

Personal Computer

Installing Options in Your Personal Computer

PC 365 with Pentium Pro Processor

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Note

Before using this information and the product it supports, be sure to read the general information under Appendix E, "Notices" on page 81.

Second Edition (October 1996)

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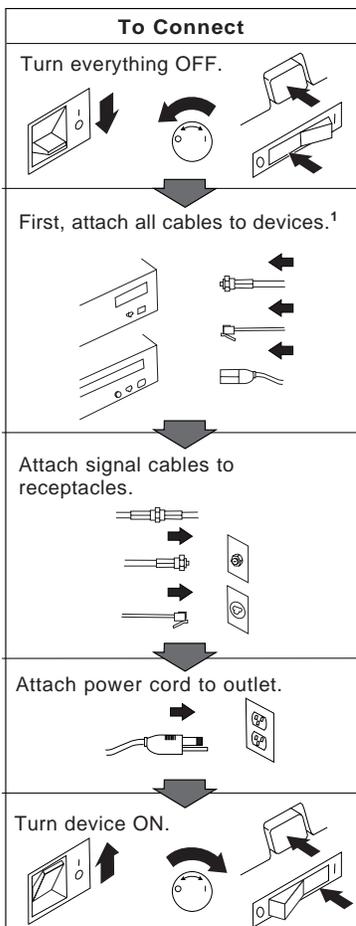
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Safety Information

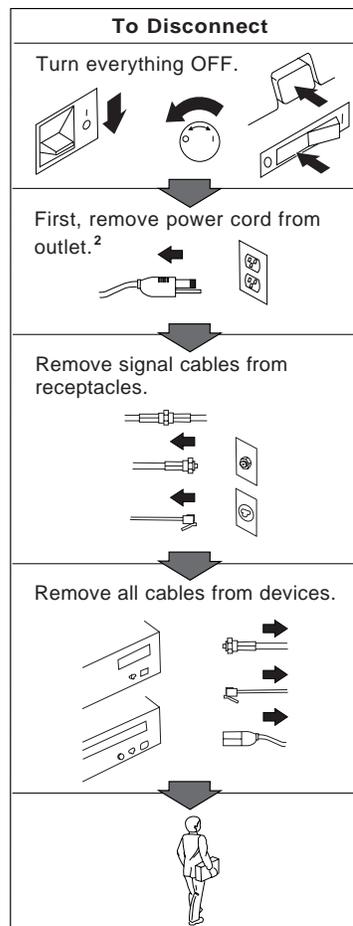


DANGER:

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.



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.

Opening the CD-ROM drive might result in exposure of hazardous laser radiation. There are no serviceable parts inside the CD-ROM drive.

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

DANGER

Laser radiation when open. Avoid direct eye exposure.

CAUTION: Laser radiation when open. Do not stare into beam or view directly with optical instruments.

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

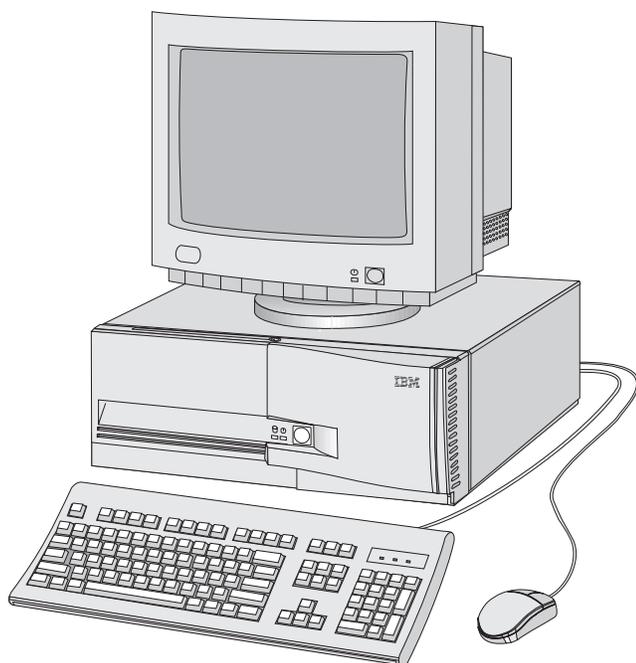
DANGER

Laser radiation when open. Avoid direct exposure to beam.

CAUTION: Laser radiation when open. Avoid exposure to beam.

About This Book

Thank you for selecting an IBM Personal Computer.



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 chapters 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 for your computer and for 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 and Internal Drives” provides instructions for installing and removing adapters and drives.
- Chapter 5, “Working with Security Options” describes features such as the security U-bolt and erasing lost or forgotten passwords. Information on diskette-write protection is also provided.
- Chapter 6, “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, “Tips for Installing SCSI Devices” provides information about the SCSI adapter, SCSI cables, and SCSI devices. The SCSI adapter is standard in some computer models.
- Appendix B, “Changing the Battery” explains how to change your computer backup battery and the precautions you should take when handling and disposing of the battery.
- Appendix C, “Installing an Optional Floor Stand” explains how to install and remove the optional floor stand. Also, illustrations are provided that show the securement of media within a CD drive in a vertically-positioned computer.
- Appendix D, “Interrupt and DMA Resources” contains the default interrupt and direct memory access (DMA) resources for your computer.
- Appendix E, “Notices” contains IBM notices and trademark information.

Related Publications

The following publications, together with this book, contain information about your computer.

- *Setting Up Your Personal Computer*
This publication contains instructions to help you set up your computer.
- *Using Your Personal Computer*
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 Personal Computer*
This online publication (provided only with computers that have IBM-preinstalled software) includes general information about using personal computers and in-depth information about the specific features of your computer. To purchase a printed copy of this publication, refer to the section on ordering publications in the "Getting Help, Service, and Information" chapter in *Using Your Personal Computer*.
- *About Your Software*
This publication (provided only with computers that have IBM-preinstalled software) contains information about the preinstalled software package.
- *S3 Trio64+ SVGA Device Driver Installation Instructions*
This publication contains instructions for installing device drivers for the S3 Trio64V+ SVGA graphics adapter installed in some models.
- *Matrox MGA Millennium Graphics Adapter Software Installation Guide*
This publication contains instructions for installing device drivers for the Matrox MGA Millennium graphics adapter installed in some models. Also, this publication includes technical data and troubleshooting information for related video problems.

- *Adaptec SCSI Documentation*
This documentation, which is provided with computers that have an IBM-installed SCSI adapter, includes information on configuring the adapter and instructions for installing and configuring SCSI devices.
- *Your Ready-to-Configure CD*
This publication contains information about the *Ready-to-Configure 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 separately purchased publication contains information for trained service technicians. To obtain a copy, refer to the section on ordering publications in the "Getting Help, Service, and Information" chapter in *Using Your Personal Computer*.
- *Technical Information Manual*
This separately purchased publication contains information for individuals who want to know more about the technical aspects of their computer. To obtain a copy, refer to the section on ordering publications in the "Getting Help, Service, and Information" chapter in *Using Your Personal Computer*.

Chapter 1. Overview

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 chapter provides a brief introduction to the options and features that are discussed in this book. Also, important information about required tools, electrical safety, and static-sensitive devices is discussed.

Important

Before you install or remove any option, read the safety procedures and component-handling guidelines in this chapter. These precautions and guidelines will help you work safely.

Refer to *Using Your Personal Computer* for general information on the use, operation, and maintenance of your computer. *Using Your Personal Computer* 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
 - Switches for diskette-write protection
 - Jumper for erasing lost or forgotten passwords
 - Battery
- Adapters
 - Industry standard architecture (ISA) adapters
 - Peripheral component interconnect (PCI) adapters
- Internal drives
- Security U-bolt
- Floor stand

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.

- Adding an infrared transceiver allows wireless communication between your computer and other infrared-capable devices. Information about related software is included on the *Ready-to-Configure CD*. For more information on the transceiver, refer to the documentation that comes with it.
- With the addition of an optional network adapter that supports local area network (LAN) wake-up requests, your computer can be remotely started using *Wake on LAN*. For more information on Wake on LAN, see *Using Your Personal Computer*.
- 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 *Using Your Personal Computer*.

For the latest information about available options:

- Within the United States, call 1-800-IBM-2YOU (1-800-426-2968), your place of purchase, or your IBM reseller.
- Within Canada, call 1-800-565-3344 or 1-800-465-7999.
- Outside the United States and Canada, contact your IBM HelpWare number, place of purchase, or IBM reseller.

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

Note: Personal 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

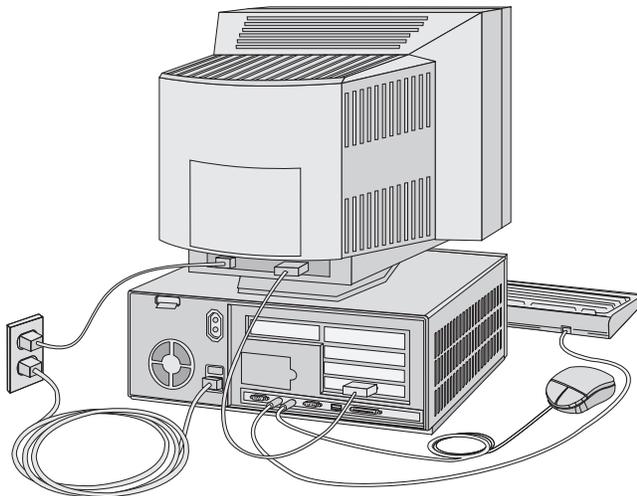
This chapter provides instructions for accessing and locating the options you want to install or remove.

Disconnecting Cables and Removing the Cover

Before you begin

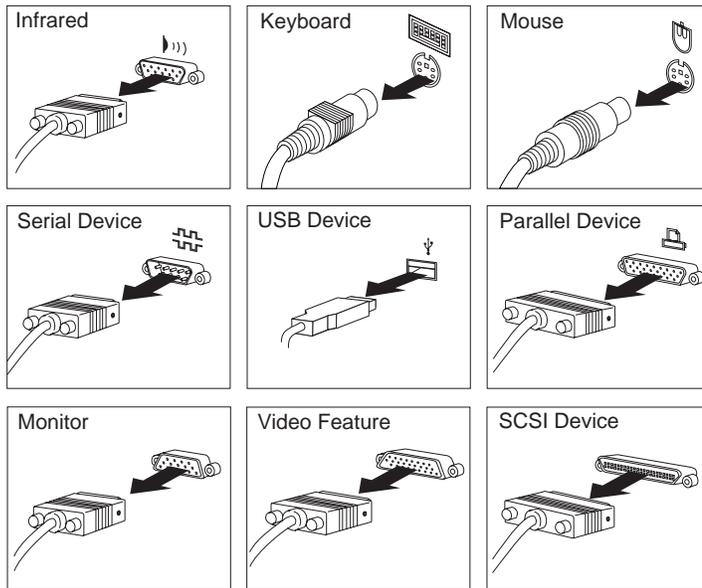
- Read “Electrical Safety” on page 4 and “Handling Static-Sensitive Devices” on page 5.
- Remove any media (diskettes, compact discs, or tapes) from the drives, and then turn off all attached devices and the computer.

- 1** Disconnect all cables attached to the computer; this includes power cords, input/output (I/O) cables, and any other cables connected to the computer. The following illustrations show the rear of the computer and examples of some I/O cables being disconnected.

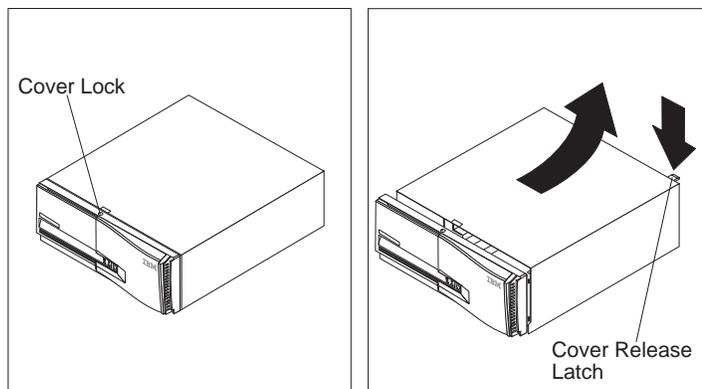


Note: Your computer might differ from the one shown above. For more information on the rear connectors, see *Setting Up Your Personal Computer*.

Note: For more information on ports, including infrared and universal serial bus (USB), refer to *Understanding Your Personal Computer*.¹



- 2** If necessary, unlock the computer cover.
- 3** Press down and hold the cover release latch, and move the cover back and upward as shown in the following illustrations.



¹ For more information on *Understanding Your Personal Computer*, see "Related Publications" on page x.

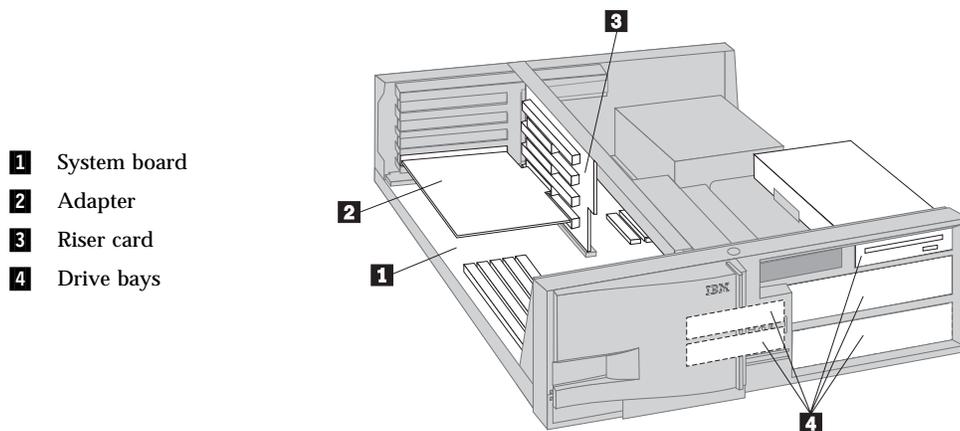
Locating Components

The following information helps you locate components and serves as a reference when you need to install options, connect input/output devices, or distinguish between the drive-bracket assembly and the drive-support bracket.

Internal View

The following illustration shows the internal view of your computer as seen from the front. For information on removing the cover, see “Disconnecting Cables and Removing the Cover” on page 6.

Note: Riser cards and adapters differ by model. The following illustration is for reference only.



Your computer comes with a graphics adapter installed on the riser card, a diskette drive installed in a drive bay, and a hard disk drive installed in a drive bay.

If your computer comes with a CD-ROM or PD/CD-ROM drive, it is installed in a drive bay; if your computer comes with a SCSI adapter, it is installed on the riser card.

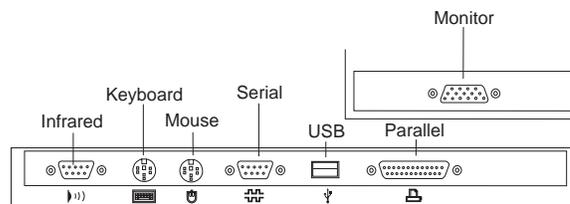
For more information on drive bays, see “Internal Drives” on page 35.

Input/Output Connectors

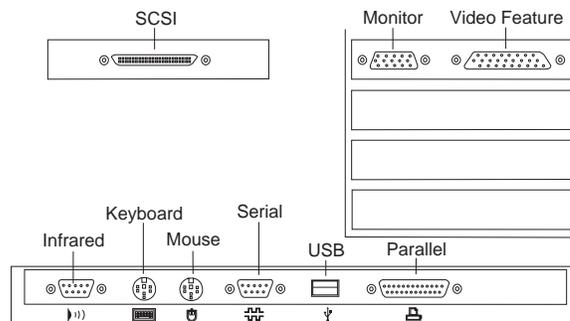
Input/output (I/O) connectors provide ports for transferring information into and out of your computer. You can connect a variety of I/O devices to your computer, including a monitor, keyboard, mouse, and printer. For more information on the ports and their specific technologies, see *Understanding Your Personal Computer*.²

At the rear of your computer is a horizontal panel that provides access to I/O connectors. Adapters installed in expansion slots might also provide I/O connectors. The following illustrations show the I/O connectors that come with your computer.

If your computer is equipped with the S3 Trio64+ SVGA graphics adapter, a connector for the monitor is located above the I/O connector panel.



If your computer is equipped with the Matrox MGA Millennium graphics adapter, two connectors, one for the monitor and one for video features, are located above the I/O connector panel. If your computer is equipped with a SCSI adapter, a connector for external SCSI devices is located above the I/O connector panel.

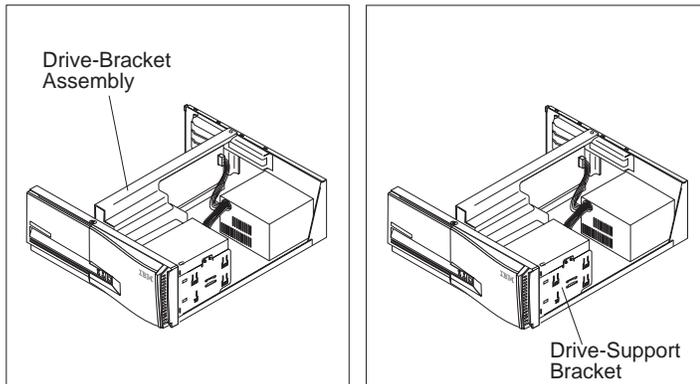


² For more information on *Understanding Your Personal Computer*, see “Related Publications” on page x.

Drive-Bracket Assembly and Drive-Support Bracket

Throughout this book, the *drive-bracket assembly* refers to the metal covering that holds drive bays 4 and 5. The drive-bracket assembly also runs the length of the computer above the riser card and attaches to the rear of the computer.

In contrast, the *drive-support bracket* refers to the metal casing that holds drive bays 1, 2, and 3. If you are viewing the computer from the front with the cover removed, the drive-bracket assembly is located in the middle of the computer, and the drive-support bracket is located at the right-front corner. The following illustrations show the locations of the drive-bracket assembly and the drive-support bracket within your computer.



Chapter 3. Working with Options on the System Board

This chapter provides information about system board options discussed in this book.

The information in this chapter helps you identify parts on the system board. Also, instructions are provided for accessing the system board. To install some options, you must have access to the system board. For example, to install a second microprocessor you must remove the drive-bracket assembly that is positioned above the microprocessor socket.

Before you begin

Before you install, remove, or replace any option, always do the following:

- Read “Electrical Safety” on page 4 and “Handling Static-Sensitive Devices” on page 5.
- Read the instructions that come with the option you want to install or replace.
- Turn off the computer and all other connected devices.
- Disconnect all external cables and power cords.

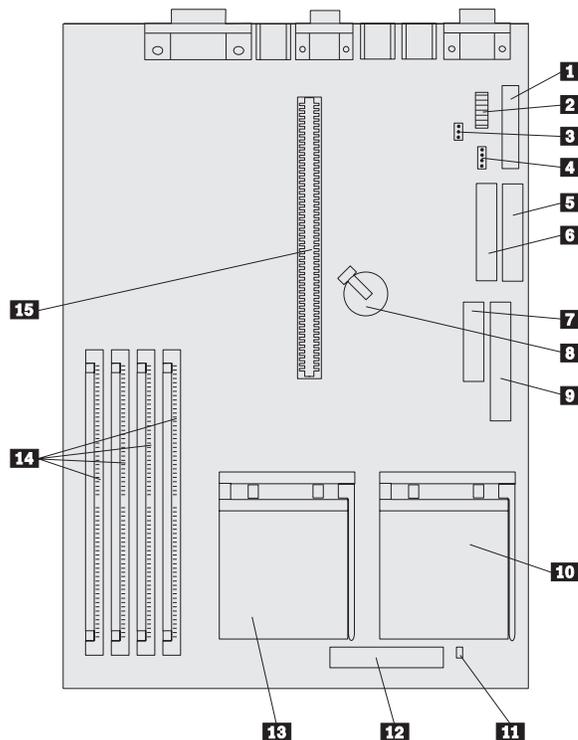
This chapter also provides instructions for installing, removing, and replacing system board components, specifically system memory and the microprocessor. For information on other system board components, see the appropriate section.

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 IBM-installed or that you can install later.

If you plan to install, remove, or replace hardware in your computer, you will need to know the layout of the system board. The following illustration shows the layout of the system board in your computer. The numbered pointers show the components that are discussed in this book.

- 1** Diskette drive connector
- 2** Switches for microprocessor speeds and diskette write protection
- 3** CMOS clear (password) jumper
- 4** SCSI LED jumper
- 5** Secondary IDE connector
- 6** Primary IDE connector
- 7** 3.3 V ac power connector
- 8** Battery
- 9** Main power connector
- 10** Second microprocessor connector
- 11** Fan connector for second microprocessor
- 12** Voltage regulator module (VRM) socket for second microprocessor
- 13** Primary microprocessor
- 14** System memory connectors
- 15** Riser card connector



Note: An illustration of the system board and additional information are provided on a label found on the underside of the computer cover.

Accessing the System Board

Note: For information on removing the computer cover, see “Disconnecting Cables and Removing the Cover” on page 6.

To access the section of the system board you need to work with, you might need to remove adapters, the riser card, or the drive-bracket assembly that holds drive bays 4 and 5. Also, you might need to remove cables that are attached to the system board. When disconnecting cables, it is important to note where they attach, so you can reattach them later.

The following examples describe when you might need to remove hardware:

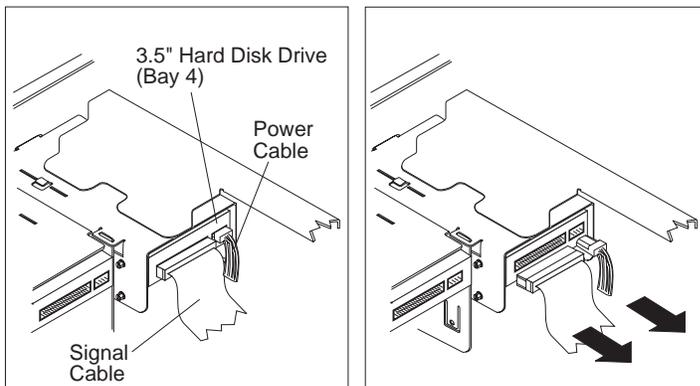
- When working with system memory modules (DIMMs), you might need to remove adapters from the riser card. For instructions on removing adapters, see “Removing Adapters” on page 33. Instructions for installing and removing memory modules are in this chapter.
- When replacing or upgrading the primary microprocessor or adding a second microprocessor, you might need to remove the drive-bracket assembly and adapters. For instructions, see “Removing the Drive-Bracket Assembly” on page 14 and “Removing Adapters” on page 33. Also, to access the switches for updating the settings for the microprocessor speed, you might need to disconnect cables attached to the system board. Instructions for the microprocessor upgrade are in this chapter.
- When replacing the system battery, you might need to remove the drive-bracket assembly, an adapter, and any cables connected to the system board that impede your access. For instructions, see “Removing the Drive-Bracket Assembly” on page 14 and “Removing Adapters” on page 33. Instructions for replacing the battery are in Appendix B, “Changing the Battery” on page 73.
- When changing jumper and switch settings, you might need to remove the drive-bracket assembly, the riser card, and any cables connected to the system board that impede your access. For instructions, see “Removing the Drive-Bracket Assembly” on page 14 and “Removing the Riser Card” on page 15. Instructions for the jumper and switches are in “Setting the Diskette Write-Protect Switch” on page 58 and “Erasing Lost or Forgotten Passwords” on page 55.

Removing the Drive-Bracket Assembly

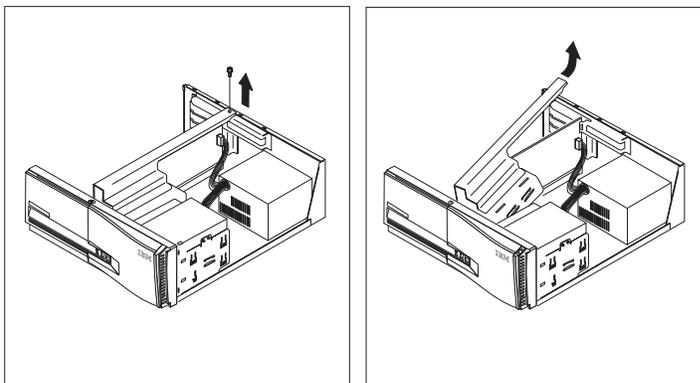
Before you begin

- 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 cables attached to the computer and remove the computer cover (see “Disconnecting Cables and Removing the Cover” on page 6).
- Locate the drive-bracket assembly. For more information, see “Drive-Bracket Assembly and Drive-Support Bracket” on page 10.

- 1** If a drive is installed in bay 4 or 5, disconnect any cables that are attached. The following illustrations show cables being disconnected from a drive in bay 4.



- 2** At the rear of the computer, remove the screw and lift the drive-bracket assembly from the frame of the computer.

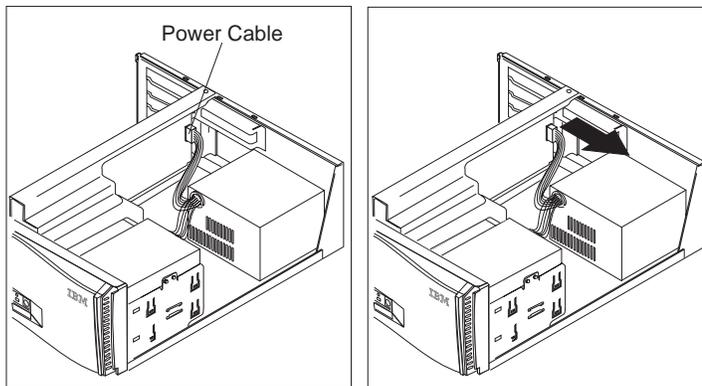


Removing the Riser Card

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 cables attached to the computer and remove the computer cover (see “Disconnecting Cables and Removing the Cover” on page 6).

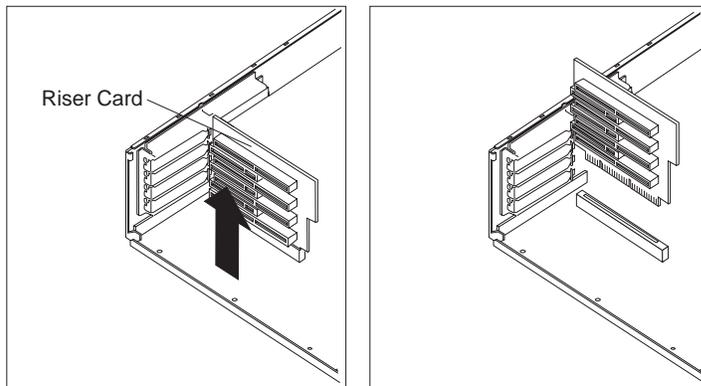
- 1** Remove any adapters that are connected to the riser card. For instructions, see “Removing Adapters” on page 33.
- 2** Disconnect the power cable that is attached to the riser card; it is important to remember where this cable connects so you can reattach it later.



- 3** Remove the drive-bracket assembly. For instructions, see “Removing the Drive-Bracket Assembly” on page 14.

4 Lift the riser card straight up from the connector on the system board.

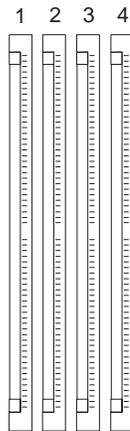
Note: Even though the riser card in your computer might be different from the one shown here, it lifts from the connector in the same way.



Working with System Memory

The maximum amount of system memory your computer supports is 512 MB. You can add memory to your computer to increase system performance. Your computer has four connectors for installing system-memory modules.

Note: To locate the memory connectors inside your computer, see “Identifying Parts on the System Board” on page 12.



The memory modules your computer uses are *dual inline memory modules (DIMMs)*. The IBM-installed DIMMs that come with your computer are extended data output (EDO) nonparity (NP) modules or EDO error correcting code (ECC) modules. You can add extra memory or replace existing memory with both types.

When installing or replacing DIMMs, the following rules apply:

- DIMMs have a maximum height of 3.05 cm (1.2 in.).
- Use only 3.3 V unbuffered DIMMs.
- You can mix EDO NP modules and EDO ECC modules; they will configure as nonparity.
- Install only EDO ECC modules to enable ECC.
- DIMMs with 60 and 50 nanosecond (ns) access speeds are supported.

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 *Mem 1*.

The following table shows suggested memory configurations for your computer; this table and additional information are also found on the underside of the computer cover. Again, alternate configurations are possible.

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

Total Memory	Mem 1	Mem 2	Mem 3	Mem 4
16	16	0	0	0
32	32	0	0	0
32	16	16	0	0
48	32	16	0	0
48	16	16	16	0
64	64	0	0	0
64	32	32	0	0
64	32	16	16	0
96	32	32	32	0
128	128	0	0	0
128	64	64	0	0
256	128	128	0	0
256	128	64	64	0
512	128	128	128	128

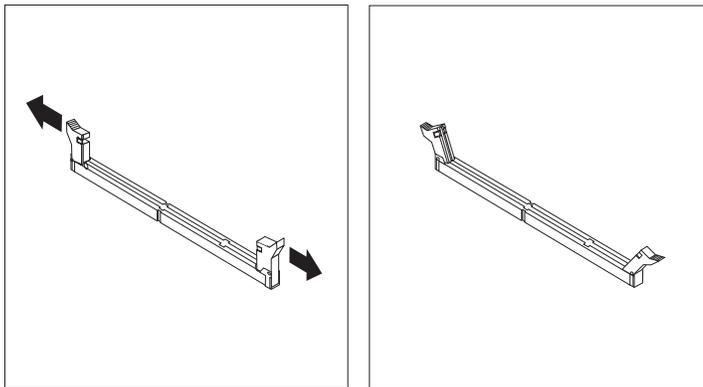
Installing a DIMM

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 off the computer and all other connected devices.
- Disconnect all cables attached to the computer and remove the computer cover (see “Disconnecting Cables and Removing the Cover” on page 6).
- Read “Accessing the System Board” on page 13.

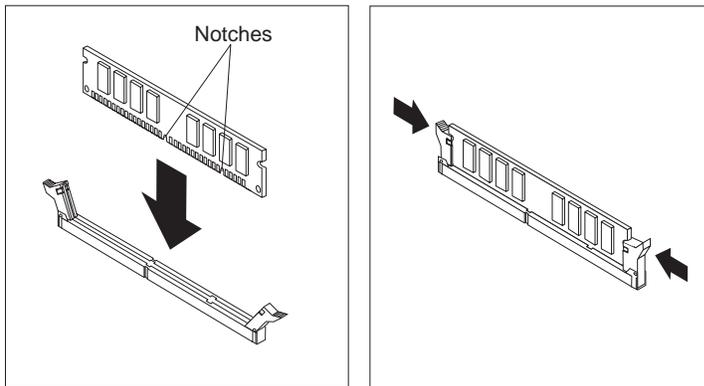
Note: For information on memory configuration, see Table 1 on page 18.

- 1** Be sure the retaining clips are in the open position, as shown in the second illustration below. If the retaining clips are perpendicular with the connector, push outward on them until they click open.



- 2** Touch the static-protective package containing the DIMM to any *unpainted* metal surface in the computer, and then remove the DIMM.
- 3** Position the DIMM above the connector so that the two notches on the bottom edge of the DIMM align properly with the connector.

- 4 Firmly push the DIMM straight down into the connector until the retaining clips pop up and snugly fit around both ends of the DIMM.



- 5 To install another DIMM, repeat steps 1—4.
- 6 Go to the device-record form in *Using Your Personal Computer* and record this installation.

What to do next

- To work with another option, go to the appropriate section.
- To complete the installation, go to Chapter 6, “Completing the Installation” on page 59.

Removing a DIMM

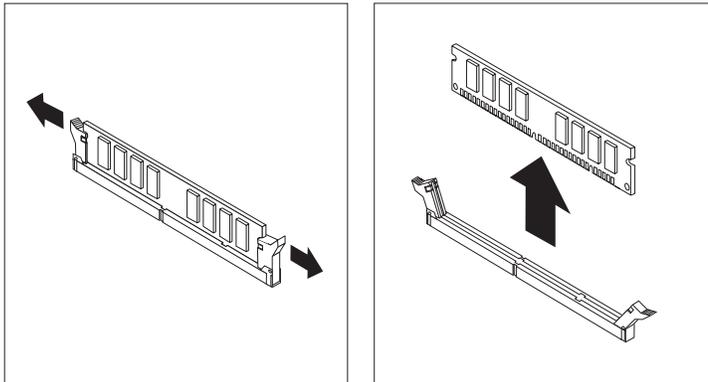
Before you begin

- 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 cables attached to the computer and remove the computer cover (see “Disconnecting Cables and Removing the Cover” on page 6).
- Read “Accessing the System Board” on page 13.

1 At both ends of the DIMM connector, push outward on the retaining clips until the DIMM is loosened.

Note: Be careful not to push too hard on the retaining clips because the DIMM may abruptly eject from the connector.

2 Lift the DIMM out of the connector.



3 Store the DIMM in a static-protective package.

What to do next

- To work with another option, go to the appropriate section.
- To complete the installation, go to Chapter 6, “Completing the Installation” on page 59.

Upgrading the Microprocessor

Your computer comes with an Intel Pentium Pro microprocessor installed in the primary connector. Future upgrades might be available for the primary microprocessor. For the latest information on microprocessor upgrades available for your computer, contact your place of purchase or your IBM reseller. If you do upgrade the primary microprocessor, use the instructions that come with the upgrade along with the instructions in this publication, “Replacing a Microprocessor” on page 23.

An important feature of your computer is support for dual processing. Dual processing allows you to add a second microprocessor to the system board, thus providing a significant performance enhancement over single processing. Located on the system board, the connector for the second microprocessor is directly beside the primary microprocessor. See “Identifying Parts on the System Board” on page 12 for locating the microprocessor connectors.

Note: Only certain operating systems support dual processing. For a list of these operating systems, see *Using Your Personal Computer*. For more information on dual processing, see *Understanding Your Personal Computer*.³

A dual-processor upgrade kit is an available option from IBM. This kit includes a second Pentium Pro microprocessor with a fan sink and a voltage regulator module (VRM) that plugs directly into the system board. The VRM provides the necessary voltage for the second microprocessor. When adding a second microprocessor, always refer to the instructions that come with that microprocessor.

Important

The speed of the second microprocessor must be equal to or higher than the speed of the primary microprocessor. If you add a second microprocessor with a higher speed, it will run at the lower speed of the primary microprocessor.

³ For more information on *Understanding Your Personal Computer*, see “Related Publications” on page x.

Replacing a Microprocessor

Before you begin

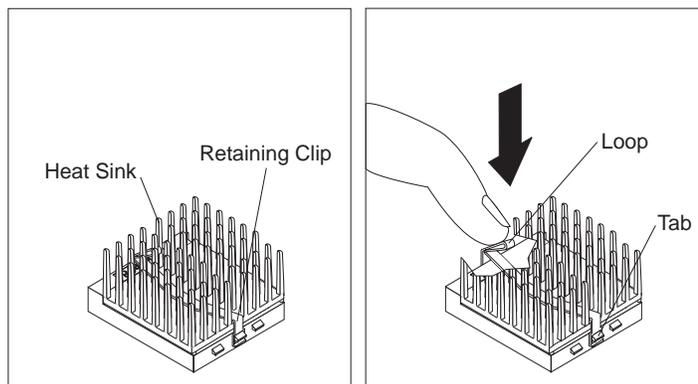
- Read “Electrical Safety” on page 4 and “Handling Static-Sensitive Devices” on page 5.
- Read the instructions that come with the new microprocessor.
- Turn off the computer.
- Disconnect all cables attached to the computer and remove the computer cover (see “Disconnecting Cables and Removing the Cover” on page 6).
- Read “Accessing the System Board” on page 13.

CAUTION:

When removing the heat sink and the microprocessor, be careful not to scrape any system board component. Also, the retaining clip is under tension and may disengage suddenly if it is not held while it is being removed.

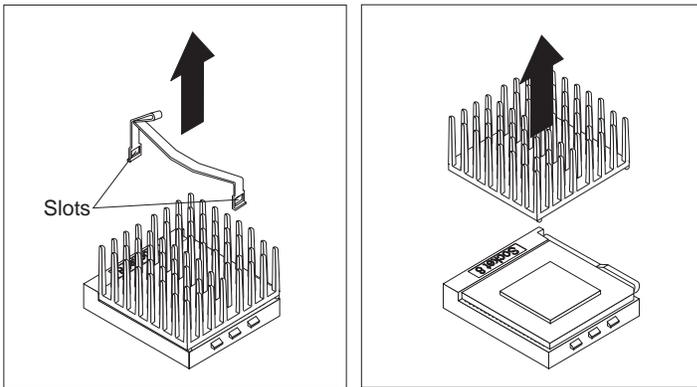
- 1 The slots on the ends of the retaining clip hook over the tabs found on the microprocessor connector. At the top of the clip is a "loop" to help with removal.

To remove the retaining clip, simultaneously press down on the loop and unhook the nearest tab from the slot, then unhook the tab on the other side.

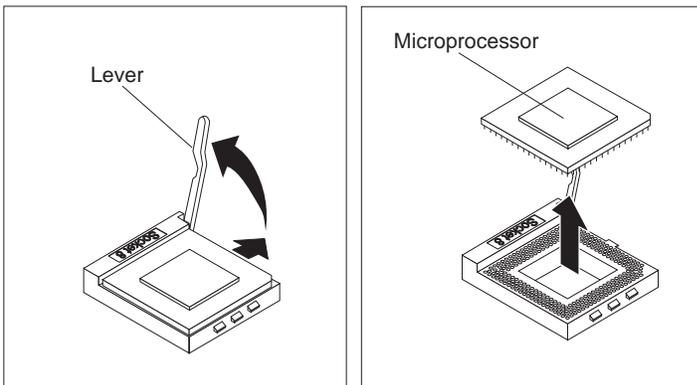


Note: A thermal grease is used to seal the heat sink to the microprocessor. If the heat sink is permanently cemented to the microprocessor, you can remove both the heat sink and the microprocessor after you lift the lever in step 3. Also, be careful not to get the grease on your skin. If the grease touches your skin, wash the area with soap and water.

2 Remove the retaining clip and the heat sink.



3 Release the lever on the side of the microprocessor connector and lift it all the way up. This releases the microprocessor. Lift the microprocessor out of the socket.



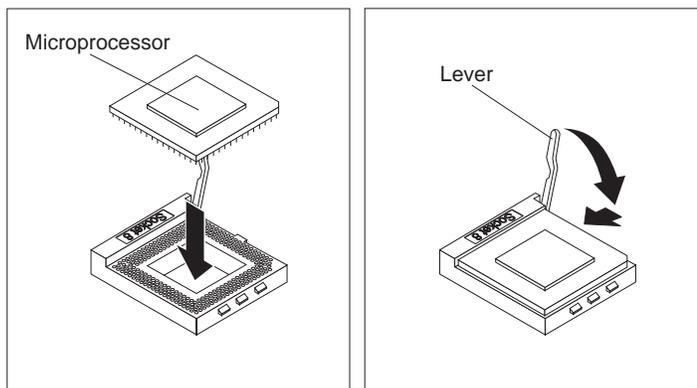
4 Store the old microprocessor in a static-protective package.

5 Touch the static-protective package containing the new microprocessor to any *unpainted* metal surface in the computer, and then remove the new microprocessor.

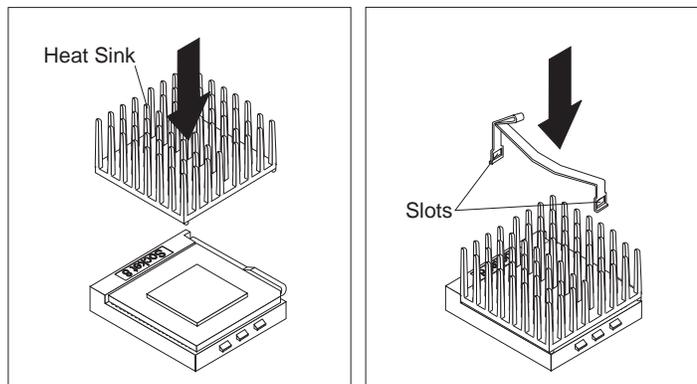
- 6** Align the pins of the new microprocessor with the socket and insert the microprocessor until it is properly seated.

Note: Be careful when inserting the microprocessor into the socket, because the pins of the microprocessor connect only one way.

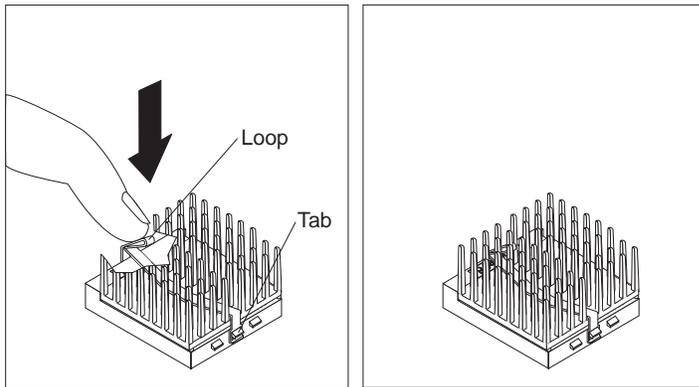
Lower the lever to lock the microprocessor into position.



- 7** Replace the heat sink and clip.



8 Press down on the loop to rehook the clip to the tabs on the connector.



9 If you replace the microprocessor with one that has a different speed, you must update the microprocessor speed. To do this, you must access the switches on the system board and set them accordingly. For information on locating the switches, see “Identifying Parts on the System Board” on page 12. For information on the appropriate switch settings, see the label on the underside of the computer cover, or contact your place of purchase or IBM reseller.

What to do next

- To work with another option, go to the appropriate section.
- To complete the installation, go to Chapter 6, “Completing the Installation” on page 59.

Chapter 4. Working with Adapters and Internal Drives

This chapter provides information and instructions for installing and removing adapters and internal drives.

When you are installing or removing adapters, it is important to resolve any resource conflicts that might arise. 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 29.

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 35.

Before you begin

Before you install, remove, or replace any option, you should always do the following:

- Read “Electrical Safety” on page 4 and “Handling Static-Sensitive Devices” on page 5.
- Read the instructions that come with the option you want to install or replace.
- Turn off the computer and all other connected devices.
- Disconnect all external cables and power cords.

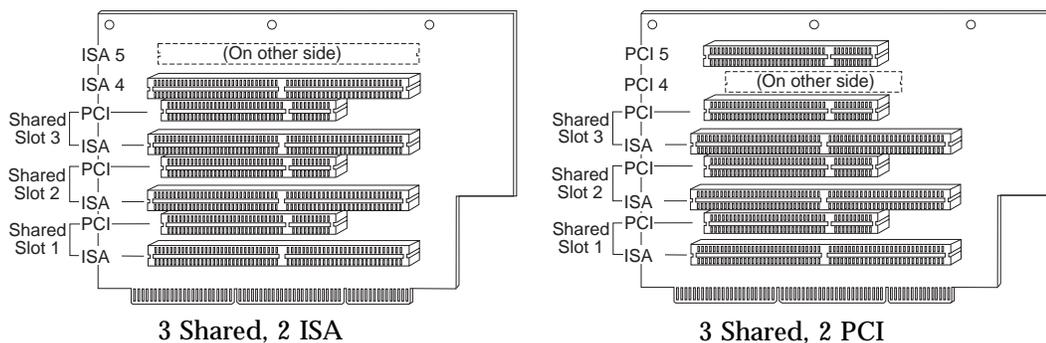
Adapters and the Riser Card

Your computer uses a riser card for expansion. The riser card contains expansion slots that connect adapters to the industry standard architecture (ISA) and peripheral component interconnect (PCI) buses.

You can add a variety of adapters to the expansion slots on the riser card. Your computer comes with an IBM-installed graphics adapter in one of the expansion slots. Some models come with an IBM-installed SCSI adapter. For information on locating the riser card, see “Locating Components” on page 8. To install or remove the riser card, see “Installing the Riser Card” on page 60 or “Removing the Riser Card” on page 15.

One of two types of riser cards is installed in your computer. One type of riser card has five ISA slots (four on one side and one on the other side), and three PCI slots. The other type has five PCI slots (four on one side and one on the other side) and three ISA slots. On both types of riser cards, three of the five slots are shared and two of the slots are dedicated to either the ISA or PCI bus. You can install only one adapter in each shared slot. On the riser card with three shared slots and two PCI slots, the dedicated PCI slots are the primary PCI slots.

The following illustrations show the expansion slots on the two types of riser cards; note that each PCI connector shares a slot with the ISA connector directly *below* it.



Note: Except for adapters installed on the single-slot side, adapters plug into the PCI slots with the components facing down and adapters plug into the ISA slots with the components facing up.

Adapter Configuration

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

Plug and Play Adapters

A new method for configuring adapters is now used by your computer. *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 to provide 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 around the resources already in use by other devices.

Most adapters designed for PCI slots are Plug and Play devices; many ISA adapters are not Plug and Play devices.

Notes:

1. If a resource conflict arises after installing a Plug and Play adapter, you might need to change the default resource settings on the adapter. For more information, refer to the documentation that comes with the adapter.
2. For more information on error messages from resource conflicts, see *Using Your Personal Computer*.

Legacy Adapters

Adapters that are not Plug and Play compatible are known as *legacy devices*. If you install a legacy adapter, you must manually configure it by setting switches on the adapter and by allocating system 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 **[Not available]**; this enables the software to use these system resources for the adapter.

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 68 or refer to *Using Your Personal Computer*. For more information on error messages from resource conflicts, see *Using Your Personal Computer*.

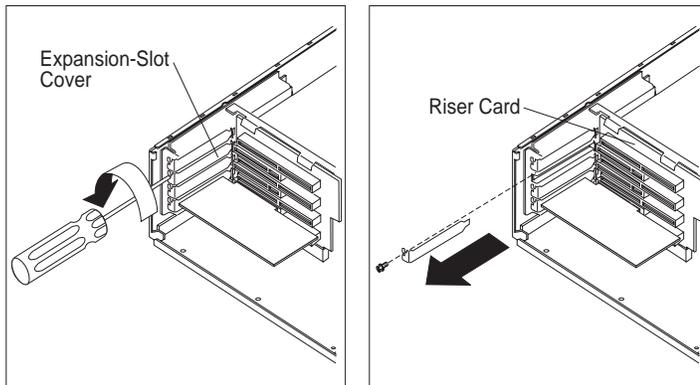
Installing Adapters

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 off the computer and all other connected devices.
- Disconnect all cables attached to the computer and remove the computer cover (see “Disconnecting Cables and Removing the Cover” on page 6).

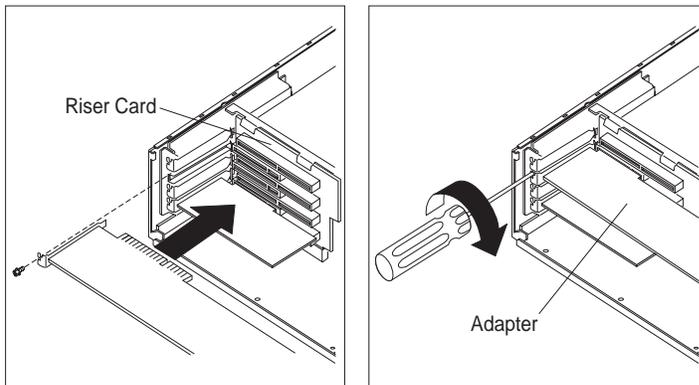
Note: The following illustrations are for reference only. The general instructions for installing an adapter work the same for both types of riser cards.

- 1** Review the instructions that come with the adapter to determine if it must be installed in an ISA or PCI slot.
- 2** Remove the screw and cover for the appropriate expansion slot.



- 3** Touch the static-protective package containing the adapter to any *unpainted* metal surface in the computer, then remove the adapter from the package.

- 4** Install the adapter into the appropriate slot on the riser card. Except for adapters installed on the single-slot side, the components of a PCI adapter face down toward the system board and the components of an ISA adapter face up. If a component in the computer or on the adapter interferes with the installation, use another slot.



- 5** Go to the device-record form in *Using Your Personal Computer*, and write the adapter name next to the slot into which you installed it.

What to do next

- To work with another option, go to the appropriate section.
- To complete the installation, go to Chapter 6, "Completing the Installation" on page 59.

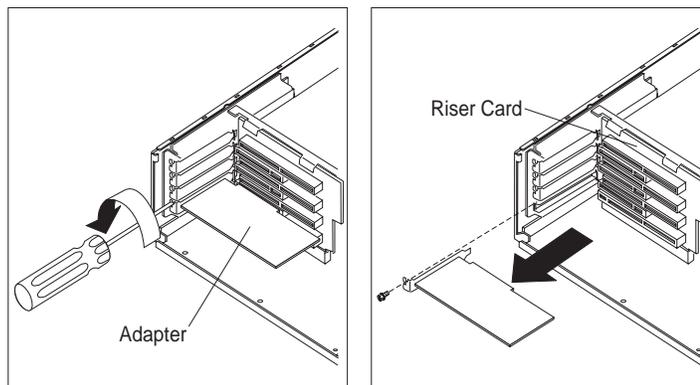
Removing Adapters

Before you begin

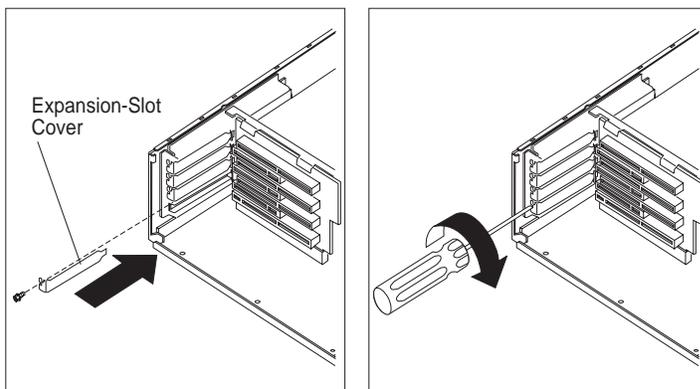
- Read “Electrical Safety” on page 4 and “Handling Static-Sensitive Devices” on page 5.
- Turn off the computer and all other connected devices.
- Disconnect all external cables and power cords, and then remove the computer cover (see “Disconnecting Cables and Removing the Cover” on page 6).

Note: The following illustrations are for reference only. The general instructions for removing an adapter work the same for both types of riser cards.

- 1** Locate the adapter and remove the screw.
- 2** Remove the adapter and insert it into a static-protective package. The following illustrations show an adapter being removed from a PCI slot.



- 3** If you are not installing another adapter in this slot, install an expansion-slot cover. The following illustrations show the expansion-slot cover being installed.



- 4** Go to the device-record form in *Using Your Personal Computer* and delete the name of the adapter you removed.

Note: Removing an adapter frees up system resources. If you remove an ISA legacy adapter, you must use the Configuration/Setup Utility program to set the previously used resources to **[Available]**. For more information, see Chapter 6, “Completing the Installation” on page 59.

What to do next

- To work with another option, go to the appropriate section.
- To complete the installation, go to Chapter 6, “Completing the Installation” on page 59.

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:

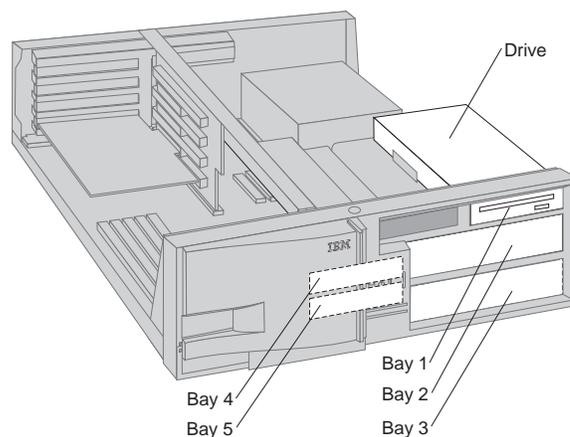
- Diskette drives
- Hard disk drives
- Tape drives
- CD-ROM drives
- PD/CD-ROM drives

Internal drives are installed in *bays* at the front of your computer. Within this book, the bays are referred to as bay 1, bay 2, and so on. Drive bays are housed in either the drive-bracket assembly or the drive-support bracket. For more information, see “Drive-Bracket Assembly and Drive-Support Bracket” on page 10.

Your computer comes with the following IBM-installed drives:

- A 3.5-inch diskette drive in bay 1.
- If your computer has a 3.5-inch IDE hard disk drive, it is installed in bay 4; if your computer has a 3.5-inch SCSI hard disk drive, it is installed on a mounting bracket in bay 3.
- If your computer has a preinstalled CD-ROM or PD/CD-ROM drive, it is installed in bay 2.

The following illustration shows the location of the drive bays in your computer.



Drive Specifications

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

Bay	Drives	Max. Height mm (in.)	Min. Height mm (in.)
1	3.5-inch diskette drive	25.4 (1.0)	—
2	5.25-inch diskette drive 3.5-inch diskette drive Tape backup drive CD-ROM drive PD/CD-ROM drive Hard disk drive	41.3 (1.6)	25.4 (1.0)
3	5.25-inch diskette drive 3.5-inch diskette drive Tape backup drive CD-ROM drive PD/CD-ROM drive Hard disk drive	41.3 (1.6)	25.4 (1.0)
4	Hard disk drive	25.4 (1.0)	—
5	Hard disk drive	25.4 (1.0)	—

Notes:

- Depending on the operating system you are running, you might not be able to install a CD-ROM drive and a PD/CD-ROM drive in the same computer.
- Drives that are greater than 41.3 mm (1.6 in.) high cannot be used.
- Drives that require removable media (diskettes, tapes, or CDs) must be installed in the accessible bays: bay 1, 2, or 3.
- To properly mount a 3.5-inch drive into bay 2 or 3, you must use a 3.5-inch conversion kit for a 5.25-inch bay. For more information, see your place of purchase or IBM reseller.

Power and Signal Cables

Your computer uses cables to connect integrated drive electronics (IDE) 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 riser card and system board.
- Flat *signal cables* connect IDE drives to the system board; signal cables are sometimes called *ribbon cables*. There are two sizes of signal cables that come with your computer:
 - The wider signal cable has three connectors. Two of these connectors attach to installed drives and the third attaches to the primary IDE connector on the system board.
 - The narrower signal cable has four connectors: one for attaching to the diskette-drive connector on the system board, two for attaching internal devices, and a fourth *unique* connector for attaching devices with adapter strips or other special connections.

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 and hard disk drive that are preinstalled in your computer come with power and signal cables attached. Also, if your computer comes with a CD drive, cables are attached. If you replace any drives, it is important to remember which cables attached to which drives.
- When a drive is installed, ensure that the drive connector at the end of the signal cable is always connected to the 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 more than one IDE device is used on a single cable, one must be designated as the primary or master device and another as the 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 hard disk drives, be sure to attach 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 adapter in the computer.

SCSI Cable

If your computer is equipped with a SCSI adapter, then a ribbon cable is provided to connect internal SCSI devices. This cable provides five identical connectors for attaching the SCSI adapter and internal SCSI devices.

For more information on connecting SCSI devices, see Appendix A, “Tips for Installing SCSI Devices” on page 71 and the *Adaptec SCSI Documentation* provided with your 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 place of purchase, or your IBM reseller.
- Within Canada, call 1-800-565-3344 or 1-800-465-7999.
- Outside the United States and Canada, contact your IBM HelpWare number, place of purchase, or IBM reseller.

Working with Drives in Bays 1, 2, and 3

To install or remove drives in bays 1, 2, or 3, you must remove the drive-support bracket from your computer.

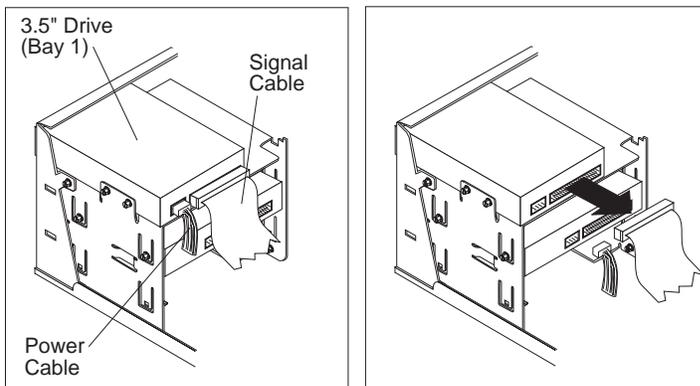
When you are facing the computer, the drive-support bracket is located at the front, right corner. To access the drive-support bracket, you must remove the drive-bracket assembly and other components. For more information on the differences between the drive-support bracket and drive-bracket assembly, refer to “Drive-Bracket Assembly and Drive-Support Bracket” on page 10.

Before you begin

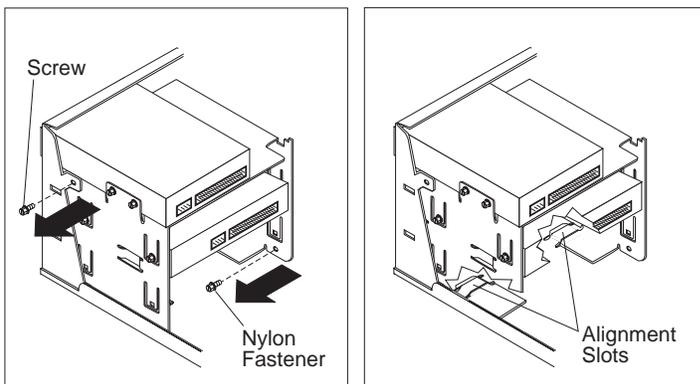
- Read “Electrical Safety” on page 4 and “Handling Static-Sensitive Devices” on page 5.
- Read the instructions that come with the drive you want to install or replace.
- Turn off the computer and all other connected devices.
- Disconnect all cables attached to the computer and remove the computer cover (see “Disconnecting Cables and Removing the Cover” on page 6).
- Remove the drive-bracket assembly (see “Removing the Drive-Bracket Assembly” on page 14).

Removing the Drive-Support Bracket

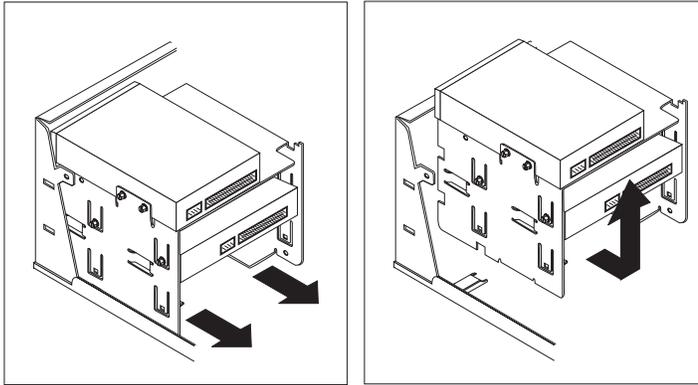
- 1 Disconnect any cables from the drives in bays 1, 2, and 3. The following illustrations show the power and signal cables being disconnected from the diskette drive in bay 1.



- 2 Remove the fasteners that attach the drive-bracket support to the computer frame.
 - a. Loosen and remove the screw from the upper-front corner of the drive-support bracket.
 - b. Remove the nylon fastener from the lower rear of the bracket. You might have to sever the nylon fastener to remove it. This fastener is included for shipping purposes only; you do not need the nylon fastener when reinstalling the drive-support bracket.
 - c. Note how the tabs at the base of the drive-support bracket fit into the alignment slots on the computer frame.



- 3** Gently slide the bracket backwards to clear the alignment slots, and then lift the bracket out of the computer.



What to do next

- To install a drive, go to “Installing a Drive in Bay 1, 2, or 3” on page 42.
- To remove a drive, go to “Removing a Drive from Bay 1, 2, or 3” on page 44.

Installing a Drive in Bay 1, 2, or 3

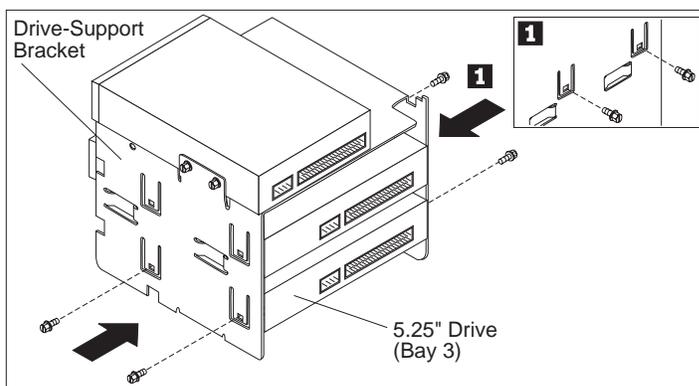
Before you begin

- Read “Working with Drives in Bays 1, 2, and 3” on page 39.
- Read the documentation that comes with the drive.

Notes:

- For information on installing SCSI drives, refer to Appendix A, “Tips for Installing SCSI Devices” on page 71 and the *Adaptec SCSI Documentation* that comes your computer.
- To install a 3.5-inch drive into drive bay 2 or 3, you must install a conversion kit. For information on purchasing a 3.5-inch conversion kit for a 5.25-inch bay, see your place of purchase or an IBM reseller.

- 1** Touch the static-protective package containing the new drive to any *unpainted* metal surface and then remove the drive.
- 2** Insert the drive into the desired drive bay and insert and tighten the four screws. The following illustration shows a drive being installed in bay 3.



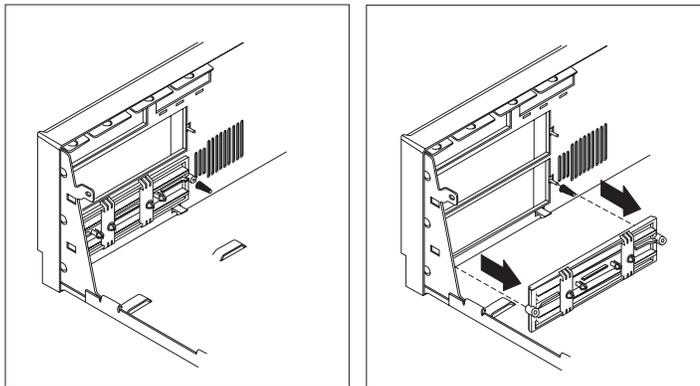
- 3** If applicable, repeat steps 1 and 2 to install another drive.
- 4** Go to the device-record form in *Using Your Personal Computer* and record the new installation.

What to do next

- To access an installed drive that has removable media, you must remove the appropriate bay panel. For more information, go to “Removing a Bay Panel” on page 43.
- To remove a drive from bay 1, 2, or 3, go to “Removing a Drive from Bay 1, 2, or 3” on page 44.
- To install the drive-support bracket, go to “Installing the Drive-Support Bracket” on page 47.

Removing a Bay Panel

- 1** Press against the front of the bay panel until it is loosened.
- 2** Remove the bay panel. The following illustrations show a bay panel being removed from bay 3.



- 3** Save the removed bay panel for possible future use.
- 4** If applicable, repeat steps 1—3 to remove another bay panel.

What to do next

- To remove a drive, go to “Removing a Drive from Bay 1, 2, or 3” on page 44.
- To install the drive-support bracket, go to “Installing the Drive-Support Bracket” on page 47.

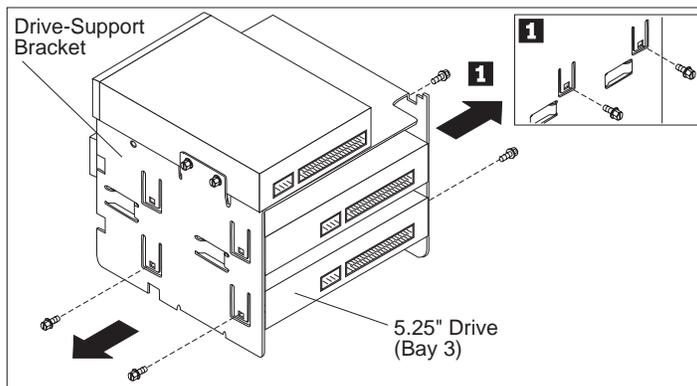
Removing a Drive from Bay 1, 2, or 3

Before you begin

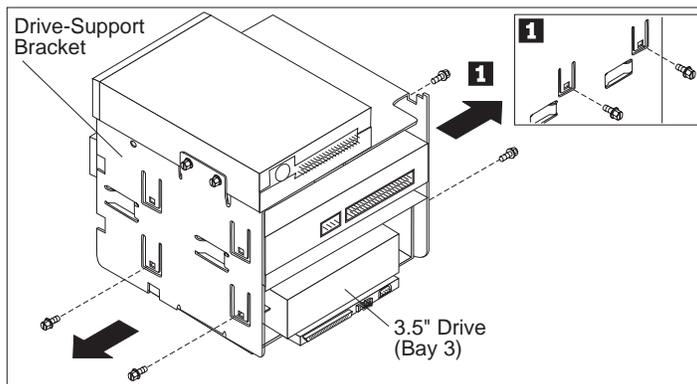
- Read “Working with Drives in Bays 1, 2, and 3” on page 39.

1 Loosen and remove the four screws and then remove the drive from the drive bay.

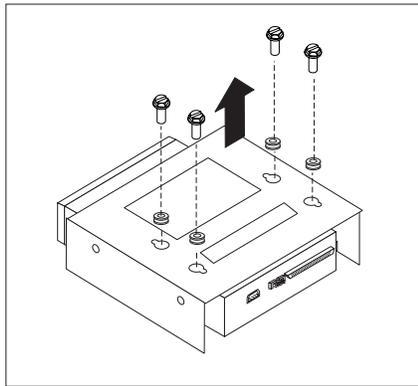
- a. The following illustration shows a 5.25-inch drive being removed from bay 3.



- b. If your computer comes with a 3.5-inch SCSI hard disk drive installed in bay 3, a mounting bracket holds the drive in place. The following illustration shows the mounting bracket being removed from the drive-support bracket.



- c. You can remove the SCSI hard disk drive from the mounting bracket. The following illustration shows the drive being removed from the mounting bracket.



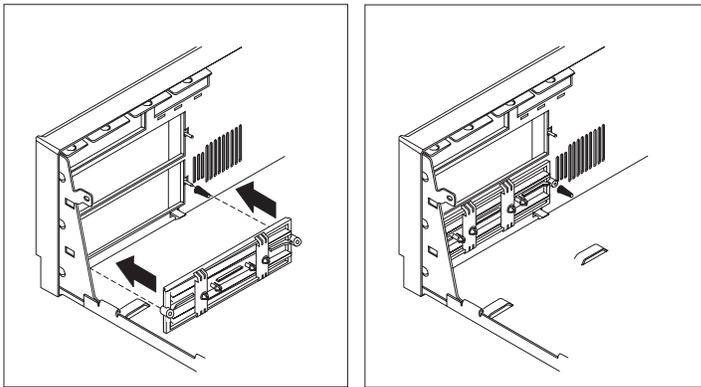
- 2** Place the removed drive in a static-protective package.
- 3** To remove another drive, repeat step 1.

What to do next

- If you are leaving the drive bay empty, or if you are replacing a removed drive with a drive that does not have removable media, install a bay panel. For more information, go to “Installing a Bay Panel” on page 46.
- To install a drive, go to “Installing a Drive in Bay 1, 2, or 3” on page 42.
- To install the drive-support bracket, go to “Installing the Drive-Support Bracket” on page 47.

Installing a Bay Panel

- 1** Align the holes in the bay panel with the tabs on the computer frame.
- 2** Install the bay panel. The following illustrations show a bay panel being installed in bay 3.



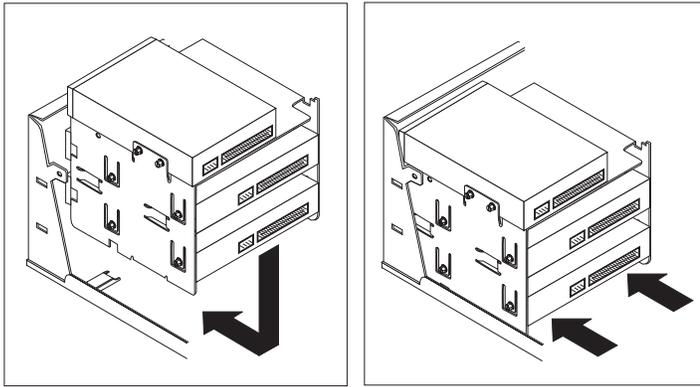
- 3** If applicable, repeat steps 1 and 2 to install another bay panel.

What to do next

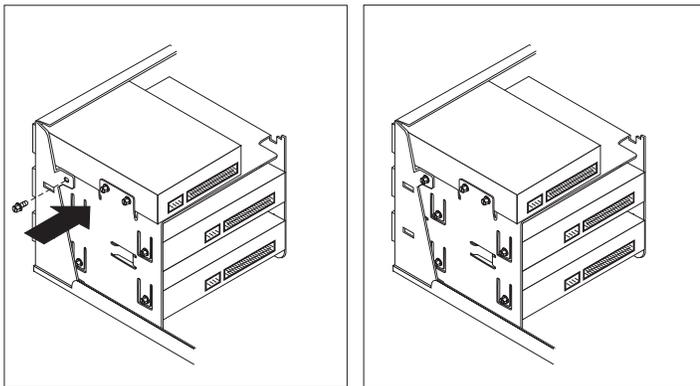
- To install a drive, go to “Installing a Drive in Bay 1, 2, or 3” on page 42.
- To install the drive-support bracket, go to “Installing the Drive-Support Bracket” on page 47.

Installing the Drive-Support Bracket

- 1** Clear any cables that might impede the installation of the drive-support bracket.
- 2** Gently place the drive-support bracket into the computer and slide the tabs on the bottom of the bracket into the alignment slots on the computer.

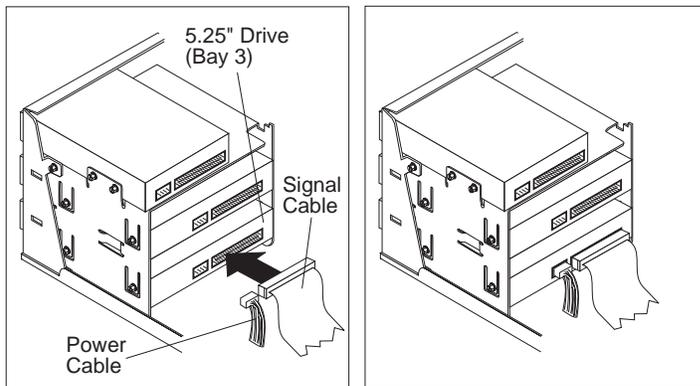


- 3** Insert and tighten the screw of the drive-support bracket to the computer frame.



- 4** Connect the cables for the drives in bays 1, 2, or 3. The following illustrations show the power and signal cables being connected to a drive in bay 3.

Note: If more than one drive is installed, attach cables to the lowest drive first and work your way up.



What to do next

- To work with a drive in bay 4 or 5, go to “Installing a Drive in Bay 4 or 5” on page 49 or “Removing a Drive from Bay 4 or 5” on page 50.
- To complete the installation, go to Chapter 6, “Completing the Installation” on page 59.

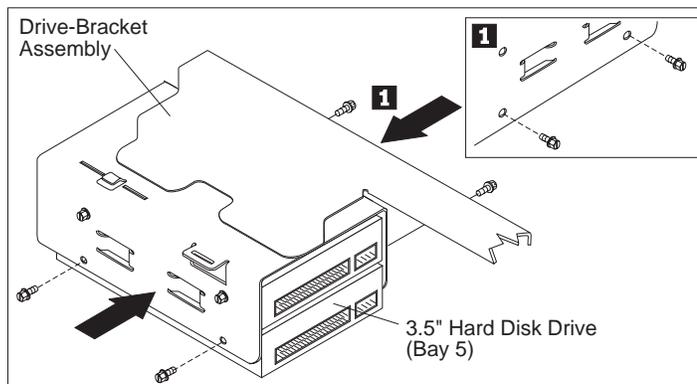
Installing a Drive in Bay 4 or 5

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 cables attached to the computer and remove the computer cover (see “Disconnecting Cables and Removing the Cover” on page 6).
- To work with drives in bays 4 and 5, you must remove the drive-bracket assembly. For more information, see “Removing the Drive-Bracket Assembly” on page 14.

Note: The drive-bracket assembly is different from the drive-support bracket. For more information, see “Drive-Bracket Assembly and Drive-Support Bracket” on page 10.

- 1** Insert the drive into the desired drive bay and insert and tighten the four screws. The following illustration shows a drive being installed in bay 5.



- 2** If applicable, repeat step 1 to install a drive in the other bay.

What to do next

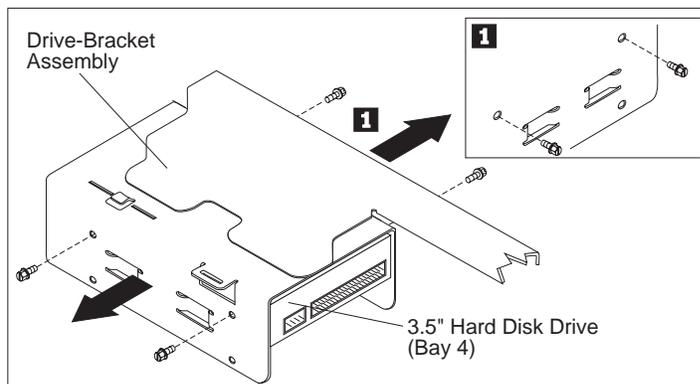
- Go to the device-record form in *Using Your Personal Computer*, and record the installation.
- To remove a drive, go to “Removing a Drive from Bay 4 or 5” on page 50.
- To install the drive-bracket assembly and complete the installation, go to Chapter 6, “Completing the Installation” on page 59.

Removing a Drive from Bay 4 or 5

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 cables attached to the computer and remove the computer cover (see “Disconnecting Cables and Removing the Cover” on page 6).
- To work with drives in bays 4 and 5, you must remove the drive-bracket assembly. For more information, see “Removing the Drive-Bracket Assembly” on page 14.

- 1** Loosen and remove the four screws and then remove the drive from the drive bay. The following illustration shows a drive being removed from bay 4.



- 2** If applicable, repeat step 1 to remove a drive from the other bay.

What to do next

- Go to the device-record form in *Using Your Personal Computer*, and record the installation.
- To install a drive, go to “Installing a Drive in Bay 4 or 5” on page 49.
- To install the drive-bracket assembly and complete the installation, go to Chapter 6, “Completing the Installation” on page 59.

Chapter 5. Working with Security Options

This chapter describes some of the security options that are available for your computer.

To help prevent hardware theft, you can add a security U-bolt and cable to your computer. To erase lost or forgotten passwords in order to set up password protection, you can move the CMOS clear (password) jumper on the system board.

Note: Use the Configuration/Setup Utility program to set, change, or delete passwords. For more information, see *Using Your Personal Computer*.

To guard against writing over diskettes, you can set the write-protect switch on the system board.

The following list is a quick reference to these procedures:

- “Installing a U-Bolt” on page 52
- “Erasing Lost or Forgotten Passwords” on page 55
- “Setting the Diskette Write-Protect Switch” on page 58

Installing a U-Bolt

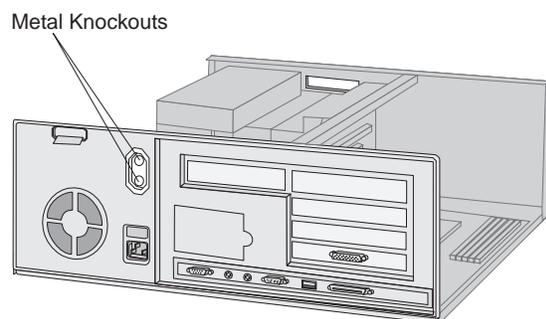
You can add a U-bolt to the rear of your computer. Adding a U-bolt enables you to add a security cable and lock which helps prevent hardware theft. After you add the security cable, make sure that it does not interfere with other cables that are connected to the computer.

Before you begin

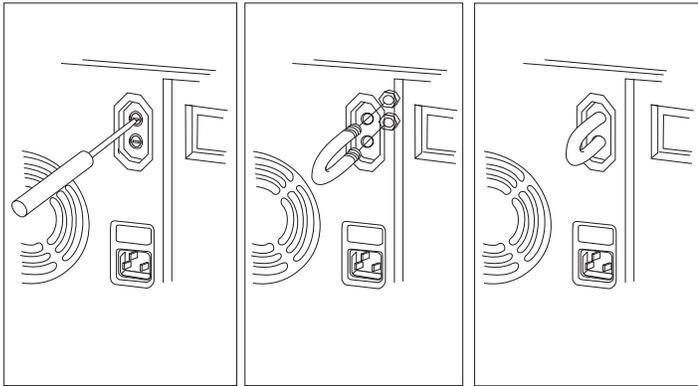
- Obtain the following:
 - A 19-mm (3/4 in.) U-bolt and threaded nuts that fit the U-bolt
 - A security cable
 - A lock, such as a combination lock or padlock
 - An adjustable wrench
- Read “Electrical Safety” on page 4 and “Handling Static-Sensitive Devices” on page 5.
- Turn off the computer and all other connected devices.
- Disconnect all external cables and power cords, and remove the computer cover (see “Disconnecting Cables and Removing the Cover” on page 6).

Note: The external connectors on the rear of your computer might differ from the ones shown in this section.

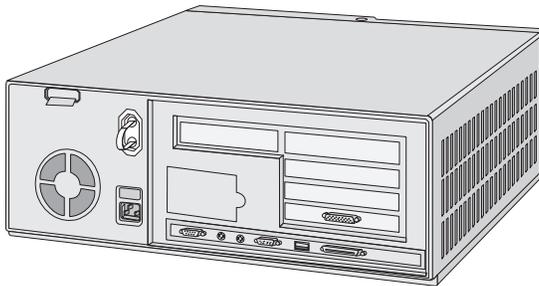
- 1** Use a tool, such as a screwdriver, to remove the two metal knockouts.



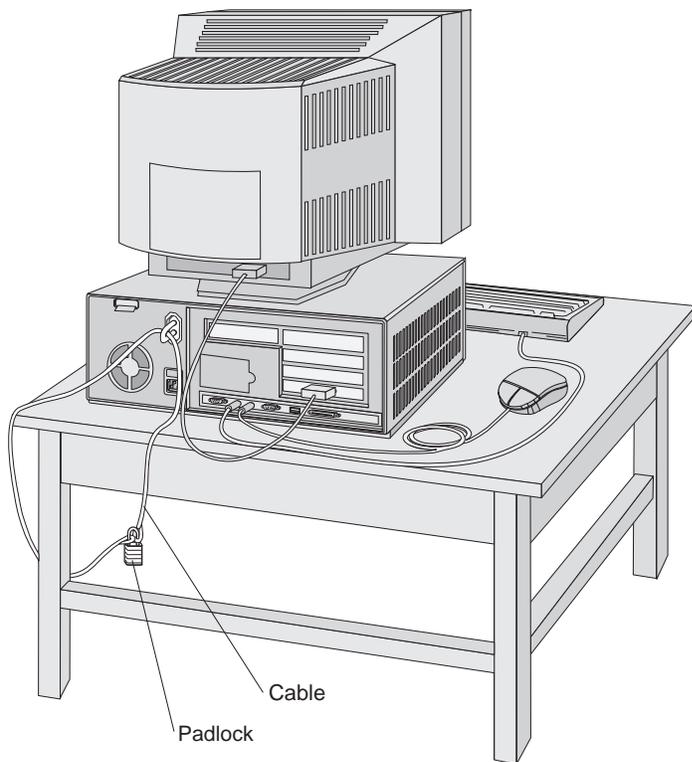
- 2 Insert the U-bolt through the rear panel, then attach and tighten the nuts with an adjustable wrench.



- 3 Replace the computer cover. For more information, see “Replacing the Cover and Connecting the Cables” on page 62.



- 4** Thread the cable through the U-bolt and around an object 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.



Erasing Lost or Forgotten Passwords

Note: To set, change, or delete a password, see *Using Your Personal Computer*.

Your computer uses *complementary metal-oxide semiconductor (CMOS)* memory on the system board for storing configuration and setup information. CMOS memory maintains information about:

- Date and time
- Security features
- Power-management devices
- Storage devices
- Keyboard and mouse
- ISA legacy configuration information
- Plug and Play configuration information
- Port assignments
- I/O addresses and interrupts
- Other selectable features

Within the security features are the settings for the power-on and administrator passwords. If you need to *erase* a lost or forgotten password, you must erase all of the configuration and setup information by moving the jumper designated for CMOS memory.

The jumper is located on the system board with the label *CMOS clear*. To locate this jumper, see “Identifying Parts on the System Board” on page 12 or see the label on the underside of the computer cover; (on the label, the jumper is referred to as the *password jumper*).

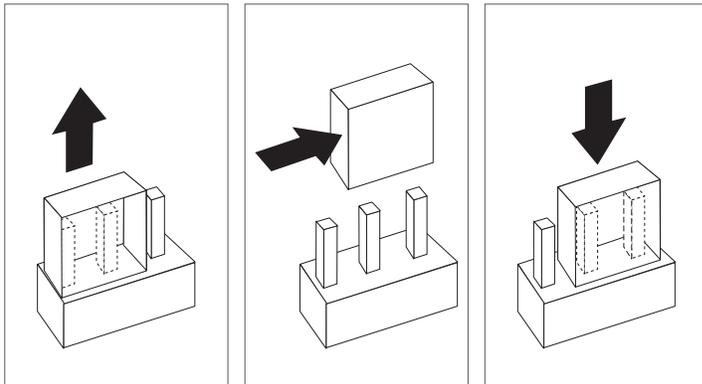
Important

Clearing CMOS memory erases the configuration of your computer. Because you need to reconfigure the computer after clearing CMOS memory, record the configuration information of your computer *before* altering the CMOS jumper.

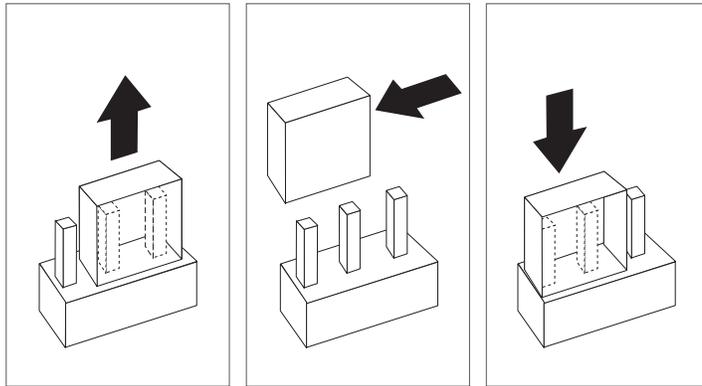
Before you begin

- Using the Configuration/Setup Utility program, record all configuration information.
- Read “Electrical Safety” on page 4 and “Handling Static-Sensitive Devices” on page 5.
- Turn off the computer.
- Disconnect all cables attached to the computer, and then remove the computer cover (see “Disconnecting Cables and Removing the Cover” on page 6).

- 1** If necessary, remove the drive-bracket assembly and riser card. For more information, see “Removing the Drive-Bracket Assembly” on page 14 and “Removing the Riser Card” on page 15.
- 2** Locate the CMOS-clear jumper on the system board. For more information, see “Identifying Parts on the System Board” on page 12 or see the label on the underside of the computer cover which refers to the jumper as the password jumper.
- 3** Move the jumper from its normal position pins (1 and 2) to pins 2 and 3. It might be helpful to use needle-nose pliers to move the jumper, but be careful not to scrape any system board components or crush the jumper.



- 4** Wait one minute and then move the jumper back to its normal position (pins 1 and 2). This clears CMOS memory.



What to do next

- After clearing CMOS memory, you must reconfigure the computer. After reassembling the computer (go to Chapter 6, “Completing the Installation” on page 59), use the Configuration/Setup Utility program to reset the date and time, reset any passwords, and reconfigure the computer. For more information, refer to “Setting Passwords” on page 70 and *Using Your Personal Computer*.

Setting the Diskette Write-Protect Switch

The diskette write-protect switch controls whether you can write information to a diskette using a diskette drive. The ability to prevent writing to a diskette is particularly useful if you are concerned about the security of information that can be obtained through a network.

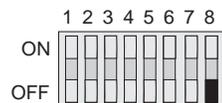
Note: This switch does not affect the ability to read information from a diskette.

Before you begin

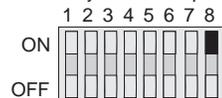
- Read “Electrical Safety” on page 4 and “Handling Static-Sensitive Devices” on page 5.
- Turn off the computer and all other connected devices.
- Disconnect all external cables attached to the computer, and then remove the computer cover (see “Disconnecting Cables and Removing the Cover” on page 6).

- 1** Locate the configuration switches on the system board. For more information, refer to the label on the underside of the computer cover or see “Identifying Parts on the System Board” on page 12.
- 2** For normal diskette operation or for read-only diskette operation, set switch 8 as illustrated below. It might be helpful to use the end of a small screwdriver to set the switch.

Normal Diskette Operation



Read-Only Diskette Operation



What to do next

- To work with another option, go to the appropriate section.
- To complete the installation, go to Chapter 6, “Completing the Installation” on page 59.

Chapter 6. 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:

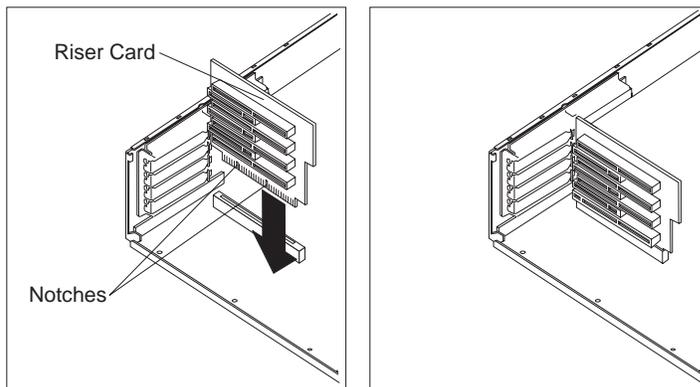
- “Installing the Riser Card” on page 60
- “Installing the Drive-Bracket Assembly” on page 61
- “Replacing the Cover and Connecting the Cables” on page 62
- “Updating the Computer Configuration” on page 64

Installing the Riser Card

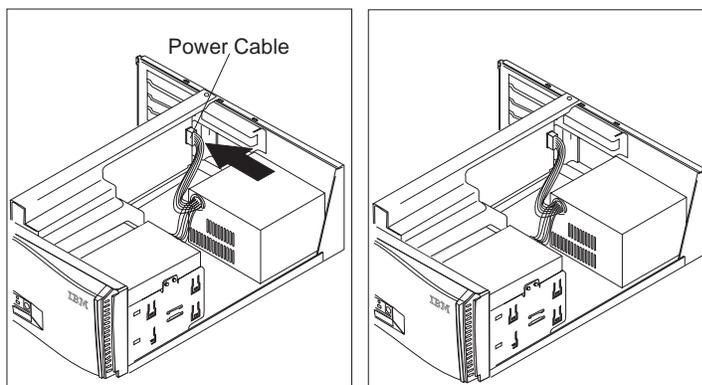
Before you begin

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

- 1** Position the riser card so that the two notches on the bottom edge align with the two notches in the connector on the system board.
- 2** Push the riser card straight down into the connector.



- 3** Install the drive-bracket assembly. For more information, see “Installing the Drive-Bracket Assembly” on page 61.
- 4** Reinstall the adapters and reconnect the power cable to the riser card. For information on installing adapters, see “Installing Adapters” on page 31.

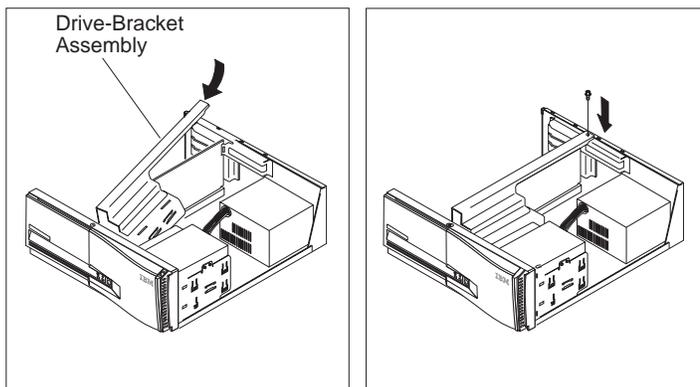


Installing the Drive-Bracket Assembly

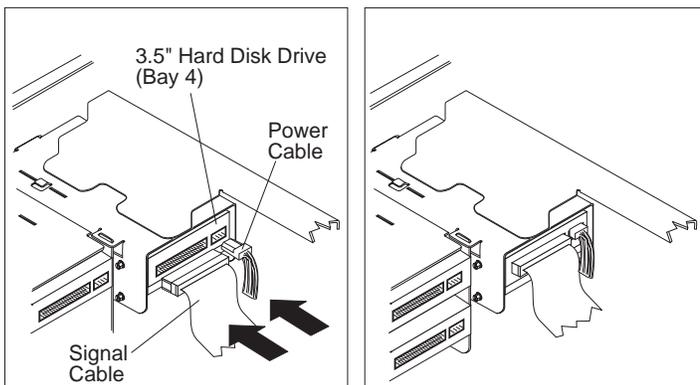
Before you begin

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

- 1** Insert the drive-bracket assembly into the computer. Ensure that the drive-bracket assembly is seated correctly.
- 2** Insert and tighten the screw.



- 3** Reconnect the cables to any drives that are housed in the drive-bracket assembly. The following illustrations show power and signal cables being connected to a drive in bay 4.

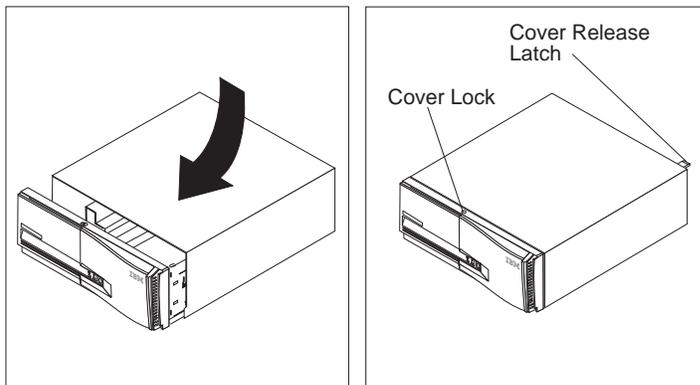


Replacing the Cover and Connecting the Cables

Before you begin

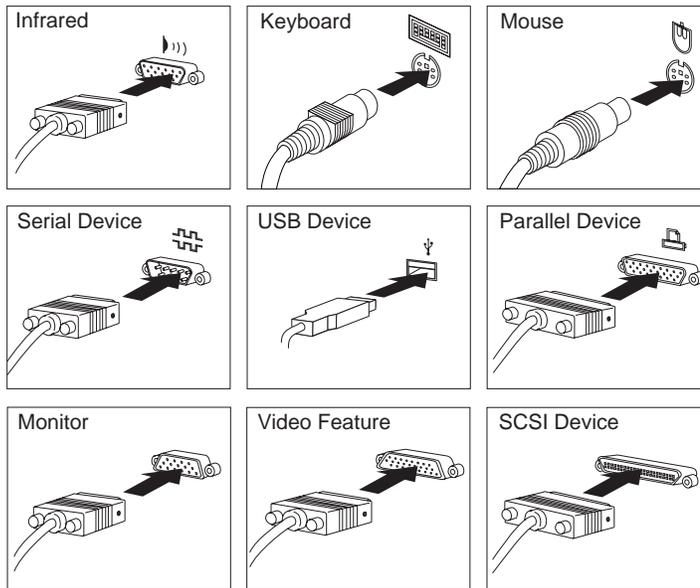
- Read “Electrical Safety” on page 4 and “Handling Static-Sensitive Devices” on page 5.

- 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** Place the cover down on the computer frame as shown in the following illustrations. Secure the cover by sliding it forward until the cover release latch catches with the rear of the cover.



- 4** If desired, lock the cover. For more information on locking the computer cover, see *Using Your Personal Computer*.

5 Reconnect the external cables and cords to the computer.



6 If you have a modem or fax machine attached to the computer, reconnect the telephone line to the wall outlet and the computer. Plug the power cords into properly grounded electrical outlets.

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 *Using Your Personal Computer*.

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. Also, video device drivers are on the *Ready-to-Configure CD*.

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. 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.

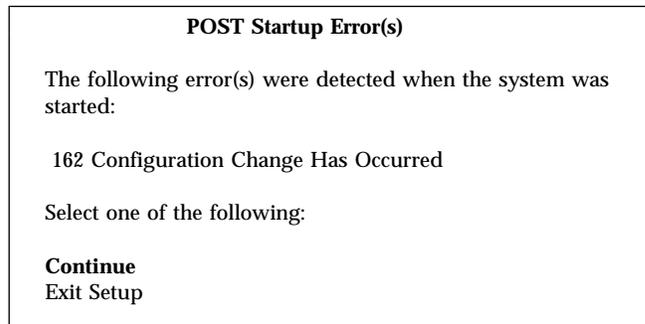
Notes:

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 *Using Your Personal Computer*.

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.



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.

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

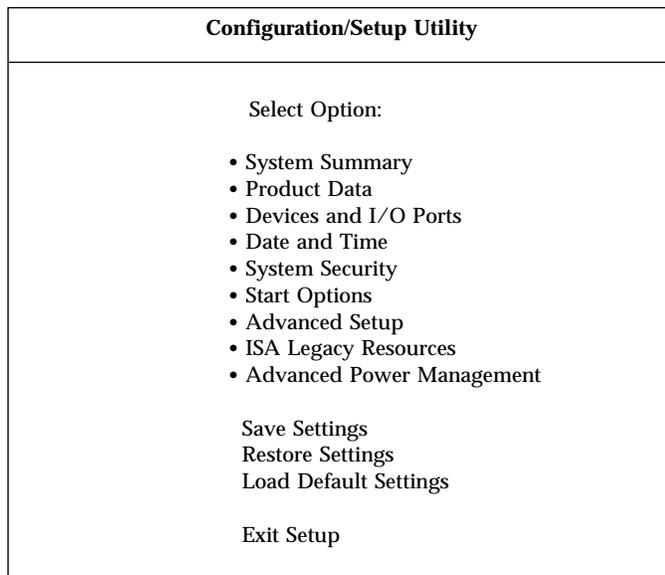
To access the Configuration/Setup Utility program:

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 set both an administrator and a power-on password, you can type either of the passwords at the password prompt. However, if you type your power-on password, you can *view* limited information in the Configuration/Setup Utility program, but you cannot *change* settings. To change settings in the Configuration/Setup Utility program, type your administrator password at the password prompt.



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 the changes, or you can make manual changes and then save the settings.

The following is a quick reference for identifying symbols in the Configuration/Setup Utility program. For information on the function of keys, see *Using Your Personal Computer*.

- 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 information, 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.

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 set the ISA legacy resource information, 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 set the legacy resource information for an installed adapter:

- 1** Start the Configuration/Setup Utility program (see “Starting the Configuration/Setup Utility Program” on page 65).
- 2** Select **ISA Legacy Resources** from the Configuration/Setup Utility menu.
- 3** As needed, select **Memory Resources, I/O Port Resources, DMA Resources, or Interrupt Resources**.
- 4** Set the appropriate resource to **Not available**.
- 5** Remember to save the changes when you exit from the Configuration/Setup Utility program.

If you remove an ISA legacy adapter, you must reset 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 29 and Appendix D, “Interrupt and DMA Resources” on page 79.

Configuring Startup Devices

Startup devices are devices that the computer initiates 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 program (see “Starting the Configuration/Setup Utility Program” on page 65).
- 2** Select **Start Options** from the Configuration/Setup Utility menu.
- 3** Select **First Startup Device**.
- 4** Use the arrow keys to make your selection.
- 5** If necessary, repeat the above steps for **Second Startup Device**, **Third Startup Device**, and **Fourth Startup Device**.
- 6** Remember to save the changes when you exit from the Configuration/Setup Utility program.

Setting Passwords

If you used the CMOS-clear jumper to erase the computer configuration and setup information, you must reconfigure the computer, set the date and time, and reset the power-on or administrator passwords.

Note: For more information on password protection and setting the date and time, see *Using Your Personal Computer*.

To reset the power-on or administrator passwords:

- 1** Start the Configuration/Setup Utility program (see “Starting the Configuration/Setup Utility Program” on page 65).
- 2** Select **System Security** from the Configuration/Setup Utility menu.
- 3** Select **Administrator Password** or **Power-on Password**.
- 4** Follow the instructions to change the password. For more information, see the passwords section of *Using Your Personal Computer*.
- 5** Remember to save the changes when you exit from the Configuration/Setup Utility program.

Note: For information on clearing CMOS memory, see “Erasing Lost or Forgotten Passwords” on page 55.

Appendix A. Tips for Installing SCSI Devices

If your computer is equipped with the Adaptec AHA-2940 *Ultra Wide* adapter, you can add SCSI devices to your computer. Along with the *Adaptec SCSI Documentation* shipped with your computer, use the following information when you are installing SCSI devices.

- 1** Prepare each SCSI device *before* installation.
 - a. Ensure that the proper SCSI identification (ID) number is set. SCSI IDs range from 0 to 15, and the SCSI ID is automatically or manually set. The default setting for the AHA-2940 *Ultra Wide* adapter is 7. If the SCSI device you are installing supports the SCSI Configured AutoMatically (SCAM) protocol, you do not need to manually assign the ID. However, if the device does not support the SCAM protocol, use the documentation that comes with the device to manually set the SCSI ID.
 - b. Ensure that the devices are properly terminated. Devices attached to either end of the SCSI cable must have their terminators enabled. Devices attached to the middle connectors must have their terminators disabled. The termination setting is automatically set for the SCSI adapter. Enabling or disabling the termination of a SCSI device is usually controlled by a jumper or switch on the device. To enable or disable termination, refer to the documentation that comes with the device.
- 2** Use the instructions in Chapter 4, “Working with Adapters and Internal Drives” on page 27 to install internal SCSI devices. These instructions are for the general installation of an internal drive in your computer.
- 3** Ensure that the SCSI cables are set up properly.
 - a. The cables attach only one way to the connectors on the adapter. Refer to the *Adaptec SCSI Documentation* for more information.
 - b. Three cables can connect to the adapter: a 68-pin, internal SCSI cable; a 68-pin, external SCSI cable; and a 50-pin, internal SCSI cable. Your computer is shipped with the 68-pin, *internal* SCSI cable that connects the preinstalled SCSI hard disk drive to the SCSI adapter.

- c. Although the physical specifications of your computer limit the number of internal devices you can install, it is possible to add up to 15 internal and external devices to the SCSI adapter. You must purchase extra cables to add more than four internal SCSI devices to your computer. For information on extra cables, contact your place of purchase or an IBM reseller.
 - d. Restrictions apply to the total length of all cables. For more information, refer to the *Adaptec SCSI Documentation* shipped with your computer.
- 4** If necessary, use the *SCSISelect* utility program to change settings for the AHA-2940 *Ultra Wide* adapter. For information on the default settings and how to use *SCSISelect*, refer to the *Adaptec SCSI Documentation* provided with your computer.

Appendix B. Changing the Battery

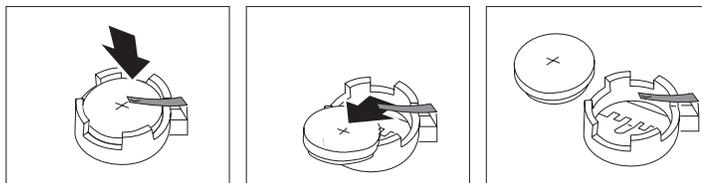
If you replace the original lithium battery with a heavy-metal battery or a battery with heavy-metal components, be aware of the following environmental consideration. Batteries and accumulators that contain heavy metals must not be disposed of with normal domestic waste. They will be taken back free of charge by the manufacturer, distributor, or representative, to be recycled or disposed of in a proper manner.

Before you begin

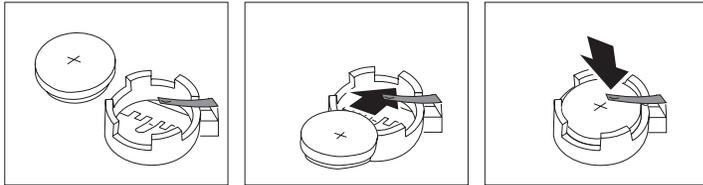
- Read “Electrical Safety” on page 4 and “Handling Static-Sensitive Devices” on page 5.
- Read the instructions that come with the replacement battery.
- Turn off the computer and all other connected devices.
- Disconnect all external cables attached to the computer and then remove the computer cover (see “Disconnecting Cables and Removing the Cover” on page 6 if you need additional information).

For information on locating the battery, see “Identifying Parts on the System Board” on page 12.

- 1** Remove the drive-bracket assembly. For instructions, see “Removing the Drive-Bracket Assembly” on page 14.
- 2** If necessary, remove the adapter installed on the single-slot side of the riser card. For instructions, see “Removing Adapters” on page 33.
- 3** Disconnect any cables from the system board that might impede access to the battery.
- 4** Read “Lithium Battery Notice” on page vi.
- 5** Remove the old battery as shown in the following illustrations.



6 Install the new battery as shown in the following illustrations.



Note: When the computer is turned on for the first time after battery replacement, an error message might be displayed. This is normal after replacing the battery.

What to do next

- To work with another option, go to the appropriate section.
- To complete the replacement, go to Chapter 6, “Completing the Installation” on page 59.
- Use the Configuration/Setup Utility program to set the date and time and any passwords. For information on setting the date and time, refer to *Using Your Personal Computer*. For information on setting passwords, see “Setting Passwords” on page 70.
- Dispose of the old battery as required by local ordinances or regulations.

Appendix C. Installing an Optional Floor Stand

This appendix provides instructions to help you install or remove the optional IBM floor stand.

CAUTION:

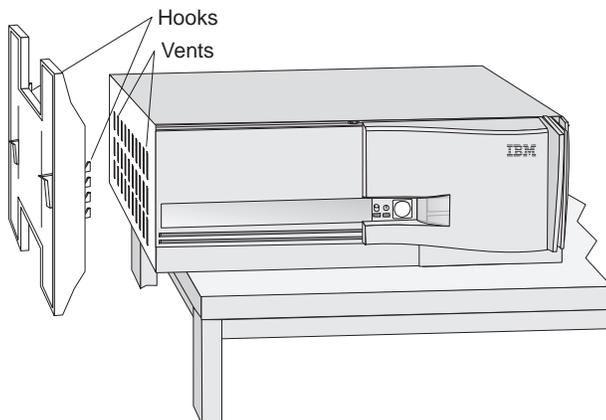
To avoid possible injury while moving or lifting the computer, ask another person to help you.

Installing the Floor Stand

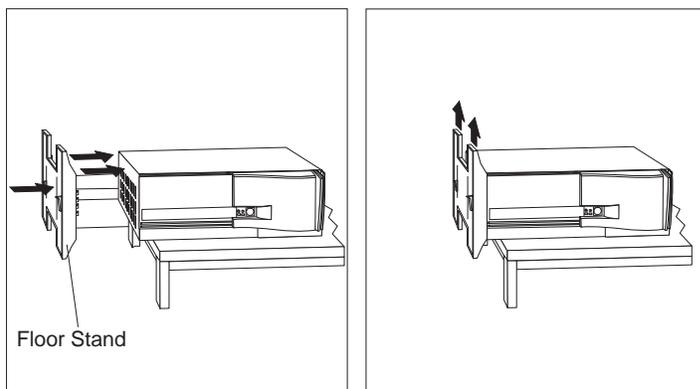
Before you begin

- Remove any media, such as CDs or diskettes, from the computer.
- Turn off the computer and disconnect all external cables and power cords.

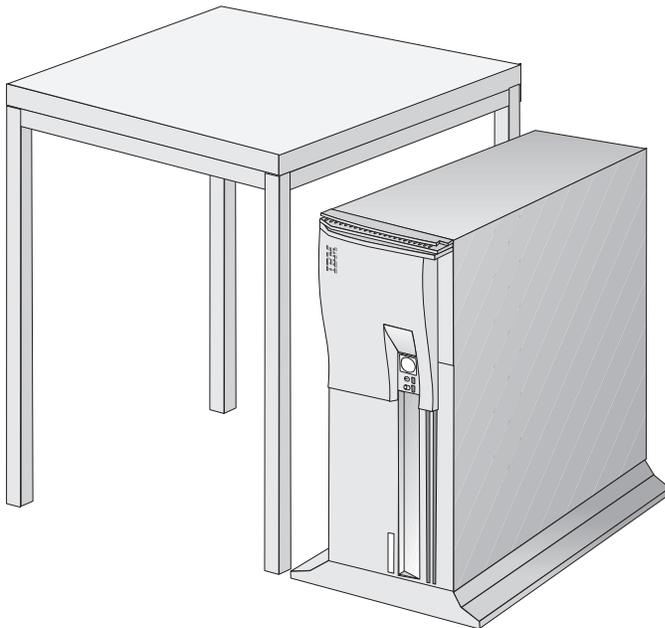
- 1** Position the computer right side up on a desk or table with the left side of the computer (the side with the air vents) facing you.
- 2** Extend the left side of the computer over the edge of the table approximately 40 mm (1.5 in.).
- 3** Align the hooks on the floor stand with the outer vents in the left side of the computer cover.



- 4** Hold the floor stand firmly against the computer and slide the stand upward. You will feel the floor stand snap into place. Check the stand to make sure it is securely attached.

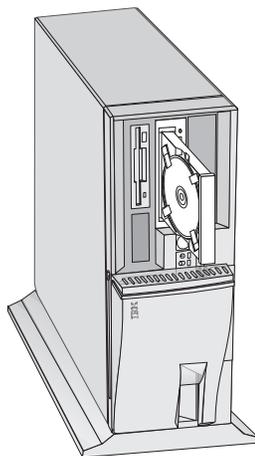


- 5** Carefully turn the computer so that it sits vertically on the floor stand.

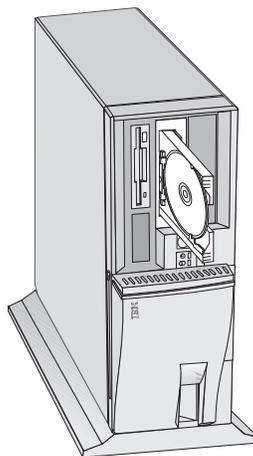


- 6** After vertical placement, secure removable media in CD-ROM and PD/CD-ROM drives by using the clips that each drive provides. The following illustrations show media installed in the loading trays of the two drives.

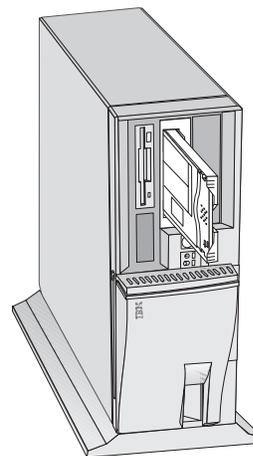
Note: For more information on inserting, securing, and unloading removable media, see *Using Your Personal Computer*.



CD-ROM Drive
with CD-ROM



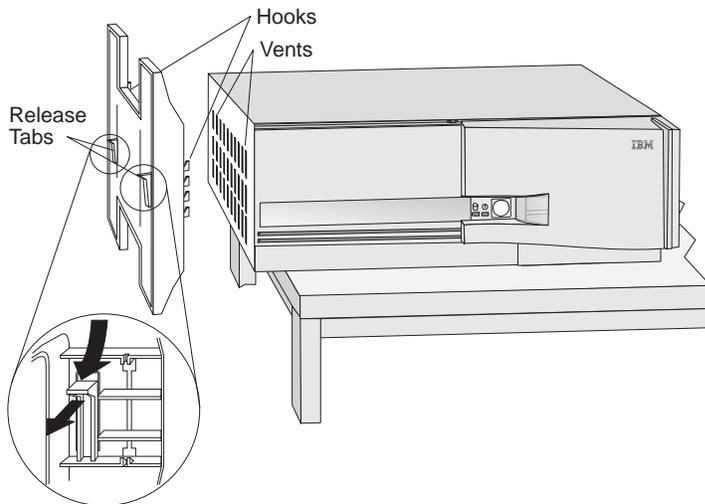
PD/CD-ROM Drive
with CD-ROM



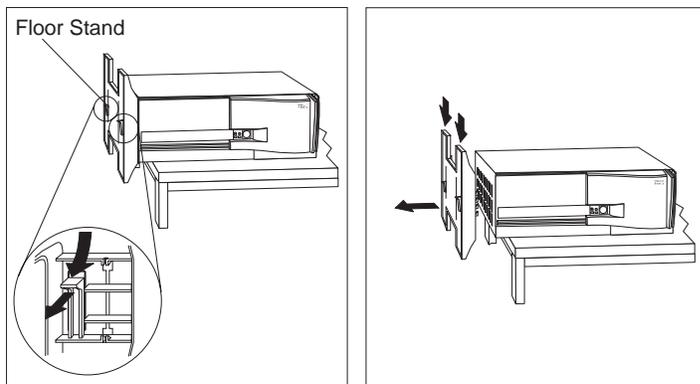
PD/CD-ROM Drive
with PD Cartridge

Removing the Floor Stand

- 1** Position the computer right side up on a desk or table with the left side of the computer (the side with the floor stand) extending over the edge of the table approximately 40 mm (1.5 in.).
- 2** Locate the two release tabs on the bottom of the floor stand.
- 3** Hold the computer firmly against the desk or table, and press both release tabs downward.



- 4** Slide the stand downward and remove it from the computer cover. Be sure to hold onto the floor stand to prevent it from falling after it is released from the cover.



Appendix D. Interrupt and DMA Resources

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

Note: The interrupt and DMA settings might change under configuration control.

Interrupt Request	System Resource
0	Timer
1	Keyboard
2	Interrupt Controller (Timer in APIC mode ⁵)
3 ⁴	Infrared
4 ⁴	Serial Port
5	Available
6	Diskette
7 ⁴	Parallel Port
8	Real Time Clock
9	Available
10	Available
11	Available
12 ⁴	Mouse
13	Coprocessor
14	IDE Drives (0, 1) if installed
15	IDE Drives (2, 3) if installed

⁴ Can be modified to alternative settings or disabled.

⁵ With dual processing, the Advanced Programmable Interrupt Controller (APIC) manages hardware interrupts to the system BIOS. The following interrupts are available only in the dual processing APIC mode.

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)

Table 4. DMA Resources

DMA Request	Data Width	System Resource
0	8 bits	Available
1 ⁶	8 bits	Infrared
2	8 bits	Diskette
3 ⁶	8 bits	Parallel Port
4	–	Available
5	16 bits	Available
6	16 bits	Available
7	16 bits	Available

⁶ Can be modified to alternative settings or disabled.

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