Personal Computer

Installing Options in Your Personal Computer

PC 300 GL (6272 and 6282)

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IBM

> **Note**
>
> Before using this information and the product it supports, be sure to read the general information under Appendix C, "Notices" on page 75.

Second Edition (April 1997)

Contents

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.

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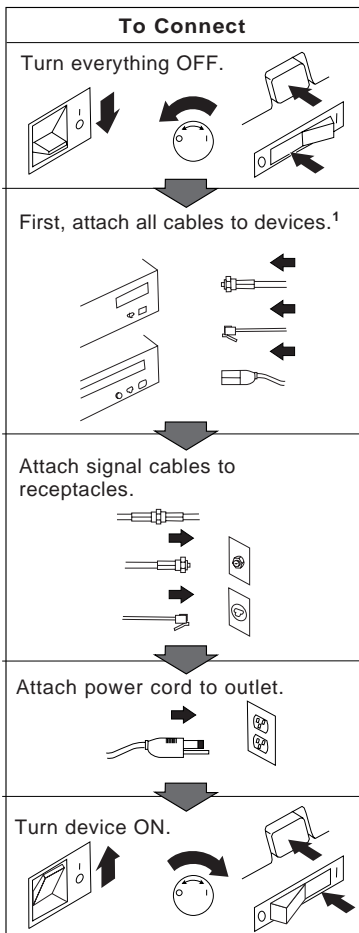
[1] In the U.K., by law, the telephone cable must be connected after the power cord.
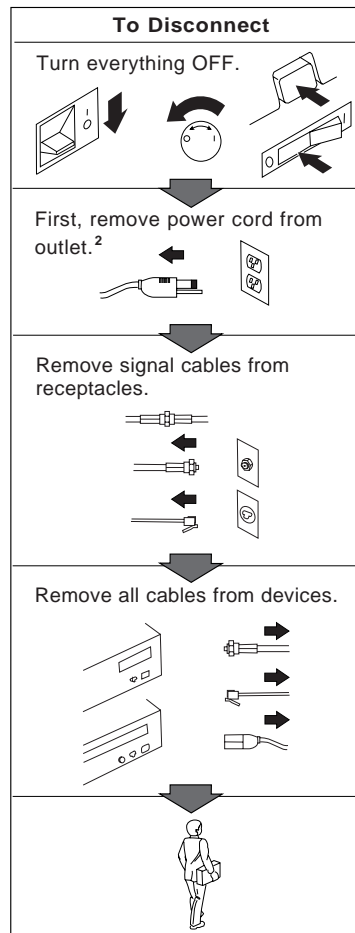
[2] In the U.K., by law, the power cord must be disconnected after the telephone line cable.

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

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

DANGER

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

About This Book

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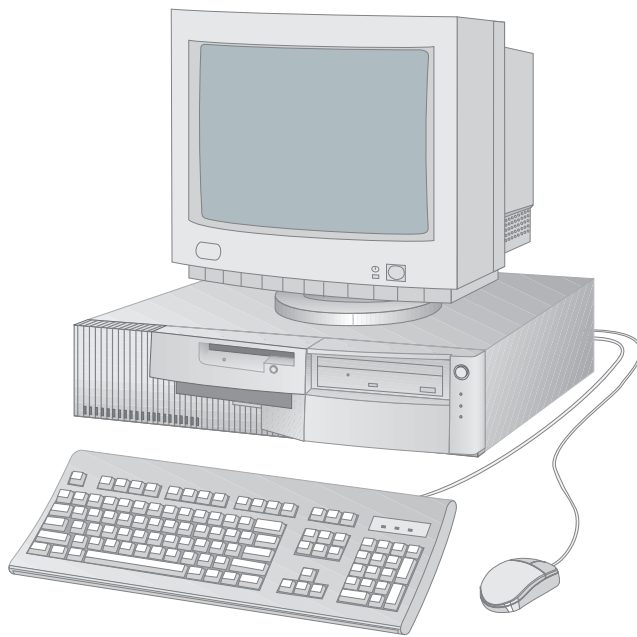
This book provides instructions for installing, removing, and replacing most options. Also, this book contains information to help you decide which options to add to your computer.

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, "Installing Options on the System Board" provides instructions for locating, accessing, and working with options on the system board.

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

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

- Chapter 6, "Working with Security Options" describes features such as erasing lost or forgotten passwords. Information on diskette-write protection is also provided.

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

- Appendix A, "Replacing the Battery" explains how to change your computer battery and the precautions you should take when handling and disposing of the battery.

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

- Appendix C, "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 instructions for configuring, operating, and maintaining your computer. Also, information about the warranty, how to diagnose and solve computer problems, and how to get help and service is included.

- *Understanding Your Personal Computer*
  This online publication (provided only with computers that have 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 *Using Your Personal Computer.*

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

- *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. Both publications can be found on the Internet at http://www.pc.ibm.com/cdt or can be ordered from IBM. To purchase a copy, refer to the section on ordering publications in the "Getting Help, Service, and Information" chapter in *Using Your Personal Computer.*

- *Hardware Maintenance Manual*
  This publication contains information for trained service technicians.

- *Technical Information Manual*
  This publication contains information for individuals who want to know more about the technical aspects of their computer.

Identifying Your Computer

In most instances, the best way to identify your computer is by the model/type number. The model/type number indicates the various features of the computer, such as the type of microprocessor or whether the computer is a desktop or minitower. You can find this number on the small label on the front of your computer. An example of a model/type number is *6282-54A*.

Throughout this book, however, your computer is identified by the number of drive bays offered with these models. If your computer has three drive bays, it is referred to as the 3-bay design. If your computer has four drive bays, it is referred as the 4-bay design. These following naming conventions are used only where it is appropriate. Instructions without these naming conventions apply to all computer models.

3-Bay Design

With the cover on, bay 2 in the 3-bay design is not visible. This bay is intended for a hard disk drive, which does not have accessible media such as a CD-ROM drive or diskette drive. The 3-bay design has two expansion slots for adapters, as shown in the rear view below.
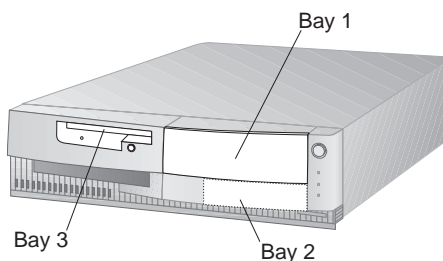
Front View
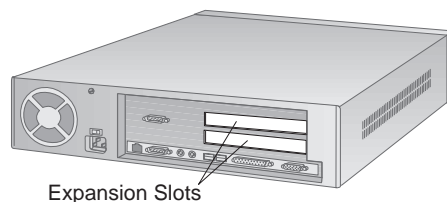
Rear View

4-Bay Design

With the cover on, bay 4 in the 4-bay design is not visible. This bay is intended for a hard disk drive, which does not have accessible media such as a CD-ROM drive or diskette drive. The 4-bay design has four expansion slots for adapters, as shown in the rear view below.
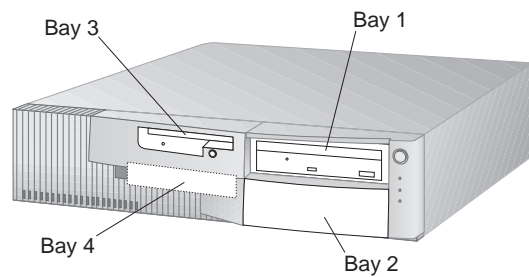
Front View
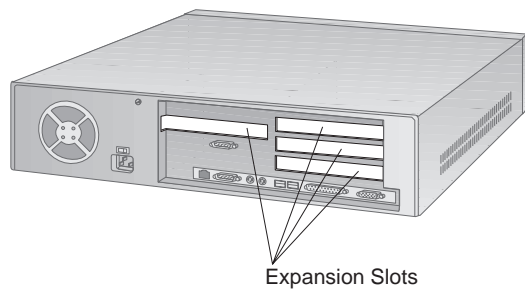
Rear View

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 upgrade
  - Video memory upgrade
  - Level 2 (L2) cache upgrade
  - Microprocessor upgrade
  - Switches for diskette-write protection
  - Jumper for erasing lost or forgotten passwords
  - Battery replacement

- Adapters

  - Industry standard architecture (ISA) adapters
  - Peripheral component interconnect (PCI) adapters

- Internal drives

Other options are also available for your computer. For example, you can place your computer vertically on an optional floor stand or wall mount. Also, for security purposes, you can add an optional U-bolt. The U-bolt allows you to secure the computer with a cable and lock. Installation instructions come with these options.

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 place of purchase or IBM reseller.

Tools Required

To install or remove options in your computer, you will need a flat-head or Phillips 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 locating the options you want to install or remove.

Disconnecting Cables and Removing the Cover

> **Before you begin**
>
> - Read "Electrical Safety" on page 3 and "Handling Static-Sensitive Devices" on page 4.
> - Remove any media (diskettes, compact discs, or tapes) from the drives, and then turn off all attached devices and the computer. For more information on removing media, see *Using Your Personal Computer.*

1 For models equipped with a cover lock, make sure it is unlocked.

2 Disconnect all cables attached to the computer; this includes power cords, cables or lines connected to the input/output (I/O) ports.

3 Remove the cover screw from the rear of the computer. Slide the cover approximately 19 mm (0.75 in.) toward the front of the computer, and lift it off. The following illustration shows the cover being removed from a 4-bay design.

Cover Screw
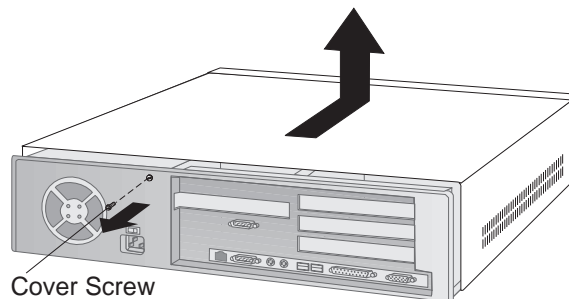
> **Note:** Although your computer might differ from the one shown above, the removal of the cover works the same for the different computer models.

Locating Components

The following information helps you locate components and serves as a reference when you need to install options. The illustrations below show the internal views of both models as seen from the front. For information on removing the cover, see "Disconnecting Cables and Removing the Cover" on page 5.
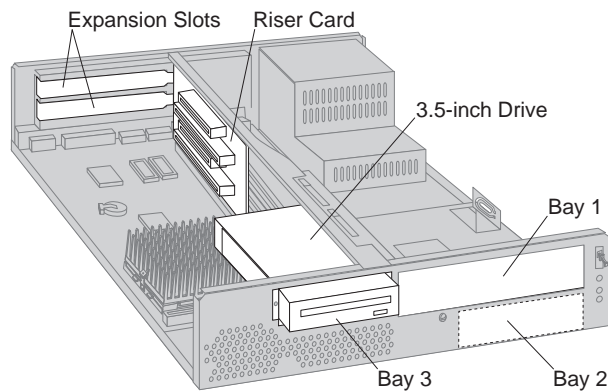
3-Bay Design
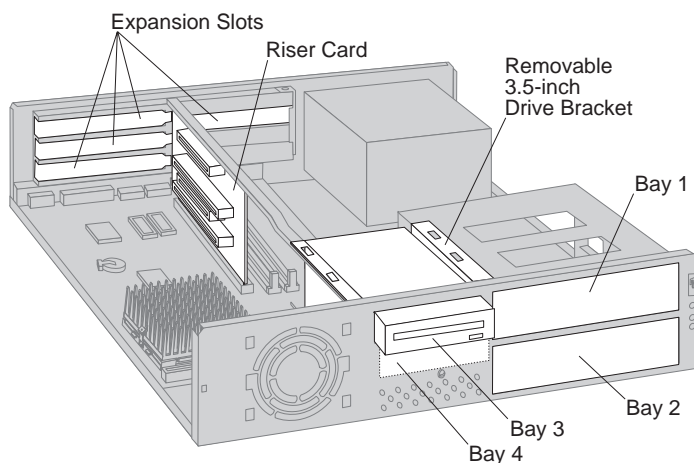
4-Bay Design

Your computer comes with a 3.5-inch diskette drive; most computers come with a hard disk drive. If your computer comes with a CD-ROM drive, it is installed in bay 1; if your computer comes with an audio adapter, it is installed on the riser card.

Identifying Parts on the System Board

The system board, also called the *planar* or *motherboard*, is the main circuit board in your computer. It provides basic computer functions and supports a variety of devices that are preinstalled 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.

|	
1	Monitor connector
2	Parallel port connector
3	USB connector
4	USB connector
5	Mouse connector
6	Keyboard connector
7	Serial port A connector (A second serial port (B) connector is located above this panel.)
8	Ethernet connector (optional feature)
9	Serial port B header
10	Main power connector
11	CMOS-clear (password) jumper
12	Diskette drive connector
13	Primary EIDE connector
14	Secondary EIDE connector
15	Hard disk drive and power LED connector
16	System memory connectors
17	Switches for microprocessor speed and diskette write protection
18	3.3 V power connector
19	Fan connector
20	LAN activity LED
21	L2-cache connector
22	Microprocessor connector
23	Riser card connector
24	Battery
25	Video memory connectors
26	Wake on LAN connector
27	Wake on ring/modem connector
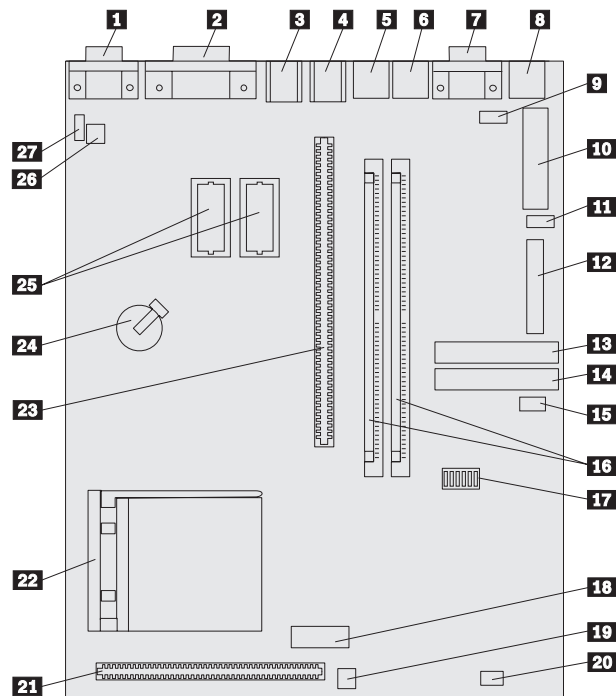
Note: An illustration of the system board and additional information are provided on a label found on the underside of the computer cover.

Identifying 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*.[1]

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 has a preinstalled audio adapter, other connectors appear above the panel. The three circular connectors are audio connections for devices such as powered speakers or a microphone. The game/MIDI (musical instrument digital interface) port is used for connecting game controls or other devices.
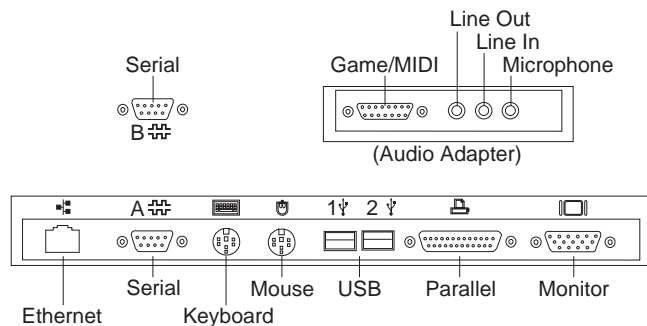
Note: Your computer might not have all the connectors shown above.

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

Chapter 3. Installing Options on the System Board

Note: Because most components on the system board are the same in both the 3-bay design and the 4-bay design, the procedures in this chapter apply to both designs.

This chapter provides information about the following system board options:

- System memory
- Video memory
- L2 cache
- Microprocessor upgrade

Before you begin

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

- Read "Electrical Safety" on page 3 and "Handling Static-Sensitive Devices" on page 4.
- 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.

Installing System Memory

You can add memory to your computer to increase system performance. Your computer has two connectors for installing system-memory modules. The maximum amount of system memory your computer supports is 128 MB.

The memory modules your computer uses are 168-pin DIMMs (dual inline memory modules). The preinstalled DIMMs that come with your computer are SDRAM (synchronous dynamic random access memory) modules. The computer comes with two connectors on the system board for adding or replacing system memory. You can add extra memory or replace existing memory with other SDRAM modules or EDO (extended data out) DRAM modules.

When installing or replacing system memory:

- Use only 3.3 volt, unbuffered, 168-pin DIMMs (SDRAM or EDO DRAM)
- Only nonparity modules are supported.
- Any sequence of module sizes is allowed.
- A mix of SDRAM and EDO modules is supported.
- Modules have a maximum height of 3.175 cm (1.25 in.). Larger modules might prevent the use of the bottom expansion slot on the riser card.
- SIMMs (single inline memory modules) are not supported.


Before you begin

- Read "Electrical Safety" on page 3 and "Handling Static-Sensitive Devices" on page 4.
- Read the instructions that come with the new system memory module.
- Turn off the computer and all other connected devices.
- Disconnect the cables attached to the computer and remove the computer cover (see "Disconnecting Cables and Removing the Cover" on page 5).
- Locate the system memory connectors on the system board. Refer to "Identifying Parts on the System Board" on page 7.
- If an adapter impedes your access to the system memory connectors, remove it. For more information, see "Removing an Adapter" on page 32.
- If you need to remove a module, go to page 12.

To install system memory:

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.
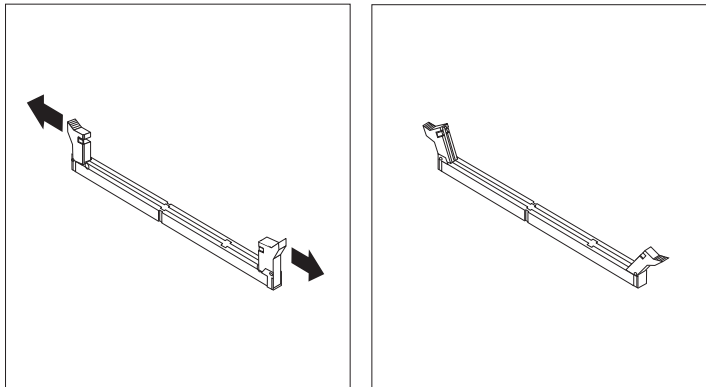
2 Touch the static-protective package containing the system memory module to any *unpainted* metal surface in the computer, and then remove the module from the package.

3 Position the module above the connector so that the two notches on the bottom edge of the module align properly with the connector.

4 Firmly push the module straight down into the connector until the retaining clips pop up and snugly fit around both ends of the module.
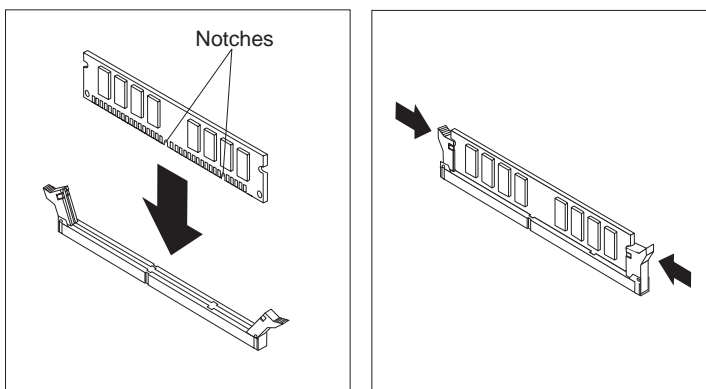
5 Go to the device-record form in *Using Your Personal Computer* and record this installation.

What to do next

- If you removed an adapter and want to reinstall it, go to "Installing an Adapter" on page 28.
- To work with another option, go to the appropriate section.
- To complete the installation, go to Chapter 7, "Completing the Installation" on page 62.

To remove system memory:

1 At both ends of the connector, push outward on the retaining clips until the module is loosened. Do not attempt to loosen or remove the module without releasing the retaining clips.

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

2 Lift the module out of the connector.

3 Store the module in a static-protective package.
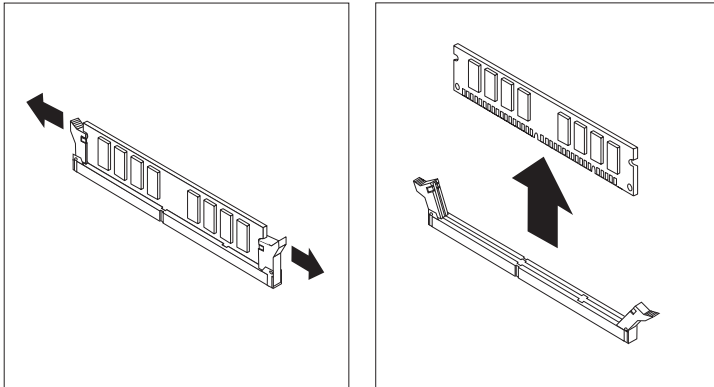

What to do next

- If you removed an adapter and want to reinstall it, go to "Installing an Adapter" on page 28.
- To work with another option, go to the appropriate section.
- To complete the installation, go to Chapter 7, "Completing the Installation" on page 62.

Installing Video Memory

The maximum amount of video memory the system board supports is 2 MB. Some models come with 2 MB of video memory already installed, and do not require a video memory upgrade.

If your computer came with 1 MB of preinstalled video memory, you can install additional video memory modules to increase system performance and display modes. A video memory module kit designed for the system board comes in increments of 1 MB. You can order this kit from IBM. For the latest information, contact an IBM representative by calling one of the phone numbers in "Available Options and Features" on page 2.

Tip

If you are uncertain of the amount of video memory installed in your computer, perform the following procedures:

1. Turn on your computer and start the Configuration/Setup Utility program (see "Starting the Configuration/Setup Utility Program" on page 67).

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

3. Select **Video Setup**.

4. Look under **Video Memory**. If the value is 1024 KB, your computer has 1 MB of video memory and can accept the upgrade. If the value reads 2048, the system board is already equipped with the maximum amount of video memory and an upgrade is not needed.

5. Exit the Configuration/Setup Utility program (see "Changing Settings and Exiting" on page 69).
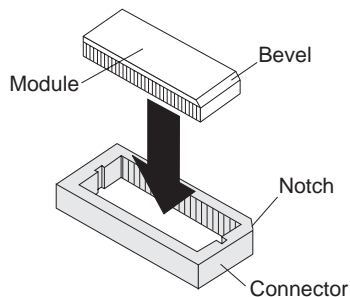

To install video memory:

Before you begin

- Read "Electrical Safety" on page 3 and "Handling Static-Sensitive Devices" on page 4.
- 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 5).
- Locate the video memory module connectors on the system board. Refer to "Identifying Parts on the System Board" on page 7.
- If an adapter impedes your access to the video memory module connectors, remove it. For more information, see "Removing an Adapter" on page 32.

1 Touch the static-protective package containing the memory module to any *unpainted* metal surface in the computer, and then remove the module from the package.

2 Position the module above the connector so that any defining markings on the module are correctly aligned with the notch on the connector.

> **Note:** The markings on video memory modules vary depending on the manufacturer. Your module might have a small circle in one corner, a beveled edge, or an indented, half-circle at the end nearest the notch. The following illustration shows a module with a beveled edge.

3 Insert the module into the connector until it is fully seated.

Chapter 3. Installing Options on the System Board **15**

4 Repeat steps 1 through 3 to install another memory module.

5 Go to the device-record form in *Using Your Personal Computer* and record this installation.

What to do next

- If you removed an adapter and want to reinstall it, go to "Installing an Adapter" on page 28.
- To work with another option, go to the appropriate section.
- To complete the installation, go to Chapter 7, "Completing the Installation" on page 62.
- You must reinstall video device drivers after upgrading or changing memory. These device drivers are on the *Ready-to-Configure CD* that comes with your computer.


Installing L2 Cache

Your computer comes standard with 256 KB of L2 cache. You can replace the module to increase the L2 cache size to 512 KB. For the latest information on an L2 cache option, contact an IBM representative by calling one of the phone numbers in "Available Options and Features" on page 2.

Note: Modules must not exceed a height of 2.90 cm (1.14 in.) or a width of 11.05 cm (4.35 in.).


Before you begin

- Read "Electrical Safety" on page 3 and "Handling Static-Sensitive Devices" on page 4.
- 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 5).
- Locate the L2 cache connector on the system board. Refer to "Identifying Parts on the System Board" on page 7.
- If you have the 3-bay design computer, remove the 3.5-inch drive bracket. For more information, see steps 1 and 2 on page 45.
- If an adapter impedes your access to the L2 cache connector, remove it. For more information, see "Removing an Adapter" on page 32.

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1 Remove the installed module by lifting it straight up.
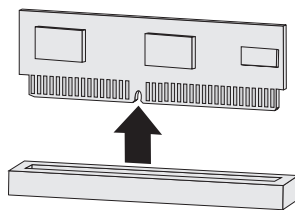
2 Touch the static-protective package containing the module to any *unpainted* metal surface in the computer, and then remove the module from the package.

3 Align the notch on the module with the notch on the connector. Insert the module into the connector until it is fully seated.
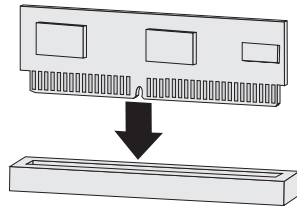
4 Go to the device-record form in *Using Your Personal Computer* and record this installation.

What to do next

- Store the removed L2 cache module in a static-protective package.
- If you removed the 3.5-inch drive bracket, reinstall it. For more information, see steps 6 and 7 on page 46.
- If you removed an adapter, reinstall it. For more information, refer to "Installing an Adapter" on page 28.
- To work with another option, go to the appropriate section.
- To complete the installation, go to Chapter 7, "Completing the Installation" on page 62.

Replacing the Microprocessor

Your computer comes with an Intel Pentium microprocessor or an Intel Pentium microprocessor with MMX technology. Microprocessor upgrades might be available. 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 microprocessor, use the instructions that come with the upgrade along with the instructions in this publication.

CAUTION:
The microprocessor and heat sink will be hot if the computer has been running. To avoid the possibility of a burn, if the computer has been on, let the microprocessor and heat sink cool for 10 minutes before continuing with the procedure.

Before you begin

- Read "Electrical Safety" on page 3 and "Handling Static-Sensitive Devices" on page 4.
- Read the instructions that come with the new microprocessor.
- Obtain a static protective package in which to store the old 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 5).
- Locate the microprocessor on the system board. Refer to "Identifying Parts on the System Board" on page 7.

To replace the microprocessor:

1 If you have the 3-bay design, remove the 3.5-inch drive bracket. For more information, see steps 1 and 2 on page 45.

2 If an adapter impedes your access to the microprocessor, remove it. For more information, see "Removing an Adapter" on page 32.

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

3 The slots on the ends of the clamp hook over the tabs found on the microprocessor connector. Remove the clamp by pressing down on it and releasing the tabs on each end of the clamp.
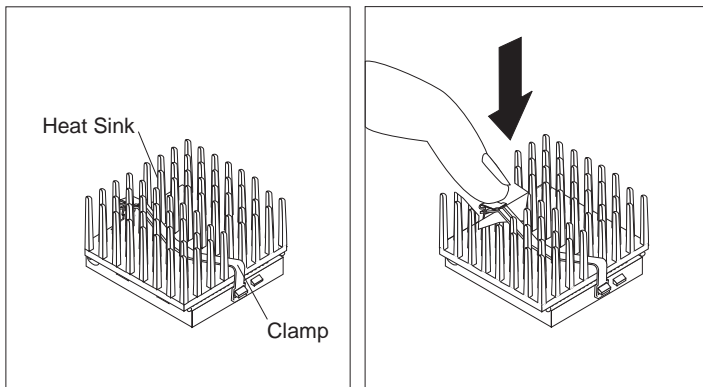

Note: A thermal grease is used to seal the heat sink to the microprocessor and to maintain safe operating temperatures. If the heat sink is permanently cemented to the microprocessor, you can remove both the heat sink and the microprocessor after you lift the lever in step 5. Also, be careful not to get the grease on your skin. If the grease touches your skin, wash the area with soap and water.

4 Remove the heat sink by sliding it slightly to one side and then lifting it up. (Sliding the heat sink loosens the thermal grease.)

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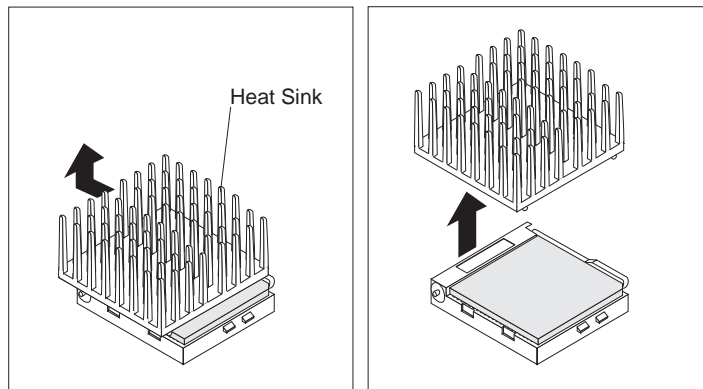
5 Release the lever on the side of the microprocessor connector and lift it all the way up. This releases the microprocessor. Lift the microprocessor out of the socket.


Lever
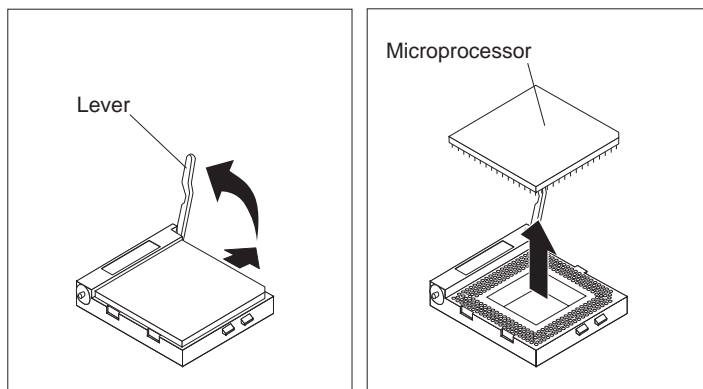
Microprocessor

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

7 Touch the static-protective package containing the new microprocessor to any *unpainted* metal surface in the computer, and then remove the new microprocessor.
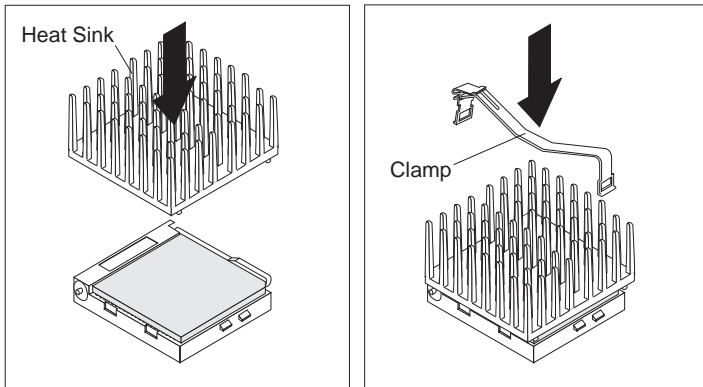
8 Align the pins of the new microprocessor with the socket and insert the microprocessor until it is properly seated.

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.
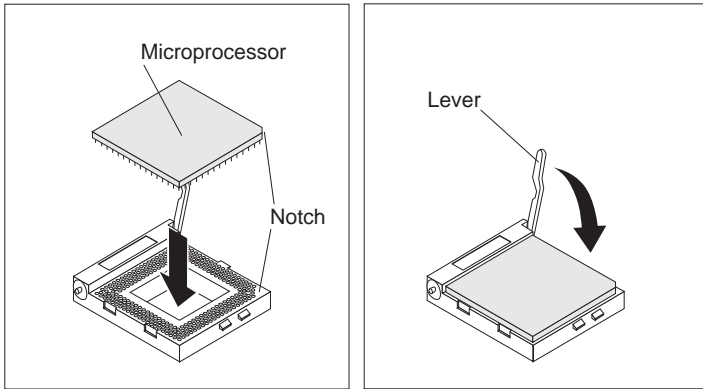
9 Replace the heat sink and clamp.

10 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 7. 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

- If you removed the 3.5-inch drive bracket, reinstall it. For more information, see steps 6 and 7 on page 46.
- To work with another option, go to the appropriate section.
- To complete the installation, go to Chapter 7, "Completing the Installation" on page 62.

Chapter 4. Working with Adapters

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

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 26.

Important

- The following size restrictions apply to new adapters:
  - In the 3-bay design, adapters longer than 17.78 cm (7.0 in.) cannot be installed.
  - In the 4-bay design, adapters longer than 17.78 mm (7.0 in.) cannot be installed in expansion slot 1. Also, adapters longer than 20.32 cm (8.0 in.) cannot be installed in expansion slot 4.
- If you have the 3-bay design, the power supply does not support 25 W adapters installed in both expansion slots.
- You can install a graphics (video) adapter in your computer. If the graphics adapter is an ISA adapter, the base ROM (read-only memory) is located at C0000H.

  Each time the computer is started, it searches for a graphics adapter installed in either an ISA or PCI slot. If the computer detects a graphics adapter, the video subsystem integrated in the system board is not enabled. No jumpers on the system board need to be changed if a graphics adapter is installed.
- If you want to install a non-graphics ISA adapter, ensure that the base ROM address is not located at C0000H. Otherwise, the computer will recognize this as a graphics adapter and will not enable the video subsystem.


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. The data path is 16-bits wide for the ISA-expansion slots and 32-bits wide for the PCI-expansion slots.

The riser card in the 3-bay design has two shared slots that provide access to the ISA and PCI buses. You can only install one adapter in each shared slot; thus the 3-bay design accommodates up to two adapters plugged into the riser card. The riser card in the 4-bay design has two shared slots, along with one slot dedicated to the ISA bus and one slot dedicated to the PCI bus. The 4-bay design accommodates up to four adapters plugged into the riser card. The following illustrations show the riser cards by model.
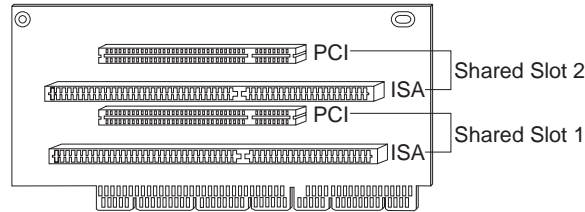
3-Bay Design
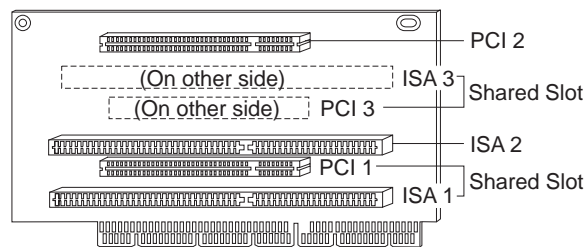
4-Bay Design

Note: On the 3-bay design riser card, each PCI connector shares a slot with the ISA connector directly below it. On the 4-bay design riser card, one pair of shared connectors is on a side by itself. For the other pair of shared connectors, the PCI connector shares a slot with the ISA connector directly below it.

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 ISA 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.

Many adapters designed for ISA slots are Plug and Play devices; ISA adapters that are not Plug and Play are called legacy adapters.

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.*

Important

If your model is equipped with an integrated Ethernet controller, and you do not plan to use it, disable this feature under the Ethernet Support option in the Configuration/Setup Utility program menu. Disabling Ethernet Support frees up system resources that can be used by other devices. For more information on disabling Ethernet Setup, 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.

Notes:

1. If you are installing both legacy and Plug and Play adapters, install the legacy adapters first, and then install the Plug and Play adapters. Plug and Play adapters will configure around the resources used by legacy adapters.

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

For information on using the Configuration/Setup Utility program when configuring ISA legacy adapters see "Configuring an ISA Legacy Adapter" on page 70 or refer to *Using Your Personal Computer*. For more information on error messages from resource conflicts, see *Using Your Personal Computer*.

Installing an Adapter

Before you begin

- If the adapter you are installing is Plug and Play compatible, continue with the next step. If the adapter you are installing is not Plug and Play compatible, use the Configuration/Setup Utility program to set resource information. For more information, see "Legacy Adapters" on page 27.
- Read "Electrical Safety" on page 3 and "Handling Static-Sensitive Devices" on page 4.
- Read the instructions that come with the new adapter; determine if it must be installed in an ISA or PCI slot.
- 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 5).
- If you are installing an adapter in the 3-bay design, or if you are installing an adapter in expansion slot 1, 2, or 3 in the 4-bay design, go to "Installing an Adapter in Expansion Slot 1, 2, or 3." If you are installing an adapter in expansion slot 4 on the 4-bay design, go to "Installing an Adapter in Expansion Slot 4" on page 30


Installing an Adapter in Expansion Slot 1, 2, or 3

Note: The following instructions are for reference only. The instructions for installing an adapter in expansion slot 1 or 2 works the same in both the 3-bay design and 4-bay design.

1 Remove the screw and cover for the appropriate expansion slot.
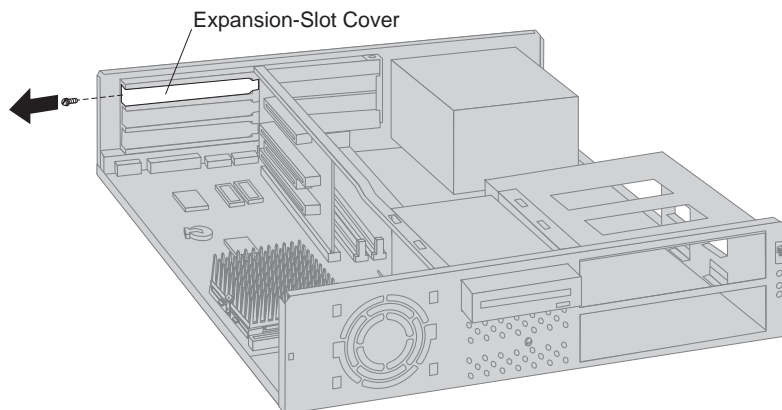
Expansion-Slot Cover

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

3 Install the adapter into the appropriate slot on the riser card. If a component in the computer or on the adapter interferes with the installation, use another slot.
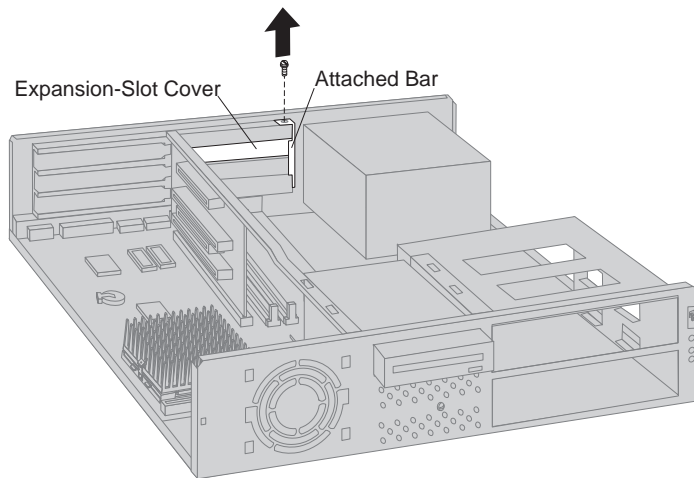

Connector
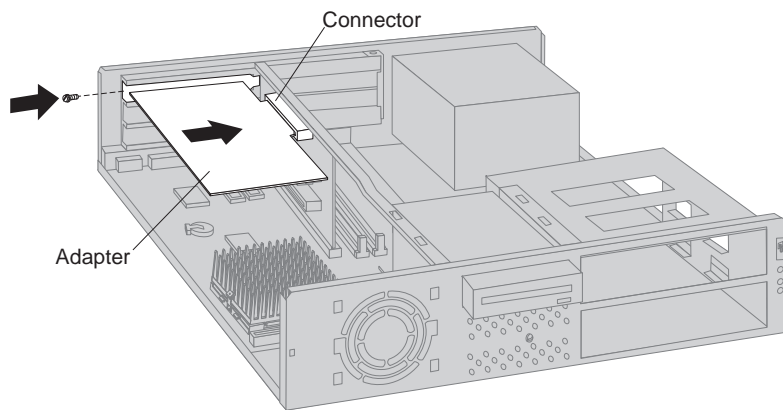
Adapter

4 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 7, "Completing the Installation" on page 62.

Installing an Adapter in Expansion Slot 4

1 Remove the screw, attached bar, and the expansion-slot cover.

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

3 Install the adapter into the appropriate ISA or PCI slot on the riser card.

   Note: If a component in the computer or on the adapter interferes with the installation, use another slot.
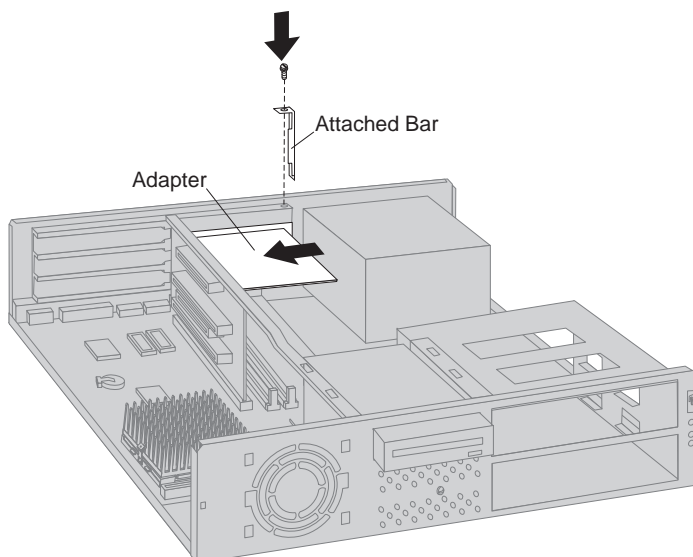
4 Go to the device-record form in *Using Your Personal Computer* and write the
adapter name next to the slot into which you installed it.

What to do next

- To work with another option, go to the appropriate section.
- To complete the installation, go to Chapter 7, "Completing the Installation"
  on page 62.

Removing an Adapter

Note: If you are removing an adapter to gain access to another computer component, remember the slot position from which you removed the adapter. You will need this information to reinstall the adapter.

Before you begin

- Read "Electrical Safety" on page 3 and "Handling Static-Sensitive Devices" on page 4.
- 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 5).

Removing an Adapter from Expansion Slot 1, 2, or 3

Note: The following instructions are for reference only. The instructions for removing an adapter from expansion slot 1 or 2 work the same in both the 3-bay design and 4-bay design.

1 Locate the adapter and remove the screw.

2 Remove the adapter and insert it into a static-protective package. The following illustration shows an adapter being removed from a PCI slot.
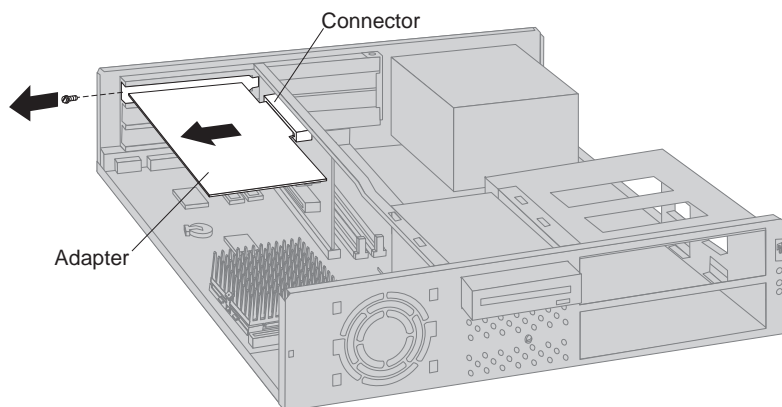
3 If you are not installing another adapter in this slot, install an expansion-slot cover. The following illustrations show the expansion-slot cover being installed.
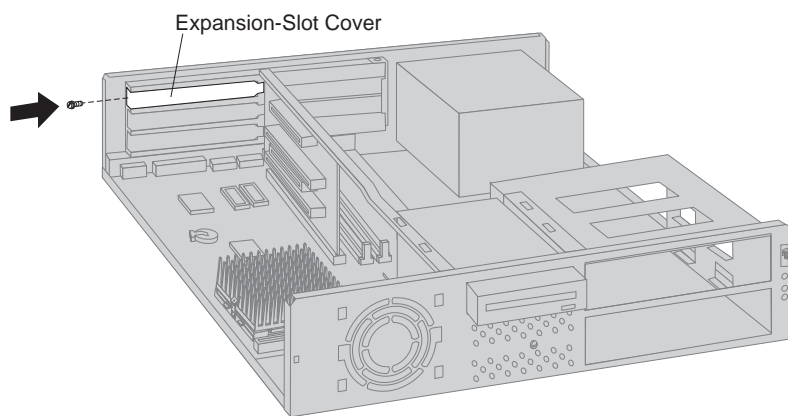
Expansion-Slot Cover

4 Go to the device-record form in *Using Your Personal Computer* and delete the name of the adapter you removed.
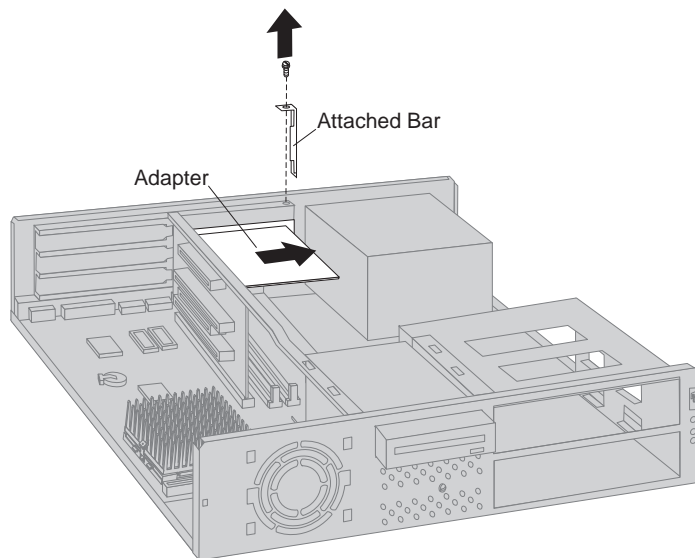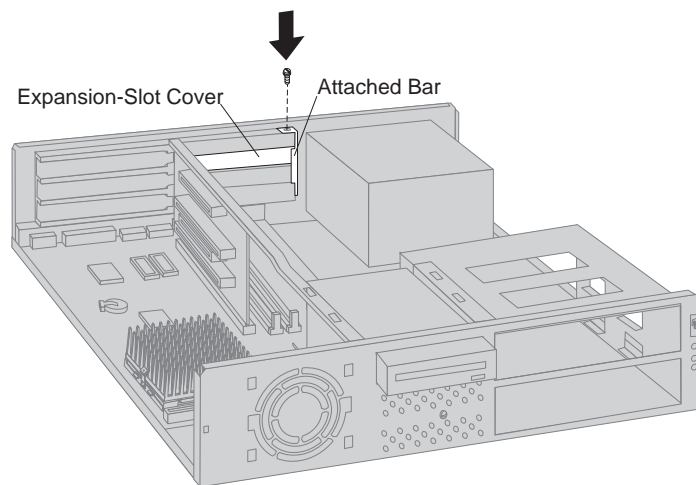
Note: Removing an adapter frees up system resources. If you remove an ISA legacy adapter, you must use the Configuration/Setup Utility program to set the previously used resources to [**Available**]. For more information, see Chapter 7, "Completing the Installation" on page 62.

What to do next

- To work with another option, go to the appropriate section.
- To complete the installation, go to Chapter 7, "Completing the Installation" on page 62.

Removing an Adapter from Expansion Slot 4

1 Remove the screw and the attached bar, then remove the adapter. The
following illustration shows an adapter being removed.

Attached Bar

Adapter

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

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

Expansion-Slot Cover   Attached Bar

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 7, "Completing the Installation" on page 62.

What to do next

- To work with another option, go to the appropriate section.
- To complete the installation, go to Chapter 7, "Completing the Installation" on page 62.

Chapter 5. Working with 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. Examples of the different drives available for your computer are diskette drives, hard disk drives, CD-ROM drives, and tape 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. Bays are part of drive brackets that house the internal drives. The 3-bay design has two drive brackets: one houses a 5.25-inch and a 3.5-inch drive, and the other houses a 3.5-inch drive. The 4-bay design also has two drive brackets: one houses two 5.25-inch drives, and the other houses two 3.5-inch drives.

Note: A conversion kit can be used to mount a 3.5-inch drive in a 5-25-inch bay. For more information, see your place of purchase or IBM reseller.

Your computer comes with internal drives already installed. In the 3-bay design, a hard disk drive is preinstalled in bay 2, and a diskette drive is preinstalled in bay 3. In the 4-bay design, a diskette drive is preinstalled in bay 3, and a hard disk drive is preinstalled in bay 4.

The following illustrations show the location of the drive bays in your computer.
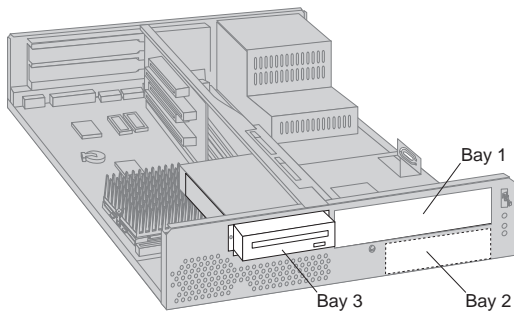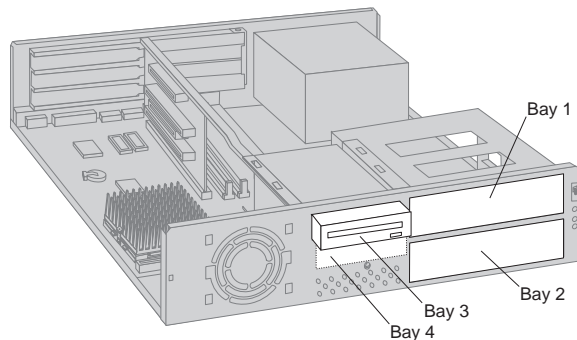
3-Bay Design   4-Bay Design

Drive Specifications

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

Table 1. Drive Specifications for the 3-Bay Design

Bay	Drives[2]	Max. Height	Min. Height
1	CD-ROM drive PD/CD-ROM drive CD-R drive Tape drive 5.25-inch diskette drive 3.5-inch diskette drive [3]	4.06 cm. (1.6 in.)	2.54 cm. (1.0 in.)
2	Hard disk drive	2.54 cm. (1.0 in.)	—
3	3.5-inch diskette drive	2.54 cm. (1.0 in.)	—

Table 2. Drive Specifications for the 4-Bay Design

Bays	Drives[2]	Max. Height	Min. Height
1 and 2	CD-ROM drive PD/CD-ROM drive CD-R drive Tape drive 5.25-inch diskette drive 3.5-inch diskette drive [3]	4.06 cm. (1.6 in.)	2.54 cm. (1.0 in.)
3	3.5-inch diskette drive	2.54 cm. (1.0 in.)	—
4	Hard disk drive	2.54 cm. (1.0 in.)	—

---

[2] Drives that require removable media (diskettes, tapes, or CDs) must be installed in bay 1 in the 3-bay design and bay 1 or 2 in the 4-bay design.

[3] To properly mount a 3.5-inch drive into the 5.25-inch drive bracket, you must use a conversion kit. For more information, see your place of purchase or IBM reseller.

Recognizing Power and Signal Cables

Your computer uses cables to connect internal drives to the power supply and system board.

Power Cables: These cables connect internal 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.

Power connectors are labelled as P*x*. When connecting an internal drive, you must use power connector P3 for a diskette drive, or P4, P5, or P6 for another type of internal drive. Use the following table to determine the points of connection for other power cables provided with your computer.

Table 3. Power Cables

Connector	Point of Connection
P1	Main power connector on the system board (P1 and P2 are plugged juxtaposed into this connection)
P2	Main power connector on the system board (P1 and P2 are plugged juxtaposed into this connection)
P3	3.5-inch diskette drive
P4	Internal drive
P5/P6	Internal drive
P9[4]	Auxiliary 5 volt connector on the system board
P10	3.3 volt connector on the riser card
P11	3.3 volt connector on the system board
P12[4]	Auxiliary 5 volt connector for an adapter with Wake on LAN capabilities

Note: Refer to "Identifying Parts on the System Board" on page 7 to identify the points of connection on the system board.

---

[4] Power connectors P9 and P12 can be interchanged. Only one of these connectors comes connected to the system board.

Signal Cables: These flat, wide cables connect internal 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 EIDE connector on the system board.

  Note: If you have the 3-bay design and a 5.25-inch drive is installed, you must remove this drive to connect or disconnect cables to the primary or secondary EIDE connectors. For more information, see "Removing a 5.25-Inch Drive from the 3-Bay Design" on page 49.

- The narrower signal cable differs by mechanical design:

  - In the 3-bay design, this cable has two connectors: one for attaching to the diskette-drive connector on the system board, and one for attaching an internal diskette drive.

  - In the 4-bay design, this 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 7.

The following are some important points to remember when connecting power and signal cables to internal drives:[5]

- The diskette drive and hard disk drive (standard in most models) that are preinstalled in your computer come with power and signal cables attached. Also, if your computer comes with a CD-ROM drive, cables are attached. If you replace any drives, it is important to remember which cables attached to which drives.

- 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.

---

[5] The maximum number of installed internal drives depends on the mechanical design of your computer. Refer to "Drive Specifications" on page 37 for more information.

Also, if a CD-ROM drive and hard disk drive are installed, ensure that these two drives are attached to the same cable, with the hard disk drive designated as the master device and the CD-ROM drive as the secondary device.

- 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 emanating from the computer.

- 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

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

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

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

Installing a 3.5-Inch Drive in the 3-Bay Design

Note: Since the 3-bay design comes with the internal drives already installed in both 3.5-inch drive bays, this section includes instructions for the removal of a drive and replacing it with a new drive.

Before you begin

- Read "Electrical Safety" on page 3 and "Handling Static-Sensitive Devices" on page 4.
- 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 5).
- Determine which drive bay you will use. If you want to use bay 2, go to "Installing a Drive in Bay 2" on page 42. If you want to use bay 3, go to "Installing a Drive in Bay 3" on page 45. To locate the different bays, see page 36.

Installing a Drive in Bay 2

1 Do one of the following:

a. If a drive is not present in bay 1, disconnect the cables attached to the drive in bay 2. Next, remove the drive bracket by removing the screws at the front and sliding the bracket backwards to clear the alignment slots. Lift the bracket from the computer.
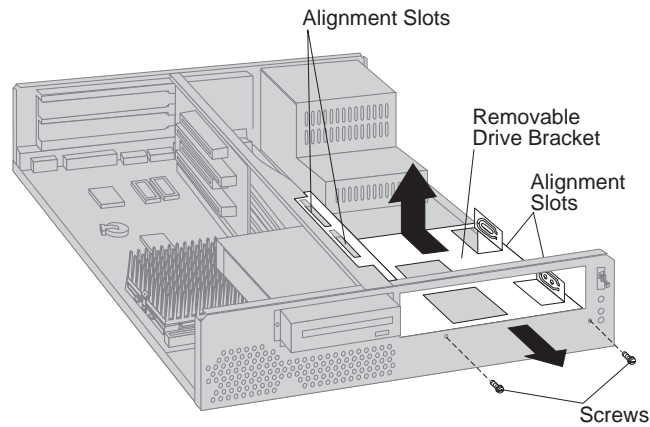
b. If a drive is present in bay 1, disconnect the cables attached to that drive. Next, remove the drive bracket by removing the screws at the front and sliding the bracket backwards to clear the alignment slots.
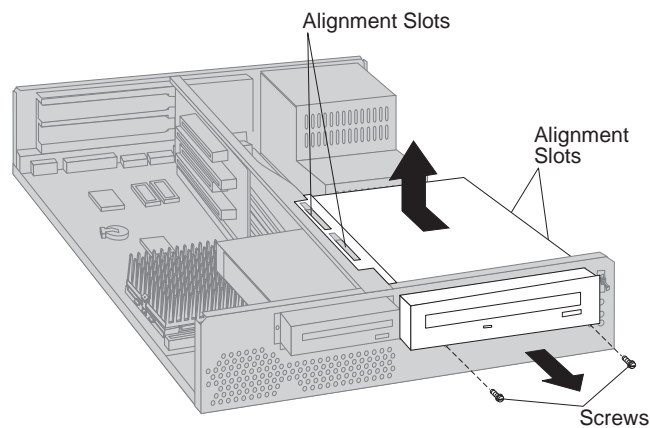
Lift the bracket from the computer, and then disconnect the power and signal cables connected to the drive in bay 2.

2 Remove the drive by removing the screws and then sliding the drive away from the bracket.
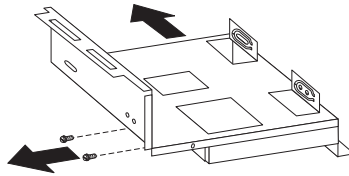
3 Touch the static-protective package containing the new drive to any *unpainted* metal surface and then remove the drive from the package.

4 Place the new drive in the drive bracket, and insert and tighten the screws.
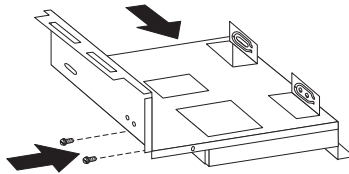
5 Do one of the following:

a. If a drive is not present in bay 1, reinstall the drive bracket by placing it in the computer and sliding it forward. Make certain that the bracket fits properly in the alignment slots. Insert and tighten the screws, and connect the power and signal cables to the drive in bay 2.
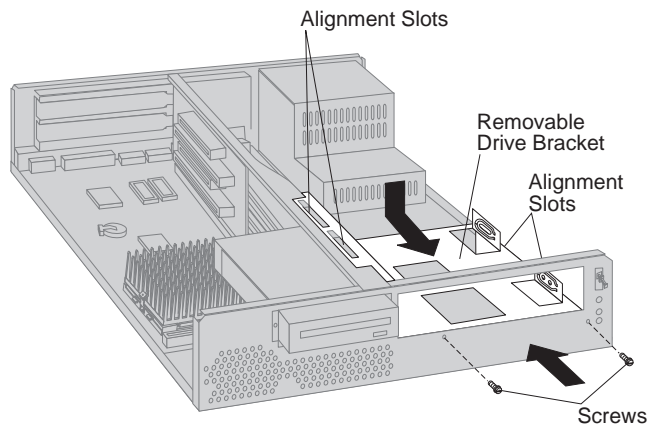
b. If a drive is present in bay 1, connect the power and signal cables to drive in bay 2, and then reinstall the drive bracket by placing it in the computer and sliding it forward. Make certain that the bracket fits properly in the alignment slots. Insert and tighten the screws, and connect the power and signal cables to the drive in bay 1.

Installing a Drive in Bay 3

1 Disconnect the signal and power cables attached to the drive in bay 3.

2 Remove the bracket that houses bay 3 by removing the screw at the front and sliding the bracket forward and away from the computer.
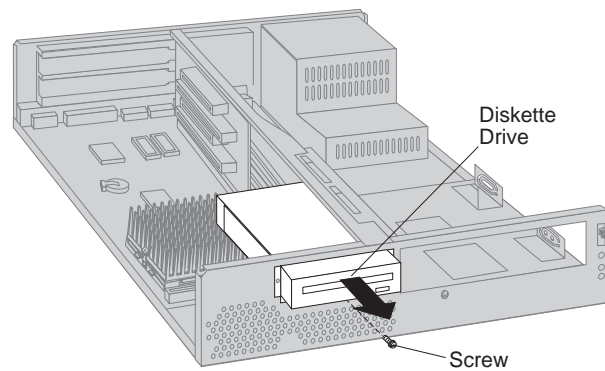
3 Remove the drive by removing the screws and then lifting the drive away from the bracket.
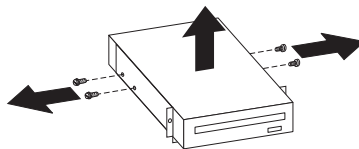
4 Touch the static-protective package containing the new drive to any *unpainted* metal surface and then remove the drive from the package.

5 Place the new drive on the drive bracket, and insert and tighten the screws.
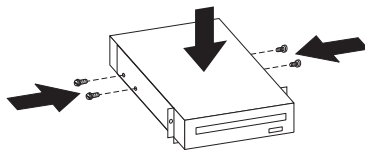
6 Reinstall the drive bracket by placing it in the sliding back in the computer. Insert and tighten the screw. The following illustration shows the drive bracket being reinstalled.
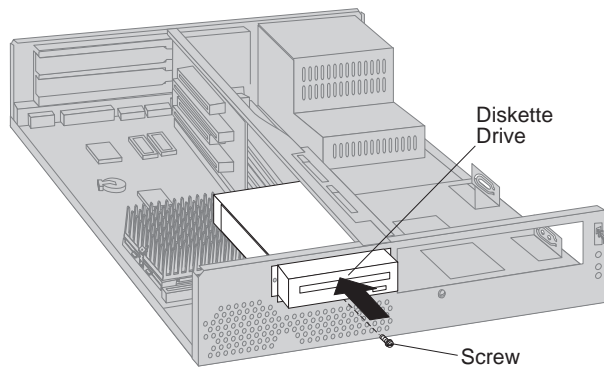
7 Connect the power and signal cables to all the drives in the computer.

What to do next

- Go to the device-record form in *Using Your Personal Computer* and record the new installation.
- To install a drive in bay 2, go to "Installing a Drive in Bay 2" on page 42.
- To work with another option, go to the appropriate section.
- To complete the installation, go to Chapter 7, "Completing the Installation" on page 62.

Installing a 5.25-Inch Drive in the 3-Bay Design

Notes:

1. The following instructions are for installing a drive. If you want to replace a drive, first go to "Removing a 5.25-Inch Drive from the 3-Bay Design" on page 49.

2. To install a 3.5-inch drive into drive bay 1, 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.


Before you begin

- Read "Electrical Safety" on page 3 and "Handling Static-Sensitive Devices" on page 4.
- 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 5).

---

1 If a drive is installed in bay 2, disconnect any cables that are attached.

2 Remove the bracket that houses bays 1 and 2 by removing the screws at the front and sliding the bracket backwards to clear the alignment slots. Lift the bracket from the computer.
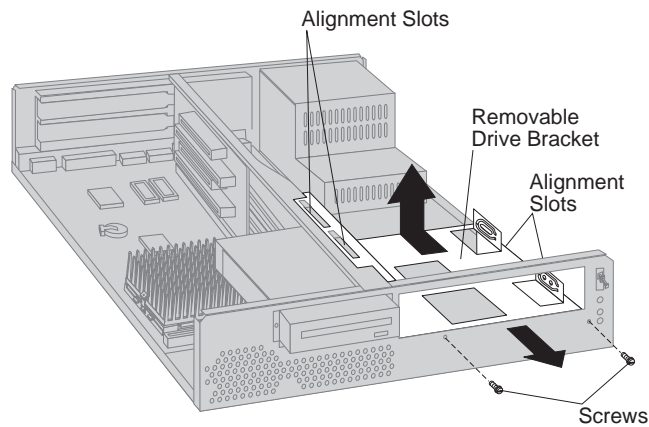
3 Touch the static-protective package containing the new drive to any *unpainted* metal surface and then remove the drive from the package.

4 Place the drive in the bracket, and insert and tighten the screws.
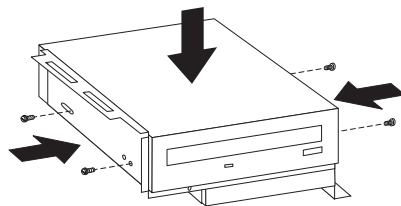
5 Connect the power and signal cables to the drive in bay 2, and reinstall the drive bracket by placing it in the computer and sliding it forward. Make certain that the bracket fits properly under the alignment slots. Insert and tighten the screws. The following illustration shows the drive bracket being reinstalled.
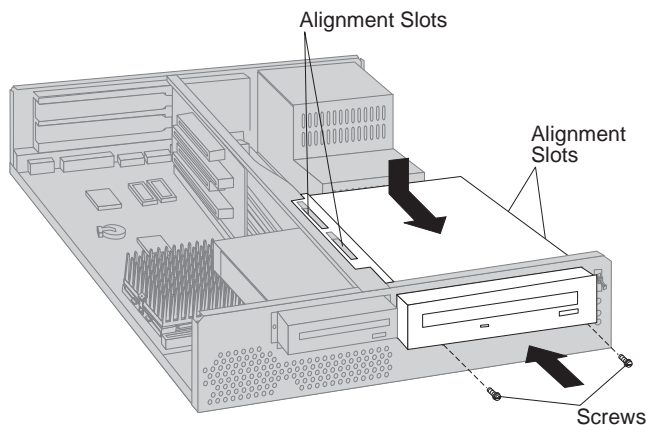
6 Connect the power and signal cables to the drive in bay 1.

What to do next

- Go to the device-record form in *Using Your Personal Computer* and record the new installation.
- To work with another option, go to the appropriate section.
- To complete the installation, go to Chapter 7, "Completing the Installation" on page 62.

Removing a 5.25-Inch Drive from the 3-Bay Design


Before you begin

- Read "Electrical Safety" on page 3 and "Handling Static-Sensitive Devices" on page 4.
- Obtain a static-protective package to store the drive you remove.
- 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 5).

---

1 Disconnect the cables attached to the drive in bay 1.

2 Remove the bracket that houses bays 1 and 2 by removing the screws at the front and sliding the bracket backwards to clear the alignment slots. Lift the bracket from the computer.

Alignment Slots

Alignment Slots
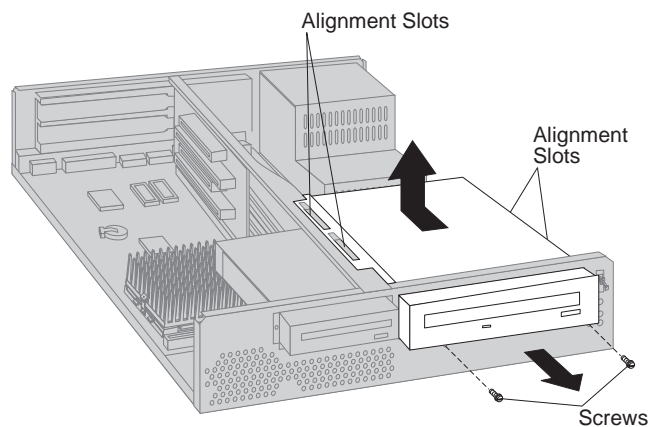
Screws

3 Disconnect the cables attached to the drive in bay 2.

4 Loosen and remove the four screws and then remove the drive.
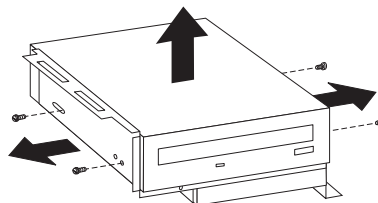
5 Place the removed drive in a static-protective package.

   Note: If you are replacing the removed drive with a new drive, go to step 3 on page 48.

6 Connect the power and signal cables to the drive in bay 2.

7 Reinstall the drive bracket by placing it in the computer and sliding it forward. Make certain that the bracket fits properly in the alignment slots. Insert and tighten the screws. The following illustration shows the drive bracket being reinstalled.
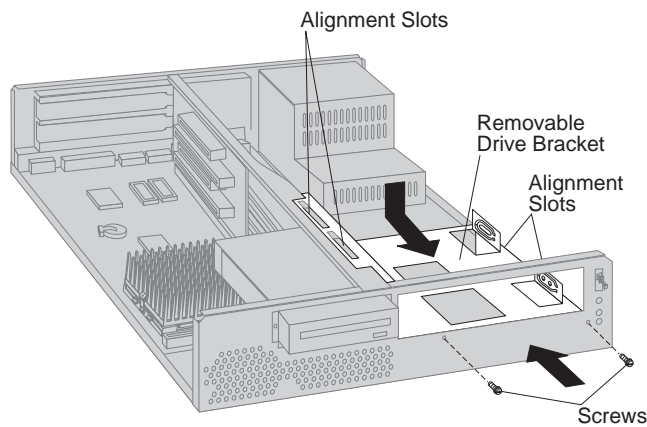
What to do next

- Go to the device-record form in *Using Your Personal Computer* and record the removal of the drive.
- To work with another option, go to the appropriate section.
- To complete the installation, go to Chapter 7, "Completing the Installation" on page 62.

Installing a Drive in the 4-Bay Design

Notes:

1. The following instructions are for installing a drive. If you want to replace a drive, first go to "Removing a Drive from the 4-Bay Design" on page 54.

2. To install a 3.5-inch drive into drive bay 1 or 2 (5.25-inch bays), 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.

Before you begin

- Read "Electrical Safety" on page 3 and "Handling Static-Sensitive Devices" on page 4.
- Read the instructions that come with the drive you want to install.
- 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 5).

---

1 Disconnect the cables attached to the drives in the 3.5-inch drive bracket.

2 Remove the screw that attaches the 3.5-inch drive bracket to the computer frame. This screw is located at the middle-front of the computer frame. Gently slide the bracket backwards to clear the alignment slots, and lift the bracket out of the computer.
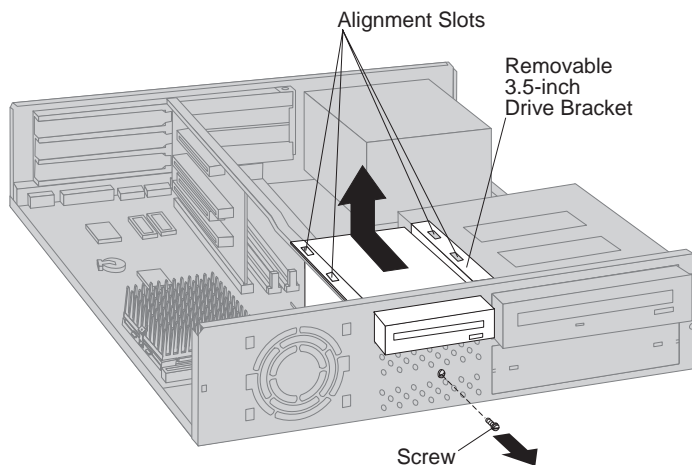
3 Touch the static-protective package containing the new drive to any *unpainted* metal surface and then remove the drive from the package.
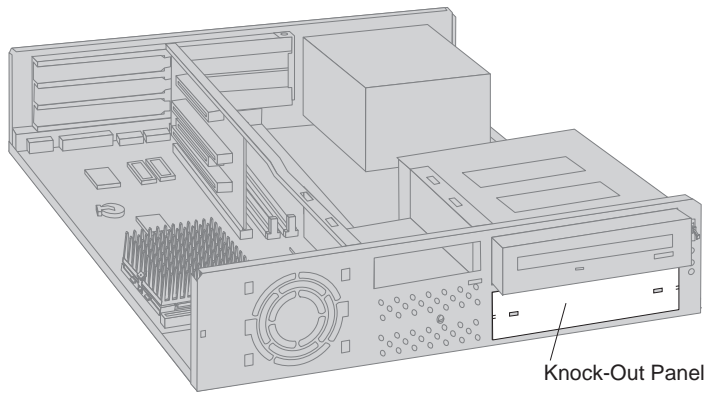
4 Do one of the following:

    a. To install a drive in the 3.5-inch drive bracket, place the drive into the desired drive bay, and insert and tighten the screws. The following illustration shows a drive being installed in bay 4.
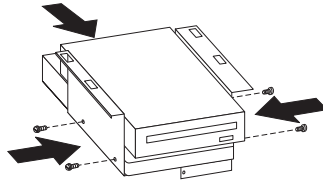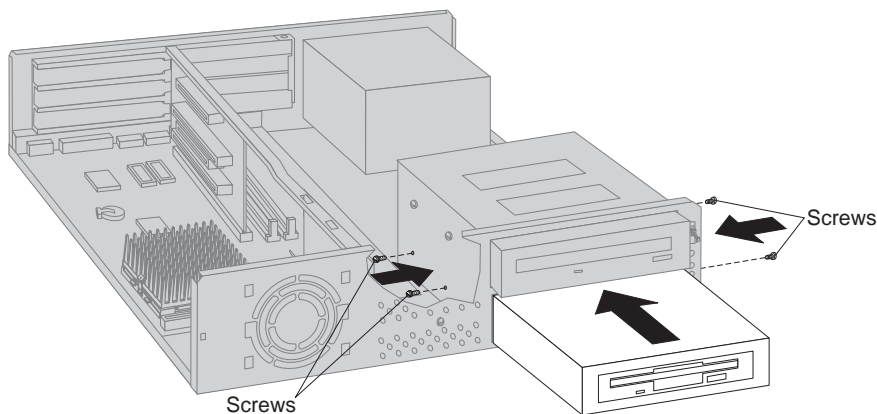


    b. To install a drive in the 5.25-inch drive bracket:

        • If applicable, remove the metal knock-out panel for the appropriate drive bay.

Knock-Out Panel

        • Place the drive into the desired drive bay, and insert and tighten the screws. The following illustration shows a drive being installed in bay 2.

Screws

Screws

5 If applicable, repeat steps 3 and 4 to install another drive.

6 Reinstall the 3.5-inch drive bracket by placing it in the computer and sliding it forward. Insert the screw and tighten it. The following illustration shows the 3.5-inch bracket being reinstalled.
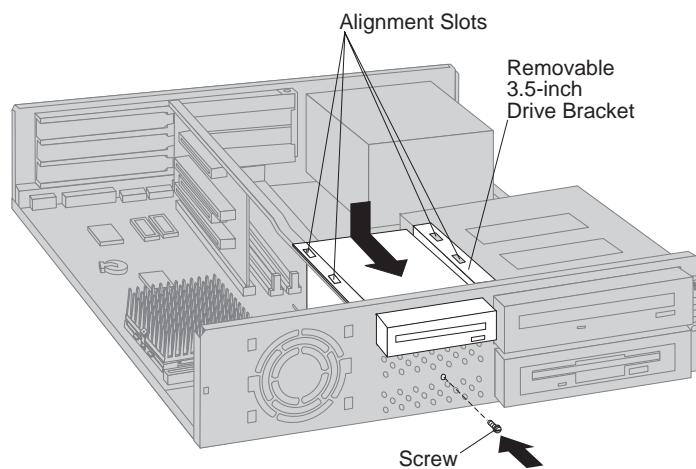
Alignment Slots

Removable
3.5-inch
Drive Bracket

Screw

7 Connect the power and signal cables to all the drives in the computer.

What to do next

- Go to the device-record form in *Using Your Personal Computer* and record the new installation.
- To work with another option, go to the appropriate section.
- To complete the installation, go to Chapter 7, "Completing the Installation" on page 62.

## Removing a Drive from the 4-Bay Design

---

Before you begin

- Read "Electrical Safety" on page 3 and "Handling Static-Sensitive Devices" on page 4.
- Obtain a static-protective package to store the drive you remove.
- 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 5).

---

1 Disconnect the cables attached to the drives in the 3.5-inch drive bracket.

2 Remove the screw that attaches the 3.5-inch bracket to the computer frame. This screw is located at the middle-front of the computer frame. Gently slide the bracket backwards to clear the alignment slots, and lift the bracket out of the computer.
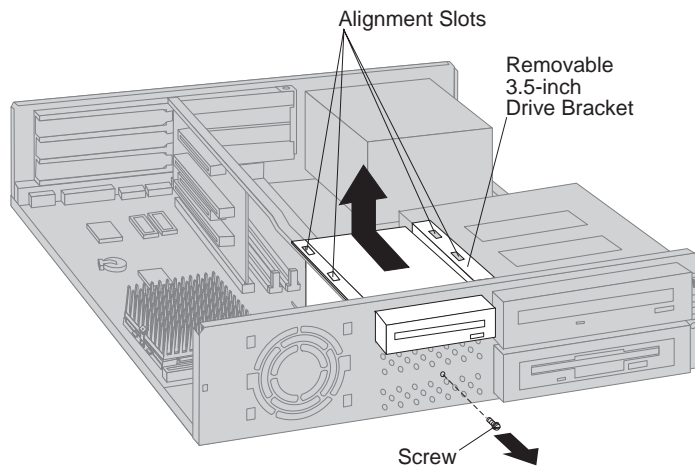
3 Do one of the following:

    a. To remove a drive from the 3.5-inch drive bracket, loosen and remove the screws and then remove the drive. The following illustration shows a drive being removed from bay 4.
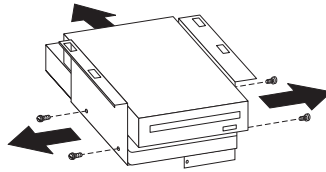
    b. To remove a drive from the 5.25-inch drive bracket, disconnect any cables attached to the drive. Next, loosen and remove the screws and then slide the drive forward. This illustration shows a drive being removed from bay 2.
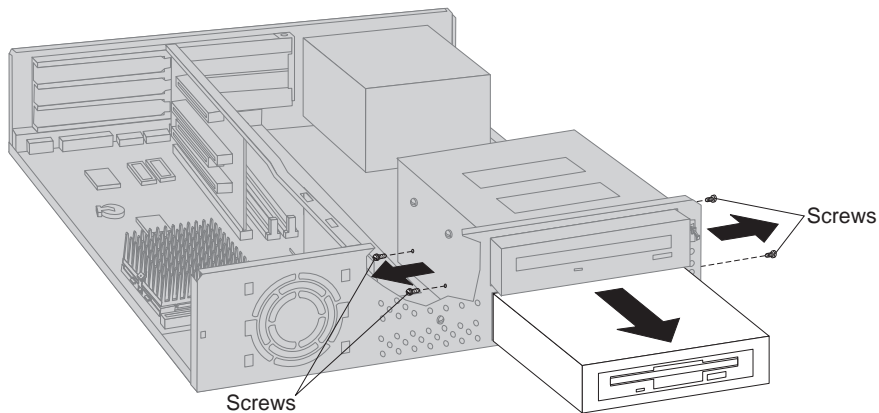

4 If you do not plan to use the removed drive, place it in a static-protective package.

    Note: If you are replacing the removed drive with a new drive, go to step 3 on page 51.

5 To remove another drive, repeat steps 3 and 4.

6 Reinstall the 3.5-inch drive bracket by placing it in the computer and sliding it forward. Insert the screw on the front of the computer frame and tighten it. The following illustration shows the 3.5-inch bracket being reinstalled.
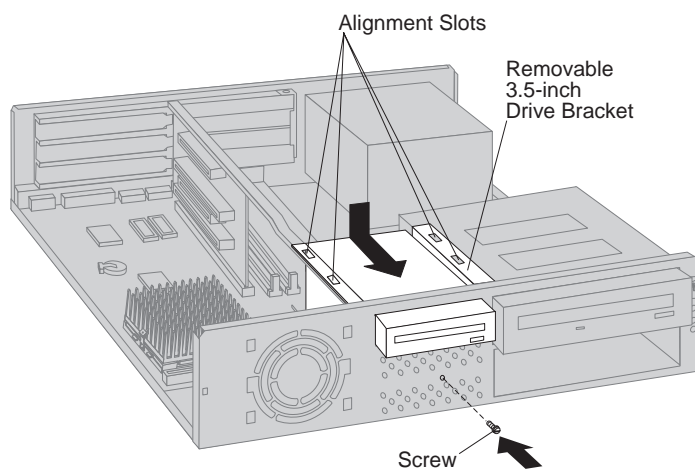
7 Connect the power and signal cables to all the installed drives.

What to do next

- Go to the device-record form in *Using Your Personal Computer* and record the removal of the drive.
- To work with another option, go to the appropriate section.
- To complete the installation, go to Chapter 7, "Completing the Installation" on page 62.

Chapter 6. Working with Security Options

This chapter describes some of the security options that are available for 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:

- "Erasing Lost or Forgotten Passwords" on page 58
- "Setting the Diskette Write-Protect Switch" on page 61

Important

Moving the CMOS-clear jumper or replacing the battery restores the default settings for your computer; thus, any configuration settings that are not part of the default settings are erased. After performing either one of these actions, you must use the Configuration/Setup Utility program to save the default settings or reconfigure and save other settings.

If your model has integrated Ethernet support, note that the settings for the primary startup sequence of your computer have been factory-changed to support network-management software. These factory settings are not the default settings of your computer. If you move the CMOS-clear jumper or replace the battery, the factory settings are erased when the default settings are restored. You must use the Configuration/Setup Utility program to reset these values. For more information on the factory settings and default settings of the startup sequence for your computer, see *Using Your Personal Computer*.

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

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.

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.

To locate the CMOS-clear jumper, see "Identifying Parts on the System Board" on page 7 or see the label on the underside of the computer cover. On the cover label, the jumper is referred to as the *password jumper*.


Before you begin

- Using the Configuration/Setup Utility program, record all configuration information.
- Read "Electrical Safety" on page 3 and "Handling Static-Sensitive Devices" on page 4.
- Read the "Important" box on page 57.
- 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 5).

---

1 If necessary, remove the drive-bracket assembly and riser card.

2 Locate the CMOS-clear jumper on the system board. For more information, see "Identifying Parts on the System Board" on page 7 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.
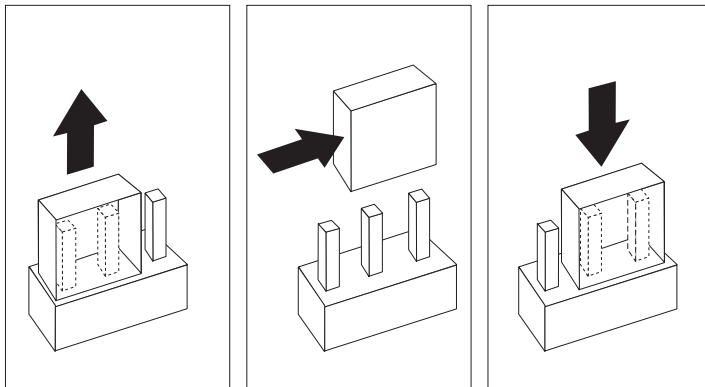
4 Wait one minute and then move the jumper back to its normal position (pins 1 and 2). This clears CMOS memory.
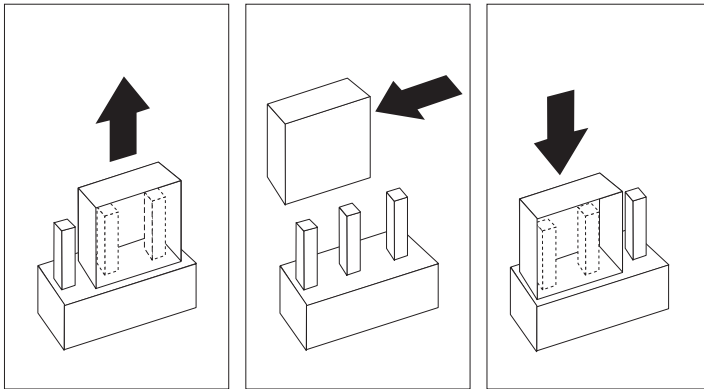
What to do next

- When you clear CMOS memory, you must reconfigure the computer. After reassembling the computer (go to Chapter 7, "Completing the Installation" on page 62), use the Configuration/Setup Utility program to reset the date and time, reset any passwords, and reconfigure the computer. For more information on using the Configuration/Setup Utility program, refer to *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 3 and "Handling Static-Sensitive Devices" on page 4.
- 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 5).

---

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 7.

2 For normal diskette operation or for read-only diskette operation, set switch 6 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 7, "Completing the Installation" on page 62.

Chapter 7. Completing the Installation

After working with options, you need to install any removed parts, replace the cover, reconnect any drive cables, and reconnect external 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:

- "Removing a Bay Panel" on page 63
- "Replacing the Cover and Connecting the Cables" on page 64
- "Updating the Computer Configuration" on page 66

Removing a Bay Panel

You must remove a bay panel if:

- You have installed a drive that has accessible media in bay 1 of the 3-bay design.
- You have installed a drive that has accessible media in bay 1 or bay 2 of the 4-bay design

Your computer might have a preinstalled drive in one of these bays. If you are replacing a preinstalled drive, a bay panel might have already been removed.

To remove a bay panel, pop it loose from the front of the computer.

The following illustrations show the bay panels that might come with your computer.

Cover Panel

3-Bay Design

Cover Panels
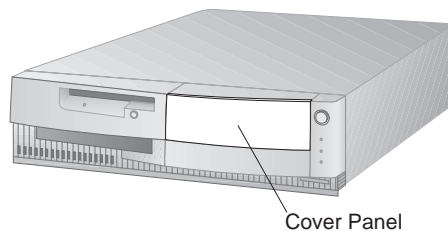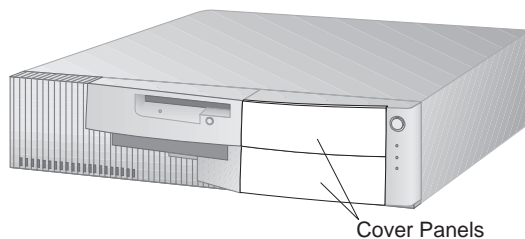
4-Bay Design

Replacing the Cover and Connecting the Cables

Before you begin

- Read "Electrical Safety" on page 3 and "Handling Static-Sensitive Devices" on page 4.

---

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.

Cover Screw

Tab

Slot
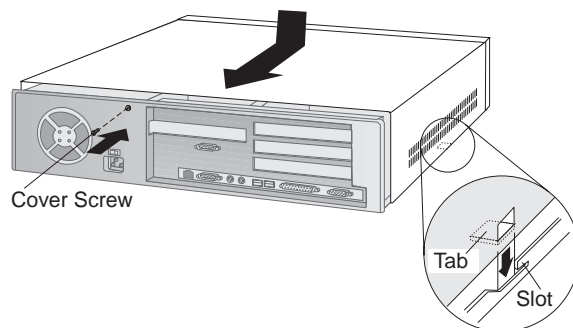
4 If your computer has a cover lock, you can lock the cover now, if desired.

5 Reconnect the external cables and cords to the computer. For more information, see *Setting Up Your Personal Computer*.
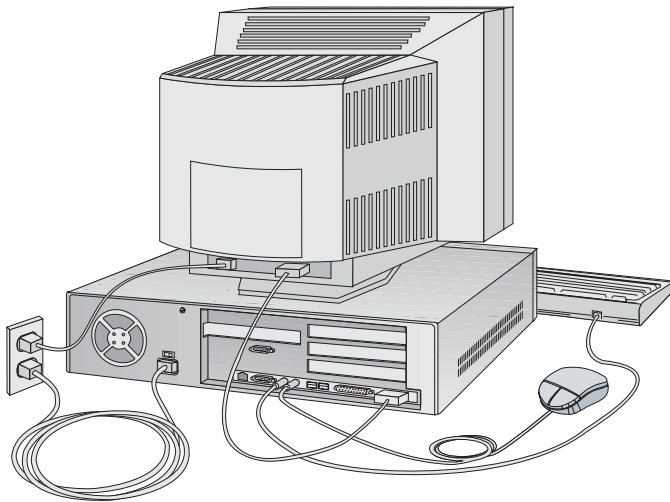
6 If you have a modem or fax machine attached to the computer, reconnect the telephone line to the wall outlet and the computer. Plug the power cords into properly grounded electrical outlets.

Updating the Computer Configuration

> **Important**
>
> For more extensive 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.
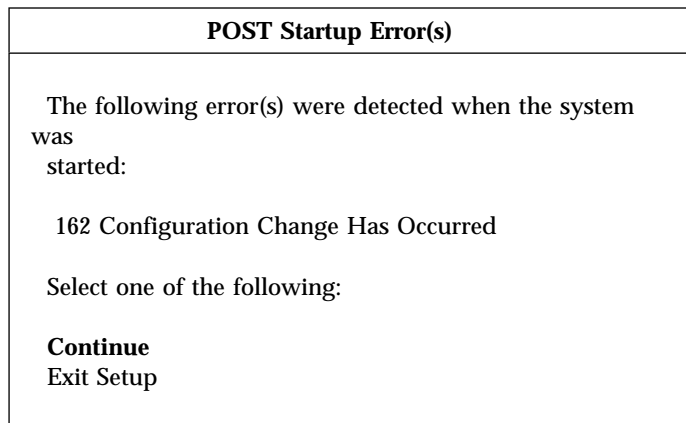
Notes:

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.

```
┌─────────────────────────────────────────────────────────┐
│                   POST Startup Error(s)                  │
├─────────────────────────────────────────────────────────┤
│                                                          │
│    The following error(s) were detected when the system  │
│  was                                                     │
│    started:                                              │
│                                                          │
│    162 Configuration Change Has Occurred                 │
│                                                          │
│    Select one of the following:                          │
│                                                          │
│    Continue                                              │
│    Exit Setup                                            │
│                                                          │
└─────────────────────────────────────────────────────────┘
```

Note: Depending on the configuration changes that occurred, the error message you see might be different from the one shown here.

If the preceding screen appears, select **Continue** until you reach the Configuration/Setup Utility menu.

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.

```
┌─────────────────────────────────────────────┐
│          Configuration/Setup Utility          │
├─────────────────────────────────────────────┤
│                                               │
│                Select Option:                 │
│                                               │
│             • System Summary                  │
│             • Product Data                    │
│             • Devices and I/O Ports           │
│             • Start Options                   │
│             • Date and Time                   │
│             • System Security                 │
│             • Advanced Setup                  │
│             • ISA Legacy Resources            │
│             • Advanced Power Management        │
│                                               │
│              Save Settings                    │
│              Restore Settings                 │
│              Load Default Settings            │
│                                               │
│              Exit Setup                       │
│                                               │
└─────────────────────────────────────────────┘
```
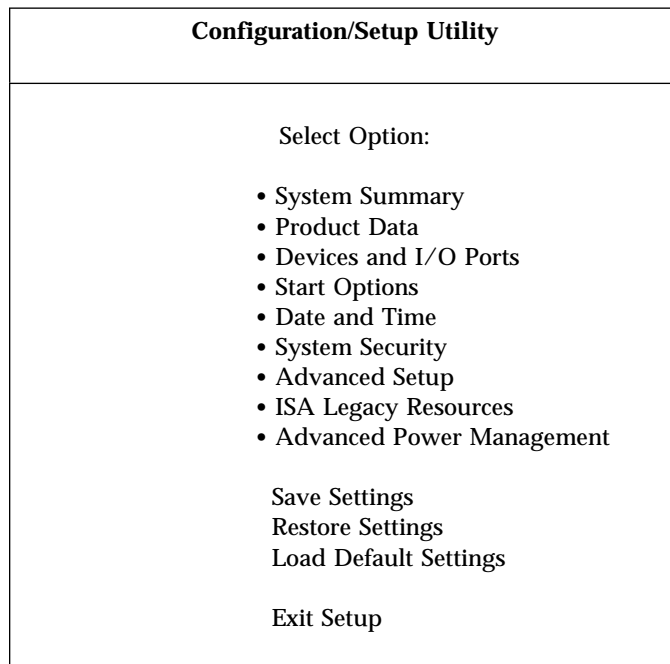
Note: The menu you see on your computer might look slightly different from the menu shown here, but it will operate the same way.

Changing Settings and Exiting

In the Configuration/Setup Utility menus, you can accept the configuration changes by viewing and saving 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 67).

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 26 and Appendix B, "Interrupt and DMA Resources" on page 73.

Appendix A. Replacing 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 3 and "Handling Static-Sensitive Devices" on page 4.
- Read the "Important" box on page 57.
- 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 5 if you need additional information).

---

1 Locate the battery on the system board.

2 If necessary, remove any adapters that impede your access to the battery. For instructions, see "Removing an Adapter" on page 32.

3 Read "Lithium Battery Notice" on page vi.

4 Remove the old battery as shown in the following illustrations.
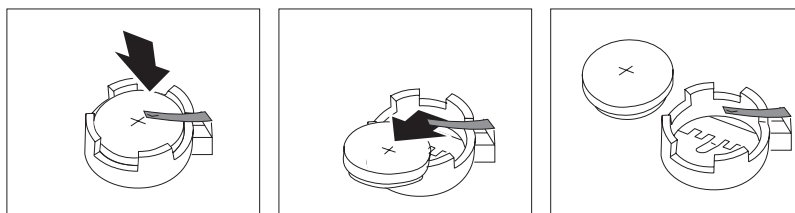
5 Install the new battery as shown in the following illustrations.
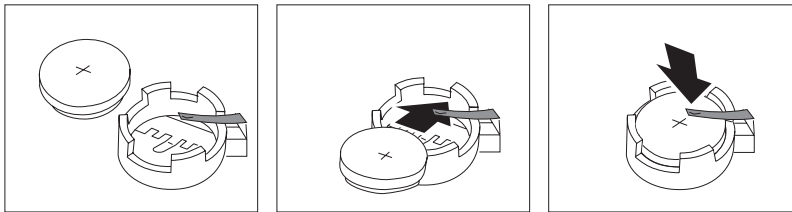
> **Note:** When the computer is turned on for the first time after battery replacement, an error message might be displayed. This is normal after replacing the battery.

What to do next

- To work with another option, go to the appropriate section.
- To complete the replacement, go to Chapter 7, "Completing the Installation" on page 62.
- Use the Configuration/Setup Utility program to reset configuration values, including the date and time, and any passwords.
- Dispose of the old battery as required by local ordinances or regulations.

Appendix B. 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.

Table 4. Interrupt Resources	
Interrupt Request	**System Resource**
0	Timer
1	Keyboard
2	Interrupt Controller
3[6]	Serial Port B
4[6]	Serial Port A
5	Available
6[6]	Diskette
7[6]	Parallel Port
8	Real Time Clock
9	Available
10	Available
11	Available
12[6]	Mouse
13	Coprocessor
14[6]	IDE Drives (0, 1) if installed
15[6]	IDE Drives (2, 3) if installed

---

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

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Table 5. DMA Resources

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

---

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

[8] This is the default setting if you have selected either the ECP mode, or the ECP/EPP mode.

Appendix C. Notices

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