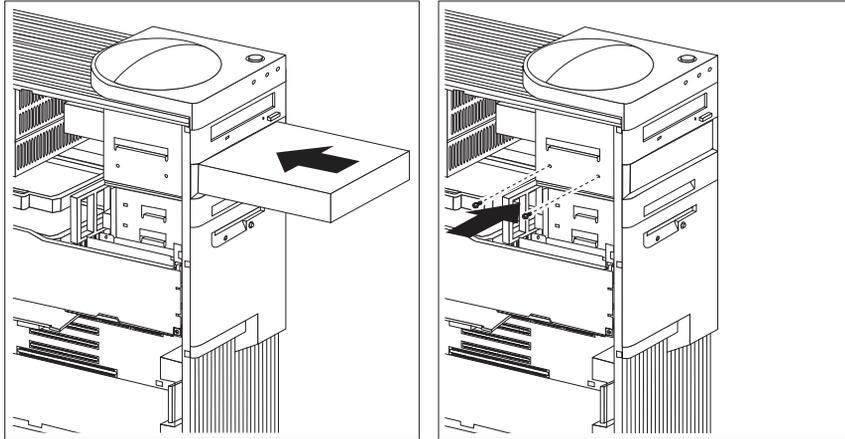## Installing Drives in Bays 1 through 4

Before you begin:
- Read "Electrical Safety" on page 4 and "Handling Static-Sensitive Devices" on page 5.
- Turn off the computer and all other connected devices.
- Disconnect all external cables and power cords, and then remove the computer cover (see Chapter 2, "Preparing to Install and Remove Options" on page 6).

**1** Remove the bay panel covering the bay where you want to install the drive.
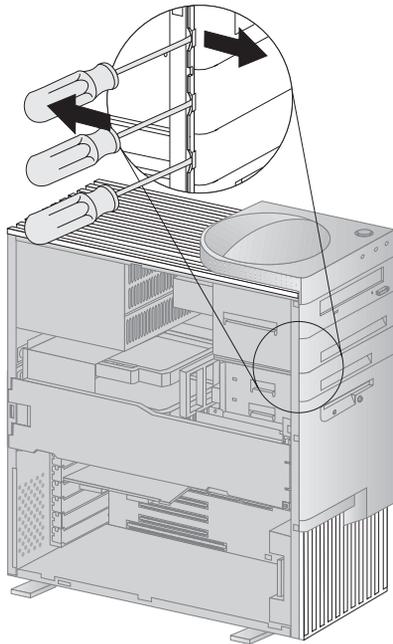
2 Remove the static shield from the drive bay where you are installing the drive.

3 Bay 2 has a conversion bracket installed that allows for the installation of 3.5-inch drive. If you are installing a 5.25-inch drive into bay 2, remove the bracket.

4 Install the drive into the upper drive bracket. Align the screw holes and insert the two screws.

5 If the drive you installed has non-removable media (such as a hard disk drive), replace the bay panel.

**6** Connect the power and signal cables to the drive(s).
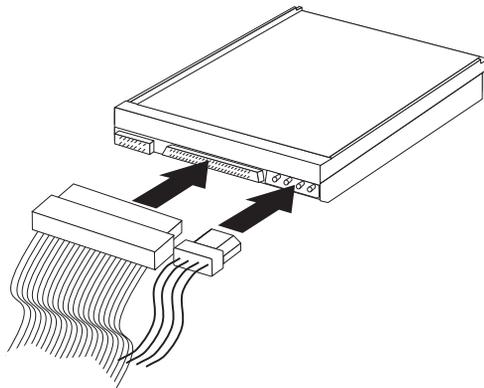
What to do next:

- To work with another option, go to the appropriate section.
- To complete the installation, go to Chapter 7, "Completing the Installation" on page 41.
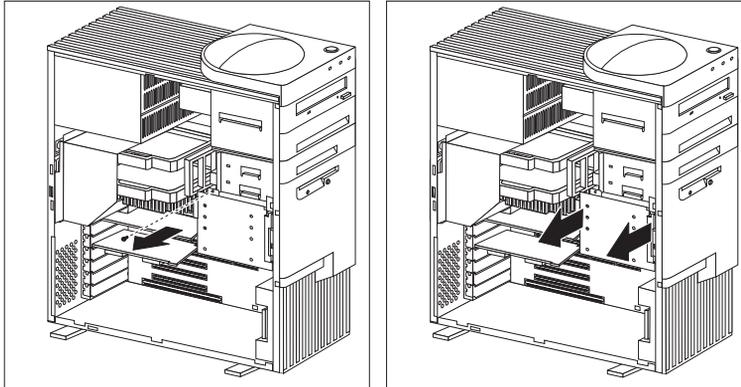
Installing a drive in bays 5 through 7

Before you begin:
- For information on installing SCSI drives, refer to *Adaptec SCSI Documentation* provided on the *Ready-to-Configure Utility Program CD.*
- Read "Electrical Safety" on page 4 and "Handling Static-Sensitive Devices" on page 5.
- Turn off the computer and all other attached devices.
- Disconnect all external cables and power cords, and then remove the computer cover (see Chapter 2, "Preparing to Install and Remove Options" on page 6).
- Read the documentation that comes with the drive.
- To install a SCSI drive in a model that has IDE drives only, you must purchase an internal SCSI cable. See your IBM reseller or IBM marketing representative.
- Read "Internal Drives" on page 29.

1 Remove the metal cover.
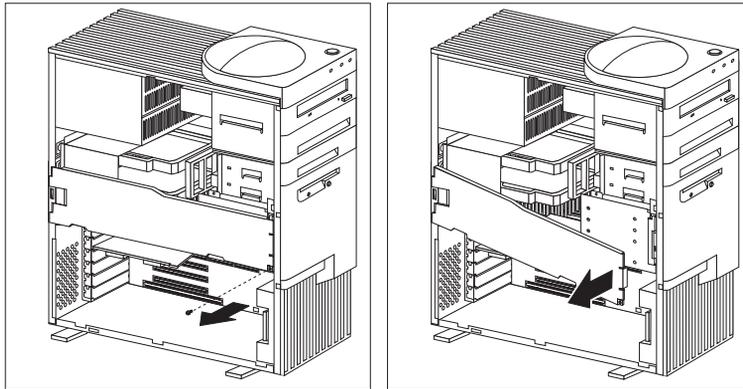
2 Remove the lower drive bracket. If there are drives already installed in the lower drive bracket, you might have to disconnect the cables attached to them in order to install the new drive. Make sure to note where the cables are attached.


3 The screws for mounting a drive in the lower drive bracket are in the conversion bracket installed in drive bay 2. See "Installing Drives in Bays 1 through 4" on page 34 to access the upper drive bracket. If the screws provided in the bracket have already been used, order kit P/N 10L5600 from your IBM reseller or IBM marketing representative. This kit includes a variety of screws.

Install the drive into the lower drive bracket so that the power and signal cable connectors are to the rear of the computer. Align the screw holes and insert the four screws.
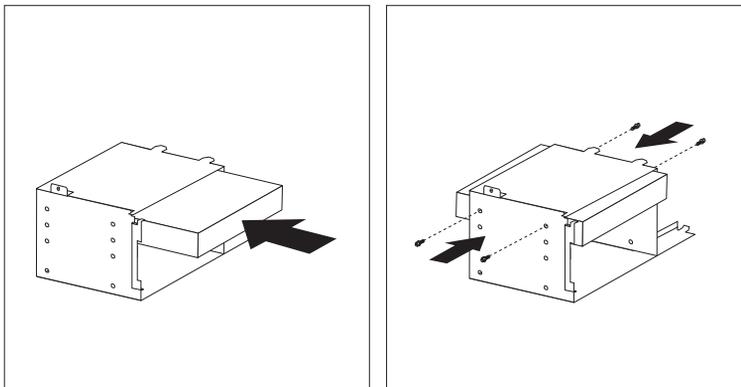
4 Connect the power and signal cables to the drives.
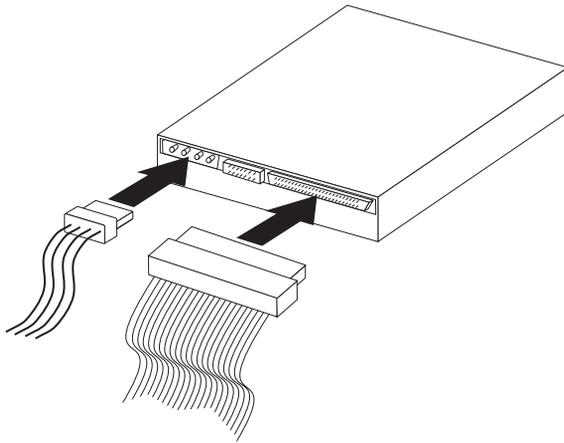
5 Reinstall the lower drive bracket and secure it with the screw.
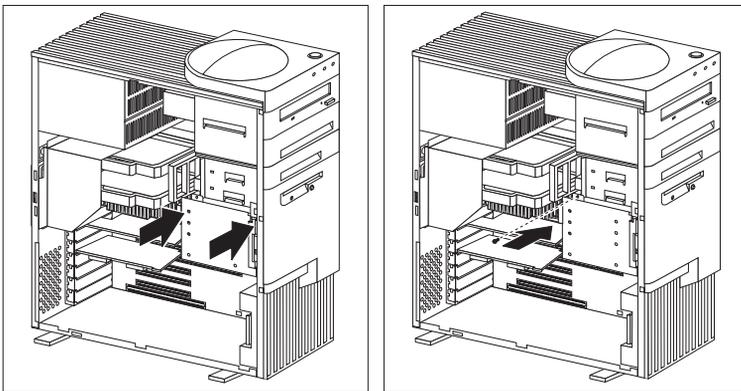

Figure 1. Installing Lower Drive Bracket

What to do next:

- To work with another option, go to the appropriate section.
- To complete the installation, go to Chapter 7, "Completing the Installation" on page 41.

Chapter 6. Installing a Security U-bolt

To help prevent hardware theft you can use the cover lock and add a security U-bolt and cable to your computer. After you add the security cable, make sure that it does not interfere with other cables that are connected to the computer.

Before you begin:

- Obtain the following:
    - A 19-mm (3⁄4 in.) U-bolt and threaded nuts that fit the U-bolt
    - A security cable
    - A lock, such as a combination lock or padlock
    - An appropriately sized or adjustable wrench
    - A flat-bladed screwdriver
- Read "Electrical Safety" on page 4 and "Handling Static-Sensitive Devices" on page 5.
- Turn the computer and all other connected devices off.
- Disconnect all external cables and power cords, and remove the computer cover (see Chapter 2, "Preparing to Install and Remove Options" on page 6).

1 Use a tool, such as a screwdriver, to remove the two metal knockouts.

Metal
Knockouts
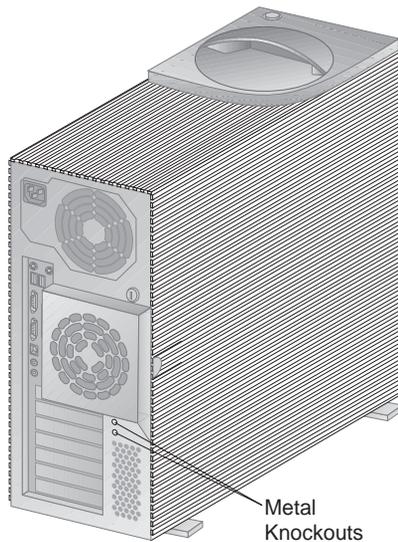
2 Insert the U-bolt through the rear panel, then attach and tighten the nuts with an appropriately sized or adjustable wrench.
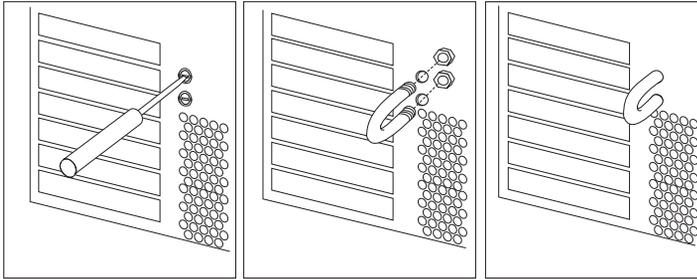
3 Replace the computer cover. For more information, see "Replacing the Cover and Connecting the Cables" on page 42.

4 Thread the cable through the U-bolt and around an object that is not a part of or permanently secured to the building structure or foundation, and from which it cannot be removed; then fasten the cable ends together with a lock.

The following illustration shows an example of how this might work.
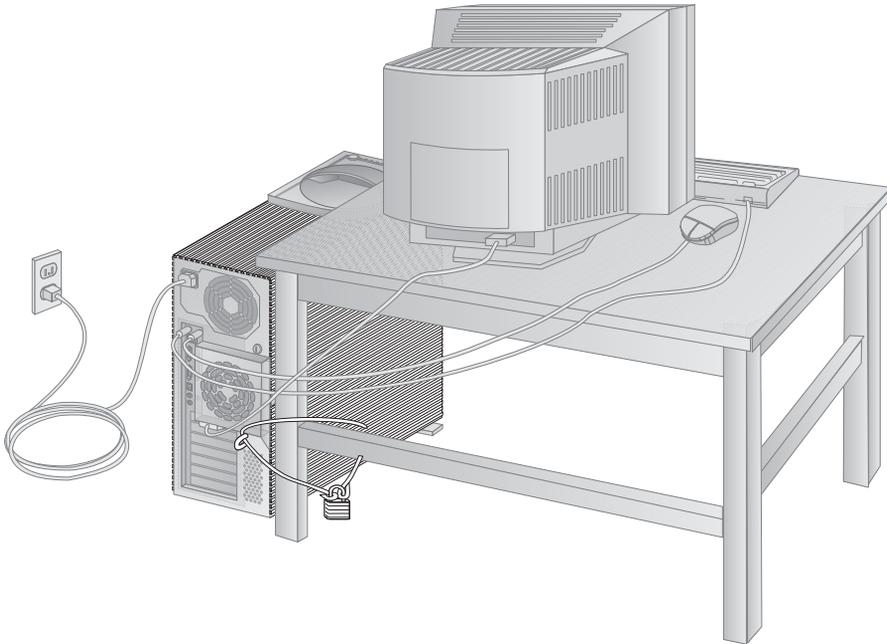
Chapter 7. Completing the Installation

After working with options, you need to install any removed parts, replace the cover, and reconnect any cables, including power cords and telephone lines. Also, depending on the option installed, you might need to update information in the Configuration/Setup Utility program.

The following list is a quick reference to these procedures:

- "Replacing the Cover and Connecting the Cables" on page 42
- "Updating the Computer Configuration" on page 44

Replacing the Cover and Connecting the Cables

Before you begin:

- Read "Electrical Safety" on page 4 and "Handling Static-Sensitive Devices" on page 5.

1 Ensure that all components have been reassembled correctly and that no tools or loose screws are left inside your computer.

2 Clear any cables that might impede the replacement of the cover.

3 Install the side cover by placing it into position and sliding it to the rear as shown in the following illustration. Make sure the cover is latched into position.
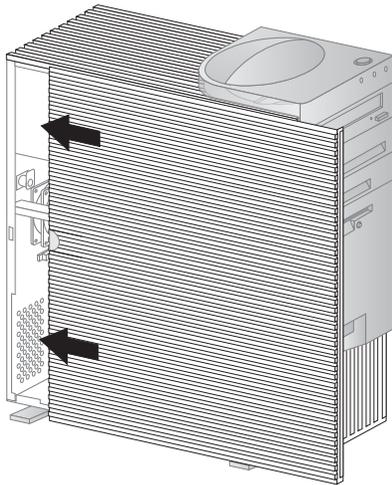

4 Lock the cover. For more information on locking the computer cover, see the *IntelliStation Z Pro User Guide.*

5 Make sure the stabilizing feet are rotated outward so that they properly support the computer. Refer to "Using the Stabilizing Feet" on page 6.

Important Information:

- In the United Kingdom, by law, the telephone cable must be connected after the power cord.
- The power line and power control behavior of the IntelliStation Z Pro is different than earlier computer models. Please observe the following:
    - When the power cord is first plugged in, the computer may appear to power on for a few seconds, then power off. This is a normal sequence to enable the computer to self initialize.
    - The power switch will normally operate with a single touch. However, in some circumstances the computer may not immediately turn off. In this case, hold the power switch down for approximately 5 seconds. The computer will then turn off.

6 Reconnect the external cables and cords to the computer.
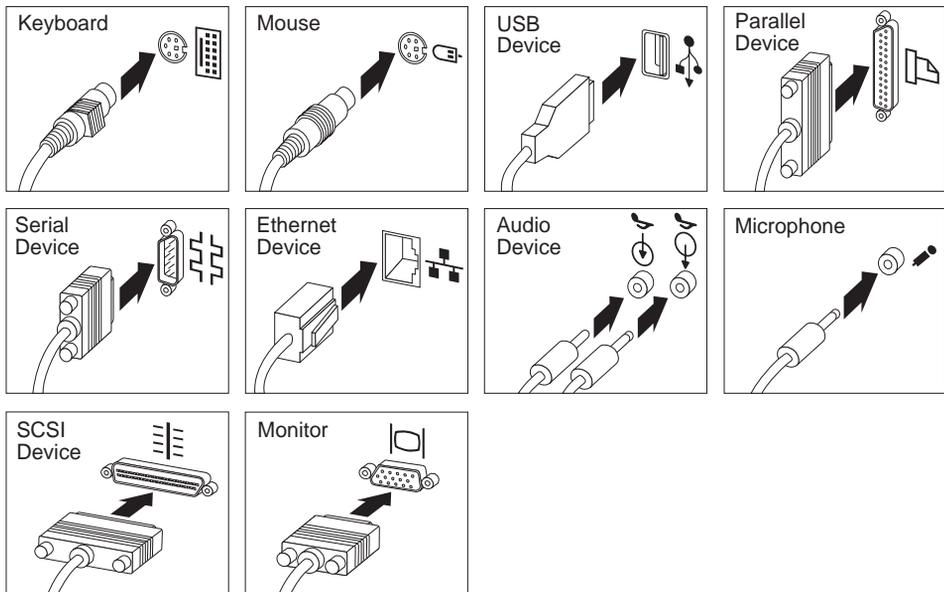
7 If you have a modem or fax machine attached to the computer, and you are not in the U.K., reconnect the telephone line to the wall outlet and the computer and plug the power cords into properly grounded electrical outlets. If you are in the U.K., plug in the power cords first and then connect the telephone line to the wall outlet and the computer.

Updating the Computer Configuration

Important:
The configuration information in this section applies to installing options. For more information on using the Configuration/Setup Utility program, see the *IntelliStation Z Pro User Guide*.

Also, you may need to install device drivers after updating the configuration settings. For more information, see the instructions that come with the option to determine if device drivers are required and how to install them. Device drivers are included on the *Ready-to-Configure Utility Program CD* that comes with your computer.

After adding, removing, or replacing options, the configuration settings will need to be updated. This reconfiguration is performed automatically by the computer or *manually* by you. When the computer automatically configures an option, it uses system programs. However, you must save the new settings. If the system programs do not update the settings, you can use the Configuration/Setup Utility program to reconfigure the appropriate settings.

For example, when you start your computer after adding most internal hard disk drives, the settings are automatically updated, and you use the Configuration/Setup Utility program to save those changes. However, if a resource conflict arises after an ISA legacy adapter is installed or removed, you must manually update the computer configuration and save the information.

Notes:
1. Make a record of all customized settings before you perform any of the following steps.
2. For more information on error messages from resource conflicts, see the *IntelliStation Z Pro User Guide*.

Starting the Configuration/Setup Utility Program

When you restart the computer for the first time after working with most options, a message appears indicating that a configuration change has occurred. You are then prompted to enter the Configuration/Setup Utility program to manually update the configuration settings or to confirm and save the settings that were automatically updated by the system programs.

After you change an option and restart the computer, the following screen might appear.

POST Startup Error(s)

The following error(s) were detected when the system was started:

162 Configuration Change Has Occurred

Select one of the following:

Continue
Exit Setup

Note:
Depending on the configuration changes that occurred, the error message you see might be different from the one shown here. If the preceding screen appears, select **Continue** until you reach the Configuration/Setup Utility menu (see "Changing Settings and Exiting" on page 47).

If the preceding screen does not appear, then use the following procedures to access the Configuration/Setup Utility menu.

To access the Configuration/Setup Utility program:

1 Turn on the computer.

If your computer is on when you start this procedure, you must shut down the operating system, turn off the computer and wait a few seconds, and then restart the computer. Do not use **Ctrl+Alt+Del** to restart the computer.

2 When the Configuration/Setup Utility prompt appears in the lower left corner of the screen, press **F1**.

a. If you have *not* set an administrator password, the Configuration/Setup Utility program menu appears. If you have set an administrator password, type the administrator password and press **Enter**.

b. If you have both an administrator and a power-on password set, type your administrator password at the password prompt. If you type your power-on password, you can *view* limited information in the Configuration/Setup Utility program, but you cannot *change* any settings.

```
          Configuration/Setup Utility

            Select Option:

            •System Summary
            •Product Data
            •Devices and I/O Ports
            •Start Options
            •Date and Time
            •System Security
            •Advanced Setup
            •ISA Legacy Resources
            •Power Management

             Save Settings
             Restore Settings
             Load Default Settings

             Exit Setup
```

Note:
The menu you see on your computer might look slightly different from the menu shown here, but it will operate the same way.

Changing Settings and Exiting

In the Configuration/Setup Utility menus, you can accept the configuration changes by viewing and saving, or you can manually change settings and then save them.

The following is a quick reference for identifying symbols in the Configuration/Setup Utility program. For information on the function of keys, see the *IntelliStation Z Pro User Guide*.

- If a bullet (•) is beside a menu item, then an additional menu is available.

- Most information enclosed in brackets ([ ]) can be changed. You cannot change information that is not surrounded by [ ].

- A right arrowhead (▶) beside a menu item indicates that a configuration change occurred in that category. The ▶ might also appear in subsequent menus.

- If an asterisk (*) is beside a menu item, then a resource conflict is detected.

When you complete your changes or finish viewing your settings, return to the Configuration/Setup Utility menu by pressing **Esc**. You might have to press **Esc** more than once.

To exit from the Configuration/Setup Utility program, follow these steps:

1 From the Configuration/Setup Utility menu, press **Esc**.

2 The Exit Setup menu appears. You can save your changes, exit from the Configuration/Setup Utility program without saving your changes, or return to the Configuration/Setup Utility menu. Use the arrow keys to select the desired option and press **Enter**.

Configuring an ISA Legacy Adapter

To configure an installed ISA legacy adapter, you might need to alter switch or jumper settings on the adapter. Also, you must use the Configuration/Setup Utility program to identify the ISA legacy resource requirements, such as memory locations, I/O assignments, and DMA and interrupt assignments.

Note:
For more information about required resources and switch settings, refer to the documentation that comes with the adapter.

To store the legacy resource information for an installed adapter:

1 Start the Configuration/Setup Utility (see "Starting the Configuration/Setup Utility Program" on page 45).

2 Select **ISA Legacy Resources** from the Configuration/Setup Utility menu and press **Enter**.

3 As needed, select **Memory Resources, I/O Port Resources, DMA Resources,** or **Interrupt Resources**. See Appendix A, "Interrupt and DMA Resources" on page 50.

4 Set the appropriate resource to **ISA Resource** and press **Enter**.

5 Return to the Configuration/Setup Utility menu and select **Save Settings** to save the changes. From this location, you can exit the Configuration/Setup Utility program.

If you remove an ISA legacy adapter, you must set to **Available** the system resources that are no longer being used. To do this, follow the above procedures and select **Available** at step 4.

Note:
For more information on adapters and resolving conflicts, see "Adapter Configuration" on page 24 and Appendix A, "Interrupt and DMA Resources" on page 50.

Configuring Startup Devices

Startup devices are devices where the computer looks for an operating system when it is powered on. After adding new devices to the computer, you might want to change the sequence of the startup devices. You can use the Configuration/Setup Utility program to configure startup devices.

To configure startup devices:

1 Start the Configuration/Setup Utility (see "Starting the Configuration/Setup Utility Program" on page 45).

2 Select **Start Options** from the Configuration/Setup Utility menu and press **Enter**.

3 Select **Startup Sequence** from the Start options menu and press **Enter**.

4 Select **First Startup Device** and press **Enter**.

5 Use the arrow keys to make your selection and press **Enter**.

6 If necessary, repeat the above steps for **Second Startup Device**, **Third Startup Device**, and **Fourth Startup Device**.

7 If **Automatic Power On Startup Sequence** is enabled, repeat the above steps to select the startup devices.

8 Remember to save the changes when you exit from the Configuration/Setup Utility program.

Appendix A. Interrupt and DMA Resources

This section lists the settings for the default interrupt and direct-memory-access (DMA) resources for your computer.

Note
The interrupt and DMA settings might change when your computer is configured.

Interrupt Request	System Resource
0	Timer
1	Keyboard
2	Interrupt Controller
3[1]	Serial Port 2
4[1]	Serial Port 1
5	Available
6	Diskette
7[1]	Parallel Port
8	Real Time Clock
9	ACPI
10	Available
11	Available
12	Mouse
13	Coprocessor
14	IDE Drives on primary channel
15	IDE Drives on secondary channel

---

[1] Can be modified to alternative settings or disabled.

The Advanced Programmable Interrupt Controller (APIC) manages additional hardware interrupts to the system BIOS. The following interrupts are available to the APIC.

Interrupt Request	System Resource
16	PCI Device
17	PCI Device
18	PCI Device
19	PCI Device
20	Not available
21	Not available
22	Not available
23	Not available
24	SMI (System Management Interrupt)

DMA Resources

DMA Channel	System Resource
0 (8 bits)	Available
1 (8 bits)	Available
2 (8 bits)	Diskette
3 (8 bits)	Parallel Port
4 (16 bits)	System Resource
5 (16 bits)	Available
6 (16 bits)	Available
7 (16 bits)	Available

Appendix B. Notices

References in this publication to IBM products, programs, or services do not imply that IBM intends to make these available in all countries in which IBM operates. Any reference to an IBM product, program, or service is not intended to state or imply that only that IBM product, program, or service may be used. Subject to IBM's valid intellectual property or other legally protectable rights, any functionally equivalent product, program, or service may be used instead of the IBM product, program, or service. The evaluation and verification of operation in conjunction with other products, except those expressly designated by IBM, are the responsibility of the user.

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