The background features several large, light gray abstract geometric shapes. On the left, a large shape resembles a stylized letter 'E' or a series of connected lines. To its right, there are various curved and angular shapes, including a wavy line at the top right and a more complex, rounded shape at the bottom right.

Macintosh Performa User's Guide

.....

*Includes setup, troubleshooting, and health-related information
for Macintosh Performa 640 series DOS Compatible computers*

 Apple Computer, Inc.

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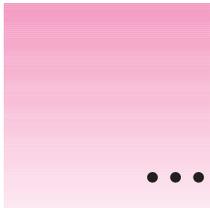
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Communications regulation information

FCC statement

This equipment has been tested and found to comply with the limits for a Class B digital device in accordance with the specifications in Part 15 of FCC rules. See instructions if interference to radio or television reception is suspected.

Radio and television interference

The equipment described in this manual generates, uses, and can radiate radio-frequency energy. If it is not installed and used properly—that is, in strict accordance with Apple’s instructions—it may cause interference with radio and television reception.

This equipment has been tested and found to comply with the limits for a Class B digital device in accordance with the specifications in Part 15 of FCC rules. These specifications are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation.

You can determine whether your computer system is causing interference by turning it off. If the interference stops, it was probably caused by the computer or one of the peripheral devices.

If your computer system does cause interference to radio or television reception, try to correct the interference by using one or more of the following measures:

- Turn the television or radio antenna until the interference stops.
- Move the computer to one side or the other of the television or radio.
- Move the computer farther away from the television or radio.
- Plug the computer into an outlet that is on a different circuit from the television or radio. (That is, make certain the computer and the television or radio are on circuits controlled by different circuit breakers or fuses.)

If necessary, consult an Apple-authorized service provider or Apple. See the service and support information that came with your Apple product. Or, consult an experienced radio/television technician for additional suggestions. You may find the following booklet helpful: *Interference Handbook* (stock number 004-000-00493-1). This booklet, prepared by the Federal Communications Commission, is available from the U.S. Government Printing Office, Washington, DC 20402.

IMPORTANT Changes or modifications to this product not authorized by Apple Computer, Inc., could void the FCC Certification and negate your authority to operate the product.

This product was tested for FCC compliance under conditions that included the use of Apple peripheral devices and Apple shielded cables and connectors between system components. It is important that you use Apple peripheral devices and shielded cables and connectors between system components to reduce the possibility of causing interference to radios, television sets, and other electronic devices. You can obtain Apple peripheral devices and the proper shielded cables and connectors through an Apple-authorized dealer. For non-Apple peripheral devices, contact the manufacturer or dealer for assistance.

DOC statement

DOC Class B Compliance This digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus as set out in the interference-causing equipment standard entitled “Digital Apparatus,” ICES-003 of the Department of Communications.

Observation des normes—Classe B Cet appareil numérique respecte les limites de bruits radioélectriques applicables aux appareils numériques de Classe B prescrites dans la norme sur le matériel brouilleur : “Appareils Numériques”, NMB-003 édictée par le ministre des Communications.

VCCI statement

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取扱説明書に従って正しい取り扱いをしてください。

CD-ROM drive

WARNING Making adjustments or performing procedures other than those specified in your equipment’s manual may result in hazardous exposure.

WARNING Do not attempt to disassemble the cabinet containing the laser. The laser beam used in this product is harmful to the eyes. The use of optical instruments, such as magnifying lenses, with this product increases the potential hazard to your eyes. For your safety, have this equipment serviced only by an Apple-authorized service provider.

If you have an internal Apple CD-ROM drive in your computer, your computer is a Class 1 laser product. The Class 1 label, located on the computer, indicates that the drive meets minimum safety requirements. A service warning label is on the CD-ROM drive inside the computer.





Your DOS-Compatible Macintosh Performa Computer

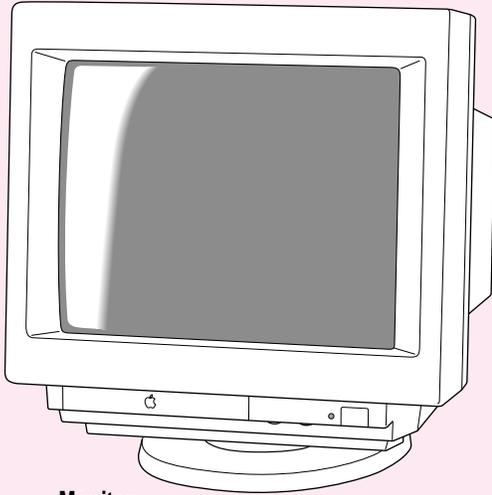


Your Macintosh Performa includes hardware and software that let you use DOS and Windows directly on your Macintosh computer. It contains a high-performance microprocessor that's fully compatible with the latest DOS and Windows software. You can

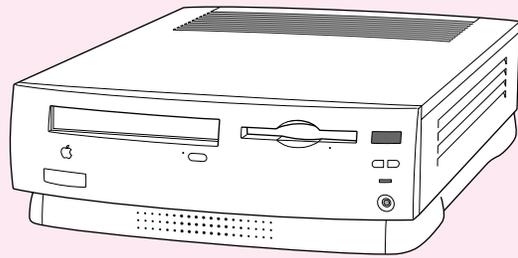
- simultaneously run Macintosh operating system (Mac OS) and PC application programs
- switch between the Mac OS and PC environment at any time without quitting the programs you're using
- view the Macintosh or PC environment on a single monitor
- use the same hard disk for both Mac OS and PC software
- share files and folders (directories) between the Mac OS and the PC environment
- cut, copy, and paste data between Mac OS and PC documents
- use your Macintosh keyboard and mouse with PC software
- use your Macintosh modem, monitor, and printer with PC software, or connect PC-compatible equipment
- use a joystick or other game controller with PC programs

- share the random-access memory (RAM) in your Macintosh with the PC environment, or use a memory module (SIMM) exclusively for the PC environment
- use the built-in Macintosh serial ports with PC software
- access PC CD-ROM discs using an Apple CD-ROM drive
- play Sound Blaster-compatible sounds
- communicate with network servers and other computers running PC software

To begin, follow the instructions in Chapters 1 and 2 to set up your computer and start using it. Read Chapters 3 and 4 when you are ready to connect additional equipment to your computer and install Mac OS application programs. Read Chapters 5 and 6 to start using application programs that run in DOS or Windows on your Macintosh computer. Turn to Chapters 7 and 8 if you have questions or problems using your Macintosh.



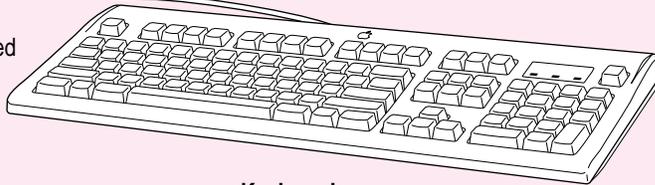
Monitor



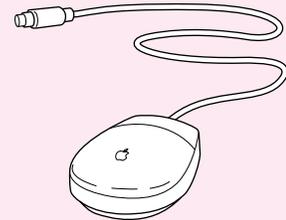
Macintosh Performa DOS-compatible computer



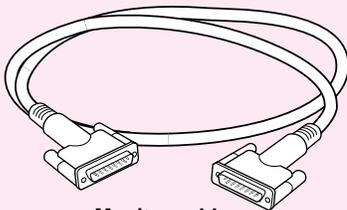
Keyboard cable
(permanently attached
to the keyboard)



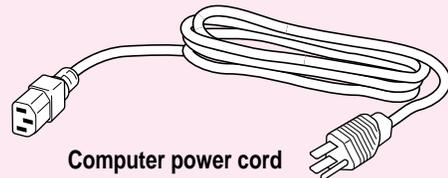
Keyboard



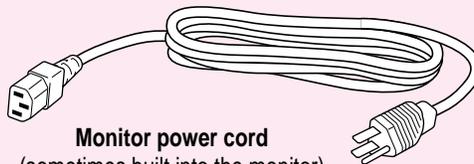
Mouse



Monitor cable
(sometimes built into the monitor)



Computer power cord



Monitor power cord
(sometimes built into the monitor)

Follow the instructions in this chapter to set up your computer and learn the basics.



Getting Started

The illustration on the facing page shows all the equipment you need to set up your computer and begin using it. Place your equipment on a sturdy, flat surface near a grounded wall outlet. Before following the setup instructions in this chapter, you may want to read “Arranging Your Office” in Appendix A (in the section on health-related information) for tips on adjusting your work furniture so that you’re comfortable when using the computer.

If you used the setup poster: The poster included with your Macintosh Performa computer was designed to help you start using your computer as quickly as possible. This chapter contains more detailed information than the poster. If you have already set up your computer using the poster, you may want to turn to the section “What’s Next?” later in this chapter.

Plugging in the computer

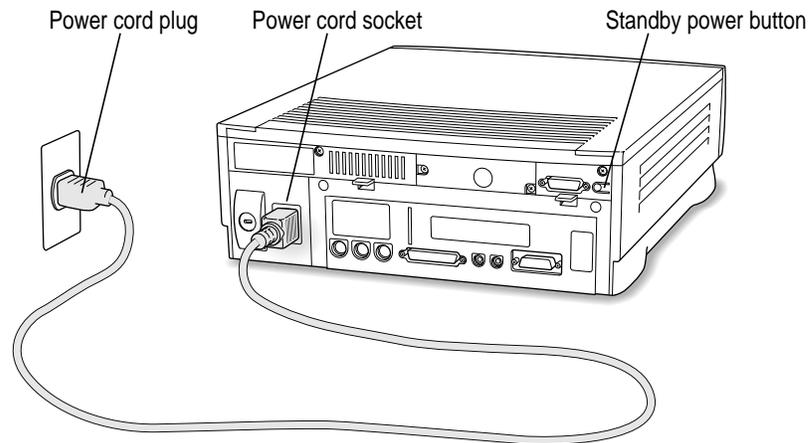
Before you plug your Macintosh into a wall socket, carefully read all the setup instructions in this chapter. Then, before you connect anything to your Macintosh, follow the instructions in this section to plug it in. The plug grounds the computer and protects it from electrical damage while you are setting up.

When you are ready to begin, follow these steps:

- 1 **Plug the socket end of the computer's power cord into the recessed power cord socket (marked with the symbol \sim) on the back of the computer.**
- 2 **Plug the other end of the power cord into a three-hole grounded outlet or power strip.**

Choose a power outlet to which you have easy access.

WARNING This equipment is intended to be electrically grounded. Your Macintosh is equipped with a three-wire grounding plug—a plug that has a third (grounding) pin. This plug will fit only a grounded AC outlet. This is a safety feature. If you are unable to insert the plug into the outlet, contact a licensed electrician to replace the outlet with a properly grounded outlet. Do not defeat the purpose of the grounding plug!



IMPORTANT Be sure that at least one end of the power cord is within easy reach so that you can unplug the computer when you need to.

If the computer starts up: If you hear a tone, the computer has started up and you need to turn it off before proceeding. Press the power button (also called the standby power button) located on the back of the computer to turn the computer off.

Installing an expansion card

If you purchased any expansion cards for your Macintosh or extra memory for use in the PC environment, install the cards or memory now. (For instructions, see Appendix B, “Installing an Expansion Card or Memory for the PC Environment,” as well as the documentation that came with the cards or memory module.) If you don’t have an expansion card or memory to install, go on to the next section, “Connecting a Monitor.”

Connecting a monitor

You can connect many types of monitors to your Macintosh. To connect a monitor from a manufacturer other than Apple, refer to the instructions that came with the monitor.

Connecting the monitor power cord

Monitors have two cords to connect—a power cord and a monitor cable.

To connect the monitor power cord, follow these steps:

1 Place the monitor where you will be using it.

You can place a monitor with a 15-inch or smaller screen on top of your computer. Don’t place larger monitors on the computer.

Keep these considerations in mind:

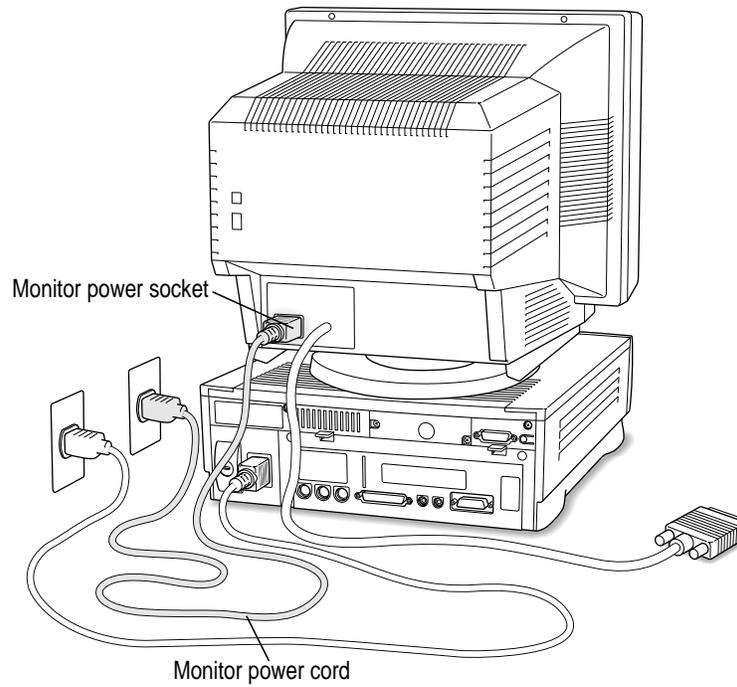
- Allow a few inches for air circulation around the sides of the computer and monitor.
- Make sure that the top of the screen is slightly below eye level when you’re sitting at the keyboard.
- Position the monitor to minimize glare and reflections on the screen from overhead lights and windows.
- Consult “Arranging Your Office” in the section “Health-Related Information About Computer Use” in Appendix A for other suggestions on positioning your computer equipment.

2 Connect the monitor power cord to the monitor.

On some monitors, the cord is already attached.

3 Plug in the monitor power cord.

Be sure to plug the power cord into a three-hole grounded outlet or power strip.



Connecting the monitor cable

After you plug in the monitor power cord, you connect the monitor cable to the computer's monitor port.

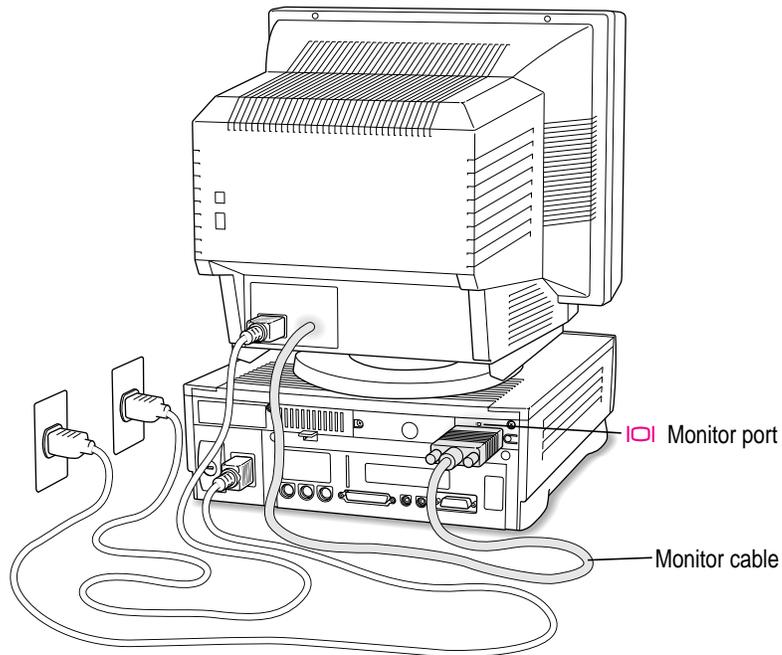
To connect the monitor cable, follow these steps:

- 1 Attach the monitor cable to the monitor.**

On some monitors, the cable is already attached (as shown below).

- 2 Attach the monitor cable to the monitor port on the back panel of the computer.**

The monitor port is on the upper-right corner of the back panel. It is marked with the  icon (symbol). Be sure you plug the cable into the correct port.

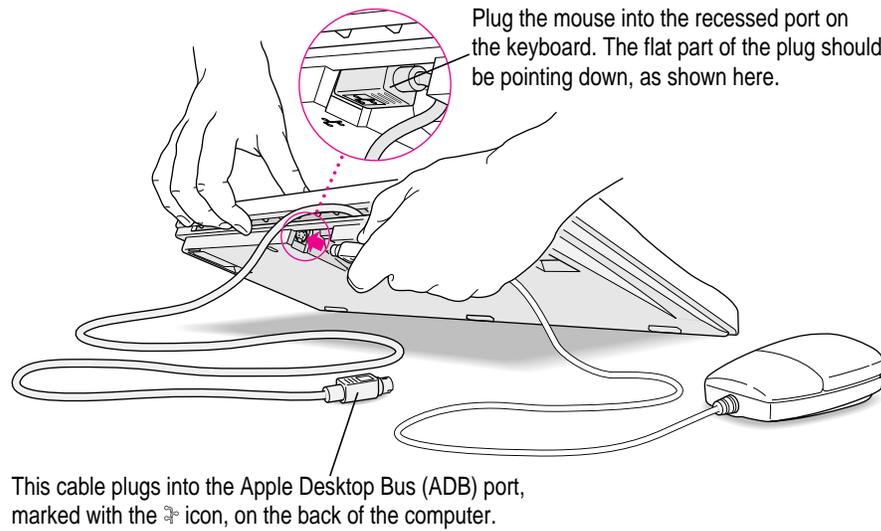


Connecting the mouse and keyboard

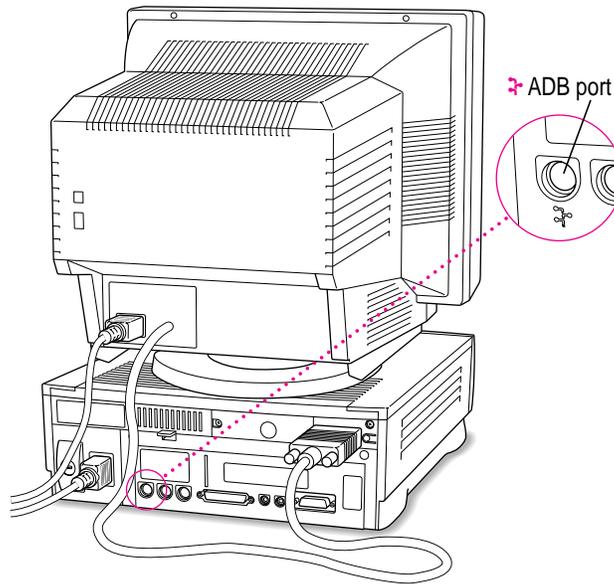
- 1 Plug the mouse cable into the recessed port on the back of the keyboard.**

The plug and the port are marked with the ⌘ icon (symbol). The positions of the port and icon on your keyboard may be different from those pictured.

By the way: A port marked with the ⌘ icon is called an Apple Desktop Bus (ADB) port.

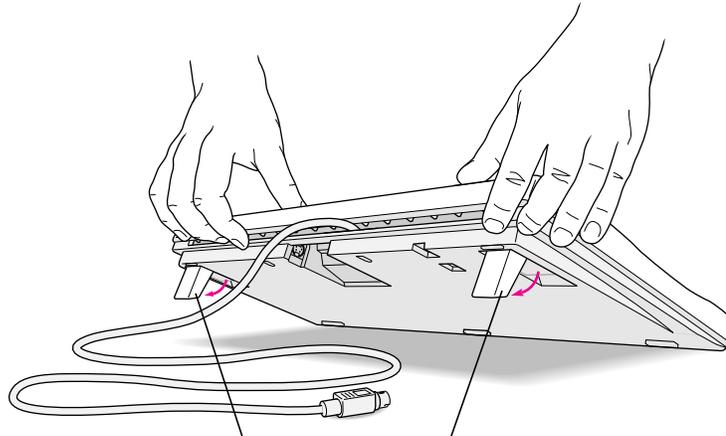


- 2** Plug the keyboard cable into the port marked with the  icon on the back of the computer.



Some monitors have a port to which you can connect the keyboard or mouse. See the information that came with your monitor.

- 3** If you want to adjust the keyboard angle, lower the feet on the keyboard.



To adjust the keyboard angle, lower the feet until they snap into position.

Connecting other equipment

If you are new to the Macintosh, it's a good idea to get some experience using your computer before you connect other equipment, such as a printer or scanner. To learn basic Macintosh skills, continue with the instructions in this chapter.

When you're ready to connect other equipment to your Macintosh, see the instructions in Chapter 3.

Turning the computer on

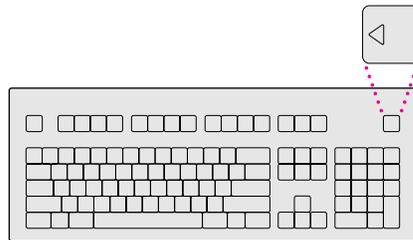
Follow these steps to turn the computer on:

1 Turn on the monitor.

See the information that came with your monitor for the location of the power button.

2 Turn on your computer by pressing the Power key.

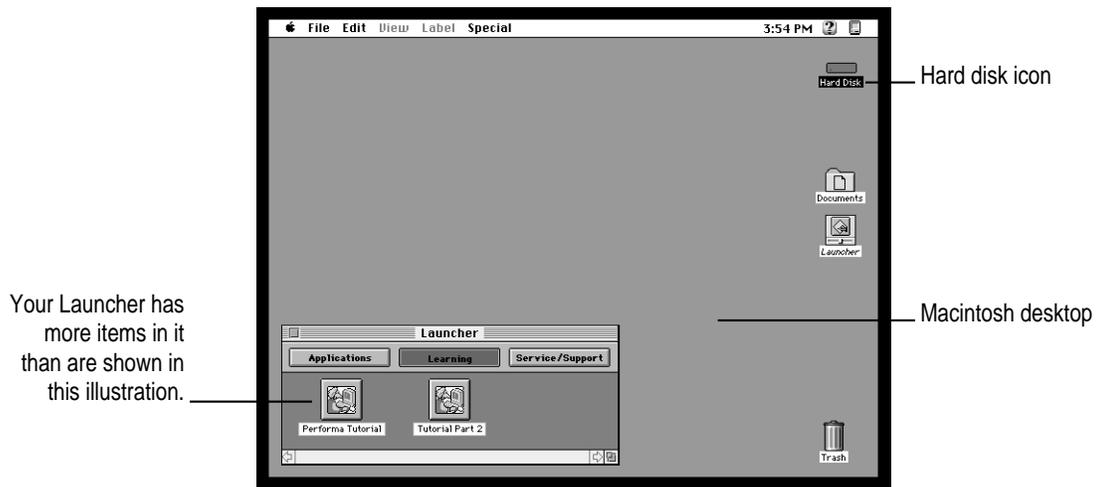
The Power key is at the top of the keyboard. You can recognize this key by the triangle outline on it (<|).



You hear a tone from the computer as it starts up.

3 Check to see what's on your screen.

- If you see the Macintosh desktop, as in the illustration below, your system software has already been installed, and your computer is ready to use. Skip now to the section “What's Next?” later in this chapter.



- If you see a blinking question mark, you may need to install system software on your computer's hard disk. (System software is the set of programs your computer uses to start itself up.) See “Solutions to Common Problems” in Chapter 7 for more information.
- If you see anything else on your screen, or nothing at all, see the next section, “Problems Turning Your Computer On?”

Problems turning your computer on?

If you don't see anything on the screen, check these items to see if you can identify the problem:

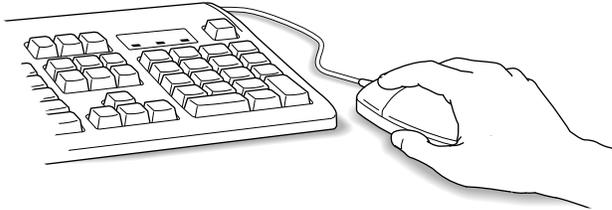
- Is the computer plugged into a power source? If it is plugged into a power strip, is the power strip plugged in and turned on?
- Is the computer turned on? The power-on light on the front panel should be on. If it isn't on, press the standby power button on the computer's back panel (marked with the symbol .
- Are the keyboard and mouse cables connected correctly? (Don't disconnect the keyboard or mouse cable while the computer is on. You could damage your equipment.)
- Is the monitor power cord plugged in?
- Is the monitor turned on? (Check the power-on light on the front of the monitor.)
- Is the monitor cable attached firmly to both the monitor and computer?
- Is the brightness control on the monitor adjusted correctly? (On Apple monitors, the brightness control is marked with the symbol .)

Learning the basics

If you are new to the Macintosh, you should begin by looking at the easy-to-use program called Performa Tutorial. The tutorial teaches you the basic skills you'll need to use your computer. To start the tutorial once you are past the welcome sequence, follow these steps:

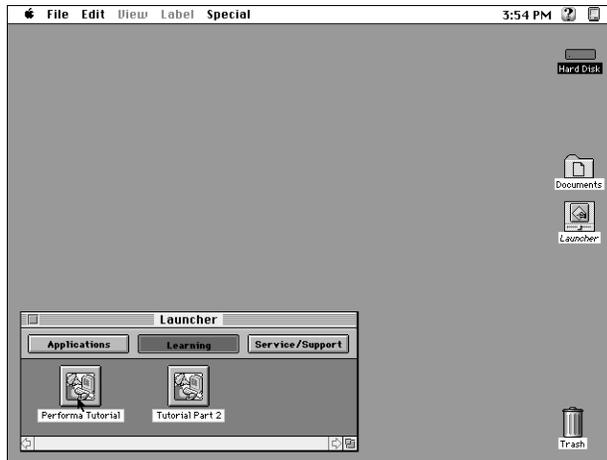
1 Slide the mouse along your mouse pad or desk.

Hold the mouse as shown, with the cable pointing away from you. Don't press the mouse button (under your index finger). Notice that the arrow (␣) on the screen moves in the same direction that you move the mouse.



If the arrow doesn't move, make sure that the cables connecting the mouse and keyboard are secure and that your mouse is positioned as shown in the illustration.

2 Move the mouse so that the tip of the arrow (␣) is over the picture labeled "Performa Tutorial."



If you don't see the Performa Tutorial picture on your screen, put the arrow on the word "Learning" and click (press and release) the mouse button.

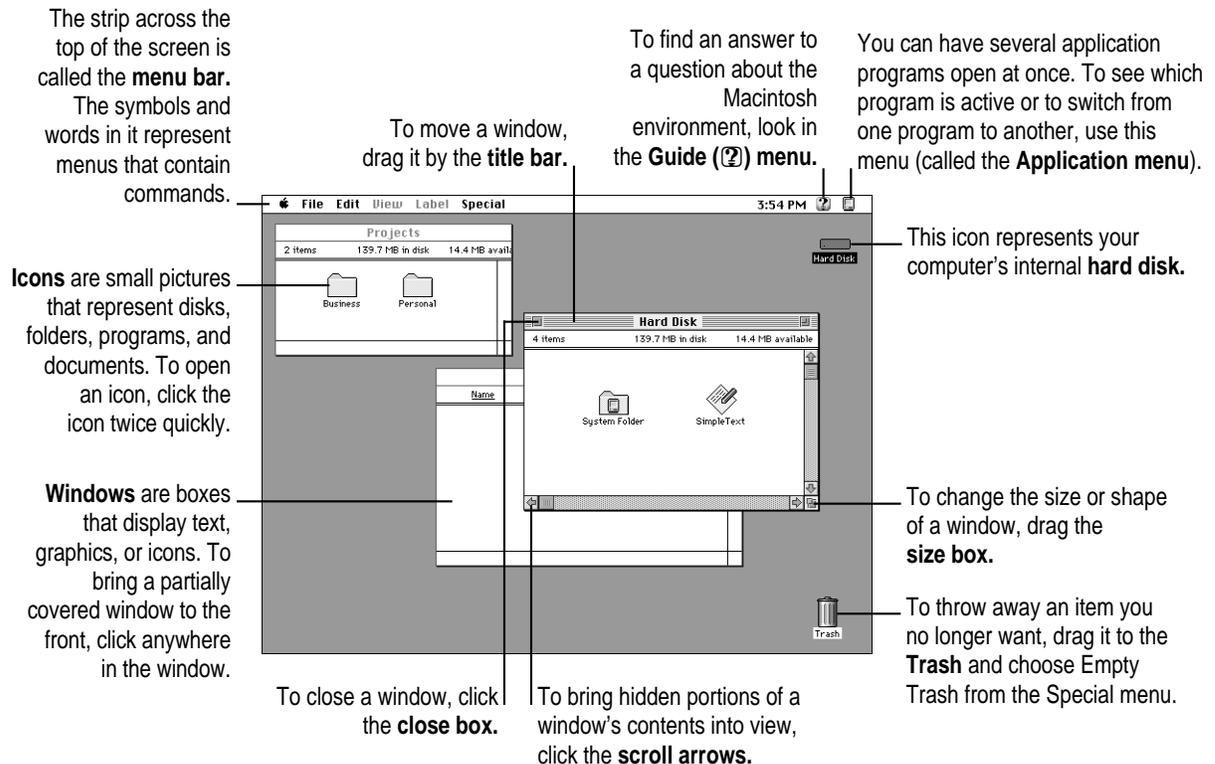
If you run out of room on your mouse pad or desk while moving the mouse, pick up the mouse and place it where there's more room. (The arrow on the screen moves only when the mouse is in contact with the mouse pad or desk.)

3 Without moving the mouse, click the mouse button.

A window appears welcoming you to the tutorial. You can set this book aside for now and follow the instructions on the screen. When you have completed both parts of the tutorial, return to this book.

Reviewing the basics

The following illustration summarizes many of the basic skills and terms you learned from the tutorial.



Turning the computer off

To turn the computer off:

- 1 **Press the Power key (marked with a triangle) on the keyboard.**

You will see a message asking whether you want to shut down or continue working.

- 2 **Click Shut Down.**

To turn the computer on, simply press the Power key again.

You can also turn off your computer by choosing Shut Down from the Apple (K) menu. Detailed instructions follow. (Note: The Shut Down command is also available in the Special menu.)

- 1 **Move the tip of the arrow to the Apple (⌘) menu at the top left of the screen.**
- 2 **With the tip of the arrow on the apple, press and hold down the mouse button.**
- 3 **While holding down the mouse button, move the arrow down the list of choices until the words “Shut Down” are highlighted, then release the mouse button.**



WARNING Do not turn the computer off by pressing the standby power button on the back panel. If you do so, you may lose any work you haven't previously saved to a disk. You also risk losing any open documents.

Where to find answers

When you have questions about using your Macintosh, there are several places you can look for answers.



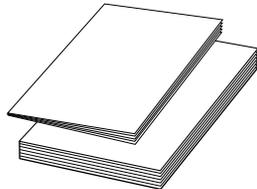
In this book

Use this book to help you set up your computer and learn about it, or to find solutions to problems with your equipment. See especially the chapters about troubleshooting in the Macintosh and PC environments.



In the Guide menu

The Guide menu (marked with the  icon) is your main source of information about the Macintosh. To learn how to get different kinds of help from the Guide menu, see Chapter 2 in this book. (Note: The Guide menu is not available when you're in the PC environment.)



In other manuals

For answers to questions about other equipment or about application programs you have purchased, see the manuals that came with the equipment or programs. Manuals for DOS and Windows are included with your computer.



From the Read Me files in the Apple Extras folder

The Apple Extras folder (in your System Folder) on your hard disk contains SimpleText documents with important information about some of the application programs included with your computer.



From Apple's customer support hotline

If you can't find an answer in any of the materials provided, call the customer support hotline. The phone number for the hotline is in the service and support information that came with your computer. (Note: If you have problems with an application program not published by Apple, call the program's publisher. Click the Phone Numbers button in the Service/Support area of the Launcher to get a software publisher's phone number.)

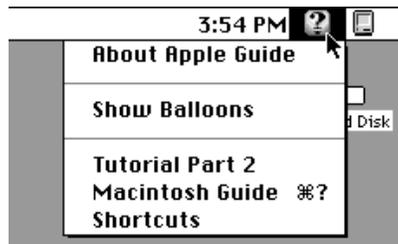
Use the instructions in this chapter to learn about the help available to you in the Guide menu.

2

Getting Help



The Guide menu is your main source of information when you're working with your computer in the Macintosh environment. The menu is identified by a question mark (?) in the upper-right corner of the screen.

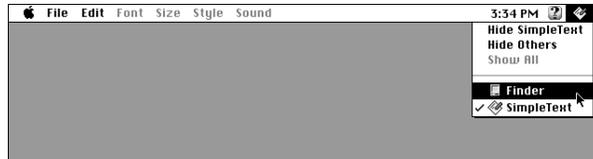


(If you need instructions on using DOS or Windows, see the manuals that came with these programs.)

Getting answers to your questions

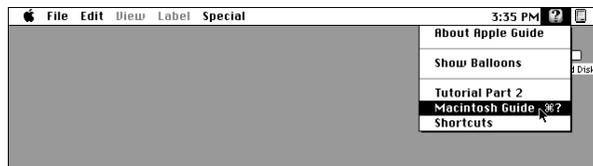
When you have a question while working with your computer, you can get the answer by choosing Macintosh Guide from the Guide menu.

- 1 Pull down the Application menu (in the upper-right corner of the screen) and choose Finder to make it the active application program.

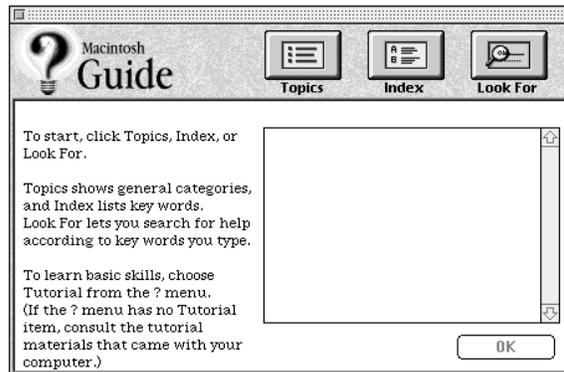


A checkmark in the menu indicates that the Finder is the active program.

- 2 Pull down the Guide menu (marked with the ? icon) and choose Macintosh Guide.



The Macintosh Guide window appears.



Whenever you use Macintosh Guide, its window remains in front of other windows. If the window gets in your way, you can move it by dragging its title bar (the gray bar across the top of the window).

- 3 Notice the three buttons at the top of the window: **Topics**, **Index**, and **Look For**.



Macintosh Guide gives you three ways of finding information:

- **Topics** lets you choose from a list of general subjects; it is like the table of contents in a book.
- **Index** lets you choose from an alphabetical list of more specific subjects; it is like the index in a book.
- **Look For** lets you search for information related to a specific word or phrase that you type.

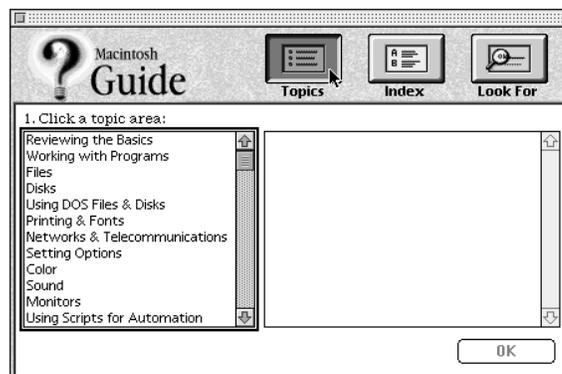
In the following sections you will practice using each method.

If you have problems while using Macintosh Guide, see “Tips for Using Macintosh Guide” later in this chapter.

Getting answers with the Topics button

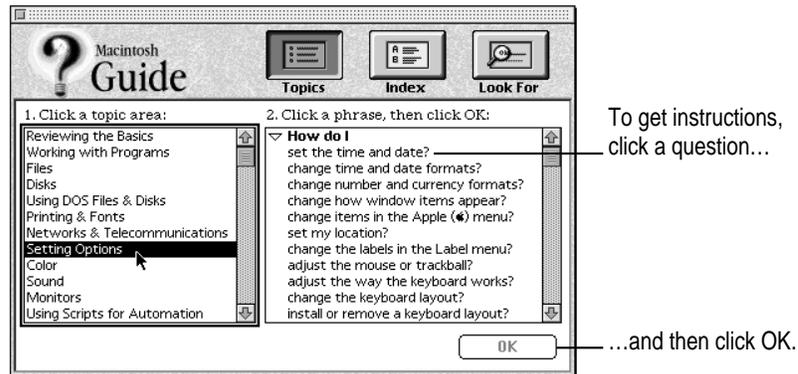
- 1 In the Macintosh Guide window, click the **Topics** button.

A list of general topics appears on the left side of the Macintosh Guide window. (Depending on the hardware and software you have, the list of topics may look different.)



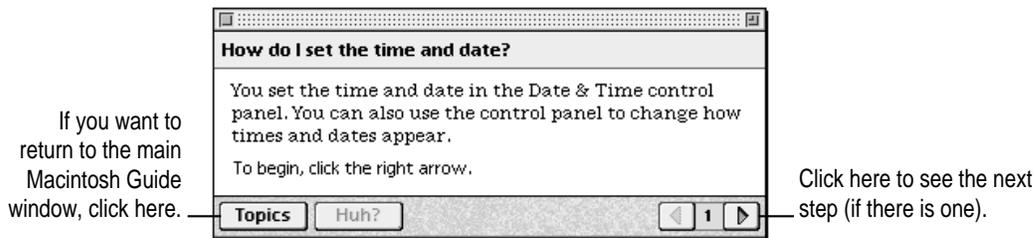
2 Click “Setting Options” in the list of topics.

When you click any topic area, a list of related questions appears on the right side of the Macintosh Guide window.



3 Click the question “How do I set the time and date?” and then click OK. Or double-click the question.

A small window appears with instructions for you to follow.



4 Read and follow the instructions in this window.

Macintosh Guide provides step-by-step instructions to answer the question you selected. When you have completed each step, click the right arrow in the lower-right corner to see the next step.

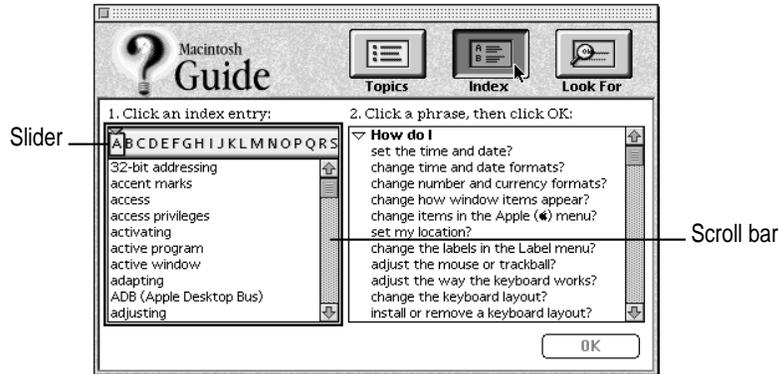
5 When you have completed all the steps, click the Topics button in the lower-left corner to return to the main Macintosh Guide window.

Now continue with the next section.

Getting answers with the Index button

- 1 In the Macintosh Guide window, click the Index button.

An alphabetical list of subjects appears on the left side of the window.

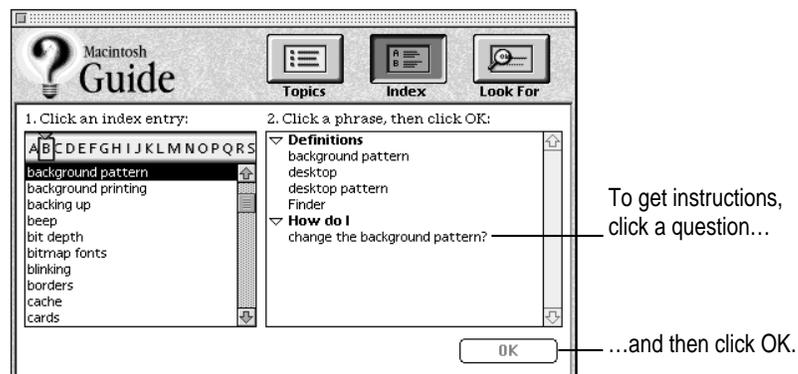


- 2 Scroll through the alphabetical list until the phrase “background pattern” is visible.

You can scroll through the list either by dragging the slider to the letter *B* or by using the scroll bar at the right of the list.

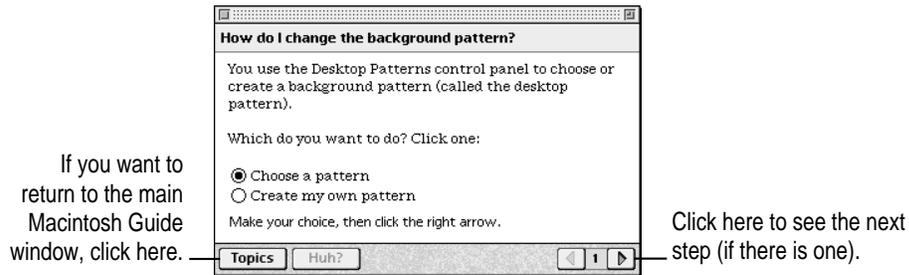
- 3 Click the phrase “background pattern” in the alphabetical list.

When you click any index entry, a list of related questions appears on the right side of the Macintosh Guide window.



- 4 Click the question “How do I change the background pattern?” and then click OK. Or double-click the question.

A small window appears with instructions for you to follow.



- 5 Read and follow the instructions in the window.

Macintosh Guide provides step-by-step instructions to answer the question you selected. When you have completed each step, click the right arrow in the lower-right corner to see the next step.

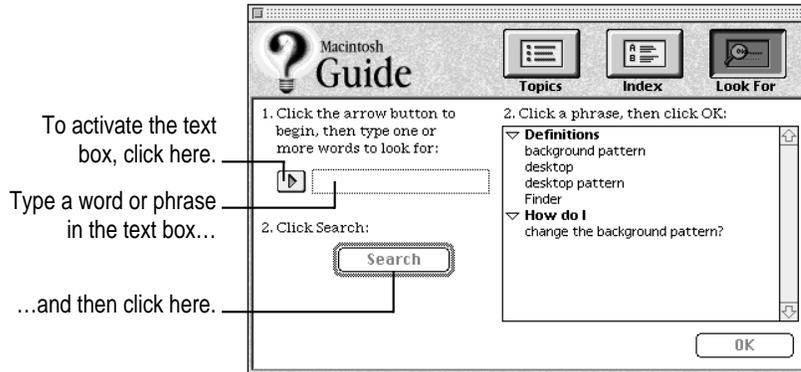
- 6 When you have completed all the steps, click the Topics button in the lower-left corner to return to the main Macintosh Guide window.

Now continue with the next section.

Getting answers with the Look For button

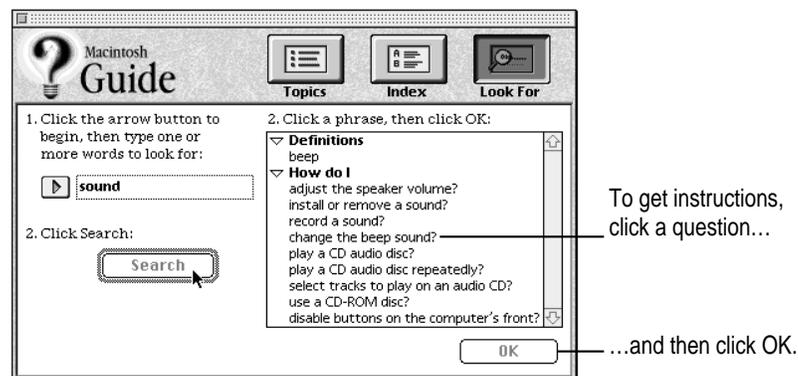
- 1 In the Macintosh Guide window, click the Look For button.

A small box appears on the left side of the window, where you can type text.



- 2 Click the arrow button to activate the text box.
- 3 Type "sound" in the text box and then click Search.

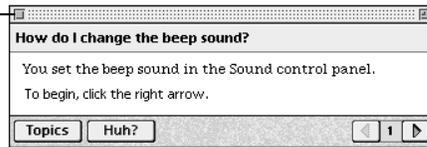
When you click Search, a list of questions related to the word or phrase you typed appears on the right side of the Macintosh Guide window.



- 4 Click the question “How do I change the beep sound?” and then click OK. Or double-click the question.

A small window appears with instructions for you to follow.

If you want to close
Macintosh Guide,
click here.



Click here to see the next
step (if there is one).

- 5 Read and follow the instructions in the window.

Macintosh Guide provides step-by-step instructions to answer the question you selected. When you have completed each step, click the right arrow in the lower-right corner to display the next step.

- 6 When you have completed all the steps, click the close box in the upper-left corner to close Macintosh Guide.

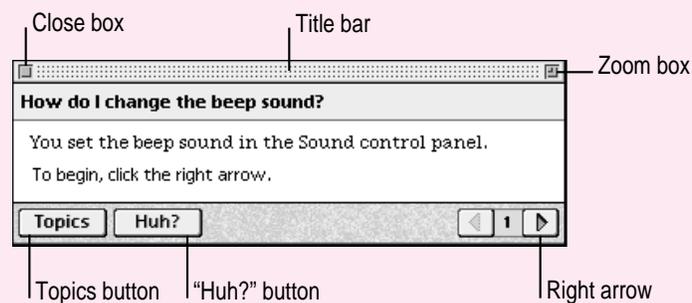
Tips for using Macintosh Guide

Here are a few tips for using Macintosh Guide effectively:

- Macintosh Guide is available only when you are in the Finder—the desktop area where you can see the icons of disks, folders, and files. (Other programs may also have help available in the Guide menu, however.) If you don't see Macintosh Guide in the Guide menu, pull down the Application menu (to the right of the Guide menu) and choose Finder.
- Follow the steps when you're instructed to; don't skip ahead or read ahead. That way the computer can check to make sure you've done a step correctly.
- Unlike most windows, the Macintosh Guide window stays in front of other windows on the screen so that your instructions are never covered. If you need to move the Guide window out of the way, drag it by the title bar at the top of the window.

You can also move the window out of the way by clicking the zoom box. Click the box once to shrink the window; click it a second time to expand the window to its original size.

- If you need more information about an instruction or a term, click the button labeled “Huh?” to get further explanation. (The “Huh?” button is dimmed when no additional information is available.)
- If you want to return to the main Macintosh Guide window, click the Topics button in the lower-left corner of the Guide window.
- When you're finished using Macintosh Guide, click the close box in the upper-left corner of the window.



Identifying objects on the screen

Sometimes you'll see an unfamiliar item on the screen and ask yourself, "What's that?" You can get an answer by using a Macintosh feature known as Balloon Help.

Balloon Help explains the functions of icons, menus, commands, and other items on the Macintosh screen in balloons like those you see in comic strips.

Follow these steps to use Balloon Help:

- 1 Pull down the Guide menu (marked with the  icon) and choose Show Balloons.**



- 2 Point to any object on the screen that you want to identify.**

A balloon appears next to the object. In the following illustration, for example, pointing to the Trash displays a balloon that explains how to use the Trash to throw items away.



Although balloons appear next to items when you point to them, the way you work does not change; you can still select icons, choose commands, and so on.

- 3 When you're finished using Balloon Help, choose Hide Balloons from the Guide menu.**

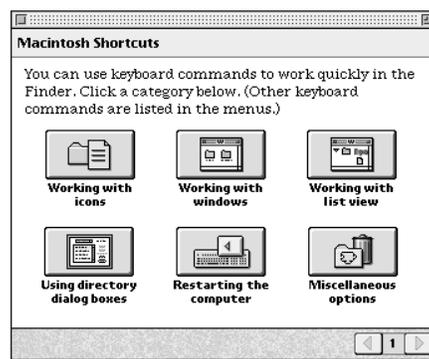
Learning useful shortcuts

You can perform many tasks in the Finder more quickly if you use keyboard or mouse shortcuts. For example, instead of clicking an icon and choosing Open from the File menu, you can simply double-click the icon to open it.

Follow these steps to learn keyboard and mouse shortcuts:

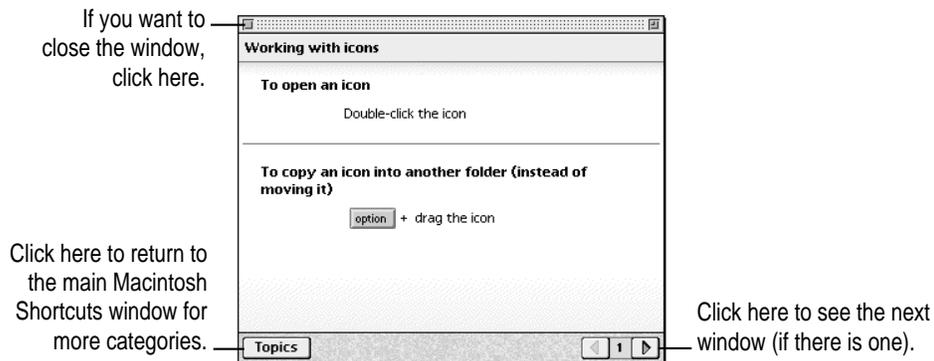
- 1 Pull down the Guide menu (marked with the ) and choose Shortcuts.

The main Macintosh Shortcuts window appears.



- 2 Click one of the category buttons.

Another window appears, describing shortcuts for that category.



3 Read about the shortcuts available for the category you selected.

Click the right arrow in the lower-right corner of the window to display the next window (if there is one).

4 When you finish reading about the shortcuts for your category, click the Topics button in the lower-left corner to return to the main Macintosh Shortcuts window. Or click the close box in the upper-left corner to close the window.

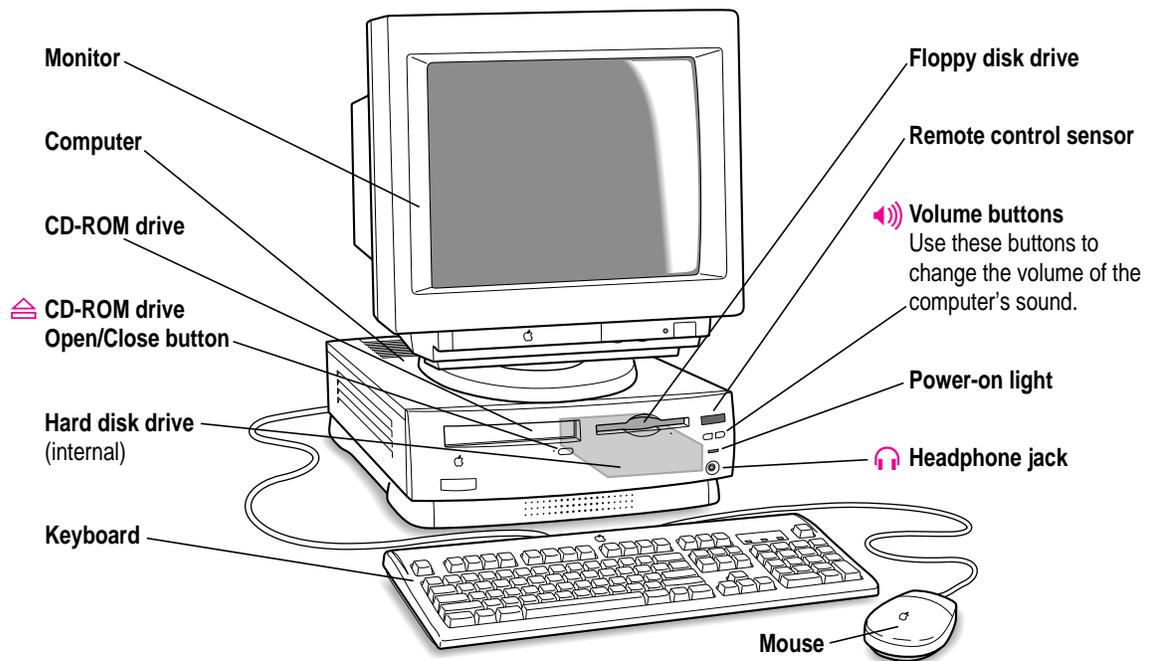


Read this chapter for information on expanding your computer system with additional hardware.

3

Connecting Additional Equipment

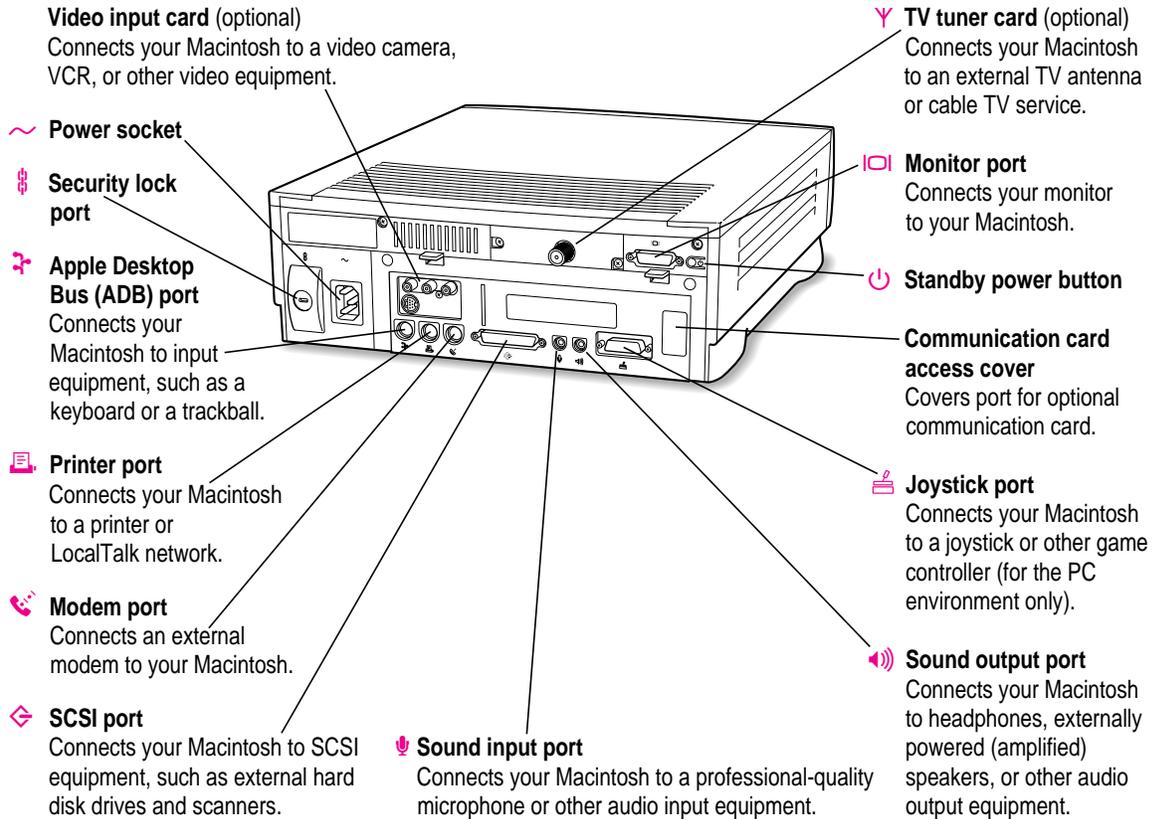
The illustration below shows a basic Macintosh system. You can expand your computer system by connecting additional hardware (such as a printer, modem, or external stereo speakers).



Where to connect additional equipment

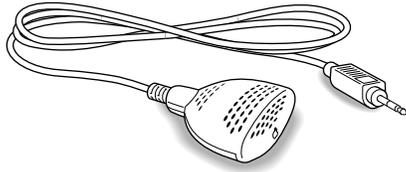
The illustration on this page shows where equipment should be connected to your computer.

For instructions on connecting additional equipment such as a printer or scanner, see the manual that came with the equipment.



Connecting an Apple PlainTalk Microphone

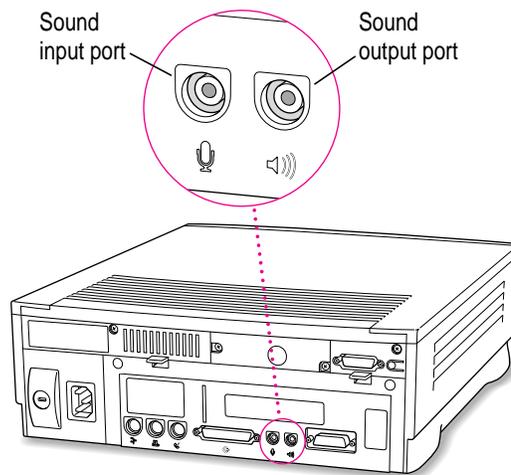
Your computer has a sound input port, which you can use to connect an Apple PlainTalk Microphone.



Use PlainTalk only: You should connect only the Apple PlainTalk Microphone. Other models of microphone will not work with your Macintosh.

To connect the microphone, do this:

- Plug the microphone's connector into the sound input port (marked with the icon ) on the back of the computer.



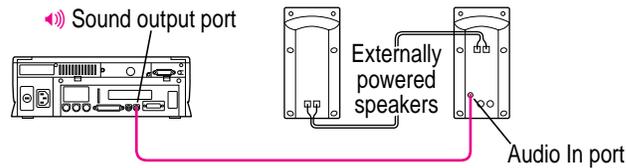
Connecting external stereo speakers

You can take advantage of your computer's stereo sound output by attaching externally powered (amplified) speakers. (Only externally powered speakers will work with your Macintosh.)

1 Assemble the speakers and the cable you need.

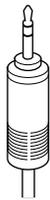
You need a cable with stereo miniplugs at each end to connect one or both speakers to the computer. (Some speakers require a dual-plug adapter. Others, like those shown here, accept a single stereo miniplug and are joined by standard speaker wires.)

The following illustration shows the equipment configuration and the connections for a computer sound system.



2 Turn off the Macintosh.

3 Plug a stereo miniplug into the sound output port on the Macintosh.



Stereo miniplug

4 Plug a stereo miniplug into the Audio In port on one of the speakers.

If the speakers take a dual-plug cable, connect both plugs to the speakers' Audio In ports.

- 5 Connect the speakers together with speaker wires, if necessary.
- 6 Turn on the computer.

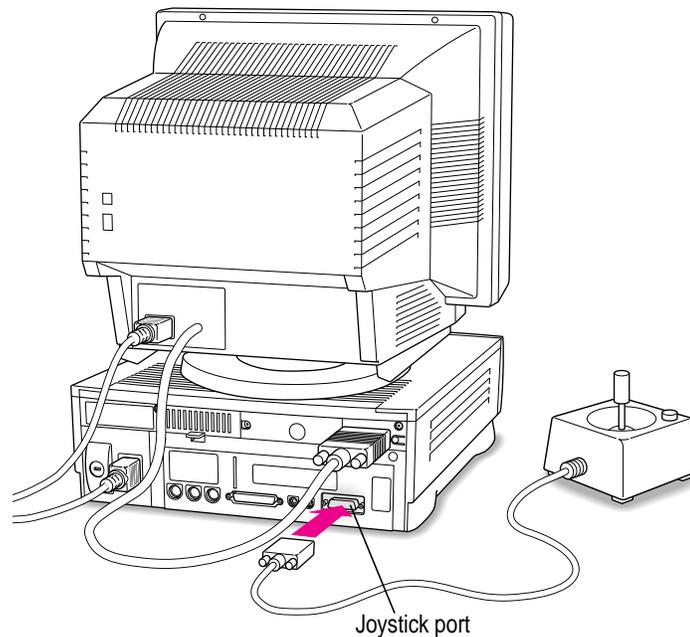
You hear the computer's sound through the external speakers.

Note: To control the volume of your external speakers, use the volume buttons on the front of the computer. If you are playing an audio compact disc (CD), you may also need to adjust the volume control in the program you're using to play CDs. For more information on sound and playing audio CDs in the Macintosh environment, see the "Sound" topic of Macintosh Guide, available in the Guide (🔗) menu. For information on hearing sounds in the PC environment, see "Turning On PC Sounds" in Chapter 6.

Connecting a game controller

To connect a game controller, such as a joystick, do this:

- Remove the plastic cover from the joystick port on the lower-right corner of the computer's back panel. Attach the joystick's connector to the joystick port. Tighten the thumbscrews securely.



Expanding memory

You can install additional random-access memory (RAM) in your computer, which allows you to work with more programs and larger documents. Additional memory comes on memory modules (also called SIMMs). The *Technical Information* booklet that came with your computer describes how much additional memory can be installed in your Macintosh.

You can also add up to 32 megabytes (MB) of RAM for use exclusively in the PC environment. See Appendix B, “Installing an Expansion Card or Memory for the PC Environment,” for further information.

WARNING To avoid damage to your computer, Apple recommends that only an Apple-certified technician install additional RAM. Consult the service and support information that came with your computer for instructions on how to contact an Apple-authorized service provider or Apple for service. If you attempt to install additional RAM yourself, any damage you may cause to your equipment will not be covered by the limited warranty on your computer. See an Apple-authorized dealer or service provider for information about this or any other warranty question.

Replacing internal storage devices

Your Macintosh comes with three internal storage devices—a floppy disk drive, a CD-ROM (compact disc read-only memory) drive, and a hard disk drive (several capacities are available). If you want to replace your internal drive, see your Apple-authorized dealer.

Read this chapter to learn how to work with application programs and protect the information on your disks while working in the Mac OS.

4

Installing and Using Application Programs in the Macintosh Environment



Your computer came with several application programs already installed. You can open these programs by clicking their buttons in the Launcher.

The Apple Extras folder on your hard disk (and on the *Macintosh Performa CD*) contains additional programs, including the following:

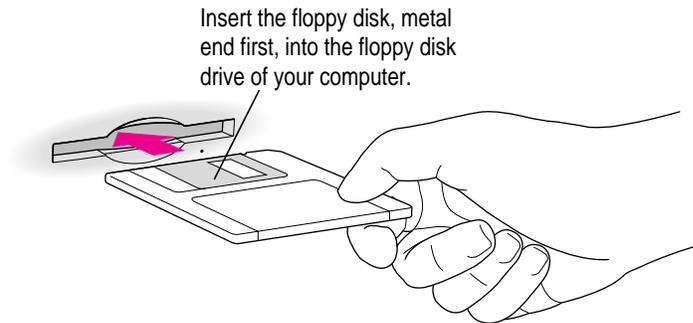
- *QuickDraw GX* gives your computer more powerful printing and font capabilities. You'll want to install QuickDraw GX only if you purchased another program that requires it. Your computer needs at least 8 megabytes of random-access memory (RAM) to use QuickDraw GX. You can install QuickDraw GX by opening the QuickDraw GX folder and double-clicking the Installer icon.
- *PowerTalk* provides an open collaboration environment with a universal mailbox and other electronic mail services. You'll want to install PowerTalk only if you use your computer on a local area network (connected to other computers) and if you purchased another program that requires it. Your computer needs at least 8 megabytes of RAM to use PowerTalk. You can install PowerTalk by opening the PowerTalk folder and double-clicking the Installer icon.
- *Video Monitor* is for use with computers that have audio-visual (AV) capabilities. For information on using Video Monitor, see the "Video" topic of Macintosh Guide, available in the Guide (🔍) menu.

If you want to install DOS application programs, see Chapter 5, "Operating in the PC Environment," and refer to your DOS manual.

Installing Macintosh application programs

You may want to buy and install additional application programs. See the manuals you receive with your programs for instructions on installing and using them.

In most cases, you'll install an application program on your internal hard disk from floppy disks that contain the program. The following illustration shows how to insert a floppy disk in your computer's floppy disk drive.



For instructions on how to eject floppy disks, see the “Disks” topic of Macintosh Guide, available in the Guide (🔍) menu.

To use your programs most effectively, follow these guidelines:

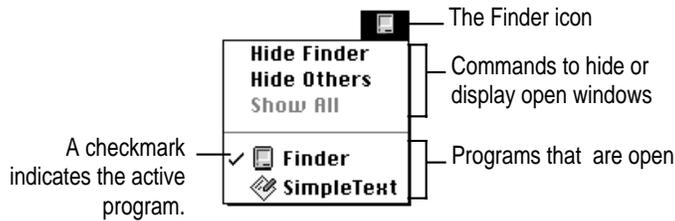
- Put only one copy of each program on your hard disk. Having more than one copy can cause errors.
- Whenever you copy a program disk to your hard disk, be careful not to copy a System Folder. Always check to see what you've copied, and drag any extra System Folders to the Trash.
- If you have problems using a program, read the manuals you received with the program.
- If a program malfunctions consistently, try installing a fresh copy. If that doesn't help, find out from the software manufacturer whether your version of the program is compatible with your computer model and the system software you're using.

To put a program into the Launcher, simply drag the program's icon (or its alias) into the Launcher window, or onto the Applications category button in the Launcher.

Working with several programs at a time

You can open as many application programs and desk accessories as your computer's memory allows.

All open programs are listed in the Application menu at the right end of the menu bar. The name of the active program (the one you're using right now) has a checkmark next to it, and its icon appears in the menu bar.



Finding out which programs are open

If you have several programs and windows open, you can find out which program is active and which other programs are open by pulling down the Application menu.

Switching programs

You can switch to another open program or desk accessory by choosing its name from the Application menu.

If a program's icon is dimmed in the menu, that means its windows are hidden. Choosing the program from the Application menu displays its windows.

You can also switch to another program by clicking in a window that belongs to an open program, by double-clicking a program icon, or by double-clicking the icon of a document that was created with the program.

Hiding and showing windows on the desktop

You can hide all windows except those of the active program by choosing Hide Others from the Application menu.

The other programs remain open even though their windows are hidden. When you switch to another program, its windows become visible again.

If you want to see all the open windows, choose Show All from the Application menu.

Protecting the information on a disk

When you have a valuable document like a birth certificate, you probably make an extra copy of it for safekeeping. Similarly, you should make a copy of the documents you create on your computer. The extra copy is called a *backup*, and the process of making the copy is called *backing up*.

Once you have a backup, you're protected from accidentally losing the information on your hard disk. In the unlikely event that something happens to your hard disk, you can easily get the information back.

Your computer's hard disk comes with a lot of valuable information already stored on it, including system software and some application programs. The *Macintosh Performa CD* contains a backup copy of all the system software and application programs that came with your computer. See the *Macintosh Performa CD* booklet for instructions on using the CD to reinstall software.

Making backup copies of your documents

You should *regularly* make copies of the documents you create.

- You can back up files stored on your hard disk by copying them to floppy disks.
- You can back up an entire floppy disk by copying it to another floppy disk of the same capacity or larger, or by copying it to a hard disk.
- You can use a commercial backup program to copy new and changed files from a hard disk to another hard disk, to a tape drive, or to a series of floppy disks.
- If your computer is on a network, you may be able to back up files by copying them to a shared disk on the network.

To back up files in the Macintosh environment, copy the files to a disk manually or use a Macintosh backup program. Do not use PC backup programs in the Mac OS.

Restoring the information on your hard disk

If information on your hard disk becomes damaged or lost, you can restore it if you have a backup copy of the information. The *Macintosh Performa CD* contains copies of all the system software and application programs that came with your computer. See the *Macintosh Performa CD* booklet for instructions on using the *Macintosh Performa CD*.

Follow the instructions in this chapter to start working in the PC environment on your Macintosh.

5

Operating in the PC Environment



Your DOS-compatible Macintosh comes with standard versions of DOS and Windows already installed. Also installed is software you can use to work in both the Macintosh and PC environments and share data between the two environments. This software is described in this chapter and in Chapter 6, “Configuring the PC Environment.”

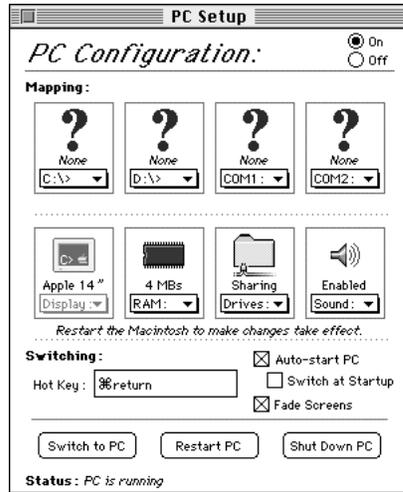
This chapter explains how to

- switch between the Mac OS and the PC environment
- set up memory management in the PC environment
- use floppy disks, CD-ROM discs, and disk drives
- cut, copy, and paste data between Macintosh and PC documents
- run network software
- use multimedia, MIDI, and game application programs
- use both Macintosh and PC peripheral devices in the PC environment

Switching between the Macintosh and PC environments

You switch between the Mac OS and the PC environment using the PC Setup control panel. Follow these steps:

- 1 In the Macintosh environment, choose Control Panels from the Apple () menu.
- 2 Double-click the PC Setup icon to open the control panel.



- 3 Click Switch to PC to switch to the PC environment.
- 4 To switch back to the Mac OS, press ⌘-Return.

Switching with a keyboard command

You can set a keyboard command, or “hot key,” to switch between the Mac OS and the PC environment. To set the hot key, you must be in the Macintosh environment. (If you are in the PC environment, press ⌘-Return.)

- **To choose a hot key, open the PC Setup control panel and press the Tab key to select the Hot Key text field; then press the keys you want to use.**

The ⌘ key is automatically included in the hot key. You can use any other keys, including Option, Control, and Shift. However, ⌘-Return always switches from the PC environment to the Mac OS, regardless of the other hot keys you set in the control panel.

Turning the PC environment on and off

You use the buttons near the bottom of the PC Setup control panel to switch environments, to restart the PC environment, or to shut the PC environment off.

- **Switch to PC** immediately switches to the PC environment.
- **Start/Restart PC** starts the PC environment if it's off, or restarts it if it's running (but doesn't actually switch to the PC environment).
- **Shut Down PC** turns off the PC environment.

IMPORTANT If you click Off at the top of the PC Setup control panel, you won't be able to switch to the PC environment. When you restart the computer, the PC environment is turned off and any RAM you requested for it is available to the Mac OS. (For more information on requesting RAM for the PC environment, see “Setting Shared Memory” in Chapter 6.)

Starting the PC environment automatically

To have the PC environment start automatically when you turn on your Macintosh:

- **Click to place an X in the Auto-start PC checkbox.**

To make the PC environment appear when you turn on your Macintosh:

- 1 Click to place an X in the Switch at Startup checkbox.**
- 2 In the Control Panels folder, double-click the General Controls icon to open it.**

3 Turn off the Shut Down Warning option in the General Controls panel.

If the Shut Down Warning is turned on when you switch from the Mac OS to the PC environment, you will not be able to switch back again for a few minutes.

Fading the screen

To have the screen fade briefly before you switch environments, click to place an X in the Fade Screens checkbox in the PC Setup control panel. This prevents the display from flashing when you switch environments.

Ejecting disks in the PC environment

Here are a few commands you will find useful while you work in the PC environment.

- To eject a disk from the Macintosh disk drive while you're in the PC environment, press ⌘-E.
- To eject a CD-ROM disc in the PC environment, press ⌘-Y.

For more details, see the section “Working in the PC Environment,” later in this chapter.

Setting up the PC environment

In order to take advantage of certain memory management utilities, you may need to modify your DOS CONFIG.SYS file. For information about how to edit DOS files, see your DOS manual. For information about the kinds of changes you might need to make, read the information in this section.

Note: Your DOS system software also includes alternative versions of the CONFIG.SYS and AUTOEXEC.BAT files that allow you to select from a variety of memory management options each time you start DOS. For information on how to install these files, see “Replacing the CONFIG.SYS and AUTOEXEC.BAT Files” in the section “Reinstalling the DOS-Compatibility Software” in Chapter 8.

Memory management utilities

If you use a memory management utility such as EMM386 or QEMM, you need to configure it so that it runs with your DOS-compatibility hardware and software.

IMPORTANT Apple Computer does not recommend using automated memory configuration utilities with your DOS-compatible Macintosh, because they can require more memory than management utilities you configure manually. In addition, some memory configuration utilities may not be compatible with DOS-compatibility hardware.

If you want to use the EMM386 utility (included as part of DOS) and don't require expanded memory, set a "DEVICE=" line in the CONFIG.SYS file to the following:

```
DEVICE=C:\DOS\EMM386.EXE NOEMS RAM=D000-EFFF
```

If you require expanded memory, set a "DEVICE=" line in the CONFIG.SYS file to the following:

```
DEVICE=C:\DOS\EMM386.EXE RAM=D000-EFFF FRAME=D000
```

If you want to use the QEMM utility, use the frame option (ST:F):

```
DEVICE=C:\QEMM\QEMM386.SYS RAM ST:F ARAM=B080-B7FF  
ARAM=C900-DFFF R:1
```

If you want to use the Stealth mapping option (ST:M), set a "DEVICE=" line in the CONFIG.SYS file to the following:

```
DEVICE=C:\QEMM\QEMM386.SYS RAM ST:M X=C800-CFFF X=FC00-  
FCFF X=FE00-FFFF ARAM=B080-B7FF ARAM=C900-DFFF R:2
```

Configure other memory management utilities so that D000 through EFFF is the only area in the BIOS that can be mapped to upper memory.

To prevent the read-only memory (ROM) BIOS from becoming damaged when the DOS-compatibility card is configured for 2 MB of memory, set the switch in the CONFIG.SYS file to turn memory testing off.

```
DEVICE=C:\DOS\HIMEM.SYS /TESTMEM:OFF
```

For more information on making the best use of memory, read the sections on memory management in your DOS manual, or refer to the documentation for your memory manager if you are using a utility other than EMM386 or QEMM.

Working in the PC environment

When you switch to DOS or Windows, you're operating in a real PC world. The floppy disk drive, mouse, and keyboard all act as they would with a standard PC. There are, however, some issues you need to be aware of.

Floppy disk drives and floppy disks

The Macintosh floppy disk drive is drive A in the PC environment. To eject a disk from this disk drive while you're in the PC environment, press ⌘-E.

In the PC environment, you can insert only DOS-format disks or blank disks. If you try to insert a Mac OS-format floppy disk, it is ejected. If a Mac OS-format disk is already in the disk drive when you switch to the PC environment, you will not be able to use it in the PC environment. (In contrast, when you are in the Mac OS, you can use Mac OS disks as well as *locked* DOS-format disks.)

If you format a blank disk in the PC environment, it is formatted as a DOS disk. (In the Mac OS, you can format disks for DOS as well as for the Mac OS). Keep in mind, however, that some blank disks are preformatted by the manufacturer. If you insert a new, blank disk in the PC environment and it is ejected, it may have been preformatted as a Macintosh disk. To use the disk in the PC environment, you must first return to the Mac OS and reformat (reinitialize) the disk as a DOS disk.

Although you can format a floppy disk in a DOS 720 format in the PC environment, DOS computers may not be able to read it. For best results, format the disk in the Macintosh environment, choosing DOS 720K as the format. See “How do I prepare a disk for use?” in the “Disks” topic of Macintosh Guide, available in the Guide (⌘) menu.

Restarting the PC from a floppy disk

To restart (reboot) the PC environment from a floppy disk, insert the disk into the floppy disk drive. Press ⌘-Control-Alt-[keypad] period. When the floppy disk is ejected, immediately reinsert it into the disk drive.

CD-ROM discs and drives

Your DOS-compatible Macintosh allows you to use CD-ROM discs that run on DOS and Windows.

To eject a CD-ROM disc in the PC environment, press ⌘-Y . If the CD-ROM disc cannot be ejected (because a file is in use or the CD-ROM disc is being shared), the Macintosh beeps.

You can listen to audio CDs in either the PC environment or the Mac OS, but you cannot control the same disc from both environments. For example, if you begin listening to an audio CD while working in the PC environment and then switch to the Mac OS, you can't adjust the CD's volume until you return to the PC environment.

If you play an audio CD in Windows while running low-level media tools, such as PC Tools or Microsoft Anti-Virus, your system may "crash." It is best to reduce computer activity to a minimum while using such tools.

You cannot use more than one CD-ROM drive at a time in the PC environment.

The PC sets up a drive letter (E) for a CD-ROM drive even if no drive is connected. If no CD-ROM drive is connected to your computer, you can use this drive letter and free some memory by editing the AUTOEXEC.BAT and CONFIG.SYS files.

In the AUTOEXEC.BAT file, type `REM` at the beginning of the line

```
LH C:\DOS\MSCDEX /D:CDDVR /L:E
```

In the CONFIG.SYS file, type `REM` at the beginning of the line

```
DEVICE=C:\Apple\CDDROM.SYS /D:CDDVR
```

If you preface these commands with `REM`, DOS ignores them.

Pointing device

The standard Macintosh pointing device (such as a mouse or trackball) has one button; most PC devices have two. The button on the Macintosh pointing device behaves like the left button on a PC device.

- To simulate the right button, press the = key on the keypad.
- To simulate pressing the left and right buttons at the same time, press the mouse button and the = key simultaneously.

If you have Windows installed, you can use its Mouse control panel to switch the button assignment.

Note: DOS does not come with a mouse driver. A mouse driver for Windows is installed on your system along with Windows, however.

Keyboard

The DOS-compatible Macintosh works with all Apple keyboards. In the PC environment, you can use the Option key on an Apple keyboard as the equivalent for the Alt key on a PC keyboard.

You can use the Apple Extended Keyboard and the AppleDesign Keyboard normally. With the Apple Keyboard II, use the following equivalents for keys on a PC keyboard. These equivalents also apply to the Apple Adjustable Keyboard if the function key keyboard isn't plugged in.

PC key	Equivalent on Macintosh keyboard
F1 through F9	⌘-1 through 9
F10	⌘-0
F11	⌘-(minus)
F12	⌘-(equal)
F13	⌘-[
F14	⌘-]
F15	⌘-\
Home	⌘-[keypad] 7
PageUp	⌘-[keypad] 9
End	⌘-[keypad] 1
PageDown	⌘-[keypad] 3
Insert	⌘-[keypad] 0
Del	⌘-[keypad] period

Using the Apple Adjustable Keyboard: If you are using the Apple Adjustable Keyboard, you cannot use key combinations made up of keys from the main keyboard and function keys (for example, Shift-F1). This means you cannot restart the PC environment using the keyboard command ⌘-Control-Alt-[keypad] period. Instead, click Restart PC in the PC Setup control panel to restart the PC environment.

MacShare

MacShare is a PC application program that lets you view Mac OS folders and volumes as drive letters when you're in the PC environment. You can have as many of these "shared drives" as there are drive letters.

- To specify the number of drive letters, modify your CONFIG.SYS file to include a LASTDRIVE statement.

```
LASTDRIVE=x
```

where *x* is a letter between E and Z. (The PC environment reserves drives A through D for its floppy and hard disk drives.)

For example, if you use M as your LASTDRIVE value, you could have up to nine extra drives using drives labeled E through M. A CD-ROM drive, if installed, uses E.

Each additional drive letter uses 100 bytes of PC memory.

Clipboards

You can exchange information between the PC environment and the Mac OS. The type of information you can exchange depends on whether you're running DOS or Windows.

Windows Clipboard

You can exchange text, PICT, RTF, and bitmap files between the Mac OS and Windows using the Copy and Paste commands from the Edit menu. You can also purchase additional software from other manufacturers to provide translations of other kinds of files.

DOS "Clipboard"

If you're running DOS, you can copy text or a PICT file that is displayed on the screen to a kind of "clipboard," then paste it into a file in the Macintosh environment. You do this by using the DOSCLIP TSR (Terminate-and-Stay-Resident) program, a memory-resident program that is loaded automatically each time you switch to DOS. You activate DOSCLIP by pressing a keyboard command (preset to Shift-Control-C) and then selecting a region to copy.

If you have a mouse driver installed, follow these steps to copy and paste information using the DOSCLIP TSR program:

- 1 In the PC environment, issue the keyboard command Shift-Control-C to activate DOSCLIP.**
- 2 Drag to select the information you want to copy.**

The information is copied to the DOSCLIP "clipboard," and you can paste it into another file.

The keyboard command starts the process: In the PC environment, you issue the keyboard command first; then you drag to select the information. In the Mac OS, you select the area first and then issue the keyboard command.

If you don't have a DOS mouse driver installed, follow these steps to copy and paste information using DOSCLIP:

- 1** In the PC environment, issue the keyboard command Shift-Control-C to activate DOSCLIP.

A cursor appears in the center of the screen.

- 2** Use the arrow keys on the keyboard to move the cursor to the upper-left corner of the region you want to copy.
- 3** Holding down the Shift key, use the arrow keys to move the cursor to the lower-right corner of the region.
- 4** Release the Shift key.

The selected area is copied to the DOSCLIP "clipboard."

To paste text into DOS from the Mac OS, do this:

- Issue the keyboard command Shift-Control-V.

Changing the predefined keyboard commands in DOS

The Shift-Control-C (Copy) and Shift-Control-V (Paste) keyboard commands are preset in DOS. However, you can change them if you wish by editing the AUTOEXEC.BAT file.

- To change the keyboard command for the Copy command, use this form:

```
C:\APPLE\DOSCLIP/Cnm...
```

- To change the keyboard command for the Paste command, use this form:

```
C:\APPLE\DOSCLIP/Pnm...
```

In both cases, you replace *n* with a number representing a key scan code from the following table, and you replace *m...* with one or more of the characters A, C, and S (for Alt, Control, and Shift).

For example, the preset keyboard command for Copy is Control-Alt-C, which is coded as /C46CA. In this code, /C means "copy using the following keys"; 46 means "the C key"; C means "the Control key"; and A means "the Alt key." To change the keyboard command to F3, you'd type the following:

```
C:\APPLE\DOSCLIP/C61
```

Note: For on-screen help about other DOSCLIP options, type DOSCLIP /? at the DOS prompt.

Key	Scan code	Key	Scan code
0	11	' "	40
1	2	, <	51
2	3	- _	12
3	4	. >	52
4	5	/ ?	53
5	6	; :	39
6	7	= +	13
7	8	[{	26
8	9	\	43
9	10] }	27
` ~	41		
+ (keypad)	78	tab	15
- (keypad)	74	alt	56
arrow (down)	80	bksp	14
arrow (left)	75	caps	58
arrow (right)	77	center	76
arrow (up)	72	ctrl	29
del	83	pgdn	81
end	79	pgup	73
enter	28	prtsc	55
esc	1	scroll	70
home	71	shift (left side)	42
ins	82	shift (right side)	54
num	69	space	57

continued ►

Key	Scan code	Key	Scan code
F1	59	F7	65
F2	60	F8	66
F3	61	F9	67
F4	62	F10	68
F5	63	F11	87
F6	64	F12	88
A	30	N	49
B	48	O	24
C	46	P	25
D	32	Q	16
E	18	R	19
F	33	S	31
G	34	T	20
H	35	U	22
I	23	V	47
J	36	W	17
K	37	X	45
L	38	Y	21
M	50	Z	44

Tips for using the Clipboard

When the PC environment is running, you have three separate clipboards to work with—the Mac OS Clipboard, the Windows Clipboard, and the DOSCLIP “clipboard.” Translation between the clipboards takes place each time you switch between the PC and Macintosh environments. When using these clipboards, keep the following points in mind:

- If you copy an item to the Macintosh Clipboard, switch to Windows, and then copy an item to the Windows Clipboard, you will lose the original Macintosh Clipboard contents. To prevent this problem from occurring, remove the PC Clipboard extension from the Extensions folder (inside the System Folder in the Mac OS).
- In order to translate the contents of the Macintosh Clipboard to the Windows Clipboard, Windows must be already running when you switch environments. If you switch to DOS and then launch Windows, the Macintosh Clipboard will be translated into DOSCLIP, and the Windows Clipboard will be blank.
- In order to translate the contents of the Macintosh Clipboard to DOSCLIP, Windows must *not* be running when you switch environments. If Windows is running when you switch to the PC environment, the Macintosh Clipboard will be translated into the Windows Clipboard, and DOSCLIP will be blank.
- DOSCLIP contents cannot be pasted into Windows, or vice versa.
- Graphics can be copied from a DOS application program to DOSCLIP, but graphics cannot be pasted into a DOS program from DOSCLIP.
- After copying a graphic from DOS using DOSCLIP, you may experience difficulty in pasting the graphic into a Macintosh application program. If this happens, try increasing the Macintosh program’s memory. (See the “Working with Programs” topic of Macintosh Guide, available in the Guide [?] menu.)
- Sounds cannot be copied between the Macintosh and the PC environments.
- Plain text is automatically translated from one environment to another, but in order to retain font and style information, additional Macintosh Easy Open translators must be used (for example, MacLink Plus from DataViz).



- When using DOSCLIP from within certain application programs, it may not be possible to select the text using the mouse. In these cases, either use the keyboard to select your text, or check that the standard DOS mouse driver is *not* loaded.
- When the PC environment is active, all Macintosh programs are put in the background to allow the PC Clipboard to run in the foreground. If you do not want your Macintosh programs to run in the background while you are in the PC environment, you must disable the Clipboard translation by removing the PC Clipboard Extension from the Extensions folder (inside the System Folder in the Mac OS).

Running network software

The DOS-compatibility software on your computer supports any networking protocols, operating systems, or application programs that are compatible with Novell's Open Data-Link Interface specification (ODI).

- **To set up the software, install your networking client software in the PC environment.**

Networking client software such as Novell's NetWare is not included with the DOS-compatible Macintosh.

For information on installing network management software, see Appendix D.

Compatible and incompatible protocols

You can run NetWare in the PC environment at the same time that you're running AppleTalk in the Mac OS.

To use IPX or TCP networking protocols, you must have an Ethernet card installed in your computer's communication slot. For instructions on installing an Ethernet card, see Appendix B.

You can use the IPX and TCP protocols at the same time in the PC environment or in the Mac OS, or you can use one protocol in the PC environment and the other protocol in the Mac OS. However, you cannot use the same protocol in both environments at the same time.

If you want to use the IPX protocol in the PC environment and you have installed MacIPX in the Mac OS, remove MacIPX from the Control Panels folder or select AppleTalk as your network interface in the MacIPX control panel.

If you want to use the TCP protocol in the PC environment, remove MacTCP from the Control Panels folder or select an interface other than Ethernet in the MacTCP control panel.

Network performance is improved by adding memory to the DOS-compatibility card installed in your computer, as described in Appendix B.

For more information on installing network management software, see Appendix E.

Using multimedia, MIDI, and game programs

These types of programs, whether they are run in the PC or Macintosh environment, see a marked performance improvement when there is a memory SIMM on the DOS-compatibility card for the exclusive use of the PC environment. See the *Technical Information* booklet to determine whether your computer has a SIMM installed on the DOS-compatibility card. You can also install a SIMM with greater memory capacity, as described in Appendix B, “Installing an Expansion Card or Memory for the PC Environment.” QuickTime performance is especially improved with a SIMM.

Some DOS-based MPEG players require a VGA monitor to output video. All VGA modes can be displayed on Macintosh monitors supported by the DOS-compatible Macintosh. If the monitor specified to display the PC is a VGA monitor, select VGA in the Display box in the PC Setup control panel. You cannot select VGA for a shared monitor configuration from the PC Setup control panel if your monitor is not capable of displaying VGA. Multiscan monitors can display VGA.

Using Macintosh peripheral devices in the PC environment

You use the serial ports of your Macintosh just like the serial ports of any PC-compatible computer.

The maximum data transfer rate supported by the DOS-compatible hardware when a COM port is mapped to a Macintosh serial port is 19,200 bits per second (bps). If you're capturing serial output to a Mac OS text file, there is no limit.

For more information about serial ports, see “Configuring the PC Serial Ports” in Chapter 6.

Using printers

For DOS or Windows printing, use the LPT1.DOS or LPT1 serial port. In general, you must use printers that are Macintosh-compatible, and you must use their corresponding Macintosh printer extensions. However, in a PC Novell NetWare environment you can print to a PC-compatible printer attached to a Novell network. See Appendix E, “Installing Network Management Software.”

DOS uses the printer selected in the Macintosh Chooser as the default LPT1 device. If you have a serial printer directly connected to a COM port, however, DOS uses that printer instead.

The DOS-compatible software can process output for Epson and PostScript™ printers, and for all printers that use Hewlett-Packard's page control language (PCL).

If a printer is not a PostScript or PCL printer, it's considered to be a QuickDraw printer. QuickDraw printers such as the Apple StyleWriter or ImageWriter work only with Epson emulation. For non-PostScript PCL printers, use the appropriate PCL driver in the PC environment. For non-PostScript, non-PCL printers, configure your DOS application program to use the Epson LQ-2500 driver. If this driver isn't available, try another Epson LQ or LX series driver. Be sure to turn on the PCL option if it's available for your printer.

The Epson emulator works by first translating the DOS text to a similar Macintosh font, then interpreting that text into a series of QuickDraw commands. Some characters in the original DOS character set may not have exact translations to a Macintosh font. The use of a PostScript font is recommended in these cases, because the PostScript standard requires no translation.

About color: When you use Epson emulation, you can't print in color. When you print from the PC environment to a color or grayscale QuickDraw printer, be sure to select the Black & White option in the Print dialog box.

If you have a PCL printer and you're printing over an AppleTalk network, printing is limited to text only or graphics only. To print text only, select your printer's driver in the Windows Control Panel. To print graphics only, choose the LaserJet III driver in the Windows Control Panel. If you need to print mixed graphics and text, many Windows programs bitmap their text so that it becomes a graphic. Additionally, you may be able to print text and graphics together on a PCL printer when you print over a Novell network, where a PC print server is connected to the PCL printer and handles the print job. Select your printer's own driver in the Windows Control Panel.

For PostScript printers, use the Apple LaserWriter II NT driver (or another PostScript driver if the Apple LaserWriter II NT driver is not available) or the PostScript driver for Windows.

IMPORTANT Be sure to make settings in the Mac OS PC Print Spooler that match the drivers you use in the PC environment, or your printer will not work correctly. For details, see "Setting Preferences in the PC Print Spooler" later in this chapter.

Turning off background printing in the Macintosh Chooser may improve the performance of some printers.

Configuring a printer for Windows: For better performance when you configure a printer for Windows, select LPT1.DOS instead of LPT as the port.

IMPORTANT If you try to print a file using a PostScript printer driver for a non-PostScript printer, and the preferences are set to Epson, your file will not be printed. Instead, the file will be moved to a folder called “Spooler Rejected” in the Mac OS. To print the file, choose the proper printer driver in the PC environment and try again.

Note: Data sent to the LPT1 port is automatically routed to the printer selected in the Chooser in the Mac OS. There is no actual parallel port on the DOS-compatible Macintosh.

AppleShare Print Server

Do not install the AppleShare Print Server software in your DOS-compatible Macintosh, because this software causes conflicts with the PC Print Spooler. You can, however, connect your DOS-compatible Macintosh to a network that uses an AppleShare Print Server.

Setting preferences in the PC Print Spooler

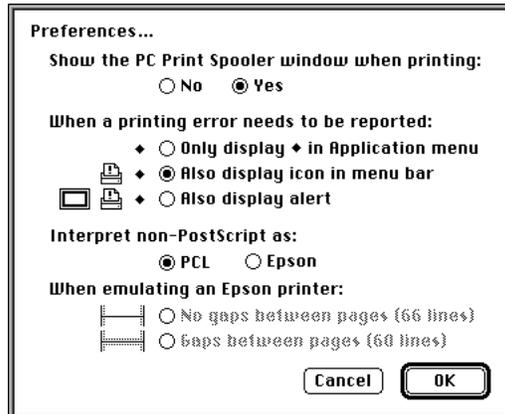
You can set preferences in the PC Print Spooler to control a variety of print functions.

To choose your Print Spooler settings, follow these steps:

- 1** In the Macintosh environment, open the Extensions folder inside the System Folder.
- 2** Open the PC Print Spooler icon.

3 Choose Preferences from the File menu.

A dialog box appears.



4 Choose your settings as appropriate.

The selection you make for “Interpret non-PostScript as” must match the type of printer you have specified in the PC environment. If the settings are mismatched, your printer may not function. In addition, the PCL option works only if the printer is set up to accept PCL commands.

The selection you make for “When emulating an Epson printer” determines how much of a page is available for printing. If you use the option that allows gaps between pages, configure your application programs to print a 60-line page, rather than a 66-line page, or your margins and text will not print correctly.

5 Click OK.

66-line maximum for Epson: If you use an Epson printer, or another printer in Epson emulation, you won't be able to print pages that are longer than 66 lines (standard letter-size paper). Legal-size and other larger pages will be cut off after either 60 or 66 lines, depending on the setting you've chosen. If you find that your printing is cut off at either the top or bottom of the page, click the No Gaps option.

Using PC peripheral devices

Because of the RS-422 implementation of the Macintosh, the following RS-232 signals are not available to the PC:

- Carrier Detect (CD)
- Data Set Ready (DSR)
- Request to Send (RTS)
- Ring Indicator (RI)

Applications or peripheral devices requiring these signals won't work with your DOS-compatible Macintosh.

While the DOS-compatible Macintosh does not support Carrier Detect (CD) signals, you can set most communications application programs to respond to the CARRIER string sent back by most modems.

For more information about using serial ports from DOS, see the documentation that came with your DOS software.

IMPORTANT The following chart lists the various signals present on the Macintosh Mini DIN-8 connector, and on what pins these signals are present on PC-style DB-9 and DB-25 connectors. This information may be of use if you are planning to have a custom cable built. Refer to the manual for the peripheral device that you plan to attach to the Macintosh for the recommended serial connection, and use the following chart to find out what the proper Macintosh wiring should be.

Macintosh signal	Macintosh Mini DIN-8	DB-9	DB-25	RS-232 name
HSK0	1	4	20	DTR
HSK1	2	8	5, 8	CTS, DCD
TXD-	3	3	2	TXD
GND	4	5	7	GND
RXDA-	5	2	3	RXD
TXDA+	6	N/C	N/C	
GP1	7	N/C	N/C	
RXD+	8	5	7	GND

Use the instructions in this chapter
if you need to change settings for
the PC environment.

6

Configuring the PC Environment



This chapter explains how to configure the PC environment and change PC options using the PC Setup control panel.

Your Macintosh comes with the PC environment already configured and ready to use. Read this chapter only if you want to change the way the PC environment is set up, or if you have reinstalled the DOS-compatibility software and need to reconfigure it.

You can control how your Macintosh and your DOS-compatible hardware and software work together with the PC Setup control panel. You use the control panel to accomplish the following tasks:

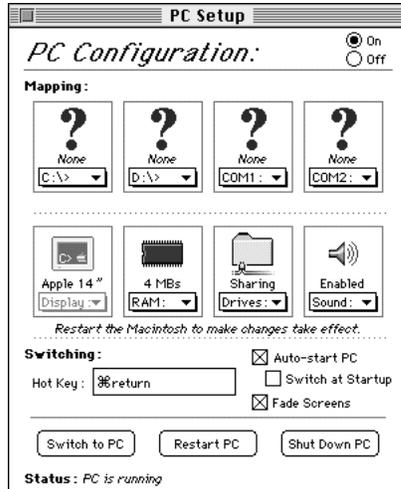
- configure PC serial ports
- set display options
- set the shared memory size
- choose folders or volumes to be shared between the Mac OS and the PC environment
- turn PC sounds on and off and use Sound Blaster sound capabilities
- configure PC drives
- turn the PC card on and off

You also use the control panel to switch environments immediately and to start, restart, or shut down the PC.

Choosing settings

To choose settings, follow these steps:

- 1 Choose Control Panels from the Apple (🍏) menu.
- 2 Double-click the PC Setup control panel to open it.



- 3 When you have specified the settings you want, close the control panel.

All settings except the setting for RAM take effect as soon as you make them. If you change the RAM setting, you must restart the Macintosh before the change can take effect.

Online help available: To get brief on-screen explanations of items in the control panel, choose Show Balloons from the Guide (📖) menu. To get detailed step-by-step help, see the “DOS Compatibility Software” topic of Macintosh Guide, available in the Guide (📖) menu.

Configuring the PC serial ports

Your DOS-compatible Macintosh supports two serial ports, COM1 and COM2. You can assign these ports to an unused Macintosh printer port or modem port, to a text file for later processing, or to a setting of None.

- **To assign a Macintosh serial port to a COM port, make a selection in the COM port's pop-up menu in the PC setup control panel.**

When you assign a port to a text file, you specify a name and location for the file in a dialog box that appears. Macintosh serial ports already in use appear dimmed in the menu. (The printer port may be in use by AppleTalk, which may be used for a network or LaserWriter connection; the modem port may be in use by communications or fax software.) Changes to these selections take place immediately.

Assigned ports may not be available to the Mac OS: Mac OS programs may no longer be able to access ports that you've assigned to DOS. Allocate these ports only when they're needed, and deallocate them when they're no longer required by your DOS programs. (You won't have to restart the computer to have the changes take effect.)

The maximum baud rate supported by the DOS-compatible Macintosh when a COM port is assigned to a Macintosh serial port is 19,200 bits per second (bps). However, when the MODE command is issued in DOS and the serial port is set at 19,200 baud, the incorrect message "Function not supported on this computer" is displayed. This occurs because DOS is looking for specific hardware (a PC UART) that is not emulated by the DOS-compatible Macintosh. The Macintosh actually does support 19,200 baud, and can be set by a number of communications application programs.

Setting the monitor

The monitor connected to your Macintosh DOS-compatible system displays the environment (Mac OS or PC) you're working in. Even though you see only one environment at a time, the other environment can still be active in the background.

To set the monitor for the PC environment:

- **Choose a monitor type in the Display pop-up menu of the PC Setup control panel.**

See the *Technical Information* booklet that came with your computer for a list of supported Macintosh monitors and for VGA and SVGA monitor specifications.

If the DOS-compatibility software recognizes the monitor connected to your computer as a non-multiscan display, it makes the appropriate selection for you; other choices in the menu are dimmed.

16" monitor requires driver: If you have a 16" monitor, the PC environment doesn't use the entire screen unless you install a display driver for the program that you're using. (DOS can't use a video driver, so there will always be a large black border around the DOS screen.) See "Reinstalling Video Drivers" in the section "Reinstalling the DOS-Compatibility Software" in Chapter 8 for instructions.

Setting the time and date

The PC environment uses the same date and time settings as the Mac OS. If you change the time and date in the PC environment, it will not affect the time and date on the Mac OS.

When you restart the PC environment, it synchronizes its time and date with the settings you've chosen in the Mac OS. (The PC environment may lag up to 10 seconds behind the Mac OS.)

Setting shared memory

You can install a 72-pin SIMM (Single Inline Memory Module) on the DOS-compatibility card in your computer to give the card up to 32 MB of RAM for its exclusive use. When no memory module is installed, the card uses a portion of the RAM installed in your Macintosh.

If your computer came with a memory module already installed on the DOS-compatibility card, you cannot share memory between the Mac OS and the PC environment. The PC environment uses the memory installed on the DOS-compatibility card exclusively. The shared memory options in the PC Setup control panel will be dimmed (unavailable). See the *Technical Information* booklet to determine whether your computer contains a memory module installed on the DOS-compatibility card.

- **Choose the amount of memory you want for the PC environment in the RAM pop-up menu.**

In the RAM pop-up menu, a small square (□) shows the RAM that the PC is currently using and a bullet (•) indicates how much RAM you assigned. When the Macintosh starts up, it claims RAM for its own use before it sets aside RAM for the PC. If the PC has less RAM than you installed, turn off the Mac OS RAM disk (if you're using one) in the Memory control panel. You may also need to decrease the disk cache size in the Memory control panel to 128K or less.

Memory changes take place when you restart the Macintosh.

IMPORTANT Memory that you set aside for the PC environment is not available to the Mac OS. To make this memory available, you must turn off the PC environment (click the Off button at the top of the PC Setup control panel) and restart the Macintosh.

Changing the amount of conventional memory

Many DOS and Windows programs require conventional memory to run. At the same time, many device drivers and TSR (Terminate and Stay Resident) programs may be loaded into conventional memory. If you find that you do not have enough conventional memory to run some of your DOS or Windows programs, take the following steps.

To increase Upper Memory Block (UMB) space to 122K instead of 64K, add the following line to your CONFIG.SYS file:

```
DEVICE=C:\WINDOWS\EMM386.EXE RAM=D000-EFFF FRAME=D000
```

To load DOS into the UMB (also known as *high memory*), also add the following to your CONFIG.SYS file:

```
DOS=HIGH, UMB
```

Insert the LOADHIGH (LH) command before all TSRs and device drivers in the AUTOEXEC.BAT file. For example:

```
LH C:\DOS\SMARTDRV.EXE /X
```

This will load these programs into UMB. If you run out of UMB space, you may see an error message like this during the startup (boot) process:

```
Run time error R6009
-not enough space for environment.
```

In this case, remove LH from TSRs and device drivers one or two at a time, and try again until the error message does not appear.

If you issue a DOSCLIP copy command while using Harvard Graphics 3.0, the PC environment crashes when you quit Harvard Graphics. To prevent this, use the steps outlined above, making sure that SMARTDRV is one of the drivers preceded with LH.

IMPORTANT To prevent the system BIOS from becoming damaged when the PC environment is configured for 2 MB of memory, set the switch in the CONFIG.SYS file to turn memory testing off:

```
DEVICE=C:\DOS\HIMEM.SYS /TESTMEM:OFF
```

Choosing shared folders or volumes

You can set up a Mac OS folder, Macintosh hard disk, shared disk, or CD-ROM disc on a network to act as a PC drive.

Sharing a folder on your Macintosh hard disk is a convenient way to transfer files between the Mac OS and the PC environment, especially if you are dealing with many files, or large files.

You can share entire disks, or volumes. This is especially useful for network volumes, CD-ROM drives, or other volumes that otherwise would not be readily available to the PC environment. DOS treats all shared volumes as network volumes. Some DOS commands, such as FORMAT, CHKDSK, UNDELETE, and SUBST, will not work on shared volumes.

- **Choose an available drive letter from the Sharing pop-up menu in the PC Setup control panel.**

A dialog box appears, letting you select a folder or disk (volume) for the drive.

Shared folders and volumes revert to their usual unshared status when you shut down your Macintosh. To have a folder or volume automatically assigned to a drive letter at startup, click the checkbox next to Attach at Startup. The name of an automatically attached folder or volume appears underlined in the Sharing pop-up menu. To turn off an assignment, choose the underlined item in the menu.

IMPORTANT For the sharing functions to work properly, DOS must be running, MacShare should be loaded as part of the AUTOEXEC.BAT file, and a LASTDRIVE=*x* statement should appear in the CONFIG.SYS file, where *x* is the highest drive letter available for sharing. AUTOEXEC.BAT and CONFIG.SYS have *x* preset to M. See “MacShare” in the section “Working in the PC Environment” in Chapter 5 for more information.

See the “Using DOS Files & Disks” topic of Macintosh Guide, available in the Guide (🔍) menu, for more information on transferring files between the PC environment and the Mac OS using floppy disks and other media.

IMPORTANT Use caution when handling the drive file. Erasing a drive file is equivalent to reformatting the hard drive it is emulating. The drive file is locked when it is installed on your computer. If you must unlock it, be very careful not to erase it.

Using shared folders

Because two operating systems have access to each shared folder, you may notice a decrease in performance when using these folders for high-speed PC application programs such as multimedia programs, or during large file transfers between them. For optimum performance, place PC application programs and their files in the C or D drive rather than in a shared folder. The performance of Macintosh programs is unaffected if placed in shared folders.

Since the PC doesn't understand the concept of resource forks the same way the Macintosh does, information in a Macintosh file's "resource fork" is lost when it is copied by the PC environment. For example, if a Macintosh file is copied between two shared folders using the COPY command in DOS, that file's original icon will be lost, and the file itself may be unusable in the Mac OS.

Many document files do not have resource forks and can be copied between shared folders with no problems. The programs that created the files contain the resource information for these files. However, QuickTime files cannot be successfully copied between shared folders.

Some Microsoft application programs misrepresent the shared drive icons. When you open a file from a shared folder in Microsoft Excel or Microsoft Word, the shared drive icon may appear as a floppy disk or CD. This does not affect the file's content, and the file is still usable.

Do not attempt to use shared folders from a DOS shell run from Windows.

Strange text characters in a document

Sometimes when you use shared folders to exchange documents between the Mac OS and the PC, a Macintosh program may not be able to interpret the file format of a PC document. When this happens, the document's formatting is displayed incorrectly and you may see strange characters in the document.

- Try using a different Macintosh program.
- Translate the document into a different file format using one of the file format translation utilities available for the Macintosh (such as MacLink Plus Easy Open Translators from DataViz).
- Transfer the text using DOSCLIP.
- Use the Export feature found in many programs.
- Use a PC-Macintosh translation utility.

Turning on PC sounds

To have Sound Blaster and other PC sounds played through the Macintosh speaker or through headphones, you need to specify settings in both the PC Setup control panel and in the Sound control panel.

Choosing a setting in the Sound pop-up menu

The Sound pop-up menu in the PC Setup control panel gives you three choices:

- To hear PC sounds in both the PC environment and the Mac OS, choose Enabled.
- To hear PC sounds only when you're in the PC environment, choose Auto Enabled.
- To shut off PC sounds entirely, choose Disabled.

Sound control panel takes precedence: The setting in the PC Setup control panel's Sound pop-up menu has no effect on sounds generated in the Mac OS. If the volume is set to 0 in the Sound control panel, however, you won't hear any PC sounds no matter what the setting is in the PC Setup control panel's Sound menu.

For sounds generated by the Sound Blaster card and for sounds from the PC, the Sound control panel must be set with the Internal CD playthrough option turned on. For instructions, see the "Sound" topic of Macintosh Guide, available in the Guide (🔍) menu.

The PC sound setting in the PC Setup control panel does not affect sounds produced by the Sound Blaster card. Only PC-generated sounds, such as the system beep, are affected by this setting. To turn off both PC and Sound Blaster-generated sounds, use the master volume control of the Mixer Control application program from the Audio program group, or turn off the Internal CD playthrough option in the Sound control panel in the Mac OS. (For instructions, see the "Sound" topic of Macintosh Guide, available in the Guide (🔍) menu.)

The Sound Blaster card installed in your DOS-compatible Macintosh is not able to record sounds.

The DOS-compatible Macintosh does not fully support Sound Blaster 8-bit, Sound Blaster 2.0, or Sound Blaster Pro drivers. If problems occur, use the Sound Blaster 16 driver that comes with your computer.

Configuring drives C and D

You use the C: and D: pop-up menus to create or select PC drives. Drive C is required; drive D is optional. You can use a DOS-format SCSI hard drive attached to your Macintosh, or you can create a storage area called a *drive container*—a “virtual PC drive”—on any Macintosh hard drive. You can even use a drive container created by SoftPC or SoftWindows.™

To use a DOS-format SCSI drive as a startup (boot) drive, format the drive to be bootable by using the `FORMAT C: /S` command.

- **To create a drive container for drive C or D, choose New Drive File from the C: or D: pop-up menu.**

Set a location for the drive container, and give it a name and a size. Then click Initialize Drive File.

When using a DOS-format SCSI device as the PC's C or D drive, ensure that the driver for that device is not loaded by Macintosh PC Exchange. This would cause Macintosh PC Exchange to mount the drive instead of the PC environment. Open the PC Exchange control panel and click the Options button. Make sure the SCSI driver for the device you want to use is not checked. Then click OK. This ensures that the PC will be able to load the C drive.

Single versus multiple partitions: When you initialize a container this way, it contains a single partition. To initialize a container with multiple partitions, prepare it in DOS using the `FDISK` command instead of initializing it through the PC Setup control panel. Then format it using the `FORMAT` command. Use the `/S` parameter in the `FORMAT` command to make the container bootable (for example, type `FORMAT C: /S` at the DOS prompt). See the DOS manual for further instructions on using these commands.

- To change the drive container for drive C or D, choose **Other Drive File** from the **C: or D: pop-up menu**, then locate the new drive container in the dialog box that appears.

The change takes effect the next time you restart the PC environment. To have the change take place immediately, click the **Restart PC** button at the bottom of the control panel.

- To use a PC drive or partition, choose **Drive Partition** from the **C: or D: pop-up menu**.

A dialog box appears with a list of available partitions.

If you use a PC drive or partition and you have a utility that mounts these devices on the Macintosh, unmount the drive or partition before starting the PC by dragging its icon to the Trash.

WARNING If you don't unmount the drive or partition, you may lose data because both the Macintosh and the PC environments may write to the device at the same time.

If you intend to mount your PC drive container, partition, or disk on the Macintosh using Macintosh PC Exchange, do not use a PC compression program. Drives that are compressed cannot be mounted.

Managing PC files from the Mac OS

You can gain access to files in a drive container even if you're in the Mac OS. Follow these steps:

- 1 **Double-click the drive container in the Finder.**

The drive container appears as a disk icon on the Mac OS desktop.



2 Double-click the container's disk icon.

The icon opens and you have access to the files inside it.

You can now manipulate these files as you would any Mac OS files.

Drive container may be read-only: If the PC environment is running, you won't be able to add anything to the drive container from the Mac OS. If you need to add files to the drive container, shut down the PC environment from the PC Setup control panel and then do steps 1 and 2 above.

Changing the size of the drive container

You may find, after installing software in a drive container, that the container is too small or too large for your needs. You cannot change the size of an existing drive container, but you can create a new one in the appropriate size and move the software to it. You can also create an additional drive container to supplement the existing one.

Two active containers maximum: For the following procedure to work, drive D must be available for assignment to a new drive container. If both drives C and D have been assigned, you must first set drive D to None and drive C to the container you need to replace. (The contents of the container assigned to drive D are unaffected.)

Calculating the proper size

To determine the proper size for the new container, follow these steps:

1 Make sure you're in the Mac OS, then open the PC Setup control panel.

You see a small Apple icon at the upper-left corner of the screen when you're in the Mac OS.

2 Check the name of the container associated with drive C.

The name of the container appears above the C: pop-up menu.



- 3 **Locate the container in the Finder.**

- 4 **Open the container's Info window and note the container's size.**

To open the container's Info window, select the container's icon and choose Get Info from the File menu.



- 5 **Close the Info window by clicking its close box.**

- 6 **Switch to the PC environment.**

- 7 **At the DOS C: prompt, type DIR.**

Note how much space is available.

- 8 **Subtract the amount of available space on the drive from the container size.**

The number you get is the current size you need for storage.

- 9 **Add 10 percent to the result of the calculation in step 8.**

It's a good idea to have extra space available, because some application programs may need to write temporary work files to the drive, or you may need to add software to the drive at a later time. The 10 percent figure, however, is arbitrary; use a number that suits your needs.

If the current container is too large, the result of this calculation is the size that the new container should be. Skip to step 12.

- 10 **Determine the amount of storage needed by the additional software you want to install.**

To do so, add together the amounts of storage space required for the programs you want to install. This information is probably available in the documentation that came with your software.

- 11 Add the sums from steps 9 and 10.**

The resulting sum is the size that the new container should be.

- 12 Press ⌘-Return to switch back to the Mac OS.**

Creating the new container

Now that you know what size the container should be, you're ready to create it.

- 1 Follow the instructions in “Configuring Drives C and D” earlier in this chapter to create a new container for drive D.**

You may need to remove some files from your hard disk to free enough space for the new container.

- 2 Click Restart PC at the bottom of the PC Setup control panel.**

- 3 Click Switch to PC.**

You now have two drives available—drive C, your original container, and drive D, the container you just created.

Moving the files

You can transfer your files from the old container to the new one in either the Mac OS or the PC environment.

- **To move files in the Mac OS, drag all the files from the existing drive container to the new one.**

To move the files in the PC environment, follow these steps:

- 1 At the DOS prompt, type `FORMAT D: /S` and press Return.**

This command makes the new drive container bootable.

Type Y when DOS asks if you're sure.

- 2 When the DOS prompt returns, type the following command:**

```
XCOPY C:\*.* D:\*.* /E /V
```

This command copies all the files and directories from your drive C container to your drive D container.

3 Press **⌘-Return** to switch back to the Mac OS when copying is finished.

4 In the PC Setup control panel, choose **None** from the **D:** pop-up menu.

Doing so deallocates drive D.

5 Choose **Other Drive File** from the **C:** pop-up menu and select the container you just created.

Your new container is now associated with drive C.

6 Click **Restart PC** at the bottom of the PC Setup control panel.

7 Click **Switch to PC**.

8 At the DOS prompt, type **DIR**.

You should see a list of all the files you copied.

You may want to run some of your programs to verify that everything has been copied correctly.

- **To throw away the original drive container, first switch to the Mac OS. Then drag the original container to the Trash and choose Empty Trash from the Special menu.**

Doing so frees up the space on your hard disk that the container held in reserve.

Understanding the status line

The status line at the bottom of the control panel gives you messages about the status of the PC hardware and software. Messages can include any of the following:

- **DOS-compatibility card not present** Your computer's system software did not recognize the DOS-compatibility card installed in your computer. Reinstall the PC software according to the directions in Chapter 8.

If reinstalling the software doesn't help, contact an Apple-authorized service provider for assistance, or call Apple's customer support hotline. (The phone number for the hotline is in the service and support information that came with your computer.)

- **PC Setup software not loaded** An error occurred during the startup process and the DOS environment won't run.
- **PC is running** You've clicked Start PC and the card is active.
- **PC is shut down** The card is installed but not running. To start the card, click Start PC, or select Auto-start PC and restart the computer.
- **PC is turned off** The Off button at the top of the PC Setup control panel is selected.
- **Not enough memory** Your computer must have at least 8 megabytes (MB) of RAM installed, and the PC environment requires at least 2 MB of free RAM if you don't have a memory module installed on the DOS-compatibility card for the exclusive use of the PC. Turn off the RAM disk (if you're using one) in the Memory control panel, and restart your Macintosh.

Consult this chapter if you experience
problems using the Mac OS.



Troubleshooting in the Macintosh Environment

When you have questions

If you want to know how to do a particular task in the Mac OS, refer to Macintosh Guide in the Guide (🔍) menu. For instructions on using Macintosh Guide, see Chapter 2 of this manual.

If you have problems working in the PC environment on your Macintosh, see Chapter 8, “Troubleshooting in the PC Environment.”

If you have questions about using DOS, see your DOS manual.

If you have trouble

While you're using your computer, you may occasionally see a bomb icon or an error message, or the pointer (⏏) may “freeze” on the screen. If you have trouble with your computer, take a few minutes to read the information in this chapter. If your problem is related to a particular procedure, you should also look for information on that procedure in Macintosh Guide, available in the Guide (🔍) menu. For additional troubleshooting information and a list of common questions relating to your system software, see the “Troubleshooting” topic of Macintosh Guide.

If you are unable to access Macintosh Guide (for example, if your screen is “frozen”), refer to this chapter to see if you can resolve the problem.

Take your time

When you see an error message, you don't have to take action immediately. The message stays on the screen until you click the OK (or Restart) button or turn off the Macintosh.

To help diagnose and correct the problem, gather as much information on the situation as you can. Then follow the instructions in the next section, "Start Over."

- Make a note of exactly what you were doing when the problem occurred. Write down the message on the screen. List the programs you were using and the names of any items you know have been added to the System Folder since the system software was installed. This information will help a service person diagnose the problem. (It is helpful to keep a printed copy of the items in your System Folder. For instructions on printing the contents of a folder, see the "Printing & Fonts" topic of Macintosh Guide, available in the Guide [?] menu.)
- Check the screen for any clues. Is a menu selected? What programs and document icons are open? Note anything else that seems relevant.
- If you were typing text and were not able to save it before the problem occurred, you can write down the parts of the text still visible on the screen so that some of your work will be easy to replace.
- Ask other Macintosh users about the problem you're having; they may have a solution for it.

If you need repair service, consult the service and support information that came with your computer for instructions on how to contact an Apple-authorized service provider or Apple for assistance.

Start over

Often you can eliminate a problem simply by clearing the computer's memory and starting over.

If you can, save any open documents before restarting the Macintosh. If your system is frozen and does not respond to anything you do, or if you have a “bomb” message on the screen, saving may not be possible. You can try pressing ⌘-Option-Esc to quit the program in use when the problem occurred; if this works, you can then save the documents open in other programs before restarting. (*Note:* Use this key combination to force a program to quit only if you can't choose Quit from the File menu.)

To restart your Macintosh, try the following steps:

- 1 If you can, choose Restart from the Special menu or from the dialog box that's on screen.**

Dialog boxes contain messages from the computer. If something goes wrong, a message may appear on the screen, asking you to restart the computer.

- 2 If you can't choose Restart, hold down the ⌘ and Control keys while you press the Power key (marked with a triangle).**

This key combination restarts the computer. (Use this key combination only when you can't choose Restart from the Special menu.)

- 3 If nothing happens, turn off your computer with the standby power button (on the back of the computer), wait at least 10 seconds, and then turn it on again.**

- 4 If the standby power button doesn't turn off the computer, unplug your Macintosh.**

If you suspect that the problem is with other equipment, such as a printer or an external hard disk that's attached to your computer, turn that equipment off for 10 seconds or longer, then turn it on again and restart the Macintosh.

Rebuild your desktop regularly

A process known as “rebuilding the desktop” helps your Macintosh keep track of data on your disks. It’s a good idea to rebuild the desktop of your disks once a month or so, especially your startup disks. (Although you usually use the hard disk in your computer as a startup disk, you can also start up from any other disk that has system software installed.)

To rebuild the desktop of your internal hard disk, follow these steps:

- 1 Hold down the Option and ⌘ keys while you start up your computer.**

Do not release the keys until you see a message asking whether you want to rebuild the desktop.

- 2 Click OK.**

You can also use this procedure to rebuild the desktop of an external hard disk or a floppy disk. Simply turn on the external hard disk or insert the floppy disk into a floppy disk drive before you turn on the computer.

If icons do not appear correctly after you rebuild the desktop, restart your computer while pressing the Shift key to temporarily turn off system extensions. When you see the “Welcome to Macintosh—extensions off” message, release the Shift key and press the Option and ⌘ keys until you see a message asking if you want to rebuild the desktop.

Solutions to common problems

The computer is turned on but the screen is dark.

One of the following is probably the cause:

- You have a screen saver program that darkens the screen when the computer has not been used for a certain period.

Press a key or move the mouse to turn off the screen saver.

- The monitor's brightness control (☼) is not adjusted properly.

Check the monitor's brightness control and turn it up if necessary.

- The Macintosh or the monitor is not getting power.

Make sure the monitor is plugged in and turned on, and that the monitor cable is firmly connected to both the computer and the monitor.

Make sure the computer's power cord is firmly connected to the computer and plugged into a grounded electrical outlet, and that the outlet has power.

If you have more than one monitor and only one is dark, check that it is set up correctly in the Monitors control panel. For information on using more than one monitor, see the "Monitors" topic of Macintosh Guide, available in the Guide (📖) menu.

- The monitor is plugged into the wrong port on the computer.

Make sure the monitor is plugged into the monitor port (marked with the 📺 icon) on the upper-right corner of the computer's back panel. If the monitor is plugged into another port, it will not work.

If you are displaying video from your computer on a television screen, it is normal for your computer monitor to be dark.

The computer won't start up.

- The game controller is plugged into the wrong port.

Make sure the game controller is plugged into the joystick port on the lower-right corner of the computer's back panel. If the game controller is plugged into another port, the computer will not start up.

The computer's clock keeps time inaccurately.

Your computer has a clock that runs continuously. When the computer is turned off, a battery keeps the clock running. If your clock begins to keep time inaccurately, have your Apple-authorized service provider replace the battery.

When you start up, a disk icon with a blinking question mark appears in the middle of the screen.



This icon indicates that your Macintosh cannot find the system software it needs to start up. One of the following is probably the cause:

- Your computer may be having a problem recognizing external SCSI equipment, such as hard disks, CD-ROM drives, and scanners. (SCSI stands for Small Computer System Interface.)

Shut down the computer, turn off all external SCSI equipment, and disconnect the first SCSI device in the chain from your computer's SCSI port. Then restart the computer. If the computer starts up after you disconnect your SCSI equipment, refer to the manuals that came with the equipment for information on the proper way to connect SCSI equipment and assign SCSI ID numbers.

If you have a printer connected to your computer's SCSI port, make sure your printer is connected properly. Most printers connect to the printer port, not the SCSI port. Check the manuals that came with your printer for information on how to connect it properly.

- System software is not installed on the startup hard disk, the system software is damaged, or the hard disk is not working properly.

Insert the *Macintosh Performa CD*. Then follow the instructions in "Repairing a Damaged Disk" later in this chapter, to test your startup hard disk and repair any damage.

If repairing the disk doesn't help, follow the instructions in the *Macintosh Performa CD* booklet to reinstall system software on your startup hard disk.

A disk icon with an X appears in the middle of the screen, and a floppy disk is ejected from the disk drive.



This icon indicates that the floppy disk you tried to start up from is not a startup disk. When you turn on your computer, it looks first in the floppy disk drive for a disk containing system software. If the disk in the drive does not contain system software, the computer ejects the disk and looks on its internal hard disk for system software.

Wait a few seconds. The computer should start up from its internal hard disk. Make sure you insert floppy disks only after the computer has begun starting up.

A “sad Macintosh” icon appears and the computer won’t start up.



This icon indicates that your Macintosh cannot start up because of a problem with the system software or the computer hardware.

Eject any floppy disks by turning off the computer and then holding down the mouse button while you turn the computer on again. Try starting up with the *Macintosh Performa CD*. (For instructions on how to start up your computer from the CD-ROM disc, see “Starting Up From a CD-ROM Disc” in the section “Repairing a Damaged Disk” later in this chapter.) If the “sad Macintosh” icon appears again, consult the service and support information that came with your computer for information on contacting an Apple-authorized service provider or Apple for assistance.

The Macintosh “hangs” or “freezes” during startup.

If the Mac OS is sharing 16 MB or more of memory with the PC environment, and Disklight of Norton Utilities 3.1.1 is installed, the computer will freeze during startup. This does not occur with 8 MB or less shared memory. Restart the Macintosh using one of the techniques described in “Start Over” in the section “If You Have Trouble,” earlier in this chapter. Also open the PC Setup control panel and change the shared memory setting to 8 MB or less.

The hard disk icon does not appear on the desktop.

If you don’t see a hard disk icon on the desktop, try the following:

- If the hard disk is internal, shut down your computer, wait at least 10 seconds, and then turn it on again.
- If the hard disk is external, make sure that it is turned on and that its cable is connected firmly; then restart the Macintosh.
- Check the ID numbers of all SCSI equipment connected to your computer. See the manuals that came with your SCSI equipment for information on setting SCSI ID numbers.
- If the hard disk is your startup disk, start your computer with the *Macintosh Performa CD*. (For instructions on how to start up your computer from the CD-ROM disc, see “Starting Up From a CD-ROM Disc” in the section “Repairing a Damaged Disk” later in this chapter.) Then follow the rest of the instructions on repairing a disk to test your startup hard disk and repair any damage.

If repairing the disk doesn’t help, follow the instructions in “Installing or Reinstalling Mac OS System Software” later in this chapter to reinstall system software on your startup hard disk.



Icons do not appear correctly on your screen.

You need to rebuild the desktop—a process that helps your Macintosh keep track of files and folders on your hard disks. For instructions, see “Rebuild Your Desktop Regularly” in the section “If You Have Trouble” earlier in this chapter.

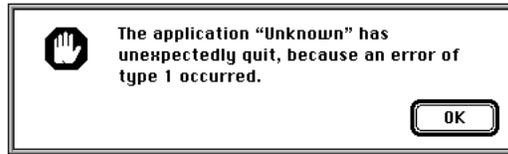
If icons do not appear correctly after you rebuild the desktop, restart your computer while pressing the Shift key to temporarily turn off system extensions. When you see the “Welcome to Macintosh—extensions off” message, release the Shift key and press the Option and ⌘ keys until you see a message asking if you want to rebuild the desktop.

Your Macintosh can't read a floppy disk.

If you see a message that a floppy disk is unreadable, try one of the following:

- If the disk has never been used, you may simply need to initialize it. For instructions, see the “Disks” topic of Macintosh Guide, available in the Guide (🔍) menu.
- The disk may be damaged. See “Repairing a Damaged Disk” later in this chapter for information on testing and repairing disks.
- If the disk is a high-density disk previously used on another computer, the disk may have been formatted incorrectly as an 800K disk rather than as a 1440K (high-density) disk. If so, use the other computer to copy the disk's contents onto a properly formatted disk.
- The disk may have been formatted for use on another kind of computer. You may be able to use a program that lets you work with such disks on your Macintosh.
- The disk may be a DOS disk that the Macintosh environment cannot use. Try switching to the PC environment and inserting the disk again.

You can't start an application program or it quits unexpectedly. Or, when you try to open a program, you see a message that not enough memory is available.



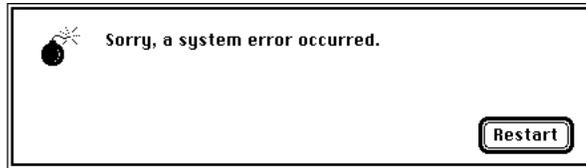
One of the following is probably the cause:

- The Macintosh ran out of memory.
Quit the programs that you have open and then open the program you want to use, or restart your Macintosh.
Use the Memory control panel to turn on virtual memory. For more information on virtual memory, see the "Memory" topic of Macintosh Guide, available in the Guide (⌘) menu.
- The program needs more memory.
Use the program's Info window to give it more memory. For more information on increasing a program's memory, see the "Memory" topic of Macintosh Guide, available in the Guide (⌘) menu.
- The program is incompatible with your Macintosh.
Contact the program's publisher to see if there is an upgrade available for the program.

You see a message that you need to have an FPU installed.

Your computer has a floating-point unit (FPU) installed. If you see this message, the program is probably incompatible with your Macintosh. Contact the program's publisher to see if there is an upgrade available for the program.

A dialog box with a bomb appears.



Your system has a software problem.

- Note what you were doing when the message appeared, and write down the text of the message.
- Restart your Macintosh. (See “Start Over” in the section “If You Have Trouble” earlier in this chapter for instructions.) Most software problems are temporary, and restarting usually corrects the problem.
- If the problem recurs, check the startup disk and application program you were using when the dialog box appeared. Make sure that all programs, desk accessories, and system extensions you’re using are compatible with the system software. Reinstalling the system software or the program may correct the problem.
- Sometimes incompatible system extensions or control panels can cause system software problems. Restart while holding down the Shift key; this temporarily turns off all system extensions. If your computer works normally after you do this, use the Extensions Manager control panel to turn on extensions and control panels one at a time. Restart after you turn on each extension. This procedure should identify incompatible extensions and control panels.

For information on using the Extensions Manager control panel to manage system extensions, see the “Setting Options” topic of Macintosh Guide, available in the Guide (🔍) menu.

- If the problem recurs, you may need to reinstall system software. See the *Macintosh Performa CD* booklet for instructions.

The pointer (␣) doesn't move when you move the mouse.

One of the following situations is probably the cause.

- Your system has a software problem. Try the following:
Press ⌘-Option-Esc to quit the application program in use when the problem occurred. If this works, you can save the documents open in other programs before restarting.
- Follow the suggestions in the previous section, “A Dialog Box With a Bomb Appears.”
- The mouse is not connected properly.
Turn the computer off using the power switch, check that the mouse and keyboard cables are connected properly, and then restart the computer.
- Signals from the mouse are not reaching the computer, either because the mouse needs cleaning or because there is something wrong with the mouse.

Clean the mouse according to the instructions in Appendix A of this book.

If you have another mouse or pointing device, try connecting and using it. (Turn off the computer before connecting it.) If the new device works, there is probably something wrong with the mouse you replaced.

If none of these procedures solves the problem, consult the service and support information that came with your computer for instructions on how to contact an Apple-authorized service provider or Apple for assistance.



Typing on the keyboard produces nothing on the screen.

One of the following is probably the cause:

- Some system software features are turned on that affect the way the keyboard works.

Use the Easy Access control panel to turn off Sticky Keys, Slow Keys, and Mouse Keys.

- There is a software problem.

Restart your Macintosh. For instructions, see “Start Over” in the section “If You Have Trouble” earlier in this chapter.

Check the startup disk and application program you were using when the problem occurred. Make sure that all programs, desk accessories, and system extensions you’re using are compatible with the system software.

If the problem recurs, you may need to reinstall system software. See the *Macintosh Performa CD* booklet for instructions.

- You haven’t selected any text or set the insertion point (I).

Make sure the program you want to type in is the active program. Then place the pointer (⏏) in the active window and click to set an insertion point (I) or drag to select text (if you want to replace the text with your typing).

- The keyboard is not connected properly.

Turn off the computer using the standby power button (on the back of the computer), then check that the keyboard cable is connected properly at both ends.

If you have a keyboard with an ADB port (marked with the ⌘ icon) on each end, turn off the Macintosh using the standby power button and plug the keyboard cable into the other ADB port on the keyboard. (You may have to unplug the mouse to do this.) Then restart the computer.

- The keyboard is damaged.

If you have access to another keyboard, try using it instead. (Turn the computer off before connecting it.) If the new keyboard works, there is probably something wrong with the one you replaced.

If none of these procedures solves the problem, consult the service and support information that came with your computer for instructions on how to contact an Apple-authorized service provider or Apple for assistance.

You can't open a document, or you see a message that an application program can't be found.

The Macintosh Easy Open control panel is not installed. This is a control panel that you can use to open documents when you don't have the program that created them. Reinstall the control panel from the *Macintosh Performa CD*. (See the booklet that came with the CD.)

- Some documents can be opened by more than one program. Try starting a program that you think might be able to open the document, then choose Open from the program's File menu to try to open the document.
- Purchase and install the correct software to use the document, or find out if the creator of the document can convert it to a form that one of your programs can use.
- Don't try to open the files in your System Folder. Most of the files in your System Folder are used by your computer for internal purposes and are not intended to be opened.
- Rebuild your desktop by holding down the Option and ⌘ keys while starting up your computer. Keep holding down the keys until you see a message asking whether you want to rebuild the desktop. Click OK.
- If the document is from a DOS computer, use the PC Exchange control panel to specify which Macintosh program will open the document. For information about working with DOS documents on your Macintosh, see the "Using DOS Files & Disks" topic of Macintosh Guide, available in the Guide (⌘) menu.



You experience problems using a DOS document.

If you can't open a DOS document using a Macintosh program, try the following:

- Open the document from within the program by choosing Open in the program's File menu.
- Use the PC Exchange control panel to specify which Macintosh program will open the document.

If a DOS document is displayed incorrectly, or you see strange codes or characters in the document, try one of the following:

- Your application program may have special procedures for opening and saving documents with different file formats. See the information that came with your program, or call the program's publisher.
- Try opening the document in another program.

Note: Some characters that can be displayed on the Macintosh are not accurately displayed on DOS computers, and vice versa.

For more information about working with DOS documents on your Macintosh, see the "Using DOS Files & Disks" topic of Macintosh Guide, available in the Guide (⌘) menu.

For more troubleshooting tips on working with DOS documents, see Chapter 8, "Troubleshooting in the PC Environment."

The Mac OS is running out of memory even though you aren't running any PC programs.

When sharing memory with the PC environment, the Macintosh allocates a portion of its memory to the PC environment. Because of this, the Mac OS may not be able to load all your system extensions, including the PC Setup control panel.

If this problem occurs, try the following:

- Add memory to the DOS-compatibility card, as described in Appendix B.
- Decrease the shared memory setting.
- Remove PowerTalk and QuickDraw GX from the Extensions folder inside the System Folder.
- Remove any other system extensions you don't need.
- Change the name of the PC Setup control panel to !PC Setup so that it loads first.

Shared memory assigned to the PC environment isn't available to the Mac OS until you turn off the PC environment. If the previous suggestions don't solve your problem, click the Off button at the top of the PC Setup control panel and restart the Macintosh.

Repairing a damaged disk

If you see a message reporting that a disk is damaged or unreadable, you may need to repair the disk.

Try these suggestions first

If you can't start up from a hard disk or you don't see the hard disk icon on the desktop, try the following:

- If the hard disk is internal, shut down your Macintosh, wait at least 10 seconds, and then turn it on again.
- If the hard disk is external, make sure that it is turned on and that its cable is connected firmly; then restart the Macintosh.
- If the hard disk is your startup disk, start up with a different startup disk. (See the following section, "Starting Up From a CD-ROM Disc.")

If, after you start up from a different disk, your hard disk's icon appears on your desktop, reinstall system software on the hard disk (see "Installing or Reinstalling Mac OS System Software" later in this chapter).

- Check the ID numbers of all SCSI equipment connected to your computer. Each device must have a unique ID number. The computer itself has the ID number 7 and the internal CD-ROM drive has the ID number 3. The ID numbers 0, 1, 2, 4, 5, and 6 are available for additional SCSI devices.

Also check that the chain of devices is terminated properly. For information on setting SCSI ID numbers and terminating a SCSI chain, see the manuals that came with your SCSI equipment.

- If none of these suggestions solves the problem, test the disk by following the instructions given later in this section.

Starting up from a CD-ROM disc

To test, repair, or initialize a hard disk, or to install system software on a hard disk, you need to start up your computer from another disk. You can start up your computer using the *Macintosh Performa CD* that came with your computer.

The procedure for starting up from the CD varies depending on the condition of the system software on your hard disk. To find out which procedure to use, you must turn on your Macintosh.

The steps that follow tell how to start up from a CD-ROM disc, depending on what you see on your screen.

If you see a blinking question mark on your screen

The blinking question mark means that your Macintosh is unable to find usable system software on your hard disk.



- 1 Press the Open/Close button of your CD-ROM drive to open the CD-ROM tray.**
- 2 Place the *Macintosh Performa CD* disc in the tray with the disc label facing up.**
Make sure the disc is lying flat in the tray.
- 3 Push the tray in, or press the Open/Close button, to close the tray.**

Your Macintosh recognizes the CD as a startup disk, and in a few seconds the Macintosh desktop with a Launcher appears.

If you see the Macintosh desktop

- 1 Press the Open/Close button of your CD-ROM drive to open the CD-ROM tray.**
- 2 Place the *Macintosh Performa CD* disc in the tray with the disc label facing up.**
Make sure the disc is lying flat in the tray.
- 3 Push the tray in, or press the Open/Close button, to close the tray.**

If the Macintosh Performa CD icon does not appear on your screen, follow the steps in the next section, “Problems Starting Up From the CD?”

If the Macintosh Performa CD icon appears on the right side of your screen, continue with these steps.

- 4 Choose Control Panels from the Apple () menu.**
- 5 Double-click the Startup Disk icon.**

The Startup Disk control panel window appears.

- 6 Click the CD icon to select it as your startup disk.**
- 7 Choose Restart from the Special menu.**

Your computer recognizes the CD as its startup disk, and in a few seconds the Macintosh desktop with a Launcher appears.

Problems starting up from the CD?

If you've followed the steps in the previous sections and the Macintosh Performa CD icon does not appear on your screen, follow these steps:

- 1 Insert the CD into the tray.**
- 2 Choose Restart from the Special menu.**
- 3 Immediately press and hold down the Command (⌘), Shift, Option, and Delete keys.**

The computer bypasses the internal hard disk, and the Macintosh Performa CD icon appears on the desktop.

If the Macintosh Performa CD icon still does not appear on the desktop, continue with these steps:

- 4 Choose Control Panels from the Apple () menu.**
- 5 Double-click the Startup Disk icon.**

The Startup Disk control panel appears.

- 6 Click the CD icon to select it as your startup disk.**
- 7 Close the Startup Disk control panel.**
- 8 Press and hold down the Control, Command (⌘), and Power keys to restart your computer.**

The computer starts up using the CD, and in a few moments the Macintosh desktop with a Launcher appears.

Checking for damage on your internal hard disk

You can check for damage on your internal hard disk with the Internal HD Format program, which is on the *Macintosh Performa CD* that came with your computer. You can use Internal HD Format at any time to check for damaged blocks (segments of the hard disk that cannot reliably be used to store information).

- 1 Start up your computer from the *Macintosh Performa CD*.**

See “Starting Up From a CD-ROM Disc” earlier in this section.

- 2 Click the Internal HD Format button in the Launcher.**

- 3 Choose Scan For Defects from the Functions menu.**

If the program finds damaged blocks, it marks them so that the computer will not store information on them. This process does not harm any information on the hard disk.

How to repair a hard disk or floppy disk

You can repair some types of disk damage by using the Disk First Aid program, which is on the *Macintosh Performa CD* that came with your computer.

- 1 Start up your computer from the *Macintosh Performa CD*.

See “Starting Up From a CD-ROM Disc” earlier in this section.

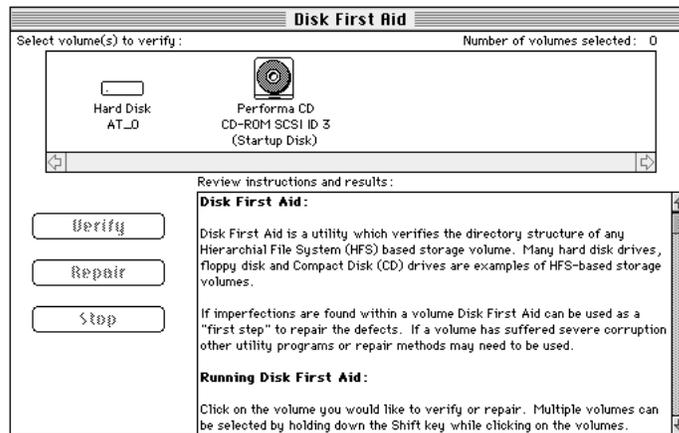
- 2 Open the Disk First Aid icon.



Disk First Aid

- 3 Click the icon of the disk you want to test.

Disk icons appear in a box at the top of the Disk First Aid window.



4 Click Repair to begin testing and repairing the disk.

If you want to test and repair another disk, click its icon and then click Repair.

5 When testing and repair are done, choose Quit from the File menu.

If Disk First Aid cannot correct the problem

- Try repairing the disk again. Sometimes repeating the process corrects the problem.
- Use another disk repair or recovery program. Some disk repair programs let you recover information from a damaged disk.
- Consult an Apple-authorized service provider for help.
- If you can't repair the disk, you'll need to reinitialize it, which erases all the information on it. Before you reinitialize, be sure you recover all the information you can and back it up. Then erase (reinitialize) the disk. For instructions on reinitializing a floppy disk, see the "Disks" topic of Macintosh Guide, available in the Guide (📖) menu. For instructions on reinitializing a hard disk, see the next section, "Initializing a Hard Disk."

If initialization doesn't work, discard the damaged disk (if it's a floppy disk), or take it to your Apple-authorized service provider for repair (if it's a hard disk). Bring the *Macintosh Performa CD* (which you received with your computer) with you to the service provider.

Initializing a hard disk

The hard disk inside your computer was initialized (formatted for use) at the factory, so you shouldn't need to initialize it. You need to initialize a hard disk only if

- you purchase an uninitialized hard disk from another manufacturer
- your hard disk is damaged

WARNING Initializing a disk erases any information that may be on it. Before you initialize a damaged disk, try to repair it as described in “Repairing a Damaged Disk” earlier in this chapter.

You initialize your internal hard disk using a program called Internal HD Format, which is on the *Macintosh Performa CD* that came with your computer.

1 Start up your computer from the *Macintosh Performa CD*.

See “Starting Up From a CD-ROM Disc” in the section “Repairing a Damaged Disk,” earlier in this chapter.

2 Click the Internal HD Format Launcher button once.

3 Type a name for your hard disk in the Name box.

4 If you want to make sure that none of the hard disk's original information can be retrieved after reinitialization, choose Zero Out Data in the Options menu.

If you choose Zero Out Data, initialization may take a few minutes. (If you don't choose Zero Out Data, initialization will take less than 30 seconds.)

5 Click Initialize.

A message informs you that initializing the disk erases all the information on it.

6 Click OK.

During initialization, a status bar shows you the progress of the initialization.

7 When initialization is complete, click Done.

If a message reports that initialization failed, try again. If initialization fails a second time, take the disk to your Apple-authorized service provider for repair.

Installing or reinstalling Mac OS system software

System software is the set of programs and other files that your computer uses to start itself up, keep track of your files, and run the application programs you use. System software is kept in the System Folder. When you turn on your computer, it looks for a startup disk, which is a disk that contains the system software. The startup disk is usually the hard disk that's inside your computer, though another hard disk or a floppy disk can also be a startup disk.

When should you install or reinstall system software?

Your Macintosh came with all the necessary system software installed on its internal hard disk, so you don't need to install system software on that disk unless you encounter software problems.

If you have a new hard disk or a newly initialized hard disk that doesn't contain system software, or if you want to upgrade to a more recent version of system software on a hard disk, you'll need to install system software. You can install or reinstall system software by following the instructions in the *Macintosh Performa CD* booklet that came with your computer.

If your hard disk already has system software installed on it but there is a problem with the disk or the software, you may see this icon in the middle of the screen:



If this icon appears, first try testing your startup hard disk and repairing any damage. To do this, follow the instructions in “Repairing a Damaged Disk” earlier in this chapter. If repairing the disk doesn't help, you may need to reinstall system software. You can install or reinstall system software by following the instructions in the *Macintosh Performa CD* booklet that came with your computer.

If you've used Apple Backup to back up the contents of your hard disk, you can use Apple Restore to reinstall system software. See “Restoring the Information on Your Hard Disk” in the section “Protecting the Information on a Disk” in Chapter 4.

How to install or reinstall Mac OS system software

You can install or reinstall system software by following the instructions in the *Macintosh Performa CD* booklet that came with your computer.

If you've used Apple Backup to back up the contents of your hard disk, you can use Apple Restore to reinstall system software. For instructions, see "Restoring the Information on Your Hard Disk" in the section "Protecting the Information on a Disk" in Chapter 4.

Consult this chapter if you have problems using the PC environment on your Macintosh.

8

Troubleshooting in the PC Environment



When you have questions

Read this chapter when you have questions about using the PC environment on your Macintosh.

If you have questions about using DOS or DOS application programs, see your DOS manual or the manuals that came with your programs.

WARNING If you have a problem with your DOS-compatibility hardware or software and nothing presented in this manual solves it, consult the service and support information that came with your computer for instructions on how to contact an Apple-authorized service provider or Apple for assistance. If you attempt to repair the DOS-compatibility hardware yourself, any damage you may cause to the DOS-compatibility hardware will not be covered by the limited warranty on your DOS-compatible Macintosh. Contact an Apple-authorized dealer or service provider for additional information about this or any other warranty question.

When you try to switch to DOS, the screen is blank or has no synchronization.

If the monitor has never worked in DOS, it is most likely not able to synchronize properly to the DOS video signal. Refer to the information in the *Technical Information* booklet on monitor specifications and video modes, and check with your monitor vendor to see if your monitor conforms to these specifications.

If your monitor was working previously, verify that its type is selected in the Display pop-up menu of the PC Setup control panel.

If its type doesn't show, use the Display pop-up menu to select the correct type. Restart the computer and, immediately after the chime sounds, hold down the ⌘, Option, P, and R keys. When you hear another chime, release the keys. Then open the PC Setup control panel again. You'll get a message that PC Setup is not properly installed. This is normal. Verify the settings, and restart the computer again.

The Macintosh "hangs" or "freezes" during startup.

If the Mac OS is sharing 16 MB or more of memory with the PC environment, and Disklight of Norton Utilities 3.1.1 is installed, the computer will freeze during startup. This does not occur with 8 MB or less shared memory. Restart the Macintosh using one of the techniques described in "Start Over" in the section "If You Have Trouble" in Chapter 7. Also open the PC Setup control panel and change the shared memory setting to 8 MB or less.

The DOS-compatibility software doesn't seem to be installed.

In the Mac OS, open the Control Panels folder and look for the PC Setup control panel. If you find it, the DOS-compatibility software is installed. If not, or if you find it but it doesn't work, there may be a problem with the software. Reinstall the software according to the instructions in "Reinstalling the DOS-Compatibility Software" later in this chapter.

If you do find the PC Setup control panel, open it. If drive C is assigned to a drive container, a drive container has been created. If drive C is not assigned to a drive container, follow the instructions in "Creating a Drive Container" in the section "Reinstalling the DOS-Compatibility Software" later in this chapter.



When you switch to the PC environment, you see this message: “Non-system disk or disk error. Replace and strike any key when ready.”

The DOS-compatibility hardware can't find DOS.

Switch to the Mac OS by pressing ⌘-Return, open the PC Setup control panel, and make sure drive C is assigned to a drive container. If not, follow the instructions under “Configuring Drives C and D” in Chapter 6.

If drive C is assigned to a drive container, it may not be the drive container that holds DOS. If other drive containers have been created, double-click each one in the Mac OS and look for DOS folders and files. If you locate a container with DOS in it, assign it to drive C.

If no drive container exists, the PC software may not be installed. First, create a drive container by following the instructions in “Configuring Drives C and D” in Chapter 6. Then follow the instructions in “Reinstalling PC Software” in the section “Reinstalling the DOS-Compatibility Software” later in this chapter.

You run application programs in both environments, and the programs seem sluggish.

You may be sharing Macintosh RAM with the PC environment. Performance may improve if you give the PC environment its own memory by installing a SIMM (Single Inline Memory Module) on the DOS-compatibility card in your computer. For instructions, see Appendix B.

Additionally, significant drive access (including file sharing) in one environment can cause the other environment to slow down.

There is a delay when you switch between environments.

When switching would interfere with a Mac OS system task, there is a slight delay until the task is completed.

There also may be a delay while Clipboard information is transferred between the two environments. (If there's a large amount of information on the Clipboard, you may actually see the translator window.)

If Shut Down Warning is turned on in the General Controls panel in the Mac OS, you cannot switch back to the Mac OS immediately after switching to the PC environment. Wait a few minutes and try switching again. To fix the problem, open the General Controls panel in the Mac OS and turn off the Shut Down Warning option.

You switch to the PC environment and don't know how to switch back to the Mac OS.

Press ⌘-Return at any time to switch to the Mac OS.

Inserting a DOS-format disk in the Mac OS displays an initialization message.

Macintosh PC Exchange may not be installed. In the Mac OS, look in the Control Panels folder for the Macintosh PC Exchange control panel. If you don't find it, reinstall Macintosh PC Exchange from the floppy disks or CD-ROM disc that contains system software.

You're in the PC environment and don't know out how to eject a floppy disk.

Press ⌘-E.

You're in the PC environment and don't know out how to eject a CD-ROM disc.

Press ⌘-Y.

The PC drive container (drive file) you initialized has only one partition.

Macintosh PC Exchange configures drives to have a single partition. The DOS program FDISK can configure a drive with up to four partitions. See your DOS manual for more information.

The PC environment won't start up, and a message says there is not enough free memory.

Your computer must have at least 8 MB of RAM installed. If you don't have a SIMM installed for the exclusive use of the PC environment (see the *Technical Information* booklet), the PC environment requires at least 2 MB of free RAM if you are using DOS, and 4 MB if you are using Windows. Turn off the RAM disk, if you're using one, in the Memory control panel. Additionally, set the disk cache size in the Memory control panel to 128K or less.

The PC Setup icon has a red slash through it at startup.

If PC Setup doesn't have enough memory to allocate to the PC environment at startup time, it will turn itself off. Check the Memory control panel for disk cache and RAM disk sizes; the disk cache should be set no higher than 128K, and the RAM disk should be turned off (or have a small amount of memory allocated to it). Restart the Macintosh if you change either of these settings.

If these steps don't correct the problem, throw away the PC Setup Prefs file in the Preferences folder within the System Folder and restart the Macintosh. Then use the PC Setup control panel to recreate your settings.

When you switch to the Mac OS from the PC environment, the following message appears: "PC Clipboard requires additional system services in order to function. Please ensure that the DOS-compatibility card is successfully installed."

Macintosh Easy Open software is either not installed or has been turned off. Turn on the Macintosh Easy Open control panel, or reinstall it using the DOS Compatibility Installer program on the *Macintosh Performa CD*.

You set the DOS-compatibility card to use 4 MB (or more) of RAM, but you get an error message saying that there's not enough memory to run a PC application program.

If you are sharing memory between the Macintosh and PC environments, the Mac OS may be using some of the RAM you requested for the PC environment. Turn off the RAM disk, if you're using one, in the Memory control panel; then restart the Macintosh.

A PC program displays a message that it needs 540K to run, but you have 4 MB of memory allocated to the PC environment.

The message is referring to conventional memory. Most of the balance of the 4 MB of memory you assigned to the PC environment is used by the EMM386 memory management software. Configure your application program to use more extended memory and less conventional memory. You may also need to disable some device drivers or other software in your CONFIG.SYS and AUTOEXEC.BAT files to free up more conventional memory. See the section on managing memory in your DOS manual for more information.

The Mac OS is running out of memory even though you aren't running any PC programs.

When sharing memory with the PC environment, the Macintosh allocates a portion of its memory to the PC environment. Because of this, the Mac OS may not be able to load all your system extensions, including the PC Setup control panel.

If this problem occurs, try the following:

- Add memory to the DOS-compatibility card, as described in Appendix B.
- Decrease the shared memory setting.
- Remove PowerTalk and QuickDraw GX from the Extensions folder inside the System Folder.
- Remove any other system extensions you don't need.
- Change the name of the PC Setup control panel to !PC Setup so that it loads first.

Shared memory assigned to the PC environment isn't available to the Mac OS until you turn off the PC environment. If the previous suggestions don't solve your problem, click the Off button at the top of the PC Setup control panel and restart the Macintosh.

Your monitor flashes oddly when you switch environments.

Turn on the Fade Screens option in the PC Setup control panel.

The PC environment is "frozen," and pressing Control-Alt-Delete doesn't reset the system.

Press ⌘-Control-Alt-[keypad] period. The system will reset with a "cold start."

When you print in the PC environment, the top and bottom of the document are cut off.

In the Mac OS, open PC Print Spooler in the Extensions folder (which is in the System Folder). Choose Preferences from the File menu, and click "Gaps between pages (60-lines)."

In the PC environment, configure your applications print a 60-line page, rather than a 66-line page, or your margins and text will not print correctly.

When you start up certain software in the PC environment, your monitor shows a jumbled image and the display appears to “roll.”

A program that writes directly to the hardware (especially a game) may cause the Apple 13", 14", and 16" monitors to lose video synchronization at program startup. Call the program's manufacturer to see if the program has a switch to force it to make BIOS calls (or see if an upgrade that has this feature is available).

DOS begins to start up but then the screen freezes. The cursor blinks, but you cannot type anything.

Press ⌘-Control-Alt-[keyboard] period to restart the PC. When you see the message “Starting MS-DOS,” press and hold down the F5 key. This will bypass your CONFIG.SYS and AUTOEXEC.BAT files. Edit the CONFIG.SYS file so that the HIMEM.SYS driver looks like the following:

```
DEVICE=C:\DOS\HIMEM.SYS /TESTMEM:OFF
```

Restart the PC environment; it should now start up normally.

Reinstalling the DOS-compatibility software

Your Macintosh DOS-compatible computer comes with the DOS-compatibility hardware and software already installed. You should reinstall the software only if you are having severe software problems. Follow the instructions in this section.

There are several steps to reinstalling your DOS-compatibility software:

- install the Mac OS software
- create a storage area (called a *drive container*) for DOS software
- set aside RAM for the PC environment, if necessary
- install the Microsoft MS-DOS operating system (and Microsoft Windows if you wish)
- install the additional DOS software that came with your DOS-compatible computer
- install your own PC software

For information on setting up the software after you install it, including additional changes you may need to make to the DOS AUTOEXEC.BAT and CONFIG.SYS files, see Chapter 5.

Reinstalling Mac OS software

You'll install several extensions and control panels in your System Folder.

- 1 Start up your Macintosh while holding down the Shift key.**

This starts the Macintosh with extensions turned off.

- 2 Insert the floppy disk named *DOS Compatibility Installer Disk (for Mac OS Environment)* into the floppy disk drive.**

If your computer has a built-in CD-ROM drive, and you don't have this floppy disk, insert the *Macintosh Performa CD* that contains system software.

- 3 Find the DOS Compatibility Installer icon and double-click it to open it.**

- 4 Click Install in the dialog box that appears.**

The software is automatically installed onto your hard disk.

- 5 When the installation is complete, click Quit and restart your Macintosh.**

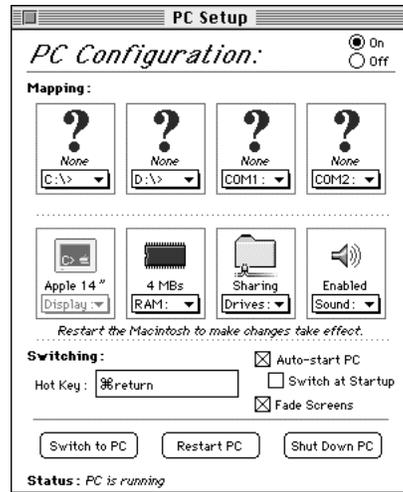
The following Mac OS software is now installed in your System Folder:

Name	Location
Macintosh Easy Open	Control Panels folder
Macintosh PC Exchange	Control Panels folder
PC Setup	Control Panels folder
PC Setup Guide Additions	Extensions folder
PC Clipboard	Extensions folder
PC Clipboard Translators	Extensions folder
PC Print Spooler	Extensions folder
PC Network Extension	Extensions folder

Creating a drive container

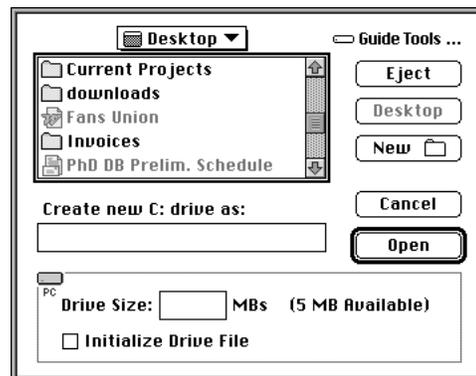
A drive container is a file on a Macintosh hard disk that acts as a hard drive for the PC environment. You create a drive container using the PC Setup control panel.

- 1 Open the PC Setup control panel.



- 2 Choose New Drive File from the C: pop-up menu.

A dialog box appears.



3 Choose a location for the drive container.

The drive container can be on any hard disk attached to the Macintosh. At least 40 MB of free space is recommended.

It's best to locate the container at the root level of your hard disk (not in any folders or subfolders) so that you can find it easily.

4 Type a name for the drive container.

You can type up to 31 characters. Use a descriptive name such as PC Drive or PC Container so that you can easily identify it.

When you finish, press the Tab key to move to the Drive Size field.

5 Type a size (in MB) for the drive container.

At least 40 MB is recommended. The exact amount of space you need depends on what application programs you intend to install for DOS and Windows. Check the documentation that came with the programs to see how much space you'll need, then allow some extra room for growth. (The software included with your DOS-compatible computer requires about 25 MB.)

6 Select Initialize Drive File to automatically initialize the drive container with a single partition.

If you want more than one partition, you can leave the box unselected and use the FDISK and FORMAT programs after you've installed DOS. (See your DOS manual for instructions and information about the FDISK and FORMAT commands and their options.)

7 Click Create.



Assigning RAM to the PC environment

The PC environment needs memory to operate. You can provide memory with a SIMM (Single Inline Memory Module) installed on the DOS-compatibility card in your computer, or by assigning RAM to the PC environment from your Macintosh. If a memory module is installed on the DOS-compatibility card, the RAM pop-up menu items in the PC Setup control panel will be dimmed (unavailable). The amount of memory available to the PC environment will depend on the amount of RAM on the installed memory module. See the *Technical Information* booklet to find out whether your DOS-compatibility card includes a memory module and what RAM capacity the memory module has. If a memory module is installed, skip to “Reinstalling PC Software,” next.

Memory installed on the DOS-compatibility card in your computer is for the exclusive use of the PC environment, and provides a marked improvement in performance of PC application programs.

If no memory module is installed, you need to assign RAM to the PC.

1 Choose a memory size from the RAM pop-up menu in the PC Setup control panel.

If you're installing DOS only, choose a minimum of 2 MB. If you intend to install Windows, choose a minimum of 4 MB.

Note: Windows performance will improve if you allocate more memory to the PC environment. However, RAM assigned to the PC environment is not available in the Mac OS until you turn off the PC environment in the PC Setup control panel and restart the computer.

2 Restart the Macintosh.

IMPORTANT If the RAM size is set to 2 MB, modify the CONFIG.SYS file in DOS as follows:

```
DEVICE=C:\DOS\HIMEM.SYS /TESTMEM:OFF
```

Reinstalling PC software

You begin by installing the Microsoft MS-DOS operating system included with your computer. You can also install Microsoft Windows, if you wish.

- 1 In the Mac OS, open the PC Setup control panel and click Switch to PC.**

The Macintosh desktop disappears, and you see a message about a missing operating system or about a disk error. Ignore the message.

- 2 Insert the CD-ROM disc containing DOS and Windows software into the computer's CD-ROM drive.**

- 3 Find and open Microsoft MS-DOS Setup.**

- 4 Follow the instructions that appear on the screen.**

Note: The MS-DOS installation files do not include a DOS mouse driver. A mouse driver for Windows is automatically installed, however, if you install Microsoft Windows. Mouse drivers for DOS are widely available from other manufacturers.

- 5 When DOS installation is complete, you may want to install Windows. Find and open the file called Windows Series Installation Instruction Diskette 1 of 6, type `A:setup`, and press Return.**

You can skip this and the next step if you don't want to install Windows.

- 6 Follow the instructions that appear on the screen.**

The following PC software is now installed:

DOS (directory)
WINDOWS (directory)
COMMAND.COM
AUTOEXEC.BAT
CONFIG.SYS

Installing additional PC software

Your DOS-compatible computer comes with additional software utilities that you may want to install. The following table describes the function of each program. For more information on using these programs, see Chapter 5, “Operating in the PC Environment.”

Program name	Function
DOSCLIP	Lets you copy and paste between DOS and the Mac OS.
WINCLIP	Lets you copy and paste between Windows and the Mac OS.
MACSHARE	Lets you share Mac OS volumes and folders with the PC environment.
CDROM	Lets you access your Macintosh CD-ROM drive from the PC environment.
MACODI	Provides support for accessing networks in the PC environment.

To install the additional software, follow these steps:

- 1** With the PC environment active, insert the disk named *DOS Compatibility Installer Disk (for PC Environment)* into the disk drive.
- 2** Choose one of the options below to install software for either DOS alone or both DOS and Windows.
 - To install software for DOS alone, type `A:INSTALL` at the DOS prompt and press Return.
 - To install software for both DOS and Windows, start Windows, select the Run command from the File menu, type `A:SETUP` for the program name, and click OK.
- 3** Follow the instructions that appear on the screen.

Replacing the CONFIG.SYS and AUTOEXEC.BAT files

Your DOS-compatible software includes alternative versions of the CONFIG.SYS and AUTOEXEC.BAT files that let you select from a variety of DOS memory-management options. Each time you start DOS, you will see a menu that asks if you want to optimize memory for just DOS, for a DOS program that requires maximum conventional memory, or for a DOS program that requires maximum expanded memory, or if you want to start Windows immediately.

To install the alternative CONFIG.SYS and AUTOEXEC.BAT files, follow these instructions:

- 1 **Switch to the PC environment.**
- 2 **At the DOS prompt, type the following:**

```
C:
REN CONFIG.SYS CONFIG.BAK
REN AUTOEXEC.BAT AUTOEXEC.BAK
COPY ALT_CFGS\CONFIG.APL CONFIG.SYS
COPY ALT_CFGS\AUTOEXEC.APL AUTOEXEC.BAT
```

- 3 **To restart the PC environment with the alternative files installed, press Control-Alt-[keypad] period.**

If your keyboard has a Delete key, you can press Control-Alt-Delete instead.

The PC environment restarts and the new menu appears.

Modifying the CONFIG.SYS and AUTOEXEC.BAT files

You may want to modify the CONFIG.SYS file by hand to meet specific needs. You use the DOS Edit command (or any other DOS or Windows editor) to make the changes given in this section.

IMPORTANT Make backup copies of your original files before you change them. That way you still have your originals in case problems develop.

Be sure to save the file when you finish. To prevent the ROM BIOS from becoming damaged when the PC environment is configured for 2 MB of memory, be sure to add the underlined text to the indicated line:

```
DEVICE=C:\DOS\HIMEM.SYS/ TESTMEM:OFF
```

If you do not intend to use software that requires expanded memory (EMS), make the following change:

```
DEVICE=C:\DOS\EMM386.EXE NOEMS RAM=D000-EFFF
```

If you do intend to use software that uses expanded memory, or you're unsure what you may need in the future, make the following change:

```
DEVICE=C:\DOS\EMM386.EXE RAM=D000-EFFF FRAME=D000
```

Depending on how you have reconfigured the file, your CONFIG.SYS file should look something like this:

```
DEVICE=C:\DOS\SETVER.EXE
DEVICE=C:\DOS\HIMEM.SYS /TESTMEM:OFF
DEVICE=C:\DOS\EMM386.EXE RAM=D000-EFFF FRAME=D000
DOS=HIGH,UMB
FILES=30
LASTDRIVE=M
```

Additionally, your AUTOEXEC.BAT file should contain the following:

```
LH C:\DOS\SMARTDRV.EXE /X
@ECHO OFF
PROMPT $p$g
PATH C:\WINDOWS;C:\DOS
SET TEMP=C:\DOS
```

(The reference to Windows in the PATH line applies only if you chose to install Windows.)

See your DOS manual to learn how to edit and save your DOS files.

IMPORTANT Some memory configuration utilities, such as MEMMAKER, may not be able to determine the exact nature of the hardware of the DOS-compatible computer and, therefore, may not be compatible. Additionally, using third-party compression software such as DriveSpace on a drive container prevents you from accessing the container or the files within it from the Mac OS. For these reasons, Apple does not recommend using these programs with your DOS-compatible computer.

Bypassing the CONFIG.SYS and AUTOEXEC.BAT files at startup

To bypass the CONFIG.SYS and AUTOEXEC.BAT files during the startup process, press and hold down the F5 key (⌘-5 on non-extended keyboards) after the memory testing is complete.

Reinstalling Sound Blaster software

To install Sound Blaster software, follow these steps:

- 1 Insert the *Sound Blaster Software Installation* disk in the floppy disk drive while the PC environment is active.
- 2 From DOS, type `A:INSTALL` and press Return.
- 3 Follow the instructions that appear on the screen.
- 4 Restart DOS to use the new software.

To do so, press Control-Alt-[keypad] period.

For information on using the Sound Blaster utilities, see the manual *Using PC Sounds with the DOS-Compatibility Card*, which came with your computer.

Reinstalling video drivers

If you intend to run Windows with 256 colors at a resolution of 640 by 480 pixels, or if you intend to use an Apple 16" or VGA display with 16 colors at a resolution of 800 by 600 pixels, follow these steps:

- 1 Insert the *Display Drivers Disk 1* disk in the floppy disk drive while the PC environment is active.
- 2 From DOS, type `A:` and press Return to set the current drive to A.
- 3 Type `SETUP` and press Return to run the setup program.

Follow the instructions on the screen to install the video drivers. Select Windows 3.1 as the application.

Note: If you are using an Apple 16" monitor, the DOS display has a resolution of 640 by 480 pixels, is centered on your monitor, and is surrounded by a large black border.

Read this appendix for important health and safety instructions, as well as tips on keeping your computer in good working order.



Appendix A Health, Safety, and Maintenance Tips



For your own safety and that of your equipment, follow all the instructions in this chapter. Keep these instructions available for reference by you and others.

Health-related information about computer use

Muscle soreness, eye fatigue, and other discomforts and injuries sometimes associated with using computers can occur from performing any number of activities. In fact, misuse of the same muscles during multiple activities can create a problem that might not otherwise exist. For example, if you engage in nonwork activities that involve repetitive stress on the wrist—such as bicycling—and also use your computer’s keyboard improperly, you may increase your likelihood of developing wrist problems. Some individuals are at greater risk of developing these problems because of their health, physiology, lifestyle, and general exposure to stress. Work organization and conditions, such as workstation setup and lighting, also play a part in your overall health and comfort. Preventing health problems is a multifaceted task that requires careful attention to the way you use your body every hour of every day.

The most common health effects associated with using a computer are musculoskeletal discomfort and eye fatigue. We’ll discuss each area of concern below.

Musculoskeletal discomfort

As with any activity that involves sitting for long periods of time, using a computer can make your muscles sore and stiff. To minimize these effects, set up your work environment carefully, using the guidelines that follow, and take frequent breaks to rest tired muscles. To make working with your computer more comfortable, allow enough space in your work area so that you can change position frequently and maintain a relaxed posture.

Another type of musculoskeletal concern is repetitive stress injuries (RSIs), also known as cumulative trauma disorders (CTDs). These problems can occur when a certain muscle or tendon is repeatedly overused and forced into an unnatural position. The exact causes of RSIs are not totally understood, but in addition to awkward posture, such factors as the amount of repetition, the force used in the activity, the individual's physiology, workplace stress level, and lifestyle may affect the likelihood of experiencing an RSI.

RSIs did not suddenly arise when computers were invented; tennis elbow and writer's cramp, for example, are two RSIs that have been with us for a long time. Although less common than other RSIs, one serious RSI discussed more often today is a wrist problem called carpal tunnel syndrome, which may be aggravated by improper use of computer keyboards. This nerve disorder results from excessive pressure on the median nerve as it passes through the wrist to the hand.

This section offers advice on setting up your work area to enhance your comfort while you use your computer. Since the effects of repetitive movements associated with using a computer can be compounded by those of other work and leisure activities to produce or aggravate physical problems, proper use of your computer system must be considered as just one element of a healthy lifestyle.

No one, of course, can guarantee that you won't have problems even when you follow the most expert advice on using computer equipment. You should always check with a qualified health specialist if muscle, joint, or eye problems occur.

Eye fatigue

Eye fatigue can occur whenever the eyes are focused on a nearby object for a long time. This problem occurs because the eye muscles must work harder to view an object that's closer than about 20 feet (6 meters). Improper lighting can hasten the development of eye fatigue. Although eye fatigue is annoying, there's no evidence that it leads to permanent damage.

Whenever you're engaged in an activity that involves close-up work—such as reading a magazine, doing craft work, or using a computer—be sure to have sufficient glare-free lighting and give your eyes frequent rest breaks by looking up and focusing on distant objects. Remember to have your eyes examined regularly.

To prevent discomfort and eye fatigue:

- Arrange your workspace so that the furniture is properly adjusted for you and doesn't contribute to an awkward working posture.
- Take frequent short breaks to give your muscles and eyes a chance to rest.

Arranging your office

Here are some guidelines for adjusting the furniture in your office to accommodate your physical size and shape.

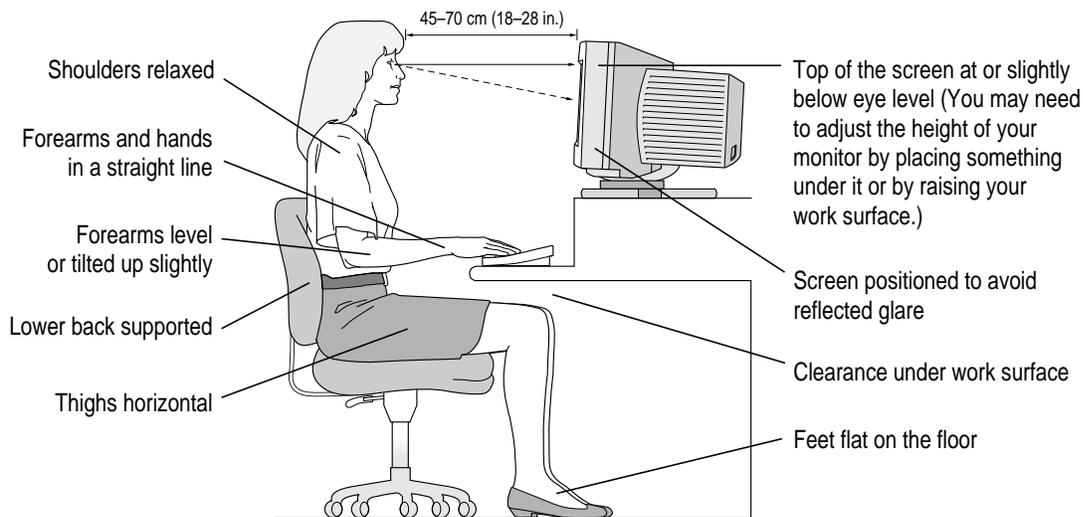
- An adjustable chair that provides firm, comfortable support is best. Adjust the height of the chair so your thighs are horizontal and your feet flat on the floor.

The back of the chair should support your lower back (lumbar region). Follow the manufacturer's instructions for adjusting the backrest to fit your body properly.

- When you use the computer keyboard, your shoulders should be relaxed. Your upper arm and forearm should form an approximate right angle, with your wrist and hand in roughly a straight line.

You may have to raise your chair so your forearms and hands are at the proper angle to the keyboard. If this makes it impossible to rest your feet flat on the floor, you can use a footrest with adjustable height and tilt to make up for any gap between the floor and your feet. Or you may lower the desktop to eliminate the need for a footrest. Another option is to use a desk with a keyboard tray that's lower than the regular work surface.

- Position the mouse at the same height as your keyboard. Allow adequate space to use the mouse comfortably.
- Arrange the monitor so the top of the screen is slightly below your eye level when you're sitting at the keyboard. The best distance from your eyes to the screen is up to you, although most people seem to prefer 18 to 28 inches (45 to 70 cm).
- Position the monitor to minimize glare and reflections on the screen from overhead lights and windows. You may want to use a tiltable monitor stand. The stand lets you set the monitor at the best angle for viewing, helping to reduce or eliminate glare from lighting sources you can't move.



Avoiding fatigue

- Change your seated position, stand up, or stretch whenever you start to feel tired. Frequent short breaks are helpful in reducing fatigue.
- Use a light touch when typing or using a mouse and keep your hands and fingers relaxed.
- Some computer users may develop discomfort in their hands, wrists, or arms after intensive work without breaks. If you begin to develop chronic pain or discomfort in your hands, wrists, or arms, consult a qualified health specialist.
- Allow adequate work space so that you can use your keyboard and mouse comfortably. Place papers or other items so you can view them easily while using your computer. A document stand may make reading papers more comfortable.
- Eye muscles must work harder to focus on nearby objects. Occasionally focus your eyes on a distant object, and blink often while you work.
- Clean your screen regularly. Keeping the screen clean helps reduce unwanted reflections.

What about electromagnetic emissions?

There has been recent public discussion of the possible health effects of prolonged exposure to extremely low frequency (ELF) and very low frequency (VLF) electromagnetic fields. Such fields are associated with electromagnetic sources such as television sets, electrical wiring, and some household appliances—as well as computer monitors.

Apple has reviewed scientific reports and sought the counsel of government regulatory agencies and respected health organizations. Based on the prevailing evidence and opinions, Apple believes that the electric and magnetic fields produced by computer monitors do not pose a health risk.

In response to those customers who wish to reduce their exposure to electromagnetic fields, Apple has lowered the emission levels of our products. We are also actively encouraging further scientific research so we can continue to promote the health and safety of our customers and employees.

Safety instructions

For your own safety and that of your equipment, always take the following precautions.

Turn off the computer completely and disconnect the power plug (by pulling the plug, not the cord) if any of the following conditions exists:

- the power cord or plug becomes frayed or otherwise damaged
- you spill something into the case
- your Macintosh is exposed to rain or any other excess moisture
- your Macintosh has been dropped or the case has been otherwise damaged
- you suspect that your Macintosh needs service or repair
- you want to clean the case (use only the recommended procedure described later in this chapter)

Be sure that you always do the following:

- Keep your Macintosh away from sources of liquids, such as wash basins, bathtubs, shower stalls, and so on.
- Protect your Macintosh from dampness or wet weather, such as rain, snow, and so on.
- Read all the installation instructions carefully before you plug your Macintosh into a wall socket.
- Keep these instructions handy for reference by you and others.
- Follow all instructions and warnings dealing with your system.

WARNING Electrical equipment may be hazardous if misused. Operation of this product, or similar products, must always be supervised by an adult. Do not allow children access to the interior of any electrical product and do not permit them to handle any cables.

Handling your computer equipment

Follow these guidelines for handling your computer and its components:

- When setting up your computer, place components on a sturdy, flat surface, and carefully follow all setup instructions.
- When connecting or disconnecting a cable, always hold the cable by its connector (the plug, not the cord).
- Turn off your computer and all its components before connecting or disconnecting any cables to add or remove any component. Failure to do so could seriously damage your equipment.
- Never force a connector into a port. If the connector and port do not join with reasonable ease, they probably don't match. Make sure that the connector matches the port and that you have positioned the connector correctly in relation to the port.
- Take care not to spill any food or liquid on the computer, keyboard, mouse, or other components. If you do, turn your computer off immediately and unplug it before cleaning up the spill. Depending on what you spilled and how much of it got into your equipment, you may have to bring your equipment to an Apple-authorized service provider.
- Protect the computer and its components from direct sunlight and rain or other moisture.
- Keep all ventilation openings clear and unobstructed. Without proper air circulation, components can overheat, causing damage or unreliable operation.

WARNING This equipment is intended to be electrically grounded. Your Macintosh is equipped with a three-wire grounding plug—a plug that has a third (grounding) pin. This plug will fit only a grounded AC outlet. This is a safety feature. If you are unable to insert the plug into the outlet, contact a licensed electrician to replace the outlet with a properly grounded outlet. Do not defeat the purpose of the grounding plug!

Handling the monitor

Follow these procedures for handling a monitor:

- Turn down the screen brightness control if you leave the computer turned on for extended periods. If the brightness is not turned down, the image on the screen could “burn in” and damage the screen.

You can also use a “screen saver” program, which dims or varies the image on the screen when the computer has been idle for a specified period of time. These programs are available from independent suppliers and user groups.

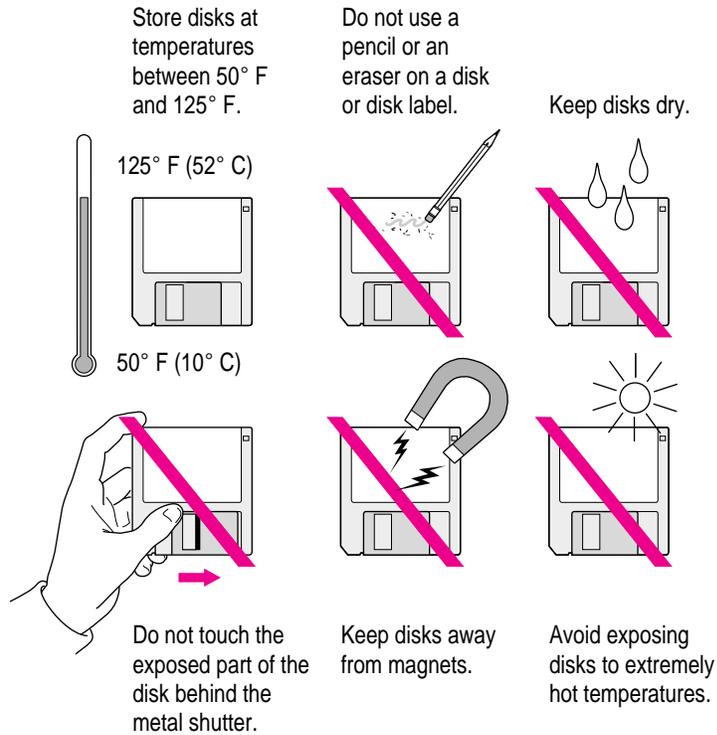
- Make sure that the ventilation openings on the computer and the monitor are clear and unobstructed.
- Some large monitors cannot safely be placed on top of the computer. Check the instructions that came with the monitor for setup information.
- If there is interference on the monitor’s screen or on a television or radio near your computer, move the affected equipment farther away.

Handling the keyboard

Take care not to spill any liquid on the keyboard. If you do, turn off your computer immediately.

- If you spill liquid that is thin and clear, unplug the keyboard, turn it upside down to let the liquid drain out, and let it dry for 24 hours at room temperature. If, after you take these steps, the keyboard doesn’t work, take it to an Apple-authorized service provider for repair.
- If you spill liquid that is greasy, sweet, or sticky, unplug the keyboard and take it to an Apple-authorized service provider for repair.

Handling floppy disks



Ejecting a disk

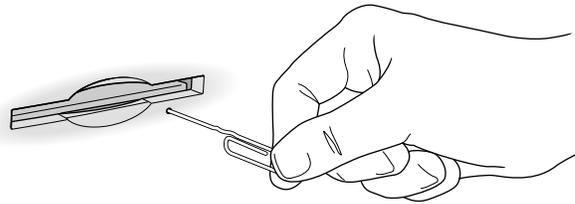
For instructions on ejecting a floppy disk, a CD-ROM disc, or a removable media disk from the Mac OS, see the “Disks” topic of Macintosh Guide, available in the Guide (📖) menu.

For instructions on ejecting disks in the PC environment, see “Ejecting Disks in the PC Environment” in Chapter 5.

If you can't eject a floppy disk

If you can't eject a floppy disk in the usual way, try the following in order:

- Hold down the ⌘ and Shift keys and press the number 1 key on your keyboard to eject a disk in the internal disk drive.
- Turn off the computer. If the disk isn't ejected, then hold down the button on your mouse or other pointing device while you turn the computer on again.
- Locate the small hole near the disk drive's opening, and carefully insert the end of a large straightened paper clip into it. Push gently until the disk is ejected. Do not use excessive force.



If nothing works, take the computer or disk drive to your Apple-authorized service provider to have the disk removed.

Power supply

The power supply in your computer is a high-voltage component and should not be opened for any reason, even when the computer is off. If the power supply needs service, contact your Apple-authorized dealer or service provider.

Cleaning your equipment

Follow these general rules when cleaning the outside of your computer and its components:

- Use a damp, soft, lint-free cloth to clean the computer's exterior. Avoid getting moisture in any openings.
- Don't use aerosol sprays, solvents, or abrasives.

Cleaning the computer case

To clean the case, do the following:

- 1** Turn off the computer completely and then disconnect the power plug. (Pull the plug, not the cord.)
- 2** Wipe the surfaces lightly with a clean, soft cloth dampened with water.

Cleaning the monitor

To clean the screen, put household glass cleaner on a soft cloth and wipe the screen. Don't spray the cleaner directly on the screen, because the liquid might drip into the monitor or computer.

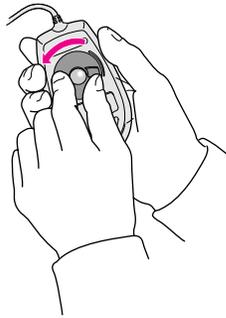
Cleaning the mouse

The mouse contains a small ball that must roll smoothly for the mouse to work properly. You can keep this ball free of dirt and grease by using the mouse on a clean, lint-free surface and cleaning it occasionally.

You need a few cotton swabs and a clean, soft, lint-free cloth.

- 1** Turn off your computer.

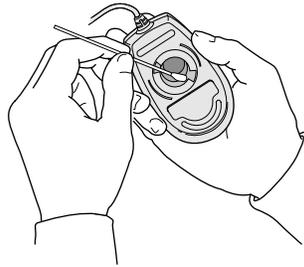
- 2 Turn the mouse upside down and turn the plastic ring on the bottom counterclockwise to disengage it.**



If you have an older mouse, you may need to press the plastic ring (rather than turn it) to disengage it.

If the mouse is locked, see the next section, “Locking and Unlocking the Mouse,” for instructions on how to unlock it.

- 3 Turn the mouse right-side up with one hand and catch the ring and the ball with your other hand.**
- 4 Clean the three small rollers inside the mouse with a cotton swab moistened with water.**
Rotate the rollers to clean all around them.



- 5 Wipe the mouse ball with a clean, soft, dry, and lint-free cloth.**
- 6 If necessary, wash the mouse ball with warm soapy water (use a mild soap such as a dishwashing liquid) and then dry the mouse ball thoroughly.**
- 7 Gently blow into the mouse case to remove any dust that has collected there.**

8 Put the ball and the ring back in place.

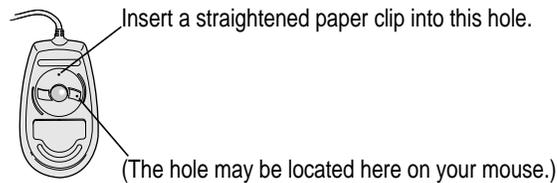
Your mouse should roll smoothly across your mouse pad or desk. If it doesn't, repeat these instructions carefully.

Locking and unlocking the mouse

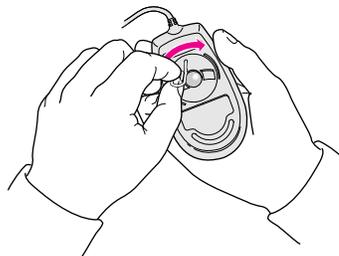
Some mouse devices can be locked so that the ball can't be removed. A locking mouse has a small hole on the plastic ring.

To lock the mouse, follow these steps:

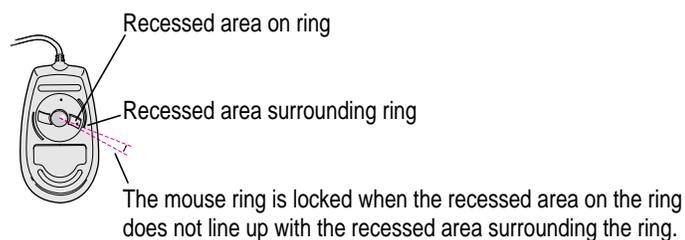
1 Insert a straightened paper clip into the hole on the plastic ring.



2 Press down on the paper clip while you turn the ring clockwise.

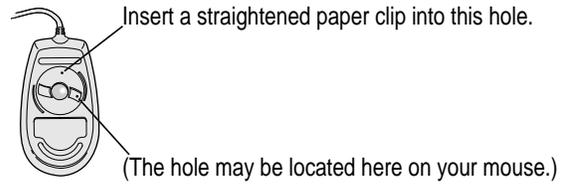


Turn the ring a very short distance, until it stops. When the recessed area on the ring is *not* lined up with the recessed area surrounding the ring, the mouse is locked.

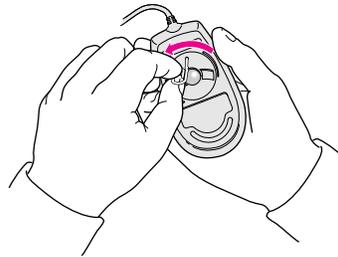


To unlock the mouse, follow these steps:

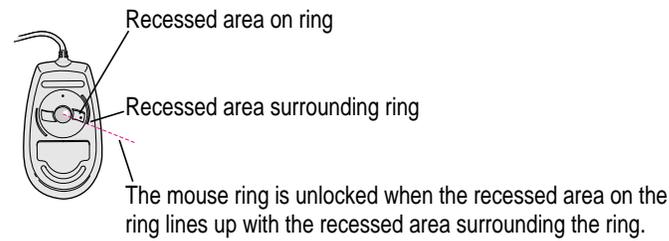
- 1 Insert a straightened paper clip into the hole on the plastic ring.**



- 2 Press down on the paper clip while you turn the ring counterclockwise.**



Turn the ring a very short distance. When the recessed area on the ring is lined up with the recessed area surrounding the ring, the mouse is unlocked.



Read this appendix for instructions on installing an expansion card in your computer or memory for the PC environment.



Appendix B Installing an Expansion Card or Memory for the PC Environment



Expansion cards are printed circuit boards that can be installed in your computer to give it special capabilities, such as enhanced video, networking and communications, and additional processing power.

You can install an expansion card by following the instructions that came with the card, or by following the instructions in this appendix. However, be sure to read this appendix for instructions that may be specific to your computer.

If your computer comes with a Single Inline Memory Module (SIMM) installed on the DOS-compatibility card, you can remove it or replace it with a SIMM that has a higher memory capacity.

If your computer does not already have a SIMM installed on the DOS-compatibility card, you can add a SIMM that provides up to 32 megabytes (MB) of RAM for the exclusive use of your PC. The SIMM that your card uses is the same type of SIMM that your computer uses. Follow the instructions in this appendix to install a SIMM.

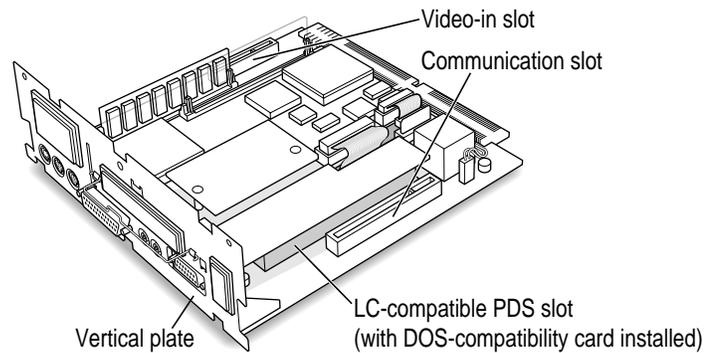
WARNING To avoid damage to your computer, Apple recommends that only an Apple-certified technician install additional RAM. Consult the service and support information that came with your Apple product for instructions on how to contact an Apple-authorized service provider or Apple for service. If you attempt to install additional RAM yourself, any damage you may cause to your equipment will not be covered by the limited warranty on your computer. See an Apple-authorized dealer or service provider for additional information about this or any other warranty question.

Cards fit into slots on the computer's logic board—the board that holds the components that make your computer work. There are three types of slots on your computer's logic board, each labeled on the board:

- a communication slot for an internal modem or an Ethernet card
- an LC-compatible 68030 processor-direct slot (PDS). The DOS-compatibility card is already installed in this slot; you cannot add another card to it.



- a video-in slot for a card that brings signals into the computer from a videocassette recorder (VCR), laserdisc player, video camera, or similar equipment



Note: This appendix contains instructions for installing a communication card and a SIMM. To install a video input card or a TV tuner card, follow the instructions that came with the kit or card.

WARNING To avoid damaging your computer and expansion card, do not attempt to install any expansion card without first checking the documentation for that card. If the documentation specifies that an Apple-certified technician must install the card (usually because the installation requires special training or tools), consult the service and support information that came with your computer for instructions on how to contact an Apple-authorized service provider or Apple for assistance. If you attempt to install the card yourself, any damage you may cause to the computer or card will not be covered by the limited warranty on your computer. If the card is not an Apple-labeled product, check with an Apple-authorized dealer or service provider to see if you can install it yourself.

Installing an expansion card or SIMM involves three steps:

- opening the computer
- inserting the card or SIMM into a particular slot
- closing the computer

Opening the computer

- 1 Shut down your computer by choosing Shut Down from the Special menu.

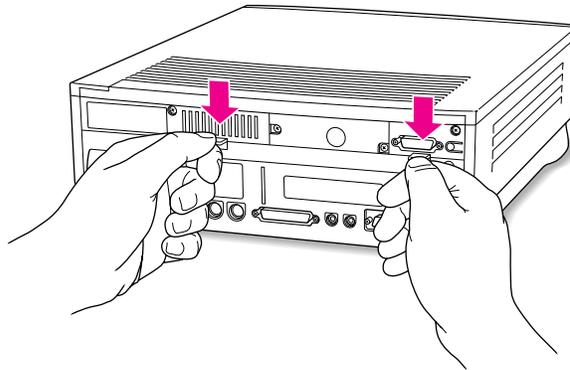
You can also press the Power key on the keyboard.

- 2 Unplug all the cables except the power cord from your computer.

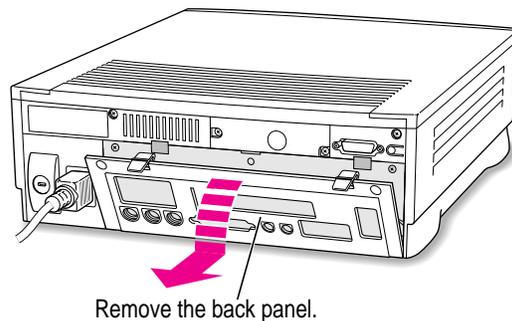
Leaving the power cord plugged in helps protect the computer from damage caused by electrostatic discharge.

IMPORTANT To avoid generating static electricity that may damage components, do not walk around the room until you have completed the installation of the expansion card or SIMM and closed the computer. Additionally, move the logic board as little as possible while it is outside the computer case.

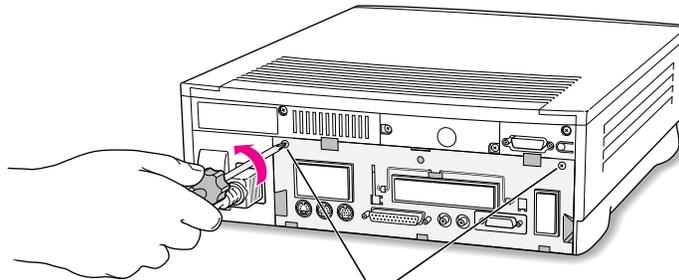
- 3 Place your thumbs on the two tabs at the top of the back panel, and press down.



- 4 Pulling gently, swing the panel down, and slip it out.



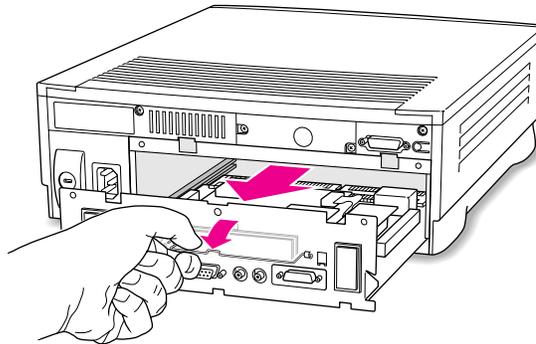
- 5** If there are security screws on the vertical plate on the back of the computer, remove them with a Phillips screwdriver.



If there are security screws, remove both screws from the vertical plate.

- 6** Unplug the power cord from your computer.
- 7** Swing the handle out from its storage position. Then grasp the handle and gently but firmly pull it toward you.

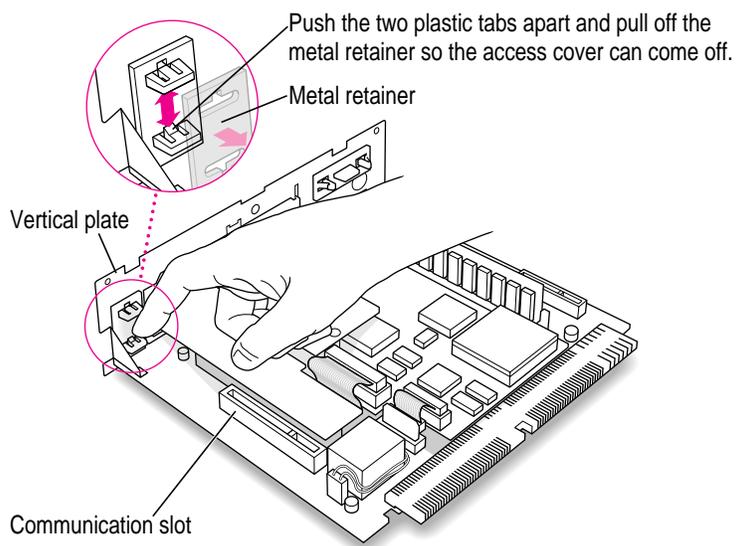
The vertical plate and the logic board to which it's attached slide all the way out of the computer. Carefully support the logic board as it comes out, and put it on a stable, clean, flat surface.



What you do next depends on the type of equipment you want to install.

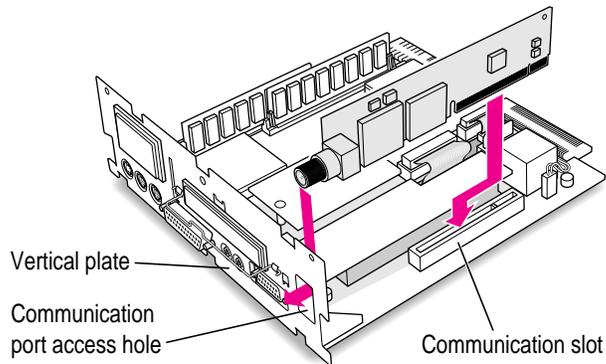
Installing a communication card

- 1 If your communication card has ports for connecting equipment, remove the plastic access cover from the vertical plate.



- 2 Remove the communication card from its static-proof bag.
Hold the card by its edges to avoid touching any connectors on the card.
- 3 Locate the slot on the logic board labeled **COMMUNICATION SLOT**.

4 Align the card over the communication slot.



5 Press down on the card until the connector is solidly in place.

Don't force the card. If you meet resistance, pull the card out and try again.

To see if the card is properly connected, lift it gently. If it resists and stays in place, it's connected.

Installing or replacing a SIMM for the PC environment

Your computer may have come with a SIMM (memory module) already installed on the DOS-compatibility card inside your computer. The SIMM provides memory for the exclusive use of the PC environment. (See the *Technical Information* booklet to find out whether your computer has such a SIMM installed.) To replace the SIMM with a SIMM of greater capacity, or to install a SIMM if you don't already have one installed, follow the instructions in this section.

Note: The SIMMs used by the DOS-compatibility card are the same 72-pin SIMMs used to expand memory in your Macintosh. They are interchangeable.

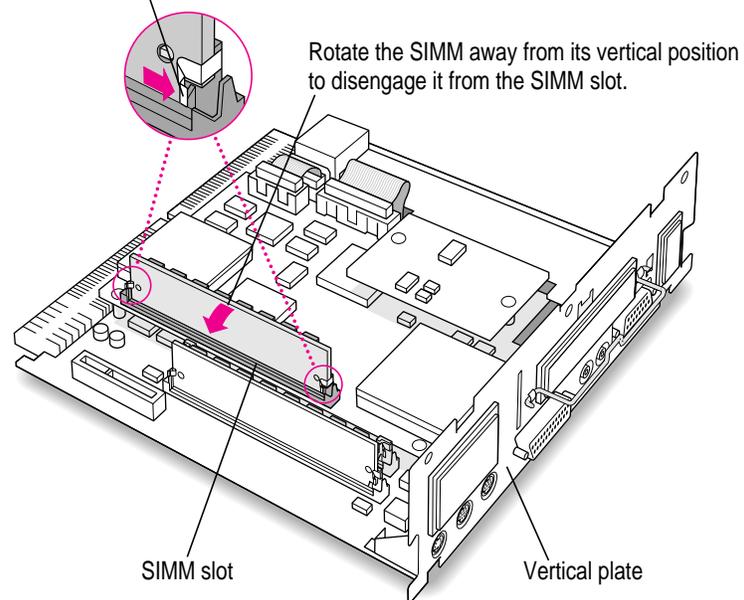
Removing a SIMM

If your computer has a SIMM already installed on the DOS-compatibility card, follow these steps to remove it.

- 1 Pull the metal clips at either end of the SIMM away from the SIMM.**

Use your fingernails.

To release the SIMM, move the metal clip on each side away from the SIMM.



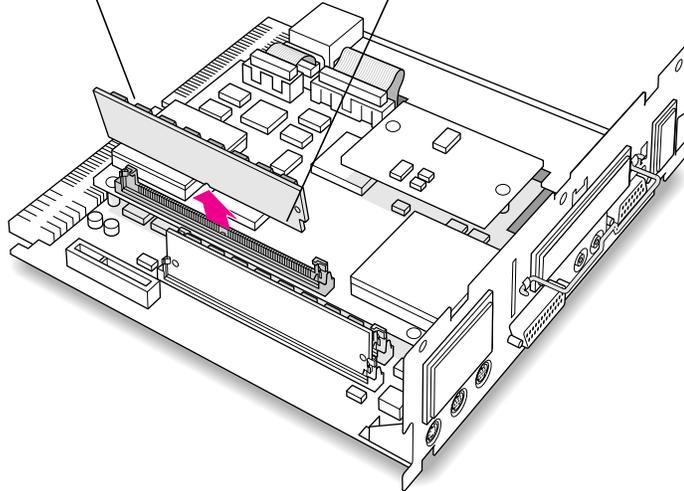
- 2 Rotate the SIMM until it is at a slight angle.**

3 Gently pull the SIMM out of its slot.

Hold the SIMM only by its sides. Don't touch the connectors along the bottom edge.

Pull the SIMM out of the SIMM slot.
(It comes out at a slight angle.)

Handle the SIMM by the sides only, so that you
don't touch the connectors along the bottom edge.



Installing a SIMM

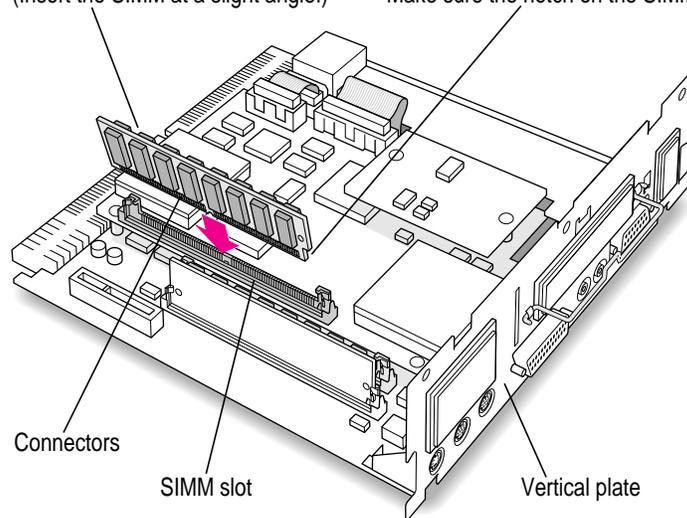
- 1 Remove the SIMM from its static-proof bag.**

Handle the SIMM by its edges. Avoid touching the connectors.

- 2 Insert the SIMM into the SIMM slot on the DOS-compatibility card assembly, as shown in the illustration. (Your SIMM may have components on one or both sides, as shown.)**

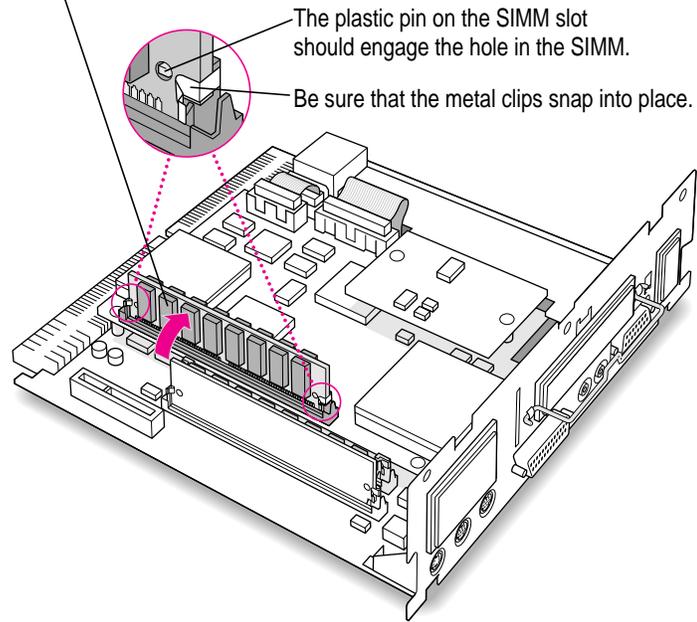
Insert the SIMM into the SIMM slot.
(Insert the SIMM at a slight angle.)

The SIMM fits into the slot only one way.
Make sure the notch on the SIMM is on this side.



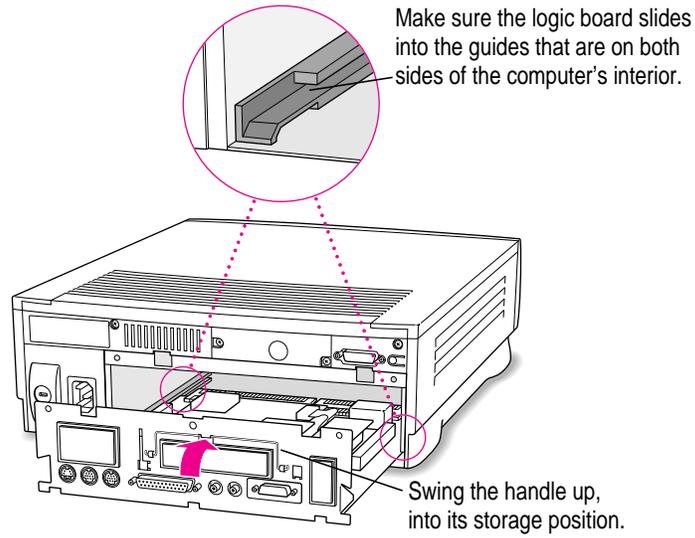
3 Rotate the SIMM gently to the back until you feel it snap into place.

Rotate the SIMM back until it snaps into place.



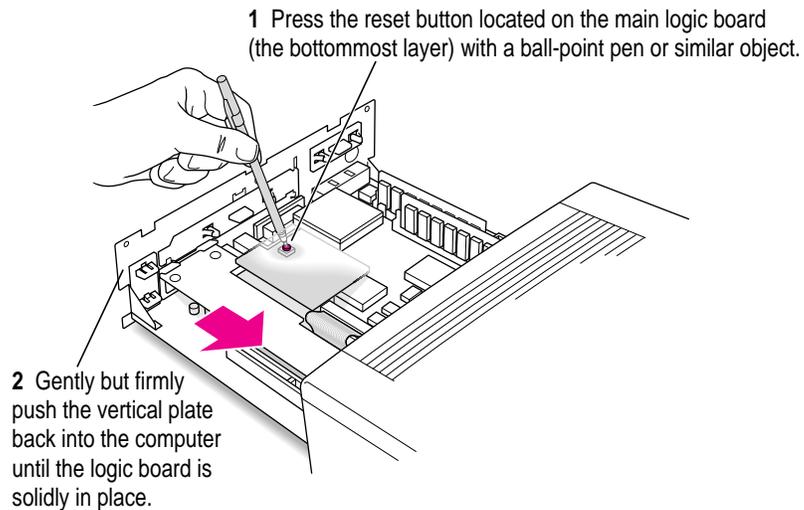
Closing the computer

- 1 Slip the base of the logic board into the guide rails inside the computer case and swing the handle back into its storage position.

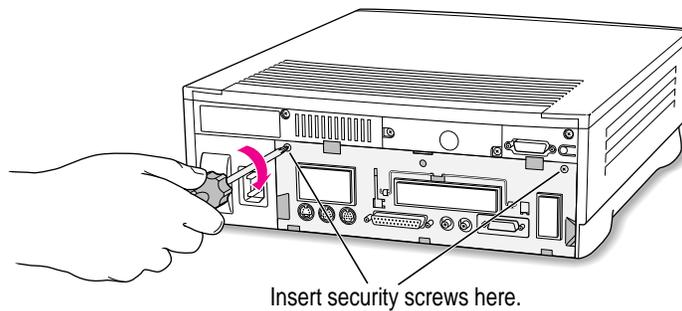


- 2 Press the reset button on the logic board, and then slide the logic board back into the computer.**

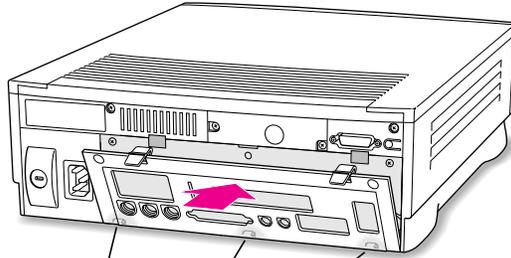
Note: When you press the reset button, some of your computer's software settings will change. You may want to open the control panels for the date and time, keyboard, and mouse to make sure that they are set the way you want them. For more information about working with control panels, see the "Setting Options" topic of Macintosh Guide, available in the Guide (📖) menu.



- 3 If you removed security screws earlier, reinsert them now.**

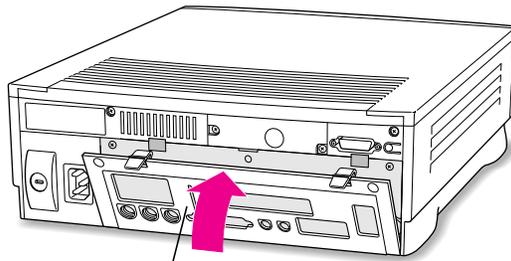


- 4 Slip the three hooks at the base of the back panel into the grooves in the computer case.



Slip the three hooks on the back panel into the grooves in the computer case.

- 5 Swing the back panel up and snap it into place.



Snap the plastic back panel into place.

- 6 Plug the cables back into the computer.

- 7 Reconnect the power cord.

Your computer is now ready to turn on and use.

WARNING Never turn on your computer unless all of its internal and external parts are in place. Operating the computer when it is open or missing parts can be dangerous, and can damage your computer.

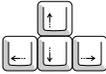
Read this appendix to learn how to use the special keys on your keyboard.

Appendix C Special Keys on Your Keyboard

Your computer keyboard contains certain special keys that typewriter keyboards don't have. Many of these keys allow you to give commands to the computer without using the mouse. For example, in many application programs, pressing the ⌘ (Command) key at the same time as the Q key lets you quit a program.

The following table describes what you can do with the special keys on your keyboard. The special keys on your keyboard depend on the model of keyboard you have; some keyboards do not have all the keys listed.

Special keys on Apple keyboards

Arrow keys		Use to move the insertion point, as an alternative to using the pointer. In some programs, the arrow keys have other functions.
Caps Lock key		Use to capitalize a series of letters (numbers and symbols aren't affected).
Clear key		Use to delete the current selection (or use the Delete key). In some programs, Clear has other functions.
⌘ (Command) key		Use in combination with other keys as an alternative to choosing a menu command.

continued ►

Special keys on Apple keyboards *(continued)*

Control key		In combination with other keys, this key provides shortcuts or modifies other actions.
Delete key		Use to delete selected material, or the character to the left of the insertion point.
Enter key		In a dialog box, pressing Enter is the same as clicking the outlined button. In some programs, pressing this key confirms information you have provided.
Escape key		The function of this key depends on the program you're using.
Function keys		Some programs allow you to use the 12 function keys to give commands. You can assign commands or action sequences to function keys with special utility programs.
Option key		Use in combination with other keys to produce special characters or modify actions.
Numeric keys		Use to produce numbers and mathematical symbols; some programs use these keys as function keys to initiate actions.
Power key		On some models, press to turn on the computer. Also press to shut down the computer on certain models.
Return key		Use to move the insertion point to the beginning of the next line. In a dialog box, pressing Return is the same as clicking the outlined button.
Shift key		Use to produce capital letters (or the upper character on the key).
Other special keys		The function of these keys depends on the operating system and program you're using.
Tab key		Use to move the insertion point to the next stopping place (such as a tab stop or field in a dialog box or program).

Typing special characters and symbols

In the Mac OS, you can type a variety of international and other special symbols and characters (including characters with diacritical marks, such as accents) by pressing combinations of keys.

The Key Caps program, which is installed with your system software, shows you the characters produced when you type certain keys and key combinations in the fonts available on your computer. Choose Key Caps from the Apple (🍏) menu, then choose the font from the Key Caps menu.



To have Key Caps show more options for special characters, press each of these keys or key combinations: Option, Shift, Shift-Option, Shift-⌘, and Option-⌘.



The highlighted key represents the key held down on the keyboard—in this case, the Option key.

If you press the Option key, Key Caps lightly outlines the keys that you can use in combination with letter keys to type letters with accents or other diacritical marks.

If you see rectangles: If you see rectangles instead of diacritical marks on some of the pictures of keys in Key Caps, try pressing Option-⌘ to see the diacritical marks. However, you only need to use the Option key (not Option-⌘) in combination with the other keys to type letters with diacritical marks.

If you press the Option key at the same time as a key for a specific diacritical mark and then release both keys, Key Caps outlines in bold the keys for letters that can be typed with that mark. (You'll see that most key combinations for diacritical marks can be used with the Space bar as well as letter keys—producing the mark without a letter.)

The most common diacritical marks and how to create them are summarized next.

Diacritical mark	Key combination
Grave accent (`)	Option-` , then type the character
Acute accent (´)	Option-e, then type the character
Circumflex (^)	Option-i, then type the character
Tilde (~)	Option-n, then type the character
Umlaut (¨)	Option-u, then type the character
The letter “c” with a cedilla (ç)	Option-c

- **To type a letter or a space with a specific diacritical mark, press the Option key and the key for the mark simultaneously. Then type the letter that needs the mark.**

If you are having trouble getting a mark and letter to appear together, try again. Be sure to press the Option key before (or at the same time as) the key for the mark; then, after you release both keys, type the letter to be marked.

Special key combinations

To do this press this key combination
Force a program to quit	⌘-Option-Esc
Force the computer to restart	⌘-Control-Power key

Read this appendix for instructions on installing PC network management software.



Appendix D Installing Network Management Software

•••••

The DOS-compatibility card inside your computer supports network drivers that conform to Novell's Open Data-Link Interface (ODI). This appendix contains instructions for installing such network management software. It covers

- installing NetWare client software
- installing Novell's LAN Workplace for DOS TCP/IP software
- installing NetManage's Chameleon TCP/IP software
- installing Windows for Workgroups
- installing Spry's Air Series TCP/IP software
- installing Mosaic

Installing NetWare client software

The instructions in this section will guide you through installation of client software for Novell NetWare versions 3.12, 4.01, and 4.02. PersonalNetWare is not supported at this time. You must have Windows installed before you can install the NetWare client software. If you need to reinstall Windows, see "Reinstalling PC Software" in the section "Reinstalling the DOS-Compatibility Software" in Chapter 8.

Before you start, be sure you have the appropriate floppy disks for the version of NetWare you wish to install.

In addition, you need to know the Ethernet frame type in use on your network segment. You must choose the appropriate frame type in Step 11 below. If you are not certain which one to select, ask your network administrator before you begin the installation.

1 Insert the *NetWare Client for DOS WSDOS_1* disk into the disk drive.

2 At the DOS prompt, type the following:

```
A: <return>
```

```
INSTALL
```

3 The NetWare Client Install screen appears.

Follow the instructions on screen, pressing Return for each selection.

4 Define the directory for NetWare.

The default is C:\NWCLIENT. Press Return once to confirm the entry and press it again to execute this step.

5 Edit the CONFIG.SYS file.

Change your LASTDRIVE statement so that it reads LASTDRIVE=Z.

6 Add the following line to your AUTOEXEC.BAT file:

```
CALL C:\NWCLIENT\STARTNET.BAT
```

Press Y-Return.

7 Decide whether you wish to load the Windows support in the directory where you have loaded Windows.

Press Y or N. If yes, press Return once to confirm the Windows subdirectory entry and again to execute this step.

8 Select the driver for the network board. Press Return.

9 A message asks you to insert another disk. Follow the instructions on the screen.

10 In the dialog box, select Power Macintosh 6100 Ethernet Adapter and press Return.

11 In the dialog box for selecting a frame type, press Return.

- 12 Use the arrow keys to choose the appropriate frame type for the Novell server you will be using.
- 13 Press Return. Then press Esc to continue.
- 14 Press Return to copy the MACODI.COM driver to the NetWare subdirectory.
- 15 Following the instructions on the screen, insert the *NetWare Client for DOS WSDOS_1* disk again.
- 16 If you wish to add files and a NetWare group to the Windows directory, insert the *NetWare Client for MS Windows WSWIN_1* disk and follow the instructions on the screen.

When installation is complete, a dialog box appears asking you to reboot (restart) the computer.

- 17 Eject the disk by pressing ⌘-E.
- 18 Press Control-Alt-Delete.

You now have additional network drives and mappings available. Your first network drive letter is Novell's default of F, unless this drive is already in use on your machine or your network is set up to use a different starting drive.

- 19 To log into the network, type the following:

F:

LOGIN <your user name>

PASSWORD: <your password, if any>

Conserving memory

During NetWare client installation, you add the line

```
CALL C:\NWCLIENT\STARTNET.BAT
```

to the beginning of the AUTOEXEC.BAT file. This command then loads four programs into DOS memory—LSL.COM, MACODI.COM, IPXODI.COM, and VLM.EXE (in this order). To conserve memory in the lower DOS region, you may wish to edit the STARTNET.BAT file (installed with your NetWare software) to load those four programs with the LOADHIGH (LH) command. See your DOS documentation for details on manually optimizing DOS memory. (Be aware that the Microsoft utility MEMMAKER does not work with the DOS-compatible Macintosh.)

Mapping drive letters

When you map a network resource as a drive letter, the Macintosh PC Setup control panel recognizes that that drive letter is unavailable for use as a shared folder. However, when the network no longer uses the drive letter, PC Setup still shows it as unavailable for shared folders until you restart the PC environment.

In addition, if a drive letter is being shared before you start up the PC environment and Novell needs to use that drive letter, then the Novell network drive will take precedence over that shared drive letter.

For further information, see your Novell installation and administration manuals, or contact your network administrator.

Installing Novell's LAN Workplace for DOS TCP/IP software

IMPORTANT You must not have MacTCP installed when you run DOS TCP/IP software; the two will conflict with one another.

You can use the IPX and TCP protocols at the same time in the PC environment or in the Mac OS, or you can use one protocol in the PC environment and the other protocol in the Mac OS. However, you cannot use the same protocol in both environments at the same time.

If you want to use the IPX protocol in the PC environment and you have previously installed MacIPX in the Mac OS, remove MacIPX from the Control Panels folder or select AppleTalk as your network interface in the MacIPX control panel.

If you want to use the TCP protocol in the PC environment and you have previously installed MacTCP in the Mac OS, remove MacTCP from the Control Panels folder or select an interface other than Ethernet in the MacTCP control panel.

You must have Windows installed before you can install the LAN Workplace for DOS software. If you need to reinstall Windows, see “Reinstalling PC Software” in the section “Reinstalling the DOS-Compatibility Software” in Chapter 8.

In addition, you need to know the following information before you start:

- A legitimate, assigned IP address for the machine on which you're installing the TCP/IP software (for example, 222.111.11.1). For connecting to the Internet, your service provider will tell you the correct address. For TCP/IP networking within your company, your network administrator can provide you with an address.

If you have either a BOOTP or an RARP server to dynamically assign IP addresses, you don't need to know the IP address before beginning the installation.

- If you are on a network with a subnet mask, you need the IP address for that mask; for example:
 - 255.0.0.0 for client Class A IP addresses (those between 0.0.0.1 and 127.255.255.254)
 - 255.255.0.0 for client Class B IP addresses (those between 128.0.0.1 and 191.255.255.254)
 - 255.255.255.0 for client Class C IP addresses (those between 192.0.0.1 and 223.255.255.254)
- If you will connect to a TCP/IP host through a router, you need to know the IP address for that router.
- The name of your domain name server (for example, server.edu).
- The IP address of your domain name server.

Once you have this information, you can proceed with the installation by following Novell's instructions and responding to the on-screen prompts.



Installing NetManage's Chameleon TCP/IP software

IMPORTANT You must not have MacTCP installed when you run DOS TCP/IP software; the two will conflict with one another.

You can use the IPX and TCP protocols at the same time in the PC environment or in the Mac OS, or you can use one protocol in the PC environment and the other protocol in the Mac OS. However, you cannot use the same protocol in both environments at the same time.

If you want to use the IPX protocol in the PC environment and you have previously installed MacIPX in the Mac OS, remove MacIPX from the Control Panels folder or select AppleTalk as your network interface in the MacIPX control panel.

If you want to use the TCP protocol in the PC environment and you have previously installed MacTCP in the Mac OS, remove MacTCP from the Control Panels folder or select an interface other than Ethernet in the MacTCP control panel.

You must have Windows installed before you can install the Chameleon TCP/IP software. If you need to reinstall Windows, see “Reinstalling PC Software” in the section “Reinstalling the DOS-Compatibility Software” in Chapter 8.

In addition, you need to know the following information before you start:

- A legitimate, assigned IP address for the machine on which you're installing the TCP/IP software (for example, 222.111.11.1). For connecting to the Internet, your service provider will tell you the correct address. For TCP/IP networking within your company, your network administrator can provide you with an address.
- The name of your domain name server (for example, server.edu).
- The IP address of your domain name server (for example, 111.222.00).
- The IP address of your Internet gateway, if any.

Once you have this information, you can proceed.

To install Chameleon from Windows:

1 In the Program Manager, choose Run from the File menu.

2 Type `A:\SETUP`.

Follow the on-screen instructions and prompts. Near the end of the installation, you will be asked to respond to a series of dialog boxes. Respond as follows:

ADD INTERFACE

Click OK.

INTERNET ADDRESS

Enter the address provided by your network administrator or service provider.

SUBNET MASK

Click OK. The software will supply the correct mask.

HOST NAME

Select a name for your client machine.

DOMAIN NAME

Enter the name for your domain name server.

3 Choose Domain Servers from the Services menu.

4 Enter the IP address of the domain name server.

5 Choose Gateway from the Services menu.

6 Enter the IP address of the Internet gateway, if any.

7 Save the settings by pressing Alt-F-S.

If you will be using a dial-up TCP/IP connection, skip to the next section, "Restarting Windows." If not, proceed with step 8.

8 Go to the `C:\NWCLIENT` directory

9 Copy `NET.CFG` to `NET.OLD`. (Save a copy of the existing `NET.CFG` file.)

10 Modify the NET.CFG file.

A sample modified file is shown below. Note the addition of the Protocol statements in the Link Driver section and the addition of the Protocol TCP/IP section. The frame types and IP addresses used in your environment may be different from this example.

```
Link Driver MACODI
    Protocol IPX E0 ETHERNET_802.2
    Frame ETHERNET_802.2
    Frame Ethernet_II
    ;    Frame Ethernet_802.3
    ;    Frame Ethernet_SNAP
        Protocol RARP 8035 ethernet_ii
    Protocol ARP 806 ethernet_ii
    Protocol IP 800 ethernet_ii
    PORT 300
    INT 10
    ;    node address 12d43
NetWare DOS Requester
    FIRST NETWORK DRIVE = F
Protocol TCPIP
    ip_router    17.131.1.0
    ip_netmask   255.0.0.0
    ip_address   17.131.0.14
    PATH LANG_CFG C:\NET\LANG
    PATH SCRIPT  C:\NET\SCRIPT
    PATH PROFILE C:\NET\PROFILE
    PATH LWP_CFG  C:\NET\HSTACC
    PATH TCP_CFG  C:\NET\TCP
Link Support
    Buffers 4 1500
    MemPool 4096
```

Restarting Windows

- 1 Restart the PC environment.
- 2 Start Windows.

You see the Chameleon group window.

Testing the installation

If you will be using a direct connection to a domain name server, you can test the installation by using the Ping application program.

- 1 Double-click the Custom icon in the Chameleon group to open it.
- 2 Double-click the Ping icon.
- 3 Click Start.
- 4 Enter the name for a domain name server.

You should get a response back within a few seconds.

Using a dial-up service

If you will be using a dial-up service such as Portal, you may need to edit the configuration file to reflect any differences between the default setup and your setup. Click the Custom icon in Windows, open the appropriate .CFG file, and edit the file.

You can test the installation by using Ping. For example, with Portal:

- 1 Connect using Alt-C.
- 2 Ping the name news.ip.portal.com.

You should get a response back within a few seconds.

Installing Windows for Workgroups

To support networking with your DOS-compatibility hardware, you need to install software that supports ODI (Open Data-Link Interface) drivers. Follow these steps:

- 1 **Install Windows for Workgroups 3.1.1, electing to not install the networking software.**
- 2 **Follow the instructions in “Installing NetWare Client Software,” earlier in this appendix.**
- 3 **Follow the instructions in “Installing NetManage’s Chameleon TCP/IP Software,” earlier in this appendix.**

Installing Spry’s Air Series TCP/IP software

IMPORTANT You must not have MacTCP installed when you run DOS TCP/IP software; the two will conflict with one another.

You can use the IPX and TCP protocols at the same time in the PC environment or in the Mac OS, or you can use one protocol in the PC environment and the other protocol in the Mac OS. However, you cannot use the same protocol in both environments at the same time.

If you want to use the IPX protocol in the PC environment and you have previously installed MacIPX in the Mac OS, remove MacIPX from the Control Panels folder or select AppleTalk as your network interface in the MacIPX control panel.

If you want to use the TCP protocol in the PC environment and you have previously installed MacTCP in the Mac OS, remove MacTCP from the Control Panels folder or select an interface other than Ethernet in the MacTCP control panel.

You must have Windows installed before you can install Spry’s Air Series TCP/IP software. If you need to reinstall Windows, see “Reinstalling PC Software” in the section “Reinstalling the DOS-Compatibility Software” in Chapter 8.

If your computer is using a VGA driver, and your Air Series software is version 3.0, you need to make the following change. (These instructions assume that you have Windows installed in the C:\WINDOWS directory. If Windows is elsewhere, type the actual Windows location.)

1 Make sure the Air Series Setup disk is *not* read-only.

2 Place the disk in drive A.

3 Type the following at the DOS prompt:

```
A: <return>
```

```
COPY SETUP.BMP SETUP.OLD <return>
```

```
COPY C:\WINDOWS\RIVETS.BMP A:SETUP.BMP <return>
```

In addition, you will need to know the following information before you start:

- Your Internet e-mail address.
- A legitimate, assigned IP address for the machine on which you're installing the TCP/IP software (for example, 222.111.11.1). For connecting to the Internet, your service provider will tell you the correct address. For TCP/IP networking within your company, your network administrator can provide you with an address.
- If you are on a network with a subnet mask, the IP address for that mask, for example:
 - 255.0.0.0 for client Class A IP addresses (those between 0.0.0.1 and 127.255.255.254)
 - 255.255.0.0 for client Class B IP addresses (those between 128.0.0.1 and 191.255.255.254) and
 - 255.255.255.0 for client Class C IP addresses (those between 192.0.0.1 and 223.255.255.254)
- If you will connect through a gateway, the IP address for that device.
- The name of your domain name server (for example, server.edu).

Once you have this information, you can proceed.



To install Air Series from Windows:

1 In the Program Manager, open the File menu and choose Run.

2 Type `A:\SETUP`.

Follow the instructions you see on the screen.

3 When the installation asks you to select the Ethernet card manufacturer and type, choose anything.

Note the name of the adapter you select (for example, 3Com is 3C5x9). The Apple driver is not on the list, so you will need to edit the AUTOEXEC.BAT file after completing the installation.

4 When the installation asks if you want to update the AUTOEXEC.BAT file, select YES.

5 Once the installation is complete, exit Windows.

6 Edit the AUTOEXEC.BAT file as follows. (You can use any convenient text editor, such as EDIT in the DOS directory.)

- Comment out the line

```
CALL C:\NWCLIENT\STARTNET.BAT
```

- Change the line

```
C:\AIR\BIN\
```

to

```
C:\AIR\BIN\MACODI
```

- If you are on a NetWare local area network and are using the Novell VLM redirector, add the line

```
C:\NWCLIENT\VLM
```

after the line

```
C:\AIR\BIN\TCPIP
```

- If you are using NETx, add the line

```
C:\NWCLIENT\VLM
```

before the line

```
C:\AIR\BIN\TCPIP
```

7 Restart the PC environment.

8 Log into the network and start Windows.

You should now see the Air Series group window.

Testing the installation

To test the installation:

1 Double-click the Air Telnet icon to open it.

An Open Telnet Session dialog box appears.

2 Double-click the name of your domain name server.

You see a VT100 window with a log-in prompt.

Installing Mosaic

IMPORTANT You must not have MacTCP installed when you run DOS TCP/IP software; the two will conflict with one another.

You can use the IPX and TCP protocols at the same time in the PC environment or in the Mac OS, or you can use one protocol in the PC environment and the other protocol in the Mac OS. However, you cannot use the same protocol in both environments at the same time.

If you want to use the IPX protocol in the PC environment and you have previously installed MacIPX in the Mac OS, remove MacIPX from the Control Panels folder or select AppleTalk as your network interface in the MacIPX control panel.

If you want to use the TCP protocol in the PC environment and you have previously installed MacTCP in the Mac OS, remove MacTCP from the Control Panels folder or select an interface other than Ethernet in the MacTCP control panel.

You must have Windows installed before you can install the Mosaic software. If you need to reinstall Windows, see “Reinstalling PC Software” in the section “Reinstalling the DOS-Compatibility Software” in Chapter 8.

In addition, you must have already installed

- A TCP/IP software package
- Win32s, which allows Windows to run 32-bit applications (Win32s is freeware and can be found on a number of online services)

To install Mosaic:

- 1** In the Program Manager, choose Run from the File menu.
- 2** Type the following:

```
C:\WIN32\DISK1\SETUP
```
- 3** Respond to all the dialog boxes to complete the installation.
- 4** After Win32s is installed, a group window labeled Win32 Applications appears.
- 5** Press Alt-F-New to create an icon for Mosaic.

6 In the New Program Object dialog box, select Program Item.

7 Fill in the Program Item Properties dialog box as follows:

Description: Mosaic

Command Line: C:\MOSAIC\MOSAIC.EXE

Working Directory: C:\MOSAIC

8 Click OK.

A Mosaic icon appears in the Win32 Applications group window.

9 Copy the C:\MOSAIC\MOSAIC.INI directory to the C:\WINDOWS\ directory.

You are now ready to use Mosaic.

If you can't find what you're looking for in this index, look in Macintosh Guide—available in the Guide (🔍) menu on your computer.



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