

IBM

Aptiva

Handbook

First Edition (May 1996)

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Safety information

The construction of the IBM Aptiva Personal Computer provides extra protection against the risk of electrical shock. The IBM Aptiva PC has a power cord with a three-prong plug that is required to ground metal parts. It is the responsibility of the person installing the computer to connect it to a properly grounded electrical outlet. Seek professional assistance before using an adapter or extension cord; these devices could interrupt the grounding circuit.

If the computer is connected to an electrical outlet that is incorrectly connected to the building wiring, serious electrical shock could result.

FOR CONTINUED PROTECTION AGAINST THE RISK OF ELECTRICAL SHOCK:

- Connect your computer only to an electrical outlet of the correct voltage. If you are unsure about the voltage of the electrical outlet you are using, contact your local power company.
- If your computer has cables other than the power cords, you must connect them before plugging the power cords into an electrical outlet. Before removing these cables, you must first unplug the power cords from the outlet.
- If your computer has a telephone connection, do not touch the telephone cords when there is lightning in the area.
- Do not use or store the computer in an area where it can become wet.
- Make sure all replacement parts have characteristics identical or equivalent to the original parts. Other parts may not have the same safety features.
- Personal injury or electrical shock may result if you undertake actions other than those specifically described in this book. This is particularly true if you try to service or

repair the power supply, monitor, or built-in modem. Always refer service or repairs to qualified service personnel.

Caution:

Your computer uses lithium batteries. There may be a risk of fire, explosion, or burns if the batteries are handled incorrectly. To ensure safety:

- Do not recharge, disassemble, heat, or incinerate a lithium battery.
- Replace the battery with an identical or equivalent type lithium battery.
- Discard used lithium batteries according to local country dispositions.

Hardware and software assistance

See “Chapter 8: Diagnosing and recovering from problems” on page 123 or the online help that came with your computer. If you need additional assistance, look in the *Guide to HelpWare* and *All the Extras* folder for more information.

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- HelpCenter
- HelpWare
- IBM
- Mwave
- Operating System/2
- OS/2
- Rapid Resume

Other company, product, and service names, which may be denoted by a double asterisk (**), may be trademarks or service marks of others.

Windows is a trademark of Microsoft Corporation.

Learning about this book **Part 1**

This part contains an introduction to the *Aptiva Handbook*. Read this part to understand how to use this book and where to go if you need additional information.

This part contains the following chapter:

- “Chapter 1: Using this book” on page 3

This chapter explains how the book is organized. It also points you to additional printed and online sources for information that is not contained in this book.

Using this book **1**

The *Aptiva Handbook* contains general information for all users of an IBM Aptiva Personal Computer. Once you have taken your computer out of the box and connected all the components, you can use this book as a guide to your computer's hardware and as a problem-solving tool.

The topics in this book range from an introduction of important Aptiva hardware features to instructions for reconfiguring or upgrading your computer. In addition, if you experience a problem with your Aptiva computer, this book can guide you to a solution.

This book includes information for several Aptiva models. Your model may not have some of the hardware mentioned in this book. You cannot use software that requires hardware you did not purchase.

How this book is organized

This book contains the following parts and chapters:

“Part 1: Learning about this book” on page 1

This part contains information to help you use the *Aptiva Handbook*. It contains the following chapter:

- “Chapter 1: Using this book” on page 3

This chapter contains information about the book's contents and organization. It also points you to other documents or online resources for more information.

“Part 2: Controlling system settings” on page 9

This part contains information to help you configure or reconfigure the hardware and hardware features that were installed in your computer at the factory. It contains the following chapters:

- “Chapter 2: Getting started with your Aptiva computer” on page 11

This chapter contains instructions for making adjustments to monitor and volume settings on your Aptiva computer. It also provides information to help you connect your computer to a printer or to other computer systems, such as the Internet.

- “Chapter 3: Understanding the Rapid Resume features” on page 21

This chapter provides instructions for finding the Rapid Resume Manager on your Windows 95 desktop and describes each of the Rapid Resume features.

- “Chapter 4: Viewing and changing Aptiva configuration” on page 29

This chapter provides instructions for using the Setup Utility, where you can view or change your system’s configuration. It also provides information to help you locate other configuration utilities.

“Part 3: Upgrading and replacing hardware” on page 49

This part contains information to help you add to or change the hardware that was installed in your computer at the factory. It contains the following chapters:

- “Chapter 5: Preparing to upgrade” on page 51

This chapter contains information to help you prepare to add or replace adapter cards, drives, and system board components in your system unit.

- “Chapter 6: Adding and replacing system board components” on page 61

This chapter contains instructions for adding and replacing hardware components on your system board.

- “Chapter 7: Adding and removing adapter cards and drives” on page 73

This chapter contains instructions for adding and removing adapter cards and drives.

“Part 4: Troubleshooting” on page 121

This part contains information to help you respond to problems with the hardware, software, and features installed in your computer at the factory. It contains the following chapter:

- “Chapter 8: Diagnosing and recovering from problems” on page 123

This chapter provides troubleshooting information, including error code interpretations. It also includes information to help you recover factory installed programs and files.

“Part 5: Technical reference” on page 149

This part contains technical information you might need if you upgrade your computer’s hardware. It contains the following appendixes:

- “Appendix A: Specification tables” on page 151

This appendix contains specific memory, address, interrupt, channel, and port specifications.

- “Appendix B: Audio and video cards” on page 161

This appendix contains descriptive information about sound, Mwave, and television cards.

- “Appendix C: Modem information” on page 163

This appendix contains descriptive information about modems, including AT command set information you can use if you decide to operate your modem from a DOS command line.

- “Appendix D: Monitor terminology” on page 181

This appendix contains definitions of some of the terms generally used to describe monitor characteristics.

The book also contains an index.

Presentation conventions used in this book

This book uses the following highlighting conventions to associate special meaning with text:

Example

Example font indicates text you should type at your keyboard.

Italics

Italics indicate a new technical term. A definition or explanation of the term follows its first use.

Bold

Bold indicates the names of keys you should press on the keyboard or screen elements you should click on with the mouse.

Bold also emphasizes hardware labels, such as those used to identify jacks or jumpers.

This book uses the following character conventions to indicate how to press combinations of keys:

+

The plus sign (+) between two key names indicates that you should press the two keys simultaneously. Hold the first key down. While holding the first key down, press and release the second key. Then release the first key.

If the plus sign appears between each key name in a string of three key names, then press and release the third key while holding down the first two keys.

For instance, if you see an instruction to press Ctrl + Alt + Delete, then press and hold down the Ctrl and Alt keys. While you hold down these two keys, press and release the Delete key. After you release the Delete key, release the Ctrl and Alt keys.

Where to find more information

The following publications and online documentation contain more information about your computer:

Read me first. This book contains instructions to help you unpack, set up, and start using your computer.

Program License and Limited Warranty Agreement. This book contains information about the use of your computer and the software that came with it. It also has information about the terms and conditions of the limited warranty.

Guide to HelpWare and All the Extras. This folder contains information about:

- Hardware service and software support for your computer
- Electronic support
- The 1-800-number (for hardware assistance) and IBM support services (for answers to questions about your new computer)
- The Program License and Limited Warranty Agreement
- A wide selection of additional software offerings

Be sure to read this information to take full advantage of all the IBM Aptiva Personal Computer offerings.

Aptiva Guide. Your computer comes with a program called the “Aptiva Guide.” This online demonstration describes the features and programs that were installed on your computer at the factory. As you watch the demonstration, you can also start some of the programs being described.

To start the Aptiva Guide demonstration, follow these steps:

1. Click on the Start button on your desktop.
2. Move your mouse pointer to the Programs menu and then to the AptivaWare menu.
3. Click on the Aptiva Guide option.

For more information about the Aptiva Guide, see the *Read me first* book.

Aptiva Helper. Your computer comes with a program called the “Aptiva Helper.” This program contains information to help you register your computer, back up operating system and data files, run computer diagnostics, and obtain IBM support.

To start the Aptiva Helper, follow these steps:

1. Click on the Start button on your desktop.
2. Move your mouse pointer to the Aptiva Helper option and click on it.

Online documentation. Your computer comes with different types of online documentation. The software that came preloaded on your computer includes online tutorials and exercises that can help you learn how to use your computer. Help is also available as you use your software programs. In most software programs, you can press F1 to access help.

From the Windows 95 desktop, you can search for specific help topics about your computer.

To start your computer's help system, follow these steps:

1. Click on the Start button on your desktop.
2. Move your mouse pointer to the Help option and click on it.

Controlling system settings **Part 2**

This part contains information to help you configure or reconfigure the hardware and hardware features that were installed in your computer at the factory. It contains the following chapters:

- “Chapter 2: Getting started with your Aptiva computer” on page 11

This chapter contains instructions for making adjustments to monitor and volume settings on your Aptiva computer. It also provides information to help you connect your computer to a printer or to other computer systems, such as the Internet.

- “Chapter 3: Understanding the Rapid Resume features” on page 21

This chapter provides instructions for finding the Rapid Resume Manager on your Windows 95 desktop and describes each of the Rapid Resume features.

- “Chapter 4: Viewing and changing Aptiva configuration” on page 29

This chapter provides instructions for using the Setup Utility, where you can view or change your system's configuration. It also provides information to help you locate other configuration utilities.

Getting started with your Aptiva computer **2**

When you purchased and set up your IBM Aptiva Personal Computer, it was ready for you to use the first time you turned it on. As you begin to use your computer, though, you might want to make adjustments to your monitor and volume settings for optimal comfort and performance. You can also connect your computer to a printer or to other computer systems, such as the Internet.

This chapter contains the following sections to help you make these adjustments and connections:

- “Controlling monitor settings” on page 11
- “Controlling volume” on page 15
- “Getting ready to print” on page 17
- “Setting up communications” on page 18
- “Configuring your Aptiva computer for a connection to the Internet” on page 19

Controlling monitor settings

When you connected your monitor to your system unit and turned your computer on for the first time, your computer automatically selected settings for monitor performance. Depending on the monitor you have, you might want to change some of these settings for optimal performance. Using Windows 95, you can customize the refresh rate, screen resolution, number of colors, and the size of displayed characters.

If you have not done so already, follow the setup instructions in the *Read me first* book to connect the monitor to the system unit. Refer to the documentation that came with your monitor for model-specific monitor information and configuration settings.

Getting the best performance from your monitor

Follow these guidelines to get the best performance from your monitor:

- Place your monitor away from sources of magnetic interference, such as other monitors, unshielded speakers, and electric power lines. (If your computer came with speakers, those speakers are shielded.)
- Keep the monitor screen clean by using a nonabrasive screen or glass cleaner. Do not spray the cleaner directly onto the screen.
- Under some conditions, interference patterns, such as curved, shadowy lines can occur. If these patterns appear on your screen, change your software program's background color or design.
- To extend the life of your monitor, turn it off at the end of each day.
- Check the documentation that came with your software programs to see if it will let you select combinations of resolution and color. This could make viewing the screen more comfortable.

Power saver feature

Your monitor documentation should indicate whether the monitor you purchased has a power saver feature. With this feature, the monitor's display disappears if you have not used your computer for a predetermined period of time. To redisplay the screen, press the Shift key on your keyboard or move the mouse.

If your monitor has a power saver feature, your monitor can work with some of the Rapid Resume features, such as Automatic Power Off and Standby. For information about these features, see "Understanding the Rapid Resume features" on page 21.

Changing display settings

The first time you turn on your computer, it automatically selects common settings for your monitor. If you purchased a monitor that supports Data Display Channel (DDC), the computer automatically selects the correct horizontal frequency and the best refresh rate your monitor can support. The horizontal frequency sets the computer's video output frequency to match the monitor's frequency. This setting cannot be changed. The refresh rate determines how quickly the screen image is drawn on the screen. This setting can be changed.

If you purchased a monitor that does not support DDC, you may want to change your monitor's refresh rate setting. With any monitor, you may want to customize one or more display properties.

Customizing display properties

In Windows 95, you can change display options such as screen resolution, number of colors, refresh rate, and the size of displayed characters.

If you need assistance in selecting display properties, highlight an area of the Display Properties window and press the F1 key to read about the selected topic.

To customize your display properties:

1. Double-click on the My Computer icon on your desktop.
2. In the My Computer window, double-click on the Control Panel folder.
3. In the Control Panel window, double-click on the Display icon.
4. In the Display Properties window, click on the Display Modes tab.

On the SiS Settings page of the Display Properties window, you can set the following display properties:

- Color palette

Lets you specify the number of colors that can be displayed on the screen.

- Desktop area

Lets you specify the screen resolution. The resolution setting determines the amount of information that can be displayed on your screen. The larger the resolution setting numbers, the more you can see on your screen, but the smaller the images on the screen appear.

If you select a resolution that causes the desktop area to extend outside your screen area, your screen will “scroll” as you move the mouse or cursor beyond the edge of the screen area.

- Font size

Lets you specify the size of the characters displayed on the screen.

You should generally use the default setting for font size since some programs were not designed to work with large fonts.

- Refresh rate

Lets you specify the rate at which the entire screen image is drawn on the screen.

Depending on the capabilities of your monitor, changing the refresh rate might not improve monitor performance. High refresh rates can also slow system performance.

The values you can choose for desktop area (resolution) and colors depend on:

- Your monitor's horizontal frequency.
- The amount of video memory available on the computer's system board.

To find out how much video memory your system uses, view the Video Information menu in the Setup Utility. For these instructions, see "Changing video configuration" on page 33.

Changing refresh rate settings

The refresh rate automatically selected for your monitor is determined by the monitor's capabilities. If you purchased a monitor that supports DDC, the refresh rate is automatically set for optimum performance. If you purchased a monitor that does not support DDC, this rate is automatically set to the default settings for VGA (60Hz noninterlaced in 640x480 resolution mode).

If your monitor does not support DDC or has capabilities greater than VGA, you can manually select a monitor refresh rate by following these steps:

1. From the Display Properties window, click on the Display Modes tab.
2. In the Refresh rate area, if the BIOS default box contains an "X," click on the box to clear the "X."
3. In the Refresh rate list, click on the refresh rate you want your monitor to use.

4. Click on the Apply button.

5. Follow the instructions in the message box that appears when you click on Apply.

If you apply a setting that does not match the capabilities of your monitor, the image may become distorted. To clear an unsupported setting, click on the Cancel button. If you cannot read the screen, wait ten seconds. Ten seconds after you select an unsupported setting, the computer will return to the last supported setting.

Tips for choosing display properties

Of the settings that your monitor supports, you should select the ones that are most comfortable for you to work with. The highest resolution and color settings are not always best. For example:

- Higher resolutions display more pels (picture elements). While this allows more text and graphics to be displayed, it makes them appear smaller. For most users, 640x480 or 800x600 is a comfortable resolution setting.
- When you select more colors, most software programs will slow down. Only choose as many colors as you need. A color setting of 256 typically provides the fastest performance.
- You can determine which settings are most comfortable to work with by selecting and trying each one.

- While your monitor resolution may allow you to change the font size, some programs do not support large fonts. Large fonts may cause words to appear cut off or pushed together.

Using the Windows Help function to select display properties

Windows Help provides instructions for choosing monitor settings. To select display properties, follow these steps:

1. From the Windows 95 desktop, click on the Start button.
2. Click on Help.

The Windows Help folder appears.

3. Click on the Index tab.
4. In the first box, type:

`monitor`

5. The second box will automatically display a list of tasks related to the monitor. Select the task you want and click on the Display button for instructions.

If you want to return to the Index list, click on the Help Topics button.

Controlling volume

If you purchased a multimedia computer with a CD-ROM drive, your computer may have volume controls in up to three different locations:

- On one of the speakers.
- In the multimedia software that came with your system.
- On the CD-ROM drive on the front of the system unit. (Your system may not have this volume control.) This volume control is used only to control headphone volume and has no effect on the speakers.

The control you use depends on whether you are listening to sound through the speakers or the headphones.

Adjusting the speaker volume

If you are listening to sound through the speakers, use the volume control on the front of the speaker to adjust the volume.

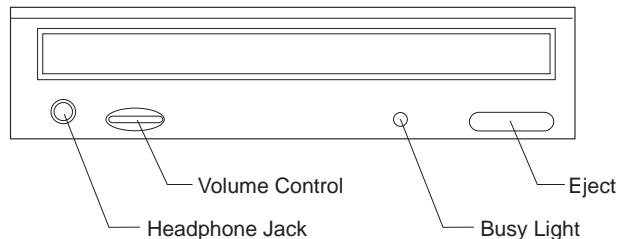
The volume control on the front of the speaker is affected by the volume control setting in the multimedia software that came with your computer. For example, if you turn the volume on the speaker up, and no sound comes out of the speakers, the volume setting in your multimedia software might be too low.

The multimedia software volume controls are located in the multimedia mixer programs.

Adjusting the headphone volume

You may be able to plug headphones into the headphone jack on the CD-ROM drive (not available on all systems) or into the Out jack on the sound card on the back of the computer's system unit.

- On some IBM Aptiva PCs, a headphone jack and a volume control are located on the CD-ROM drive on the front of the computer's system unit.



When your headphones are plugged into the headphone jack on the CD-ROM drive, they will pick up only the sound coming from an ordinary audio CD in the CD-ROM drive. The headphones will not pick up other sounds generated from your computer or any external device connected to the computer, such as a MIDI (Musical Instrument Digital Interface) keyboard.

When your headphones are plugged into this jack, use the volume control on the CD-ROM drive to adjust the volume of the headphones. This volume control adjusts the volume of the headphones, but not the speakers. If you want to turn the speaker volume down while using the headphones, use the volume control on the speaker.

- On all models of the IBM Aptiva PC, the headphones can be plugged into the Out jack on the sound card on the back of the system unit. This is the same jack you plug your speakers into. You must disconnect your speakers to use this jack with your headphones.

If you plug your headphones into the jack on the sound card, the headphones will pick up all sounds generated from your computer and any external devices connected to the computer, such as a MIDI (musical) keyboard. The headphones will also pick up sound coming from a CD in the CD-ROM drive.

note:

When your headphones are plugged into the jack on the sound card, you must control the headphone volume through the volume control in the multimedia software on your computer. You cannot control the headphone volume from the volume control on the CD-ROM drive.

When using this jack, a few sounds may not be audible through the headphones, such as the beep when you turn on your computer.

Getting ready to print

After you have attached your printer to your computer as described in the *Read me first* book, you need to install the correct printer driver for the operating system you are using. A *printer driver* is a file that describes the characteristics of your printer to the software. The software then uses the file to convert your text and graphics into a form that your printer can understand.

Windows 95 contains printer drivers for many popular printers. If you find that Windows 95 does not have the driver for your printer, use the printer drivers provided with the printer.

Windows Help provides instructions for installing the driver for your printer. To access these instructions, follow these steps:

1. From the Windows 95 desktop, click on the Start button.
2. Click on Help.
3. The Windows Help folder appears.
4. Click on the Index tab at the top of the folder.
5. In the first box, type:

`printer`

6. The second box will automatically display a list of tasks related to the printer. Select "printer drivers, installing" and click on the Display button for instructions.

note:

If you want to return to the Index list after reading the printer drivers entry, click on the Help Topics button.

7. As you follow the instructions, you will need to indicate:

- The manufacturer and the model of your printer. If you do not see the manufacturer or model name of your printer in the list, see if your printer came with a diskette that has a driver for Windows 95. If so, follow the instructions for using the diskette.

Or, your printer may have an emulation mode that allows it to print like one of the printers in the list. Look in the documentation that came with your printer to find information on emulation modes. Then select the name of one of the printers it can emulate in this list.

- The default port for your printer. Select the LPT1: ECP Printer Port option.

Setting up communications

Some IBM Aptiva computers have a modem already installed. If your computer has a modem, your computer can communicate with other computers and telephones. If your computer has a fax/data modem, your computer can also communicate with fax machines.

Before your computer can use its modem, you must complete two procedures:

- Connect the modem to the telephone network
- Configure your computer's communications software

Your communications software uses the Hayes AT command set to send and receive data over telephone lines. If you decide not to use a communications software program, you can still use your modem. See "About modems" on page 163 for information about typing AT commands at your DOS prompt. If you need more information about modems, see "How modems work" on page 165.

Connecting your modem to the telephone network

Modems are designed to operate over the *public switched telephone network* (PSTN or PSN). This is an *analog network* commonly used by most households and businesses. Connect the modem to an analog network only. If you are not sure about your telephone line, contact your local telephone company.

Before you connect your modem to a telephone network, read the safety notices in "Safety information" on page xiii.

Warning!

- *Excessive voltages can occur on telephone lines, especially during lightning storms. To avoid any possible damage to sensitive electronic parts, unplug the computer and the telephone cords during such storms.*
- *Some businesses, schools, and buildings have digital telephone systems, known as digital private branch exchange (PBX) systems. These systems do not work with the modem. Connecting your modem to a digital telephone system might damage the modem.*

The telephone line your modem uses cannot be used for any other purpose while the modem is operating. Any interruption on the line your computer is using will stop computer communications. You cannot pick up a telephone on the same line your computer is using. You must also disable any Call Waiting features on your telephone service. Contact your local telephone company for information about how to disable Call Waiting. Your telephone company might have a dialing

sequence procedure that lets you temporarily suspend Call Waiting.

If your computer's telephone line connection is interrupted during modem operation, you must clear the telephone line and restart the communication. If you were sending a fax, you must resend the fax. If you were dialed into a network (communicating with other computers), you must redial.

Configuring your communications software

Your Aptiva computer can run software programs that let you use your computer as a telephone, a telephone answering machine, and a fax machine. To configure your computer to operate as one of these machines, follow the instructions provided with your communications software programs.

Your Aptiva computer also comes with software that lets you use your computer as a terminal on a computer network. You can connect to a network through a standard telephone line or through a direct line to a local area network (LAN).

To configure your computer to use a dial-up connection over telephone lines, follow these steps:

1. From the Windows 95 desktop, double-click on the My Computer icon.
2. In the My Computer window, double-click on the Dial-Up Networking icon.

3. Follow the on-screen instructions. If you need assistance, press the F1 key to view the online help.

You can also use a Windows 95 program to configure a dial-up connection to The Microsoft Network. If you want to become a member of The Microsoft Network, follow these steps:

1. From the Windows 95 desktop, double-click on the The Microsoft Network icon.

If this icon does not appear on your desktop, open the Programs menu and click on the The Microsoft Network option.

2. Follow the on-screen instructions. If you need assistance, press the F1 key to view the online help.

Configuring your Aptiva computer for a connection to the Internet

Before you can connect to the Internet, you must connect your computer to the telephone network and configure your communications software. See "Setting up communications" on page 18 for information about these tasks.

You can connect to the Internet using the IBM Internet Connection, The Microsoft Network program, or another

service provider. If you are connected to a local area network (LAN), your LAN might provide Internet access. Your Aptiva computer comes with some software and all of the hardware required to connect to the Internet.

The IBM Internet Connection

Your Aptiva computer is already configured to use the IBM Internet Connection. To access the IBM Internet Connection, follow these steps:

1. From the Windows 95 desktop, double-click on the Information Superhighway icon.
2. In the Information Superhighway window, double-click on the Internet Registration icon.
3. Follow the on-screen instructions. If you need assistance, press the F1 key to view the online help.

The Internet Setup Wizard

Your Aptiva computer also comes with a program that guides you through the steps for connecting to the Internet. You can use this program, called a *wizard*, to set up an Internet connection using The Microsoft Network or any other service provider.

To start the Internet Setup Wizard, follow these steps:

1. From the Windows 95 desktop, click on the Start button.
2. Move your mouse pointer to the Programs menu, then the Accessories menu, and finally the Internet Tools menu.
3. Click on the Internet Setup Wizard option.

The wizard lists the information you need to collect for your connection and then takes you through the steps required to connect. Follow the on-screen instructions. If you need assistance, press the F1 key to view the online help.

note:

You can also set up your connection to The Microsoft Network using the instructions in "Configuring your communications software" on page 19.

Understanding the Rapid Resume features **3**

The IBM Aptiva Personal Computer comes with a set of energy-saving features, called the Rapid Resume features. Using the Rapid Resume features, your computer can perform certain tasks unattended or in less time. For example, you can set up your computer to automatically turn on, run a program, and turn back off again. You can also reduce the amount of time required to start your computer.

You can view or change the current settings for the Rapid Resume features in two locations. On your Windows 95 desktop, you can open the Rapid Resume Manager. In the Setup Utility, you can open a menu for Rapid Resume settings.

In the Rapid Resume Manager, you can work with the basic Rapid Resume features. See the following sections for descriptions of these features:

- "Rapid Resume" on page 22
- "Automatic Power Off" on page 23
- "Standby" on page 24
- "Snapshot" on page 24
- "Scheduler" on page 25
- "Automatic Power On" on page 25
- "Wake Up on Ring" on page 26
- "Ring Indicator" on page 26

In the Setup Utility, you can work with all the features that are available in the Rapid Resume Manager except the Scheduler. In addition, you can work with the following Rapid Resume features:

- APM BIOS Mode
- Initialize Adapter Cards
- Halt CPU When Idle
- Blink Power Light
- Check Keyboard and Mouse Activity
- Check Hard Disk and CD-ROM Activity
- Check Serial Port Activity
- Check Parallel Port Activity
- Check Other Device Activity
- On/Off Button Mode

For general instructions on using the Setup Utility, see "Using the Setup Utility" on page 29. See "Changing Rapid Resume features configuration" on page 37 for descriptions of all of the Rapid Resume features that are available from the Setup Utility.

Starting the Rapid Resume Manager

To start the Rapid Resume Manager, follow these steps:

1. Double-click on the AptivaWare icon on your desktop.
2. When the AptivaWare window appears, double-click on the Rapid Resume Manager icon.

The Rapid Resume Manager window contains these four icons:

- Rapid Resume
- Standby
- Scheduler
- Wake Up on Ring

Click on any of these icons to view or change Rapid Resume features. Note that some of the Rapid Resume features work only when you have enabled other Rapid Resume features.

This book describes the Rapid Resume features and tells you how to find each of these features in the Rapid Resume Manager. For help with configuring Rapid Resume features, see the online instructions and help screens in each window.

To view an online tutorial about the Rapid Resume features, follow these steps:

1. In the Rapid Resume Manager window, double-click on the Rapid Resume icon.
2. When the Rapid Resume window opens, click on the Tutorial button to learn about the Rapid Resume features.

Rapid Resume features

In the Rapid Resume window, you can work with settings for these features:

- Rapid Resume
- Automatic Power Off

Rapid Resume

The Rapid Resume feature works like a bookmark for your desktop. It saves the state of your computer when you turn it off and returns to that state the next time you turn your computer on. Your software programs and any open data files appear just as you left them. This feature reduces the amount of time required for your computer to start up.

As part of a normal routine, each time you use your computer, your computer stores information about the programs you have running and any data you are

working on in those programs in working memory. Your computer can access this working memory very quickly, but it does not automatically keep the data in this area when you turn your computer off. If you want to continue working where you left off the next time you turn on your computer, you must start your software programs again and reopen your data files. Any personal data you did not save to a file before you turned your computer off is lost. (Saved files are not lost.)

If you enable Rapid Resume before you turn off your computer, Rapid Resume stores the program information and unsaved personal data from the working memory area to a special file on your hard disk. (This is called *suspending*.) Then when you turn on your computer again, Rapid Resume uses this special file to restore your desktop. (This is called *resuming*.) Personal data you did not save to file before you turned off your computer is also restored.

note: *It is always a good idea to save all personal data to a file periodically and before you turn your computer off.*

To enable (turn on) or disable (turn off) the Rapid Resume feature, double-click on the Rapid Resume icon in the Rapid Resume Manager window. The Rapid Resume window appears. Follow the instructions on the screen. If you need help, press F1.

With the Rapid Resume feature enabled, you can save your desktop by selecting Suspend from the Start button on your desktop when you are ready to turn off your computer. Suspend saves your desktop and then turns off your computer. To specify whether the on/off button on your system unit saves your desktop before

turning off the power, you must use the Setup Utility. See “On/off button mode” on page 41 for these instructions.

For more technical information about the Rapid Resume feature, refer to the README.TXT file located in the IBMTTOOLS directory of your computer.

Automatic Power Off

The Automatic Power Off feature automatically turns off your computer when you have not used your computer for an amount of time you specify. If you have an energy saving monitor, this feature can also turn off your monitor.

In the Setup Utility, you can specify which devices your computer checks to determine whether you are using your computer. For these instructions, see “Rapid Resume advanced options” on page 40.

You can enable the Automatic Power Off feature only after you enable the Rapid Resume feature. Rapid Resume saves the state of your desktop when Automatic Power Off turns off your computer.

To enable or disable the Automatic Power Off feature, double-click on the Rapid Resume icon in the Rapid Resume Manager window. When the Rapid Resume window appears, enable Rapid Resume and click on the Set Options button. The Rapid Resume Options window appears. Follow the instructions on the screen. If you need help, press F1.

Standby features

In the Standby window, you can work with settings for these features:

- Standby
- Snapshot

Standby

The Standby feature puts your computer into a state of reduced power consumption (as if it were napping) when you have not used the computer for an amount of time you specify. If you have an energy saving monitor, then the monitor's display goes blank when the computer enters Standby.

In the Setup Utility, you can specify which devices your computer checks to determine whether you are using your computer. For these instructions, see "Rapid Resume advanced options" on page 40.

Once your computer enters Standby, you can use any of the checked devices to return to your desktop. For instance, unless you turn off checking for the mouse and the keyboard in the Setup Utility, you can press any key or move the mouse at any time to return to your desktop.

note:

If you are using the Automatic Power Off feature, the time you set for Standby must be less than the time you set for Automatic Power Off. Otherwise, your computer will turn off before it can enter Standby.

To enable or disable the Standby feature, double-click on the Standby icon in the Rapid Resume Manager window. The Standby window appears. Follow the instructions on the screen. If you need help, press F1.

Snapshot

The Snapshot feature saves the state of your computer when it enters Standby. With this feature, if the power supply to your computer is interrupted while your computer is in Standby, your desktop is restored when power is returned.

To enable or disable the Snapshot feature, double-click on the Standby icon in the Rapid Resume Manager window. When the Standby window appears, select the number of minutes before the computer enters Standby and then click on the Snapshot option under the Options menu. You can enable the Snapshot feature only after you enable the Standby feature. If you need help, press F1.

Scheduler features

In the Scheduler window, you can work with settings for these features:

- Scheduler
- Automatic Power On

Scheduler

The Scheduler feature performs activities you specify at times you specify. If you use Scheduler with Rapid Resume, you can schedule activities to occur even when your computer is turned off. This feature can turn on your computer, run a program, and then turn off your computer. You can schedule activities to occur once, hourly, daily, during weekdays, and weekly.

To enable or disable the Scheduler feature, double-click on the Scheduler icon in the Rapid Resume Manager window. The Scheduler window appears. Follow the instructions on the screen. If you need help, press F1.

Automatic Power On

The Automatic Power On feature turns on your computer at a time you specify. If you want to turn on your computer automatically without scheduling any other activity, you can use the Automatic Power On feature.

To enable or disable the Automatic Power On feature, double-click on the Scheduler icon in the Rapid Resume Manager window. When the Scheduler window appears, click on the Automatic Power On button. The Automatic Power On window appears. Follow the instructions on the screen. If you need help, press F1.

Wake Up on Ring features

In the Wake Up on Ring window, you can work with settings for these features:

- Wake Up on Ring
- Ring Indicator

To use these features, your computer must have an Mwave card, an internal modem that supports Wake Up on Ring, or an external modem connected to serial port A. The modem must be connected to the telephone line.

Wake Up on Ring

The Wake Up on Ring feature turns on your computer when the telephone rings. With this feature, you can receive phone calls, messages, faxes, and data at any time without leaving your computer on.

note: *With Wake Up on Ring, your computer may turn on automatically when you dial out on a rotary or pulse telephone. If this occurs, disable the Wake Up on Ring feature and use it only when you know you will have incoming fax communications.*

To enable or disable the Wake Up on Ring feature, double-click on the Wake Up on Ring icon in the Rapid Resume Manager window. The Wake Up on Ring window appears. Follow the instructions on the screen. If you need help, press F1.

Ring Indicator

The Ring Indicator feature works with the Automatic Power Off feature. If both features are enabled, then the system unit's power light flashes after your computer turns on to answer a telephone ring and then turns off again.

To enable or disable the Ring Indicator feature, double-click on the Wake Up on Ring icon in the Rapid Resume Manager window. When the Wake Up on Ring window appears, enable the Wake Up on Ring feature and then select the Ring Indicator option under the Options menu. You can enable the Ring Indicator feature only after you enable the Wake Up on Ring feature. If you need help, press F1.

How Rapid Resume features change your computer's behavior

The following table describes the way your computer normally operates when each of the Rapid Resume features is enabled (turned on).

Table 1: Rapid Resume feature behaviors

| Behavior: | Feature and explanation: |
|---|---|
| Computer does not automatically go into Standby when AutoPlay is enabled. (In Windows 95, you can turn on AutoPlay for CDs. With AutoPlay enabled, audio CDs start to play automatically when you put them into the CD-ROM drive.) | Feature: Standby If AutoPlay is enabled, your computer will not enter Standby unless you disable hard drive and CD-ROM drive checking in the Setup Utility. For information about these Setup Utility options, see "Rapid Resume advanced options" on page 40. |
| Computer waits before turning off. | Feature: Rapid Resume It can take up to several seconds before Rapid Resume saves the desktop and turns off the computer. |

Table 1: Rapid Resume feature behaviors

| Behavior: | Feature and explanation: |
|---|---|
| Computer won't start from diskette if Rapid Resume is enabled. | <p>Feature: Rapid Resume</p> <p>After you turn on the computer, press Ctrl + Alt + Delete when you see the Rapid Resume screen. There may be a slight delay before the computer restarts.</p> <p>Note that using Ctrl + Alt + Delete will cause the loss of your saved desktop. If possible, first start your computer without the diskette and save any unsaved information. Then exit Windows. After you have exited Windows, then insert the diskette and press Ctrl + Alt + Delete.</p> |
| System unit and monitor are on, but nothing is displayed on the screen. | <p>Feature: Standby</p> <p>This is a normal function of the Standby feature. To exit Standby, use any of the devices your computer checks for activity. For information about these checked devices, see "Standby" on page 24.</p> |
| Delay before mouse works. | <p>Feature: Standby</p> <p>When your computer comes out of Standby, and the desktop reappears, it may take a few seconds for the mouse to become active.</p> |

Table 1: Rapid Resume feature behaviors

| Behavior: | Feature and explanation: |
|---|--|
| System unit power light is blinking while the system unit is on. | <p>Feature: Standby</p> <p>This is a normal function of the Blink Power Light feature. You can turn this feature on and off only in the Setup Utility.</p> |
| Computer comes on when you haven't pushed the on/off button. | <p>Feature: Scheduler or Automatic Power On</p> <p>This is a normal function of the Scheduler feature. You can schedule your computer to come on at a specific date and time.</p> |
| System unit power light is blinking, but system unit is turned off. | <p>Feature: Ring Indicator, with Wake Up on Ring</p> <p>This is a normal function of the Wake Up on Ring feature. It indicates that your computer turned on to receive data, a fax, or a voice message.</p> |
| Computer comes on when the phone rings. | <p>Feature: Wake Up on Ring</p> <p>This is a normal function of the Wake Up on Ring feature. You can set up your computer to turn itself on when the phone rings to receive data, a fax, or a voice message.</p> |

Viewing and changing Aptiva configuration **4**

Your IBM Aptiva Personal Computer comes from the factory configured for immediate use. You can view your computer's configuration settings using the Setup Utility and the Windows 95 Device Manager.

You can also use these configuration utilities to change some configuration settings. For instance, if you add or replace hardware inside your system unit, you might need to verify or update specific settings. For information about working with your system unit's hardware, see "Part 3: Upgrading and replacing hardware" on page 49.

This chapter contains the following sections to help you personalize or reconfigure your computer:

- "Using the Setup Utility" on page 29
- "Using other configuration utilities" on page 47

Using the Setup Utility

The Setup Utility lets you view and change important information about your computer and its hardware. You might need to use the Setup Utility if you upgrade the hardware in your computer or if you get an error message while using your computer.

In most circumstances, when you add or replace hardware in your system unit, your computer's *Basic Input/Output System (BIOS)* detects the hardware changes and updates the Setup Utility automatically. In some cases, however, especially if you purchase hardware that does not meet Plug and Play requirements, you might need to manually change the configuration information in the Setup Utility. If you remove hardware, in some cases, an online message asks you to check the Setup Utility to verify that automatic detection made the correct configuration changes.

Of course, you can always use the Setup Utility just to view information about your system's hardware configuration. In general, the Setup Utility contains the following hardware and configuration information:

- Processor speed
- System, cache, and video memory
- Diskette, hard disk, and CD-ROM drives
- Serial and parallel ports
- Rapid Resume features

- Plug and Play and ISA Legacy resource assignments
- Startup options
- Model information
- Date and time
- Security options

Some of the options in the Setup Utility are strictly informational, such as system and model information. Other options let you control how your computer operates. For example, you can use the Setup Utility to:

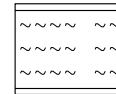
- Create or change a power-on password.
- Reduce energy consumption with Rapid Resume features, such as Rapid Resume, Standby, or Automatic Power Off.
- Enable or disable the system memory test.
- Enable or disable the virus detection provided with your BIOS. (You cannot use the Setup Utility to turn off the IBM AntiVirus program or any antivirus protection that is provided with additional products.)

Starting the Setup Utility

Sometimes, when you get an error message, your computer displays a message window with an error code and a description of the problem. When this occurs, you can press the Enter key to get the Setup Utility Main Menu. Otherwise, to access the Setup Utility, you must either start or restart your computer.

To start the Setup Utility when your computer is on, follow these steps:

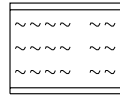
1. Save all open files and close all software programs.
2. Click on the Start button on your Windows 95 desktop.
3. Click on the Shut Down option.
4. From the Shut Down Windows window, restart the computer.
5. When the following symbol appears at the top right corner of the screen, press F1:



To start the Setup Utility when your computer is off, follow these steps:

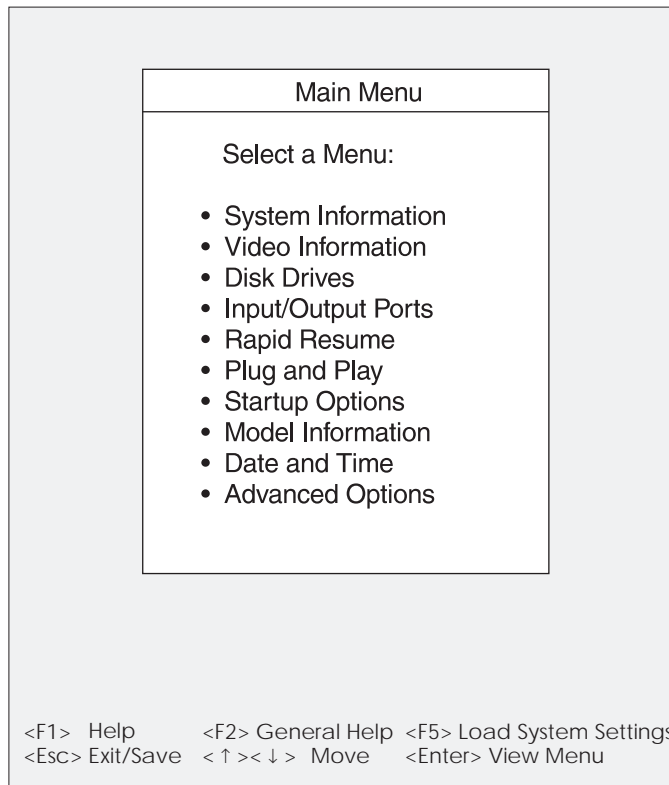
1. Turn on your monitor.
2. Turn on your system unit.

3. When the following symbol appears at the top right corner of the screen, press F1:



note: *The Main Menu you see on your computer may look slightly different from the menu shown here, but it will operate the same way.*

The Setup Utility Main Menu appears:



Working with the Setup Utility menus

The Setup Utility Main Menu lists options that identify system configuration topics. When you select one of these options, an additional menu appears.

To select and move through Setup Utility options, you must use the keyboard. To move through menus, press the down (↓) or up (↑) arrow key on the keyboard until the option you want is highlighted. To select a highlighted menu option, press the Enter key.

To move through menus, use the following keys:

| Keys | Function |
|------|---|
| ↑ ↓ | Use these arrow keys to highlight an option on the menu. (Press the Enter key to choose the option.) |
| ← → | Use these arrow keys to make a selection and change an option's setting. On some menus, you can use these keys to move from one field to another. |
| + | Use this key on some menus to increase the numerical value of a setting. |
| - | Use this key (the minus or hyphen key) on some menus to decrease the numerical value of a setting. |

| Keys | Function |
|-------|---|
| F1 | Press this key if you want help for a selected menu option. |
| F2 | Press this key if you want general information on using the Setup Utility. |
| F5 | Press this key if you want to return the Setup Utility settings to the factory defaults (the original settings that were installed at the factory). |
| Esc | After viewing or making changes to the settings on a menu, press this key to exit the menu. |
| Enter | Press this key to choose a highlighted option from a menu. |

note:

Not all of these keys are available on every menu. The keys that are available on each menu are displayed at the bottom of the menu.

Changing and restoring settings

In Setup Utility menus, the configuration information you can change is enclosed in brackets like these: []. You cannot change information that is not surrounded by brackets.

When you make a change, the ► symbol or an asterisk (*) appears next to the changed option. If you return the changed option to its original setting, the symbol disappears.

When you complete your changes or finish viewing information, return to the Main Menu. From this location, you can exit the Setup Utility and save your changes or exit without saving your changes.

To exit the Setup Utility, follow these steps:

1. From the Main Menu, press the Esc key.
2. The Exit Setup Utility menu appears. If you have made changes in the Setup Utility, it will contain an option for saving your changes.
 - If you would like to save your changes, highlight the option to save your changes and exit the Setup Utility, then press Enter.
 - If you do not want to save your changes, highlight the option to exit the Setup Utility without saving, then press Enter.

Restoring factory settings

When you purchase an Aptiva computer, it is already configured for use. The Setup Utility stores these original configuration settings, called *factory settings*, so that you can return to the original configuration at any time. If you have made changes in the Setup Utility and you would like to restore the factory settings, follow these steps:

1. From the Main Menu, press the F5 key.

The Load System Settings menu appears.
2. Highlight the option to reload the factory settings, then press Enter.
3. Exit from the Setup Utility and save your changes.

Viewing system information

From the Setup Utility Main Menu, select the System Information option to view information about the hardware installed on your computer. You cannot use this menu to change information. The Setup Utility automatically updates this menu when you:

- Add or change hardware on your computer
- Make changes to other menus in the Setup Utility and save those changes

The System Information menu contains information about the processor, memory, drives, and ports installed in your system. This menu also shows if the mouse is installed.

Changing video configuration

From the Setup Utility Main Menu, select the Video Information option to view or change video configuration settings. The Video Information menu appears. This menu contains information-only options and configurable options.

Video controller

This option displays the name of the video controller installed on your system.

Video memory

This option displays the amount of memory your computer uses for video. Your computer's video memory is actually part of your system memory (RAM). The amount of memory you select here will be subtracted from system memory. If your computer has 16MB of RAM and you select 2MB for video memory, your computer will have 14MB of system memory left.

If your computer has 16MB of system memory, you can select either 1MB (1024KB) or 2MB (2048KB) of video memory. You should not select 2MB of video memory unless you have at least 10MB of system memory.

Changing disk drive configuration

If you install a new diskette, hard disk, or CD-ROM drive, you should enter the Setup Utility to identify or verify the type of drive you installed.

From the Setup Utility Main Menu, select the Disk Drives option to view or change disk drive configuration settings. The Disk Drives menu appears. It shows the size of the drives installed in your computer and indicates what additional drives can be installed.

Diskette drive (A: or B:)

These options display the size and storage capacity of the currently installed diskette drive or drives. Empty drive bays are indicated with a "Not installed" setting. Your Aptiva computer comes with a diskette drive A:. If you add an additional diskette drive, it will be designated as diskette drive B:.

Hard disk drive and CD-ROM drive

These options display the hard disk and CD-ROM drives that either are already installed or can be installed in your computer. You can have a maximum of four IDE drives installed.

The drives are identified as follows:

- *Hard Disk Drive 1* is attached to Local Bus connector 1 on the system board and set as the master device. This is the hard disk that comes preinstalled with your computer.
- *Hard Disk Drive 2* (if installed) is attached to Local Bus connector 1 on the system board and set as the slave device.
- *CD-ROM Drive 3* is attached to Local Bus connector 2 on the system board and set as the master device. This is the CD-ROM drive that comes preinstalled with your computer.
- *Hard Disk Drive 4* (if installed) is attached to Local Bus connector 2 on the system board and set as the slave device.

To see if a drive is installed, highlight the option for that drive and press Enter. The screen for that drive appears. This screen can have all or some of the following options.

Size

This option displays the size of the installed drive. If your computer does not have a drive installed in this bay, the setting is "Not installed."

Local bus IDE mode

This option lets you set the speed (performance) at which the drive will transfer data. To get the best disk performance, run IDE drives (such as a hard disk or CD-ROM drive) in High Performance mode.

Read prefetch

If the Local Bus IDE Mode setting is High Performance, you can enable this option for maximum hard disk performance. This option is not available for CD-ROM drives.

note: *Some operating systems, such as Windows NT and OS/2, may require this option to be disabled.*

Disk BIOS translation

With most operating systems, this option lets your computer use IDE hard disks larger than 528MB.

note: *You may need to disable this option if you are using Novell Netware with IDE hard disks larger than 528MB.*

You can choose to have a hard disk use Logical Block Addressing (LBA) or Cylinder/Head/Sector (CHS) format. If you purchase a new hard disk and it supports LBA, you should select the LBA format for that disk.

If you install a hard disk that was previously used on another computer, you should select the translation mode that was used for the disk on the other computer. For example, you should not select the LBA format option if the hard drive you are using is formatted in CHS.

Changing input/output port configuration

From the Setup Utility Main Menu, select the Input/Output Ports option to view or change port configuration settings. The Input/Output Ports menu appears. This menu lets you configure serial and parallel ports. It also displays whether a mouse is installed and lets you configure specific keyboard settings.

Serial port (A or B)

These options display the current addresses for the serial ports on your system board. Your computer comes with two serial ports.

If you install an adapter card with a serial port, an error message will notify you if you have an address conflict among the serial ports. Use this menu to make sure that each serial port has a different address. If you change serial port addresses in this menu, you might also need to make changes in the software that uses serial ports. For instructions on changing your software, see the user's guide or online information that came with the software.

Parallel port

This option displays the current address for the parallel port on your system board. Your computer comes with one parallel port.

If you install an adapter card with a parallel port, an error message will notify you if you have an address conflict between the parallel ports. Use this menu to make sure that each parallel port has a different address. If you change parallel port addresses in this menu, you might also need to make changes in the software that uses the parallel port. For instructions on changing your software, see the user's guide or online information that came with the software.

Parallel port mode

As long as the Parallel Port setting is not Disabled, this option lets you choose an operational mode for the parallel port.

You can choose either the Compatible mode or one of the extended modes (ECP, EPP, or PS/2 Bidirectional) for a parallel port. The parallel port extended modes will increase the efficiency of your parallel port; however, the extended modes use recent technology and are only supported by newer hardware (such as some printer models). The available extended modes are:

- PS/2 Bidirectional

This mode is used for data transfer to other PC systems and supported devices.

- ECP

The Extended Capabilities Port mode (ECP) provides higher speed data transfers than the Compatible mode. It is used for high-speed printers and other devices.

- ECP and EPP 1.7

This mode combines the capabilities of the Extended Capabilities Port (ECP) and Enhanced Parallel Port (EPP) modes. This mode is not compatible with the ECP and EPP 1.9 mode.

- ECP and EPP 1.9

This mode combines the capabilities of the Extended Capabilities Port (ECP) and Enhanced Parallel Port (EPP) modes. This mode is not compatible with the ECP and EPP 1.7 mode.

If you change the mode of a parallel port on an adapter card, you might need to make changes to the port's adapter card and its software. See the user's guide or online information that came with the adapter card.

Mouse

This option shows if a mouse is installed.

Keyboard NumLock state

This option displays whether the NumLock function on the keyboard turns on automatically each time you turn your computer on. You can change this setting to On or Off.

Keyboard speed

This option displays the speed at which your keyboard responds when you hold down a key. The Normal rate is 10 characters per second. The Fast rate is 30 characters per second. You can select the speed that is most comfortable to you.

For example, if your keyboard speed is set for the Fast rate and you hold down one of the arrow keys, the

cursor moves three times faster than it would if your keyboard speed were set for the Normal rate.

Changing Rapid Resume features configuration

The Rapid Resume features are a set of IBM energy-saving features that lets you set up your computer to perform certain tasks unattended. For information about these features and how to enable and disable them from your desktop, see “Understanding the Rapid Resume features” on page 21.

The Setup Utility lets you configure additional settings you cannot configure from your Windows 95 desktop. From your desktop, you can enable and disable Rapid Resume features and specify how they work. In the Setup Utility, you can enable and disable some of the same features and configure specific hardware settings.

The changes you make in the Setup Utility appear in the Rapid Resume Manager windows on your desktop. The changes you make in the Rapid Resume Manager windows on your desktop also appear in the Setup Utility.

From the Setup Utility Main Menu, select the Rapid Resume option to view or change Rapid Resume features settings. The Rapid Resume menu appears.

APM BIOS mode

The Basic Input/Output System (BIOS) controls the basic hardware operations in your computer. The APM BIOS Mode option allows you to enable or disable communications between the BIOS and the operating system’s advanced power management (APM) driver.

You must have APM BIOS mode enabled to use Rapid Resume features.

Rapid Resume

This option lets you enable or disable the Rapid Resume feature. With this feature, you can set up your computer to *suspend*, which saves your desktop when you turn off your computer. For more information about the Rapid Resume feature, see “Rapid Resume” on page 22.

Enable this option to change the following options:

- Automatic Power Off
- Initialize Adapter Cards

Automatic Power Off

If the Rapid Resume option is enabled, you can use the Automatic Power Off feature to set up your computer to turn itself off when you leave it on but unused for a specified period of time. If you enable this feature, you can specify up to 90 minutes for the delay between the time you stop using your computer to the time it turns itself off. For more information about the Automatic Power Off feature, see “Automatic Power Off” on page 23.

For information about how you can define which devices your computer checks to determine whether you are using your computer, see “Rapid Resume advanced options” on page 40.

Initialize adapter cards

If the Rapid Resume option is enabled, you can use the Initialize Adapter Cards option to indicate whether your adapter cards will be restarted (initialized) when you turn on your computer. When adapter cards are initialized, the device drivers for the cards are reloaded.

This option might be required for adapter cards that do not support power management.

Standby

This option lets you enable or disable the Standby feature. With this feature, you can set up your computer to consume less power if you leave it on but unused for a specified period of time. If you enable this feature, you can specify up to 90 minutes for the delay between the time you stop using your computer to the time it enters Standby. For more information about the Standby feature, see “Standby” on page 24.

note:

If you are using the Automatic Power Off feature, the time you set for Standby must be less than the time you set for Automatic Power Off. Otherwise, your computer will turn off before it enters Standby.

For information about how you can define which devices your computer checks to determine whether you are using your computer, see “Rapid Resume advanced options” on page 40.

Enable the Standby option to change the following options:

- Snapshot
- Halt CPU When Idle
- Blink Power Light

Snapshot

If the Rapid Resume and Standby options are enabled, you can use the Snapshot option to save the state of your desktop when your computer enters Standby. For more information about the Snapshot feature, see “Snapshot” on page 24.

Halt CPU when idle

If the Standby option is enabled, you can use the Halt CPU When Idle option to stop the central processing unit (CPU) during Standby. This conserves power without affecting the operation of your computer.

Blink power light

If the Standby option is enabled, you can use the Blink Power Light option to specify whether you want the system unit's power light to blink when your computer is in Standby.

Wake Up on Ring

This option lets you enable or disable the Wake Up on Ring feature. With this feature, you can set up your computer to turn itself on when the telephone rings. For more information about the Wake Up on Ring feature, see "Wake Up on Ring" on page 26.

Enable this option to change the following option:

- Ring Indicator

To use this feature, you must have an internal modem that supports Wake Up on Ring or an external modem connected to serial port A. The modem must be connected to the telephone line.

note:

With Wake Up on Ring, your computer may turn on automatically when you dial out on a rotary or pulse telephone. If this occurs, disable the Wake Up on Ring feature and use it only when you know you will have incoming fax communications.

Ring indicator

If the Wake Up on Ring option is enabled, you can use the Ring Indicator option to specify whether your system unit's power light flashes after your computer turns itself on to answer a telephone ring and then turns itself off again. For more information about the Ring Indicator feature, see "Ring Indicator" on page 26.

Automatic Power On

This option lets you enable or disable the Automatic Power On feature. With this feature, you can schedule your computer to turn itself on at a specified date and time. For more information about the Automatic Power On feature, see "Automatic Power On" on page 25.

Enable this option to change the following options:

- Power On Date
- Power On Time

You can schedule your computer to turn itself on just once or on a daily basis.

Power on date

When you enable the Automatic Power On option, use the Power On Date option to specify the date on which you want your computer to turn itself on.

Power on time

When you enable the Automatic Power On option, use the Power On Time option to specify the time at which you want your computer to turn itself on.

Enter the date in the format shown on the screen. Enter the time in 24-hour format (hours and minutes). For example:

- 12 midnight is 00:00
- 12 noon is 12:00
- 1 p.m. is 13:00

Rapid Resume advanced options

Select this option to open the Rapid Resume Advanced Options menu. In this menu, you can define which devices your computer checks to determine whether you are using your computer. You can also control how the on/off button on your system unit works with the Rapid Resume feature.

Check keyboard and mouse activity

Use this option to specify whether your computer checks the keyboard and the mouse to determine whether you are using your computer.

If the Standby feature is enabled and you enable this setting, your computer will not enter Standby while you are using the keyboard or the mouse. You can also return to your desktop from Standby if you press a key on the keyboard or move the mouse.

If the Automatic Power Off feature is enabled and you enable this setting, your computer will not turn itself off while you are using the keyboard or the mouse.

Check hard disk and CD-ROM activity

Use this option to specify whether your computer checks all hard disk and CD-ROM drives to determine whether you are using your computer.

If the Standby feature is enabled and you enable this setting, your computer will not enter Standby while any hard disk or CD-ROM drive is active. If your computer enters Standby, it will return to the desktop when one of the drives becomes active.

If the Automatic Power Off feature is enabled and you enable this setting, your computer will not turn itself off while any hard disk or CD-ROM drive is active.

Check serial port activity

Use this option to specify whether your computer checks serial ports A and B to determine whether you are using your computer.

If the Standby feature is enabled and you enable this setting, your computer will not enter Standby while serial port A or serial port B is active. If your computer enters Standby, it will return to the desktop when either of these ports becomes active.

If the Automatic Power Off feature is enabled and you enable this setting, your computer will not turn itself off while either serial port is active.

Check parallel port activity

Use this option to specify whether your computer checks the parallel port to determine whether you are using your computer.

If the Standby feature is enabled and you enable this setting, your computer will not enter Standby while the parallel port is active. If your computer enters Standby, it will return to the desktop when the parallel port becomes active.

If the Automatic Power Off feature is enabled and you enable this setting, your computer will not turn itself off while the parallel port is active.

Check other device activity

Use this option to select a device or group of devices for your computer to check to determine whether you are using your computer. You can select from a list of drives or adapter card functions.

If the Standby feature is enabled and you enable this setting, your computer will not enter Standby while the selected device is active. If your computer enters Standby, it will return to the desktop when the selected device becomes active.

If the Automatic Power Off feature is enabled and you enable this setting, your computer will not turn itself off while the selected device is active.

On/off button mode

Use this option to control whether the Rapid Resume feature works with the on/off button on your system unit.

If you select the Rapid Resume setting, then when you use the on/off button to turn off your system unit, your computer saves the state of your desktop and then turns your system unit off. The next time you turn your computer on, the desktop appears the way you left it.

If you select the Power Off setting, then when you use the on/off button to turn off your system unit, your computer turns off immediately and does not save the state of your desktop. You can still have Rapid Resume save your desktop, however, by selecting Suspend from the Start button on your desktop when you are ready to turn off your computer.

As with all Setup Utility settings, you must save your changes and exit the Setup Utility before the new settings can take effect. If you change the On/Off Button Mode setting from Power Off to Rapid Resume and then press the on/off button on your system unit before you save and exit from the Setup Utility, Rapid Resume will not be set to work with your on/off button.

Changing adapter card device information

When you install a new Plug and Play adapter card, the Basic Input/Output System (BIOS) can automatically detect it and configure your computer to use it. If you install a non-Plug and Play or a non-PCI adapter card, the BIOS does not detect it. Instead, you must enter the Setup Utility to dedicate ISA Legacy resources for the card.

From the Setup Utility Main Menu, select the Plug and Play option to view or change adapter card configuration settings. The Plug and Play menu appears. This menu indicates how many Plug and Play cards are installed. It also provides access to another menu for configuring non-Plug and Play or non-PCI adapter cards.

Plug and Play cards detected

This option indicates the number of Plug and Play adapter cards installed in your computer.

ISA Legacy resources

This option lets you configure non-Plug and Play adapter cards, which are not automatically detected by your computer. You must identify the following ISA Legacy resources as dedicated to your new adapter card so the BIOS does not attempt to assign them to Plug and Play cards:

- Memory Resources
- I/O Port Resources
- DMA Resources
- Interrupt Resources

Each of the options on the ISA Legacy Resources menu opens another menu.

Memory resources

Select this option to open the Memory Resources menu, where you can allocate system memory regions for the adapter card. This menu lists the hexadecimal addresses of the available memory regions. You allocate memory to an adapter card by selecting the Not Available setting for a particular hexadecimal address.

Be sure to read the documentation that came with your new adapter card. You may need to make changes to the card to accommodate the selections you make for Memory Resources. For example, you may have to move jumpers or switches on the adapter card, or make changes to the software that came with the adapter card.

I/O port resources

Select this option to open the I/O Port Resources menu, where you can allocate input/output ports for the adapter card. This menu lists the hexadecimal addresses of the available I/O ports. You allocate I/O Ports to an adapter card by selecting the Not Available setting for a particular hexadecimal address.

Be sure to read the documentation that came with your new adapter card. You may need to make changes to the card to accommodate the selections you make for I/O Port Resources. For example, you may have to move jumpers or switches on the adapter card, or make changes to the software that came with the adapter card.

DMA resources

Select this option to open the DMA Resources menu, where you can allocate direct memory access (DMA) channels for the adapter card. This menu lists the channel assignments for DMA. DMA allows I/O devices to transfer data to and from memory. You allocate DMA channels to an adapter card by selecting the Not Available setting for a particular channel.

Be sure to read the documentation that came with your new adapter card. You may need to make changes to the card to accommodate the selections you make for DMA Resources. For example, you may have to move jumpers or switches on the adapter card, or make changes to the software that came with the adapter card.

Interrupt resources

Select this option to open the Interrupt Resources menu, where you can allocate interrupt requests (IRQs) for the adapter card. This menu lists the system IRQs and their functions. You allocate IRQs to an adapter card by selecting the Not Available setting for a particular IRQ.

Be sure to read the documentation that came with your new adapter card. You may need to make changes to the card to accommodate the selections you make for Interrupt Resources. For example, you may have to move jumpers or switches on the adapter card, or make changes to software that uses the adapter card.

Configuring startup options

From the Setup Utility Main Menu, select the Startup Options option to view or change startup configuration settings. The Startup Options menu appears. This menu identifies the startup devices and provides options for enabling and disabling the system memory test and virus detection.

Startup devices (first - fourth)

When you turn your computer on, it searches for the operating system files. Your computer can search for these files on a hard disk, a CD-ROM, a diskette, an adapter card, or a network. The Startup Devices options let you specify the order in which the computer searches devices for the operating system files.

For example, if you select diskette drive A as the First Startup Device, and Hard Disk 1 as the Second Startup Device, your computer will search for the operating system files on diskette drive A first and hard disk 1 second.

note: *Hard disk 1 is the hard disk that came preinstalled in your computer. For more information, see “Changing disk drive configuration” on page 33.*

Note that if you select a hard disk drive as your first startup device and your system becomes corrupted, you might not be able to recover lost or corrupted files using the *Product Recovery CD-ROM*. See “Recovering factory installed programs and files” on page 148 for recovery instructions.

System memory test

This option lets you enable or disable the system memory test, which is part of the *power-on self test (POST)*. The POST is a series of tests that check components of your computer for proper operation each time you turn your computer on. Disabling the system memory test saves time when you turn on your computer. Your operating system and programs become available sooner.

Virus detection

This option lets you specify whether you want the virus checker that comes with your computer’s BIOS to check for viruses each time you turn on your computer.

When this virus detection is enabled, your computer checks the master boot record to see if the information there has changed since the last time you turned on the computer. If the information has changed, the BIOS displays a message that warns that your computer may have a virus.

note: *This option does not have an effect on the IBM AntiVirus program or on additional virus checking programs you may have purchased. It also does not remove viruses from your computer.*

Viewing model information

From the Setup Utility Main Menu, select the Model Information option to view information about your computer model. You cannot change any information in this menu. The Setup Utility automatically updates this screen only if the Basic Input/Output System (BIOS) is upgraded.

The Model Information menu contains the following information:

- Model Number
- Serial Number
- BIOS Version
- BIOS Date

Setting the date and time

From the Setup Utility Main Menu, select the Date and Time option to view or change the system clock. The Date and Time menu appears.

If you change the system date, enter the date in the format shown on the screen. If you change the time, enter the time in 24-hour format (hours, minutes, seconds). For example:

- 12 midnight is 00:00:00
- 12 noon is 12:00:00
- 1 p.m. is 13:00:00

Configuring advanced options

From the Setup Utility Main Menu, select the Advanced Options option to view or change a variety of configuration settings. The Advanced Options menu appears, with the following options:

- Security Options
- Cache Options
- ROM Shadowing
- PCI Card Options
- Memory Timing

Each of these options opens an additional menu.

Security options

The Security Options menu lets you configure the following options:

- Power-on Password
- Diskette Drive Access
- Operate without Keyboard
- Operate without Diskette Drive(s)

Power-on password

Select this option to open the Power-on Password menu. In this menu, you can set up a password to restrict the use of your computer. You can also change or remove the password.

If you set up a power-on password, you must type this password each time your computer is turned on. If you do not type the correct password, you cannot use your computer.

note: *The power-on password does not appear on the screen when you type it.*

The power-on password can be up to seven characters long (letters, numbers, or both). *Once you create your password, be sure to write it down and put it in a secure place.*

In addition, you can choose to display or not display a password prompt. If you turn on the prompt, your computer will ask you for your password before it starts the operating system. If you turn off the prompt, your computer starts the operating system and then locks the keyboard until you enter the password.

Diskette drive access

This option lets you enable or disable access to the diskette drive(s).

Operate without keyboard

This option lets you avoid a POST error when the keyboard is disconnected.

If you enable this option, you must disable the power-on password.

Operate without diskette drive(s)

This option lets you avoid a POST error when the diskette drive is disconnected.

Cache options

The Cache Options menu shows how much cache memory is installed on your computer and lets you enable or disable it.

Cache size

This option identifies how much cache memory is installed on your computer. You can install a maximum of 512KB cache memory.

Cache memory is special buffer storage that holds frequently used instructions and data, and works faster than main storage.

Cache state

This option lets you specify whether your computer uses its cache memory. With cache memory enabled, your programs run faster. If you run programs that require slower speeds, you can disable cache memory to slow down your computer.

Enable this option to change the following option:

- Cache System BIOS

Cache system BIOS

If the Cache State option is enabled, you can use the Cache System BIOS option to specify whether your computer runs the system BIOS region in cache memory. With this option enabled, your computer's performance improves.

You might need to disable this option when you are using a program that attempts to write to the BIOS. Virus checking programs may attempt to write to the BIOS.

ROM shadowing

The ROM Shadowing menu shows which system devices are using read-only memory (ROM) shadowing. With ROM shadowing, your computer stores data from the specified device in random access memory (RAM). Since your computer can access data in RAM faster than it can access data from ROM, programs run faster when ROM shadowing is enabled.

If you install an adapter card that has its own ROM, you can enable the ROM shadowing option for that card so the card will run faster.

note: *The ROM Shadowing option may not work on cards that use memory-mapped I/O, such as network cards.*

The Upper Memory Boundary option identifies the upper memory boundary for your computer. This boundary is the beginning of the computer's BIOS region that is not available to an upper memory manager.

PCI card options

The PCI Card Options menu lets you enable or disable bus mastering for the PCI adapter cards installed in your computer. *Bus mastering* lets installed bus master PCI cards process information without using the microprocessor.

If PCI cards do not operate properly, you might need to disable this option.

Memory timing

The Memory Timing menu lets you specify the timing of installed system memory. If you have any 70 nanoseconds (ns) memory installed in your computer, select the 70 ns setting.

If your computer came with 60 ns memory and you install 70 ns memory, the system memory performance will decrease slightly.

Warning! *Do not select the 60 ns timing if you have any 70 ns memory installed. Selecting a lower setting could result in lost data.*

Using other configuration utilities

You can use the Setup Utility that comes with your Aptiva computer to view or change configuration settings for most of your factory installed hardware. If you install new hardware, however, you might need to use other configuration utilities.

Windows 95 provides the Device Manager to help you view or change the system resources used by the hardware installed in your computer. Since you typically do not need to use this utility unless you upgrade your hardware, a description of the Windows 95 Device Manager and instructions for using it are in "Chapter 7: Adding and removing adapter cards and drives" on page 73. See "Starting and using the Windows 95 Device Manager" on page 75 for this information.

When you purchase new hardware to install in your Aptiva computer, a configuration utility might come with the new device. See the documentation provided with the new hardware for instructions on using any included configuration utility. The instructions might be printed or online.

Upgrading and replacing hardware **Part 3**

This part contains information to help you add to or change the hardware that was installed in your Aptiva computer at the factory. It contains the following chapters:

- “Chapter 5: Preparing to upgrade” on page 51

This chapter contains information to help you plan and prepare to add or replace adapter cards, drives, and system board components in your system unit.

- “Chapter 6: Adding and replacing system board components” on page 61

This chapter contains instructions for working with the hardware components on your system board.

- “Chapter 7: Adding and removing adapter cards and drives” on page 73

This chapter contains instructions for working with adapter cards and drives.

Preparing to upgrade 5

To upgrade your computer's hardware, you can add or replace adapter cards, drives, or system board components. If you take the time to evaluate your new hardware and plan your hardware changes, you can reduce the effort required to make the changes.

For instance, the type of hardware you plan to add or replace determines whether you begin with your computer turned on or off. Also, if you plan to work with more than one piece of hardware, you can avoid repeated steps if you follow the recommended order for hardware changes.

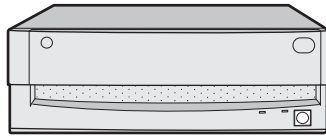
The instructions in this chapter contain upgrade procedures for both the desktop systems and the minitower systems. Use these instructions the first time you upgrade your computer. If you make additional hardware changes after your first upgrade, many of these instructions will still be useful. You are responsible, however, for recording all hardware settings changed by your upgrades.

As you prepare to add or replace hardware in your system unit, follow the instructions in these sections:

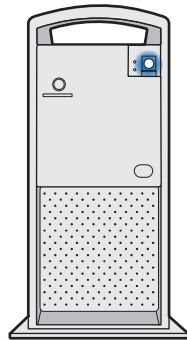
- "Understanding the differences between the desktop and minitower systems" on page 52
- "Evaluating your new hardware" on page 54
- "Planning your hardware changes" on page 56
- "Opening the system unit" on page 58

Understanding the differences between the desktop and minitower systems

You can easily distinguish between a desktop system and a minitower system by outside appearance. The desktop system sits flat on your desk, perhaps with your monitor placed on top of it. The desktop system looks like this:



The minitower system stands upright either on your desk or on the floor. The minitower system looks like this:



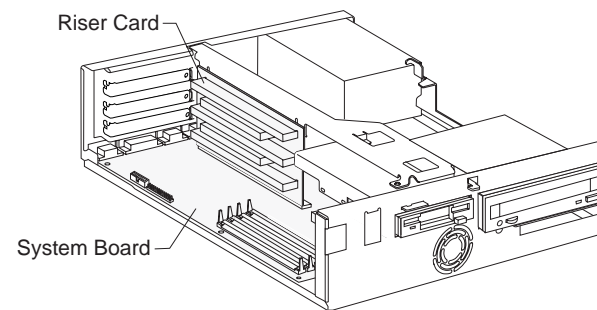
So that you can recognize the smaller hardware components in your Aptiva computer, you need to know the location of the following major hardware components inside your system unit:

- The *system board*. The system board has a socket for the *processor*, also known as the central processing unit (CPU). It also has sockets for drive cable connectors, memory modules, the system battery, and the riser card.
- The *riser card*. The riser card has connectors for adapter cards.

Inside the desktop system

In the desktop system, the system board is positioned flat on the bottom of the system unit. The riser card stands in a vertical position, perpendicular to the system board.

After you remove the system unit cover, the system unit looks like this:

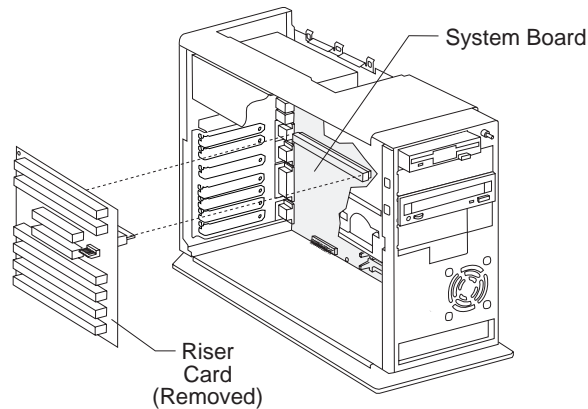


After you have read “Evaluating your new hardware” on page 54 and “Planning your hardware changes” on page 56, see “Opening a desktop system unit” on page 58 for instructions on removing the cover.

Inside the minitower system

In the minitower system, the system board is positioned up against the right wall. The riser card is attached to the system board, parallel and very close to the system board.

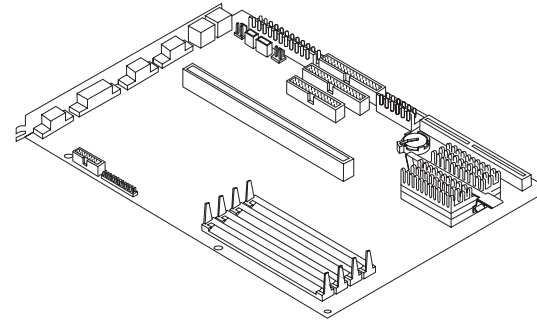
After you remove the system unit cover, the system unit looks like this:



After you have read “Evaluating your new hardware” on page 54 and “Planning your hardware changes” on page 56, see “Opening a minitower system unit” on page 59 for instructions on removing the cover.

Similarities between the systems

Except for the different positions of the hardware components in the desktop and minitower systems, the procedures for adding and replacing adapter cards, drives, and system board components are similar for both system units. Whether you have a desktop system or a minitower system, the system board looks like this:



Adapter cards and drives are positioned differently in the two system units, but cable connections, any necessary online configuration, and adapter card operation remain the same.

Since the system boards in the two system units are identical, instructions for upgrading system board components are contained in one chapter:

- “Chapter 6: Adding and replacing system board components” on page 61

To accommodate the differences between adapter card and drive locations in the two system units, instructions for adapter card and drive upgrades are in separate sections in “Chapter 7: Adding and removing adapter cards and drives” on page 73:

- “Working with the hardware in the desktop system unit” on page 78
- “Working with the hardware in the minitower system unit” on page 100

Evaluating your new hardware

If you install new hardware in your system unit, the new device might attempt to use a system resource that is already assigned to hardware that was installed at the factory. This book contains information to help you resolve some of these potential resource conflicts.

For conflicts with system resources used by an Mwave card

If you purchased a computer with an *Mwave card*, an adapter card that functions as both a sound card and a modem card, evaluate your new hardware to determine if it will interfere with the operation of your Mwave card. The current resource assignments for your Mwave card might also interfere with the operation of your new hardware.

To find out if your computer contains an Mwave card, you can use the Windows 95 Device Manager. If your computer contains an Mwave card, Mwave options appear in the Device Manager. For information about the Device Manager, see “Starting and using the Windows 95 Device Manager” on page 75.

The instructions in this book can help you resolve conflicts with Mwave resources and the joystick port. To determine what system resources your new hardware uses, refer to the documentation that came with the new hardware. To identify the system resources used by your Mwave card, use the Windows 95 Device Manager.

For information about the Device Manager, see “Starting and using the Windows 95 Device Manager” on page 75. If you need additional information, refer to your computer’s online help for Mwave. To access the Mwave online help, follow these steps:

1. From your Windows 95 desktop, click on the Start button.
2. Move your mouse pointer to the Programs menu and then to the Mwave menu.
3. Click on the Mwave Help option.

For conflicts with system resources used by a Plug and Play card

If you install hardware that gives your computer a combination of Plug and Play hardware and non-Plug and Play hardware, you must enter the Setup Utility before you install the new hardware to prevent resource conflicts. In the Setup Utility, assign ISA Legacy resources for the non-Plug and Play hardware so that your computer’s BIOS does not attempt to assign those resources to Plug and Play hardware.

For information about the adapter card combinations that require you to assign ISA Legacy resources, see “Resolving Plug and Play resource conflicts” on page 76 and Table 2, “Adapter card configurations,” on page 77.

For instructions on assigning ISA Legacy resources in the Setup Utility, see “Changing adapter card device information” on page 42.

For conflicts with other system resources

If you install hardware that creates conflicts with other system resources, you should receive an error message the first time you turn on your computer after you have installed the new hardware. If you receive an error message, enter your computer’s Setup Utility to reassign system resources.

The instructions in “Chapter 6: Adding and replacing system board components” on page 61 and “Chapter 7: Adding and removing adapter cards and drives” on page 73 contain information about the Setup Utility changes you need to make for your new hardware.

Planning your hardware changes

You should understand how your new hardware will work with your existing hardware before you unplug your system unit, pull the cover off, and start removing or adding hardware. You should also plan an order for your changes and then record your changes as you work.

If you plan to make hardware changes to a desktop system, be sure to read “Opening a desktop system unit” on page 58 to prevent damage to delicate parts inside your system unit. If you plan to make hardware changes to a minitower system, be sure to read “Opening a minitower system unit” on page 59.

Understanding the Setup Utility’s role

Your computer’s Basic Input/Output System (BIOS) automatically detects most hardware changes and then updates the related configuration settings in the Setup Utility. In many cases, if the Setup Utility is not automatically updated, you receive a message reminding you to check the Setup Utility.

The following chapters contain instructions for manually updating the Setup Utility when changes are not automatically detected:

- “Chapter 6: Adding and replacing system board components” on page 61
- “Chapter 7: Adding and removing adapter cards and drives” on page 73

“Chapter 4: Viewing and changing Aptiva configuration” on page 29, contains instructions for working with the Setup Utility.

Planning an order for hardware changes

The type of hardware you plan to add or replace determines whether you begin with your computer turned on or off. “Evaluating your new hardware” on page 54 contains information to help you determine whether your new hardware has the potential for creating resource conflicts.

If potential for resource conflict exists, you begin your hardware upgrade or replacement by using an online configuration utility. You might need to work in the Windows 95 Device Manager, the Setup Utility, or a utility that came with your new hardware.

If no potential for resource conflict exists, you begin by removing the cover on your system unit and installing the new hardware.

Also, if you plan to work with more than one piece of hardware, you can avoid repeated steps if you follow the recommended order for hardware changes.

Keeping in mind that you also need to follow the instructions that came with your new hardware, follow these steps when you upgrade or replace your hardware:

1. If you install hardware that meets one or both of the following criteria, turn on your computer:
 - Might create a system resource conflict with an installed Mwave adapter card
 - Might create a system resource conflict with an installed Plug and Play card

Otherwise, skip to step 4.

2. If you install hardware that might create a resource conflict with an installed Mwave adapter card, follow the instructions in “Resolving Mwave resource conflicts” on page 73. Complete your work in the Windows 95 Device Manager.
3. If you install hardware that might create a resource conflict with an installed Plug and Play adapter card, follow the instructions in “Resolving Plug and Play resource conflicts” on page 76. Complete your work in the Setup Utility.
4. Turn off your computer and remove the system unit cover as instructed in “Opening the system unit” on page 58.

5. Complete your hardware changes as instructed in “Chapter 6: Adding and replacing system board components” on page 61 and “Chapter 7: Adding and removing adapter cards and drives” on page 73.
6. Reassemble your computer.
7. Turn on your computer. If you receive any messages telling you to check the Setup Utility, follow the instructions in “Updating the Setup Utility” on page 72 if you worked with system board components. If you worked with adapter cards or drives, follow the instructions in “Updating the Setup Utility” on page 119.

If you plan to make more than one hardware change while you have the system unit cover off, make changes in the following order:

1. Make all changes on the system board.
2. Add or replace any drives.
3. Add or replace any adapter cards.

To access some hardware components, you must first remove other hardware components. For instance, if you add system memory to a desktop system, you might have to remove one or more adapter cards to access the memory sockets on the system board. If you add system memory to a minitower system, you will have to remove all adapter cards and the riser card to access the memory sockets on the system board.

If you follow the recommended order for hardware changes, you will not need to remove components you just added to access another component.

Recording your changes

The instructions in this book apply when you have not yet made hardware changes in your computer. However, when you have added or replaced hardware, you must rely on your own notes about the changes you have already made. The information you need to record as you work includes, but is not limited to:

- Changes to jumper positions
- Connection of drive and adapter card cables to the system board
- Changes to Setup Utility settings
- Changes to settings in other online configuration utilities, such as the Windows 95 Device Manager or a configuration utility that might come with your new hardware

Opening the system unit

Each time you open your system unit, you must follow specific safety procedures to ensure you do not damage your computer.

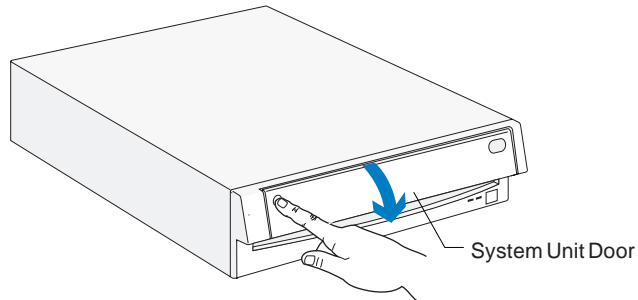
Opening a desktop system unit

To open a desktop system unit, you need no tools. However, when you work with the hardware components in the system unit, you might need a set of small screwdrivers.

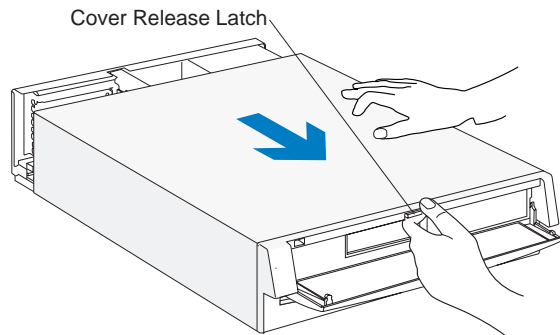
For your safety and the safety of your equipment, follow these steps when you remove the system unit cover:

1. If your computer is on, turn off the system unit, the monitor, and any external components, such as a printer.
2. If your monitor is placed on top of your system unit, move the monitor away from the system unit.
3. Unplug all cables and cords from the system unit except the system unit power cord. Be sure to disconnect any telephone line connections too.

4. Remove the system unit cover. The cover on the desktop system unit slides along grooves that run along the sides of the frame. Follow these steps:
 - a. Press on the corner of the system unit door to open it.



- b. Press up on the cover release latch and slide the cover off completely.



5. Touch the bare metal frame of your system unit to dissipate the static electricity from your body. Do not touch any of the components inside the frame before you touch the frame. Do not touch any component with a voltage warning label.
6. Disconnect the system unit power cord.

Opening a minitower system unit

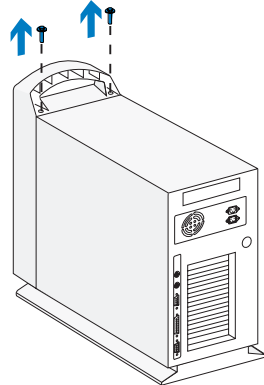
To open a minitower system unit, you need a screwdriver. When you work with the hardware components in the system unit, you might need a set of small screwdrivers.

For your safety and the safety of your equipment, follow these steps when you remove the system unit cover:

1. If your computer is on, turn off the system unit, the monitor, and any external components, such as a printer.
2. Unplug all cables and cords from the system unit except the system unit power cord. Be sure to disconnect any telephone line connections too.

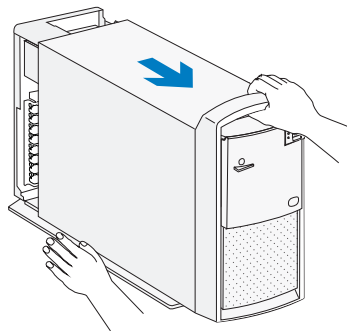
3. Remove the system unit cover. The cover on the minitower system unit is attached to the frame with two screws. It also slides along grooves that run along the sides of the frame. Follow these steps:

- a. Remove the screws.



(Back View)

- b. Slide the cover forward and completely remove it from the system unit.



(Front View)

4. Touch the bare metal frame of your system unit to dissipate the static electricity from your body. Do not touch any of the components inside the frame before you touch the frame. Do not touch any component with a voltage warning label.

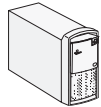
5. Disconnect the system unit power cord.

Adding and replacing system board components **6**

To work with the hardware components on the system board, you must first unplug the system and remove the system unit cover.



If you have a desktop system and you have not removed the cover from your system unit, see "Opening a desktop system unit" on page 58.



If you have a minitower system and you have not removed the cover from your system unit, see "Opening a minitower system unit" on page 59.

To access the section of the system board that you need to work with, you might need to remove adapter cards and drives. If you have a minitower system, you might also need to remove the riser card. With the system board exposed, you can work with the processor, cache and system memory modules, and the system battery.

Once you have completed your hardware changes and put the cover back on your system unit, you might need to enter the Setup Utility. For information about whether this is a step you need to take, see "Updating the Setup Utility" on page 72.

The system boards for the desktop and minitower systems are identical. The following sections contain instructions for working with the hardware components on your system board:

- "Accessing the system board" on page 61
- "If you need to remove the riser card in a minitower system" on page 62
- "Identifying the parts of the system board" on page 63
- "Installing an upgrade processor" on page 65
- "Installing cache memory modules" on page 66
- "Installing system memory modules" on page 68
- "Replacing the system battery" on page 71
- "Updating the Setup Utility" on page 72

Accessing the system board

To access the section of the system board you need to work with, you might need to remove adapter cards and drives. If you have a minitower system, you might also need to remove the riser card.

If you are working with a desktop system unit, see "Working with the hardware in the desktop system unit" on page 78 for instructions on working with adapter cards and drives.

If you are working with a minitower system unit, see “Working with the hardware in the minitower system unit” on page 100 for instructions on working with adapter cards and drives. If you need to remove the riser card in a minitower system, see the following section.

If you need to remove the riser card in a minitower system

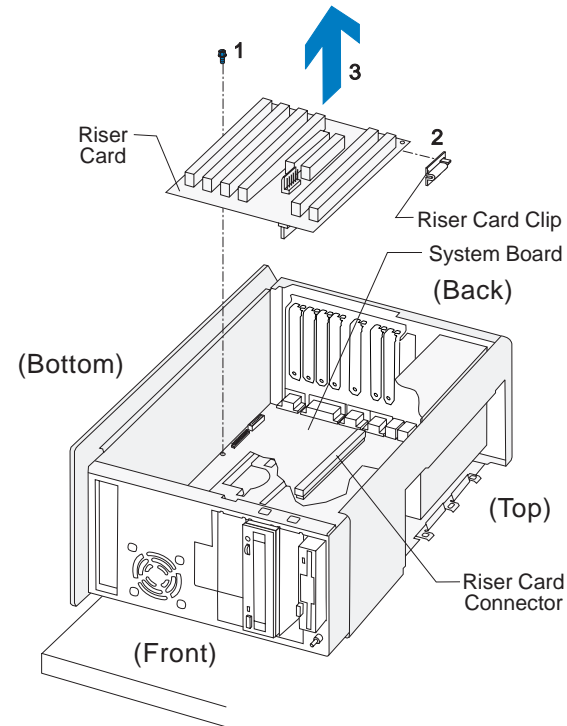
In the minitower system, you might need to remove the riser card to access some of the components on the system board. To remove the riser card, you must first remove all the adapter cards from the riser card. If any of your cards have cable connections to the system board or one of your drives, disconnect the cables. Take note of all of your disconnections so that you can reconnect without error.

For instructions on removing adapter cards in your minitower system, see “Removing adapter cards” on page 108.

To remove the riser card, follow these steps:

1. Remove all adapter cards, noting the locations of any cable connectors from which you remove cables.

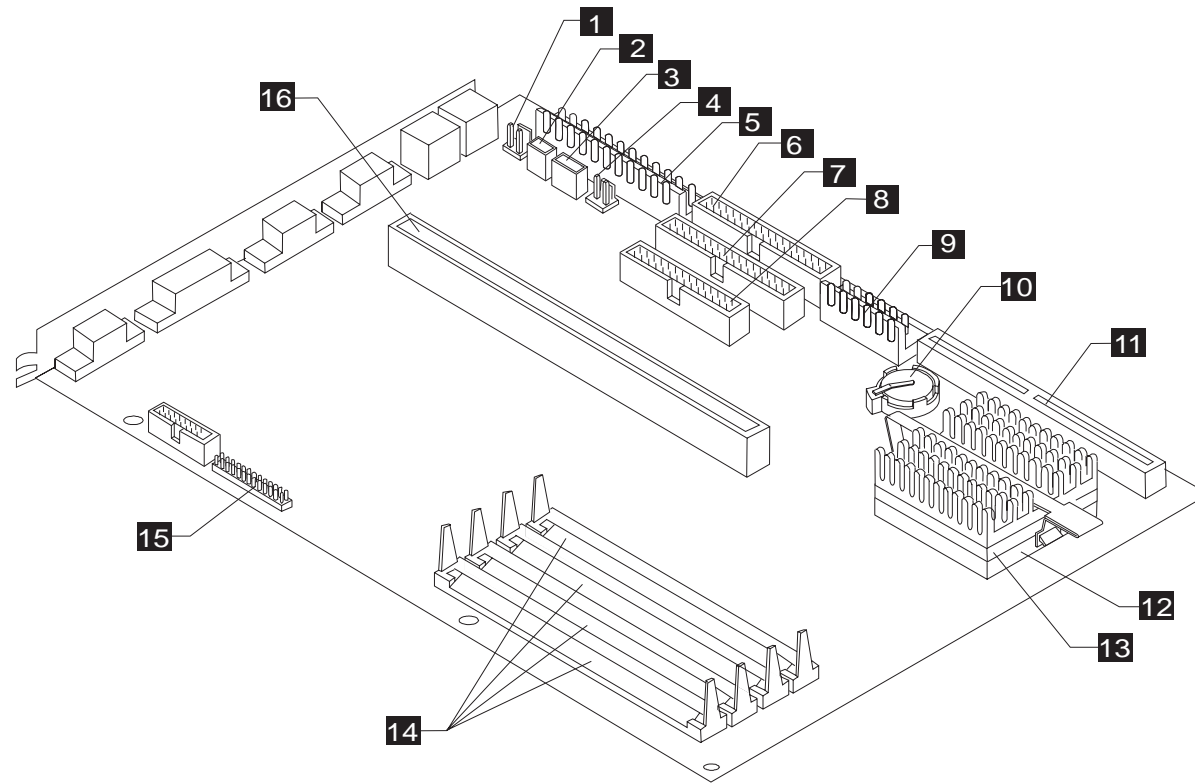
2. Disconnect the power cable from the riser card. Remove the riser card screw and the riser card clip. Then remove the riser card.



note: *To reinstall the riser card, reverse the removal procedure. Reconnect any adapter card cables you disconnected when you removed the adapter cards from the riser card.*

Identifying the parts of the system board

If you plan to add or replace hardware in your computer, you will need to know the layout of the system board. This picture shows an example of the system board in your computer. The items on the next page correspond to the numbered locations on the picture.



The *system board*, sometimes called the *planar* or *motherboard*, is the main circuit board in the system unit. It supports a variety of devices and provides other basic computer functions that are preinstalled or that you can install later. The system board shown on page 63 has the following parts:

- 1** 12V speaker connector. Holds the connector for 12V speakers.
- 2** Power switch connector. Holds the connector from the power switch.
- 3** 5V auxiliary power supply connector. Holds the 3-wire connector from the power supply.
- 4** Wake Up on Ring connector. Holds the Wake Up on Ring cable that attaches to the internal modem.
- 5** Power supply connector. Holds connectors P1 and P2 from the power supply. Connector P10 attaches to the riser card.
- 6** Local Bus IDE connector 1. Holds signal cables that attach to drives.
- 7** Local Bus IDE connector 2. Holds signal cables that attach to drives.
- 8** Diskette drive connector. Holds signal cables that attach to drives.
- 9** 3.3V power supply connector. Holds connector P11 from the power supply.
- 10** Battery. A 3-volt (CR2032) lithium battery. If you replace the battery, you must use the same type.

- 11** Cache memory module socket. Can hold a 256KB or 512KB cache memory module. Any cache memory module you install must meet the following specifications.

Specifications: 160-pin; 64-bit; 256KB (32KBx64) or 512KB (64KBx64); 15 *nanoseconds* (ns); pipelined burst synchronous SRAM.

- 12** Processor socket. Holds the processor.

- 13** Processor. A Pentium class processor.

- 14** Memory module sockets (for SIMMs). Your system board has a set (bank) of sockets for system memory modules. These memory modules are called *single inline memory modules* (SIMMs). The sockets are numbered 1 through 4, with socket 4 at the edge of the board.

You can upgrade the memory on your system board to a maximum of 128MB. Before you remove modules from or insert modules into any of the sockets, see "Installing system memory modules" on page 68 for guidelines you must follow. For possible module placement configurations, see the specification table in "Memory module placement" on page 151. Any SIMM you install must meet the following specifications.

Specifications: 72-pin; 32-bit or 36-bit; 4MB, 8MB, 16MB, or 32MB; 60 *nanoseconds* (ns); tin-lead contacts; fast-page mode or extended data out (EDO); *dynamic random access memory* (DRAM).

- 15** VESA video feature connector. Used for motion video adapter cards, such as a television card.

- 16** Riser card connector. Holds the riser card, which contains connectors for adapter cards.

Installing an upgrade processor

Instructions for removing your old processor are given in this section. Instructions for installing an upgrade processor should come packaged with the processor.

To remove the old processor:

Warning!

The heat sink retaining clip is under tension and may disengage suddenly if not held while being removed.

1. Remove the heatsink retaining clip by pressing the release tab (square end) of the clip. If pressing the tab does not release the clip, press the tab while using the tip of a thin bladed screwdriver or other similar object to gently push out the leg that is hooked on the catch underneath the tab. Take extreme care not to push the leg too hard, or you might accidentally damage surrounding parts.

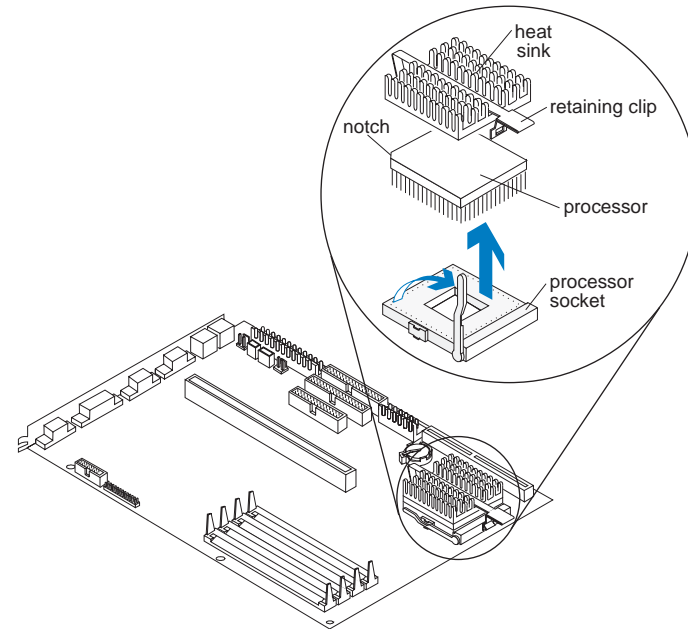
2. Remove the heatsink by lifting it straight up.

note:

If the heatsink is permanently cemented to the processor, you should remove both the heatsink and the processor after you lift the handle in step 3.

3. Unlatch the handle on the side of the processor socket and lift it all the way up.

4. Lift the processor out of the processor socket.



5. Install the new processor by following the instructions that came with it.

Installing cache memory modules

You can install either 256KB or 512KB of cache memory on your system board. If a 256KB module is already installed, you must remove it to install a 512KB module.

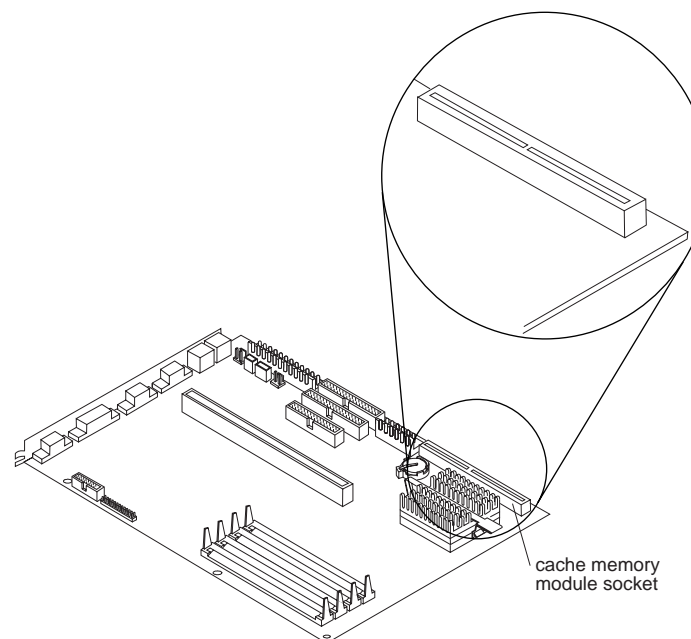
note:

Each cache memory module you install must have these specifications: 160-pin; 64-bit; 256KB (32KBx64) or 512KB (64KBx64); 15 nanoseconds (ns); pipelined burst synchronous SRAM.

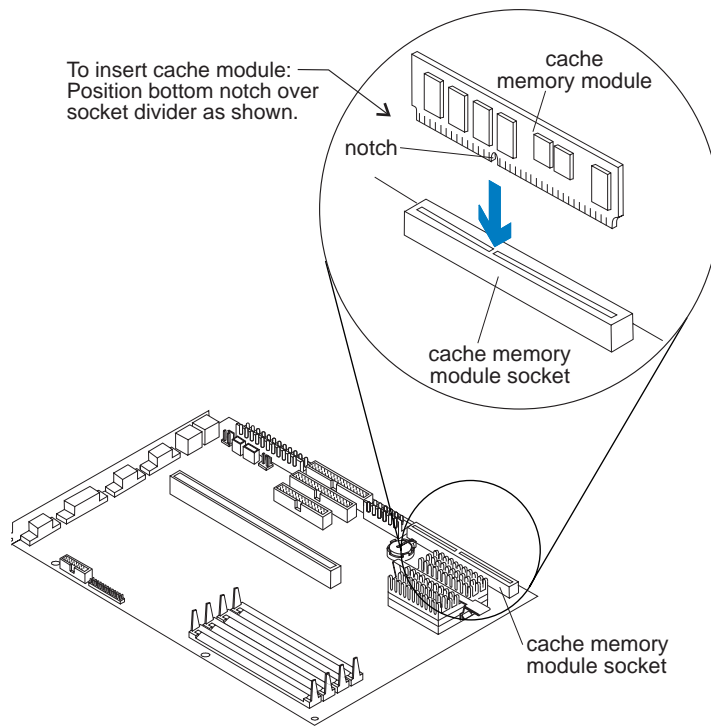
Inserting a new module

To install a cache memory module into an empty socket, follow these steps:

1. Locate the single cache memory module socket on the system board.



2. Position the new cache module over the cache socket so that the notch at the bottom of the module lines up over the divider in the socket. As shown in the next picture, match the wide part of the module to the wide part of the opening in the socket.

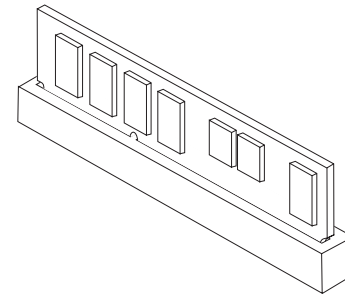


Important:

The module can be installed only when the notch is aligned correctly.

3. Push the module straight down into the socket.

A properly-inserted module looks like this:



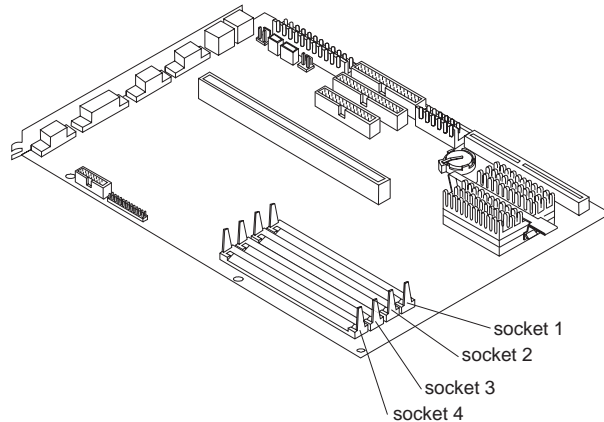
Replacing an existing module

If you want to upgrade from 256KB of cache memory to 512KB of cache memory, you must replace the existing 256KB module with a 512KB module.

To replace an existing module, remove the installed module by pulling straight up on the module. Then follow the instructions in "Inserting a new module" on page 66 to install the new module.

Installing system memory modules

Your system board has four system memory module sockets, labeled socket 1 through socket 4. These sockets hold *single inline memory modules* (SIMMs).



If your computer comes with 8MB installed on the system board, your SIMM sockets are filled in one of the following configurations:

- One 8MB module in socket 1
- One 4MB module in socket 1 and one 4MB module in socket 2
- One 4MB module in socket 3 and one 4MB module in socket 4

If your computer comes with 16MB installed on the system board, your SIMM sockets are filled in one of the following configurations:

- One 16MB module in socket 1
- One 8MB module in socket 1 and one 8MB module in socket 2
- One 8MB module in socket 3 and one 8MB module in socket 4
- One 8MB module in socket 1, one 4MB module in socket 3, and one 4MB module in socket 4

To upgrade your system memory, you can install additional memory modules. You can also replace the existing memory modules with modules that have higher memory capacity. The maximum amount of memory you can install is 128MB.

If you add or replace system memory modules, you must follow these guidelines:

- You can have a module in socket 1 without putting a module in socket 2.
- If you put a module in socket 2, you must have a module in socket 1.
- If you have modules in sockets 1 and 2, the modules must have the same specifications.
- If you add a module to socket 3 or 4, you must have a module in both sockets and these modules must have the same specifications.

- The specifications for the modules in sockets 3 and 4 do not have to match the specifications for the modules in sockets 1 and 2.

note:

Each memory module you install must have these specifications: 72-pin; 32-bit or 36-bit; 4MB, 8MB, 16MB, or 32MB; 60 nanoseconds (ns); tin-lead contacts; fast-page mode or extended data out (EDO); dynamic random access memory (DRAM).

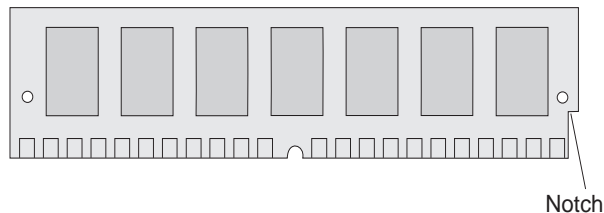
If you install modules with different system memory timings (60 ns and 70 ns), you should check the Setup Utility to make sure the timings are configured correctly. For instructions on setting system memory timings, see "Configuring advanced options" on page 45.

For possible module placement configurations, see the reference table in "Memory module placement" on page 151.

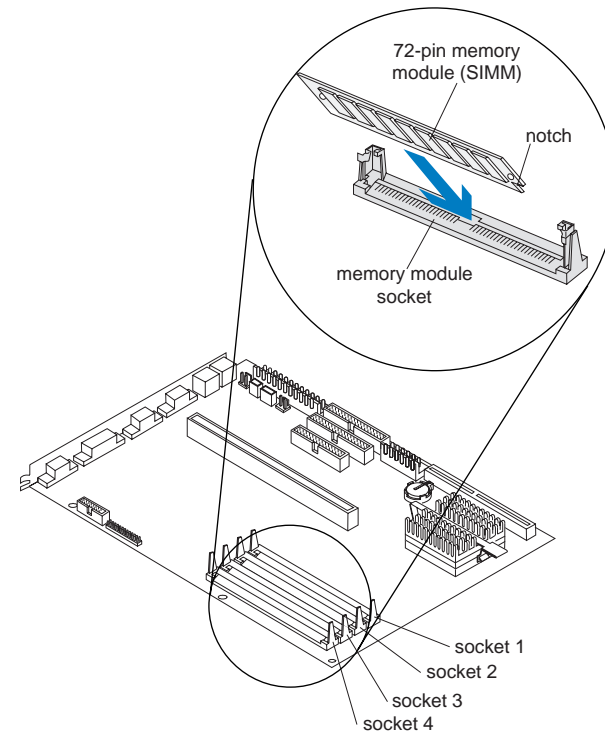
Installing memory modules

To install an additional memory module in an empty socket:

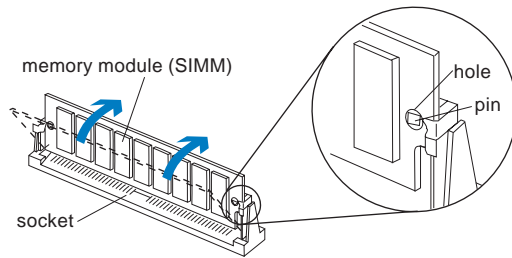
1. Find the notched edge of the module, and position it as shown here.



2. Insert the module into the socket at a 45-degree angle as shown. Make sure the connectors line up and the module is firmly held in the socket at approximately a 45-degree angle.



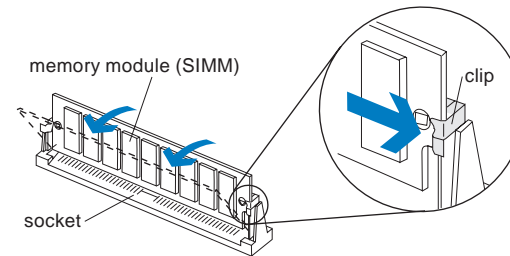
3. Press forward **firmly** on the memory module to move it into a vertical position. Both sides of the module will “click” when the module locks into place. The newly-installed memory module will be locked into the socket in a vertical position with pins showing through the holes on each side.



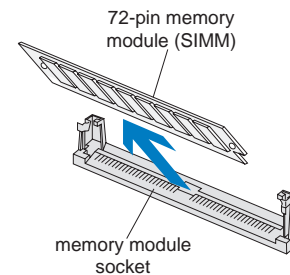
Removing memory modules

To remove a memory module from its socket:

1. Locate the two clips that hold the memory module in place. One clip holds the left edge of the module and the other clip holds the right edge.
2. At the same time, push both clips outward, away from the module. The module will release and move forward.



3. Lift the module out of the socket.



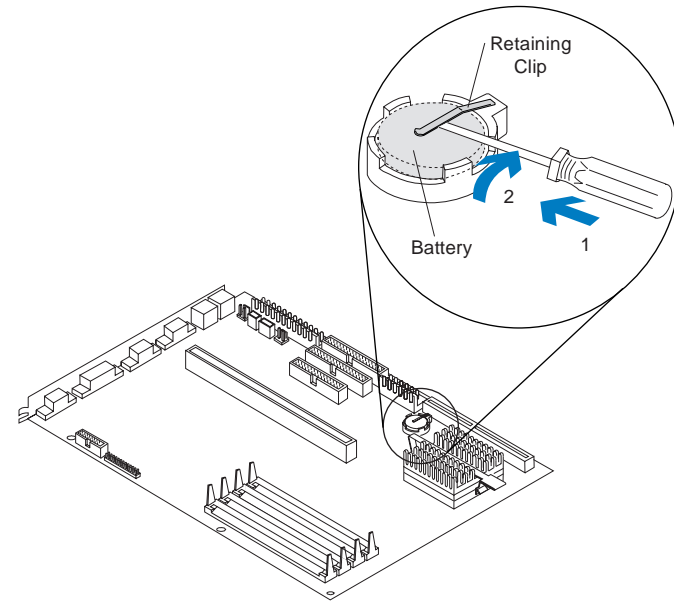
Replacing the system battery

To replace the battery, follow these steps:

1. Place the blade of a small, flat-blade screwdriver under the edge of the retaining clip.
2. Turn the screwdriver one quarter turn, raising the clip while pressing down on the old battery to remove it.
3. Raise the retaining clip, and insert a new 3-volt (CR2032) lithium battery in its place.

note:

Make sure the positive side of the battery (the side with a + symbol printed on it) is facing up when you insert the battery into the socket.



Updating the Setup Utility

When you add system board components, such as an upgrade processor and system or cache memory modules, your system's Basic Input/Output System (BIOS) detects the hardware changes and updates the Setup Utility automatically. If you replace or remove components, you might receive an online message that asks you to verify that automatic detection made the correct configuration changes.

To verify or correct configuration settings in the Setup Utility, see "Using the Setup Utility" on page 29 for information about how to start and update the Setup Utility.

For a cache memory module

If you remove cache memory, the power-on self test (POST) generates an error message. In the Setup Utility, verify that the information the BIOS automatically recorded is correct.

To view the cache memory settings in the Setup Utility, select the following options from the Setup Utility's Main Menu:

- System Information

See "Viewing system information" on page 33 for information about this option.

- Advanced Options and then Cache Options

See "Configuring advanced options" on page 45 for information about these options.

For system memory modules

If you remove system memory, the power-on self test (POST) generates an error message. In the Setup Utility, verify that the information the BIOS automatically recorded is correct. Use this opportunity to verify that any remaining memory modules are installed as intended.

To view the system memory settings in the Setup Utility, select the System Information option from the Setup Utility's Main Menu. See "Viewing system information" on page 33 for information about this option.

For the system battery

If you replace the system battery, you need to reset the system date and time. You can perform this task from the Windows 95 desktop or from the Setup Utility.

To reset the system date and time in the Setup Utility, select the Date and Time option from the Setup Utility's Main Menu. See "Setting the date and time" on page 45 for information about this option.

Adding and removing adapter cards and drives **7**

Before you begin working with the hardware inside your system unit, read the following sections of “Chapter 5: Preparing to upgrade”:

- “Evaluating your new hardware” on page 54

This section contains information you need to understand about potential system resource conflicts. Your new hardware might attempt to use a resource that is already assigned to other hardware.

- “Planning your hardware changes” on page 56

This section contains important information about planning an order for hardware changes and recording changed hardware settings. You can avoid repeated steps if you follow the recommendations in this section.

If you need to resolve resource conflicts, read the following sections of this chapter:

- “Resolving Mwave resource conflicts” on page 73
- “Resolving Plug and Play resource conflicts” on page 76

When you are ready to work inside your system unit, note that adapter card slot and drive bay positions vary depending on whether you have a desktop unit or a minitower unit. Follow the instructions in the appropriate section:

- “Working with the hardware in the desktop system unit” on page 78
- “Working with the hardware in the minitower system unit” on page 100

Resolving Mwave resource conflicts

If you purchased a computer with an Mwave card, the instructions in this section can help you resolve some potential conflicts between your new hardware and the Mwave card. This section contains information to help you resolve system resource or joystick port conflicts.

To resolve resource and joystick port conflicts, you use the Windows 95 Device Manager. Using the Device Manager, you can resolve conflicts that might occur with input/output (I/O) address, interrupt request (IRQ), and direct memory access (DMA) resources.

If you need information about the Mwave card installed in your computer, refer to your computer's online help for Mwave. To access the Mwave online help, follow these steps:

1. From your Windows 95 desktop, click on the Start button.
2. Move your mouse pointer to the Programs menu and then to the Mwave menu.
3. Click on the Mwave Help option.

Resolving resource conflicts

Using the Device Manager and the documentation that came with your new hardware, compare the resources used by the installed Mwave card and the new hardware. If both devices attempt to use the same resource, refer to the new hardware's documentation to change the resource used by the new hardware.

If the resource for the new hardware cannot be changed, change the resource for the Mwave card in the Device Manager. See "Starting and using the Windows 95 Device Manager" on page 75 for information about the Device Manager.

If you change the I/O address for the Mwave card in the Device Manager, you must move the I/O address jumper on the Mwave card so the card will use the new address. Once you have removed the system unit cover, see "Setting jumpers on the Mwave card" on page 82 for instructions on changing the I/O address jumper setting

on the Mwave card. (These same instructions are also in "Setting jumpers on the Mwave card" on page 104.)

Resolving joystick port conflicts

Using the Device Manager and the documentation that came with your new hardware, determine whether the joystick ports on both the installed Mwave card and the new hardware are enabled. See "Starting and using the Windows 95 Device Manager" on page 75 for information about the Device Manager.

If the joystick ports on both devices are enabled, refer to the new hardware's documentation to disable the joystick port on the new hardware.

If the joystick port on the new hardware cannot be disabled, follow the instructions in "Setting jumpers on the Mwave card" on page 82 to disable the joystick port on the Mwave card. (These same instructions are also in "Setting jumpers on the Mwave card" on page 104.)

Starting and using the Windows 95 Device Manager

Use the Windows 95 Device Manager to verify or change the resources used by your Mwave card or to determine whether the joystick port on your Mwave card is enabled.

You can use the Device Manager to resolve several resource conflicts, such as those that might occur with input/output (I/O) address, interrupt request (IRQ), and direct memory access (DMA) resources.

To start the Device Manager, follow these steps:

1. From the Windows 95 desktop, double-click on the My Computer icon.
2. In the My Computer window, double-click on the Control Panel icon.
3. In the Control Panel window, double-click on the System icon.
4. In the System Properties window, click on the Device Manager tab.

To view or change I/O address, interrupt request, and direct memory access resources for an installed Mwave card, follow these steps:

1. In the System Properties window, click on the Device Manager tab.
2. Click on the View devices by type radio button.

3. Double-click on the IBM Mwave Digital Signal Processors list item to expand the list underneath this item.
4. Double-click on the item in the expanded list.
5. In the window that appears, click on the Resources tab.

To view or change I/O address and interrupt request resources for a port on an installed Mwave card, follow these steps:

1. In the System Properties window, click on the Device Manager tab.
2. Click on the View devices by type radio button.
3. Double-click on the Ports (COM & LPT) list item to expand the list underneath this item.
4. Double-click on the Mwave Communications Port (COM1) item in the expanded list.
5. In the Mwave Communications Port (COM1) Properties window, click on the Resources tab.

You can also use the Device Manager to resolve Mwave resource conflicts with other devices, such as sound and musical instrument digital interface (MIDI) devices. If your computer has these devices installed, the Device Manager displays entries (list items) for the devices. For instance, sound devices might be contained in the expanded list that appears when you double-click on the the Sound, video, and game controllers list item.

If you need help in using the Device Manager, press the F1 key to view the online help.

You must restart your computer before any Device Manager changes can take effect. If you plan to turn your computer off immediately to change jumper settings, you do not need to restart your computer first.

Resolving Plug and Play resource conflicts

If you install hardware that gives your computer a combination of Plug and Play hardware and non-Plug and Play hardware, you must enter the Setup Utility before you install the hardware to prevent resource conflicts. In the Setup Utility, you can assign the following ISA Legacy resources for the non-Plug and Play hardware so that your computer's BIOS does not attempt to assign those resources to Plug and Play hardware:

- System memory regions
- Input/output ports
- Direct memory access (DMA) channels
- Interrupt requests (IRQs)

The documentation that came with your new hardware should contain information about the settings required by the new hardware. If the documentation refers you to information about your computer's I/O addresses, system board interrupt requests (IRQs), or DMA channel

assignments, you can find this information in "Specification tables" on page 151.

If you need information about the adapter cards installed in your computer, refer to the documentation that came with the cards. This documentation might be printed or online.

For information about the hardware combinations that require you to assign ISA Legacy resources, see Table 2, "Adapter card configurations," on page 77. If you purchased a computer with an Mwave adapter card, the Mwave card is not Plug and Play. If you purchased a computer with a TV/MPEG adapter card, the TV/MPEG card is Plug and Play.

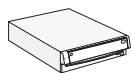
For instructions on starting the Setup Utility, see "Using the Setup Utility" on page 29. For instructions on assigning ISA Legacy resources in the Setup Utility, see "Changing adapter card device information" on page 42.

Table 2: Adapter card configurations

| If the adapter card or cards currently installed are: | and the adapter card you are installing is: | then: |
|--|---|---|
| None | Plug and Play | Do not change any settings. |
| | Non-Plug and Play | Do not change any settings. |
| Plug and Play | Plug and Play | Do not change any settings. |
| | Non-Plug and Play | Change the settings in the Setup Utility's Plug and Play menu <i>before</i> you install the new card. For instructions on working with these settings, see "Changing adapter card device information" on page 42. |
| Non-Plug and Play | Plug and Play | Change the settings in the Setup Utility's Plug and Play menu <i>before</i> you install the new card. For instructions on working with these settings, see "Changing adapter card device information" on page 42. |
| | Non-Plug and Play | Do not change any settings. |
| Both Plug and Play and Non-Plug and Play | Plug and Play | Do not change any settings. |
| | Non-Plug and Play | Change the settings in the Setup Utility's Plug and Play menu <i>before</i> you install the new card. For instructions on working with these settings, see "Changing adapter card device information" on page 42. |
| Note: ISA Plug and Play adapter cards should be clearly labelled as Plug and Play cards. PCI adapter cards should be considered Plug and Play cards. | | |

Working with the hardware in the desktop system unit

To work with the hardware components in the system unit, you must first unplug the system and remove the system unit cover.



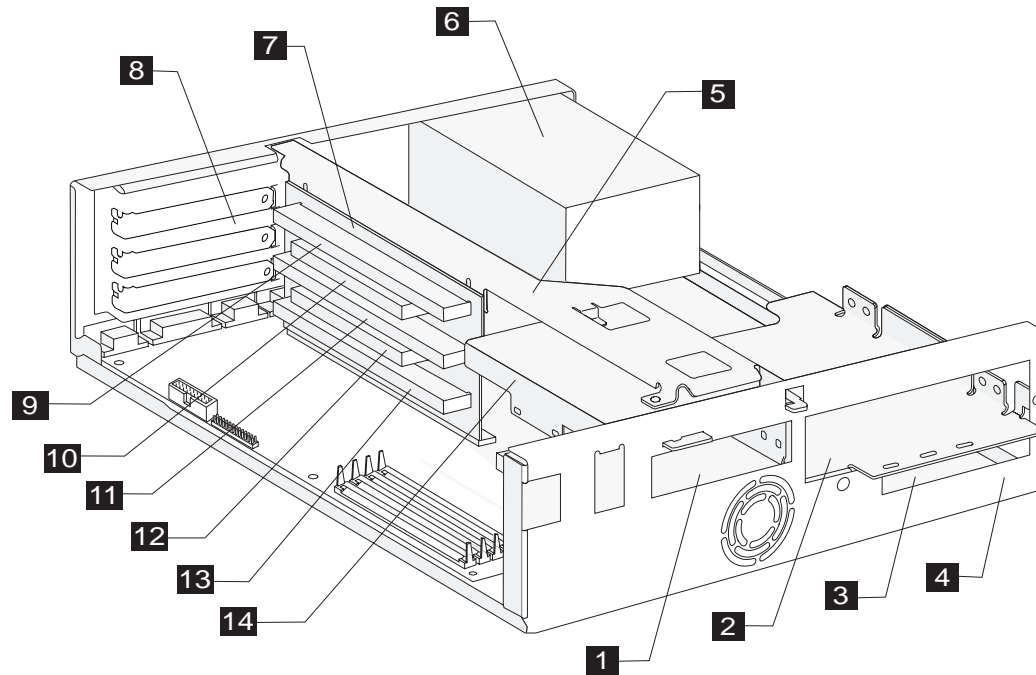
If you have not removed the cover from your system unit, see “Opening a desktop system unit” on page 58.

If you plan to add or replace both an adapter card and a drive, install or replace the drive before you install or replace the adapter card. If you also plan to make hardware changes on the system board, see “Adding and replacing system board components” on page 61 and finish your work with the system board before continuing to work with drives and adapter cards.

To add or remove adapter cards or drives in the desktop system unit, complete the instructions in the following sections:

- “Identifying the parts of the system unit” on page 79
- “Adding and removing adapter cards” on page 81
- “Adding and removing drives” on page 86

Identifying the parts of the system unit



Your computer's system unit has four drive bays and can hold up to four drives. It also has three adapter card slots and five adapter card connectors and can hold up to three adapter cards. You can purchase a drive to install in any empty bay or an adapter card to install in any empty slot.

You can install industry standard architecture (ISA) advanced technology (AT) adapter cards, and peripheral component interconnect (PCI) adapter cards. You can install an AT adapter card in any AT adapter card connector. You can install a PCI adapter card in any PCI adapter card connector.

Diskette drives use the standard diskette advanced technology (AT) interface. Hard disks use an integrated drive electronics (IDE) AT interface. This computer supports the American National Standards Institute (ANSI) standard for AT attachment disk drives.

- 1** Bay 1. Holds a 3.5-inch slim drive, such as a diskette or tape drive.
- 2** Bay 2. Holds up to a 5.25-inch half high drive, such as a diskette, tape, or CD-ROM drive.
- 3** Bay 3. Located under bay 2. Holds a 3.5-inch slim hard disk drive. (No external access).
- 4** Bay 4. Located under bay 3. Holds a 3.5-inch slim hard disk drive. (No external access).
- 5** Right bracket. Holds drives in bays 2, 3, and 4.
- 6** Power supply. Capable of providing at least 145 watts of power to the system unit.
- 7** Riser card. Holds the adapter card connectors.

- 8** Adapter card slots. Three openings for adapter cards.
- 9** AT adapter card connector 1 (AT – 1). Holds an AT adapter card.
- 10** PCI adapter card connector 1 (PCI – 1). Holds a PCI adapter card. This connector shares a slot with the AT – 2 connector. If you install a card in this connector, you cannot install a card in connector AT – 2.
- 11** AT adapter card connector 2 (AT – 2). Holds an AT adapter card. This connector shares a slot with the PCI – 1 connector. If you install a card in this connector, you cannot install a card in connector PCI – 1.
- 12** PCI adapter card connector 2 (PCI – 2). Holds a PCI adapter card. This connector shares a slot with the AT – 3 connector. If you install a card in this connector, you cannot install a card in connector AT – 3.
- 13** AT adapter card connector 3 (AT – 3). Holds an AT adapter card. This connector shares a slot with the PCI – 2 connector. If you install a card in this connector, you cannot install a card in connector PCI – 2.
- 14** Left bracket. Holds a drive in bay 1.

Adding and removing adapter cards

The desktop system unit has three slots and five connectors for adapter cards. A maximum of three adapter cards can be installed in the system unit at one time.

Identifying adapter card connectors

You can install ISA AT or PCI adapter cards. Use the following table to help you determine what type and length adapter card you can install in each adapter card connector. Adapter card connectors are identified in “Identifying the parts of the system unit” on page 79.

| Adapter card connector | Specifications |
|------------------------|--|
| AT – 1 | Can hold a half-length or three-quarter-length ISA AT adapter card. Can hold a full-length ISA AT adapter card if the left bracket is removed. |
| PCI – 1 | Can hold a half-length or full-length PCI adapter card. |
| AT – 2 | Can hold a half-length, three-quarter-length, or full-length ISA AT adapter card. |
| PCI – 2 | Can hold a half-length or full-length PCI adapter card. |
| AT – 3 | Can hold a half-length, three-quarter-length, or full-length ISA AT adapter card. |

note:

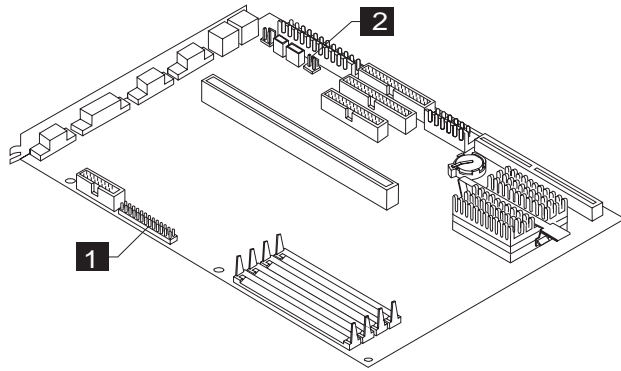
You can install a PCI adapter card in connector PCI – 1 or an AT adapter card in connector AT – 2. However, you cannot install adapter cards in connectors PCI – 1 and AT – 2 at the same time. You can install a PCI adapter card in connector PCI – 2 or an AT adapter card in connector AT – 3. However, you cannot install adapter cards in connectors PCI – 2 and AT – 3 at the same time.

Identifying card cable connectors

Depending on the type of adapter card you install, you might need to attach cables from the card to connectors on the system board or to connectors on the CD-ROM drive. The following table identifies each connector on the system board and the type of card that might have a cable you need to connect:

| System board connector | Type of card or feature using the connector | Number in picture |
|------------------------|---|-------------------|
| J14 | Television card / video card | 1 |
| JP5 | Wake Up on Ring | 2 |

Use the following picture to identify card cable connectors on your system board:



Setting jumpers

When you install an adapter card, you might have to set switches or move jumpers to make the card work properly with any cards that are already installed. If you install a Plug and Play adapter card, however, you typically do not have to change any switch or jumper settings after you install it. The computer and the card automatically work together to make sure the settings are correct.

Refer to the documentation that came with the new hardware to determine if you need to set any switches or move any jumpers.

Setting jumpers for video cards

When you install a video adapter card you do not need to reset (move) jumpers on the system board. The built-in video controller will be disabled automatically. However, you might need to set jumpers on the video adapter card. Check the documentation that came with the card to see if any jumpers need to be set.

Setting jumpers on the Mwave card

If you are installing an adapter card that uses I/O address or joystick port settings that conflict with the settings for the installed Mwave card, you began to resolve these conflicts before you turned your computer off. If you could not change the I/O address or joystick port settings on the device you are now installing, you changed the online configuration for the installed Mwave card in "Resolving Mwave resource conflicts" on page 73.

With your system unit open, you can change the required jumpers on the Mwave card to finish resolving these conflicts. If you need to remove the Mwave card to access the jumpers, follow the instructions in "Removing adapter cards" on page 86.

If you need more information about the Mwave card, refer to your computer's online help for Mwave. To access the Mwave online help, follow these steps:

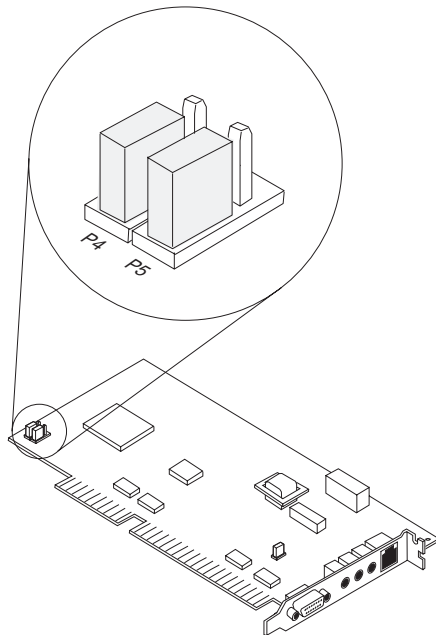
1. From your Windows 95 desktop, click on the Start button.
2. Move your mouse pointer to the Programs menu and then to the Mwave menu.

3. Click on the Mwave Help option.

Moving the I/O address jumpers

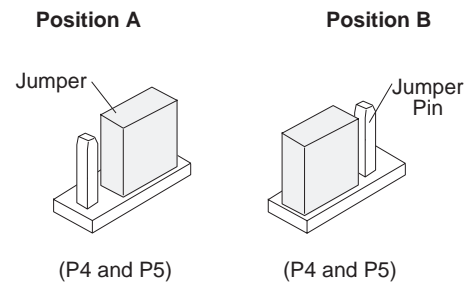
If you changed the I/O address in the Windows 95 Device Manager, set the jumpers on the Mwave card to match that address. These jumpers on the Mwave card are labeled P4 and P5. To set the I/O address jumpers, follow these instructions:

1. Locate the I/O address jumpers on the Mwave card.



2. Use the following table and picture to determine how to set the jumpers.

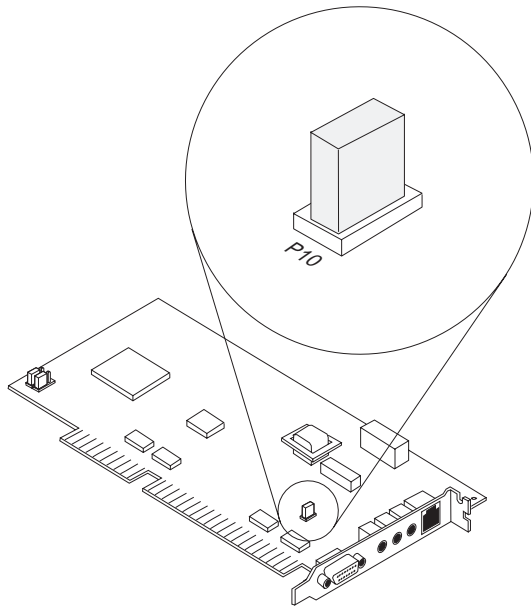
| If you choose I/O address: | Set P4 to: | Set P5 to: |
|----------------------------|------------|------------|
| CE30 | Position B | Position B |
| 01B0 | Position A | Position B |
| 0130 | Position A | Position A |



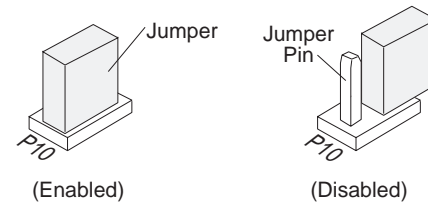
Moving the joystick port jumper

If you need to disable the joystick port on the Mwave card, follow these steps:

1. Locate the jumper labeled P10 on the Mwave card.



2. Move the jumper from the enabled position to the disabled position as shown in the picture.



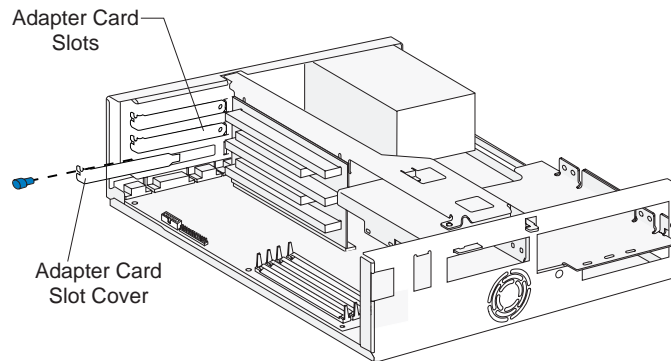
If you had to remove the adapter card to access the jumpers, reinstall the card.

Installing adapter cards

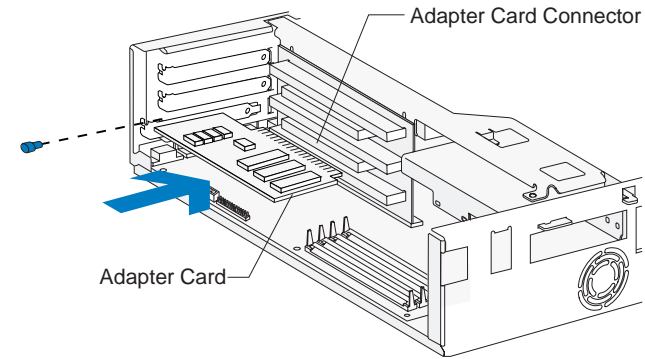
For some hardware changes, you might need to remove preinstalled adapter cards. If these adapter cards have cables attached, disconnect them. Be sure to notice where the cables connect to the cards. You will need to reattach the cables when you reinstall the adapter cards.

To install an adapter card:

1. Remove the screw and then the adapter card slot cover.



2. Align and insert the adapter card into the adapter card connector. Insert the screw.



3. Reinstall all hardware and screws you removed to install the adapter card.

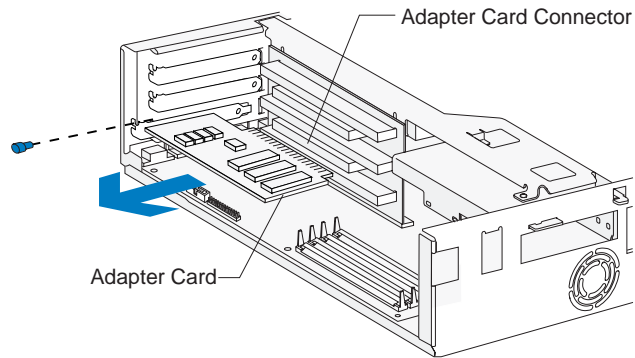
Connecting card cables

If you have not already done so, connect the cable or cables from the adapter card to the correct connection on the system board or CD-ROM drive. Verify your connections using the information in "Identifying card cable connectors" on page 81.

If you had to disconnect any cables to gain access to the adapter card connector on the riser card or to gain access to a section of the system board, reconnect the cables.

Removing adapter cards

If you need to remove an adapter card, remove the adapter card screw. Carefully pull the adapter card straight out of the slot so that the card's components do not bend. If an adapter card has cables, disconnect them. Be sure to notice where the cables connect to the cards. You will have to reconnect these cables if you reinstall the card.



Adding and removing drives

The desktop system unit has four bays for various types of drives. Some of these bays already hold drives that were installed at the factory.

When you purchase a new drive, make sure you also purchase the appropriate power and signal cables.

Identifying drive bays

The desktop system can accommodate 3.5-inch slim drives, such as diskette, hard disk, and tape drives. The system can also accommodate 5.25-inch half high drives, such as diskette, tape, and CD-ROM drives. Two of the bays in your system have external access. Two do not.

You can install a drive in any empty bay that accommodates the drive's size. Use the following table to help you determine where to install your drive.

| Bay | Drive Specifications | Bay Capacity |
|-----|---|------------------------------------|
| 1 | Holds a 3.5-inch slim drive, such as a diskette or tape drive. | 101.6 x 25.4 mm (4.0 x 1.0 in.) |
| 2 | Holds up to a 5.25-inch half high drive, such as a diskette, tape, or CD-ROM drive. | 149.0 x 41.3 mm (5.87 x 1.625 in.) |
| 3 | Holds a 3.5-inch slim hard disk. (No external access) | 101.6 x 25.4 mm (4.0 x 1.0 in.) |
| 4 | Holds a 3.5-inch slim hard disk. (No external access) | 101.6 x 25.4 mm (4.0 x 1.0 in.) |

Note: *Using the appropriate installation hardware, you can install smaller drives than those listed here.*

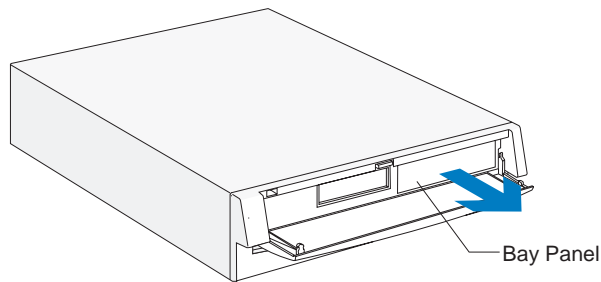
To identify drive bays in the desktop system unit, see "Identifying the parts of the system unit" on page 79.

Removing and replacing bay panels

When you first unpack your computer, all external drive bays that do not contain drives are covered with bay panels. To install a drive in a previously unoccupied external bay, first remove the bay panel from the system unit cover. If you remove a drive from an external bay and you do not intend to install a new drive immediately, replace the bay panel in the system unit cover.

To remove a bay panel, follow these steps:

1. Remove the system unit cover, if you haven't already. For these instructions, see "Opening a desktop system unit" on page 58.
2. Locate the panel latches on the inside of the cover. Squeeze the latches and push the panel out.



To replace a bay panel, follow these steps:

1. Insert the panel into the opening at the front of the cover.
2. Push the panel into place until you hear the latch click.

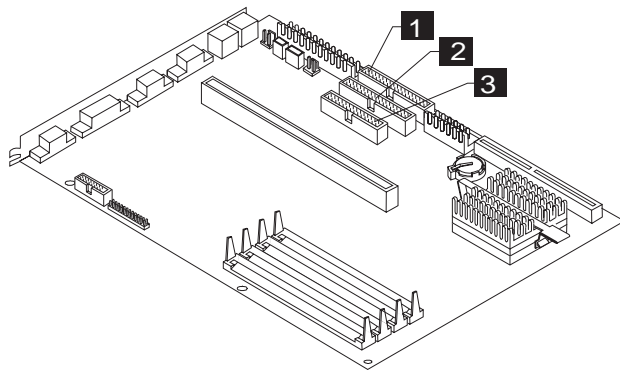
Identifying signal cable connectors

When you install a drive of any type, you must attach the *signal cable* (also called the data cable) from the drive to a connector on the system board. The following table identifies each connector on the system board and the type of drive that uses the connection. Note that the first two connectors are for IDE/ATA local bus drives (such as hard drives and CD-ROM drives), while the third connector is for diskette interface drives (such as diskette drives or diskette AT interface tape drives).

| System board connector | Interface type | Type of drive using the connector | Number in picture |
|-----------------------------|-------------------|---|-------------------|
| Local Bus connector 1 - J9 | IDE/ATA Local Bus | Preferred location for first and second hard disk drives. A CD-ROM drive can also be attached here. | 1 |
| Local Bus connector 2 - J10 | IDE/ATA Local Bus | Preferred location for a third or fourth hard disk drive. A CD-ROM drive should be attached here. | 2 |

| System board connector | Interface type | Type of drive using the connector | Number in picture |
|----------------------------|----------------------|--|-------------------|
| Diskette connector - J7 | Standard diskette AT | Should be used for diskette drives or diskette AT interface tape drives. | 3 |

Use the following picture to identify signal cable connectors on your system board:



Guidelines for connecting IDE/ATA signal cables

Your system board has two connectors for attaching IDE/ATA signal cables, but you can install two IDE/ATA drives to each of these connectors if you have the proper cables. When two drives are attached to one connector, one drive must be the *master* device, and the other the *slave* device. Jumper settings on the drives determine which drive is the master and which is the slave.

The hard disk that came installed in your computer is attached to Local Bus connector 1 and is set as a master device. If your computer came with a CD-ROM drive, it is attached to Local Bus connector 2 and is set as a master device.

These are the general guidelines for IDE/ATA signal cable connections:

- If only one drive is attached to a connector, it must be set as a master device.
- On each connector, there can be only one drive set as the master device and one drive set as the slave device.
- A maximum of four IDE drives can be attached to your computer, two on Local Bus connector 1, and two on Local Bus connector 2.
- If a hard disk shares the same connector with a drive that requires a software device driver (such as a CD-ROM drive), the hard disk must be set as the master device.

If you are installing a drive on Local Bus connector 1, follow these guidelines:

- Attach the signal cable from the drive to Local Bus connector 1, which is labeled J9 on the system board.
- Set the newly installed drive as a master device if one of these conditions exists:
 - The new drive is the only drive attached to the connector.
 - Another drive that is not a hard disk drive (such as a CD-ROM) is already attached to the connector. Set the drive that is already attached to the connector as the slave device. Jumpers for setting CD-ROM drives as master or slave devices are typically located at the back of the drive.
- Set the newly installed hard disk as a slave device if another hard disk is already attached to the connector.

If you are installing a drive on Local Bus connector 2, follow these guidelines:

- Attach the signal cable from the drive to Local Bus connector 2, which is labeled J10 on the system board.
- Set the newly installed drive as a master device if one of these conditions exists:
 - The new drive is the only drive attached to the connector.
 - Another drive that is not a hard disk drive is already attached to the connector. Set the drive that is already attached to the connector as the slave device. Jumpers for setting CD-ROM drives as master or slave devices are typically located at the back of the drive.
- Set the newly installed hard disk as a slave device if another hard disk is already attached to the connector.

If you are installing a CD-ROM drive (or any drive that requires a software device driver), follow these guidelines:

- Attach the signal cable from the drive to Local Bus connector 1 (labeled J9) or Local Bus connector 2 (labeled J10).
- Set the newly installed drive as a master device if it is the only drive attached to the connector. Otherwise, set the new drive as a slave device. For instructions on changing a drive setting, see the documentation that came with the new drive.

Guidelines for connecting diskette AT interface signal cables

Your system board has one connector for attaching diskette AT interface signal cables, but you can install two diskette AT interface drives to this connector if you have the proper cables.

If you are installing a second diskette drive or an AT interface tape drive, follow these guidelines:

- Attach the signal cable from the drive to the Diskette connector, which is labeled J7 on the system board.
- Do not change any settings on a diskette drive that is already installed.
- If you are installing a 5.25-inch drive, you must purchase a signal cable with a “card edge” connector. Attach the card edge connector to the 5.25-inch drive.

- If you are installing a 3.5-inch device, you might have to purchase a signal cable.

Tip for proper drive alignment

To ensure that a drive is aligned properly in a bay, do the following:

1. Insert each screw and tighten loosely.
2. After all screws are properly set in their correct positions, tighten each screw securely.

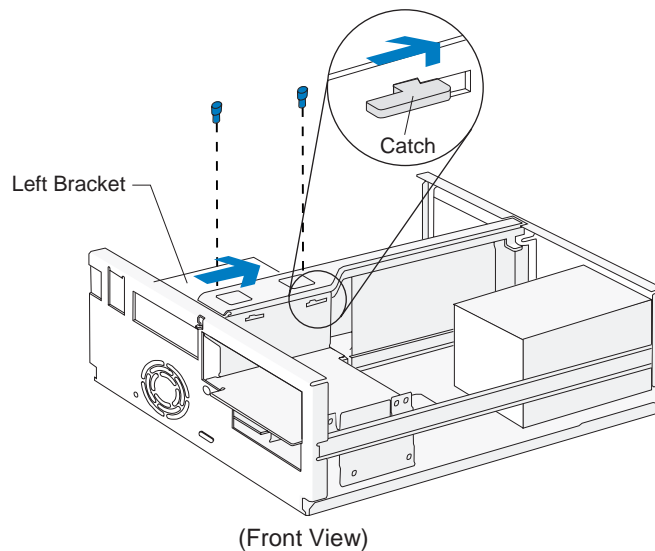
Installing a drive in bay 1

Bay 1 holds a 3.5-inch slim drive, such as a diskette or tape drive.

Before beginning these steps, you need to remove any installed adapter cards. For instructions on removing adapter cards, see "Removing adapter cards" on page 86.

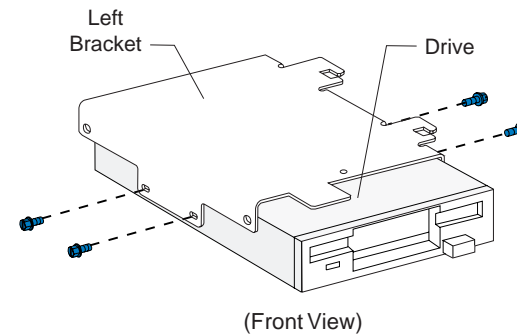
1. Left bracket removal

Remove the screws and disconnect any drive cables. (Notice how the cables are attached. You may need to reconnect these cables when you are finished.) Slide the left bracket back to release the catches, and then remove the bracket (with any attached drive, if present).



2. Drive attachment/removal

For drive attachment, lay the drive upright on a flat surface. Place the bracket on top of the drive. Align the screw holes and insert the screws. (Reverse this step for drive removal.)

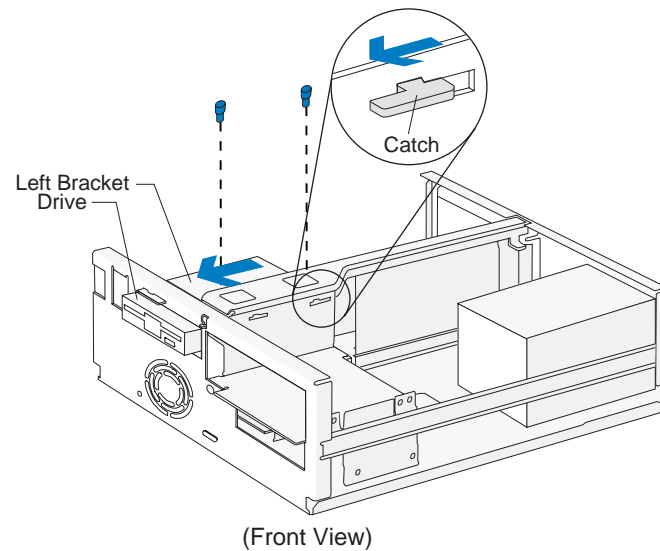


note: | Screw locations may differ.

Installing a drive in bay 1 (continued)

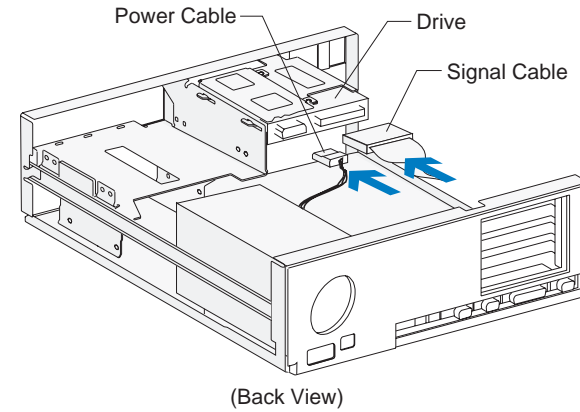
3. Left bracket replacement

Insert the left bracket catches into the slots and slide the bracket forward until it locks into place. Align the screw holes and insert the screws.



4. Drive cable connection

Connect all drive cables.



If you are adding a diskette or tape drive that attaches to the Diskette connector, make sure the signal cable you plug into the drive is attached to the Diskette connector on the system board. To identify the Diskette connector, see "Identifying signal cable connectors" on page 87.

note:

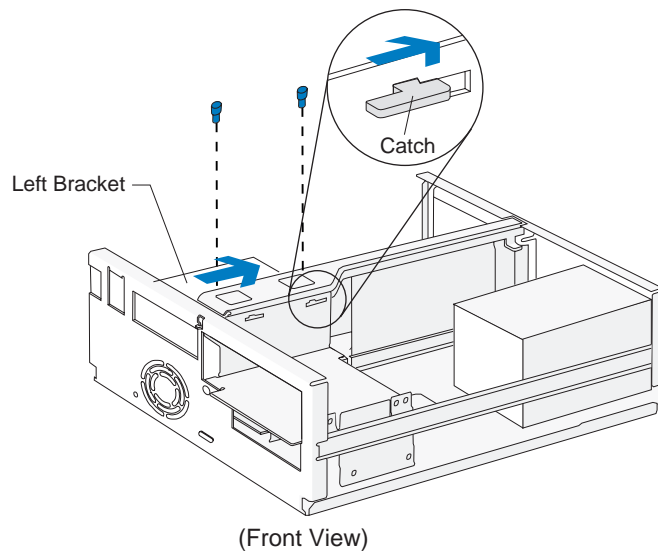
Installing a drive in bay 2

Bay 2 holds up to a 5.25-inch half high drive, such as a diskette, tape, or CD-ROM drive.

Before beginning these steps, you might need to remove any installed adapter cards. For instructions on removing adapter cards, see "Removing adapter cards" on page 86.

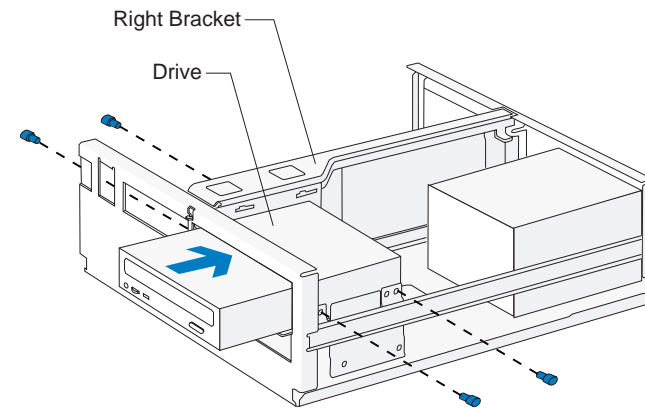
1. Left bracket removal

Remove the screws and disconnect any drive cables. (Notice how the cables are attached. You might need to reconnect these cables when you are finished.) Slide the left bracket back to release the catches, and then remove the bracket (with any attached drive, if present).



2. Drive attachment/removal

For drive attachment, slide the drive into the bracket. To insert each screw, align the screw hole on the drive with the rearmost of the two screw holes on the bracket. Insert the screws. (Reverse this step for drive removal.)

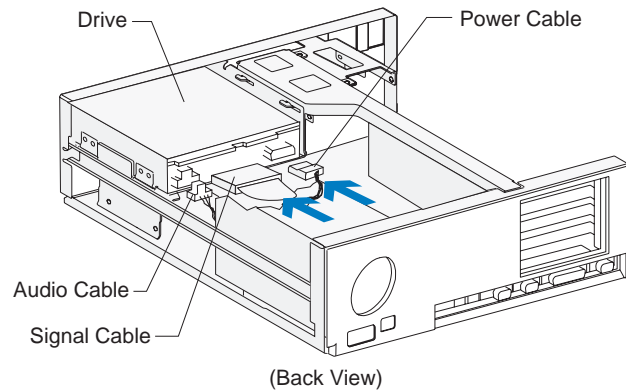


note: | Screw locations may differ.

Installing a drive in bay 2 (continued)

3. Drive cable connections

Connect all drive cables.



note:

If you are adding a diskette or tape drive that attaches to the Diskette connector, make sure the signal cable you plug into the drive is attached to the Diskette connector on the system board. To identify the Diskette connector, see "Identifying signal cable connectors" on page 87.

4. Left bracket replacement and drive cable connections

For instructions on replacing the left bracket and connecting the drive cables for any drive that may be attached to the left bracket, see page 92.

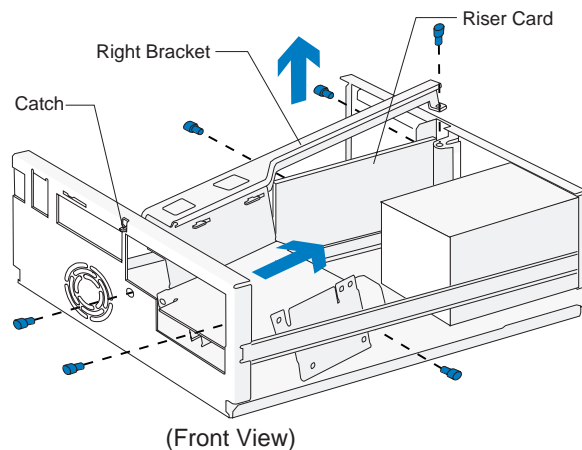
Installing a drive in bay 3

Bay 3 holds a 3.5-inch slim hard disk.

Before beginning these steps, you must remove any drives installed in bays 1 and 2. For instructions on removing a drive from bay 1, see “Installing a drive in bay 1” on page 91. For instructions on removing a drive from bay 2, see “Installing a drive in bay 2” on page 93.

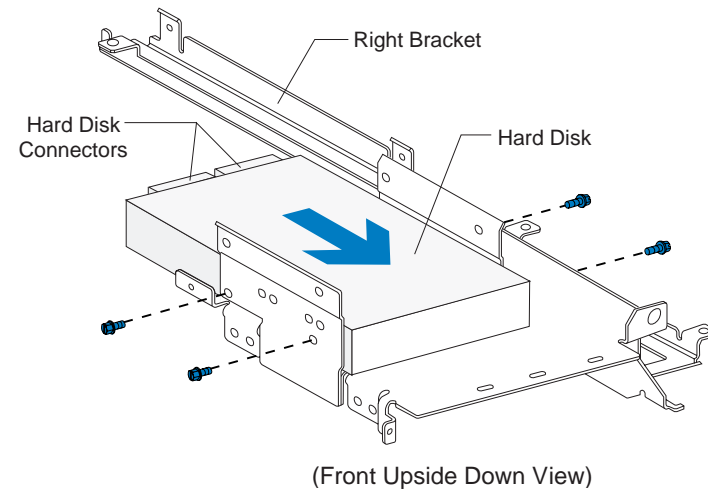
1. Right bracket removal

Remove the screws and disconnect any drive cables. (Notice how the cables are attached. You may need to reconnect these cables when you are finished.) Slide the right bracket back to release the catch, then lift and remove the bracket.



2. Drive attachment/removal

For drive attachment, turn the bracket upside down and slide the drive into the bracket with the component side down. Align the screw holes on the drive with the screw holes on the bracket. Insert the screws. (Reverse this step for drive removal.)



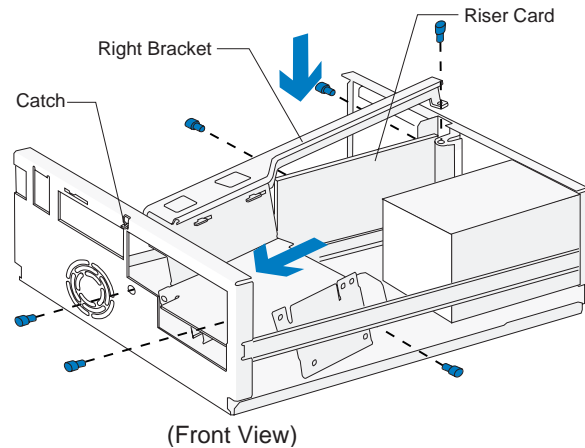
note: | Screw locations may differ.

Installing a drive in bay 3 (continued)

3. Right bracket replacement

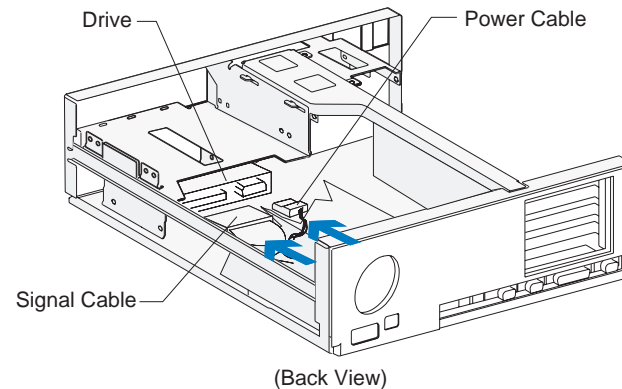
Slide the right bracket into the bay. Make sure you insert the catch into its slot on the front of the system unit. Also make sure the riser card is located to the left of the bracket.

Align the screw holes. Insert the two front screws first, then insert the remaining screws. (The riser card should be located to the left of the bracket so that the screws go through the riser card first.)



4. Hard disk cable connections

Connect all drive cables. Reinstall any drives you removed in bays 1 and 2. For instructions on installing a drive in bay 1, see "Installing a drive in bay 1" on page 91. For instructions on installing a drive in bay 2, see "Installing a drive in bay 2" on page 93.



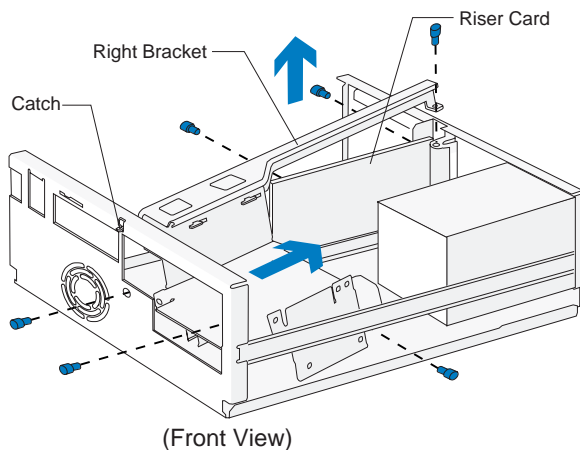
Installing a drive in bay 4

Bay 4 holds a 3.5-inch slim hard disk.

Before beginning these steps, you must remove any drives installed in bays 1 and 2. For instructions on removing a drive from bay 1, see “Installing a drive in bay 1” on page 91. For instructions on removing a drive from bay 2, see “Installing a drive in bay 2” on page 93.

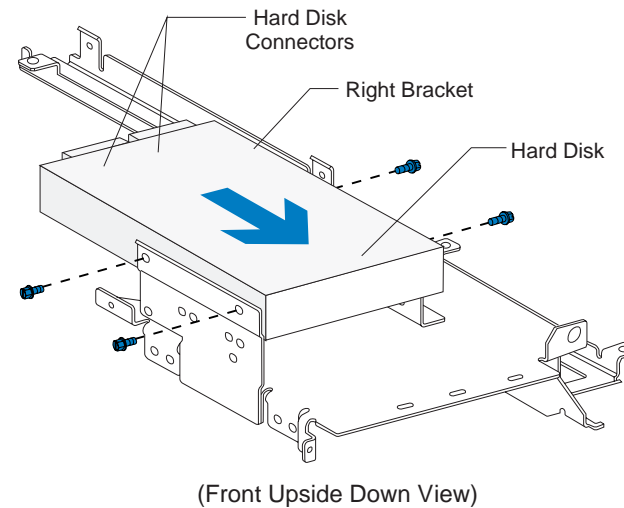
1. Right bracket removal

Remove the screws and disconnect any drive cables. (Notice how the cables are attached. You may need to reconnect these cables when you are finished.) Slide the right bracket back to release the catch, then lift and remove the bracket.



2. Drive attachment/removal

For drive attachment, turn the bracket upside down and slide the drive into the bracket with the component side down. Align the screw holes on the drive with the screw holes on the bracket. Insert the screws. (Reverse this step for drive removal.)



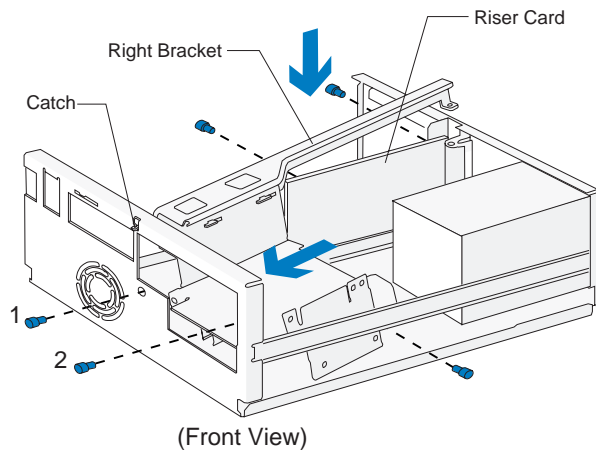
note: | *Screw locations may differ.*

Installing a drive in bay 4 (continued)

3. Right bracket replacement

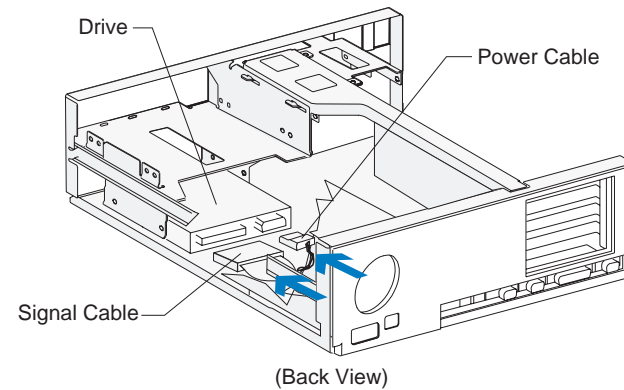
Slide the right bracket into the bay, making sure to insert the catch into its slot. Also make sure the riser card is located to the left of the bracket.

Align the screw holes. Insert the two front screws first, then insert the remaining screws. (The riser card should be located to the left of the bracket so that the screws go through the riser card first.)



4. Hard disk cable connections

Connect all drive cables. Reinstall any drives you removed in bays 1 and 2. For instructions on installing a drive in bay 1, see page 91. For instructions on installing a drive in bay 2, see page 93.



Connecting signal cables

If you have not already done so, connect the signal cable from the drive to the correct connection on the system board. Verify your connections using the information in “Identifying signal cable connectors” on page 87.

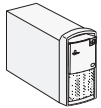
If you had to disconnect any cables to gain access to a section of the system board, reconnect the cables.

Removing drives

To remove a drive from a specific bay, reverse the steps for installing a drive in that bay. To remove a drive from bay 3 or bay 4, you must first remove the drives in bay 1 and bay 2. When you remove a drive from bay 2, you might need to remove the adapter cards from the riser card first.

Working with the hardware in the minitower system unit

To work with the hardware components in the system unit, you must first unplug the system and remove the system unit cover.



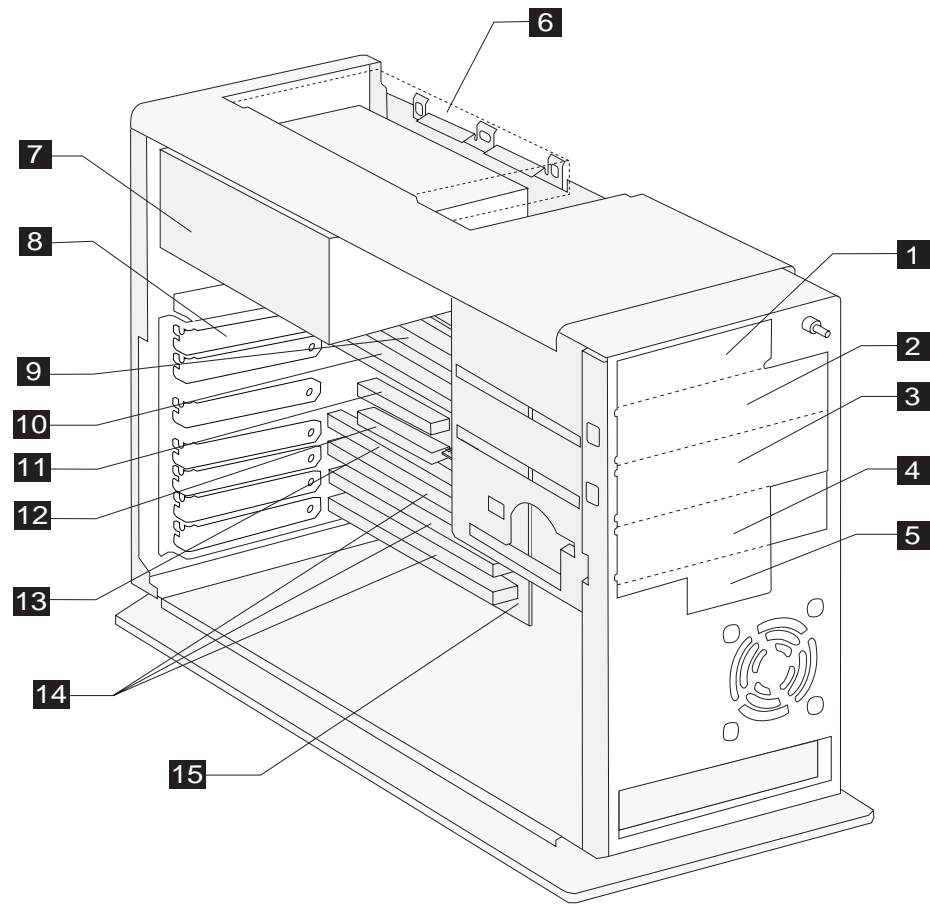
If you have not removed the cover from your system unit, see “Opening a minitower system unit” on page 59.

If you plan to add or replace both an adapter card and a drive, install or replace the drive before you install or replace the adapter card. If you also plan to make hardware changes on the system board, see “Adding and replacing system board components” on page 61 and finish your work with the system board before continuing to work with drives and adapter cards.

To add or remove adapter cards or drives in the minitower system unit, complete the instructions in the following sections:

- “Identifying the parts of the system unit” on page 101
- “Adding and removing adapter cards” on page 103
- “Adding and removing drives” on page 108

Identifying the parts of the system unit



Your computer's system unit has six drive bays and can hold up to six drives. It also has seven adapter card slots and eight adapter card connectors and can hold up to seven adapter cards. You can purchase a drive to install in any empty bay or an adapter card to install in any empty slot.

You can install industry standard architecture (ISA) advanced technology (AT) adapter cards, and peripheral component interconnect (PCI) adapter cards. You can install an AT adapter card in any AT adapter card connector. You can install a PCI adapter card in any PCI adapter card connector.

Diskette drives use the standard diskette advanced technology (AT) interface. Hard disks use an integrated drive electronics (IDE) AT interface. Your computer supports the American National Standards Institute (ANSI) standard for AT attachment disk drives.

- 1** Bay 1. This bay can hold a 3.5-inch slim drive, such as a diskette or tape drive.
- 2** Bay 2. This bay can hold up to a 5.25-inch half high drive, such as a diskette, hard disk, tape, or CD-ROM drive.
- 3** Bay 3. This bay can hold up to a 5.25-inch half high drive, such as a diskette, hard disk, tape, or CD-ROM drive.
- 4** Bay 4. This bay can hold up to a 3.5-inch half high drive, such as a diskette or tape drive.
- 5** Bay 5. This bay can hold a 3.5-inch slim hard disk drive. (No external access.)
- 6** Bay 6. This bay can hold a 3.5-inch slim hard disk drive. (No external access.)

- 7** Power supply. Capable of providing at least 145 watts of power to the system unit.
- 8** Adapter card slots. Seven openings for adapter cards.
- 9** AT adapter card connector 1 (AT - 1). Holds an AT adapter card.
- 10** AT adapter card connector 2 (AT - 2). Holds an AT adapter card.
- 11** PCI adapter card connector 1 (PCI - 1). Holds a PCI adapter card.
- 12** PCI adapter card connector 2 (PCI - 2). Holds a PCI adapter card. This connector shares a slot with the AT - 3 connector. If you install a card in this connector, you cannot install a card in connector AT - 3.
- 13** AT adapter card connector 3 (AT - 3). Holds an AT adapter card. This connector shares a slot with the PCI - 2 connector. If you install a card in this connector, you cannot install a card in connector PCI - 2.
- 14** AT adapter card connectors 4 - 6 (AT - 4 - 6). Holds AT adapter cards.
- 15** Riser card. Holds the adapter card connectors.

Adding and removing adapter cards

The minitower system unit has seven slots and eight connectors for adapter cards. A maximum of seven adapter cards can be installed in the system unit at one time.

Identifying adapter card connectors

You can install ISA AT or PCI adapter cards. Use the following table to help you determine what type and length adapter card you can install in each adapter card connector. Adapter card connectors are identified in "Identifying the parts of the system unit" on page 101.

| Adapter card connector | Type of adapter card you can install |
|------------------------|---|
| AT - 1 | Can hold a half-length ISA AT adapter card. |
| AT - 2 | Can hold a half-length, three-quarter-length, or full-length ISA AT adapter card. |
| PCI - 1 | Can hold a half-length or full-length PCI adapter card. |
| PCI - 2 | Can hold a half-length or full-length PCI adapter card. |
| AT - 3 | Can hold a half-length, three-quarter-length, or full-length ISA AT adapter card. |
| AT - 4 - 6 | Can hold a half-length, three-quarter-length, or full-length ISA AT adapter card. |

note:

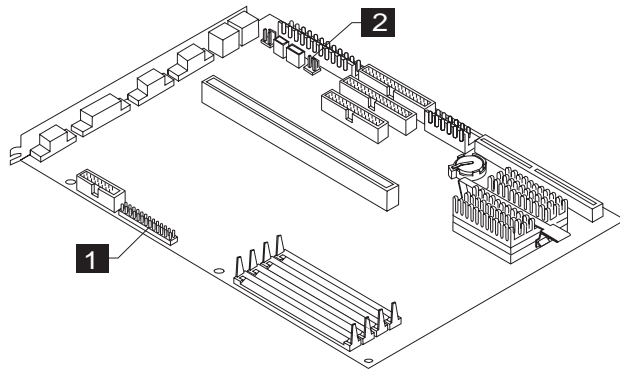
You can install a PCI adapter card in connector PCI - 2 or an AT adapter card in connector AT - 3. However, you cannot install adapter cards in connectors PCI - 2 and AT - 3 at the same time.

Identifying card cable connectors

Depending on the type of adapter card you install, you might need to attach cables from the card to connectors on the system board or to connectors on the CD-ROM drive. The following table identifies each connector on the system board and the type of card that might have a cable you need to connect:

| System board connector | Type of card or feature using the connector | Number in picture |
|------------------------|---|-------------------|
| J14 | Television card / video card | 1 |
| JP5 | Wake Up on Ring | 2 |

Use the following picture to identify card cable connectors on your system board:



Note whether the location of the cable connector you need to use is beneath the riser card. If it is, follow the instructions in “If you need to remove the riser card in a minitower system” on page 62 before you install the new adapter card.

Setting jumpers

When you install an adapter card, you might have to set switches or move jumpers to make the card work properly with any cards that are already installed. If you install a Plug and Play adapter card, however, you typically do not have to change any switch or jumper settings after you install it. The computer and the card automatically work together to make sure the settings are correct.

Refer to the documentation that came with the new hardware to determine if you need to set any switches or move any jumpers.

Setting jumpers for video cards

When you install a video adapter card you do not need to reset (move) jumpers on the system board. The built-in video controller will be disabled automatically. However, you might need to set jumpers on the video adapter card. Check the documentation that came with the card to see if any jumpers need to be set.

Setting jumpers on the Mwave card

If you are installing an adapter card that uses I/O address or joystick port settings that conflict with the settings for the installed Mwave card, you began to resolve these conflicts before you turned your computer off. If you could not change the I/O address or joystick port settings on the device you are now installing, you changed the online configuration for the installed Mwave card in “Resolving Mwave resource conflicts” on page 73.

With your system unit open, you can change the required jumpers on the Mwave card to finish resolving these conflicts. If you need to remove the Mwave card to access the jumpers, follow the instructions in “Removing adapter cards” on page 108.

If you need more information about the Mwave card, refer to your computer's online help for Mwave. To access the Mwave online help, follow these steps:

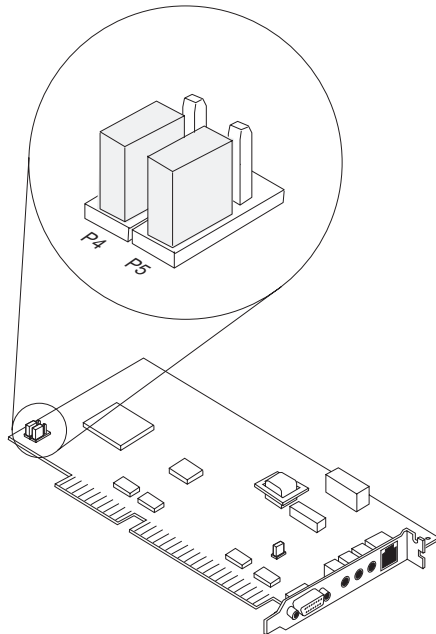
1. From your Windows 95 desktop, click on the Start button.
2. Move your mouse pointer to the Programs menu and then to the Mwave menu.

3. Click on the Mwave Help option.

Moving the I/O address jumpers

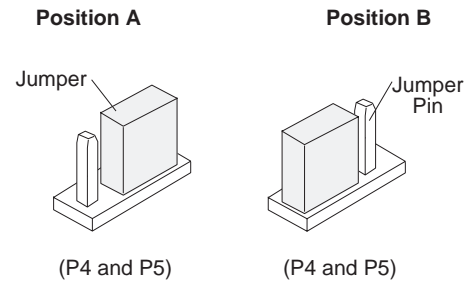
If you changed the I/O address in the Windows 95 Device Manager, set the jumpers on the Mwave card to match that address. These jumpers on the Mwave card are labeled P4 and P5. To set the I/O address jumpers, follow these instructions:

1. Locate the I/O address jumpers on the Mwave card.



2. Use the following table and picture to determine how to set the jumpers.

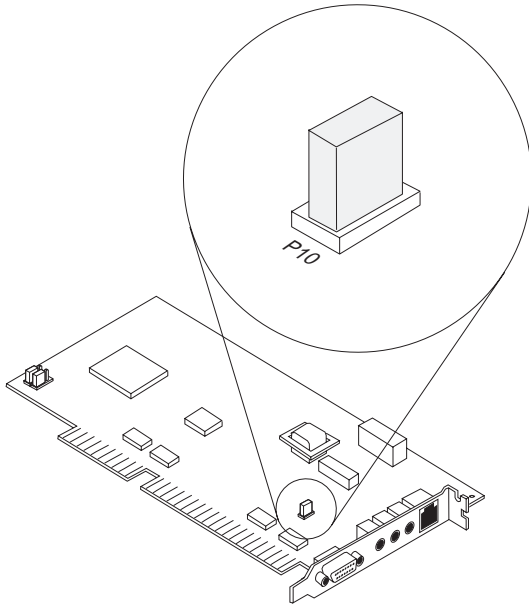
| If you choose I/O address: | Set P4 to: | Set P5 to: |
|----------------------------|------------|------------|
| CE30 | Position B | Position B |
| 01B0 | Position A | Position B |
| 0130 | Position A | Position A |



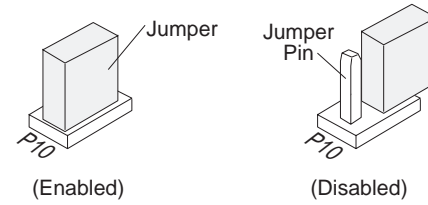
Moving the joystick port jumper

If you need to disable the joystick port on the Mwave card, follow these steps:

1. Locate the jumper labeled P10 on the Mwave card.



2. Move the jumper from the enabled position to the disabled position as shown in the picture.

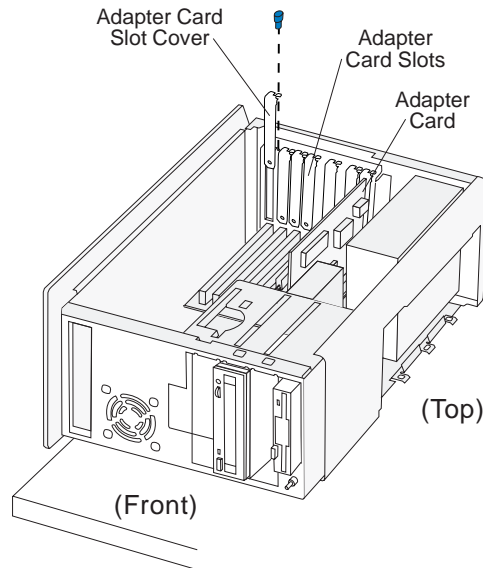


If you had to remove the adapter card to access the jumpers, reinstall the card.

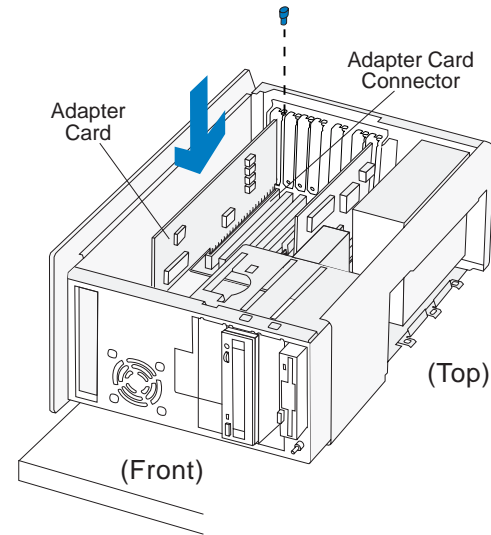
Installing adapter cards

To install an adapter card, you must position the system unit for access to the riser card:

1. Rest your system on a sturdy, flat surface. Turn the system unit on its side so that the system board faces you. To ensure that the system unit lays flat, make sure the base (bottom) of the system unit hangs over the edge of your work surface as shown in the illustration.
2. Remove the adapter card slot cover screw. Then remove the slot cover.



3. Align and insert the adapter card into the adapter card connector. Insert the screw.



4. Reinstall all hardware and screws you removed to install the adapter card.

Connecting card cables

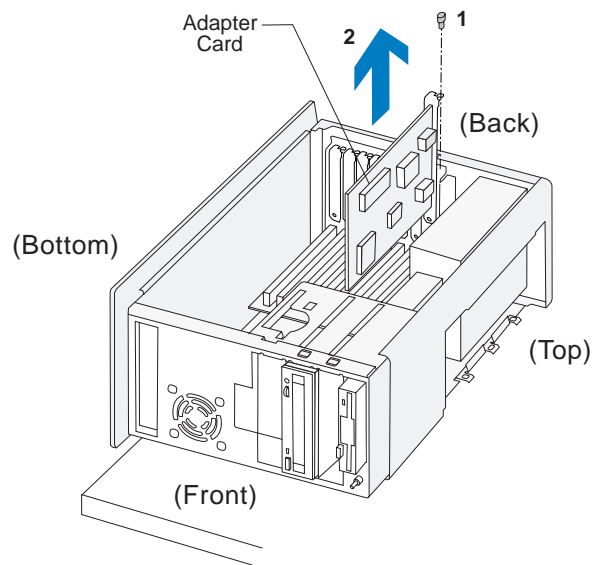
If you have not already done so, connect the cable or cables from the adapter card to the correct connection on the system board or CD-ROM drive. Verify your connections using the information in "Identifying card cable connectors" on page 103.

If you had to disconnect any cables to gain access to the adapter card connector on the riser card or to gain

access to a section of the system board, reconnect the cables.

Removing adapter cards

If you need to remove an adapter card, follow the instructions in step 1 on page 107 to position the system unit. Remove the adapter card screw. Carefully pull the adapter card straight out of the slot so that the card's components do not bend. If an adapter card has cables, disconnect them. Be sure to notice where the cables connect to the cards. You will have to reconnect these cables if you reinstall the card.



Adding and removing drives

The minitower system unit has six bays for various types of drives. Some of these bays already hold drives that were installed at the factory.

When you purchase a new drive, make sure you also purchase the appropriate power and signal cables.

Identifying drive bays

The minitower system can accommodate 3.5-inch slim and 3.5-inch half high drives, such as diskette and tape drives. The system can also accommodate 5.25-inch half high drives, such as diskette, hard disk, tape, and CD-ROM drives. Four of the bays in your system have external access. Two do not.

You can install a drive in any empty bay that accommodates the drive's size. Use the following table to help you determine where to install your drive.

| Bay | Drive Specifications | Bay Capacity |
|-----|---|-------------------------------------|
| 1 | Can hold a 3.5-inch slim drive, such as a diskette or tape drive. | 101.6 x 25.4 mm (4.0 x 1.0 in.) |
| 2 | Can hold up to a 5.25-inch half high drive, such as a diskette, hard disk, tape, or CD-ROM drive. | 149 x 41.3 mm (5.87 x 1.625 in.) |

Note: Using the appropriate installation hardware, you can install smaller drives than those listed here.

| Bay | Drive Specifications | Bay Capacity |
|-----|---|--------------------------------------|
| 3 | Can hold up to a 5.25-inch half high drive, such as a diskette, hard disk, tape, or CD-ROM drive. | 149 x 41.3 mm (5.87 x 1.625 in.) |
| 4 | Can hold up to a 3.5-inch half high drive, such as a diskette or tape drive. | 101.6 x 41.3 mm (4.0 x 1.625 in.) |
| 5 | Can hold a 3.5-inch slim hard disk. (No external access.) | 101.6 x 25.4 mm (4.0 x 1.0 in.) |
| 6 | Can hold a 3.5-inch slim hard disk. (No external access.) | 101.6 x 25.4 mm (4.0 x 1.0 in.) |

Note: Using the appropriate installation hardware, you can install smaller drives than those listed here.

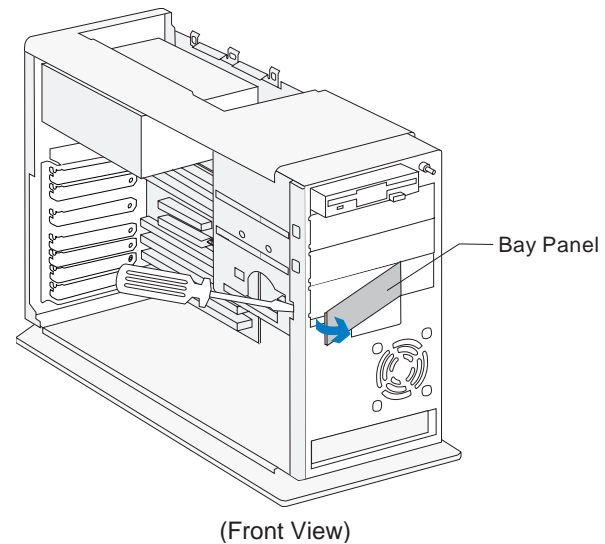
To identify drive bays in the desktop system unit, see “Identifying the parts of the system unit” on page 101.

Removing and replacing bay panels

When you first unpack your computer, all external drive bays that do not contain drives are covered with bay panels. To install a drive in a previously unoccupied external bay, first remove the bay panel from the system unit cover. If you remove a drive from an external bay and you do not intend to install a new drive immediately, replace the bay panel in the system unit cover.

To remove a bay panel, follow these steps:

1. Remove the system unit cover, if you haven’t already. For these instructions, see “Opening a minitower system unit” on page 59.
2. Locate the panel latches on the inside of the frame. Insert a small, flat-blade screwdriver behind the panel and depress the panel latches. See the following illustration for an example.



To replace a bay panel, follow these steps:

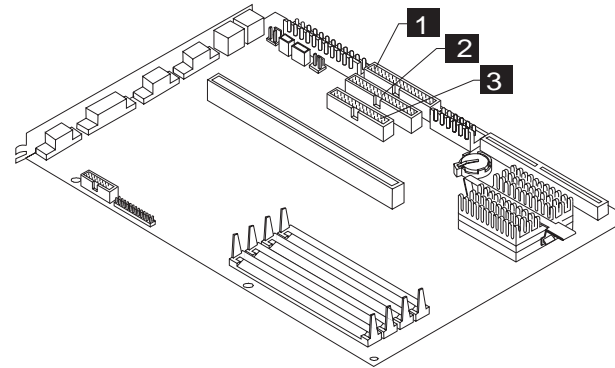
1. Insert the panel into the opening at the front of the frame.
2. Push the panel into place until you hear the latch click.

Identifying signal cable connectors

When you install a drive of any type, you must attach the *signal cable* (also called the data cable) from the drive to a connector on the system board. The following table identifies each connector on the system board and the type of drive that uses the connection. Note that the first two connectors are for IDE/ATA local bus drives (such as hard drives and CD-ROM drives), while the third connector is for diskette interface drives (such as diskette drives or diskette AT interface tape drives).

| System board connector | Interface type | Type of drive using the connector | Number in picture |
|--------------------------------|-------------------------|---|-------------------|
| Local Bus connector 1 – J9 | IDE/ATA Local Bus | Preferred location for first and second hard disk drives. A CD-ROM drive can also be attached here. | 1 |
| Local Bus connector 2 – J10 | IDE/ATA Local Bus | Preferred location for a third or fourth hard disk drive. A CD-ROM drive should be attached here. | 2 |
| Diskette connector – J7 | Standard diskette AT | Should be used for diskette drives or diskette AT interface tape drives. | 3 |

Use the following picture to identify signal cable connectors on your system board:



Guidelines for connecting IDE/ATA signal cables

Your system board has two connectors for attaching IDE/ATA signal cables, but you can install two IDE/ATA drives to each of these connectors if you have the proper cables. When two drives are attached to one connector, one drive must be the *master* device, and the other the *slave* device. Jumper settings on the drives determine which drive is the master and which is the slave.

The hard disk that came installed in your computer is attached to Local Bus connector 1 and is set as a master device. If your computer came with a CD-ROM drive, it is attached to Local Bus connector 2 and is set as a master device.

These are the general guidelines for IDE/ATA signal cable connections:

- If only one drive is attached to a connector, it must be set as a master device.
- On each connector, there can be only one drive set as the master device and one drive set as the slave device.
- A maximum of four IDE drives can be attached to your computer, two on Local Bus connector 1, and two on Local Bus connector 2.
- If a hard disk shares the same connector with a drive that requires a software device driver (such as a CD-ROM drive), the hard disk must be set as the master device.

If you are installing a drive on Local Bus connector 1, follow these guidelines:

- Attach the signal cable from the drive to Local Bus connector 1, which is labeled J9 on the system board.
- Set the newly installed drive as a master device if one of these conditions exists:
 - The new drive is the only drive attached to the connector.
 - Another drive that is not a hard disk drive (such as a CD-ROM) is already attached to the connector. Set the drive that is already attached to the connector as the slave device. Jumpers for setting CD-ROM drives as master or slave devices are typically located at the back of the drive.
- Set the newly installed hard disk as a slave device if another hard disk is already attached to the connector.

If you are installing a drive on Local Bus connector 2, follow these guidelines:

- Attach the signal cable from the drive to Local Bus connector 2, which is labeled J10 on the system board.
- Set the newly installed drive as a master device if one of these conditions exists:
 - The new drive is the only drive attached to the connector.
 - Another drive that is not a hard disk drive is already attached to the connector. Set the drive that is already attached to the connector as the slave device. Jumpers for setting CD-ROM drives as master or slave devices are typically located at the back of the drive.
- Set the newly installed hard disk as a slave device if another hard disk is already attached to the connector.

If you are installing a CD-ROM drive (or any drive that requires a software device driver), follow these guidelines:

- Attach the signal cable from the drive to Local Bus connector 1 (labeled J9) or Local Bus connector 2 (labeled J10).
- Set the newly installed drive as a master device if it is the only drive attached to the connector. Otherwise, set the new drive as a slave device. For instructions on changing a drive setting, see the documentation that came with the new drive.

Guidelines for connecting diskette AT interface signal cables

Your system board has one connector for attaching diskette AT interface signal cables, but you can install two diskette AT interface drives to this connector if you have the proper cables.

If you are installing a second diskette drive or an AT interface tape drive, follow these guidelines:

- Attach the signal cable from the drive to the Diskette connector, which is labeled J7 on the system board.
- Do not change any settings on a diskette drive that is already installed.
- If you are installing a 5.25-inch drive, you must purchase a signal cable with a “card edge” connector. Attach the card edge connector to the 5.25-inch drive.

- If you are installing a 3.5-inch device, you might have to purchase a signal cable.

Tip for proper drive alignment

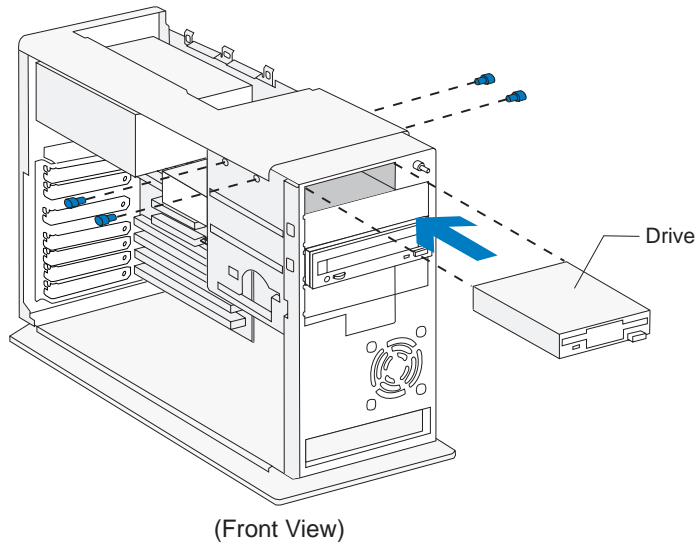
To ensure that a drive is aligned properly in a bay, do the following:

1. Insert each screw and tighten loosely.
2. After all screws are properly set in their correct positions, tighten each screw securely.

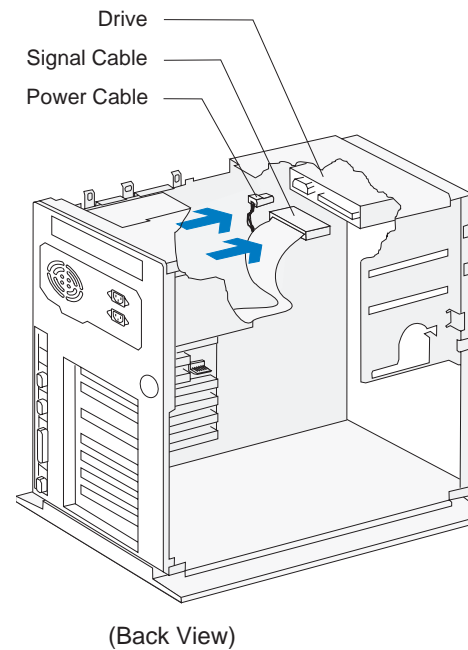
Installing a drive in bay 1

Bay 1 can hold a 3.5-inch slim drive, such as a diskette or tape drive.

1. Insert the drive into the bay. Align the screw holes and insert the four screws.



2. Connect the power and signal cables to the drive.



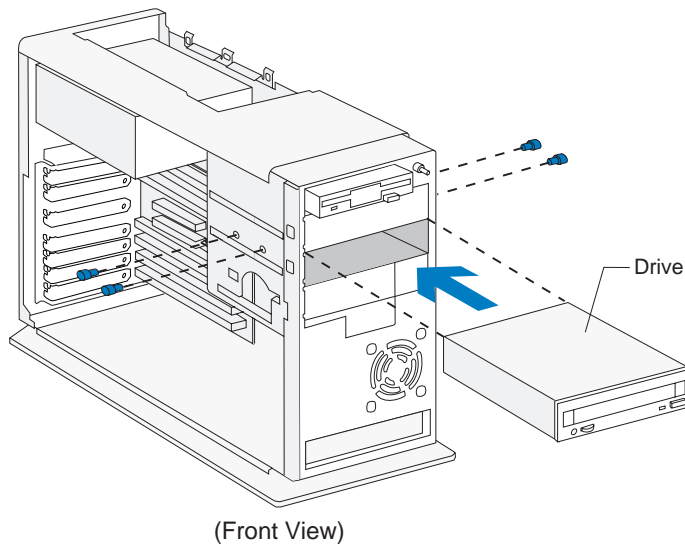
note:

If you add a diskette drive or a tape drive that attaches to the Diskette connector, make sure the signal cable you plug into the drive is attached to the Diskette connector on the system board. To identify the Diskette connector on the system board, see "Identifying signal cable connectors" on page 110.

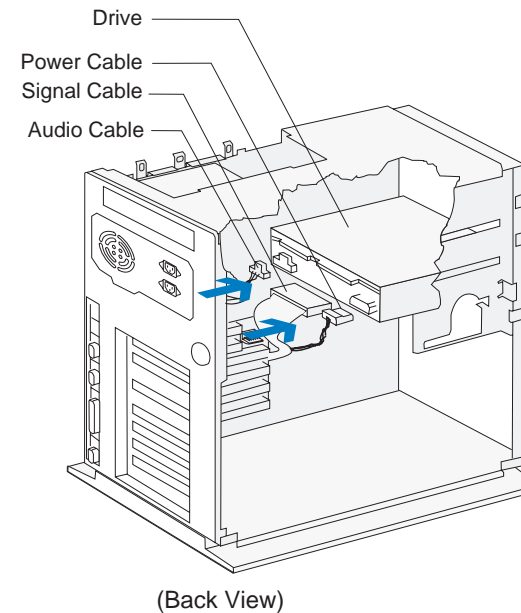
Installing a drive in bay 2 or 3

Bay 2 or 3 can hold up to a 5.25-inch half high drive, such as a diskette, hard disk, tape, or CD-ROM drive.

1. Insert the drive into the bay. Align the screw holes and insert the four screws.



2. Connect the power and signal cables to the drive.



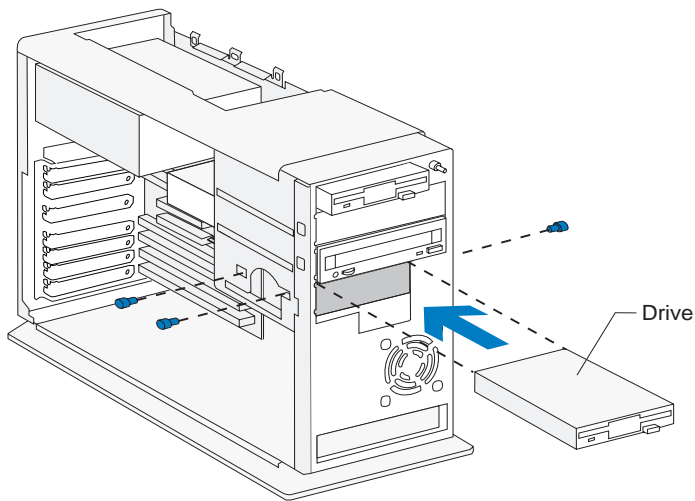
note:

If you add a diskette drive or tape drive that attaches to the Diskette connector, make sure the signal cable you plug into the drive is attached to the Diskette connector on the system board. If you add a CD-ROM, it is recommended that you use the signal cable attached to Local Bus connector on 2 on the system board. To identify the connectors, see "Identifying signal cable connectors" on page 110.

Installing a drive in bay 4

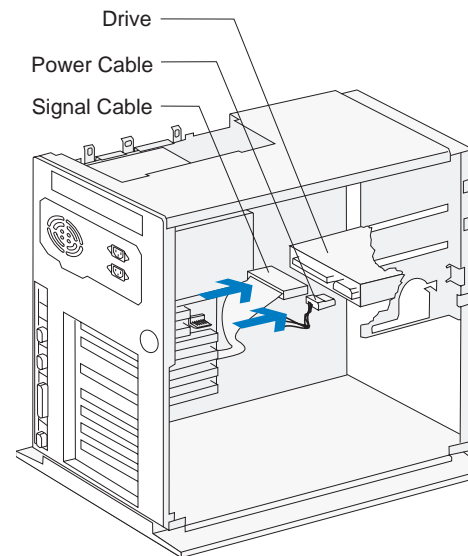
Bay 4 can hold up to a 3.5-inch half high drive, such as a diskette or tape drive.

1. Insert the drive into the bay. Align the screw holes and insert the three screws.



(Front View)

2. Connect the power and signal cables to the drive.



(Back View)

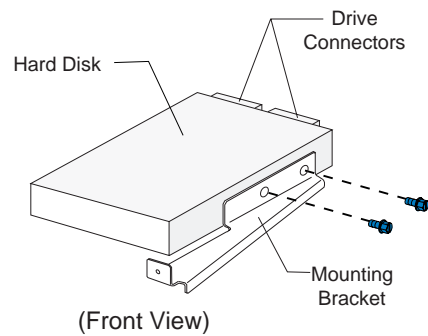
note:

If you add a diskette drive or a tape drive that attaches to the Diskette connector, make sure the signal cable you plug into the drive is attached to the Diskette connector on the system board. To identify the Diskette connector on the system board, see "Identifying signal cable connectors" on page 110.

Installing a drive in bay 5

Bay 5 can hold a 3.5-inch slim hard disk.

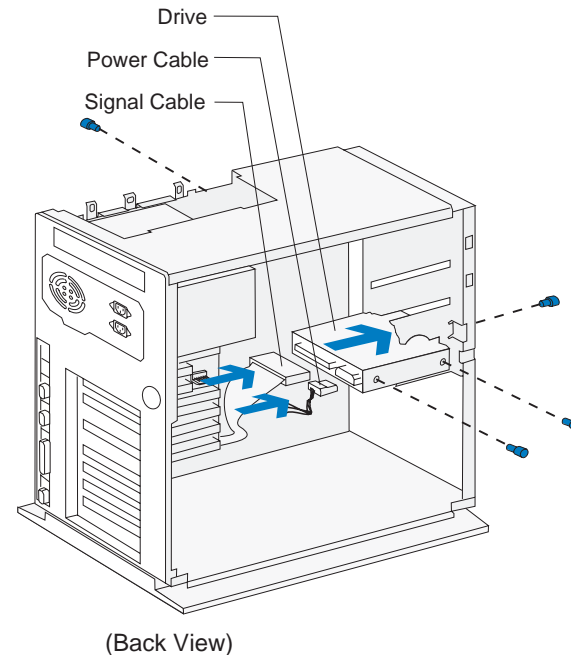
1. To attach the mounting bracket, align the screw holes and insert the two screws.



note:

The drive is drawn in this position to show bracket attachment. Once the bracket is installed on the drive, rotate the drive 180 degrees so that the front of the drive faces the front of the system unit.

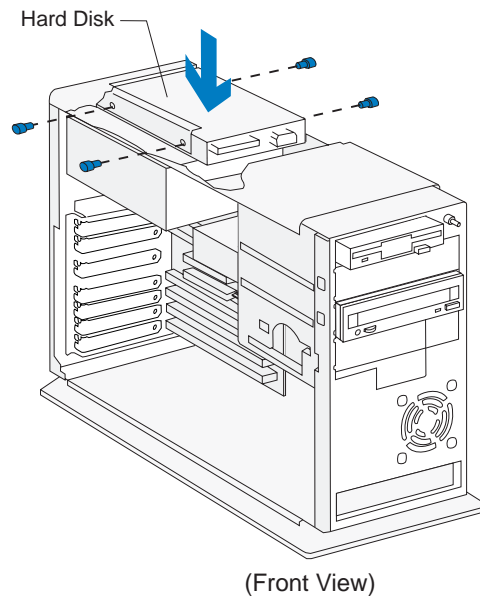
2. Insert the hard disk (with the bracket attached) into the bay. Align the screw holes and insert the four screws. Connect the power and signal cables. (To ensure that your hard drive functions properly, read "Guidelines for connecting IDE/ATA signal cables" on page 111 before connecting the cables.)



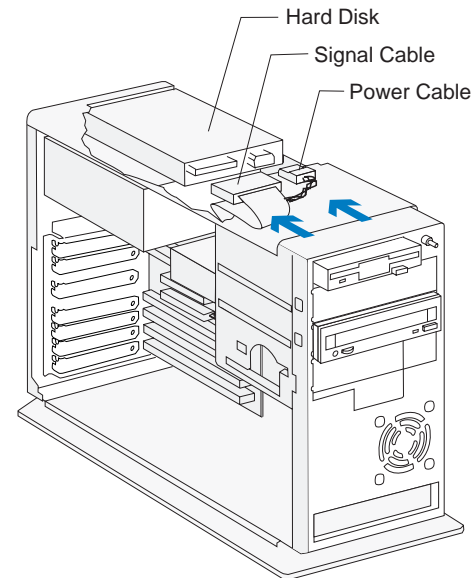
Installing a drive in bay 6

Bay 6 can hold a 3.5-inch slim hard disk.

1. Insert the drive into the bay. Align the screw holes and insert the four screws.



2. Connect the power and signal cables. (To ensure that your hard drive functions properly, read "Guidelines for connecting IDE/ATA signal cables" on page 111 before connecting the cables.)



Connecting signal cables

If you have not already done so, connect the signal cable from the drive to the correct connection on the system board. Verify your connections using the information in “Identifying signal cable connectors” on page 110.

If you had to disconnect any cables to gain access to a section of the system board, reconnect the cables.

Removing drives

To remove a drive from a specific bay, reverse the steps for installing a drive in that bay.

Updating the Setup Utility

When you add Plug and Play adapter cards and drives, your system’s Basic Input/Output System (BIOS) detects the hardware changes and updates the Setup Utility automatically. When you add devices that are not Plug and Play, the BIOS might still detect the new hardware. In a few cases, however, you might need to enter the Setup Utility to verify or correct configuration settings.

If you need to verify or correct configuration settings in the Setup Utility, see “Using the Setup Utility” on page 29 for information about how to start and update the Setup Utility.

For adapter cards

When you install a new adapter card, you can select the following options from the Setup Utility’s Main Menu to view or change adapter card information:

- Input/Output Ports

Select this option to see if you have an Mwave adapter card installed. See “Changing input/output port configuration” on page 35 for information about this option.

- Plug and Play

Select this option to view the system resources assigned to non-Plug and Play adapter cards. See “Changing adapter card device information” on page 42 for information about this option.

“Resolving Plug and Play resource conflicts” on page 76 contains instructions for using the Plug and Play menu before you install specific adapter cards.

- Advanced Options and then PCI Cards

Select this option to see if bus mastering is enabled for PCI cards. See “Configuring advanced options” on page 45 for information about these options.

For drives

When you install a diskette drive, you should check the size and storage capacity of the drive in the Setup Utility.

To specify the diskette drive size and capacity, select the Disk Drives option on the Setup Utility Main Menu. See “Changing disk drive configuration” on page 33 for information about this option.

If you remove a diskette, hard disk, or CD-ROM drive, the power-on self test generates an error message. In the Setup Utility, verify that the information the BIOS automatically recorded is correct. Use this opportunity to verify that the remaining drives are installed as intended.

Select the following options from the Setup Utility's Main Menu to verify drive setup:

- System Information

See “Viewing system information” on page 33 for information about this option.

- Disk Drives

See “Changing disk drive configuration” on page 33 for information about this option.

- Startup Options

See “Configuring startup options” on page 43 for information about this option.

Troubleshooting **Part 4**

This part contains information to help you respond to problems with the hardware, software, and features installed in your computer at the factory. It contains the following chapter:

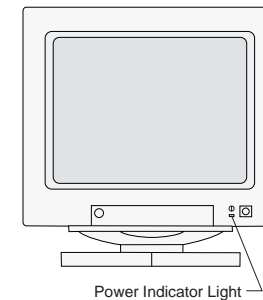
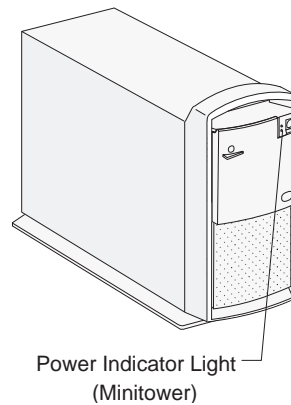
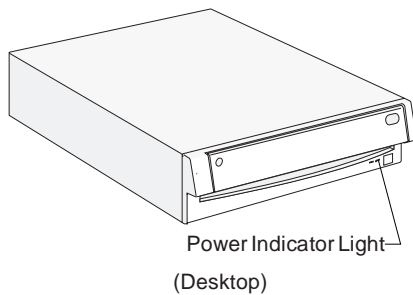
- “Chapter 8: Diagnosing and recovering from problems” on page 123

This chapter provides troubleshooting information, including error code interpretations. It also includes information to help you recover factory installed programs and files.

Diagnosing and recovering from problems 8

Before you panic: some simple fixes

Step 1 Are the power indicator lights on the system unit and monitor lit?



Note: The locations of the power indicator lights may be different from those shown in these pictures.

Yes

Power is reaching the system unit and monitor. Go to Step 2.

No

- Press the on/off buttons on the system unit and monitor to make sure they are turned on.
- Make sure your system unit and monitor cables are correctly and securely connected. Make sure the system unit and monitor power cords are plugged into electrical outlets. Your *Read me first* book shows how the cables and cords should be connected.
- Make sure the electrical outlets you are using are not controlled by a wall or dimmer switch.
- If you are using a multiple outlet device (for example, a power surge protector or power strip), make sure it is plugged in and turned on.

If the problem continues, check your *Guide to HelpWare and All the Extras* folder for information on obtaining service.

Step 2 Did the system unit beep after it was turned on?

Yes, once

The system unit has passed the power-on self test (POST). Go to Step 3.

Yes, more than once

There is a problem with the system unit. Find the code in “Responding to error codes” on page 141 and take the action listed.

No

There is a hardware problem. If you added hardware, remove it and restart the computer to see if the problem is corrected. If the problem is corrected, you may have installed your hardware incorrectly. Reinstall your hardware.

For instructions on installing hardware in your desktop system unit, see “Working with the hardware in the desktop system unit” on page 78. For instructions on installing hardware in your minitower system unit, see “Working with the hardware in the minitower system unit” on page 100. For instructions on installing hardware on your system board, see “Adding and replacing system board components” on page 61.

If the problem continues, check your *Guide to HelpWare and All the Extras* folder for information on obtaining service.

Step 3 Is anything displayed on the monitor?

Yes

There is a problem with the system unit if:

- A three or four digit error code appears. Find the code in "Responding to error codes" on page 141 and take the action listed.
- A box containing an error code and message appears. Follow the instructions in the message. For instructions on using the Setup Utility, see "Using the Setup Utility" on page 29.
- A blinking cursor appears. Check your *Guide to HelpWare and All the Extras* folder for information on obtaining service.
- The image on the screen is unreadable (the image is scrolling, blinking, or flashing). You may have selected a monitor setting that your monitor does not support. Follow these steps to reconfigure your monitor:
 - a. Restart the computer. If necessary, turn off the system unit, pause for 15 seconds, and then turn the system unit back on.
 - b. When you see "Starting Windows 95" appear on the screen during startup, press F8. This opens the Microsoft Windows 95 Startup Menu.
 - c. Select Choice 3 for Safe Mode and press Enter. This starts your computer using the factory configuration settings.
 - d. When your computer has completed startup, double-click on the My Computer desktop icon.
 - e. In the My Computer window, double-click on the Control Panel icon.
 - f. In the Control Panel window, double-click on the Display icon.
 - g. In the Display Properties window, click on the Properties tab.
 - h. See "Changing display settings" on page 12 for instructions on selecting new monitor settings.
 - i. Restart the computer again. Your computer may take a little longer than usual to restart.


(Steps continued on the next page.)


Step 3 Is anything displayed on the monitor? (Continued)

- The colors displayed are wrong. Check to make sure the monitor cable is correctly and securely connected to the system unit. Your *Read me first* book shows how the cable should be connected.

If the problem continues, check your *Guide to HelpWare and All the Extras* folder for information on obtaining service.

- Nothing happens when you use the mouse or keyboard.
 - a. Make sure the keyboard and mouse cables are correctly and securely connected to the ports on the back of the system unit.

The keyboard port has this symbol next to it: 

The mouse port has this symbol next to it: 

- b. Turn off the system unit, and then turn it on again.

If the problem you are having continues, or if it does not appear in this list, look for a description of the problem in the troubleshooting tables that begin on page 127.

No

- There may be a problem with the monitor.
 - a. Make sure your monitor cables are correctly and securely connected. Your *Read me first* book shows how the cables should be connected.
 - b. Adjust the brightness and contrast controls. For instructions, see the documentation that came with your monitor.
- There may be a problem with the battery on your system board. See “Replacing the system battery” on page 71 for instructions on replacing the battery.

If the problem continues, check your *Guide to HelpWare and All the Extras* folder for information on obtaining service.

Solving hardware problems

Table 3: Troubleshooting: Hardware problems

| If the problem is: | Here's what to do: |
|---|---|
| No beep during power-on self test (POST). | Make sure that the system unit is turned on. |
| Screen is black (no error code), more than one beep in self-test. | If you installed memory modules or adapter cards, make sure you installed them correctly. For instructions on installing memory modules on your system board, see "Installing system memory modules" on page 68. For instructions on installing adapter cards in your desktop system unit, see "Adding and removing adapter cards" on page 81. For instructions on installing adapter cards in your minitower system unit, see "Adding and removing adapter cards" on page 103. |
| Error code (and description), more than one beep in self-test, or continuous beep occurs. | <p>If an error code:</p> <ul style="list-style-type: none"> • <u>Is</u> displayed, find the code in "Responding to error codes" on page 141 and take the action listed. • <u>Is not</u> displayed, check your <i>Guide to HelpWare and All the Extras</i> folder for information on obtaining service. |
| Computer turns off without warning. | <ol style="list-style-type: none"> 1. If the Standby feature is enabled, move the mouse to exit Standby. 2. If the Rapid Resume feature is enabled and you have set up the Automatic Power Off option, or set the Scheduler feature to turn off the system unit, turn the system unit back on. 3. Make sure that the system unit and monitor power cords are securely plugged into electrical outlets. 4. Make sure that the cables are correctly and securely connected to the system unit. 5. Check for a blown fuse, tripped circuit breaker, or power failure. 6. Unplug the system unit power cord from the electrical outlet, wait 10 seconds, and then plug the power cord back into the electrical outlet. If the computer does not start immediately, push the on/off button on the system unit. |
| <p>Note: If any of these problems continue after taking the actions listed, check your online Aptiva Helper or the <i>Guide to HelpWare and All the Extras</i> folder for information on obtaining service.</p> | |

Table 3: Troubleshooting: Hardware problems (Continued)


| If the problem is: | Here's what to do: |
|---|---|
| Can't enter password. | <ol style="list-style-type: none"> 1. Make sure you are typing the correct password. 2. Make sure the keyboard cable is correctly and securely connected to the keyboard port (not the mouse port) on the back of the system unit. The keyboard port has this symbol next to it:  3. If you have forgotten your password, check your <i>Guide to HelpWare and All the Extras</i> folder for information on obtaining service. |
| Can't read information on diskette or CD. | <ol style="list-style-type: none"> 1. Make sure you are using the correct type of diskette. Make sure the diskette is formatted correctly. 2. Make sure the diskette or CD is inserted into the drive correctly. 3. Make sure the CD is clean and not scratched. 4. Try to read a diskette or CD that you know is good. If it works, the first diskette or CD is damaged. If you can't read the information on the good diskette or CD, there may be a problem with your diskette or CD-ROM drive. 5. Make sure the drive power and signal cables are securely attached to the back of the drive. For instructions on working in the desktop system unit, see "Working with the hardware in the desktop system unit" on page 78. For instructions on working in the minitower system unit, see "Working with the hardware in the minitower system unit" on page 100. |
| Audio CD does not play when inserted into CD-ROM drive. | <p>Make sure you have enabled AutoPlay. To enable AutoPlay:</p> <ol style="list-style-type: none"> 1. From your desktop, click on the Start button. 2. Select Settings and click on Control Panel. 3. Double-click on the System icon. 4. Click on the Device Manager tab. 5. Double-click on CD-ROM and select the listed CD-ROM option. 6. Click on the Settings tab. 7. Under Options, click on Auto insert notification (a check appears in the box). 8. Click on OK. <p>Note: If you enable AutoPlay, then Standby and Automatic Power Off might not work properly.</p> |
| <p>Note: If any of these problems continue after taking the actions listed, check your online Aptiva Helper or the <i>Guide to HelpWare and All the Extras</i> folder for information on obtaining service.</p> | |

Table 3: Troubleshooting: Hardware problems (Continued)


| If the problem is: | Here's what to do: |
|---|---|
| Can't send information (write) to diskette. | <ol style="list-style-type: none"> 1. Make sure you are using the correct type of diskette. Make sure the diskette is formatted correctly. 2. Make sure the diskette is not write-protected. 3. Make sure you are sending information to the correct drive. 4. Make sure there is space on the diskette for the information. (Try using a blank, formatted diskette.) 5. Make sure the drive power and signal cables are securely attached to the back of the drive. For instructions on working in the desktop system unit, see "Working with the hardware in the desktop system unit" on page 78. For instructions on working in the minitower system unit, see "Working with the hardware in the minitower system unit" on page 100. 6. In the Setup Utility, make sure Diskette Drive Access is enabled on the Security Options menu that is accessible from the Advanced Options menu. |
| Can't format diskette. | <ol style="list-style-type: none"> 1. Make sure the diskette is not write-protected. 2. Make sure you are using the correct type of diskette. 3. Make sure the drive power and signal cables are securely attached to the back of the drive. For instructions on working in the desktop system unit, see "Working with the hardware in the desktop system unit" on page 78. For instructions on working in the minitower system unit, see "Working with the hardware in the minitower system unit" on page 100. 4. In the Setup Utility, make sure Diskette Drive Access is enabled on the Security Options menu that is accessible from the Advanced Options menu. |
| Keyboard doesn't work or only some keys work. | <ol style="list-style-type: none"> 1. Make sure the keyboard cable is correctly and securely connected to the keyboard port (not the mouse port) on the back of the system unit. The keyboard port has this symbol next to it:  2. Move your fingers across the keys. Make sure no keys are stuck. 3. Make sure you are using a screen that allows typing. Some screens do not. 4. Turn off the system unit, wait 10 seconds, and then turn on the system unit again. |
| <p>Note: If any of these problems continue after taking the actions listed, check your online Aptiva Helper or the <i>Guide to HelpWare and All the Extras</i> folder for information on obtaining service.</p> | |

Table 3: Troubleshooting: Hardware problems (Continued)



| If the problem is: | Here's what to do: |
|---|---|
| <p>Mouse does not move the cursor.</p> | <ol style="list-style-type: none"> 1. Move the mouse onto a mouse pad and try using the pad. 2. Make sure you are using a screen that allows the use of a mouse. Some screens do not. 3. Make sure the mouse cable is correctly and securely connected to the mouse port (not the keyboard port) on the back of the system unit. The mouse port has this symbol next to it:  4. Clean the mouse. To clean the mouse: <ol style="list-style-type: none"> a. Turn off the computer. b. Disconnect the mouse cable from the system unit. c. Turn the mouse upside down. Unlock the retainer on the bottom of the mouse by turning it counterclockwise. Now turn the mouse right-side up, and the retainer and the ball will drop out. d. Using a damp cloth, wipe the outside of the mouse and the retainer. Be sure to wipe the rollers inside the mouse. e. Insert the ball and retainer. Lock the retainer by turning it clockwise. f. Reconnect the mouse cable to the system unit. 5. Turn off the system unit, wait 10 seconds, and then turn on the system unit again. |
| <p>Note: If any of these problems continue after taking the actions listed, check your online Aptiva Helper or the <i>Guide to HelpWare and All the Extras</i> folder for information on obtaining service.</p> | |

Table 3: Troubleshooting: Hardware problems (Continued)

| If the problem is: | Here's what to do: |
|---|--|
| Modem/communications errors. | <ol style="list-style-type: none"> 1. Make sure the telephone cord is securely connected. Your <i>Read me first</i> book shows how the cord should be connected. 2. Make sure the telephone line works by plugging a working telephone into the same telephone outlet that the computer was plugged into. Then make sure you can place a call. 3. Make sure you are calling the correct number, and that you are using the correct communications settings. For additional help, see the user's guide for your communications software. 4. Make sure no one is using the telephone while you are communicating with another computer. 5. If some communications programs work but others do not, there may be a configuration problem. For additional help, see the user's guide for your communications software. 6. Make sure your modem cord is connected to an analog telephone line. For additional help, see "Setting up communications" on page 18. 7. Make sure the modem adapter card is installed correctly. For instructions on installing adapter cards in a desktop system unit, see "Adding and removing adapter cards" on page 81. For instructions on installing adapter cards in a minitower system unit, see "Adding and removing adapter cards" on page 103. |
| <p>Note: If any of these problems continue after taking the actions listed, check your online Aptiva Helper or the <i>Guide to HelpWare and All the Extras</i> folder for information on obtaining service.</p> | |

Table 3: Troubleshooting: Hardware problems (Continued)

| If the problem is: | Here's what to do: |
|---|--|
| <p>When the computer is turned on, a picture appears indicating a diskette should be inserted into drive A.</p> | <ol style="list-style-type: none"> 1. Choose Startup Options from the Setup Utility Main Menu, and make sure that startup devices are set correctly. 2. Make sure the drive power and signal cables are securely attached to the back of the hard disk drive. For instructions on working in the desktop system unit, see "Adding and removing drives" on page 86. For instructions on working in the minitower system unit, see "Adding and removing drives" on page 108. 3. Insert the <i>Product Recovery CD-ROM</i> into the CD-ROM drive and press Ctrl + Alt + Delete. Follow the instructions on your screen to restore the operating system files to your computer's hard disk. Warning: This recovery process formats your hard drive, erasing all files. 4. If you are not able to restore the operating system files to your computer's hard disk, check your <i>Guide to HelpWare and All the Extras</i> folder for information on obtaining service. |
| <p>Printer error.</p> | <ol style="list-style-type: none"> 1. Make sure the printer cable is correctly and securely connected to the printer and to the parallel (printer) port on the back of the system unit. The printer port has this symbol next to it:  2. Make sure the printer power cord is securely connected to an electrical outlet. 3. Make sure the printer is ready for printing. (If the Ready light is on, but not flashing, the printer is ready.) 4. Make sure the correct printer driver is selected in the software, if required. For instructions on selecting a printer driver, see "Getting ready to print" on page 17. 5. Make sure the paper and the cartridge containing the print material (ink, ribbon, or toner) are loaded correctly. 6. Turn off the printer and system unit and wait 10 seconds. Now turn on the printer <u>first</u>, and then the system unit. 7. Make sure the Parallel Port option is not set to "Disabled" in the Input/Output Ports menu of the Setup Utility. 8. Make sure the Parallel Port Mode option in the Setup Utility is set to a mode that matches your printer. 9. For additional help, see the user's guide that came with the printer. |
| <p>Note: If any of these problems continue after taking the actions listed, check your online Aptiva Helper or the <i>Guide to HelpWare and All the Extras</i> folder for information on obtaining service.</p> | |

Solving software problems

Table 4: Troubleshooting: Software problems

| If the problem is: | Here's what to do: |
|---|--|
| Computer automatically turns off instead of entering Standby. | Make sure the Standby timer is set to a shorter period of time than the Automatic Power Off timer. |
| You hear 3 beeps when you turn off the computer or try to suspend. | Sometimes installing new software changes the information your computer uses to start. Installing new software sometimes changes your AUTOEXEC.BAT file. If you installed new software, make sure the following line is still in the AUTOEXEC.BAT file, and "REM" does not appear at the beginning of the line: C:\IBMTOOLS\IBMPFILE.EXE |
| Computer doesn't go into Standby or Automatically Power Off when the set time has elapsed. | <ol style="list-style-type: none"> 1. Make sure you don't touch the mouse or keyboard, and don't start a program that involves using the hard disk, such as a Windows 95 screen saver. These activities make the timer start over. 2. Make sure AutoPlay is disabled or BIOS checking of hard disk and CD-ROM drives is disabled. When both AutoPlay and hard disk and CD-ROM drive checking are enabled, Rapid Resume detects activity in the CD-ROM drive and keeps the computer from going into Standby and Automatic Power Off. For information about hard disk and CD-ROM checking, see "Rapid Resume advanced options" on page 40. 3. If the computer does not automatically turn off, make sure the Automatic Power Off option is enabled in the Rapid Resume Manager or on the Rapid Resume menu of the Setup Utility. For instructions on using the Setup Utility, see "Using the Setup Utility" on page 29. 4. Allow a few minutes more than the specified time. Windows 95 periodically accesses the hard disk for memory swapping and this activity resets the Standby timer. Windows 95 might access the hard disk for a short time after you last touched your computer. |
| <p>Note: If any of these problems continue after taking the actions listed, check your online Aptiva Helper or the <i>Guide to HelpWare and All the Extras</i> folder for information on obtaining service.</p> | |

Table 4: Troubleshooting: Software problems (Continued)

| If the problem is: | Here's what to do: |
|---|--|
| The Rapid Resume Features screen does not appear in the Setup Utility and the Rapid Resume Manager icon does not appear in the AptivaWare window. | Check your <i>Guide to HelpWare and All the Extras</i> folder for information on obtaining service. |
| When you turn on the computer, the desktop is not as you left it when you turned off the computer. | <ol style="list-style-type: none"> 1. Make sure another person hasn't used the computer and changed the desktop. 2. Make sure Rapid Resume is enabled. 3. Choose the Rapid Resume option from the Setup Utility Main Menu, and make sure that the APM BIOS Mode option is enabled. |
| Computer turns off without saving information. | <ol style="list-style-type: none"> 1. Make sure Rapid Resume is enabled. 2. Make sure Windows 95 is running when you turn off or suspend your computer. If you are running DOS instead of Windows, Rapid Resume will not work. 3. Make sure the APM BIOS Mode option in the Setup Utility is enabled. For information about this option, see "Changing Rapid Resume features configuration" on page 37. 4. Make sure the On/Off Button Mode option in the Setup Utility is set to Rapid Resume. For information about this option, see "Rapid Resume advanced options" on page 40. 5. EMM386 or an upper memory manager program may not be set up properly. |
| You pressed the on/off button on the system unit, but the computer has not turned off after 5 minutes. | Check your <i>Guide to HelpWare and All the Extras</i> folder for information on obtaining service. |
| Program is not active when you turn on the computer to resume working. | Restart the program. Some programs will not operate correctly with Rapid Resume. |
| Adapter cards don't work after you turn on the computer to resume working. | In the Rapid Resume menu of the Setup Utility, make sure the Initialize Adapter Cards option is set to "Reload Device Drivers." Some adapter cards do not operate correctly with Rapid Resume. |
| <p>Note: If any of these problems continue after taking the actions listed, check your online Aptiva Helper or the <i>Guide to HelpWare and All the Extras</i> folder for information on obtaining service.</p> | |

Table 4: Troubleshooting: Software problems (Continued)

| If the problem is: | Here's what to do: |
|---|---|
| Computer turns off or screen goes blank during activity (for example, when using a joystick). | <ol style="list-style-type: none"> 1. Press the system unit's on/off button. 2. Increase the Automatic Power Off time. 3. Disable Rapid Resume and Standby during long periods of activity, such as when using a joystick. |
| The game or program you were using does not have sound after a Rapid Resume. | <p>You were probably playing a game or using a program that communicates directly to the sound card, instead of communicating through the driver to the sound card. The game or program must communicate with the driver in order for Rapid Resume to restore the game or program.</p> <ol style="list-style-type: none"> 1. Restart the program. 2. Restart the computer. |
| You need to reset your computer because it does not respond to input from the keyboard and you cannot reset because Rapid Resume is enabled for the system unit's on/off button. | <ol style="list-style-type: none"> 1. Press the system unit's on/off button. 2. Press Ctrl + Alt + Delete when you see the Rapid Resume screen. There may be a slight delay before the computer restarts. <p>Note: Any data that is not saved before you press Ctrl + Alt + Delete will be lost.</p> |
| You added hardware or installed new software and you want to cancel Rapid Resume and restart the computer. | <ol style="list-style-type: none"> 1. Turn on the monitor. 2. Turn on the system unit. 3. Press Ctrl + Alt + Delete when you see the Rapid Resume screen. There may be a slight delay before the computer restarts. <p>Note: Any data that is not saved before you press Ctrl + Alt + Delete will be lost.</p> |
| Problems using or connecting to networks after turning on the computer to resume working where you left off. | <ol style="list-style-type: none"> 1. Try reconnecting to your network drives. 2. If your computer has only DOS/Windows on it, make sure network drivers, network start commands, and other network commands come before "RESUME.EXE" in the AUTOEXEC.BAT file. 3. Log off the network before turning off the computer. 4. Use the Standby feature instead of the Rapid Resume feature to save energy. 5. Some network cards are not designed to support Advanced Power Management (APM). These cards will not work with Rapid Resume. |
| <p>Note: If any of these problems continue after taking the actions listed, check your online Aptiva Helper or the <i>Guide to HelpWare and All the Extras</i> folder for information on obtaining service.</p> | |

Table 4: Troubleshooting: Software problems (Continued)

| If the problem is: | Here's what to do: |
|---|--|
| Computer shuts off without pressing the on/off button. | <ol style="list-style-type: none"> 1. In Rapid Resume Manager, check the Scheduler feature and the Automatic Power Off option of the Rapid Resume feature to see if either of them is set to turn off the computer. 2. Check to see if the Automatic Power Off feature is enabled on the Rapid Resume menu of the Setup Utility. For instructions on using the Setup Utility, see "Using the Setup Utility" on page 29. |
| You set the computer to start when the phone rings in order to receive a fax, but it receives a regular phone call instead. | <p>If you have an Mwave card: Make sure that the Aptiva Communication Center is running.</p> <p>If your sound card and modem are separate: Either disable the Wake Up on Ring feature in the Rapid Resume menu of the Setup Utility, or disable the Auto Answer feature in your fax software. Use Wake Up on Ring only when you know you will have incoming fax communications. For instructions on using the Setup Utility, see "Using the Setup Utility" on page 29.</p> <p>You can also prevent this from occurring by installing a telephone line sharing device, which will direct calls where you specify (to either an answering machine or a fax modem).</p> |
| You click on the Suspend option in the Start menu and your computer does not turn off. | Rapid Resume must be enabled for the Suspend option in the Start menu to work properly. In Rapid Resume Manager, check Rapid Resume. Make sure it is enabled. |
| Your computer turns on automatically when you dial out on a rotary or pulse telephone. | <p>Either disable the Wake Up on Ring feature in the Rapid Resume menu of the Setup Utility, or disable the Auto Answer feature in your fax software. Use Wake Up on Ring only when you know you will have incoming fax communications. For instructions on working with the Rapid Resume features in the Setup Utility, see "Changing Rapid Resume features configuration" on page 37.</p> <p>You can also prevent this from occurring by installing a telephone line sharing device, which will direct calls where you specify (to either an answering machine or a fax modem).</p> |
| <p>Note: If any of these problems continue after taking the actions listed, check your online Aptiva Helper or the <i>Guide to HelpWare and All the Extras</i> folder for information on obtaining service.</p> | |

Table 4: Troubleshooting: Software problems (Continued)

| If the problem is: | Here's what to do: |
|---|--|
| The phone rings and the computer turns on, but a fax isn't received. | The fax software must be open and set to receive faxes. See the documentation that came with your fax software to make sure it is set up to answer the phone. |
| Standby Snapshot is enabled (turned on), but the computer does not Rapid Resume after a power failure. | <p>In order for Standby Snapshot to work properly after a power failure, make sure that:</p> <ol style="list-style-type: none"> 1. Rapid Resume is enabled. 2. Standby is enabled. 3. Your computer is in Standby when the power failure occurs. |
| A POST error code appears after you turn on your computer using Rapid Resume. | <ol style="list-style-type: none"> 1. Turn off the system unit. 2. If you: <ul style="list-style-type: none"> • <u>Have not</u> installed or removed hardware, find the error code in "Responding to error codes" on page 141 and take the action listed. • <u>Have</u> installed or removed hardware, return the computer to its previous configuration. Then wait 10 seconds and turn on the system unit. If the error does not reoccur after turning off the power with the on/off button, save any work that you want to keep and reinstall your hardware. For instructions on installing hardware in your desktop system unit, see "Working with the hardware in the desktop system unit" on page 78. For instructions on installing hardware in your minitower system unit, see "Working with the hardware in the minitower system unit" on page 100. For instructions on installing options on your system board, see "Adding and replacing system board components" on page 61. |
| <p>Note: If any of these problems continue after taking the actions listed, check your online Aptiva Helper or the <i>Guide to HelpWare and All the Extras</i> folder for information on obtaining service.</p> | |

Solving monitor problems

Table 5: Troubleshooting: Monitor problems

| If the problem is: | Here's what to do: |
|--|--|
| Discolored screen. | <ol style="list-style-type: none"> 1. Make sure the monitor controls are adjusted correctly. Refer to the documentation that came with your monitor for information about the monitor controls. 2. Move the monitor away from any equipment that might cause magnetic interference; for example, other monitors, audio speakers, or microphones. (Some models of the computer come with microphones and speakers, which are shielded to prevent magnetic interference.) Turn off the monitor, wait 30 minutes, and then turn the monitor on again. 3. Select a new video device driver. |
| Picture shape on monitor screen is poor. | Adjust the monitor controls. For instructions, see the documentation that came with the monitor. |
| Display fonts appear cut off or pushed together. | While your monitor resolution may allow you to change the font size, some programs do not support large fonts. Large fonts may cause words to appear cut off or pushed together. Check the settings in Display Properties. Make sure the font size selected is small fonts. |
| White screen. | <ol style="list-style-type: none"> 1. Make sure the monitor cable is correctly and securely connected to the system unit. 2. Make sure the system unit is turned on. 3. If available, connect another monitor to your system unit. If the problem is corrected, something may be wrong with your monitor. |
| Flickering or unsteady picture on monitor screen. | <ol style="list-style-type: none"> 1. Select lower resolution, fewer colors, and higher refresh rates. 2. If your monitor is located close to another monitor, move them farther apart. 3. Change the video device driver in your software program. |
| Screen is an intense yellow, magenta (purple or red-blue), or cyan (blue-green) color. | Check your <i>Guide to HelpWare and All the Extras</i> folder for information on obtaining service. |
| Note: If any of these problems continue after taking the actions listed, check your online Aptiva Helper or the <i>Guide to HelpWare and All the Extras</i> folder for information on obtaining service. | |

Table 5: Troubleshooting: Monitor problems (Continued)

| If the problem is: | Here's what to do: |
|--|---|
| Adjustments from earlier use were not saved. | You may have selected more user-definable modes than the monitor can save. When this occurs, the newest mode replaces the oldest mode. Use the monitor controls to adjust the image for the display mode you are using. |
| Image control indicator lights on the monitor flash consecutively. | <ol style="list-style-type: none"> 1. Make sure the monitor cable is correctly and securely connected to the system unit. 2. The monitor is using settings that have not yet been stored in its memory. Adjust the monitor controls so that the screen is adjusted the way you want it. The settings will be saved and the indicator lights will not flash. |
| <p>Any of the following:</p> <ul style="list-style-type: none"> • Totally blank screen • No cursor displayed • Only the cursor is displayed • Screen is unreadable • Other monitor problems | <ol style="list-style-type: none"> 1. If you have enabled the Standby feature, press any key or move the mouse to exit Standby. 2. If you have enabled the Rapid Resume feature and set up the Automatic Power Off option, turn the system unit back on. If necessary, turn the monitor back on. 3. Make sure the monitor cable is correctly and securely connected to the system unit. 4. Make sure the system unit and monitor power cords are securely plugged into electrical outlets. 5. Make sure the system unit and monitor are turned on. (The power indicator lights on the system unit and the monitor are lit when they are on.) 6. Adjust the monitor controls. 7. Change the background colors in your software program or try using a different software program. 8. Unplug the system unit power cord from the electrical outlet, wait 10 seconds, and then plug the power cord back into the electrical outlet. If the computer does not start immediately, push the on/off button on the system unit. |
| <p>Note: If any of these problems continue after taking the actions listed, check your online Aptiva Helper or the <i>Guide to HelpWare and All the Extras</i> folder for information on obtaining service.</p> | |

Solving audio, multimedia, and modem problems (Mwave)

Table 6: Troubleshooting: Mwave multimedia problems

| If the problem is: | Here's what to do: |
|--|--|
| You don't hear sound from the audio program after modem connection. | Set the modem to operate at a lower transfer rate. See "Mwave Help" in the Mwave group. |
| You can't play or record messages when a speaker phone program is running. | Close the speaker phone program when you want to play or record messages. |
| You don't hear sound and the modem doesn't work after you change the I/O address jumpers on the Mwave card. | Make sure the I/O adapter settings in the Windows 95 Device Manager match the jumper settings on the Mwave adapter card. For instructions on changing Mwave adapter card settings, see "Resolving Mwave resource conflicts" on page 73 and "Setting jumpers on the Mwave card" on page 82. |
| Note: If any of these problems continue after taking the actions listed, check your online Aptiva Helper or the <i>Guide to HelpWare and All the Extras</i> folder for information on obtaining service. | |

Responding to error codes

Table 7: Error codes, descriptions, and corrective actions

| Error Code | Description | Here's what to do: |
|---|--|--|
| | No beep during power-on self test (POST) | Make sure that the system unit is turned on. |
| | Screen is black (no error code), more than one beep in self-test | If you installed memory modules or adapter cards make sure you installed them correctly. For instructions on installing memory modules on your system board, see "Installing system memory modules" on page 68. For instructions on installing adapter cards in your desktop system unit, see "Adding and removing adapter cards" on page 81. For instructions on installing adapter cards in your minitower system unit, see "Adding and removing adapter cards" on page 103. |
| 10X 129 | System Board Error | Turn off the system unit, wait 10 seconds, and then turn on the system unit again. |
| 110 | System Board Parity Error | <ol style="list-style-type: none"> 1. A system memory module (SIMM) has failed. Make sure SIMMs are inserted correctly. For instructions on inserting SIMMs, see "Installing system memory modules" on page 68. 2. Turn off the system unit, wait 10 seconds, and then turn on the system unit again. |
| 111 114 | I/O Channel Parity Error Adapter ROM Error | <ol style="list-style-type: none"> 1. Make sure all adapter cards are installed correctly. For instructions on installing adapter cards in your desktop system unit, see "Adding and removing adapter cards" on page 81. For instructions on installing adapter cards in your minitower system unit, see "Adding and removing adapter cards" on page 103. 2. Turn off the system unit, wait 10 seconds, and then turn on the system unit again. |
| <p>Notes:</p> <ol style="list-style-type: none"> 1. An X shown as part of the error code in this table represents any number between 0 and 9. 2. If any of these errors continue after taking the actions listed, check your online Aptiva Helper or the <i>Guide to HelpWare and All the Extras</i> folder for information on obtaining service. | | |

Table 7: Error codes, descriptions, and corrective actions (Continued)

| Error Code | Description | Here's what to do: |
|---|--|---|
| 127 | Processor Speed Error | <ul style="list-style-type: none"> • If you changed the processor, it may not be fully supported by the BIOS. The computer will operate normally, but you will always see this error when you turn on the computer. • If you did not change the processor, turn off the computer, wait 10 seconds, and then turn on the computer again. |
| 161 | Bad CMOS Battery | <p>Make sure the battery is installed correctly. If the error continues, install a new battery. For instructions on installing the battery, see "Replacing the system battery" on page 71.</p> |
| 162 | Configuration Error Configuration Change Has Occurred | <ul style="list-style-type: none"> • If you <u>are</u> using Rapid Resume, complete the following steps: <ul style="list-style-type: none"> - If you <u>have not</u> installed or removed hardware, check your <i>Guide to HelpWare and All the Extras</i> folder for information on obtaining service. Note: Any work that you did not save before the computer was turned off cannot be retrieved. - If you <u>have</u> installed or removed hardware, press the on/off button on the system unit to turn it off. Return the hardware to its previous configuration, wait 10 seconds, and then turn on the system unit again. If the error does not reoccur, save any work that you want to keep and reinstall your hardware. If the error occurs again, check your <i>Guide to HelpWare and All the Extras</i> folder for information on obtaining service. • If you <u>are not</u> using Rapid Resume: <ul style="list-style-type: none"> - Press Enter while the error message is displayed to start the Setup Utility. Look through the Setup Utility and verify that the options with ► next to them were supposed to change. If so, press the Esc key and then press Enter to save the new settings. Then exit the Setup Utility. For more information on using the Setup Utility, see "Using the Setup Utility" on page 29. If options changed that were not supposed to, check your <i>Guide to HelpWare and All the Extras</i> folder for information on obtaining service. |
| <p>Notes:</p> <ol style="list-style-type: none"> 1. An X shown as part of the error code in this table represents any number between 0 and 9. 2. If any of these errors continue after taking the actions listed, check your online Aptiva Helper or the <i>Guide to HelpWare and All the Extras</i> folder for information on obtaining service. | | |

Table 7: Error codes, descriptions, and corrective actions (Continued)

| Error Code | Description | Here's what to do: |
|---|-------------------------|---|
| 163 151 | Date and Time Incorrect | <ol style="list-style-type: none"> 1. The clock module on the system board may not be set correctly. To set the correct date and time, press Enter while the error message is displayed to enter the Setup Utility. For instructions on using the Setup Utility, see "Using the Setup Utility" on page 29. You can change the clock in the Date and Time menu. 2. You may need to replace the system battery. For these instructions, see "Replacing the system battery" on page 71. |
| 164 | Memory Size Error | <ol style="list-style-type: none"> 1. If you are using Rapid Resume and you have installed or removed hardware, press the on/off button on the system unit to turn it off. Return the hardware to its previous configuration, wait 10 seconds, and then turn on the system unit again. If the error does not reoccur, save any work that you want to keep and reinstall your hardware. If the error occurs again, check your <i>Guide to HelpWare and All the Extras</i> folder for information on obtaining service. 2. If you are not using Rapid Resume and you have added or removed system memory from your computer, press Enter while the error message is displayed to enter the Setup Utility. Choose System Information from the Setup Utility Main Menu to verify that the new memory size is correct. For instructions on using the Setup Utility, see "Using the Setup Utility" on page 29. If you have not removed memory from your computer, check your <i>Guide to HelpWare and All the Extras</i> folder for information on obtaining service. |
| 201 | Memory Error | Make sure memory modules (SIMMs) are inserted correctly and completely. For instructions on inserting SIMMs, see "Installing system memory modules" on page 68. |
| 229 | External Cache Error | If you have added any external cache modules, make sure they are inserted correctly and completely. For instructions on inserting cache memory modules, see "Installing cache memory modules" on page 66. |
| <p>Notes:</p> <ol style="list-style-type: none"> 1. An X shown as part of the error code in this table represents any number between 0 and 9. 2. If any of these errors continue after taking the actions listed, check your online Aptiva Helper or the <i>Guide to HelpWare and All the Extras</i> folder for information on obtaining service. | | |

Table 7: Error codes, descriptions, and corrective actions (Continued)



| Error Code | Description | Here's what to do: |
|---|---------------------------------|---|
| 262 | DRAM Parity Configuration Error | <ol style="list-style-type: none"> 1. If you added or changed the system memory modules (SIMMs), press Enter while the error message is displayed to enter the Setup Utility. From the Setup Utility Main Menu, choose System Information and verify that the Memory Type setting is correct. For instructions on using the Setup Utility, see "Using the Setup Utility" on page 29. 2. If you did not add or change the system memory modules (SIMMs), make sure the existing memory modules have been installed properly. For instructions on installing memory modules, see "Installing system memory modules" on page 68. |
| 264 | External Cache Size Error | If you have removed cache memory from your computer, press Enter while the error message is displayed to enter the Setup Utility. Choose System Information from the Setup Utility Main Menu to verify that the new cache memory size is correct. For instructions on using the Setup Utility, see "Using the Setup Utility" on page 29. If you have not removed memory from your computer, check your <i>Guide to HelpWare and All the Extras</i> folder for information on obtaining service. |
| 30X | Keyboard Error | <ol style="list-style-type: none"> 1. Make sure the keyboard and mouse cables are correctly and securely connected to the ports on the back of the system unit. The keyboard port has this symbol next to it:  The mouse port has this symbol next to it:  2. Make sure that a keyboard key or a mouse button is not being held down. |
| 602 | Diskette Boot Error | Make sure the diskette has been formatted. If you don't want to use the diskette to boot (start) your computer, remove the diskette from the drive. |
| <p>Notes:</p> <ol style="list-style-type: none"> 1. An X shown as part of the error code in this table represents any number between 0 and 9. 2. If any of these errors continue after taking the actions listed, check your online Aptiva Helper or the <i>Guide to HelpWare and All the Extras</i> folder for information on obtaining service. | | |



Table 7: Error codes, descriptions, and corrective actions (Continued)

| Error Code | Description | Here's what to do: |
|---|--------------------------------------|--|
| 662 | Diskette Drive Configuration Error | <ol style="list-style-type: none"> 1. If you added or removed a diskette drive, press Enter while the error message is displayed to enter the Setup Utility. Choose Input/Output Ports from the Setup Utility Main Menu and verify that the Diskette Drive settings are correct. If the settings are not correct, change the settings. For instructions on using the Setup Utility, see "Using the Setup Utility" on page 29. 2. If you did not add or remove a diskette drive, make sure the diskette drive cables are connected correctly. |
| 762 | Math Coprocessor Configuration Error | Check your <i>Guide to HelpWare and All the Extras</i> folder for information on obtaining service. |
| 962 | Parallel Port Configuration Error | If you installed or removed hardware, press Enter while the error message is displayed to enter the Setup Utility. Choose Input/Output Ports from the Setup Utility Main Menu and verify that the Parallel Port setting is correct. If the setting is not correct, change the setting. For instructions on using the Setup Utility, see "Using the Setup Utility" on page 29. |
| 1162 | Serial Port Configuration Error | If you installed or removed hardware, press Enter while the error message is displayed to enter the Setup Utility. Choose Input/Output Ports from the Setup Utility Main Menu and verify that the Serial Port settings are correct. If the settings are not correct, change the settings. For instructions on using the Setup Utility, see "Using the Setup Utility" on page 29. |
| 1762 | Hard Disk Configuration Error | <ol style="list-style-type: none"> 1. Make sure the cables to all drives are securely attached. 2. Press Enter while the error message is displayed to enter the Setup Utility. Choose Disk Drives from the Setup Utility Main Menu. Make sure the settings for the drive options are correct. If the settings are not correct, change the settings. For instructions on using the Setup Utility, see "Using the Setup Utility" on page 29. |
| <p>Notes:</p> <ol style="list-style-type: none"> 1. An X shown as part of the error code in this table represents any number between 0 and 9. 2. If any of these errors continue after taking the actions listed, check your online Aptiva Helper or the <i>Guide to HelpWare and All the Extras</i> folder for information on obtaining service. | | |

Table 7: Error codes, descriptions, and corrective actions (Continued)

| Error Code | Description | Here's what to do: |
|---|--|--|
| 1780 1781 1782 1783 | Drive 1 (Hard Disk) Error Drive 2 (Hard Disk) Error Drive 3 (Hard Disk) Error Drive 4 (Hard Disk) Error | <ol style="list-style-type: none"> 1. Make sure the cables to all drives are securely attached. 2. Press Enter while the error message is displayed to enter the Setup Utility. Choose System Information from the Setup Utility Main Menu and verify that the Processor Speed setting is correct. (Find the processor speed [in MHz] on the label attached to the front of your system unit.) If the setting is not correct, check your <i>Guide to HelpWare and All the Extras</i> folder for information on obtaining service. 3. Make sure the hard disk signal cable is attached to the correct connector on the system board and the jumper settings on the hard disk are correct. For information about drive connectors and settings in the desktop system unit, see "Adding and removing drives" on page 86. For information about drive connectors and settings in the minitower system unit, see "Adding and removing drives" on page 108. |
| 180X | PCI or Plug and Play Adapter Card Resource Error | <ol style="list-style-type: none"> 1. In the Setup Utility's ISA Legacy Resources menus, verify that the resources allocated to installed adapter cards are actually required by the cards. For instructions on using the Setup Utility, see "Using the Setup Utility" on page 29. For information about assigning ISA Legacy resources, see "Changing adapter card device information" on page 42. 2. To provide resources for the adapter card: <ol style="list-style-type: none"> a. From the Windows 95 Device Manager, remove the COM and LPT ports. b. In the Setup Utility, disable the serial ports and the parallel port. c. Restart Windows. The serial and parallel ports will be enabled when they are needed. |
| 24XX | Video Error | <ol style="list-style-type: none"> 1. Make sure the monitor cables are correctly and securely connected to the system unit. 2. If a video adapter card is installed, make sure it is installed correctly. For instructions, see the documentation that came with the adapter card. 3. If the error continues, remove the video adapter card. If removing the card corrects the error, replace the card with a new one. |
| <p>Notes:</p> <ol style="list-style-type: none"> 1. An X shown as part of the error code in this table represents any number between 0 and 9. 2. If any of these errors continue after taking the actions listed, check your online Aptiva Helper or the <i>Guide to HelpWare and All the Extras</i> folder for information on obtaining service. | | |

Table 7: Error codes, descriptions, and corrective actions (Continued)

| Error Code | Description | Here's what to do: |
|--|----------------------------|---|
| 2462 | Video Configuration Error | <p>1. Make sure the monitor cables are correctly and securely connected to the system unit.</p> <p>2. If you installed or removed a video adapter card, press Enter while the error message is displayed to enter the Setup Utility. Press the Esc key and then press Enter to save the new setting.</p> <p>3. Press Enter while the error message is displayed to enter the Setup Utility. Choose System Information and Video Information from the Setup Utility Main Menu to verify that the settings for the Video Controller and Video Memory options are correct in the Setup Utility. For instructions on using the Setup Utility, see "Using the Setup Utility" on page 29.</p> |
| 5962 | CD-ROM Configuration Error | <p>1. Make sure all CD-ROM drive cables are correctly and securely connected.</p> <p>2. If you added, removed, or moved any drives in your system unit, press Enter while the error message is displayed to enter the Setup Utility. Choose the System Information from the Setup Utility Main Menu to verify that only the options for the drives you changed have ► next to them. Return to the Main Menu, press the Esc key and then press Enter to save the new configuration. If options changed that were not supposed to, check your <i>Guide to HelpWare and All the Extras</i> folder for information on obtaining service.</p> |
| 86XX | Pointing Device Error | <p>1. Make sure the keyboard and mouse cables are correctly and securely connected to the ports on the back of the system unit.</p> <p>The keyboard port has this symbol next to it: </p> <p>The mouse port has this symbol next to it: </p> <p>2. Make sure that a keyboard key or a mouse button is not being held down.</p> |
| <p>Notes:</p> <p>1. An X shown as part of the error code in this table represents any number between 0 and 9.</p> <p>2. If any of these errors continue after taking the actions listed, check your online Aptiva Helper or the <i>Guide to HelpWare and All the Extras</i> folder for information on obtaining service.</p> | | |

Recovering factory installed programs and files

Your Aptiva computer comes with preinstalled system and program files. If you accidentally erase any of these files, or if some of these files become corrupted when you install a new program, you can recover them. To recover lost or corrupted files that were installed at the factory, you need the *Product Recovery CD-ROM*.

The recovery process formats the hard drive, erasing all the files there, and then installs new copies of the system and program files on the clean drive.

To protect your personal data and any special system configuration, you should make regular backups of your data and configuration files. You will need these backup copies if you ever need to recover your system. See the online Aptiva Helper for help with backing up system files.

It's a good idea to duplicate the directory structure that is on your hard drive when you make backup copies of files. Otherwise, you need to keep notes about where your files belong on the hard drive. If you ever have to recover your system, you will need to copy your personal data and configuration files back to their original hard drive location.

To recover the factory installed system and program files, follow these steps:

1. Make sure your computer is turned on.

2. Insert the *Product Recovery CD-ROM* into your CD-ROM drive.
3. Make sure you do not have a diskette or CD-ROM in any other drive.
4. Turn off your computer.
5. Wait 30 seconds.
6. Turn on your monitor and system unit.
7. When you see the Aptiva Product Recovery menu, use the arrow keys to select Recover all Original Aptiva Software. Press the Enter key.
8. After the Aptiva software has been reinstalled, copy your personal configuration and data files back into their original directories on the hard drive.

Depending on how your startup devices are defined, you might not be able to use the *Product Recovery CD-ROM* to recover a system that will not start on its own. For example, your computer might not attempt to read the CD-ROM at all if it reads first from the hard drive that contains corrupted operating system files. For instructions on selecting startup devices in the Setup Utility, see "Configuring startup options" on page 43.

See the online Aptiva Helper for instructions on recovering specific files, such as Mwave drivers and files your computer uses to create the graphical user interface (your desktop).

Technical reference **Part 5**

This part contains technical information you might need if you upgrade your computer's hardware. It contains the following appendixes:

- "Appendix A: Specification tables" on page 151

This chapter contains specific memory, address, interrupt, channel, and port specifications.

- "Appendix B: Audio and video cards" on page 161

This chapter contains descriptive information about sound, Mwave, and television cards.

- "Appendix C: Modem information" on page 163

This chapter contains descriptive information about modems, including AT command set information you can use if you decide to operate your modem from a DOS command line.

- "Appendix D: Monitor terminology" on page 181

This appendix contains definitions of some of the terms generally used to describe monitor characteristics.

Specification tables **Appendix A**

Memory module placement

This table shows how to place single inline memory modules (SIMMs) on your system board. Use this information when adding or removing system memory.

Table 8: Memory module placement

| Total memory | Socket 1 | Socket 2 | Socket 3 | Socket 4 |
|--------------|----------|----------|----------|----------|
| 8MB | 8MB | | | |
| 8MB | 4MB | 4MB | | |
| 8MB | | | 4MB | 4MB |
| 12MB | 4MB | | 4MB | 4MB |
| 16MB | 16MB | | | |
| 16MB | 8MB | 8MB | | |
| 16MB | 4MB | 4MB | 4MB | 4MB |
| 16MB | 8MB | | 4MB | 4MB |
| 16MB | | | 8MB | 8MB |
| 20MB | 4MB | | 8MB | 8MB |
| 24MB | 8MB | 8MB | 4MB | 4MB |
| 24MB | 4MB | 4MB | 8MB | 8MB |
| 24MB | 16MB | | 4MB | 4MB |
| 24MB | 8MB | | 8MB | 8MB |
| 32MB | 32MB | | | |

Table 8: Memory module placement (Continued)

| Total memory | Socket 1 | Socket 2 | Socket 3 | Socket 4 |
|--------------|----------|----------|----------|----------|
| 32MB | 16MB | 16MB | | |
| 32MB | 8MB | 8MB | 8MB | 8MB |
| 32MB | 16MB | | 8MB | 8MB |
| 32MB | | | 16MB | 16MB |
| 36MB | 4MB | | 16MB | 16MB |
| 40MB | 16MB | 16MB | 4MB | 4MB |
| 40MB | 4MB | 4MB | 16MB | 16MB |
| 40MB | 32MB | | 4MB | 4MB |
| 40MB | 8MB | | 16MB | 16MB |
| 48MB | 16MB | 16MB | 8MB | 8MB |
| 48MB | 8MB | 8MB | 16MB | 16MB |
| 48MB | 32MB | | 8MB | 8MB |
| 48MB | 16MB | | 16MB | 16MB |
| 64MB | 32MB | 32MB | | |
| 64MB | 16MB | 16MB | 16MB | 16MB |
| 64MB | 32MB | | 16MB | 16MB |
| 64MB | | | 32MB | 32MB |
| 68MB | 4MB | | 32MB | 32MB |
| 72MB | 32MB | 32MB | 4MB | 4MB |
| 72MB | 4MB | 4MB | 32MB | 32MB |
| 72MB | 8MB | | 32MB | 32MB |
| 80MB | 32MB | 32MB | 8MB | 8MB |

Table 8: Memory module placement (Continued)

| Total memory | Socket 1 | Socket 2 | Socket 3 | Socket 4 |
|--------------|----------|----------|----------|----------|
| 80MB | 8MB | 8MB | 32MB | 32MB |
| 80MB | 16MB | | 32MB | 32MB |
| 96MB | 32MB | 32MB | 16MB | 16MB |
| 96MB | 16MB | 16MB | 32MB | 32MB |
| 96MB | 32MB | | 32MB | 32MB |
| 128MB | 32MB | 32MB | 32MB | 32MB |

Memory map

This table shows the hexadecimal addresses for the system memory regions. You may use this information for adapter cards that require you to set up memory regions.

Table 9: Memory map

| Address range | Description |
|----------------------------------|--|
| 0-640KB (0-9FFFFH) | Base memory |
| 640-768KB (A0000-BFFFFH) | VGA mode video memory |
| 768-800KB (C0000-C7FFFH) | Video BIOS |
| 800-896KB (C8000-DFFFFH) | Adapter card memory or upper memory |
| 896-960KB (E0000-EFFFF) | System POST and Rapid Resume BIOS (available for upper memory) |
| 960-1024KB (F0000-FFFFFFH) | System BIOS (some may be available for upper memory) |
| 1024KB-128MB (100000-7FFFFFFH) | Extended memory |
| 192MB-193MB (C000000H-C0FFFFFFH) | Linear video memory |

System input/output addresses

This table shows the hexadecimal addresses for each of the system board input/output (I/O) functions. You may want to use this information if you install an adapter card that requires you to set I/O addresses.

Table 10: System I/O addresses

| Address range (hexadecimal) | Function |
|-----------------------------|---------------------------|
| 0000-001F | DMA controller |
| 0020-0021 | Interrupt controller 1 |
| 0022-0023 | Reserved |
| 0040-0043 | System timers |
| 0060 | Keyboard/mouse controller |
| 0061 | System control port B |
| 0064 | Keyboard/mouse controller |
| 0070-0071 | RTC/CMOS and NMI mask |
| 0080-008F | DMA controller |
| 00A0-00A1 | Interrupt controller 2 |
| 00C0-00DF | DMA controller |
| 00F0-00FF | Math coprocessor |
| 0100-0101 | Reserved |
| 0170-0177, 0376 | Secondary IDE controller |
| 01F0-01F7, 03F6 | Primary IDE controller |

Table 10: System I/O addresses (Continued)

| Address range (hexadecimal) | Function |
|--------------------------------|----------------------------------|
| 0201 | Joystick |
| 0220-022F, 0388-0389 | Mwave sound |
| 0278-027F, 67B-67A | Parallel port 3 |
| 02E8-02EF | Serial port 4 |
| 02F8-02FF | Serial port 2 |
| 0330-0333 | Mwave MIDI |
| 0370-0371 | Reserved |
| 0378-037F, 77B-77A | Parallel port 2 |
| 03BC-03BF, 7BC-7BE | Parallel port 1 |
| 03C0-03CF, 3D4, 3D5, 03DA | SVGA controller |
| 03E8-03EF | Serial port 3 |
| 03F2-03F5, 03F7 | Diskette controller |
| 03F8-03FF | Mwave modem/fax or serial port 1 |
| 04D0-04D1 | Reserved |
| CF8-CFC | Reserved |
| CE30 | Mwave system |
| FE80-FE8F | Bus master IDE controller |

System interrupts

This table shows the system interrupt requests (IRQs) and their functions. You may use this information if you install an adapter card that requires you to set IRQs.

Table 11: System interrupts

| Interrupt request (IRQ) | Function |
|-------------------------|-----------------------------------|
| SMI | Power management |
| NMI | Parity error or I/O channel check |
| 0 | Timer |
| 1 | Keyboard |
| 2 | Cascade to IRQ8-IRQ15 |
| 3 | Serial port |
| 4 | Mwave modem/fax or serial port |
| 5 | Mwave sound |
| 6 | Diskette |
| 7 | Parallel port |
| 8 | Real-time clock |
| 9 | Mwave MIDI |
| 10 | Mwave system |
| 11 | User available |
| 12 | Mouse |
| 13 | Math coprocessor |
| 14 | Primary IDE |
| 15 | Secondary IDE |

DMA channel assignments

This table shows the channel assignments for direct memory access (DMA). DMA allows I/O devices to transfer data directly to and from memory. You may need to select an open DMA channel if you add an I/O device that uses DMA.

Table 12: DMA channel assignments

| DMA channel | Assignment |
|-------------|-----------------------------|
| 0 | User available |
| 1 | Mwave sound |
| 2 | Diskette |
| 3 | ECP parallel port (default) |
| 4 | Cascade |
| 5 | User available |
| 6 | User available |
| 7 | Mwave system |

Serial port addresses

IBM Aptiva PCs have two built-in external serial ports already installed in the computer. The connectors for these ports are located at the back of your computer. These ports can be used to connect a serial mouse, serial printer, or other serial device, and to transfer data between computers.

The built-in serial ports support these addresses and interrupts:

| Address | Windows 95 | Interrupt | Default |
|---------|------------|-----------|---------------|
| 3F8 | COM1 | IRQ 4 | Modem |
| 3E8 | COM3 | | Serial port B |
| 2F8 | COM2 | IRQ 3 | Serial port A |
| 2E8 | COM4 | | |

If you are using an operating system other than Windows 95, conflicts may arise if you add adapter cards with serial ports or if you change the address settings on your modem. You can resolve most of these conflicts by using the Setup Utility to change serial port addresses. See "Changing input/output port configuration" on page 35 for more information.

Audio and video cards

Appendix B

About sound cards

Some IBM Aptiva PCs come with a sound card already installed.

Many software programs use the sound card for sound effects and music. The sound card processes audio data files and works with the CD-ROM drive to play audio compact discs

Most sound cards have the following connections:

| | |
|----------|---|
| Line in | This connector is designed to receive the output from another device such as a stereo receiver or tape recorder. |
| Mic | This connector is designed to receive input from an external microphone. |
| Line out | This connector is designed to transmit audio output from the sound card to another device such as amplified speakers, a stereo, tape recorder, or headphones. |
| MIDI | This connector is designed to receive or transmit MIDI (Musical Instrument Digital Interface) signals from devices such as a keyboard. This connector may also be used with input devices for games such as a joystick. |

If you use an industry standard MIDI/joystick expansion cable, you can connect up to two

joysticks and one MIDI device at the same time.

If you need more information about the sound card that came installed in your computer, refer to the documentation that came with the sound card. This documentation may be online or in a printed book.

About Mwave cards

Some IBM Aptiva PCs come with an Mwave card already installed.

The Mwave adapter card combines all of the features of a sound card and modem. The Mwave card works with the software and hardware to provide:

- A sound system with CD quality stereo playback and recording
- Operation of many programs that are written for SoundBlaster sound cards
- A joystick port

- A set of telephone functions that include:
 - Full duplex (two way) speaker phone
 - Telephone answering machine
 - Fax modem
 - Data modem

If you need more information about the Mwave card that came installed in your computer, refer to the documentation that came with the Mwave card. This documentation may be online or in a printed book.

About television cards

Some IBM Aptiva PCs come with a television (TV) card already installed.

The TV card is designed to work with many devices. Some examples of devices you might be able to attach to the TV card are a TV antenna, cable TV, VCR, laser-disc player, or a video camera. You can also attach speakers to the audio-output connector.

If you need more information about the TV card that came installed in your computer, refer to the documentation that came with the TV card. This documentation may be online or in a printed book.

Modem information **Appendix C**

About modems

Some IBM Aptiva PCs have a modem already installed. Using a telephone network, a modem allows your computer to communicate with other computers, fax machines, or telephones. For information about connecting your modem to a telephone network, see “Connecting your modem to the telephone network” on page 18.

Before you plug your modem into a telecommunications system outside the country in which it was purchased, make sure your modem is designed to work with that telecommunications system. Otherwise, you could damage your computer.

Read the guidelines in “Safety information” on page xiii before you plug your modem into any telecommunications system.

If you need specific information about the modem installed in your computer, see the online documentation or online help that came with your modem. Help for Mwave modems is available on the Programs menu from the Start button on your desktop.

Operating your modem

You can operate your modem either through a modem communications software program or from your DOS prompt. For information about configuring communications software, see “Configuring your communications software” on page 19.

Most people use a communications software program to operate their modem. An example of one of these software programs is Windows HyperTerminal. These programs allow you to operate your modem without using the Hayes AT command set—the commands that modems understand. With these software programs, you operate your modem by choosing menu items from a screen on your computer. If you use a communications software program, see the user’s guide that came with the software for detailed instructions on operating your modem.

note:

Most modem communication software programs also allow you to send specific AT commands to the modem.

You can also send commands to your modem from the DOS (C:>) prompt. Operating your modem with DOS is difficult and generally for experienced modem users only. With DOS, you must type long AT command strings and you may need to send a variety of commands for each transmission. Also, you are not always sure if your commands have been received and executed by the modem.

To communicate with a modem from DOS, use the ECHO command. Direct these commands to the port your modem is connected to. For example:

```
C:\ > echo AT&W0&W1>COM1 and press Enter.
```

This is an AT command that:

- Stores a 0 into S register 0 to turn Auto Answer off (ATS0=0). S registers are storage areas inside the modem. The S registers hold values that the command set uses to control modem operations. For more information on S registers, see “S registers” on page 174.
- The &W0&W1 portion of the command stores ATS0=0 into memory (NVRAM locations 0 and 1) for future use.
- The command is directed to the modem's port (>COM1).

Whether you use DOS or a modem communications software program, you can send a wide variety of commands to your modem. For a detailed listing of modem commands see “Modem commands” on page 170.

Using the Auto Answer feature

If you use a modem communications software program, it may require your modem to be set for *Auto Answer*. The Auto Answer feature lets your computer answer calls from another computer automatically.

Your modem communications software determines how the modem operates with Auto Answer. Some fax programs do not require you to type an AT command to turn Auto Answer on or off. For specific instructions, see the user's guide that came with the communications software.

To start the Auto Answer feature from your communications software, use the command: ATS0=n. This command tells the modem to answer a call after a certain number of rings. To set the number of rings, replace n with any number from 1 to 255.

Turn Auto Answer off when you are not using your modem. Otherwise, callers will be greeted with the modem tone. To turn Auto Answer off, use the command: ATS0=0.

If you are using Auto Answer with a fax software program, setting a high number of rings will allow you to answer the telephone before the fax modem does.

If your computer came with fax software already installed, use the fax software documentation included in the box your computer came in or the fax software online Help for additional information.

Disabling Call Waiting

If you use Call Waiting, you may want to disable it while using your modem. With Call Waiting, communications can be interrupted when a second call is waiting to be answered.

To disable Call Waiting, contact your telephone company. Different telephone companies have different procedures for disabling this feature. Also, some telephone companies cannot disable Call Waiting. Your telephone company business office should be able to tell you the procedures and *dialing sequence* required to disable Call Waiting.

A dialing sequence is similar to a command you type on your computer. For example, in some areas the following dialing sequence disables Call Waiting:

```
(/# or *)70,,,(complete telephone number)
```

The dialing sequence you type on your computer might look like this: *70,, ,5554343. The commas (,,) pause the modem until the command is carried out, then the telephone number is dialed automatically.

Call Waiting will be disabled only for the duration of your modem's current call and only from the calling end. For incoming calls, you may find it helpful to change the value of register S10 to a higher number. For more information on S registers, see "S registers" on page 174.

Your modem communications software determines how your modem operates with Call Waiting. For specific

instructions, see the user's guide or online Help that came with the communications software.

If your computer came with fax software already installed, the fax software documentation was included in the box your computer came in.

How modems work

If you are having problems connecting to other modems, or are interested in learning more about how modems work, the information in this section can help you. This section discusses the modem connection process, data modems, connecting to other data modems, fax modems, and choosing fax software programs.

Modem connection process

For two modems to connect, they must be of the exact same type and function. A data modem can only connect to a data modem and a fax modem can only connect to a fax modem. Many modern modems are designed with both data and fax capabilities. The data components of these data/fax modems can communicate with data modems, and the fax components can communicate with fax modems.

The connection process is controlled by software built into the modem. This connection process is called a *protocol*. Modems communicate by protocol and

negotiate to achieve a connection. These protocols must be compatible for the modems to connect.

The result of this negotiation determines the speed at which the two modems connect. For example, a 14,400 bits per second (bps) modem connects with a 9,600 bps modem at the lower speed of 9,600 bps. But, because of phone line noise, they may connect at 2,400 bps. If you use a modem communications software program, such as Windows HyperTerminal, you should see the final connection speed on the screen. This rate remains constant throughout the session.

Data modems

Data modems send and receive data in the form of codes that represent letters, numbers, and spaces. Each letter of a word is represented by a code. These codes are sent in a series with a different code representing a space between words. Special programs, like word processors, use additional code sequences to indicate font type, bold, italic, and so on.

You use the *Attention* command set (sometimes called the *AT* or *Hayes* command set) to send commands to your data modem. The AT command set has evolved over the years, and some of its “standards” have also changed. Modem default settings and the more sophisticated modem commands, in particular, have changed over time.

Modem protocols govern the way a modem converts digital information from the computer into analog signals that can be transmitted over the telephone lines. Over time, standards have been created for these

protocols. These standards are necessary so that modems made by different companies can exchange data.

Primarily, modem standards and recommendations in the United States have been set by two organizations:

- The International Telephone and Telegraph Corporation set the *Bell* standards.
- The International Consultative Committee on Telephony and Telegraphy (CCITT) set the *V.* (Vee Dot) recommendations.

Data modems use these standards for speeds up to 28,800 bps:

- Bell 103
- Bell 212A
- CCITT V.21, V.22, V.22bis, V.23, V.32, V.32bis, and V.34

Many modems support all of these standards. Older modems may support some, but not all of these standards.

Connecting to other data modems

Phone line noise can cause loss of data and connection when modem speeds rise above 1200 bps. Over time, many different software transmission protocols, such as X-modem, MNP, and V.42bis, have been developed solely to detect and correct the errors caused by phone line noise. Not all of these protocols are compatible. This may be the reason you are unable to connect to another modem.

If your data modem uses any error detection and correction protocol, the modem on the other end must also have the same protocol. For example, if your data modem uses X-modem (one of the early protocols), the modem you're connecting to must also use X-modem. This is why you are asked to choose a transfer type in your software before downloading a file from a bulletin board.

Many different error detection and correction protocols are commonly used today. Examples of the earliest error detection and correction protocols include X-modem, Y-modem, and Kermit. These protocols are performed by software on your computer.

Recently developed protocols include the Microcom Network Protocol (MNP) and V.42bis. V.42bis is the newer of these two protocols. It has its own methods of error detection and correction, and also incorporates the MNP 4 and 5 protocols. As a result, modems with MNP 4 and 5 and modems with V.42bis can connect with each other.

If you cannot connect to another modem, it may be because the protocol you are using is not compatible with the protocol of the modem on the other end. If you're having trouble connecting to other modems, try following these guidelines.

- If you know what protocols are available on the modem you are connecting to, enable a protocol on your modem that is supported by the other modem. Usually V.42bis works best if both modems support it.
- If you frequently connect to bulletin boards, you should buy a modem communications software program that includes many different software protocols. Different bulletin boards use different protocols.
- Many network services have their own proprietary protocols. To connect to these services, you often have to buy the protocol from the service. Other network services rely on V.42bis or MNP 4 and 5.

Important:

All error detection and correction protocols compress data to avoid slowing the transmission rate. However, combining protocols will not increase your transmission speed or significantly reduce transmission errors. For example, running V.42bis and X-modem together will not give you a greater compression rate or transmission speed than running V.42bis alone. Use only one protocol.

Fax modems

Fax modems send and receive facsimiles and generally transmit and receive pictures better than text or other data. In a fax machine, a page is *read* by a scanner and broken into a series of dots representing light and dark portions of the page. These dots compose the pictures, graphics, letters, and numbers printed by the fax machine.

Important: *The scan rate option in your fax software determines the size of a fax and how much time it takes to transmit the file.*

The fax machine scans a page line-by-line and records the number and position of each dot in a scan line. This information is converted into a special code and transmitted to another computer or fax machine. This transmission uses a set of transfer and modulation specifications called protocols.

Fax machines and modems are connected in *Groups*. The Group a fax machine belongs to indicates its speed and level of technological advancement. The original fax machines were Group 1 machines. These are the slowest machines and are almost obsolete today. Faster Group 2 fax machines replaced the Group 1 machines. Group 2 machines are also nearly obsolete today. Most fax machines sold today are Group 3 machines.

Generally, a Group 3 fax machine can connect most efficiently to another Group 3 machine and may also be able to connect to many Group 2 machines. However, a Group 2 machine cannot connect to a Group 3 machine. The modem in your computer works with most Group 3 fax machines but not Group 2 or Group 1 fax machines.

Choosing fax software programs

If your computer did not come with fax software, you must buy a fax software program to operate your fax modem. Also, if you add a fax modem to your computer, you need to purchase fax software.

You send commands to a fax modem (or the fax portion of a data modem) using a revised version of the AT command set. This revised version includes two different sets of commands: *Class 1* and *Class 2*. Some modems support one class of command while others support both. When buying a fax software program, choose the highest class that your modem supports. The modem in your computer supports class 2 fax machines.

note: *CAS and SENDFAX are two other commonly used command sets. These command sets are not supported by the modems already installed in IBM Aptiva PCs.*

Communications settings

The modems already installed in IBM Aptiva PCs are preset to COM1 SERIAL PORT 1. The addresses and interrupts supported by your computer are:

| COM # | Address | Interrupt |
|-------|---------|-----------|
| COM1 | 3F8 | IRQ 4 |
| COM2 | 2F8 | IRQ 3 |
| COM3 | 3E8 | IRQ 4 |
| COM4 | 2E8 | IRQ 3 |

Changing modem addresses for the Mwave adapter card

The modem address in your communications software must match the address setting of your modem. If you purchased a computer with an Mwave card, see "Starting and using the Windows 95 Device Manager" on page 75 for information about how to verify the address used by your Mwave card.

If you cannot change the address used by your communications software, see "Resolving Mwave resource conflicts" on page 73. This section contains information to help you avoid potential conflicts when you need to change resources used by the Mwave card.

Changing modem addresses for non-Mwave adapter cards

If you purchased a computer that does not have Mwave modem support or if your computer has a non-Mwave modem, refer to the documentation that came with the modem for instructions on changing modem addresses.

Modem commands

Table 13 lists common modem commands. The modems that are already installed in your computer are compatible with the Hayes AT command set. All commands in this table must be preceded by the letters AT unless otherwise indicated.

For example, locate Ds in the Code/Command column of Table 13. To tell your modem to dial a telephone number using touch-tone dialing, type ATDT followed by the telephone number and then press Enter. The complete command might look like this: ATDT5554242. To dial the same telephone number using pulse dialing, you would type ATDP5554242. Spaces are not required in the commands unless otherwise indicated.

If you purchased a computer with an Mwave adapter card, then not all of the AT commands used by your computer are listed in this table. Some additional AT commands are listed in the online Mwave Modem help. To view additional AT commands in the Mwave Modem help, follow these steps:

1. From your Windows 95 desktop, click on the Start button.
2. Move your mouse pointer to the Programs menu and then to the Mwave menu.
3. Click on the Mwave Modem option.
4. From the Mwave Modem window, click on the Help menu and select the Contents option.
5. From the Mwave Modem Help window, click on the AT Command Summary option.

Table 13: Modem commands

| Code/Command | Function |
|--------------|---|
| AT | Begins the command line. The modem is ready to accept a command. |
| A/ | Repeats the last command given, if it is not preceded by AT or followed by a carriage return. |
| A | Answers the call immediately. |

Table 13: Modem commands (Continued)

| Code/Command | Function |
|--------------|---|
| DsN | The modem automatically dials a telephone number "N" where "N" is a complete telephone number. The command may also include the following codes: s=P Pulse dialing s=R Dial an "originate-only" modem s=T Touch-tone dialing s=, Pause while dialing s=@ Wait 30 seconds for a valid ringback followed by 5 seconds silence before next symbol s=; Return to command state after dialing s=! Go off-hook 0.5 seconds s=W Wait for dial tone |
| Ds=n | Dials one of four stored telephone numbers. |
| En | Sets Echo on or off n=0 Echo off n=1 Echo on |
| Hn | On/Off hook n=0 On hook n=1 Off hook |
| Ln | Sets the volume of the speaker on the modem n=0 Low volume n=1 Low volume n=2 Medium volume n=3 High volume |
| Mn | Controls when the modem speaker is in use n=0 Speaker off n=1 Speaker is on except when receiving n=2 Speaker on n=3 Speaker is off when dialing or receiving |
| On | Online n=0 Go online n=1 Retrain at 2400 bps |

Table 13: Modem commands (Continued)

| Code/Command | Function |
|--------------|--|
| Qn | Sends result codes n=0 Result codes sent n=1 Result codes not sent |
| Vn | Determines whether the result code is sent as numbers or words. n=0 Result code is sent as numbers n=1 Result code is sent as words |
| Xn | Sets the type of result code sent n=0 Basic result code sent (0 to 4) n=1 Extended result code sent (0 to 5, and 10) n=2 Extended result code sent (0 to 6, and 10) n=3 Extended result code sent (0 to 7, and 10) n=4 Whole result code sent (0 to 10) |
| Z | Resets the modem to the defaults |
| Z0 | Recalls modem profile 1 |
| Z1 | Recalls modem profile 2 |
| &Zn= | Stores up to four telephone numbers in the modem's memory |
| &V | The modem answers with the active profile and the phone numbers stored in NVRAM |
| &W0 | Saves the current register setting as profile 1 |
| &W1 | Saves the current register setting as profile 2 |
| &F&W0&W1 | Returns a modem profile to the original factory setting |
| +++ | Escape sequence Return to command state |
| +FCLASS=? | Shows which class of fax commands the modem supports. If the modem answers: 0,1 it supports Class 1 commands 0,1,2 it supports Class 1 or Class 2 commands 0,2 it supports Class 2 commands |

Modem return codes

The following table lists some codes that the modem sends to your computer in response to the commands you type. They are called return codes. Not all of the return codes are listed here.

Table 14: Return codes

| Digit code | Word code | Meaning |
|------------|--------------|---|
| 0 | OK | Command was carried out without error |
| 1 | Connect | Connected at 300 bits per second (bps) |
| 2 | Ring | Ringling signal detected |
| 3 | No carrier | Carrier is lost or not heard |
| 4 | Error | Error in the command line Invalid command Command line exceeds buffer Invalid character format |
| 5 | Connect 1200 | Connected at 1200 bps |
| 6 | No dial tone | No dial tone during the time-out period |
| 7 | Busy | The line being called is busy |
| 8 | No answer | The line being called did not answer within the time-out period |
| 10 | Connect 2400 | Connected at 2400 bps |
| | WORD FORM | Preceded and terminated by CR LF |

S registers

S registers are information storage areas inside the modem. The AT command set uses the S registers to configure modem options. Some S registers have default settings. For normal modem operations, the default settings are usually adequate. However, special circumstances may require you to change some defaults. To change or read the value of an S register, begin the command with the letters AT.

To read the value of an S register:

- Use the `ATSr?` command (*r*=register number 0-28).

For example, to read the value of S register 0, type `ATS0?` and press Enter.

To change the value of an S register:

- Use the `ATSr=n` command (*r*=register number 0-28, *n*=the new value you want to assign).

For example, to change the value of S register 0 to 20 rings, type `ATS0=20` and press Enter.

If you purchased a computer with an Mwave adapter card, then not all of the S registers used by your computer are listed in this table. Some additional S registers are listed in the online Mwave Modem help. To view additional S registers in the Mwave Modem help, follow these steps:

1. From your Windows 95 desktop, click on the Start button.
2. Move your mouse pointer to the Programs menu and then to the Mwave menu.
3. Click on the Mwave Modem option.
4. From the Mwave Modem window, click on the Help menu and select the Contents option.
5. From the Mwave Modem Help window, click on the S Register Summary option.

Table 15: S registers

| Register | Function | Range/units | Default |
|----------|---|--------------------------|---------|
| S0 | Auto-answer ring | 0-255 /rings | 0 |
| S1 | Ring counter | 0-255 /rings | 0 |
| S2 | Escape code character | 0-127 /ASCII | 43 |
| S3 | Carriage return character | 0-127 /ASCII | 13 |
| S4 | Line feed character | 0-127 /ASCII | 10 |
| S5 | Backspace character | 0-32, 127 /ASCII | 8 |
| S6 | Dial tone wait time | 0-255 /seconds | 2 |
| S7 | Remote carrier wait time | 1-255 /seconds | 45 |
| S8 | Comma pause time | 0-255 /seconds | 2 |
| S9 | Carrier detect response time | 0-255 /10ths of a second | 6 |
| S10 | Carrier loss time | 0-255 /10ths of a second | 14 |
| S11 | Touch-tone dialing speed | 50-255 /milliseconds | 95 |
| S12 | Escape character detect time | 0-25 /50ths of a second | 50 |
| S13 | Reserved (Do not use) | | None |
| S14 | Echo, response, dialing, originate/answer | Bit-mapped register | None |
| S15 | Reserved (Do not use) | | None |
| S16 | RDL, Clear-Down, Retrain Response | Bit-mapped register | None |
| S17 | Reserved (Do not use) | | None |
| S18 | Modem test timer | 0-255 /seconds | 0 |
| S19 | Reserved (Do not use) | | None |
| S20 | Reserved (Do not use) | | None |

Table 15: S registers (Continued)

| Register | Function | Range/units | Default |
|----------|--|---------------------------|---------|
| S21 | Originate-only, line, DTR, DCD, DSR, and Long Space Disconnect | Bit-mapped register | None |
| S22 | Speaker, M/B ratio and response | Bit-mapped register | None |
| S23 | DTE data rate, parity, and guard tone | Bit-mapped register | None |
| S24 | Calling tone | | None |
| S25 | Data Terminal Ready delay | 0-100 seconds | 5 |
| S26 | RTS to CTS delay interval | 0-255 /100ths of a second | 1 |
| S27 | Async/Sync operation, clock source, DCE speed | Bit-mapped register | None |
| S28 | Line speed control register | | None |

United States modem regulations

FCC and telephone company requirements

If your IBM Aptiva Personal Computer comes with a modem already installed, the following Federal Communications Commission (FCC) and telephone company requirements apply:

1. The modem adapter card is located inside the back of the system unit. It complies with Part 68 of the FCC rules. A label is affixed to the built-in modem that contains, among other things, the FCC registration number, USOC, and Ringer Equivalency Number (REN) for this equipment. If these numbers are requested, slide the system unit cover forward to see the label, and provide this information to your telephone company.
2. The REN is useful to determine the quantity of devices you may connect to your telephone line and still have those devices ring when your number is called. In most, but not all areas, the sum of the RENs of all devices should not exceed five (5.0). To be certain of the number of devices you may connect to your line, as determined by the REN, you should call your local telephone company to determine the maximum REN for your calling area. The REN for the factory installed modem in your computer is 0.8B.
3. If the built-in modem causes harm to the telephone network, the telephone company may discontinue your service temporarily. If possible, they will notify you in advance; if advance notice isn't practical, you will be notified as soon as possible. You will be advised of your right to file a complaint with the FCC.
4. Your telephone company may make changes in its facilities, equipment, operations, or procedures that could affect the proper operation of your equipment. If they do, you will be given advance notice so as to give you an opportunity to maintain uninterrupted service.
5. If you experience trouble with this built-in modem, check the "FCC and Telephone Company Requirements" section of the *Program License and Limited Warranty Agreement* for information on obtaining service. The telephone company may ask you to disconnect this equipment from the network until the problem has been corrected, or until you are sure the equipment is not malfunctioning.
6. No customer repairs are possible to the modem.
7. The modem may not be used on coin service provided by the telephone company. Connection to party lines is subject to state tariffs. Contact your state public utility commission or corporation commission for information.
8. When ordering network interface (NI) service from the Local Exchange Carrier, specify service arrangement USOC RJ11C.
9. The Telephone Consumer Protection Act of 1991 makes it unlawful for any person to use a computer or other electronic device to send a message via a telephone fax machine unless such message clearly contains, in a margin at the top or bottom of each transmitted page, or on the first page of the transmission, the date and time it is sent and an identification of the business, or other entity, or other individual sending the message and the telephone number of the sending machine of such business, other entity, or individual. In order to program this information into your computer you should be sure to follow the installation instructions for your fax software package.

Canadian modem regulations

Canadian Department of Communications certification label

Notice: The Canadian Department of Communications label identifies certified equipment. This certification means that the equipment meets certain telecommunications network protective, operational and safety requirements. The Department does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, the company's inside wiring associated with a single line individual service may be extended by means of a certified connector assembly (telephone extension cord). The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be made by an authorized Canadian maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines and internal water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

CAUTION:

Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate.

LOAD NUMBER (LN)

The load number (LN) assigned to each terminal device denotes the percentage of the total load to be connected to a telephone loop which is used by the device, to prevent overloading. The termination on a loop may consist of any combination of devices subject only to the requirement that the total of the load of all the devices does not exceed 100. The load number of the built-in modem is 10.

Étiquette d'homologation du Ministère des Communications du Canada

AVIS: L'étiquette du ministère des Communications du Canada identifie le matériel homologué. Cette étiquette certifie que le matériel est conforme à certaines normes de protection, d'exploitation et de sécurité des réseaux de télécommunications. Le ministère n'assure toutefois pas que le matériel fonctionnera à la satisfaction de l'utilisateur.

Avant d'installer ce matériel, l'utilisateur doit s'assurer qu'il est permis de le raccorder aux installations de l'entreprise locale de télécommunications. Le matériel doit également être installé en suivant une méthode acceptée de raccordement. L'abonné ne doit pas oublier qu'il est possible que la conformité aux conditions énoncées ci-dessus n'empêchent pas la dégradation du service dans certaines situations.

Les réparations de matériel homologué doivent être effectuées par un centre d'entretien canadien autorisé désigné par le fournisseur. La compagnie de télécommunications peut demander à l'utilisateur de débrancher un appareil à la suite de réparations ou de modifications effectuées par l'utilisateur ou à cause d'un mauvais fonctionnement.

Pour sa propre protection, l'utilisateur doit s'assurer que tous les fils de mise à la terre de la source d'énergie électrique, des lignes téléphoniques et des canalisations d'eau métalliques, s'il y en a, sont raccordés ensemble. Cette précaution est particulièrement importante dans les régions rurales.

CAUTION:

L'utilisateur ne doit pas tenter de faire ces raccordements lui-même, il doit avoir recours à un service d'inspection des installations électriques ou à un électricien, selon le cas.

L'INDICE DE CHARGE (IC)

L'INDICE DE CHARGE (IC) assigné à chaque dispositif terminal indique, pour éviter toute surcharge, le pourcentage de la charge totale qui peut être raccordé à un circuit téléphonique bouclé utilisé par ce dispositif. L'extrémité du circuit bouclé peut consister en n'importe quelle combinaison de dispositifs pourvu que la somme des INDICES DE CHARGE de l'ensemble des dispositifs ne dépasse pas 100. L'indice de charge du modem intégré est de 10.

Monitor terminology

Appendix D

As you read the documentation that came with your monitor and the monitor information provided in this chapter, you might find a few technical terms. If you change your monitor settings, refer to the following table to understand some of the terms used to describe monitor characteristics.

Table 16: Monitor terms and definitions

| Term | Definition |
|----------------------|--|
| display mode | A resolution setting associated with a vertical frequency setting (and sometimes a color setting). For example, 640x480 at 75 Hz, 256 colors. |
| horizontal frequency | Rate (in kilohertz [kHz]) at which each line on the screen is drawn. |
| interlaced | Method of producing an image by drawing only alternating lines until the entire image is completed. |
| noninterlaced | Method of producing an image by drawing each line, one after the other, until the entire image is completed. This method produces less flicker than the interlaced method. |
| pel (or pixel) | A picture element. A small rectangle or portion of an image that together with other pels make up the entire image. |
| resolution | The number of pels required to display an image horizontally and vertically. For example, 640x480 means 640 pels horizontally and 480 pels vertically. |

Table 16: Monitor terms and definitions

| Term | Definition |
|--------------------|--|
| SVGA | Super video graphics array. A video standard that provides some of the higher text and graphics resolutions. |
| vertical frequency | Rate (in hertz [Hz]) at which the entire image is drawn on the screen. Also called "refresh rate." |

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