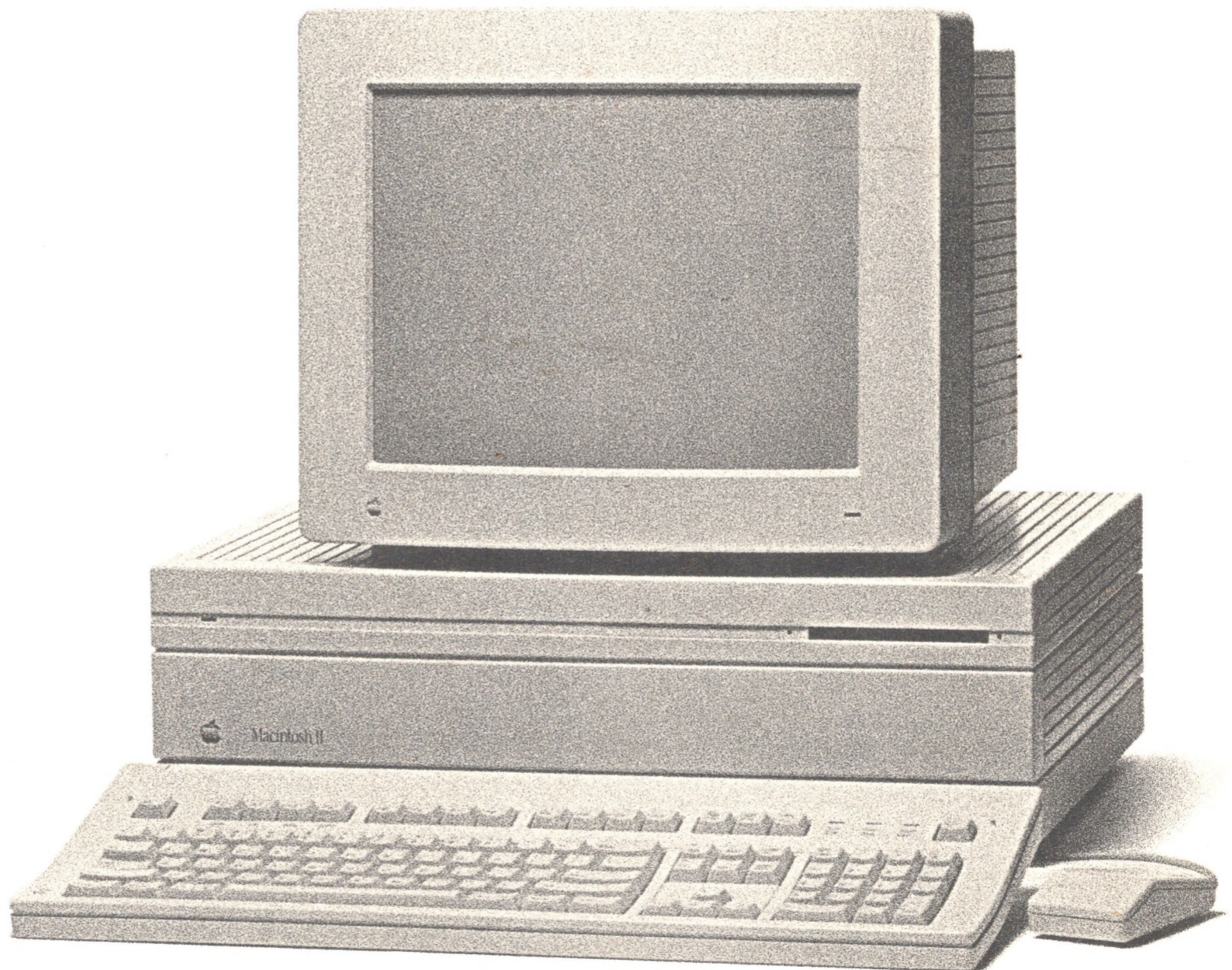




Macintosh[®] II Owner's Guide



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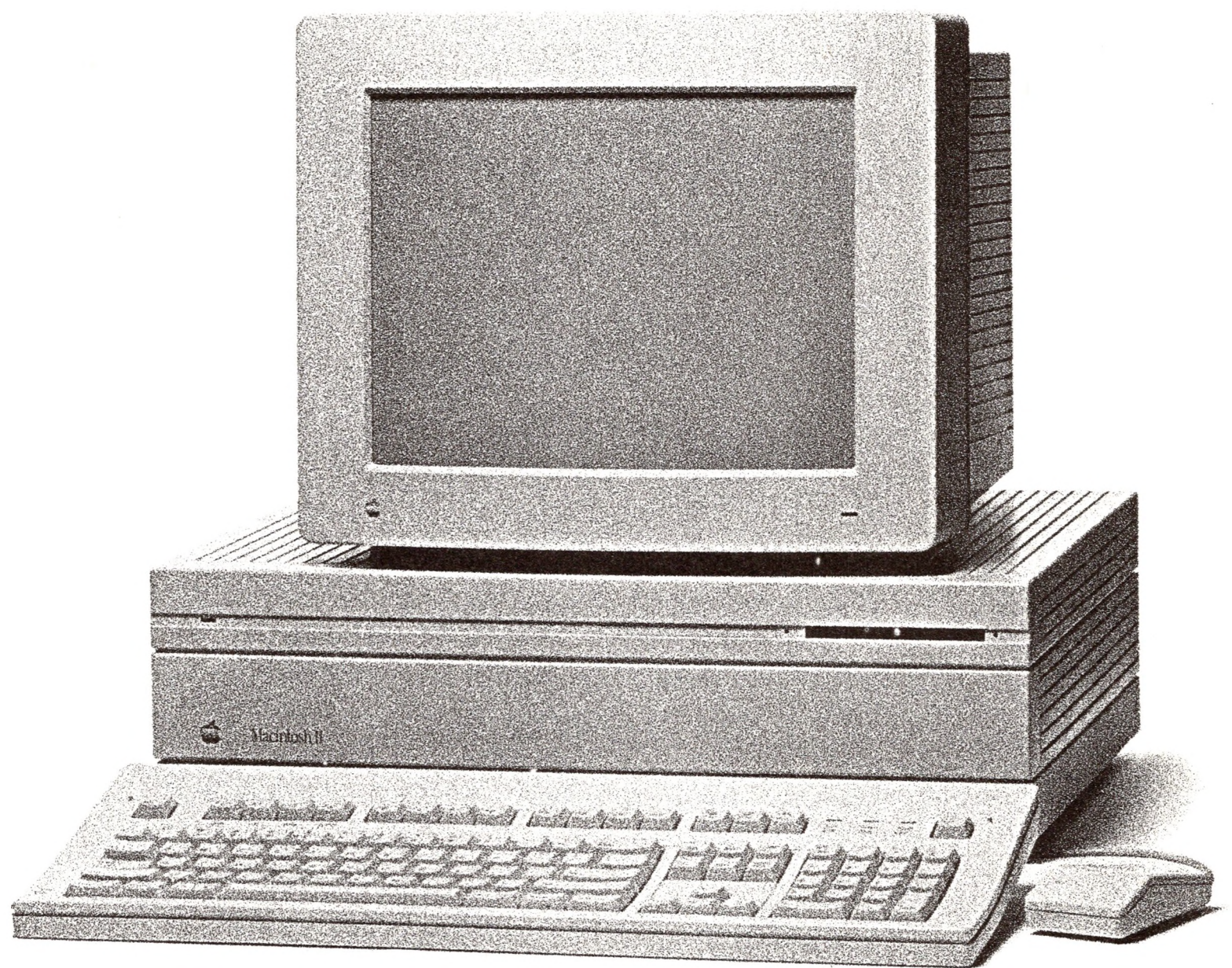
WARNING

This equipment has been certified to comply with the limits for a Class B computing device pursuant to Subpart J of Part 15 of FCC rules. Only peripheral devices (computer input/output devices, terminals, printers, and so on) certified to comply with Class B limits may be attached to this computer.

Operation with noncertified peripheral devices is likely to result in interference to radio and television reception.



Macintosh® II Owner's Guide



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Tell Apple card

Radio and television interference

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

This equipment has been tested and complies with the limits for a Class B computing device in accordance with the specifications in Subpart J of 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 the interference will not occur in a particular installation.

You can determine whether your computer 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.)
- Consider installing a rooftop television antenna with a coaxial cable lead-in between the antenna and the television.

If necessary, consult your authorized Apple dealer or an experienced radio/television technician for additional suggestions. You may find helpful the following booklet, prepared by the Federal Communications Commission: “How to Identify and Resolve Radio-TV Interference Problems” (stock number 004-000-00345-4). This booklet is available from the U.S. Government Printing Office, Washington, DC 20402.

△ Important

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

Welcome to the Macintosh II

THIS MANUAL TEACHES YOU ABOUT THE APPLE[®] MACINTOSH[®] II computer. The Macintosh II embodies the same “user-friendly” philosophy as the original Macintosh, while providing an open architecture, faster performance, more memory, and more sophisticated system software. The Macintosh is still easy to learn and use, and more powerful than ever.

About this manual

Here's what you'll find in this manual:

- Chapter 1, "Getting Started," shows you how to set up your Macintosh II and how to start the training disk, *Your Apple Tour of the Macintosh II*.
- Chapter 2, "Inside the Macintosh II," describes the parts of the Macintosh II and what they do.
- Chapter 3, "How the Macintosh II Works," explains how the computer hardware and software work together.
- Chapter 4, "Macintosh II Buses and Ports," explains the different buses and ports you'll use to attach devices to your Macintosh II.
- Chapter 5, "Caring for Your Macintosh II," describes how to keep your computer running at peak efficiency.
- Appendix A, "The Macintosh Product Line," is a chart that summarizes the differences between the Macintosh II and other models of Macintosh computers.
- Appendix B, "Technical Information," provides specifications, Apple Desktop Bus™ and NuBus™ power requirements, SIMM configurations, pin assignments, and a guide to peripheral device cables.
- Appendix C, "Connecting SCSI Devices," presents information you may need if you plan to attach SCSI devices to your computer system.
- Appendix D, "Guide to Technical Documentation," summarizes the technical documentation available for Macintosh computers and explains the resources available for Macintosh programmers and developers.

You'll find a glossary of Macintosh terms and an index at the end of the manual. Inside the back cover, you'll also find a Tell Apple card. After you've spent some time with your computer, be sure to fill out the card and send it in. We want to know what you think about Apple products and training materials.

△ Important

After using Chapter 1 to set up your Macintosh II, you can put this manual aside and go on to other learning materials or start your own work. Read the rest of this manual if you're curious about how the computer works, or use it for reference. △

About the other manuals

Besides the book you're reading, your Macintosh II came with some other manuals. *You won't have to read them all to learn how to use your computer.* They're there to give you information when you need it, but you'll quickly be up to speed with very little "required reading." Here's what the other books are for:

- *Macintosh System Software User's Guide:* This is the manual that explains how to use the *Macintosh System Tools* and *Macintosh Printing Tools* disks that came packed with your computer. After you've set up your computer, this is also the manual you'll use to learn basic Macintosh techniques—the same techniques you'll use whenever you operate the computer. It also teaches you about the Macintosh Finder™—an important application program you'll use whenever you work with your Macintosh II.
- *Macintosh Utilities User's Guide:* This is the manual that explains how to use the *Macintosh Utilities* disks, which contain special programs you'll use occasionally to customize your system to your specific needs, and to update it and keep it running efficiently.
- *HyperCard User's Guide:* This manual explains an exciting new software product—HyperCard®—that's included free with your Macintosh II. HyperCard is a personal toolkit for using, customizing, and creating information. You'll want to read the *HyperCard User's Guide* only after you've become familiar with the Macintosh II.

Using the manuals

You can use these manuals in a variety of ways, depending on your level of computer experience. The following sections suggest approaches to learning about your Macintosh II.

For the beginner

If your computer is already set up, you're ready to turn to the training disk or tutorial.

If you've never used a Macintosh computer before, follow these steps:

1. Use the instructions in Chapter 1 of this manual to set up your Macintosh II.
2. Follow the instructions in Chapter 1 to start the training disk called *Your Apple Tour of the Macintosh II*, or go through the tutorial in the *Macintosh System Software User's Guide* to learn basic Macintosh skills. (You may want to use both the training disk and the tutorial; it's up to you.)
3. If your computer includes an internal hard disk, see the instructions in the *Macintosh System Software User's Guide* to prepare the hard disk for use.
4. If you have other devices to attach to your computer, turn to the manuals that came with those devices for instructions on connecting them correctly.
5. For an introduction to the types of application programs available for the Macintosh II, start up the disk called *Your Apple Tour of Macintosh II Applications*. (Use the same procedure you learned to start the training disk.)
6. Look through the manuals that came with the application programs you'll be using with your computer.

Return to this book if you have questions about the Macintosh II or how to care for it. Refer to the *Macintosh System Software User's Guide* for information about Macintosh system software or help in troubleshooting any problems you encounter. Use the *Macintosh Utilities User's Guide* when you need instructions for using utility programs.

For the experienced user

Even though this manual is written primarily for newcomers to the Macintosh computer, you'll probably want to read the following:

1. Read Chapter 1 for instructions on setting up your computer.
2. If your computer includes an internal hard disk, follow the instructions in the *Macintosh System Software User's Guide* to prepare the hard disk for use.
3. See Appendix A, "The Macintosh Product Line," for a quick guide to how the Macintosh II differs from other models of Macintosh computers.
4. Use the *Macintosh System Software User's Guide* to learn about the new features of Macintosh system software with which you may be unfamiliar.

5. Use the *Macintosh Utilities User's Guide* to learn about utilities that may be new to you.

If you're interested in learning more about the Macintosh II, read Chapter 2, "Inside the Macintosh II," Chapter 3, "How the Macintosh II Works," and Chapter 4, "Macintosh II Buses and Ports."

For the advanced user

If you're looking for technical information about the Macintosh II, the appendixes may contain what you need:

- Use Appendix A to determine how the Macintosh II differs from other Macintosh models you may be familiar with.
- Look in Appendix B for specifications, Apple Desktop Bus and NuBus power requirements, SIMM configurations, and other technical information.
- Read Appendix C if you need information about connecting SCSI devices to your computer.
- If none of the appendixes has what you're looking for, see Appendix D, "Guide to Technical Documentation"; it will lead you to the appropriate technical manuals. (Appendix D also provides information that may be useful if you're a programmer or developer.)

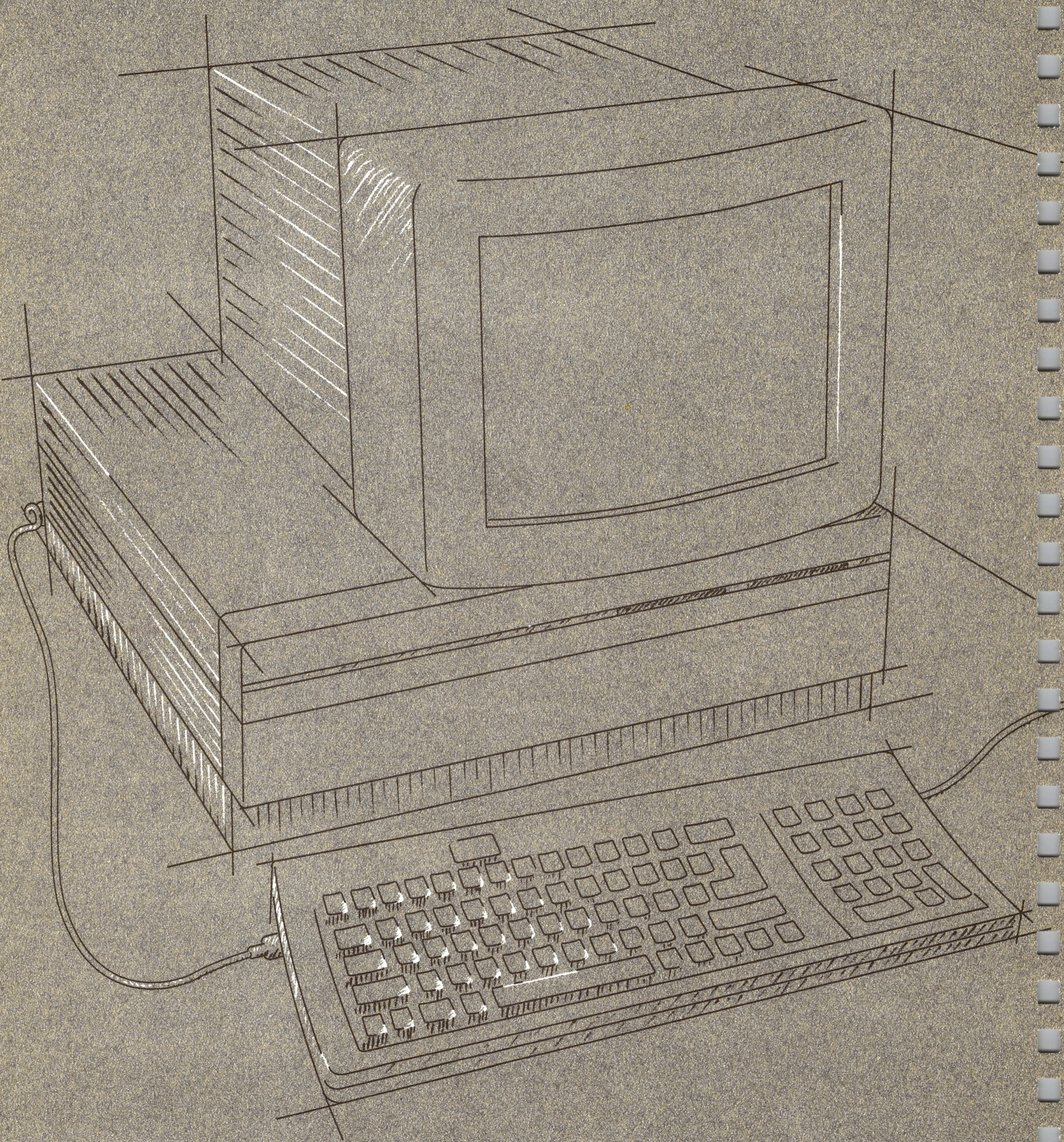
Apple user groups

No matter what your level of computer experience, you can get lots of support by joining an Apple user group. Apple user groups are composed of people who work with Apple computers and who enjoy sharing what they know with others. Activities may include new product demonstrations, informal question-and-answer sessions, and regular classes on using popular software applications or learning to write your own programs. Many user groups have special beginners' nights.

Ask your authorized Apple dealer for the name of the Apple user group nearest you, or call 1-800-538-9696. For user groups outside the United States, or if you are interested in starting your own user group, contact either

The Boston Computer Society
One Center Plaza
Boston, MA 02108
(617) 367-8080

or Berkeley Macintosh User Group
1442-A Walnut Street #62
Berkeley, CA 94709
(415) 849-9114



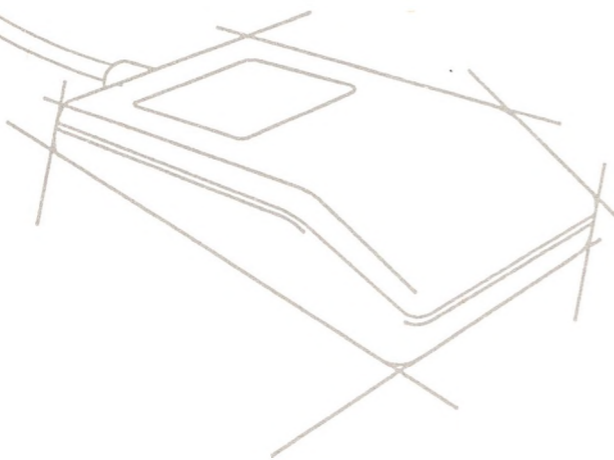
Getting Started

THIS CHAPTER WILL HELP YOU GET STARTED WITH YOUR MACINTOSH[®] II computer. You'll find instructions for

- unpacking the equipment
- setting up the Macintosh II
- starting the computer
- starting the training disk, *Your Apple Tour of the Macintosh II*

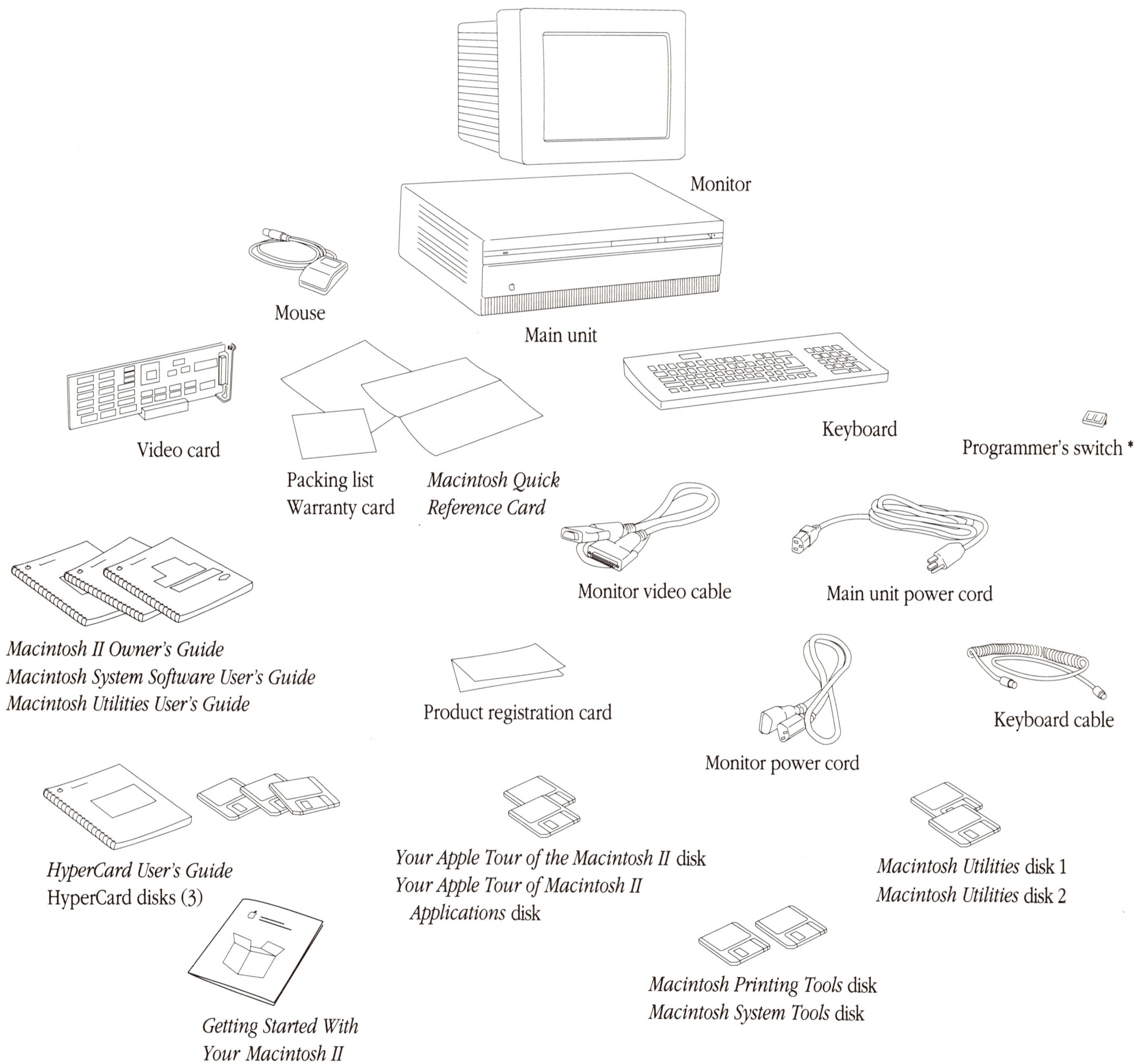
You'll also find important safety instructions.

Unpacking and setting up your Macintosh II is easy and takes only a few minutes. If somebody has already set up your computer for you, you can skip most of this chapter; go directly to the "Important Safety Instructions" section and continue on from there.

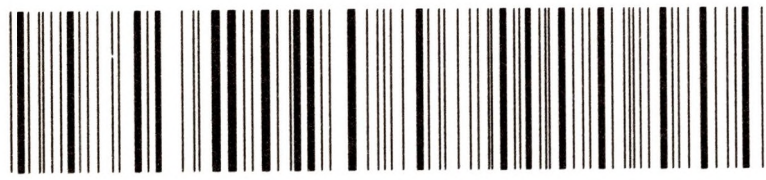


Unpacking

The first thing to do is take all the materials out of the packing boxes and make sure you have everything shown here:



* Put this aside for now. You won't install the switch unless you're developing application programs for the Macintosh II.



* F 7 2 6 8 B 5 M 5 Ø 1 1 *

Serial number

Bar code

- ❖ *Different keyboard?* Apple offers two keyboards for the Macintosh II. Yours may look different from the one shown here.

Check your packing lists to make sure you have everything. If something is missing, contact your authorized Apple® dealer or representative.

Be sure to fill out the product registration card and mail it in. The registration card asks for the product serial numbers; you'll find the numbers on either the bottom or the back of each component.)

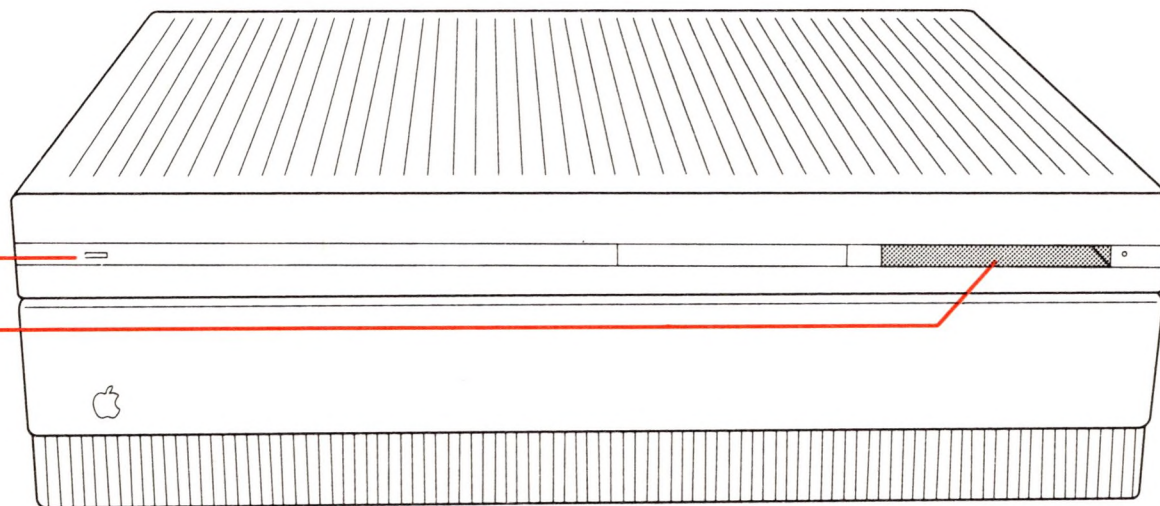
- ❖ *Save the packing materials:* Keep the boxes and all the packing materials; repack your computer system to protect it from rough handling and jarring if you have to move it over long distances. It's especially important to repack your computer if it has an internal hard disk drive.

Taking a closer look

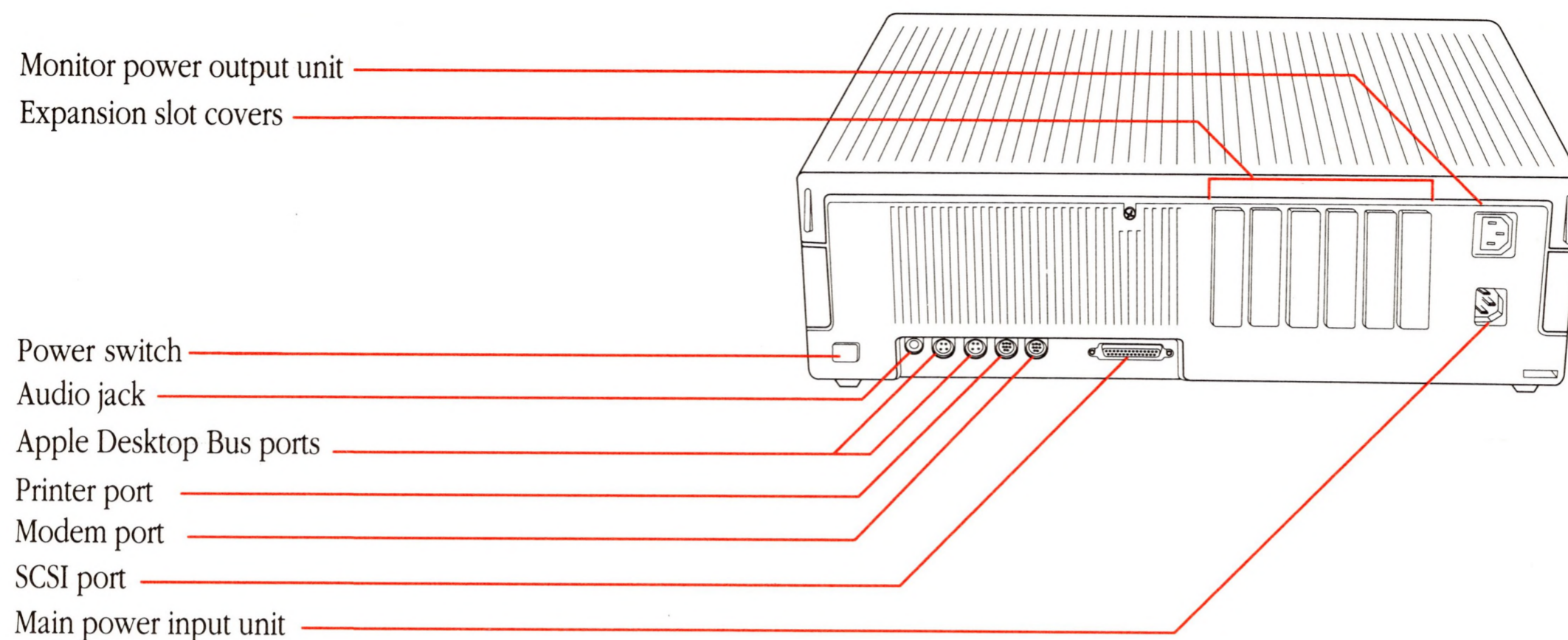
Now that you have unpacked your Macintosh II, take a closer look so you're familiar with its parts.

In-use light

3.5-inch disk drive



Most of the devices you'll use with your Macintosh II attach to connectors, or **ports**, on the back panel of the computer. You can usually tell which port to use by looking at the **icons** (small pictures) above each one. (All the ports on the back panel are discussed in more detail in Chapter 4, "Macintosh II Buses and Ports.")



△ Important One item on the back of the main unit—the power switch—is there when you must use it, but it's not intended for regular use. Normally, you turn the computer on with the Power On key at the top of the keyboard, and you turn it off by choosing the Shut Down command from the Special menu. (Don't worry if these terms are new to you; they're described later in this book and in the *Macintosh System Software User's Guide*.)

If you encounter a problem with the computer and for some reason cannot use the Shut Down command to turn it off, you can push the power switch instead. (Be sure you only push it once.) Wait a few seconds, and the computer will turn itself off. Then you can start it again by pressing the Power On key. Note that this method of turning the computer off is not recommended, since you will lose any work you had not previously saved on a disk. △

Basic ergonomics

Before you set up your computer, it's a good idea to prepare your work area. Thinking ahead and paying attention to some basic **ergonomics** will help you avoid fatigue, muscle aches, and eye strain.

Of greatest importance are your work surface height and monitor viewing angle. Your hands should rest comfortably at the keyboard so that your lower arms form a 70° to 90° angle with your torso. The monitor screen should be within a 30° viewing angle; a 15° viewing angle is optimal.

The following diagram presents measurements for a person of average adult height (5 feet 6 inches, or 168 cm, standing). Use the table that follows the diagram as a guideline for adjusting your work surface. If your work surface is not adjustable, you might need to raise or lower your chair. (You may have to experiment a bit with both your work surface height and chair height to find the best arrangement.)

Average adult standing height 5' 6"

Optimal viewing range 15–30°

Optimal keyboard/arm arc 70°

Desk depth 30"

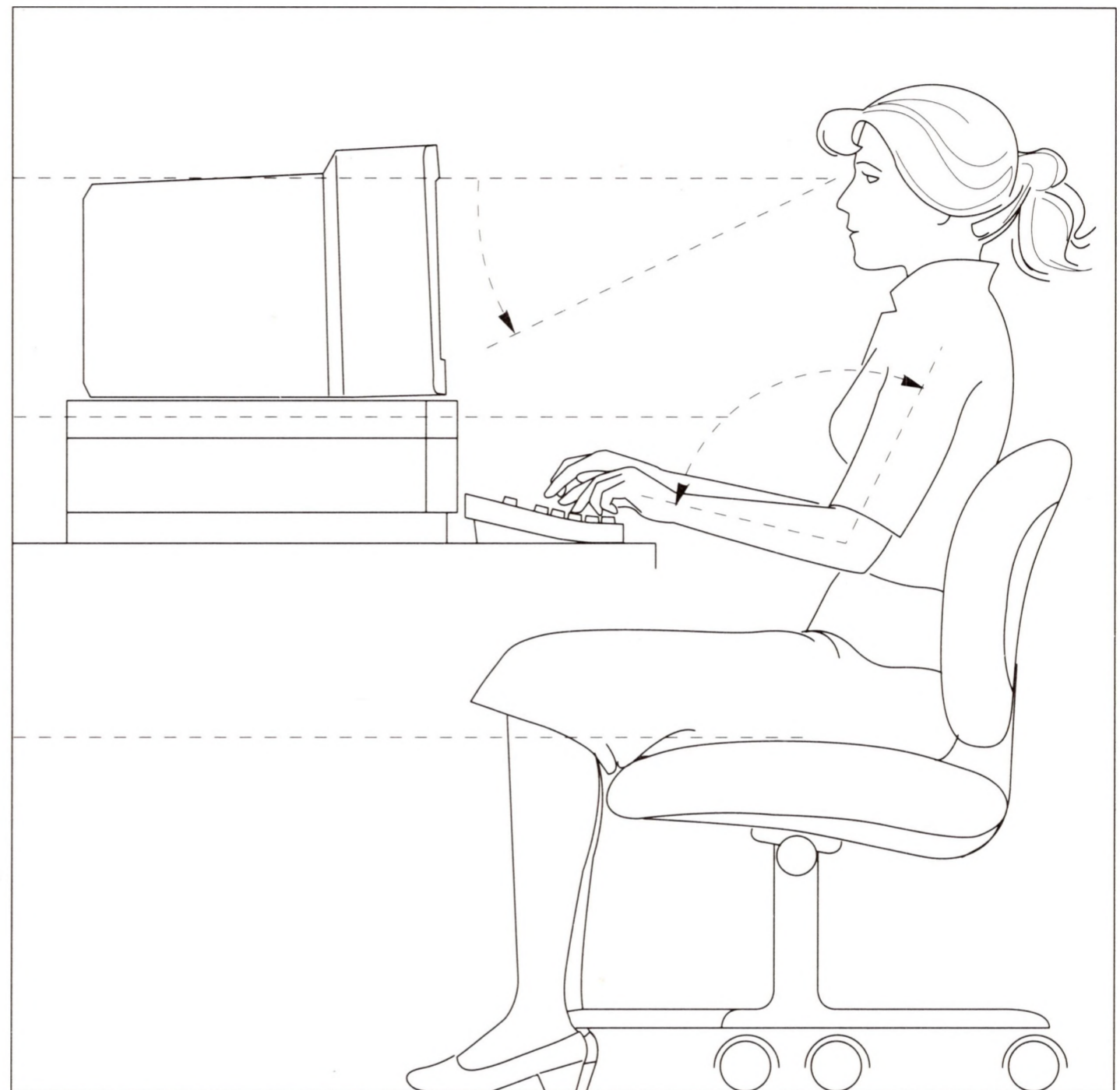
Average desk height 25"

8"

Average chair-to-desk height 8"

17"

Average chair height 17"



If you are

4 feet 11 inches	150 cm
5 feet 4 inches	163 cm
5 feet 6 inches	168 cm
5 feet 9 inches	175 cm
6 feet 2 inches	188 cm

Your work surface should be

23 inches high	58 cm
24 inches high	61 cm
25 inches high	64 cm
26 inches high	66 cm
28 inches high	71 cm

Macintosh computers are designed so that, for most users, the monitor viewing angle will be within 30° once you've found the appropriate work surface height (assuming you're using a single, level work surface.) To avoid monitor glare, try to position your computer so that your light source is neither directly behind nor directly in front of you.

- ❖ *Getting it right:* Some furniture manufacturers offer specially designed “computer” desks with separate adjustable surfaces for both the keyboard and the main unit; these offer the greatest range of adjustment. Also available are computer stands, antiglare screens, and other equipment to make your work environment fit your individual needs.

Putting it all together

Now that you're familiar with the computer, and have prepared your work area, follow the steps in the next few sections to set up your computer system. Assemble the system in the order given in the next few pages.

The power cord

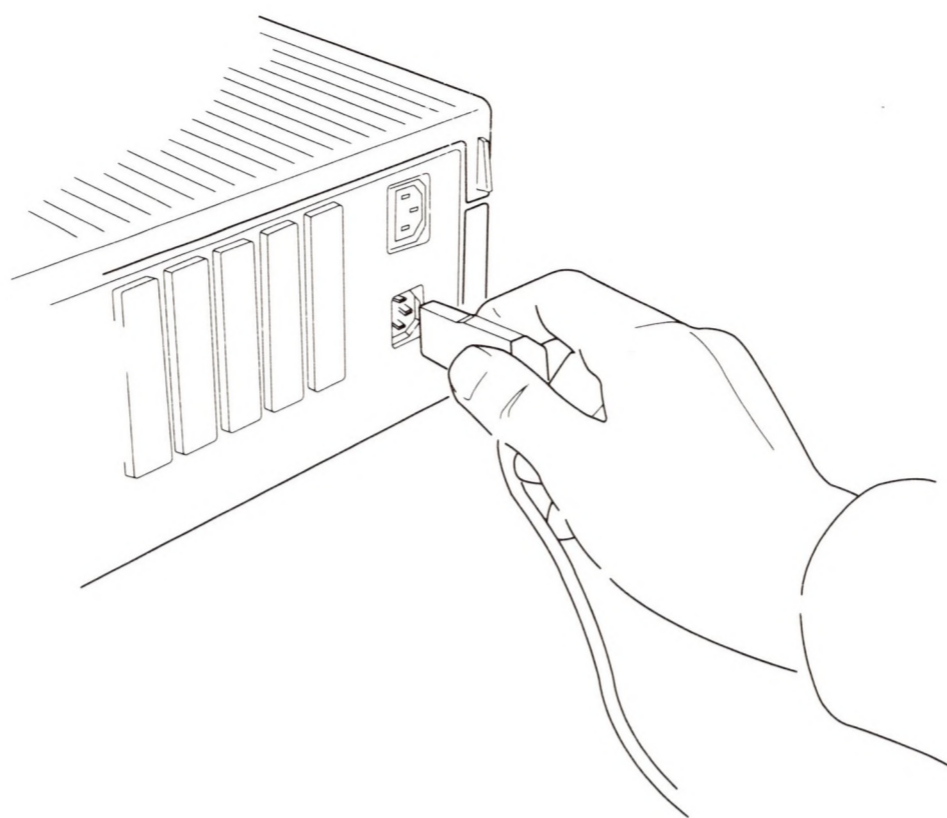
The first step in assembling your computer system is attaching and plugging in the power cord. As you assemble your system, keep the power cord plugged in. When properly connected to a grounded outlet, the power cord acts as a ground for the system, protecting its components from static electrical discharge—even when the computer is turned off.

To connect the power cord:

- **Plug the socket end of the power cord into the main power input unit—the bottom receptacle on the right side of the computer's back panel.**

(The connector above the main power input unit is for the monitor power output; you'll read about that in a moment.)

- **Plug the other end of the power cord into a three-hole grounded outlet.**

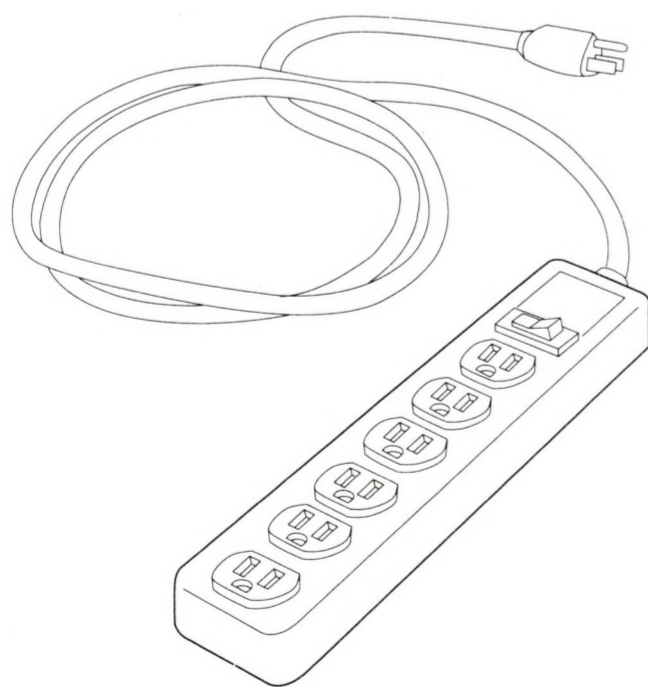


▲ Warning

Do not turn on the computer until you've completed the entire installation process. Turning it on sooner could result in electrical shock to you or damage to your computer system's components.

If the power has been on, turn it off and wait at least 5 minutes before connecting anything to or disconnecting anything from the main unit. There are several ways to turn off the computer. If you know how to choose the Shut Down command from the Special menu, do that. If you're unfamiliar with using such commands, push once on the external power switch (on the back of the main unit) and wait for the computer to shut itself off. If all else fails, pull the plug on the power cord from the outlet.

This equipment is intended to be electrically grounded. Your Macintosh II is equipped with a three-wire grounding plug—a plug that has a third (grounding) pin. This plug will fit only a grounding-type 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! ▲



Many computer devices—monitors, printers, modems, and so on—need to be plugged into three-hole, grounded outlets. If you have more than two devices that need to be plugged into the wall, you should get a power strip. Available at any electronics or hardware store, a power strip is like a wall socket with four to eight outlets. Many power strips come with an on/off switch, so you can turn all your devices on and off with one switch. (Some also have a surge protector, which acts like a circuit breaker if there's a surge of power on the incoming electrical lines.)

The monitor

Apple Computer provides both color and monochrome monitors for the Macintosh II. The basic installation procedure is the same for all monitors: you connect the monitor to your computer through the socket on a video card installed in an expansion slot in the computer's main unit.

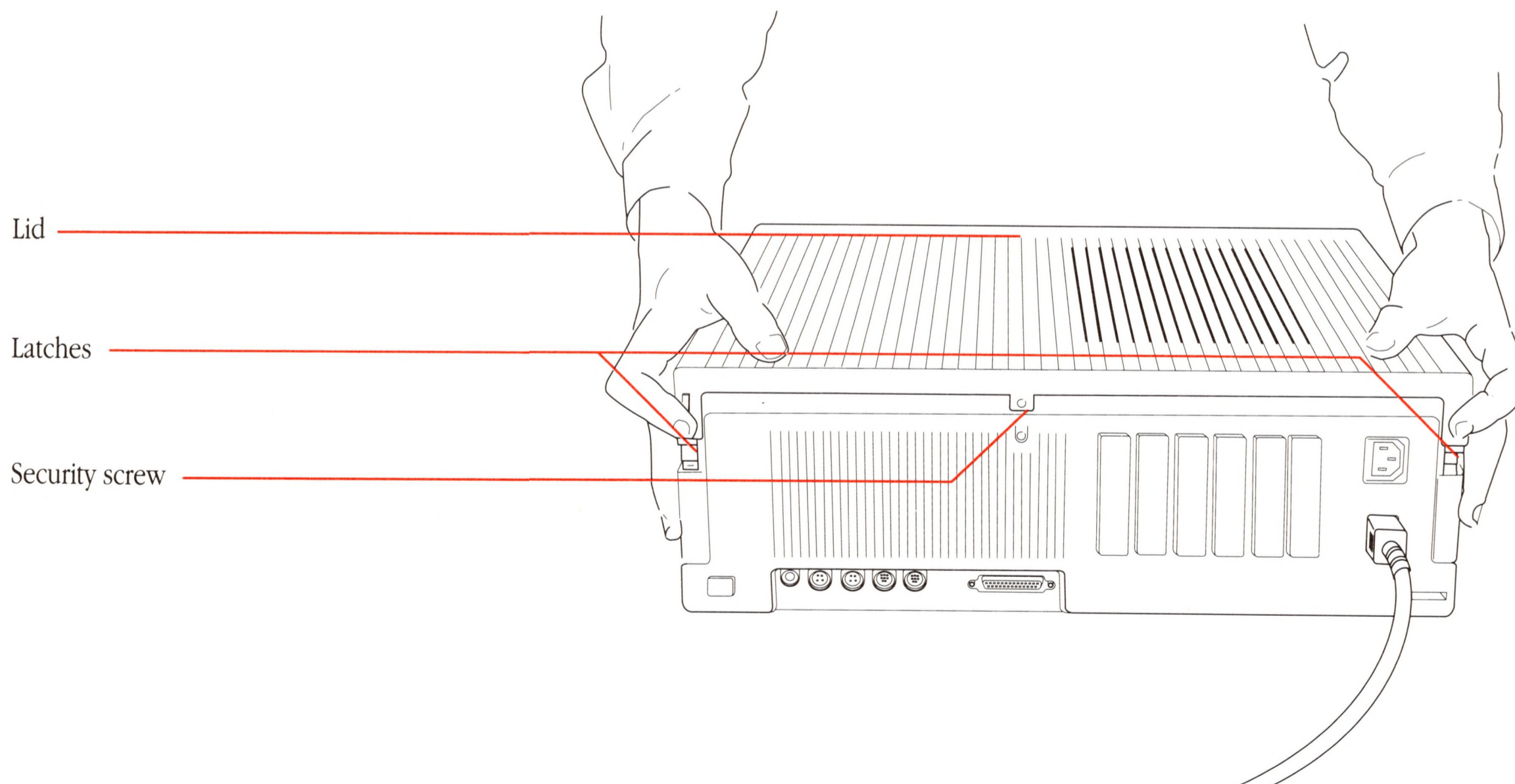
Here are the major steps involved in attaching your monitor, followed by specific steps for each stage of the procedure:

- installing the video card in the main unit
- connecting the monitor's video cable
- connecting the monitor's power cord

The video card

Follow these steps to install the video card:

- **Remove the lid from the computer's main unit.**
 - Using a Phillips screwdriver, loosen and remove the security screw that holds the lid to the main unit. (It's at the top center of the rear panel.)
 - Wrap your hands around the rear corners of the case.

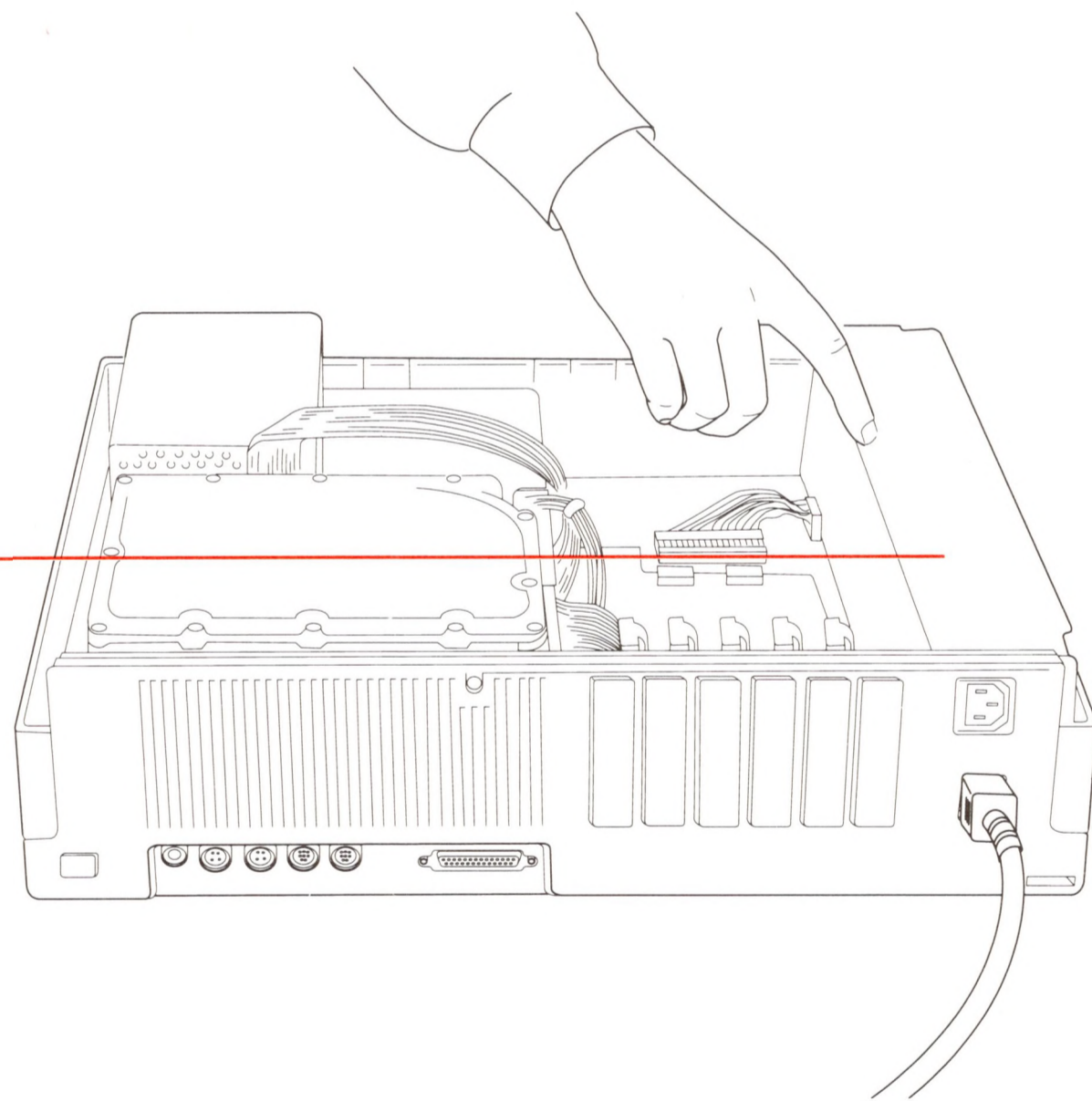


- Press on the latches as you lift up on the back of the lid.
- Gently move the lid back and away from the main unit's case. (The lid needs to clear three small hooks inside the front of the main unit's case.)
- Lift the lid all the way off the case and put it aside.
- **Touch the power supply case inside the computer to discharge any static electricity that might be on your clothes or body.**

▲ Warning

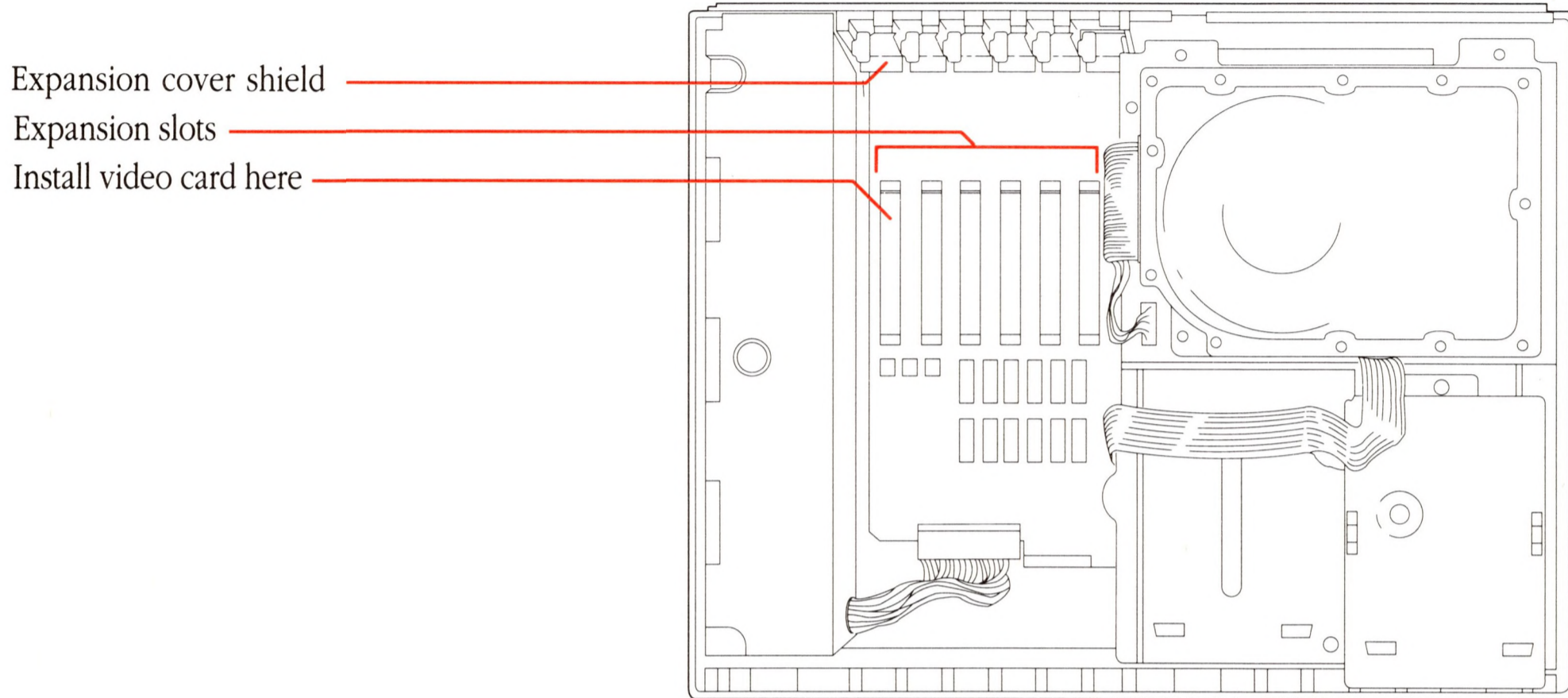
It's OK to touch the power supply if you've just unpacked the computer. However, the power supply can get hot during normal use. If the computer has been on, shut it off and wait at least 5 minutes before touching the power supply. ▲

Power supply case



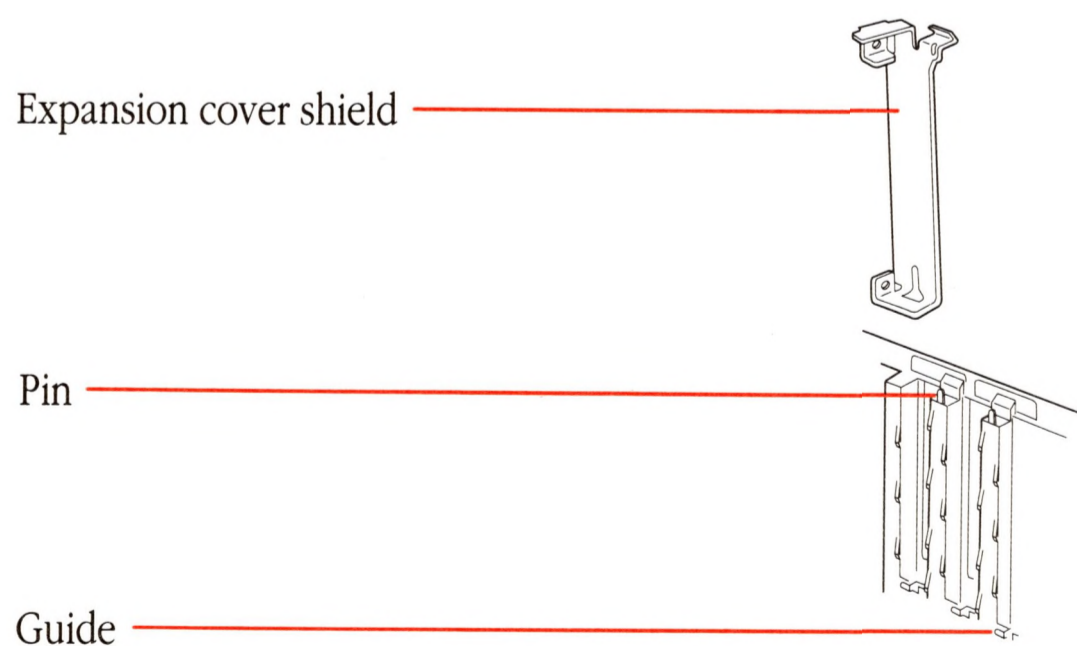
- **Choose the expansion slot you want to use.**

The expansion slots are the narrow, plastic strips running along the bottom of the main unit, near the back. It doesn't matter which one you choose.



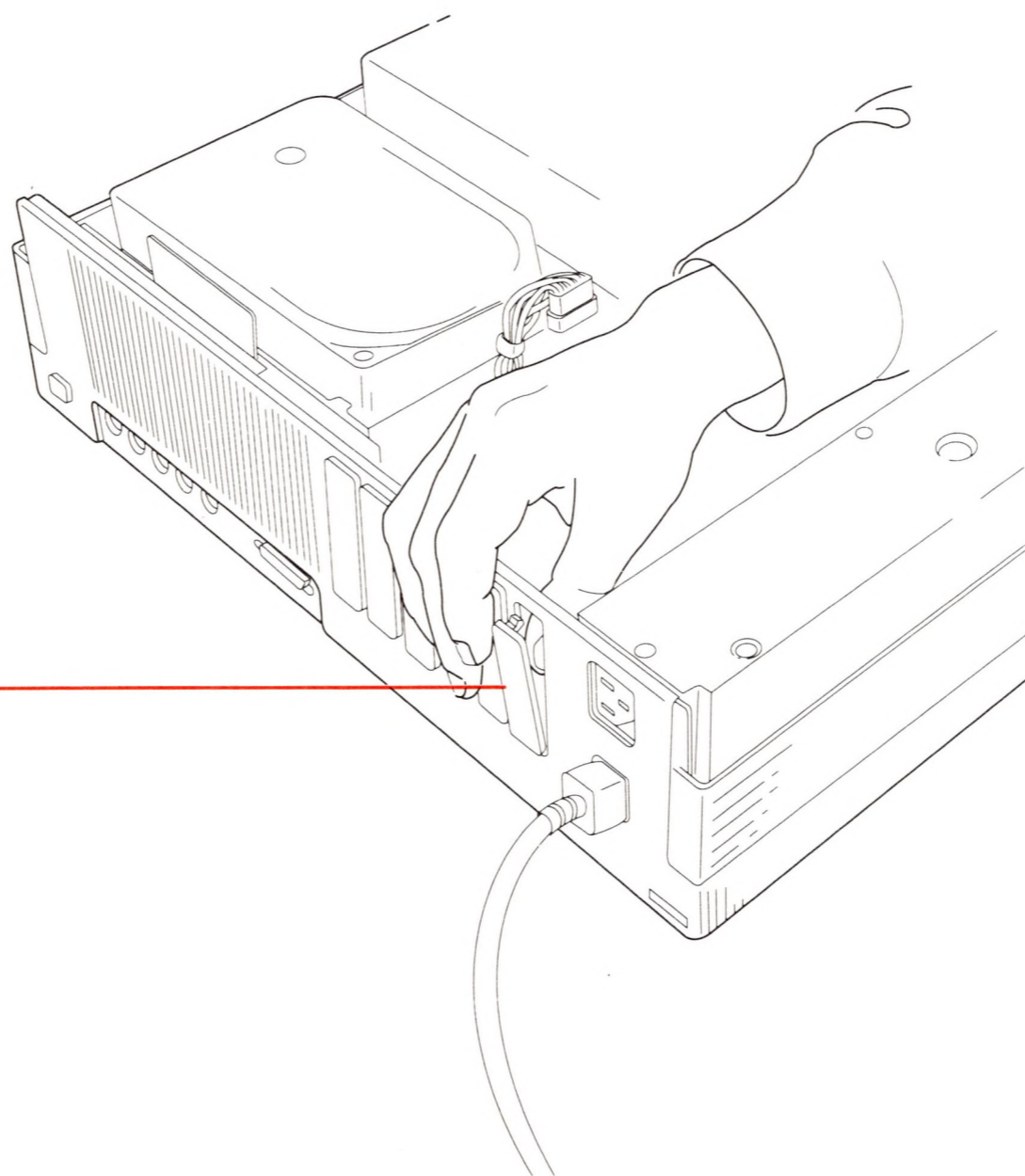
- **Remove the expansion cover shield behind the expansion slot you've chosen by lifting it up until the shield is free of the guide and pin.**

Save the shield; you will need it later if you take the card out of the slot. The card itself has a shield attached to it that will replace the shield you just removed.



■ **Push out the plastic hole cover that lines up with the slot.**

- Grasp the cover with your thumb inside the computer and your fingers outside.
- Push the cover out with your thumb, and set the cover aside.

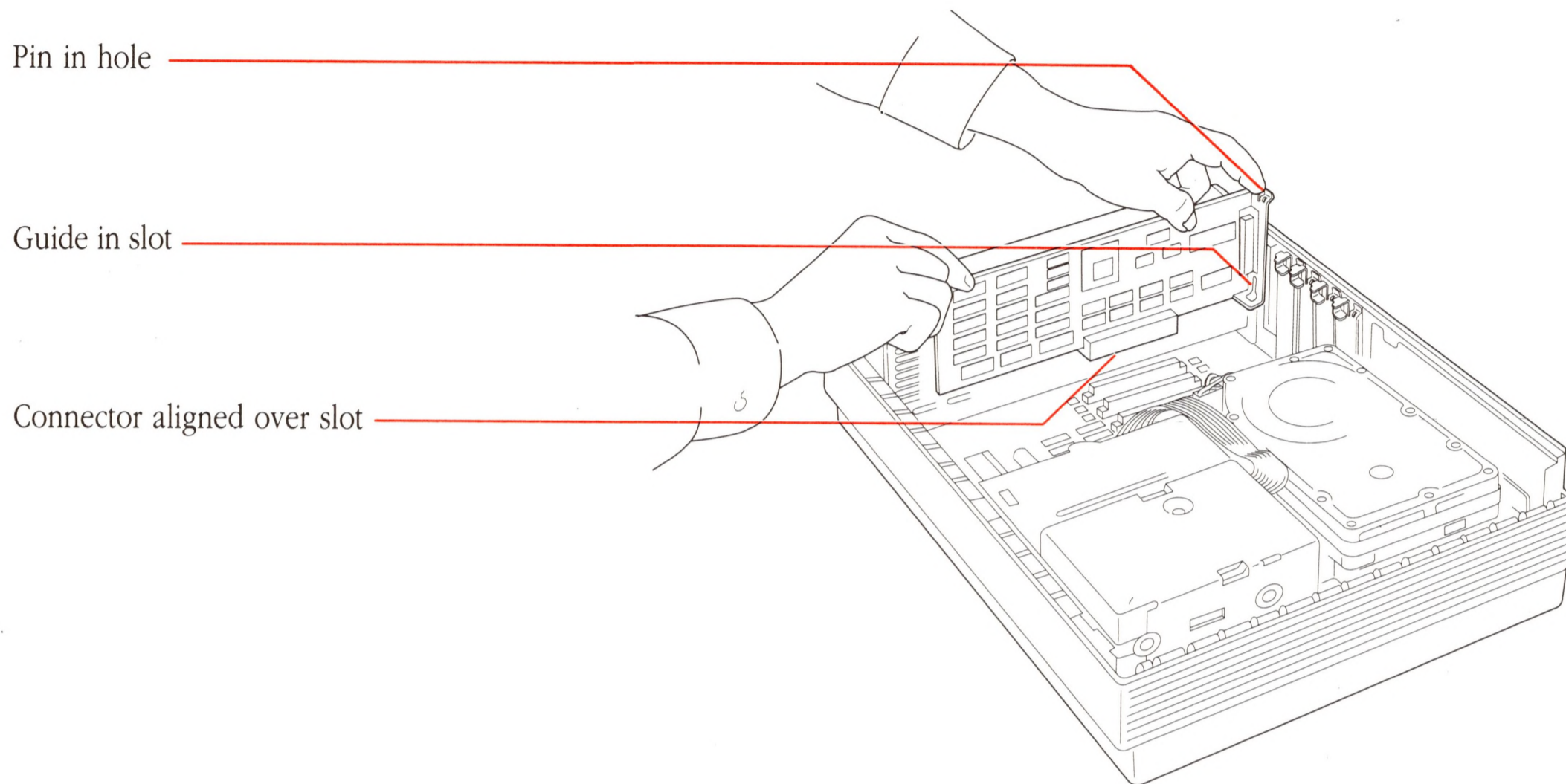


Hole cover

■ **Insert the video card into the expansion slot.**

- Pick up the video card by the top of the metal bracket and the top of the card's other end. (Be careful not to touch the pins on the bottom edge of the card.)

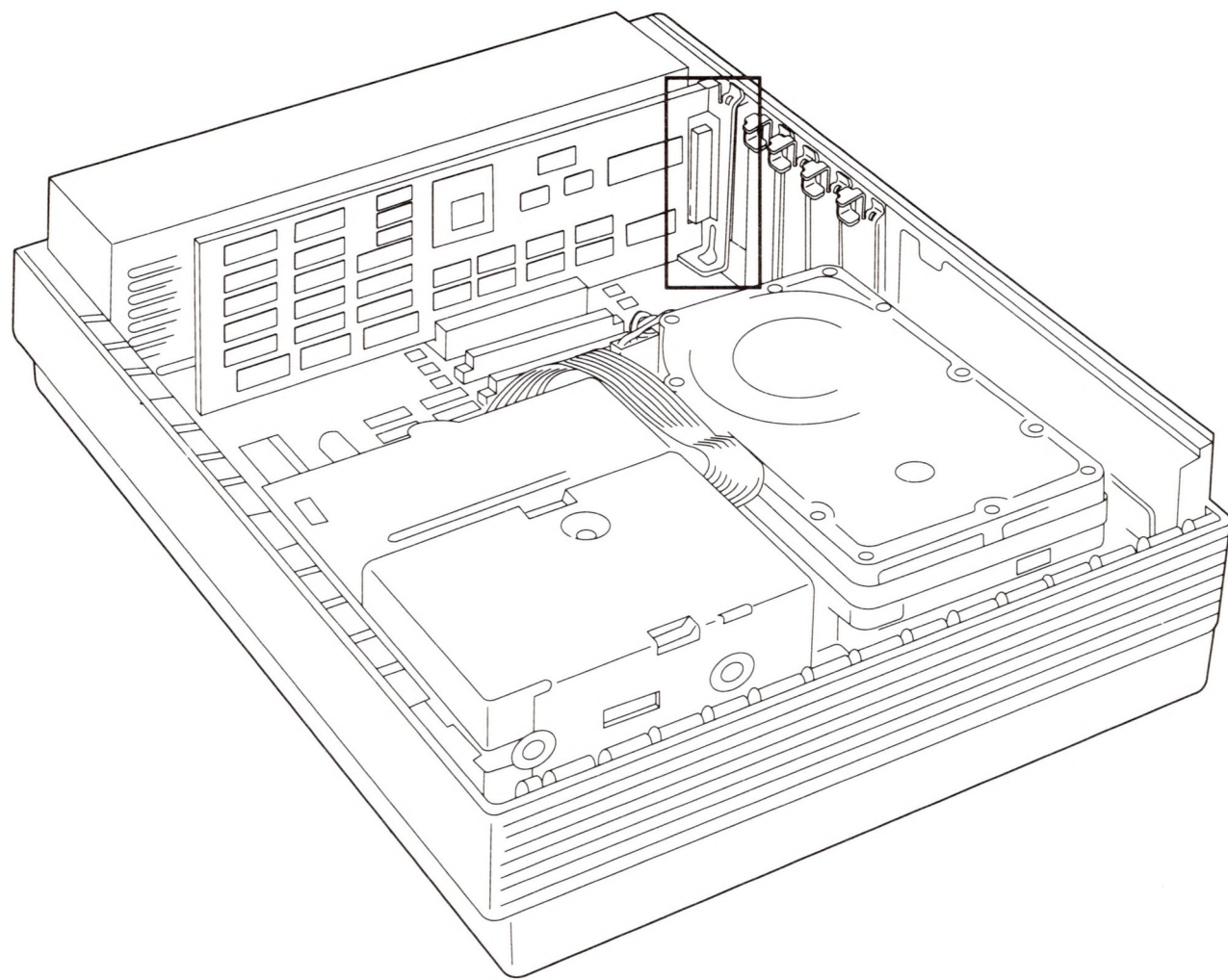
- The expansion cover shield on the card attaches to the inside of the back panel in the same way as the shield you just removed. Align the card so that the guide fits through the lower slot in the shield on the card and the pin sticks up slightly through the hole at the top of the shield.



- Align the connector on the bottom of the card directly over the slot.
- Place one hand along the top edge of the card, directly over the connector area; push down firmly on the card until the connector is fully seated.

△ Important Don't force the card. If you meet a lot of resistance, pull the card out and try again.

Don't wiggle the card from side to side when you insert it; this puts unnecessary stress on the card and slot. △



You can test to see whether the card is properly connected by lifting the card gently. If it resists and stays in place, it's connected.

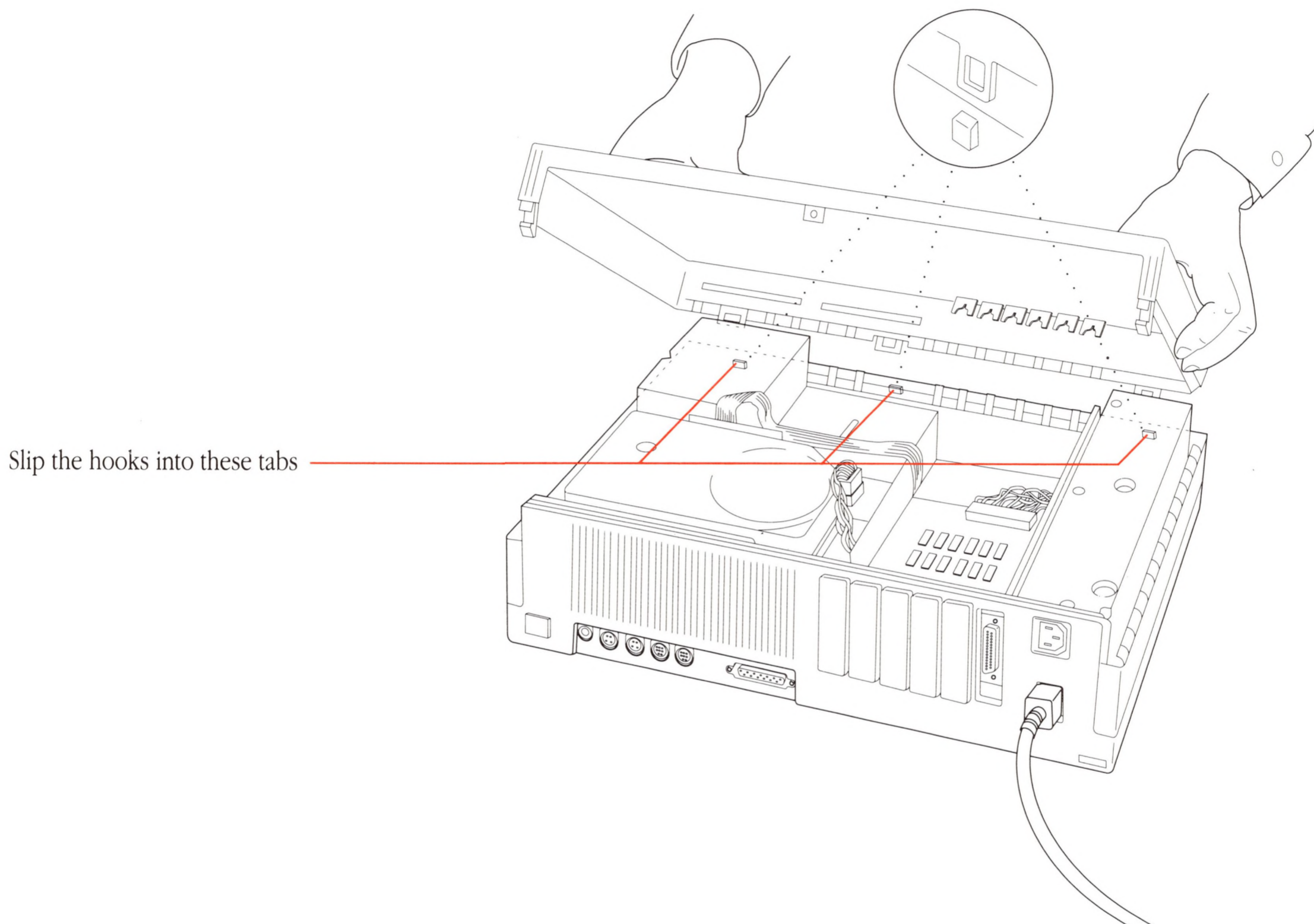
△ Other cards?

If you have purchased other peripheral devices that require cards, install them now, too. You can use the method described above to install all expansion cards in your Macintosh II at any time. If the computer has been running, let it cool down for 5 minutes before you open up the main unit. Of course, you should also read and follow any instructions included with the other expansion cards.

If you plan to install more than one card, see the "NuBus Power Requirements" section in Appendix B for details on the power available for the expansion slots. △

■ **Replace the lid on the main unit.**

- Tip the front of the lid down so it catches the three hooks under the lid in the front of the main unit's case.
- Lower the back of the lid onto the case and press firmly on the back corners until you hear the rear latches snap into place.
- Replace and tighten the security screw.



The video cable

With the back of the main unit facing you, place your monitor near the main unit. Turn the monitor so its back panel is also facing you. Then follow these steps to connect the video cable:

- **Plug one end of the video cable (both ends are the same) into the video socket on the back of the monitor.**

The socket is marked with a video icon.

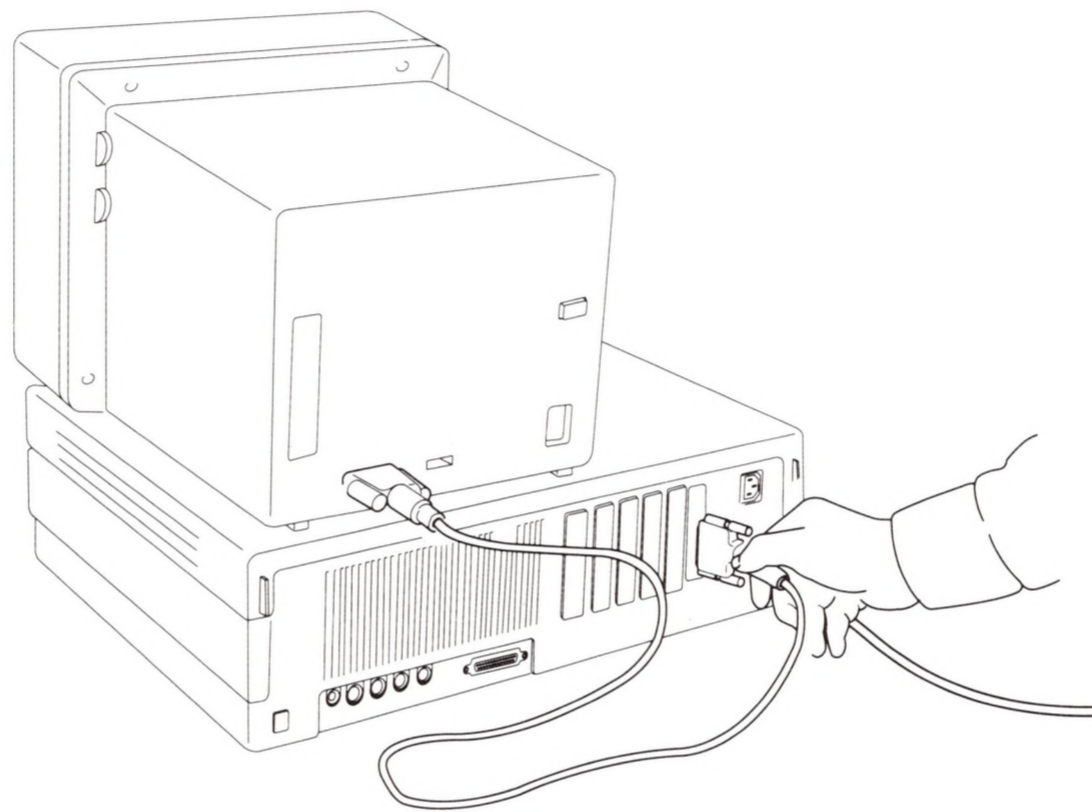
- **Tighten the thumbscrews on the connector.**

A tight connection keeps the cable from coming loose, and prevents radio and television interference.

- **Plug the other end of the video cable into the socket on the video card and tighten the thumbscrews.**

Connect the cable to the card through the opening in the computer's back panel.

❖ *More than one card?* If you have installed more than one expansion card, make sure you plug the video cable into the *video* card.



The monitor's power cord

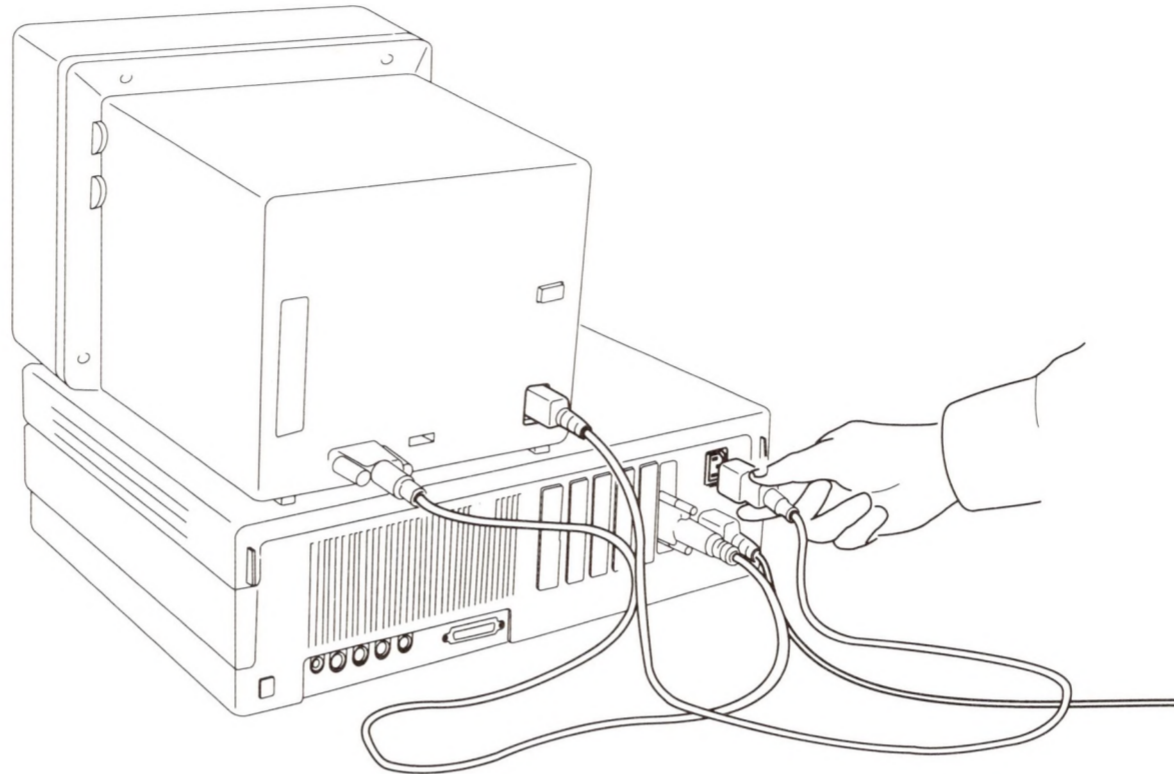
Follow these steps to connect the monitor's power cord.

- **Plug the socket end of the power cord into the monitor power input unit on the back of the monitor.**

The plug is marked with a power icon.

- **Connect the other end of the power cord to the monitor power output unit on the back of the computer.**

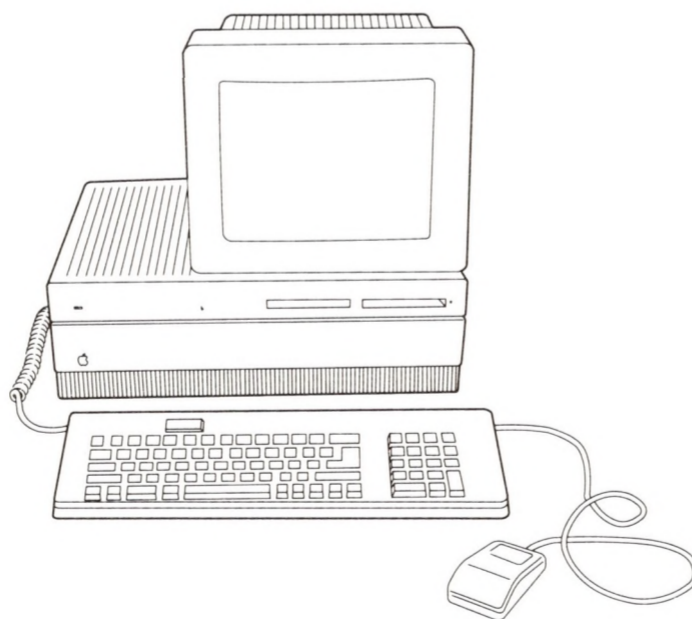
The monitor power output unit is on the right side of the computer's back panel, just above the main power input unit.



For information about adjusting brightness and contrast (and alignment, if you have a color monitor), see the manual that came with your monitor. But wait to do this until you've attached the mouse and the keyboard.

The mouse and the keyboard

There are several ways to connect the mouse and the keyboard. The steps below describe how to connect the mouse to the keyboard and then how to connect the keyboard to the main unit. When you've completed this procedure, you'll find information on other ways to connect these devices.



△ **Important** These steps are presented in this order so that the last thing you do is connect the keyboard to a power source. (Once the keyboard has power, accidentally pressing the Power On key will turn your computer on prematurely.) △

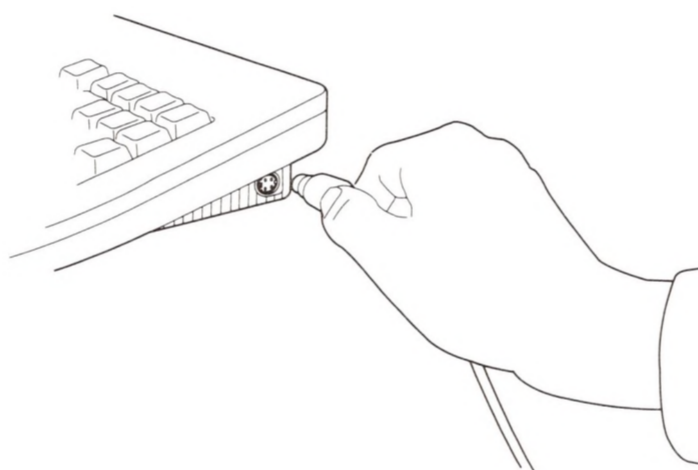
Your Macintosh II works with a variety of keyboards. Although they may look different, you attach them to the main unit in the same way.

Place your keyboard near the back of the main unit with the keyboard facing you. Then follow these steps:

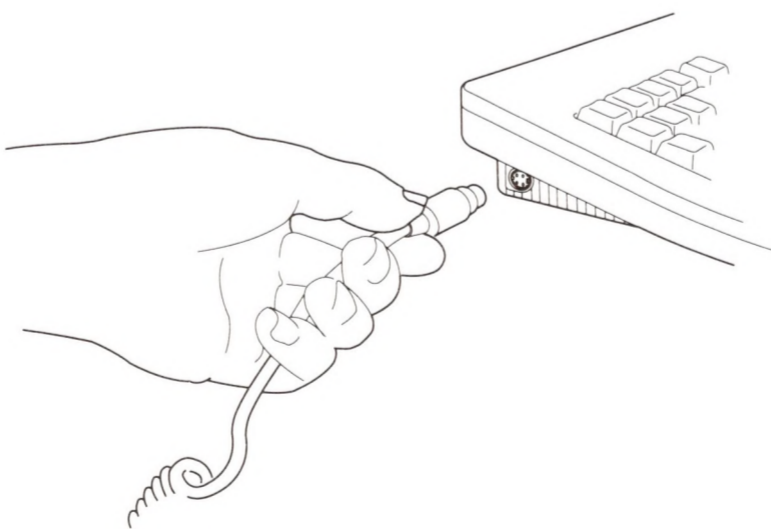
- **Plug the mouse cable into the port on the right side of the keyboard.**

If you're left-handed, you may want to plug it into the port on the left side instead.

This arrangement is known as a **daisy chain**. (In effect, the mouse will be connected to the computer through the keyboard.)

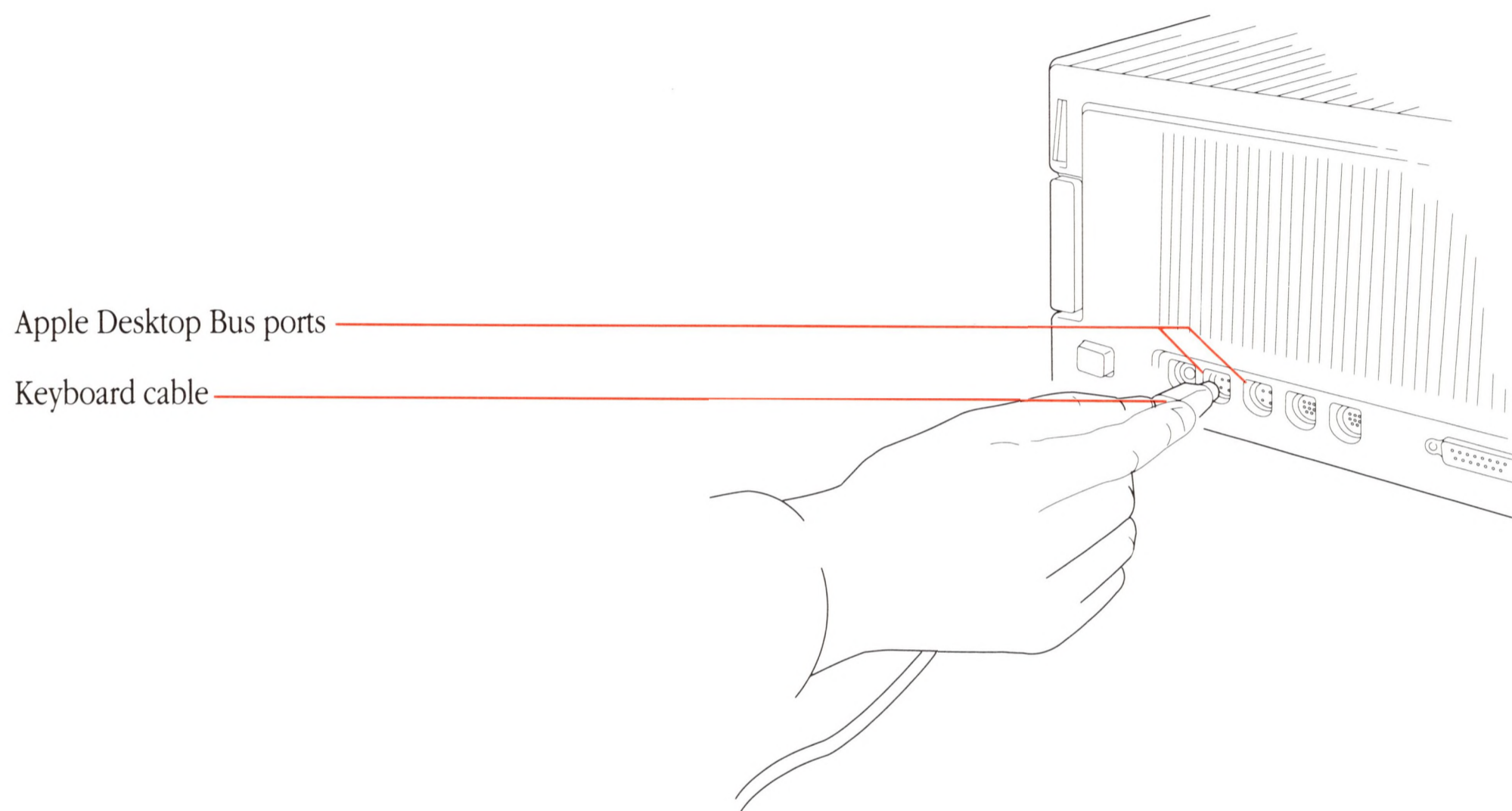


- **Plug one end of the keyboard cable into the other port on the keyboard.**



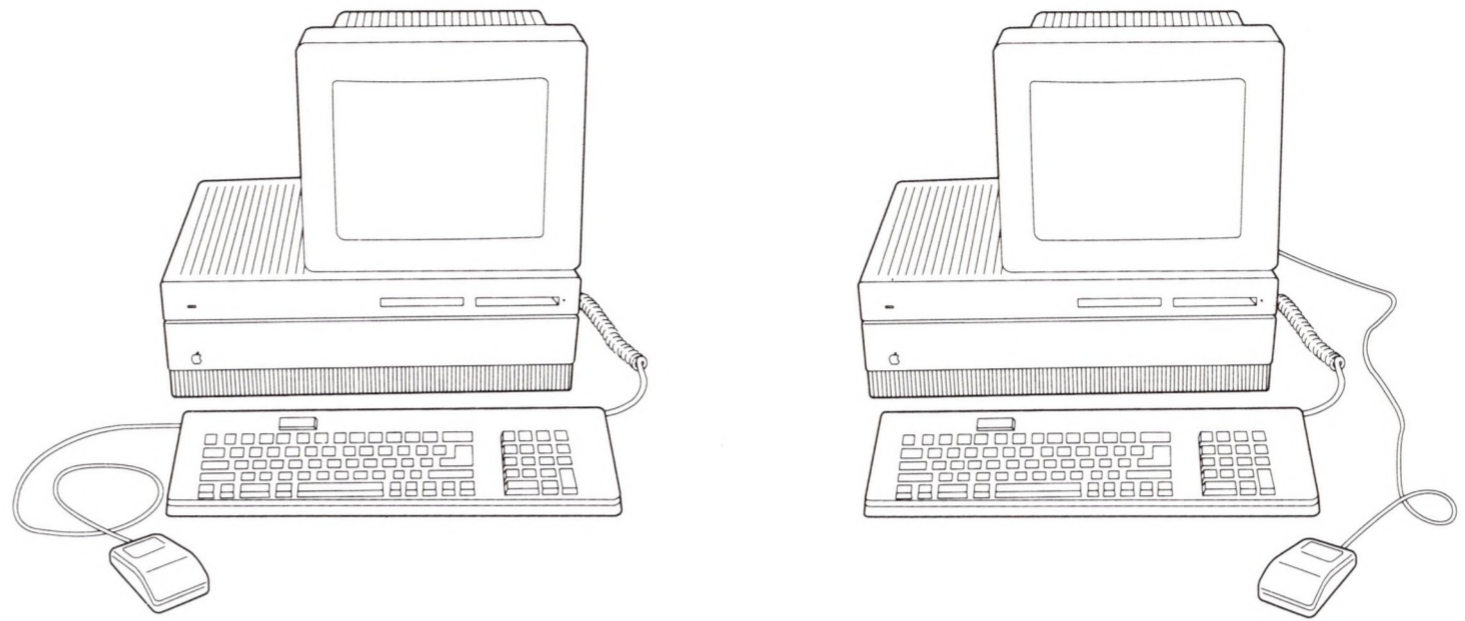
- **Plug the other end of the keyboard cable into either of the two Apple Desktop Bus™ ports on the left side of the main unit's back panel.**

Some Apple Desktop Bus devices use locking cable connectors. These locking connectors prevent the cables from being accidentally disconnected. The Apple Desktop Bus ports can accept either locking or nonlocking cable connectors. You plug and unplug either type of cable in the same manner: always hold the cable *by the connector* as you push it into or pull it out of the port.



The **Apple Desktop Bus** is so named because several different devices (the keyboard, the mouse, and other Apple Desktop Bus devices, such as a graphics tablet, a joystick, or another keyboard) can send information along one “bus line” to the computer. Your Macintosh II has two Apple Desktop Bus ports.

You might prefer to plug the mouse into the other connector on the back of the Macintosh II, leaving the second connector on the keyboard free. Here are some possibilities:



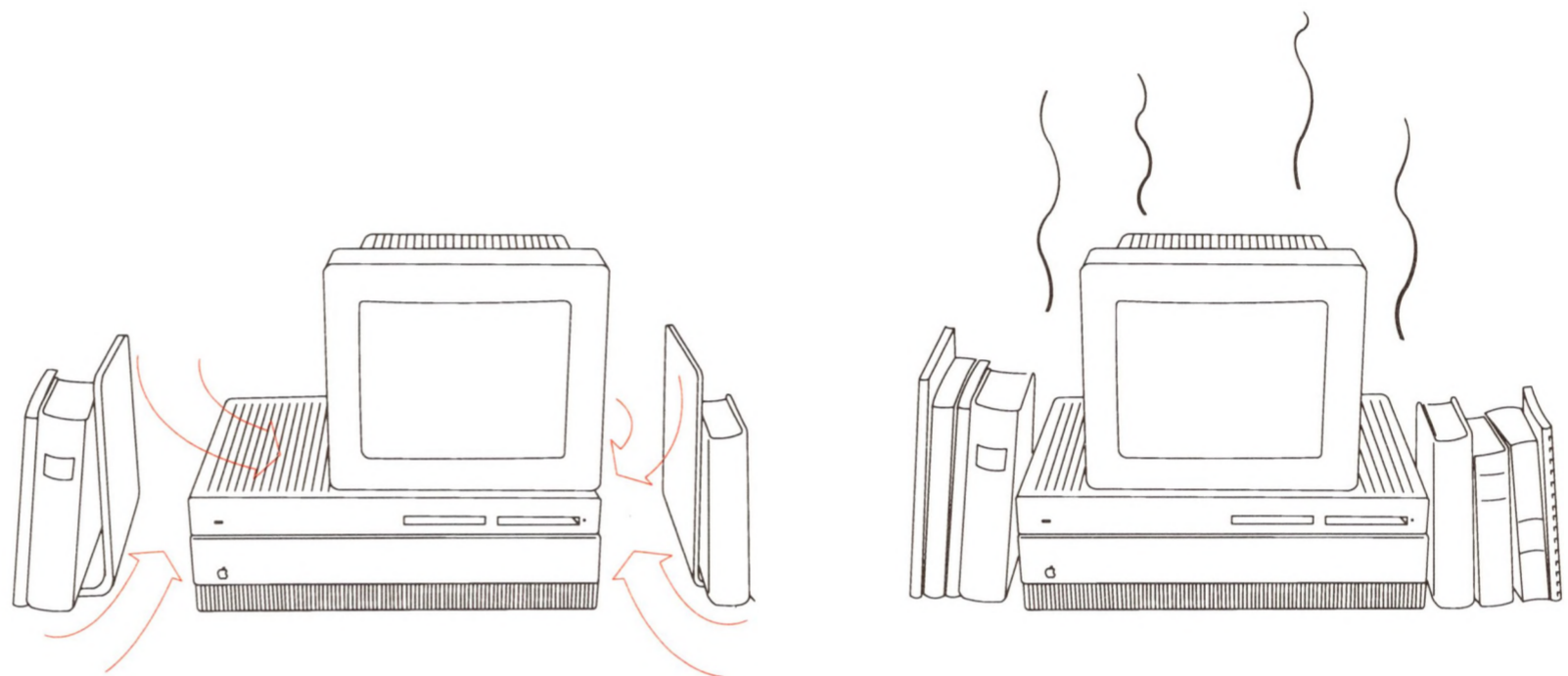
If you have other Apple Desktop Bus devices to attach to your system, you can either daisy-chain them to the keyboard or use one of the ports on the computer's back panel.

△ Important If you need to rearrange the devices on the Apple Desktop Bus while using your system, turn off the computer before connecting or disconnecting any devices. △

Ready to go?

Once you're satisfied that everything is connected properly, you'll want to arrange your Macintosh II components conveniently in your work area. Turn the main unit so that it's facing you. Place the monitor where you want it (on top of the main unit is fine), and position the keyboard and mouse where you can reach them comfortably.

Note that if you place your monitor on top of the main unit, it should sit at least 8 mm (.314 inches) above the surface. Apple monitors come with small rubber "feet" to raise them to the correct height, letting air circulate properly.



▲ Warning

Always keep your computer's main unit flat, sitting on its rubber feet. Standing it on edge defeats the cooling design and is likely to make your computer overheat. This may eventually damage the main unit. ▲

Other devices

You may have purchased other computer equipment—a printer, an external disk drive, or a modem, for instance. You'll find instructions for connecting those devices in the manuals that came with them. Whether you set them up now or wait until later depends on how familiar you are with using a Macintosh: some devices require an understanding of how to use Macintosh system software and utilities for you to complete their setup procedures. If you are new to the Macintosh, you may want to put the other components aside for now and continue on in this chapter.

▲ Warning

Some devices may be SCSI devices. (SCSI stands for *Small Computer System Interface*.) Connecting SCSI devices incorrectly can damage your system. If any of your devices are SCSI devices, read Appendix C, “Connecting SCSI Devices,” *before* connecting them. (The manual that came with the device should tell you if it’s a SCSI device.) ▲

Internal hard disk

If your system includes an internal hard disk drive, you might need to prepare it for use; the procedure is explained in the *Macintosh System Software User’s Guide*. For the veteran Macintosh user, it’s easy—read the next section, “Important Safety Instructions,” and then go to the system software guide to prepare the hard disk. But if you’re a newcomer, skip setting up your hard disk for now and continue on in this chapter. After you’ve mastered some Macintosh techniques, then go to the *Macintosh System Software User’s Guide* to prepare the hard disk.

Important safety instructions

Before you start your Macintosh II, read these important safety instructions. For your own safety and that of your equipment, always take the following precautions.

Disconnect the power plug (by pulling on the plug, not the cord) under these circumstances:

- if the power cord or plug becomes frayed or otherwise damaged
- if anything is spilled into the equipment
- if your equipment is exposed to rain or any other excess moisture
- if your equipment is dropped or the case has been damaged
- if you suspect that your computer needs servicing or repair
- whenever you clean the case

Be sure you always

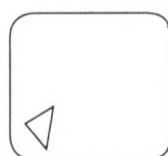
- Keep all air vents clear. Leave at least 4 to 6 inches of clearance between the vents on both sides of the main unit and any object that may restrict air flow. If you place your monitor on top of the main unit, make sure it sits at least 8 mm (.314 inches) above the surface of the main unit. (Apple monitors come with small rubber “feet” to raise them the correct distance, allowing air to circulate properly.)
- Keep your equipment away from any source of liquid. If you drink a beverage while you’re at your computer, take care not to spill.
- Protect your equipment from damp or wet weather.
- Keep these instructions handy for reference.
- 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 permit children to handle cables. ▲

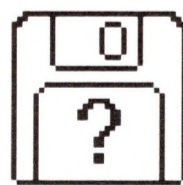
Starting up the computer

Follow these steps to start up your Macintosh II:



- **Turn your computer on by pressing the Power On key (at the top of the keyboard).**

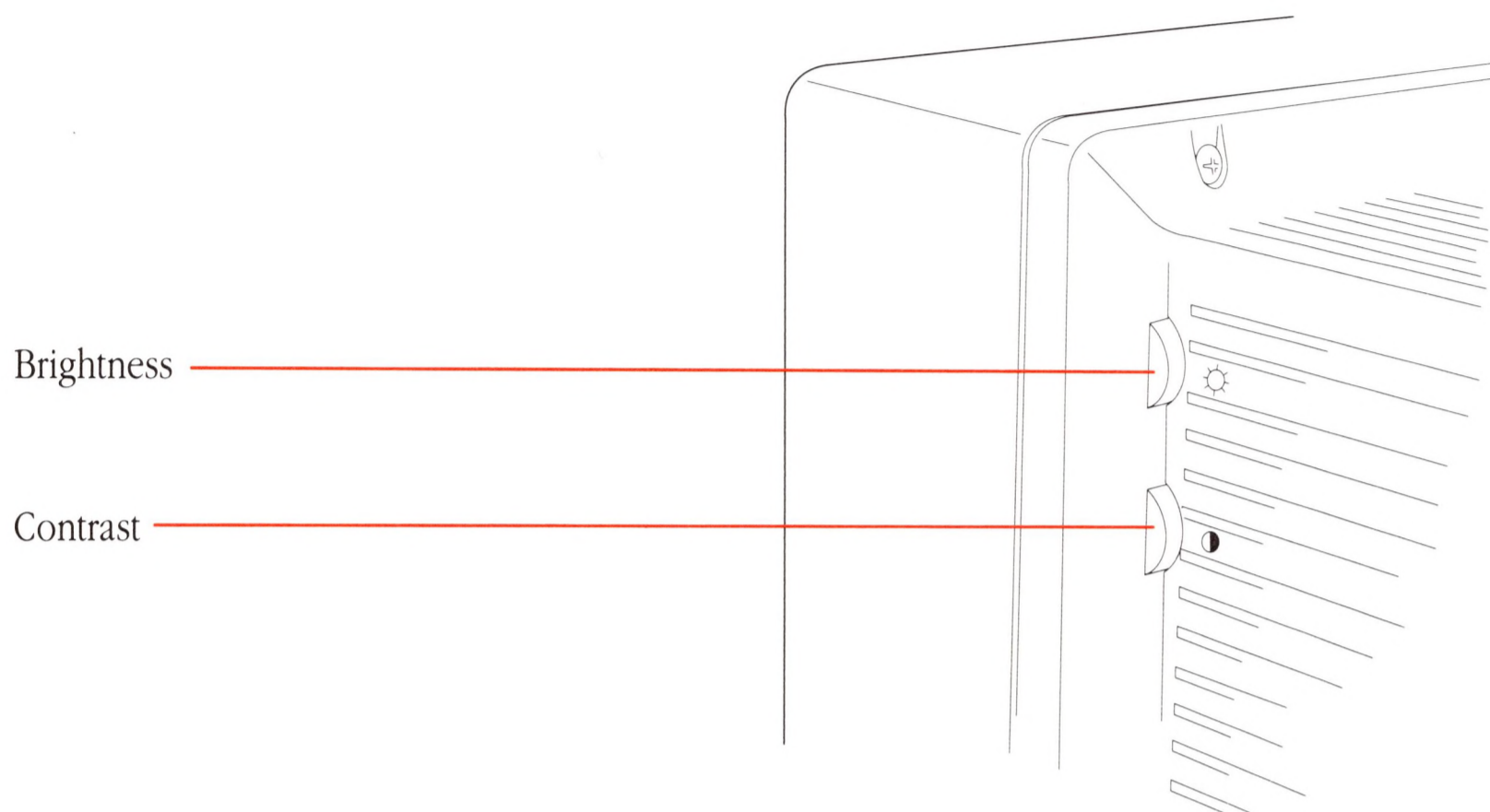
A beep lets you know the computer has started. If this is the first time the power has been turned on, a yellow sheet of plastic will pop out of the disk drive (or drives, if your system includes the second internal 3.5-inch drive). Remove the plastic piece from the disk drive, but don’t discard it. If you ever need to transport your Macintosh II, inserting the sheet in the disk drive will prevent damage to the drive during shipping.



An **icon** (a small picture) representing a Macintosh disk appears on the screen. The blinking question mark shows that the Macintosh II is ready for you to insert a disk.

- **Adjust the brightness and contrast controls on your monitor to the level you want.**

See the manual that came with your monitor for instructions.



△ Important

If you see something other than the question mark icon on your screen, and your system includes an internal hard disk drive, someone may already have prepared the hard disk for you. For now, just turn off the Macintosh II and continue on in this chapter. To turn the computer off at this time, push once on the power switch on the back of the main unit. △

Training disk or tutorial?

Before you begin learning how to operate your Macintosh II, you have a choice to make. The material presented in the training disk called *Your Apple Tour of the Macintosh II* is also taught in a tutorial in the *Macintosh System Software User's Guide*. Both are designed to give you first-hand experience using the computer, but in different ways.

The training disk is an interactive guide to the Macintosh II. That means it teaches you Macintosh concepts and techniques, prompts you step by step, and corrects you when you've made a mistake. It provides you with an entertaining, controlled learning environment.

The tutorial uses real software applications to teach you the same techniques, but in more depth. You'll be learning in the same working environment that you'll use whenever you work with your Macintosh II. Even with the actual software applications, you won't make any mistakes if you follow the instructions step by step. Whether you use the disk or the tutorial is up to you. Many people find it helpful to use both.

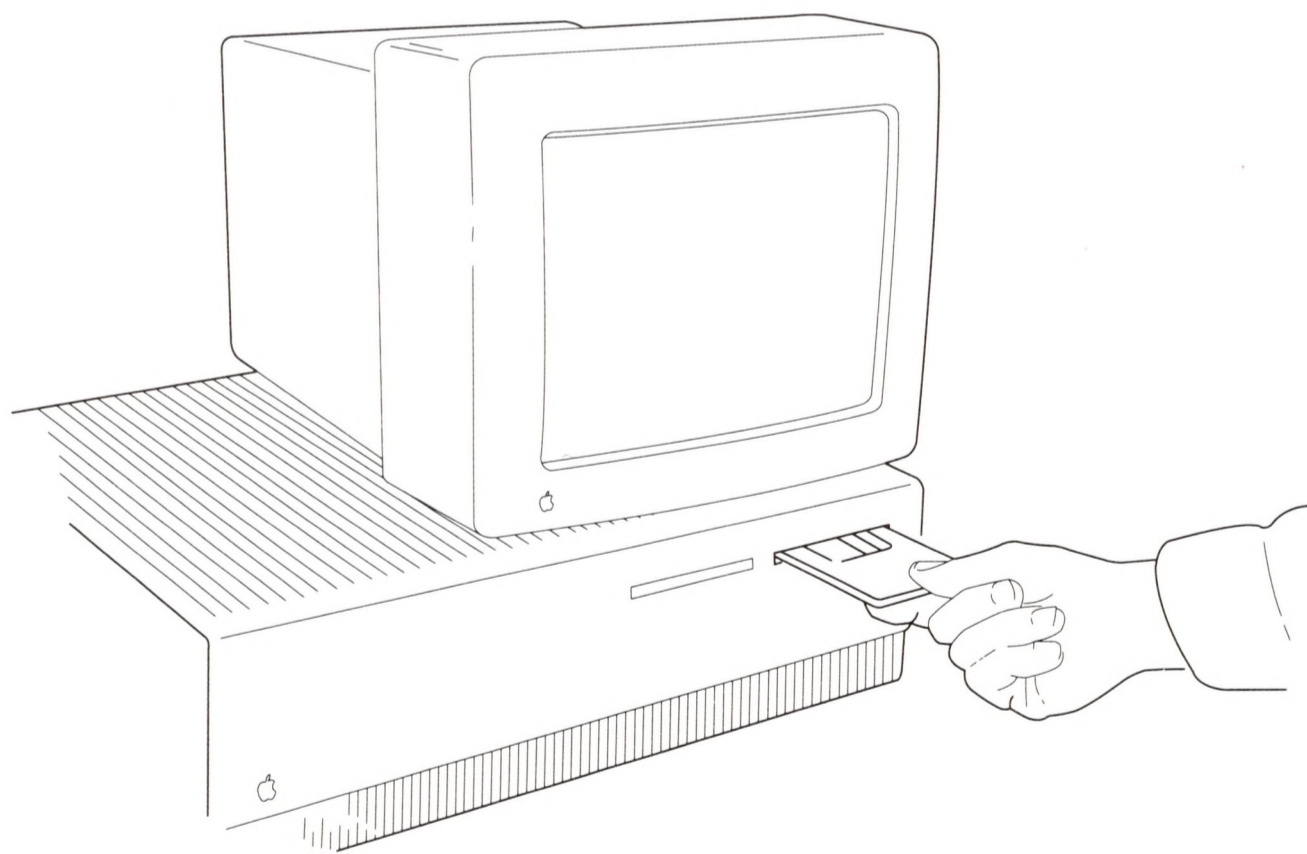
If you would like to take the guided tour, follow the steps in the next section, "The Training Disk." If you'd rather stay with the printed page, skip now to the first chapter of the *Macintosh System Software User's Guide*.

The training disk

Follow these steps to start up *Your Apple Tour of the Macintosh II*:

- **Insert the disk labeled *Your Apple Tour of the Macintosh II* into the disk drive, metal end first, label side up.**

If your system includes a second internal 3.5-inch drive, insert the disk in the drive on the right.



If you switched off the computer earlier after seeing something other than the question mark icon on your screen, insert the training disk now and switch the computer back on by pressing the Power On key. This should get you started correctly.

When the disk is most of the way into the disk drive, the Macintosh II automatically pulls it in and into place. The soft hum you hear is the Macintosh II starting up the training disk. After a few moments, you should see a display welcoming you to the guided tour.



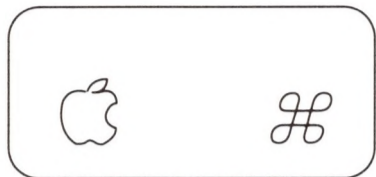
■ **Follow the instructions that appear on the screen.**

Use the training disk as long as you like. Anything you need to know to use the disk will be explained right on the screen.

Problems starting up?

If you don't see the opening display, go through the following list to see if you can identify the problem:

- Is the computer plugged into a power source?
- If your computer is plugged into a power strip, is the power strip turned on?
- Is the monitor connected to the computer properly?
- Is the monitor power cord plugged in?
- Is the computer turned on? (Look at the in-use light on the front left side of the main unit.) If the light is not on, press the Power On key.



Command key

- Is the monitor on? (Look at the in-use light on the front of the monitor.) See the manual that came with the monitor if necessary.
- Is the brightness control adjusted correctly?
- Are you using the correct disk? To check, hold down the Command and Shift keys while you press the 1 key on the main keyboard. This will eject the disk. (You'll learn more appropriate ways to eject disks later, but use this shortcut for now.) If it is the correct disk, reinsert it into the disk drive (the rightmost drive, on two-drive systems).
- If you have an internal hard disk drive, and it's already been prepared for you, did you turn off the Macintosh II before inserting the disk?

If you can't identify the problem yourself, get help from a more experienced Macintosh user or from your authorized Apple dealer or representative.

Stopping

When you're ready to stop using the training disk:

- **Click the "Quit the Tour" button in the main menu and answer "Yes" to the question that appears on the screen.**

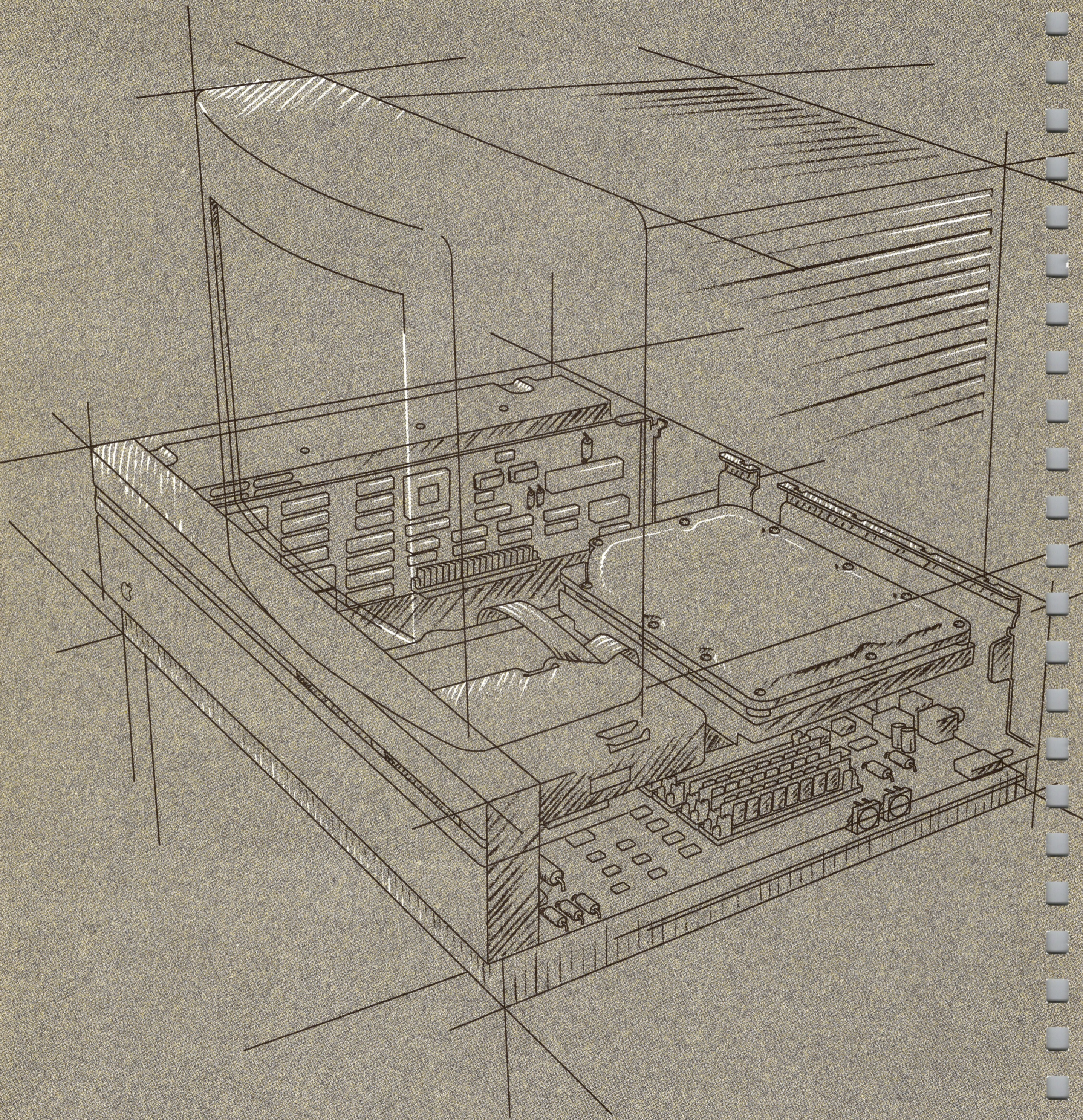
This will shut down the computer and eject the disk.

- **Take the disk out of the drive.**
- **To continue working with the Macintosh II, you can do any of the following:**
 - Go through the written tutorial in the *Macintosh System Software User's Guide* for some additional practice.
 - Insert the disk called *Your Apple Tour of Macintosh II Applications*. Then press the Power On key (at the top of the keyboard) to restart the computer and learn about some of the many applications you can run on your Macintosh II.
 - Insert the *Macintosh System Tools* disk, press the Power On key to restart the computer, and experiment with the Finder. (Make a copy of this disk and set the original aside for safekeeping; you'll find instructions for copying disks in the *Macintosh System Software User's Guide*.)
 - Start any of your applications (following the instructions in the manual that came with the application).

△ **Important** You may have to use the Installer on the *Macintosh System Tools* disk to update the system software on your application disks before they'll work on the Macintosh II. You'll find instructions for using the Installer in the *Macintosh System Software User's Guide*.

If you're uncertain whether you need to update the disk, go ahead and try the disk first. If you get unexpected results—if your keyboard doesn't work correctly, or if the application behaves strangely—these are indications that you probably need to update the system software. △

If your system includes an internal hard disk drive, go to the *Macintosh System Software User's Guide* to get your hard disk set up and running.



Inside the Macintosh II

IF YOU USED THE TRAINING DISK, *YOUR APPLE TOUR OF THE MACINTOSH II*, or went through the tutorial in the *Macintosh System Software User's Guide*, you've already learned the basic skills you'll use to work with your Macintosh II computer. The next two chapters expand on what you've learned.

This chapter briefly introduces you to the more important parts of the Macintosh II—the basic hardware components of your computer system. Chapter 3 describes how they work together with software.

You don't need to know the material in this chapter or in Chapter 3 to use your Macintosh II. But a basic familiarity with how a Macintosh works will help you understand advanced concepts that you may encounter in using system software and applications. It may also come in handy when considering hardware options and peripheral devices for your computer.

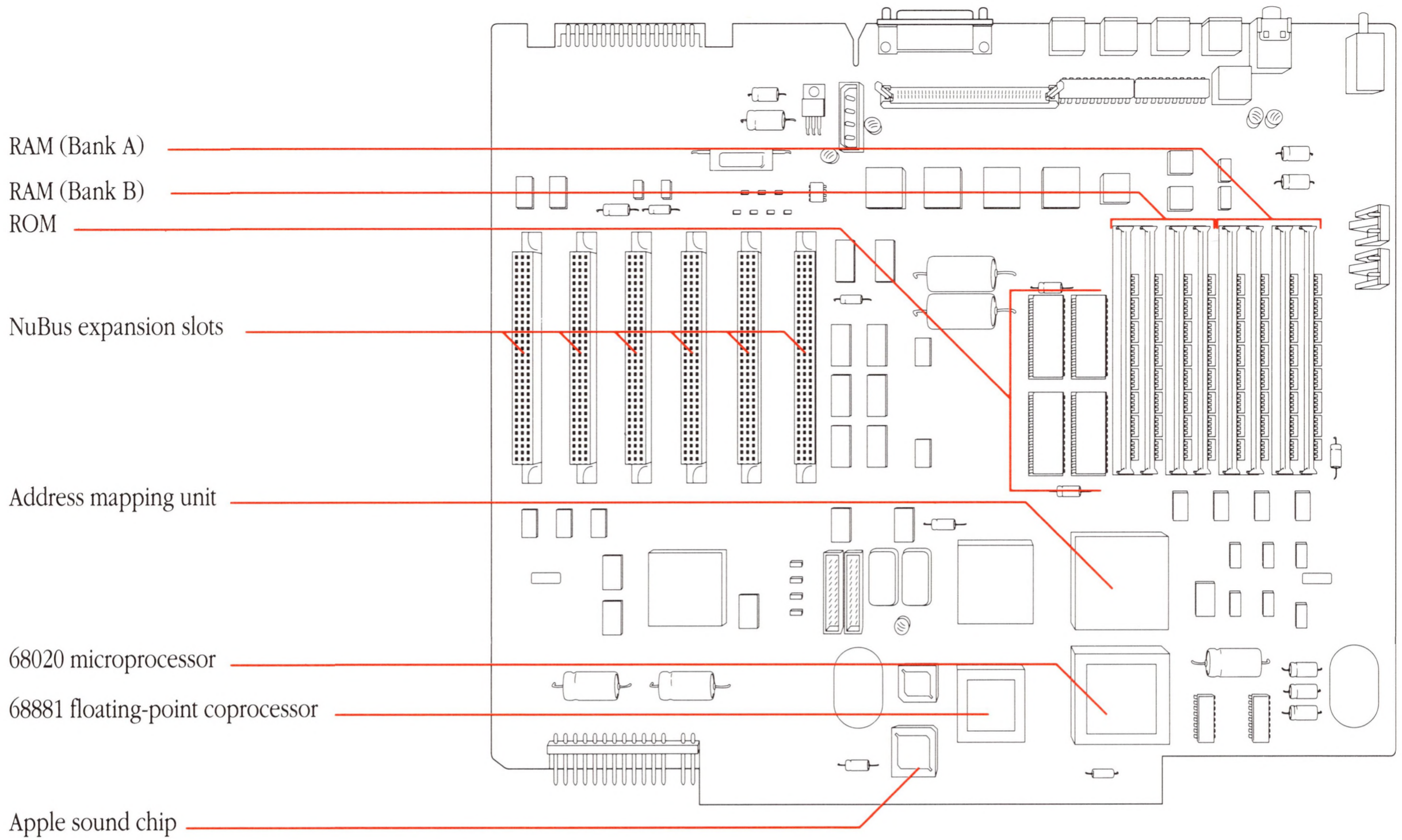
Here's a brief summary of what you'll read about in this chapter:

- the microprocessor
- coprocessors
- RAM and ROM
- video displays
- disk drives and disks
- the mouse and the keyboard

The microprocessor

The **microprocessor** is an integrated circuit, or chip, on the computer's main circuit board that processes the instructions supplied to it by software. In a sense, the microprocessor is the computer's "brain": it controls the computer by directing the flow of electrical impulses, and thereby coordinates the efforts of the other parts of the machine. When the microprocessor receives an instruction, it interprets the instruction and tells the other parts of the computer what they should do.

The instructions the microprocessor receives are in the microprocessors's own vocabulary, known as the microprocessor's **instruction set**. Each microprocessor on the market understands its own set of instructions. The Macintosh II's microprocessor, the **Motorola 68020**, uses an instruction set particular to it.



Macintosh II main circuit board

Software programs are normally designed to run on specific microprocessors. That's one important factor in whether software is **compatible** with the computer system you want to run the software on. Earlier models of Macintosh computers contain the **Motorola 68000**, the predecessor of the Macintosh II's microprocessor. However, software designed for the 68000 is still compatible with the newer 68020 because the 68020's instruction set includes all the instructions for the 68000.

Inside the microprocessor are **registers**—areas where instructions and data are stored temporarily while the microprocessor works with them. The microprocessor uses **buses** to communicate with the other parts of the computer, such as the other chips on the main circuit board. The **address bus** is the circuit the microprocessor uses to indicate the source or destination of data. The **data bus** is the path over which data is sent.

A microprocessor's performance is determined, in part, by the width of its registers and buses, measured in **bits**. The wider the address bus, for instance, the more specific locations the microprocessor can use to store data. The wider the data bus, the more data the microprocessor can move at one time. The 68020's registers, address bus, and data bus are all 32 bits wide. (The 68000 has 32-bit registers, but uses a 24-bit address bus and a 16-bit data bus.) This means that applications written specifically to take advantage of the full 32-bit buses will run very fast.

Because applications written for earlier models of Macintosh computers expect only a 24-bit address bus, and because newer software for the Macintosh II uses the full 32-bit addressing, the Macintosh II functions in either a 24-bit or 32-bit mode. On the main circuit board, a built-in 24- to 32-bit address mapping unit (AMU) handles the job of switching between the two modes.

A **bus** is a circuit that acts as a common connection for a number of devices.

The term **bit** is a contraction of the phrase *binary digit*, the smallest unit of information the microprocessor can process.

Bits and bytes

Information is processed and stored in computers as electrical charges. A computer contains thousands of minute electrical circuits connected by switches that can be in only one of two states: opened or closed. An open switch does not complete a circuit, so no electrical charge can pass. A closed switch completes a circuit, allowing the charge to flow through it. An open

switch is therefore off; a closed switch is on.

A **binary** numbering system is used to represent these two conditions. 0 means off; 1 means on. Each 0 or 1 represents one binary digit, or **bit**. Each letter, number, and punctuation mark on the keyboard has its own distinct arrangement of eight bits,

NuBus is a hardware feature described in Chapter 4, “Macintosh II Buses and Ports.”

Scientific notation is a method of writing numbers in terms of powers of ten. For example, the number 20,687 would be represented as 2.0687×10^4 .

called a **byte**. Most computers use a standardized system for the binary representation of characters called **ASCII**, an acronym that stands for American Standard Code for Information Interchange, and is pronounced “ASK-ee.”

Counting individual bytes would result in astronomical numbers; it's more

Coprocessors

A **coprocessor** is a chip designed to assist the microprocessor, usually in performing very specialized tasks. The Macintosh II comes with one standard coprocessor and can also accept others, either directly on the main circuit board or on expansion cards installed in **NuBus™** expansion slots.

The Motorola 68020 is the Macintosh II's primary processor, but the system also includes the **Motorola 68881 floating-point coprocessor**. It's sometimes referred to as the *floating-point unit*, or *FPU*. The term *floating-point* refers to the method, similar to scientific notation, of performing calculations on large numbers; it provides much greater speed and flexibility.

The 68881 is located on the computer's main circuit board. It automatically takes over many mathematical processing functions that would otherwise have to be performed by the 68020. The 68881 performs the kinds of arithmetic calculations that make most spreadsheet programs run much faster. It performs algebraic and trigonometric computations that are necessary for generating sophisticated graphics for computer-aided design and three-dimensional modeling in general.

Other coprocessors come on their own NuBus expansion cards. Some are designed to run software that isn't ordinarily compatible with the Macintosh's 68020. This is possible because control of the computer is handed over to the coprocessing chip on the card—in effect, turning the Macintosh into another type of computer system.

often convenient to use larger units, such as **kilobytes** and **megabytes**. A kilobyte is 1024 bytes (2 to the tenth power) and represented with a **KB**, or more informally, **K**. A megabyte is 1024 kilobytes, and represented **MB**. You'll often hear computer memory, disk storage space, and application and document sizes described in K's

or MB's. For instance, the text of this manual occupies about 275K, or 281,600 bytes; the minimum amount of RAM in the Macintosh II is 1 MB, or 1024K.

RAM

Your Macintosh II uses two types of **memory**, both contained in more chips connected to the computer's main circuit board. **RAM** is one type; its name is an acronym that stands for **random-access memory**. RAM is the computer's working area, the primary location where the microprocessor stores the information it needs. It's called *random-access* because of the microprocessor's ability to get at information in memory randomly by knowing its location, or **address**, rather than by having to hunt through memory sequentially from beginning to end, as you would with a cassette recorder when you're looking for a particular song.

Because information in RAM is stored electronically, the microprocessor can access data stored there very quickly. But because it is stored electronically, all information in RAM is temporary: when you switch off the computer, everything in RAM disappears. (That's why you must save your work on a more permanent storage medium, such as a disk.)

When you start up an application, the microprocessor finds the application at its permanent location on a disk, and transfers a temporary copy of the application (or segments of it) into RAM. And when you create a document with the application, the document is stored there, too. The amount of space in RAM is therefore an important factor in how complex the application can be and how large a document you can create with it. The Macintosh II comes with a minimum of 1 megabyte (1 MB) of RAM. If you need more space, RAM in the Macintosh II can be expanded by installing additional RAM chips.

Extra RAM means you can work with more sophisticated applications, or work with more applications open at the same time. Extra RAM can also increase the computer's performance. With 1 megabyte of RAM, the microprocessor may occasionally need to go to the disk drive to load in segments of an application program, if the application is too large to fit entirely into RAM. Additional RAM cuts down on disk access time by allowing more of the application's **code** to reside in RAM rather than on the disk.

RAM chips are contained on small circuit boards called **SIMMs** (an acronym for Single In-line Memory Module). The Macintosh II has eight SIMM sockets on its main circuit board that you can use to install extra SIMMs. You need to be careful to arrange the SIMMs in the correct manner; see the "SIMM Configurations" section in Appendix B.

Code is another term for computer instructions.

The PMMU

Multitasking means the computer can perform more than one task at the same time. Usually, this means you can run more than one application concurrently. UNIX is a widely used, very powerful operating system developed by AT&T.

Multitasking environments such as A/UX™, Apple's version of UNIX™, rely on a feature called **paged memory management**. It's a technique that allows the microprocessor to access a much greater amount of data than can fit in RAM at one time. To handle that need, the Macintosh II supports an optional memory management coprocessor, the **Motorola 68851 paged memory management unit**, or **PMMU**. It's called *paged* because of how it manages data in memory. A page is a fixed-size chunk of memory that is swapped in and out from the disk; the PMMU keeps track of pages in memory. When the 68020 tries to access a memory location that's not in RAM (that is, any data not in one of the pages), the page containing the data is swapped in from the disk to RAM.

The PMMU can be installed in a socket on the main circuit board of the Macintosh II, replacing the existing address mapping unit. When installed, the PMMU handles the usual 24- to 32-bit switching, in addition to providing the support for paged memory management.

ROM

ROM is another type of computer memory; its name is an acronym that stands for **read-only memory**. It's called *read-only* because the microprocessor can read and use the information in the ROM chip, but it can't store anything there. The contents of ROM are permanent and cannot be erased or changed.

Whereas RAM chips store both applications and data that change every time you use your computer, ROM chips contain information that never changes. And unlike the contents of RAM, the information in ROM stays intact when you turn off the computer. The ROM holds important instructions that the microprocessor needs to make the computer work. These instructions are just like other forms of software instructions, but because they are permanent and unchangeable, they are often referred to as **firmware**.

Perhaps more than any other part of the system, the features of the Macintosh ROM are what give the Macintosh computer its distinctive "user-friendly" interface. The ROM contains built-in libraries of over 700 **routines** (sequences of instructions). These routines can be broken down into two general categories: the Macintosh Operating System and the User Interface Toolbox.

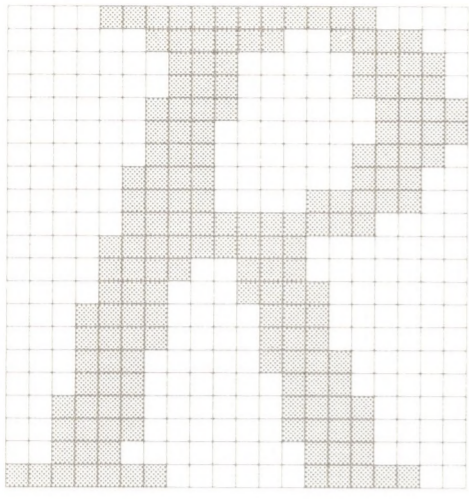
The **Macintosh User Interface** provides a consistent way for you to interact with all Macintosh computers and the applications designed to run on them.

- The **Macintosh Operating System** routines take care of basic tasks such as starting the system, moving data to and from disks and peripheral devices, and managing the memory space in RAM.
- The **User Interface Toolbox** provides application program developers with hundreds of routines for creating applications that conform to the standard **Macintosh User Interface**. That means programmers can start with a consistent set of templates for windows, dialog boxes, icons, menus, and so on. Their application programs borrow these common elements from the Macintosh ROM. The fact that almost all applications use the same ROM routines assures you, the user, a very high level of consistency among Macintosh applications.

Video displays

The Macintosh II does not have a built-in monitor; it supports a variety of stand-alone color and monochrome display devices which you connect to the system through interface cards plugged into NuBus expansion slots. Apple Computer offers two monitors for the Macintosh II: the Apple High-Resolution Monochrome Monitor and the AppleColor™ High-Resolution RGB Monitor. Both use a cathode-ray tube (sometimes abbreviated *CRT*) similar to those found in common televisions. In both, the video display is created by a moving electron beam inside the picture tube that scans across the screen. As it scans, it turns on and off to create tiny dots. These dots are called **pixels** (short for *picture elements*).

To present a screen image, the electron beam starts at the top-left corner of the screen and scans horizontally from left to right, turning on and off to create individual pixels, forming a line of graphics. Each time the scanning beam reaches the right edge of the picture, it flicks invisibly back to the left edge and down a pixel to the beginning of the next line, much as you move your eyes when you read a line of print. When the scanning beam reaches the bottom-right corner of the picture, it flicks back to the top-left corner and begins rescanning, or “refreshing,” the screen. This process happens too quickly for the human eye to detect, so the image appears constant.



RGB stands for red-green-blue, the three primary colors blended to create the spectrum of colors on a color display.

A video card's **palette** is the total number of colors a video card is capable of generating.

The pixels on a Macintosh II display are represented by bits stored in an area on the video card called the **screen buffer**. (The screen buffer actually resides in RAM chips on the video card.) The number of bits used to display each pixel varies, depending on the type of video card installed in the system and the number of chips on the card. With some monochrome monitors, each bit in the screen buffer corresponds, or is "mapped," to one pixel on the display. In this case, bits whose value is 0 are displayed as white dots (background), and bits whose value is 1 are displayed as black.

Most Macintosh II video cards, however, represent each pixel with more than one bit. The additional bits provide more information about each pixel. On a monochrome display, the extra bits control the intensity of the pixels, allowing for a variety of shades of gray, each shade defined by a certain level of brightness. With color monitors, the extra bits determine the number of colors on the display. Pixels on an **RGB** color display are made up of red, green, and blue beams of light, each aimed to create one dot whose color is a blend of the three primary colors. Different colors are created by varying the intensity of each of the three beams.

The Macintosh II Video Card supports 1, 2, and 4 bits per pixel; with a Video Card Expansion Kit, the card can support 8 bits per pixel. If 2 bits are available per pixel, 4 (or 2^2) colors or grays can be displayed; with 4 bits per pixel, 16 (or 2^4) colors or grays can be displayed; and 8 bits per pixel allow 256 (or 2^8) colors or grays.

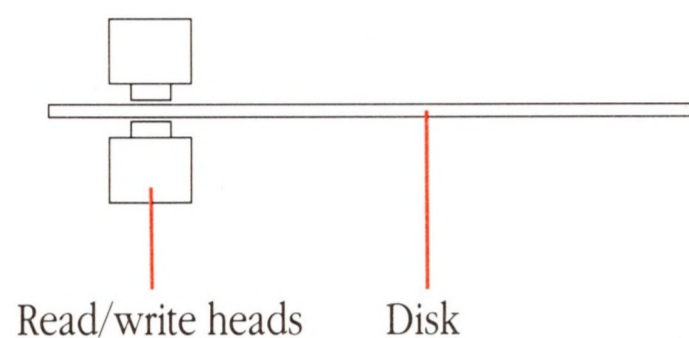
This can be misleading, however. In an RGB display using eight bits for the intensity value of each of the red, green, and blue beams, the video card's **palette** is 2^{24} (2^8 for each red, green, and blue beam), or 16,777,216, different colors. A video card may have a palette of over 16 million colors, but the monitor can display only 256 at one time. To select the colors you want displayed on your monitor screen, you use the Control Panel desk accessory in the Apple menu. For instructions on using the Control Panel, see the *Macintosh System Software User's Guide*.



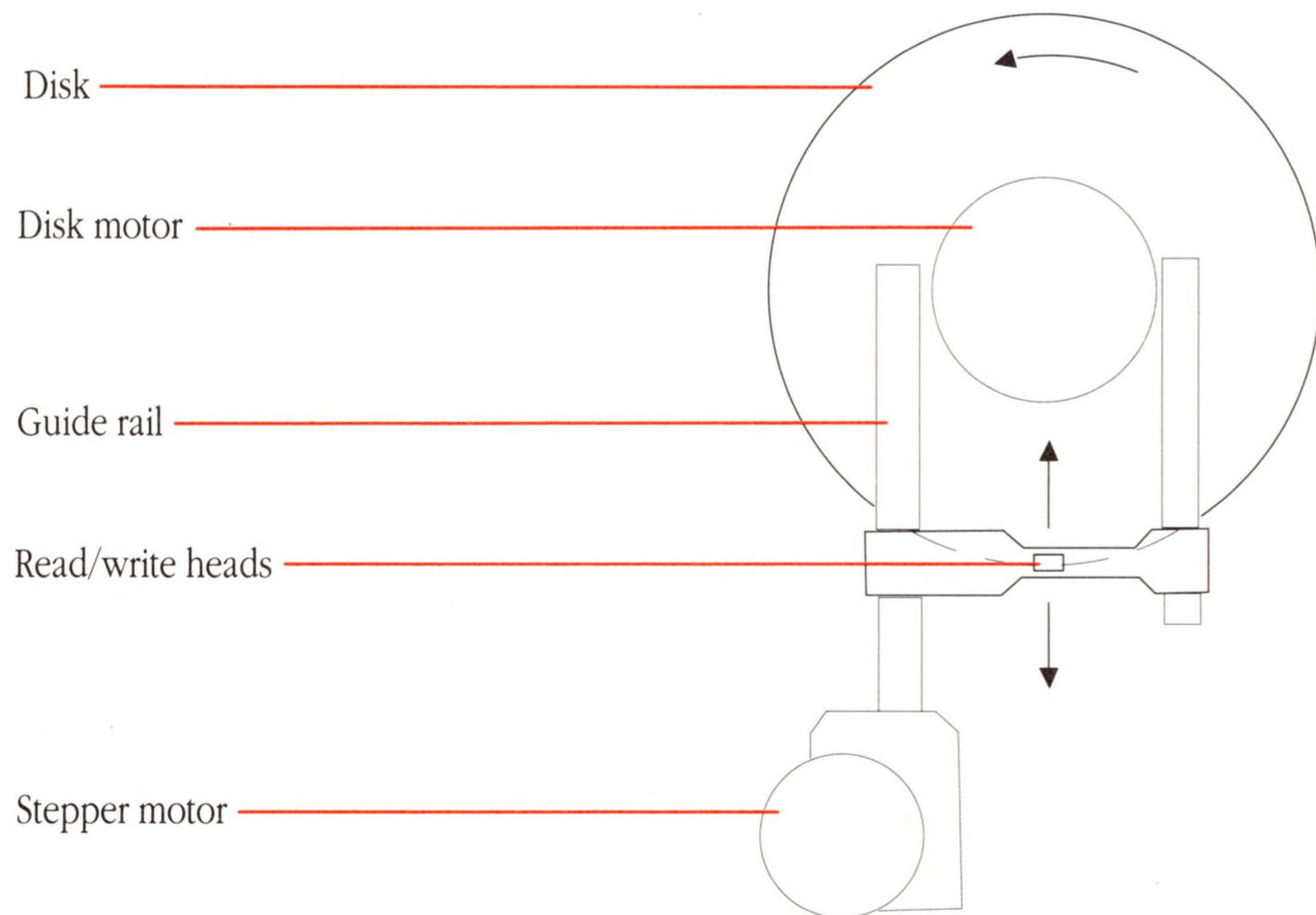


Disk drives and disks

A computer would be of little use if you couldn't load information into RAM or if you couldn't store your documents after you'd finished working with them. Since the contents of RAM disappear when you shut off the computer, your applications and data must be stored on a more permanent medium. That's the function of **disk drives** and **disks**. Disk drives record information on thin, circular disks, coated with a magnetic surface. Macintosh computers use two types of disks—**3.5-inch disks** (sometimes called "floppies") and **hard disks**.

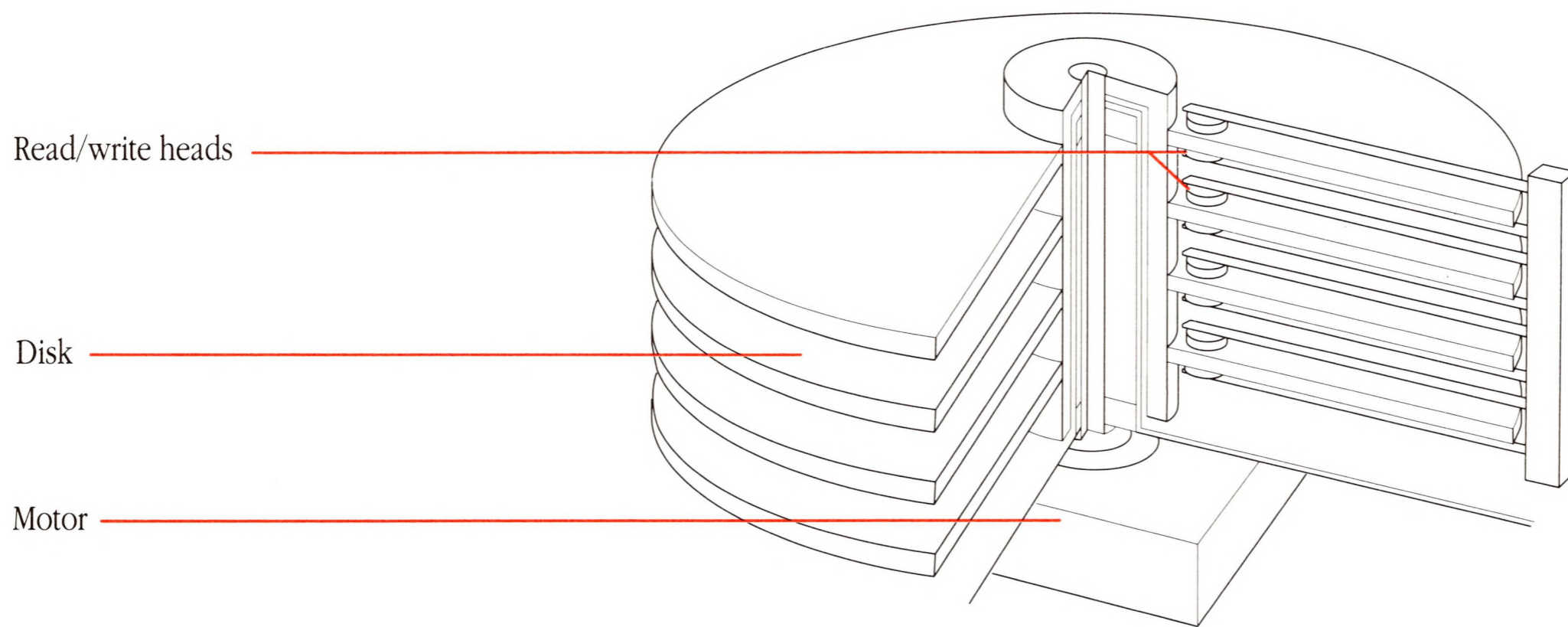


The 3.5-inch disk drives in the Macintosh II contain two read/write heads, similar to the recording heads in a cassette recorder. When you insert a disk in the drive, a lever moves the spring-loaded shutter aside. This exposes the disk's magnetic surface to the read/write heads, which are positioned opposite each other with the disk's surface between them. When the disk drive is in use, the drive's stepper motor moves the read/write heads radially across the disk's surface while the disk motor spins the disk.



3.5-inch disk drive

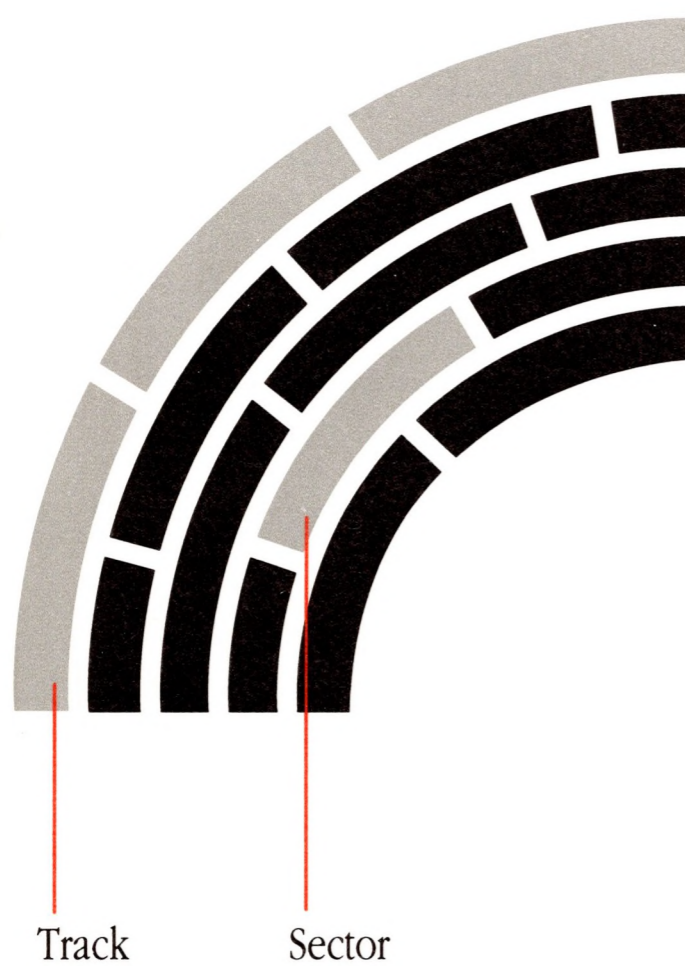
Hard disk drives record information in the same manner as 3.5-inch disk drives. But instead of thin, flexible plastic, hard disk drives use rigid metal disks encased permanently inside the drive. Hard disk drives contain one or more disks, depending on the overall storage capacity of the drive, each disk with its own pair of read/write heads. Unlike 3.5-inch disks, which turn inside the drive only when the operating system is storing or retrieving data, the disks inside a hard disk drive spin continuously whenever the power is on.



Hard disk

There are two advantages to hard disks: they hold many times more information than 3.5-inch disks, and the operating system can store and retrieve information much more quickly. Whereas a 3.5-inch disk typically holds about 5,000 bits per inch (or *bpi*), hard disks can hold from 12,000 to 15,000 bpi. And because hard disks spin at much faster speeds, information can be written on them, or read from them, much more quickly than with 3.5-inch disks.

Apart from storage capacity and speed, the two types of disks actually work in much the same way. For the operating system to locate information on disks, the magnetic surface of the disk is divided into concentric circles, or **tracks**, and each track is divided into **sectors**. When you insert a blank disk in a disk drive (or when you use a hard disk for the first time), the disk drive must format, or **initialize**, the disk's surface. This involves setting magnetic markers for each track and sector and creating an index, or **disk directory**, that will record the specific locations of data stored on the disk.

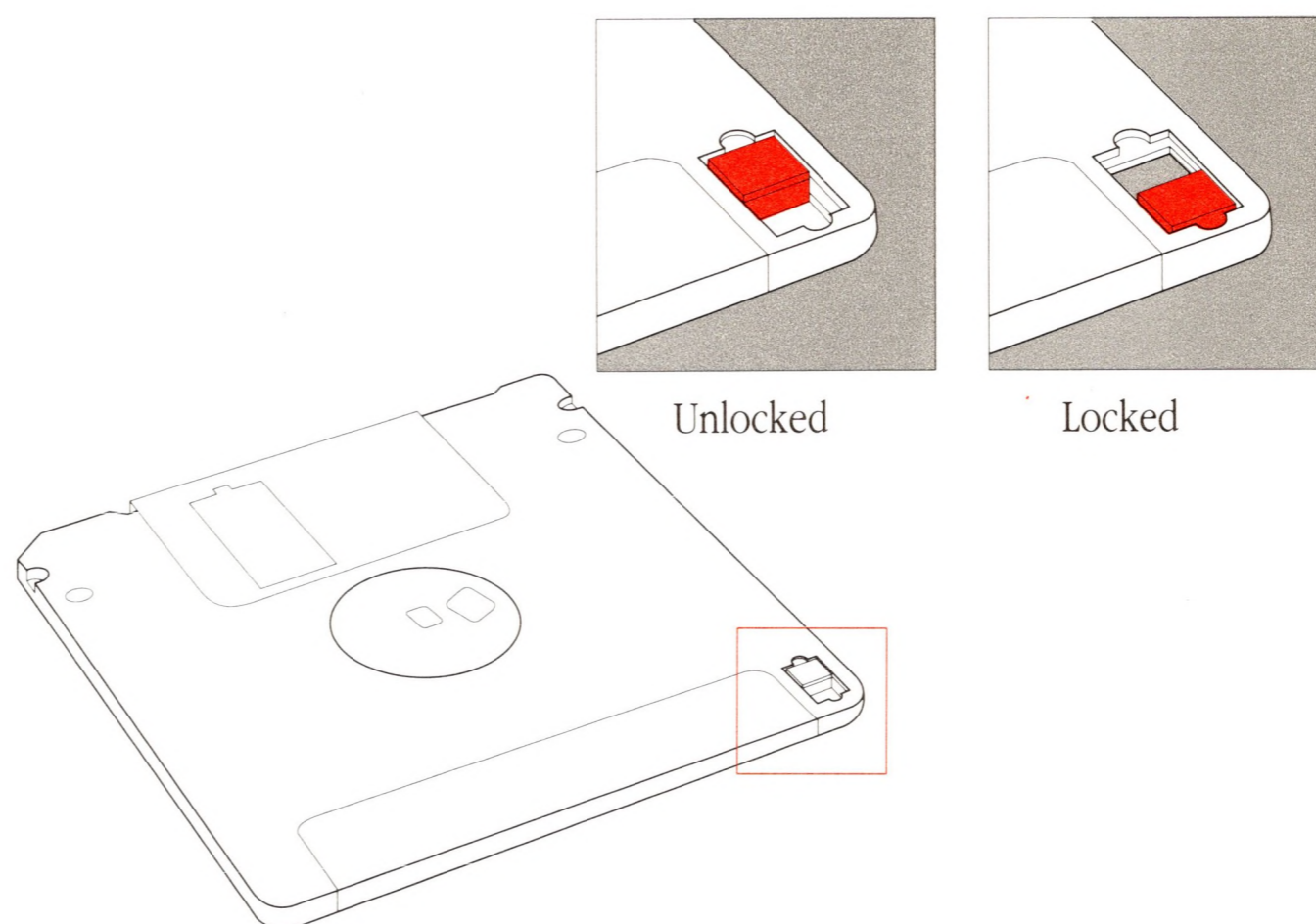


When you save a file on a disk, the operating system looks in the disk directory for free storage space, moves the read/write heads to the free sectors and writes the data, and then records a directory entry for the file. Later, when you open the file's icon from the Finder desktop, the operating system looks again in the disk directory, finds the file's name and location on the disk, moves the read/write heads to the appropriate sectors, and begins reading the file into RAM.

The operating system doesn't store information on the disk right away. When you first open a disk's icon from the Finder desktop, the operating system sets aside a portion of RAM as a **disk buffer**, which acts as a temporary storage area. As a time-saving measure, most applications write changes to the disk buffer in RAM and then only periodically transfer those changes to the disk itself. That's why you shouldn't remove a 3.5-inch disk from the disk drive manually: you must use the Finder to eject the disk because the operating system needs to record the contents of the disk buffer onto the disk before ejecting it.

Disks are permanent storage devices, in the sense that once a file has been saved on a disk, you can shut off the computer and the information is still recorded magnetically on the disk. But disks are reusable. Individual files can be removed (by dragging their icons to the Trash), and the sectors formerly used for storing that file can be used again. Removing a file doesn't actually erase any data; it merely lists those sectors as free for future storage in the disk directory. Reinitializing the disk erases all the data from the disk and creates a new disk directory.

If you want some added assurance that the contents of a disk won't be changed or erased inadvertently, you can **lock** a 3.5-inch disk by sliding the small tab toward the edge of the disk to expose the little hole beneath it.



When a disk is locked, you can't add new information to it or change any information on it. You can open and print the documents it contains, but you won't be able to save, delete, rename, move, duplicate, or change any information on it. (Some applications won't work if they are on a locked disk.) To allow the disk to be altered again, just slide the tab to cover the hole.

The mouse and the keyboard

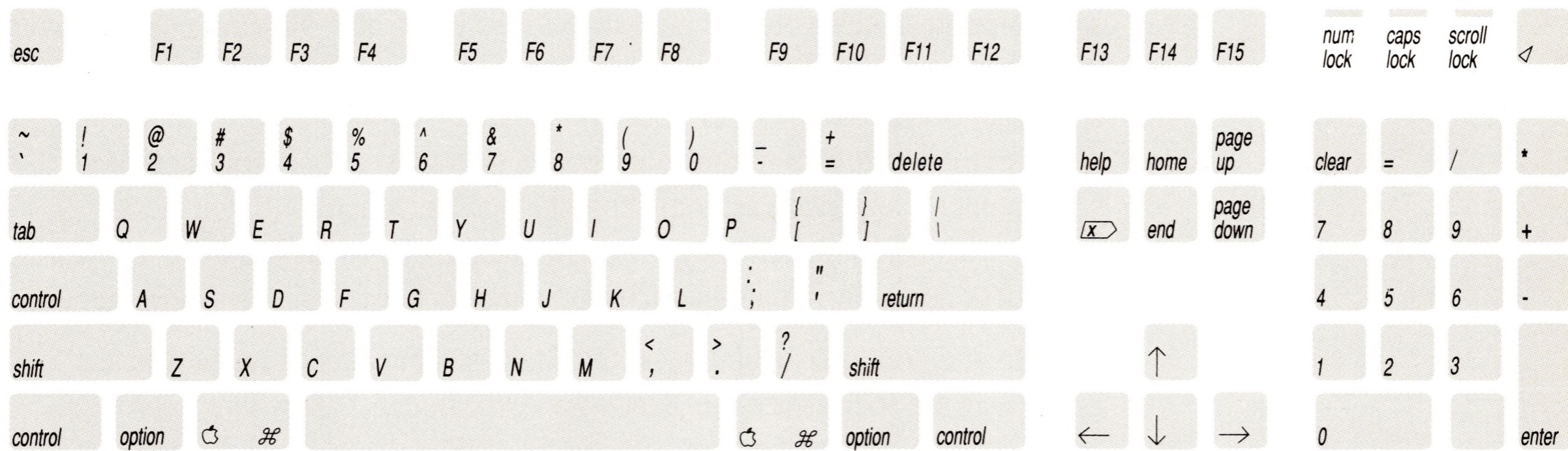
The mouse and the keyboard are tools for communicating with your Macintosh II. They are your computer's primary **input devices**.

The mouse

The Macintosh mouse is a hand-operated device that lets you easily control the location of the pointer on your screen and make selections and choices with the mouse button. Coupled with the graphic elements of the Macintosh User Interface—icons, windows, pull-down menus, and so on—the mouse makes ordinary operation of the system almost effortless: you view your work on the screen and interact with it merely by pointing with the mouse and clicking the mouse button.

The Macintosh mouse contains a rubber-coated ball that rests on the surface of your working area. When the mouse is rolled over that surface, the ball turns two rotating axles inside the mouse. The axles track vertical and horizontal motions. As the axles turn, detectors register the changing positions, and a small integrated circuit inside the mouse signals the operating system to move the pointer on your screen accordingly. (There's also a third axle that helps balance the ball and keep it rolling smoothly.)

The mouse registers relative movement only; the operating system can tell how far the mouse has moved and in which direction, but not the mouse's absolute location. That's why you can pick up the mouse and move it to another place on your table or desk surface and the pointer will not move. You can adjust the speed with which the pointer on the screen responds to the mouse's movements by using the Control Panel desk accessory in the Apple menu.



Apple Extended Keyboard



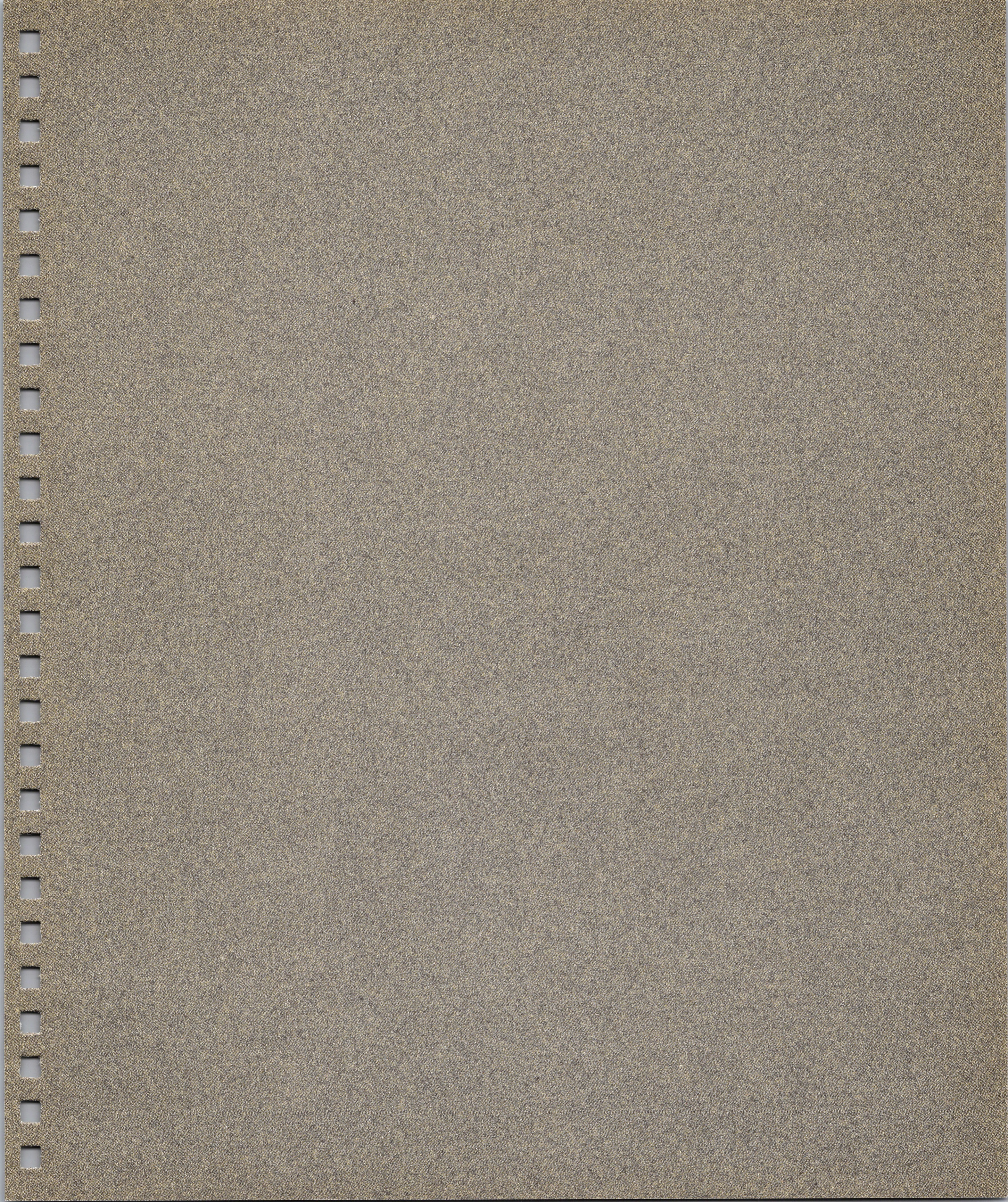
Apple Keyboard

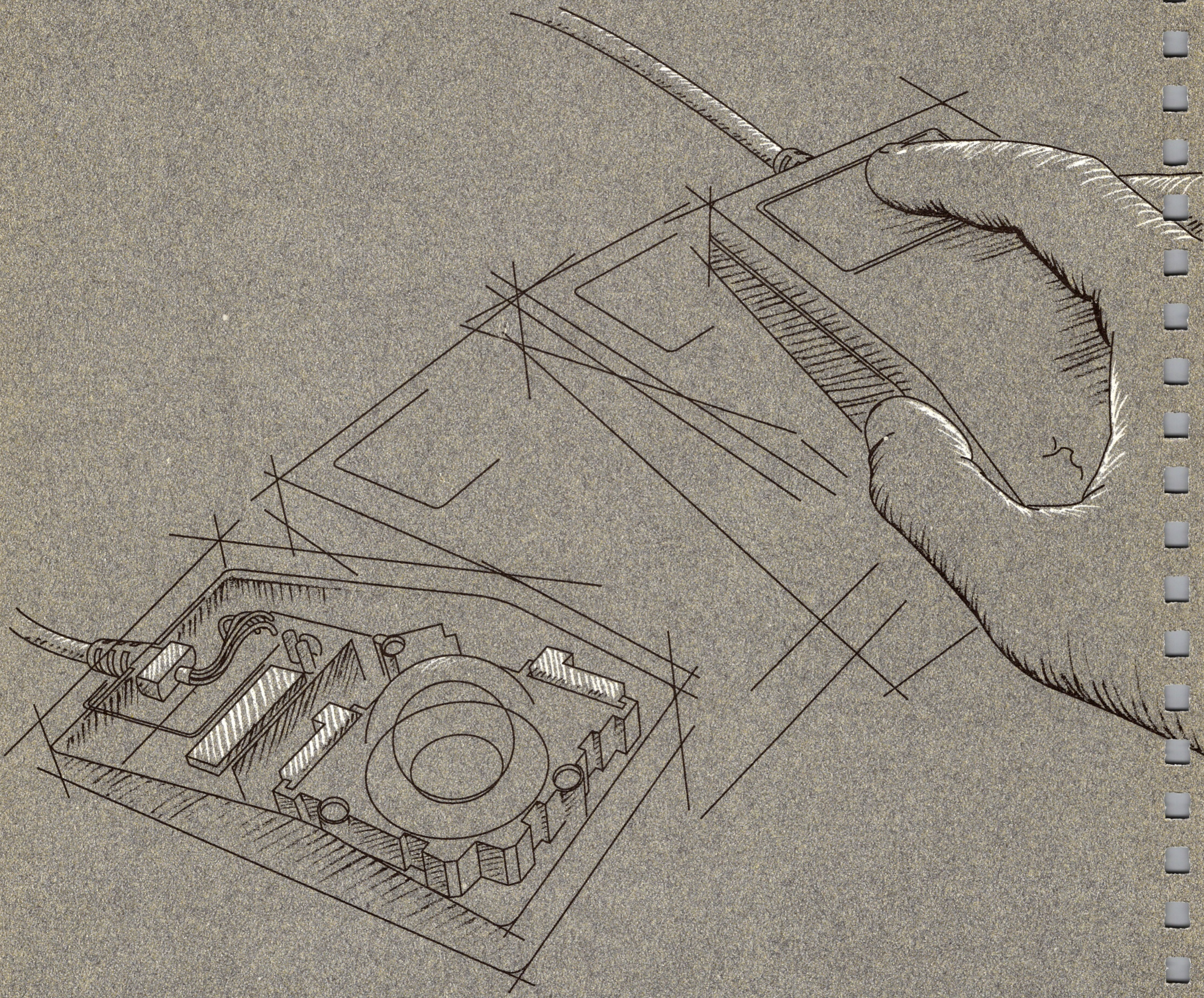
The keyboard

The keyboard is another tool for communicating with the computer. Apple offers two choices of keyboards for your Macintosh II system: the Apple Keyboard and the Apple Extended Keyboard. Both keyboards have a common set of keys; the Apple Extended Keyboard has additional keys that you may be familiar with if you've worked with applications that run on other operating systems such as MS-DOS or UNIX. With appropriate software, these additional keys can be programmed for special purposes and used with Macintosh applications, too.

Macintosh keyboards include all the keys you'd normally find on a typewriter keyboard. You'll also find a built-in numeric keypad that lets you enter numbers and numeric symbols more quickly than by using the number keys on the top row of the main keyboard. (But most applications accept numbers and symbols from either the main keyboard or the numeric keypad.) The numeric keypad is especially useful when you use the Calculator desk accessory, a built-in calculator you can choose from the Apple menu.

In addition to character keys (that is, keys that produce text characters) there are special keys on Macintosh keyboards that allow you to produce alternate character sets or to duplicate actions you'd normally perform with the mouse. If you're accustomed to function keys on other types of computer keyboards, or if you just want to use keyboard shortcuts, you can use the special keys on the keyboard instead of the mouse for most operations. (For more information on special keys, see the *Macintosh System Software User's Guide*.)





How the Macintosh II Works

IN CHAPTER 2, YOU LEARNED ABOUT THE HARDWARE COMPONENTS OF your Macintosh II computer. Another essential part of the computer system is software, the instructions that determine how the hardware will perform. This chapter provides a brief introduction to a particular type of software—system software—and then explains how Macintosh hardware and software work together.

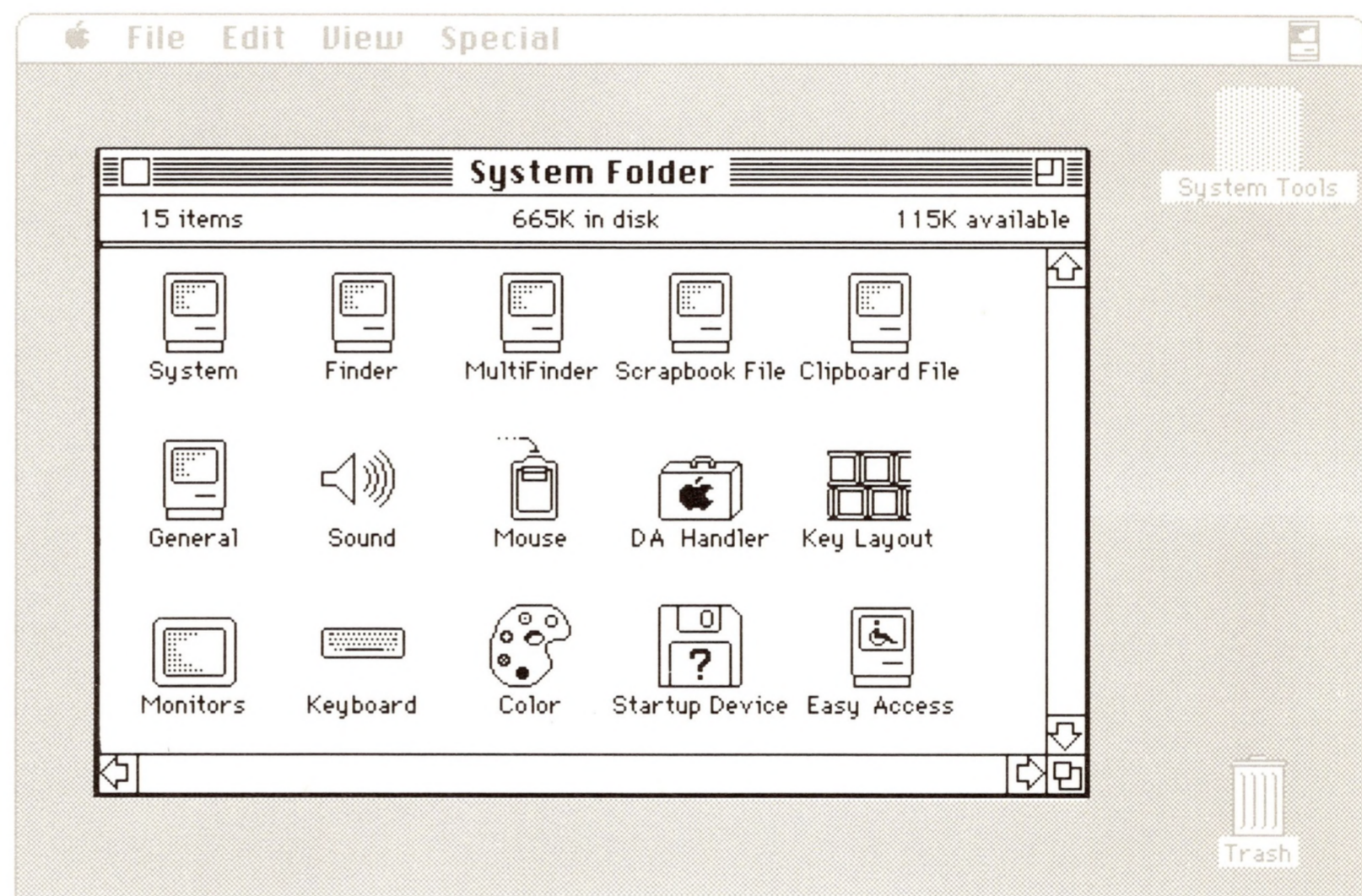
System software

Of course, the Macintosh II hardware is useless without software, the instructions programmed to make the machine perform its varied tasks.

System software is one type of software: it's called *system software* because it's an essential collection of programs that the computer *system* needs before you can use it. It's also called *system software* to distinguish it from *application software*, the specific applications—word processing and spreadsheet applications, for instance—that you use to perform your work.

Though technically the routines in ROM are also considered system software, the phrase *system software* generally refers to a set of disk-based programs and files contained in a disk's **System Folder**. Among these programs and files are the System file, the Finder, and various resources.

For a more detailed discussion of system software and the contents of the System Folder, see the *Macintosh System Software User's Guide*.



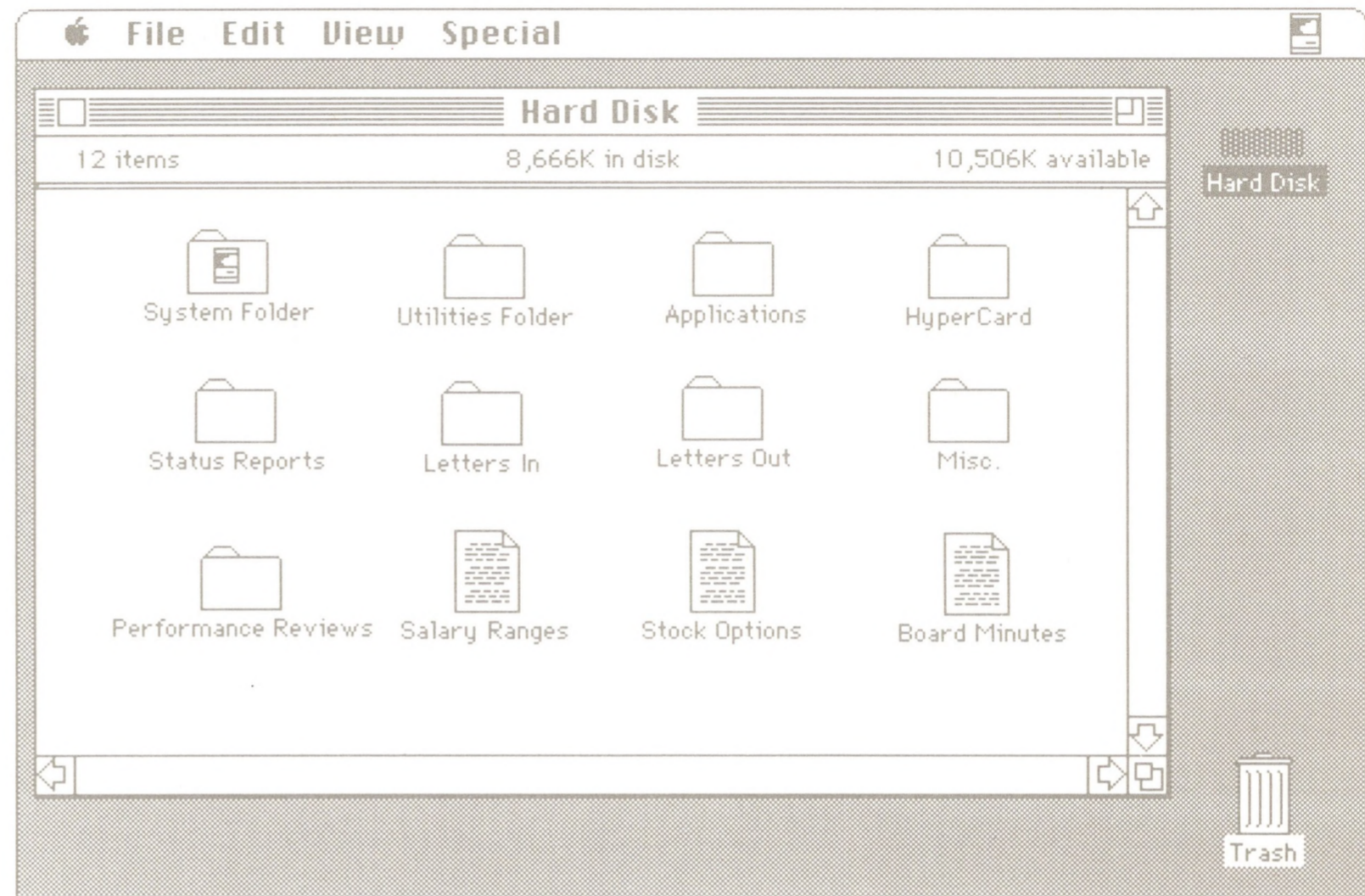
The System file

The contents of the **System file** are loaded into RAM automatically when you start up the computer. The System file contains important information that adds to or modifies the operating system routines in ROM:

- Messages that your computer uses to communicate with you need to be in a language you can understand. These messages are contained in the System file rather than in ROM so that the same computer can accommodate users of a wide variety of languages. (That is, the ROM contains no language-specific information. Instead, Apple Computer produces an extensive variety of foreign-language versions of its system software disks.)
- Keyboard layouts vary in international markets. This information is contained in the System file because it's more efficient to adapt a disk for foreign markets than the ROM itself.
- **Fonts** and **desk accessories** are kept in the System file so that you can customize your disks with whatever special fonts and desk accessories you need for your work.
- **Patch code** incorporates minor changes to the routines in ROM. That way, Apple can offer periodic ROM enhancements that you can take advantage of without having to upgrade the ROM chip itself. The routines in patch code are loaded into RAM when you start up the computer; they merely override the routines in ROM that they replace.

The Finder

The **Finder** is a special application that manages the Macintosh desktop; it is automatically loaded into RAM whenever you start up the computer. If you used the training disk, or the tutorial in the *Macintosh System Software User's Guide*, you've already worked with the Finder.



Along with the mouse, the Finder makes working with disks and their contents simple. Disks and files—usually applications, folders, and documents—are represented graphically in windows. As you've already seen, you use the pointer on the screen and the mouse button to work with icons, windows, and menus. You can perform almost all your disk and file functions just by pointing, clicking, and dragging, rather than by typing out lengthy commands.

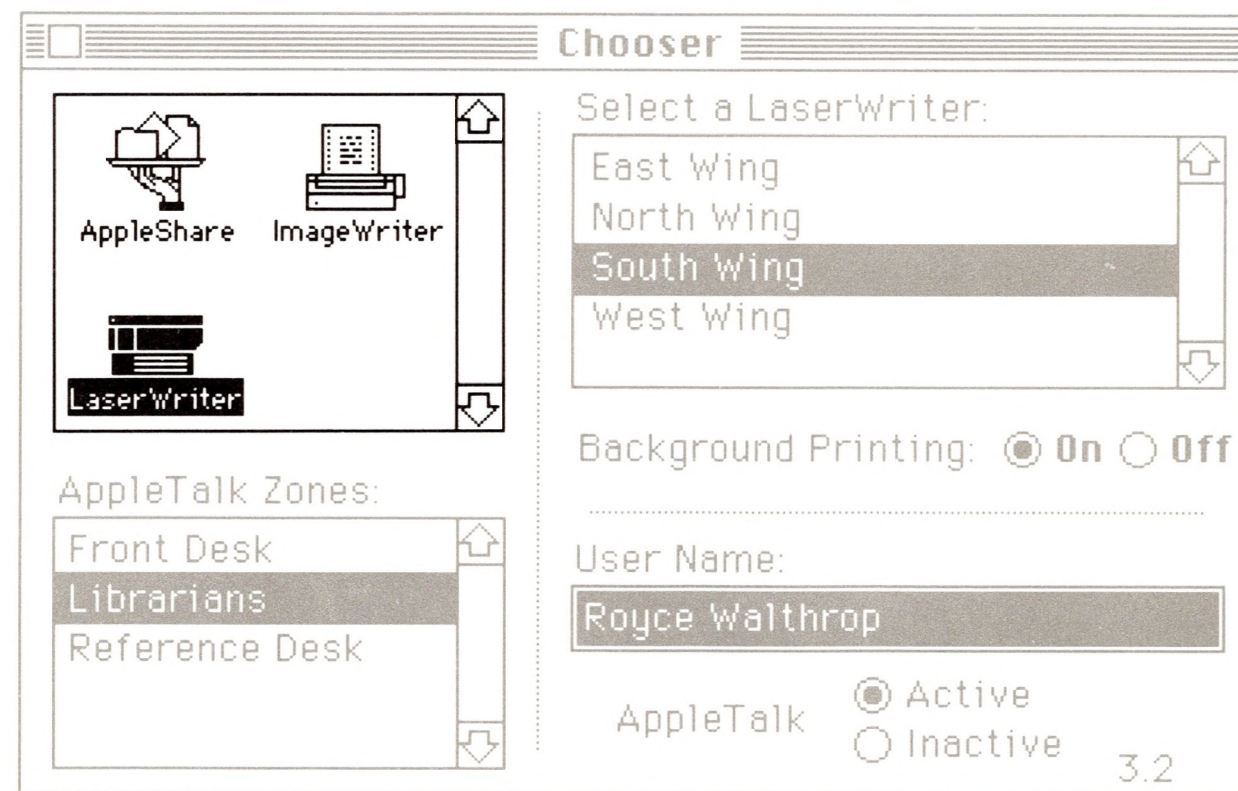
Resources

Resources are also sometimes referred to as *device drivers*.

Resources are files that contain information the microprocessor needs before it can communicate with devices attached to your computer system. For example, before you can print a document on a printer, the computer needs information about the type of printer you're using and how to communicate with it. This information is contained in **printer resources**. Other devices—such as plotters, scanners, file servers, and so on—require their own resources as well.

For instructions on using the Chooser desk accessory, see the *Macintosh System Software User's Guide*.

The resources in your System Folder determine the types of devices you can use with your Macintosh. When you start up the computer, the operating system notes which resources you have in the System Folder, and then lists them in the Chooser desk accessory window. Before you can print a document on a printer, for example, you must first use the Chooser (from the Apple menu) to indicate which printer you want and what port the printer is connected to.



Startup disks

Because the information in the System Folder is essential to the Macintosh operating system, your computer cannot complete its startup procedure without it. Accordingly, disks that contain a System Folder are called **startup disks**. It's possible to have more than one startup disk in your system's disk drives, but the computer will use only one to start itself up. When you switch on your computer, the operating system searches through the disk drives for a startup disk, and uses the System Folder on the first startup disk it finds to start itself.

Scanning order

In searching for a startup disk, the operating system scans the available disk drives in a particular order. First it looks in the right 3.5-inch disk drive. If it finds none there, it looks in the left 3.5-inch drive, if one is installed. Next it looks for SCSI drives—first for external drives connected through the SCSI port, and then for an internal hard disk, if one is installed.

- ❖ *Overriding the scanning order:* If your system includes a SCSI hard disk, you can override this scanning order by using the Control Panel desk accessory and choosing a specific startup device. See the *Macintosh System Software User's Guide* for details.

Current startup disk

The first startup disk the operating system finds becomes the **current startup disk**. If your computer system includes a hard disk, you'll probably find it most efficient to use the hard disk as the computer's startup disk. Occasionally, though, you'll want to use a 3.5-inch disk to start your system; that's why the operating system looks in the 3.5-inch drives before starting from the hard disk. In effect, the hard disk is the default startup disk: if it doesn't find a disk with a System Folder in any other drive, it uses the hard disk. (You'll learn more about startup disks in the *Macintosh System Software User's Guide*.)

How it works

The following sections provide a general description of how the hardware and software components of the Macintosh II system work together.

Starting up the computer

When you switch on your Macintosh II, the operating system determines how much memory space is present in RAM, performs some system diagnostic tests, and then begins scanning the disk drives for a startup disk.

When it identifies a startup disk, the operating system looks in the disk directory for the location of the System file, directs the disk drive's read/write heads to the appropriate sectors, and loads the essential parts of the System file into RAM.

With the core of the System file in RAM, the operating system now has all the information it needs about your keyboard layout, the messages it needs to communicate with you, the specific fonts and desk accessories installed in the System file, and any enhancements to the ROM routines in the form of patch code.

Once it has loaded the System file into RAM, the operating system goes back to the startup disk and loads the resources it needs to communicate with the printers and other devices attached to the system. Then the operating system goes back again to the startup disk, loads the Finder application into RAM, and presents the Finder desktop on the screen. After presenting an icon for the startup disk, the operating system continues looking in other disk drives, presenting icons on the Finder desktop for any additional disks it finds.

With the Finder loaded into RAM and the Finder desktop presented on the screen—showing icons for each of the disks in the system's drives—the system waits for an instruction from you to tell it what to do next. Normally, the instructions you give the computer are in the form of mouse operations (or sometimes keyboard instructions). For example, you might open a disk's icon by selecting the icon and choosing the Open command from the File menu. Or you may want to move or copy a document by dragging its icon. Each time you move the mouse, the operating system keeps track of the pointer's location on the screen and responds appropriately to your clicking the mouse button. More than likely, you'll want to perform some work using an application.

Starting up an application

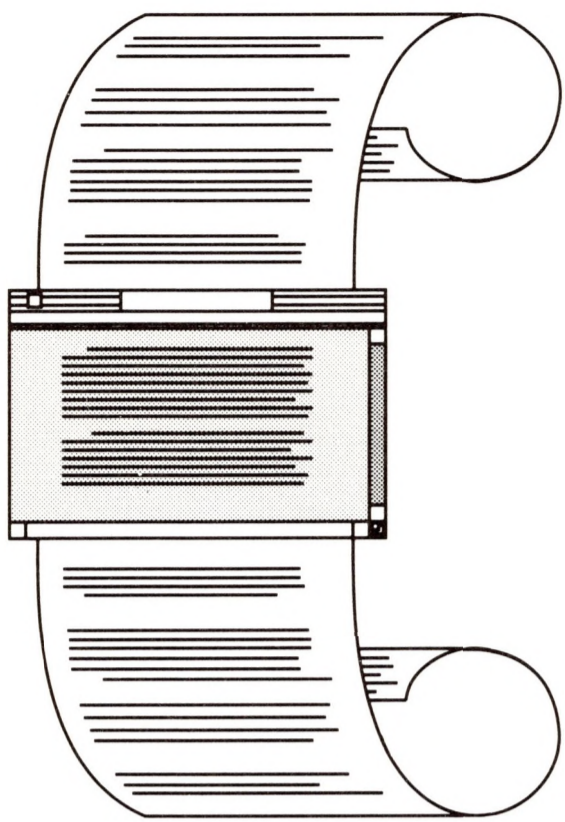
When you start up an application, the operating system goes to the disk directory to find the location of the application's instructions and loads them into RAM.

Depending on the size of the application, the operating system may load only part of the application's code into RAM at one time. While you're using the application, if you try to perform an action that requires parts of the program that are still on the disk, the operating system goes back to the disk and loads the necessary instructions into RAM, sometimes substituting them for code that's already been loaded for previous actions.

Creating a document from scratch

When you start up an application, most applications present an "Untitled" window, ready for you to begin typing text, drawing pictures, and so on. As you create a document, the operating system assigns specific locations in RAM for all the characters you type on the keyboard (or the art you create with the mouse), and displays what you create on the screen.

Because information in RAM is stored electronically, the document is in a very dynamic state: you can change the contents of the document, move parts from one place to another, delete them entirely, and generally create at your leisure until you've decided on its final form. Meanwhile, the application changes the electronic version of the document in RAM as you go along.



Depending on how much you create, the document you're working on may eventually become too large for you to see all of its contents on the screen at one time. In fact, there's quite a bit more room in RAM for a document than there is room on the screen to display it. As you continue creating, part of the document seems to move beyond the top or side of the screen to make room for the new material you're adding. Actually, the operating system is removing portions of your document from the screen buffer to make room for the new text or graphics.

To see the parts of the document that aren't displayed on the screen, you use the scroll arrows or the scroll bars. As you scroll, the operating system moves the appropriate portions of the document in and out of the screen buffer. This creates the effect of the document being moved under the application's window.

Saving your work

When you've finished working on a document, you'll probably want a permanent copy of it for safekeeping. To save a document on a disk, you choose the Save command from the File menu. This tells the operating system to create a file on the disk that will contain the document.

Once you give the document a name, and indicate which disk you want the document saved on, the operating system looks in the disk directory for free space in which to store the document. When it finds the space, it moves the disk drive's read/write heads to the available sectors and writes a copy of the electronic version of the document onto the disk's magnetic surface. Then the operating system makes an entry for the document in the disk directory and returns you to the electronic version still in RAM. With a copy of the document safely stored on the disk, you can close the document and free the space in RAM for other work.

Revising an existing document

You'll often need to return to documents you've already created and stored on a disk. For example, you may need to update your customer lists in a database, change some figures in a spreadsheet budget, or revise a letter or annual report.

When you open a document, the operating system looks first for the application you used to create the document and loads it into RAM. Then it finds the document you're opening, loads a copy of it into RAM, and presents the document on the screen.

Again, the copy of the document in RAM is in its dynamic state. Using the mouse and keyboard, you can make any changes to this version of the document that you want to, and the application changes the electronic version accordingly. Meanwhile, a copy of the original version of the document remains unaltered on the disk.

After you've finished revising the document, you have a choice of two ways to save it on the disk. You can save the revised document with the same name you gave the original; in this case, the operating system replaces the original version with the new one.

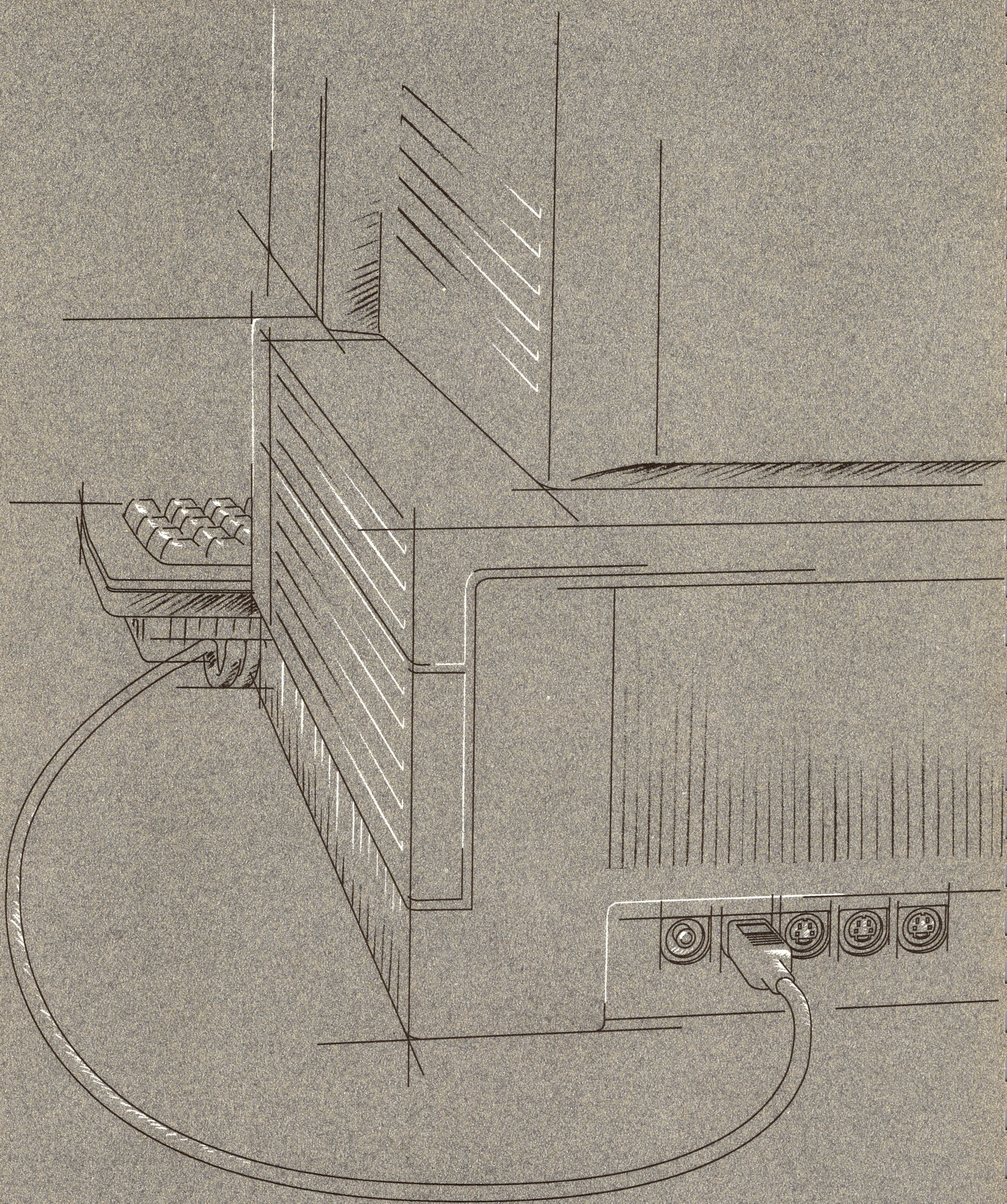
That's fine if you don't want to keep a separate copy of the original document. But you may want to save the revision and keep the original, too. For example, you may have a template document that you want to keep as an original and revise to create personalized versions. In this case, you give the revised document its own name, and the operating system creates a completely new file for the revised version: you have both the original document and the revised document on the disk.

Quitting an application

After you've saved your documents and are finished working with an application, you quit the application, usually by choosing the Quit command from the application's File menu. This merely directs the operating system to free the space in RAM that was occupied by the application's program code.

What's next?

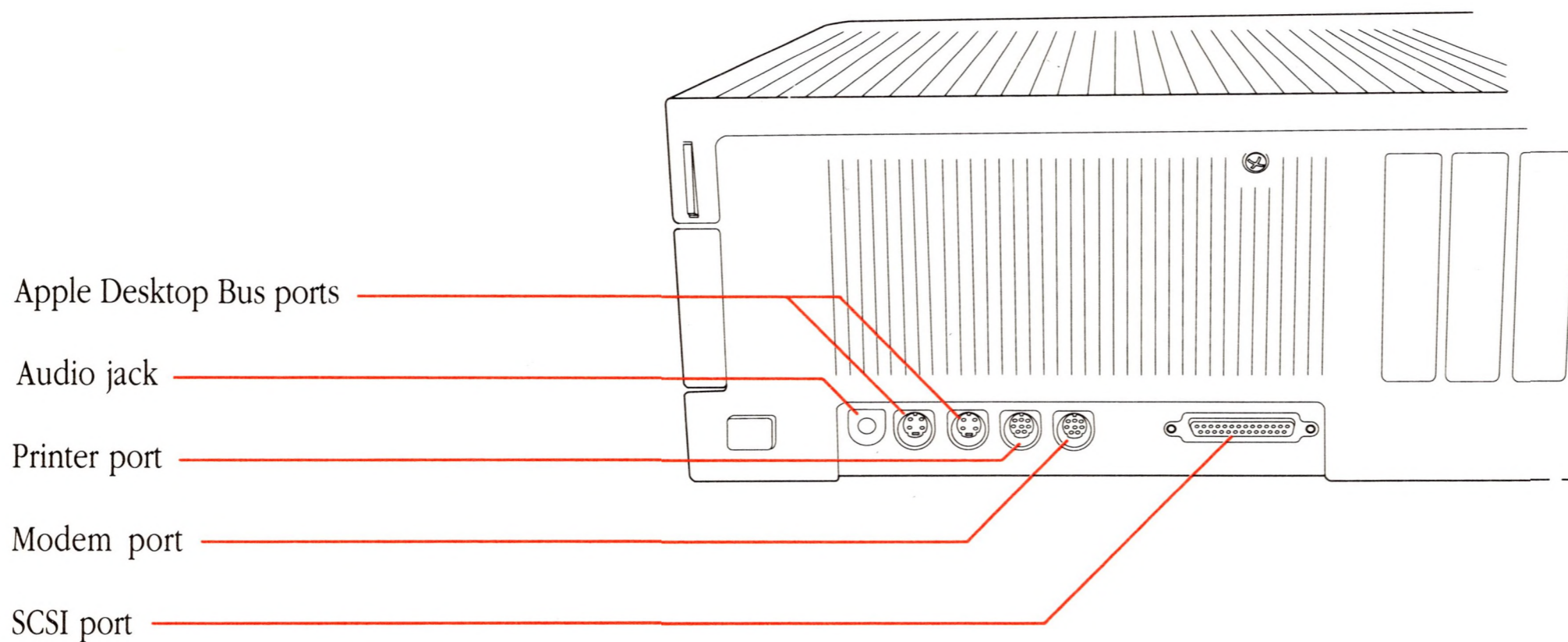
In this chapter, you've only scratched the surface of how your computer works. If you're interested in learning more about the Macintosh II, see Appendix D, "Guide to Technical Documentation." It describes other manuals you may want to investigate.



Macintosh II Buses and Ports

THE MACINTOSH II COMPUTER IS DESIGNED TO ACCOMMODATE A VARIETY OF peripheral devices that you can add to your system to customize it for your particular needs. This chapter briefly explains the buses and ports you'll use to attach peripheral devices to your Macintosh II computer, and to connect your computer to an AppleTalk network system.





A **bus** is a circuit that acts as a common connection for a number of devices.

The Apple Desktop Bus

You connect both the mouse and the keyboard to the computer through the **Apple Desktop Bus** (sometimes abbreviated *ADB*). Though all you normally need to operate the computer are the mouse and keyboard, the Apple Desktop Bus lets you connect a variety of devices concurrently, to customize your system to your particular needs. For instance, you could use a mouse, a keyboard, a track ball, and a graphics tablet all at once. Other devices you might connect to the Apple Desktop Bus ports include specialized keyboards or mouse devices, light pens, bar code readers, and so on.

The Macintosh II provides two Apple Desktop Bus ports on its back panel. The Apple Keyboard and Apple Extended Keyboard include additional ports that you can use to daisy-chain devices. All these ports allow greater flexibility in connecting devices: you can attach them directly to the back-panel ports or daisy-chain them through the keyboard.

The Apple Desktop Bus ports can accept either locking or nonlocking cable connectors. (Locking connectors prevent the cables from being accidentally disconnected.) You plug and unplug either type of cable in the same manner: always hold the cable *by the connector* as you push it into or pull it out of the port.

The number of devices that can be supported by the Apple Desktop Bus varies, depending on the power requirements of each device. Performance will probably deteriorate if more than three devices are daisy-chained to each of the computer's Apple Desktop Bus ports—giving an effective total of six devices.

See the "Apple Desktop Bus Power Requirements" section in Appendix B for more information on how many Apple Desktop Bus devices you should attach at one time.

Open architecture refers to the system's ability to use a variety of components designed to meet specialized needs, including video, coprocessing, networking, and so on.

NuBus

The Macintosh II contains six expansion slots, each slot consisting of a 96-pin connector that communicates with the computer's **NuBus** interface. The NuBus interface gives the Macintosh II its **open architecture**. It lets you add a variety of components to customize the system to your specific needs—in much the same way as you would assemble components in a stereo system. Expansion cards that use the NuBus interface include

- video cards
- coprocessor cards
- network interface cards
- RAM cards
- peripheral device cards

NuBus cards are self-configuring: each card contains its own **configuration ROM** chip that provides the operating system with the information it needs to communicate with the card. That means you can install a card in any slot without setting switches on the card. When you start up the computer, the operating system determines what cards are in the expansion slots and reads the information in the configuration ROMs automatically. The Control Panel desk accessory displays icons for some types of cards; you choose whatever settings you need to suit your own preferences (such as the colors you want to use with a color video card).

Some expansion cards depend on the Macintosh II's 68020 microprocessor to control their functions, but some are designed to perform independently. That means video and networking cards, for instance, can operate without interrupting the 68020's normal execution of program instructions—giving the Macintosh II added flexibility and better system performance.

Expansion cards vary in the amount of power they require from the computer's power supply. If you plan to use more than a few cards at a time, you'll need to determine the total power requirements of the cards you install; see the "NuBus Power Requirements" section in Appendix B for more details.

The modem and printer ports

Serial communication means that the eight bits in each byte of data move single-file—*serially*—down one line inside a cable.

You use the **modem** and **printer ports** to attach modems, printers, and other **serial communication** devices to the Macintosh II. Because they provide serial communication, these ports are sometimes referred to as the *serial* ports.

The two ports are almost identical; in practical terms, you can attach most serial devices to either port. There are two differences, however:

- The modem port has a higher interrupt priority than the printer port, which means that the microprocessor responds to signals from the modem port first. That's to ensure the constant contact between a modem and the microprocessor necessary for high-speed telecommunication.
- The **AppleTalk** network system is designed to be supported primarily through the printer port. That means if you plan to connect your Macintosh II to a **LocalTalk**[™] network, you'll need to use the printer port.

The modem and printer ports can accept either locking or nonlocking cable connectors. (Locking connectors prevent the cables from being accidentally disconnected.) You plug and unplug either type of cable in the same manner: always hold the cable *by the connector* as you push it into or pull it out of the port.

When you connect a device to either the modem or printer port, you also need to use the Chooser desk accessory from the Apple menu to confirm that choice: this gives the operating system the information it needs to communicate with the device.

AppleTalk

AppleTalk is Apple's network system for linking Apple computers with other workstations and devices on local- and wide-area networks. AppleTalk's network architecture is built into the Macintosh II. The AppleTalk software is included with the system software on the *Macintosh System Tools* disk.

Different types of cables can be used to link computers and other devices to form an AppleTalk network system. **LocalTalk** cables are one type; they provide a simple, easily installed, and very low-cost cabling system that lets you link up to 32 computers or devices together to form a local-area network.

Parallel communication means that the eight bits in each byte of data move along eight separate *parallel* lines inside a single cable.

The SCSI port

SCSI (commonly pronounced “SKUH-zee”) is an acronym that stands for *Small Computer System Interface*. SCSI is an industry-standard interface, defined by the American National Standards Institute (ANSI). The SCSI port is a **parallel communication** port that provides very high-speed data access for hard disks, tape backup systems, printers, and other devices. Because it uses an industry-standard interface, you can use many devices (with appropriate software) that would otherwise not be compatible with Apple computers.

The SCSI interface can communicate with up to seven SCSI devices daisy-chained through the SCSI port.

▲ Warning

Connecting SCSI devices incorrectly can damage your computer. Appendix C, “Connecting SCSI Devices,” provides important instructions for connecting SCSI devices to your system. Be sure to read the instructions before connecting any SCSI devices to your computer. ▲

The audio jack

The Macintosh II provides a stereo **audio jack** on its back panel that lets you attach a variety of audio accessories—headphones, amplifiers, and other devices. The jack accepts a standard miniature phone plug, the type commonly found on portable cassette headphones.

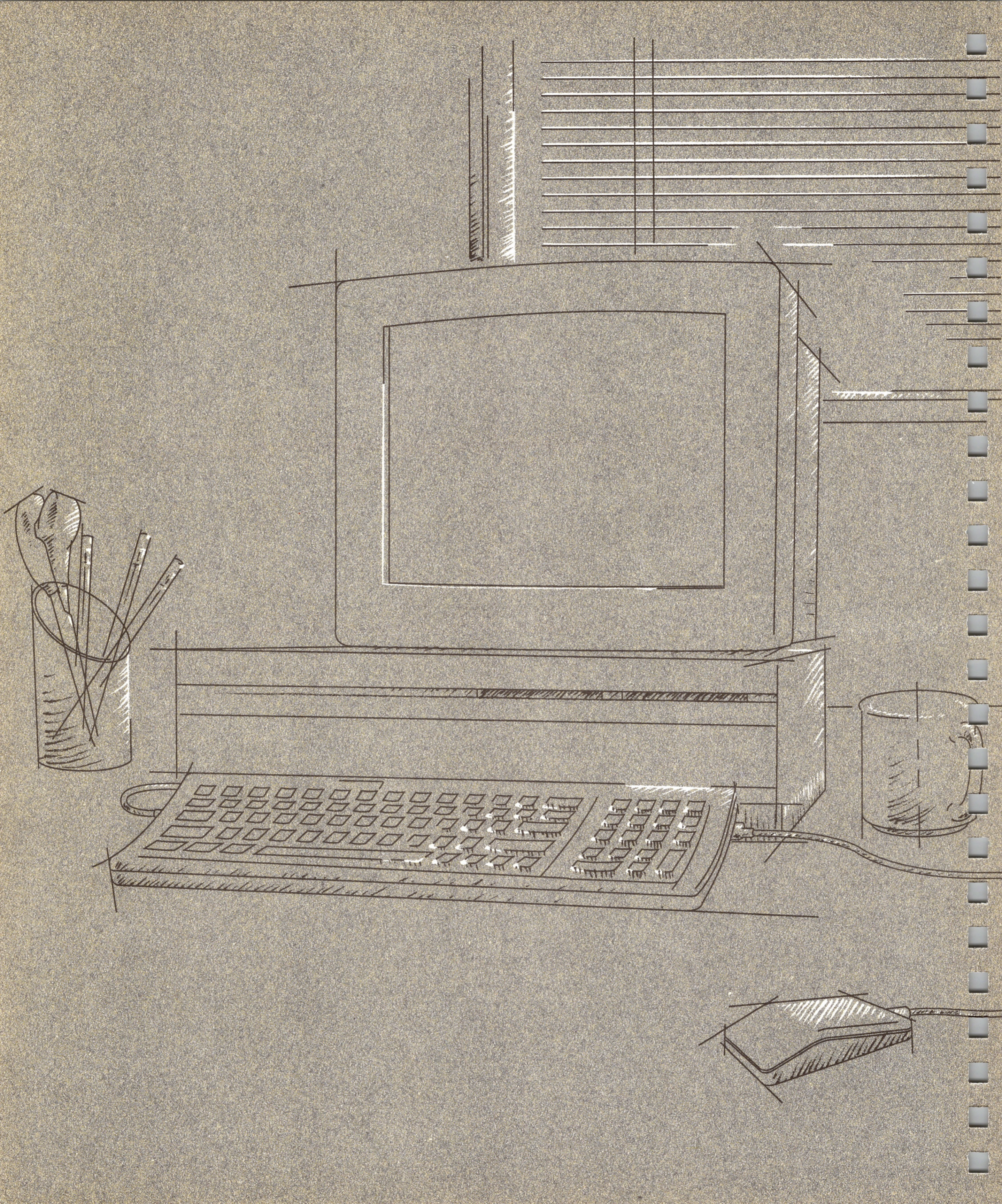
LocalTalk delivers all the benefits of multi-user communication and shared resources, and is the most cost-effective AppleTalk network system.

Another AppleTalk network system is **EtherTalk™**. It is a high-speed alternative that uses the high-performance coaxial cables

of an Ethernet network (a communications network widely used in the computer industry), and connects to an EtherTalk Interface Card installed in a NuBus expansion slot in your computer. EtherTalk allows as many as 254 devices to be active on the network at one time, and more than a thousand can be

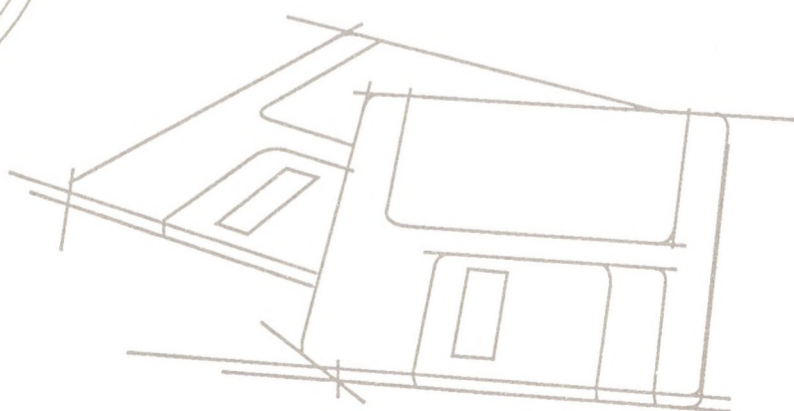
connected to the same Ethernet cable.

For more information about AppleTalk, and the variety of AppleTalk network systems available for the Macintosh II, ask your authorized Apple dealer or representative.



Caring for Your Macintosh II

THIS CHAPTER PROVIDES INFORMATION ON HOW TO CARE FOR YOUR Macintosh II computer. Your computer is sturdy and requires little physical maintenance. But like any piece of electrical equipment, it should not be abused or treated roughly. If you follow the few suggestions here, your computer will work efficiently for a long time.



The main unit

Give your Macintosh II plenty of space—enough so air can circulate on all sides. Make sure air can circulate around each of the ventilation slots on the top and sides of the main unit. The computer has a built-in fan that maintains the operating temperature, but be sure not to block its outlet. You can store your Macintosh II on a shelf, but it shouldn't be crammed into a small space while you're using it.

△ Important Proper ventilation is important to the life of the computer. Be sure to leave at least a 4-inch to 6-inch clearance between the side vents on the main unit and any object that might restrict air flow. Always keep your computer's main unit flat, sitting on its rubber feet. Standing it on edge defeats the cooling design, and is likely to make your computer overheat. This will eventually damage the main unit. △



The Macintosh II can tolerate about the same range of temperatures as you can, but don't let it sit outside in direct sunlight or expose it to rain or moisture. The main unit will normally feel a bit warm to the touch after it's been on for a while.

If your system includes a hard disk and you plan to be away from it for eight hours or more, shut off your entire computer system to extend the hard disk's life. While the computer part of your system can stay on indefinitely, the disk drive will eventually wear out.

Use common sense when handling your computer—especially if your system includes an internal hard disk. The hard disk can be damaged if the computer is dropped or bumped, particularly when the computer is on. If you need to transport the Macintosh II any great distance, use the original packing materials.

Follow these suggestions if you need to clean the Macintosh II:

- Clean the main unit with a *damp* (not wet) lint-free cloth.
- Don't use aerosol sprays, solvents, or abrasives that might damage the computer's finish.

The monitor

There are a number of ventilation slots on the top of most monitors. These vents allow heat to escape, so be sure to leave them unobstructed. Don't leave anything—not even a piece of paper—on the top of the monitor's case.

If you choose to leave your computer on all the time, remember to turn down the brightness on the monitor when you're not using it; if your computer is left on for long periods (days or weeks), the image on the screen will start to "burn in," and the screen may be permanently damaged.

If the screen gets dirty, apply a household glass cleaner to a clean cloth or paper towel and wipe the screen. Don't spray glass cleaner directly onto the screen. It could run down inside the case and damage electrical circuits.

The keyboard

Try not to spill anything on your keyboard. It can be ruined by a spilled soft drink or anything that leaves a sticky residue. Follow these steps if you spill something on the keyboard and it stops working:

- If the liquid is sweet or sticky, unplug the keyboard and take it to your authorized Apple dealer for repair or replacement.
- If the liquid is thin and clear, try unplugging the keyboard, turning it upside down to let the liquid drain out, and drying it for 24 hours at room temperature. If it still doesn't work, take it to your authorized Apple dealer.

The mouse

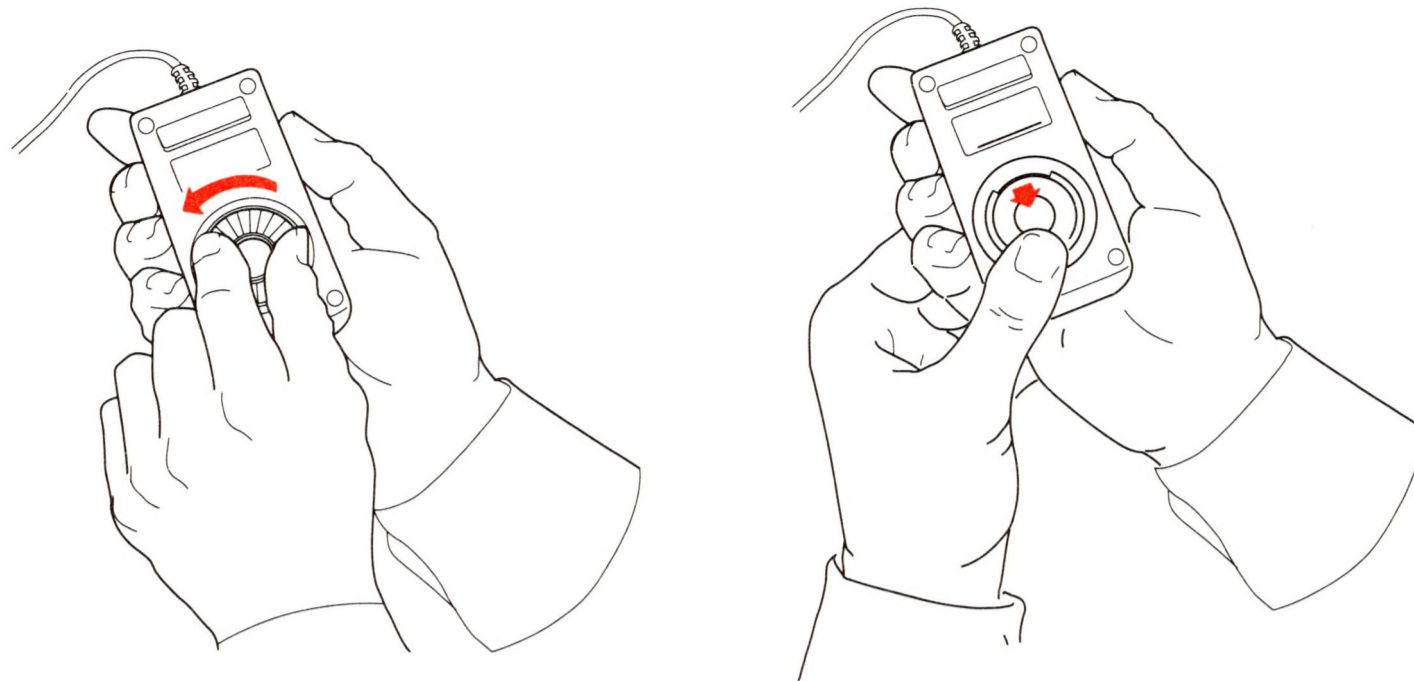
Be careful not to drop the mouse or let it hang from a table by its cable. Use common sense in treating it as carefully as you can.

The surface your mouse moves on should be as smooth, clean, and dust-free as possible. And give the mouse itself an occasional cleaning.

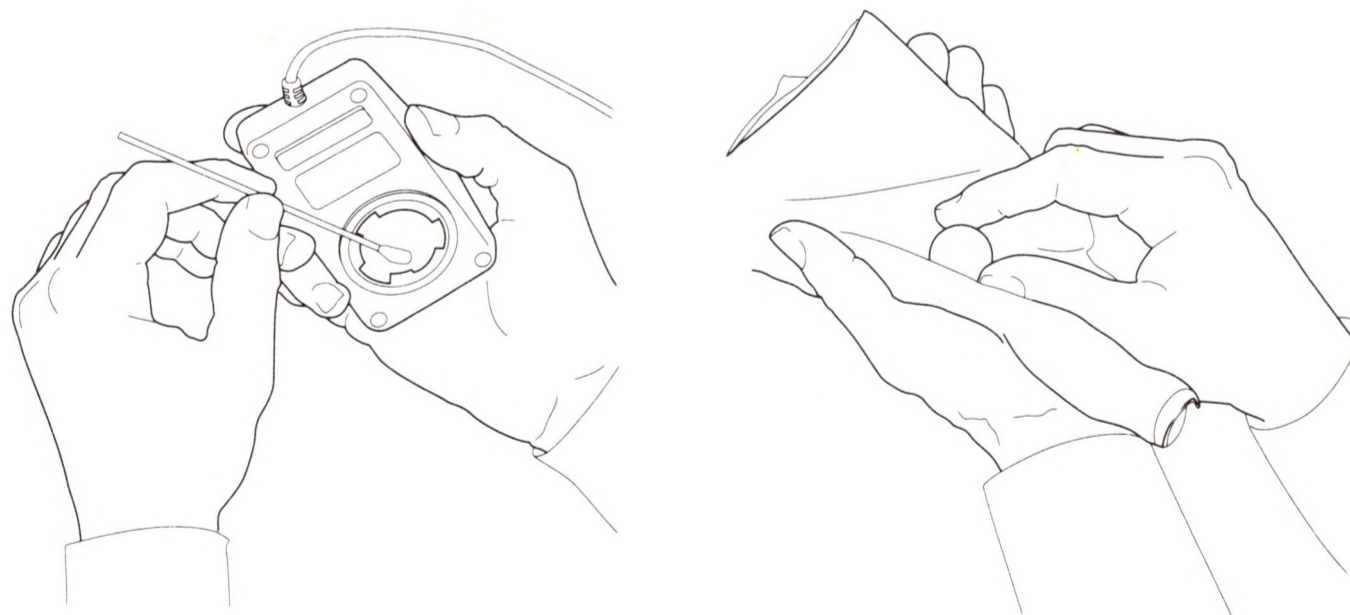
Follow these steps to clean the mouse:

- 1. Turn the mouse upside down and open the plastic ring that holds the mouse ball.**

Apple provides two types of mouse devices with Macintosh computers. The way you open your mouse depends on which type you received. Either rotate the ring counterclockwise as far as it will go (as shown on the left), or pull the ring down so that it snaps toward the bottom end of the mouse (as shown on the right). If one of these methods doesn't work, the other will.



2. **If you have the mouse on the left, hold one hand over the ball and ring to catch them, and turn the mouse back right side up. If you have the mouse on the right, lift the ring off the mouse, hold one hand over the ball, and turn the mouse right side up.**
3. **Inside the case are three rollers, similar to those on a tape recorder. Using a cotton swab moistened with alcohol or tape head cleaner, gently wipe off any oil or dust that has collected on the rollers, rotating them to reach all surfaces.**
4. **Wipe the ball with a soft, clean, dry cloth. (Don't use tissue or anything that may leave lint, and don't use a cleaning liquid.)**



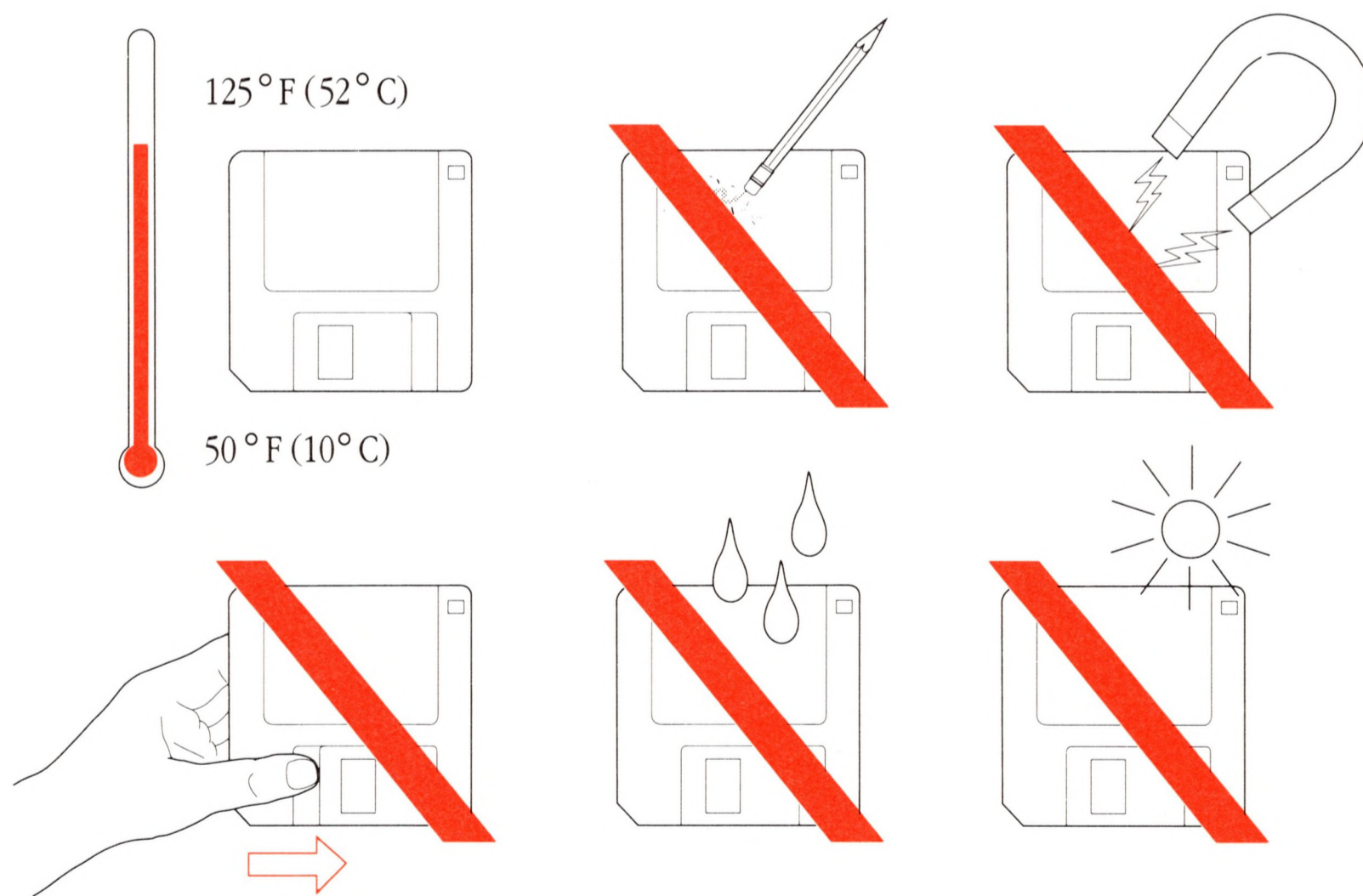
5. **Blow gently into the case to remove any dust that has collected there.**
6. **Put the ball back into its socket. Replace and lock the ring.**

3.5-inch disks

Although Apple 3.5-inch disks are quite tough, they do have a few modest physical requirements—about the same as audio cassette tapes have. Keep your Macintosh disks dry and away from extreme temperatures. (Don't put them on top of your Macintosh II or your monitor, or store them on the seat of your car.) Keep them out of direct sunlight and out of reach of anything that contains a magnet, such as a telephone. (Magnetic fields can scramble the information on the disk.)

When the disk is inserted into a disk drive, the metal covering on the disk case slides to the left so the Macintosh II can get information from and save information on the disk. When the disk is out of the disk drive, the metal covering closes by spring action to protect the disk underneath it. Never touch the exposed disk under the metal covering.

Other than that, you don't have to treat disks especially carefully. You can carry them around in your briefcase or coat pocket or even send them through the mail. (Two fit nicely in a business envelope.)



Be sure to make a backup copy of any disk you can't do without. (See the *Macintosh System Software User's Guide* for instructions on copying disks.)

You can purchase disks in packages of ten from your authorized Apple dealer.

The clock battery

Your Macintosh II has a clock that runs continuously, even when the computer is switched off. (You can set the clock by choosing either Alarm Clock or Control Panel from the Apple menu.) When the computer's power is off, the clock runs on an internal lithium battery with a life expectancy of several years. If the clock begins to lose accuracy, see your authorized Apple dealer or representative for a battery replacement.

Service and support

To help you get the best performance from your system, Apple Computer, Inc. has established a worldwide network of full-support authorized Apple dealers. If you need answers to technical questions or information about product updates, your authorized Apple dealer can help you. Apple's Technical Support organization backs each dealer and international technical support group via AppleLink[®], a state-of-the-art on-line electronic information service, to ensure prompt, reliable assistance.

Your dealer has the latest information on new hardware and software products as well as product updates. If you wish to upgrade your system, your dealer can help you select compatible components.

If your product requires service, your local authorized Apple dealer is trained and ready to support you. Apple provides factory-quality parts and the latest available diagnostic equipment to the more than three thousand authorized Apple service centers throughout the world. Apple guarantees parts and warranty labor. (Regulations in each country determine the length of warranty. Some restrictions may apply, depending on the country of original purchase.)

If for some reason you cannot return to the authorized dealer from whom you purchased your system, go to the nearest service location. For the location nearest you, in the United States, call (800) 538-9696; in Canada, call (800) 268-7796 or (800) 268-7637. For locations in other countries, either call the Apple headquarters in your country or write to

Apple Computer, Inc.	or	Apple Canada, Inc.
Attn: Customer Relations		7495 Birchmount Road
20525 Mariani Avenue		Markham, Ontario
Cupertino, CA 95014		L3R 5G2
USA		Canada

Apple also offers service options designed to meet your needs. One of these is the *AppleCare*[®] Service Agreement (available in the United States, Canada, and Australia only), which extends full warranty coverage up to three years. Your *AppleCare* contract will be honored at any participating authorized Apple dealer within the country of purchase—an added benefit if you relocate. Local service means time saved in getting your Apple system back to work.

You can purchase *AppleCare* at any time, but it's a good idea to purchase it with your system, or at least before your warranty has expired, to avoid an owner-paid inspection.

There are also self-service plans designed to allow large installations to repair their own equipment. Whether you use your computer at home, in the office, or at school, Apple has a low-cost service plan for you. For details, please see your authorized Apple dealer.

The Macintosh Product Line

THIS APPENDIX SUMMARIZES THE DIFFERENCE BETWEEN THE VARIOUS MODELS of Macintosh computers. It is provided primarily for users who may be familiar with earlier models and who need a quick reference to the added features of newer Macintosh systems. The chart focuses primarily on hardware features; for a historical summary of the different versions of Macintosh system software, see the *Macintosh System Software User's Guide*.

	Macintosh (128K)	Macintosh 512K	Macintosh 512K Enhanced	Macintosh Plus	Macintosh SE	Macintosh II
Processor	MC68000 CPU	MC68000 CPU	MC68000 CPU	MC68000 CPU	MC68000 CPU	MC68020 CPU
Clock frequency	7.8336 MHz	7.8336 MHz	7.8336 MHz	7.8336 MHz	7.8336 MHz	15.6672 MHz
Addressing	32-bit internal registers 24-bit address bus	32-bit internal registers 24-bit address bus	32-bit internal registers 24-bit address bus	32-bit internal registers 24-bit address bus	32-bit internal registers 24-bit address bus	32-bit internal registers 32-bit address bus
Coprocessor	None	None	None	None	None built in. Accepts optional coprocessor card installed in internal SE Bus expansion connector.	Built-in MC68881 Floating-Point Unit (FPU). Accepts optional coprocessor cards installed in NuBus expansion slots.
ROM	64 KB	64 KB	128 KB	128 KB	256 KB	256 KB
RAM	128 KB	512 KB	512 KB	1 MB, 2MB, 2.5MB, or 4 MB	1 MB, 2MB, 2.5MB, or 4 MB	1 MB expandable to 8 MB (expandable to 128 MB when SIMMs with higher-density DRAM chips become available; additional expandability through NuBus slots)
Hardware memory management	None	None	None	None	None	Built-in 24/32-bit Address Mapping Unit (AMU) for address translation. Optional MC68851 Paged Memory Management Unit (PMMU).
Slot expansion	None	None	None	None	SE Bus expansion connector	Six NuBus expansion slots
Sound	RAM-based sound buffer Monophonic (Miniature phone plug)	RAM-based sound buffer Monophonic (Miniature phone plug)	RAM-based sound buffer Monophonic (Miniature phone plug)	RAM-based sound buffer Monophonic (Miniature phone plug)	RAM-based sound buffer Monophonic (Miniature phone plug)	Apple Sound Chip (ASC) Stereophonic (Miniature phone plug)

	Macintosh (128K)	Macintosh 512K	Macintosh 512K Enhanced	Macintosh Plus	Macintosh SE	Macintosh II
Internal 3.5-inch disk drive	400K	400K	800K	800K	800K Optional second 800K	800K Optional second 800K
External 3.5-inch disk drive	400K	400K	400K or 800K	400K or 800K	400K or 800K	Not supported
Hard disk	None	Optional external Hard Disk 20	Optional external Hard Disk 20	Optional external Hard Disk 20 Optional external SCSI hard disks	Optional external Hard Disk 20 Optional SCSI hard disks (internal/external)	Optional SCSI hard disks (internal/external)
SCSI	None	None	None	SCSI port (DB-25)	SCSI port (DB-25)	SCSI port (DB-25)
Serial ports	Two serial ports (DB-9)	Two serial ports (DB-9)	Two serial ports (DB-9)	Two serial ports (Mini-8)	Two serial ports (Mini-8)	Two serial ports (Mini-8)
Video display	Built-in 9-inch diagonal 512-by-342 pixel black-and-white monitor	Built-in 9-inch diagonal 512-by-342 pixel black-and-white monitor	Built-in 9-inch diagonal 512-by-342 pixel black-and-white monitor	Built-in 9-inch diagonal 512-by-342 pixel black-and-white monitor	Built-in 9-inch diagonal 512-by-342 pixel black-and-white monitor. Accepts optional external monitor connected through video card in SE Bus expansion connector.	Supports multiple external color and monochrome monitors connected through video cards in NuBus expansion slots.
Keyboard	Macintosh keyboard (RJ-11)	Macintosh keyboard (RJ-11)	Macintosh keyboard (RJ-11)	Macintosh Plus keyboard—includes numeric keypad (RJ-11)	Apple Keyboard or Apple Extended Keyboard connected through Apple Desktop Bus ports (Mini-4)	Apple Keyboard or Apple Extended Keyboard connected through Apple Desktop Bus ports (Mini-4)
Mouse	Macintosh Mouse connected through mouse port (DB-9)	Macintosh Mouse connected through mouse port (DB-9)	Macintosh Mouse connected through mouse port (DB-9)	Macintosh Mouse connected through mouse port (DB-9)	Apple Desktop Bus Mouse (Mini-4)	Apple Desktop Bus Mouse (Mini-4)

Technical Information

THIS APPENDIX PROVIDES SOME TECHNICAL INFORMATION ABOUT YOUR Macintosh II computer. If you don't find the information you need, refer to Appendix D, "Guide to Technical Documentation." There you'll find a thorough discussion of the technical documentation available for Macintosh computers.

Here's a list of the sections you'll find in this appendix:

- specifications
- programmer's switch
- Apple Desktop Bus power requirements
- NuBus power requirements
- SIMM configurations
- pin assignments
- Macintosh peripheral cables

If you've used other types of Macintosh computers, Appendix A, "The Macintosh Product Line," will help you determine how the Macintosh II differs from other models you may be familiar with.

Specifications

Processor:	MC68020, 32-bit architecture 15.6672 MHz clock frequency
Coprocessors:	MC68881 Floating-Point Unit (follows IEEE standards) MC68851 Paged Memory Management Unit (optional)
Memory:	1 MB expandable to 8 MB (expandable to 128 MB when SIMMs with higher-density DRAM chips become available; additional expandability through NuBus slots) 256 KB ROM 256 bytes of user-settable parameter memory
Disk capacity:	800 KB on double-sided 3.5-inch (floppy) disks (second unit optional) 20, 40, or 80 MB optional Apple SCSI hard disks, internal and/or stand-alone (higher-capacity SCSI hard disks available from independent manufacturers)
Interfaces:	Two Apple Desktop Bus connectors for communication with keyboard, mouse, and other devices over low-speed, synchronous serial bus Six internal NuBus expansion slots supporting full 32-bit address and data lines Two RS-232/RS-422 serial ports, 230.4K baud maximum (up to 0.920 Mbit per second if clocked externally) SCSI interface Sound port for external audio amplifier

Sound generator:	Apple Sound Chip (ASC) including 4-voice wave-table synthesis and stereo sampling generator capable of driving stereo mini phone jack headphones or stereo equipment
Input:	Line voltage: 120/240 volts AC, RMS automatically configured Frequency: 48–62 Hz single phase Power: 230 watts maximum, not including monitor power
Clock/calendar:	CMOS custom chip with long-life lithium battery
Keyboards:	Apple Keyboard Apple Extended Keyboard
Mouse:	Apple Desktop Bus Mouse Mechanical tracking, optical shaft or contact encoding $3.94 \pm .39$ pulses per mm (100 ± 10 pulses per inch) of travel
Monitors:	Options include 12-inch, 640-by-480-pixel monochrome; 13-inch, 640-by-480-pixel RGB

Environment

Operating temperature:	10° C to 35° C 50° F to 95° F
Storage temperature:	-40° C to 47° C -40° F to 116.6° F
Relative humidity:	5% to 95% (noncondensing)
Altitude:	0 to 3048 m (0 to 10,000 ft)

Size and weight

	Weight	Height	Width	Depth
Main unit	10.9–11.8 kg* 24–26 lbs*	140 mm 5.5 in	474 mm 18.7 in	365 mm 14.4 in
Apple Keyboard	1.0 kg 2 lbs 2 oz	44.5 mm 1.8 in	418.3 mm 16.5 in	142.0 mm 5.6 in
Apple Extended Keyboard	1.6 kg 3 lbs 10 oz	56.4 mm 2.3 in	486 mm 19.1 in	188 mm 7.4 in
Mouse	.17 kg 6 oz	27.9 mm 1.1 in	53.3 mm 2.1 in	96.5 mm 3.8 in
Apple High-Resolution Monochrome Monitor	7.7 kg 17 lbs	255 mm 10.0 in	310 mm 12.2 in	373 mm 14.7 in
Apple High-Resolution RGB Color Monitor	15.45 kg 34 lbs	281 mm 11.1 in	344 mm 13.5 in	402 mm 15.8 in

* Weight varies depending on installed optional hard disk and second 3.5-inch drive.

Programmer's switch

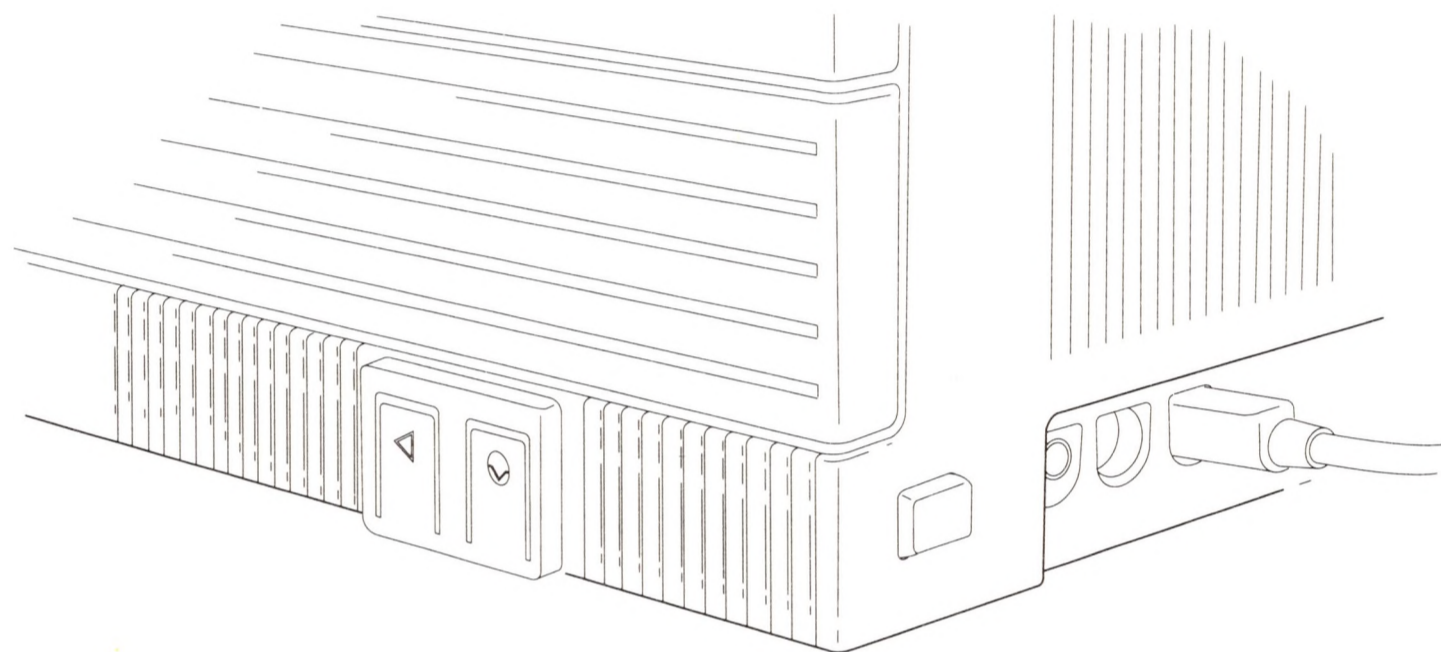
The programmer's switch is for people who want to write application programs for the Macintosh II. If you aren't an applications developer, just ignore the switch. Installing it and using it in the wrong way could cause you to lose information.

If you are an applications developer, install the programmer's switch only if you're developing stand-alone applications or desk accessories. The switch has two parts. The front part of the switch is a reset switch. Pressing it is just like turning the power switch off and back on, and carries the same cautions—press it only in the Finder with all disks properly ejected. The back part of the switch is an interrupt switch; press it only if you have debugging software installed.

The switch snaps into place on the right side of the Macintosh II.

Follow these steps to install the switch:

1. **Align the switch so that the rightmost pin on the switch fits in the last air vent on the right side of the main unit.**
2. **Tip the switch and insert the top pair of pins with the hooks facing up.**
3. **Push up and in on the bottom of the switch. The switch should snap into place.**



Apple Desktop Bus power requirements

Although the Apple Desktop Bus can address up to 16 devices, performance will probably deteriorate if more than three devices are daisy-chained to each of the computer's Apple Desktop Bus ports (giving an effective total of six devices). Apple Desktop Bus devices may use the +5 volt power supplied by the bus, but must not draw more than 500 mA total for all devices. The mouse draws an average of 80 mA. The power needed by the keyboard varies, depending on which type of keyboard you have attached to your system:

Apple Keyboard	80 mA
Apple Extended Keyboard	25 mA

All devices are connected in parallel using the signal, power, and ground wires. Total cable length should be no longer than 5 meters, and cable capacitance should not exceed 100 picofarads per meter.

▲ Warning

Do not connect or add a device to the Apple Desktop Bus while the system is on. Connecting any device while the system is on will reset the addresses for all devices on the bus. ▲

NuBus power requirements

There are limits to the amount of power available for the six NuBus expansion slots in the main unit of the Macintosh II. Under most circumstances, this should not create a problem. However, if you plan to install several cards, you should check the total power requirements for all cards combined and make sure that the total does not exceed recommended limits. Installing a group of cards that make excessive demands on available power may cause damage to one or more cards, or to the computer itself.

A NuBus expansion card can draw three types of current from a NuBus expansion slot:

- +5 volt current
- +12 volt current
- -12 volt current

Each card will normally draw power from these currents in varying combinations and in varying amounts. First determine the power requirements for each of your cards, and then add those numbers together and verify that the *totals* do not exceed the recommended limits. The following table defines those limits:

Type of current	Recommended totals
+5 volt	12.8 amps
+12 volt	1.3 amps
-12 volt	1.0 amp

Use the specifications that came with the cards you want to install to calculate total power requirements. (They're usually listed in a manual or specifications sheet, or on the product package.)

SIMM configurations

RAM in the Macintosh II is provided in four or eight packages called single in-line memory modules, or SIMMs. (Memory can also be added on cards installed in NuBus expansion slots.) Each SIMM contains surface-mounted dynamic RAM (DRAM) chips on a single circuit board, with electrical “finger” contacts along one edge that plug into the SIMM sockets mounted on the computer’s logic board. SIMMs can contain RAM chips with densities of either 256 Kbits or 1 Mbit. (SIMMs with higher-density chips can be used when available.)

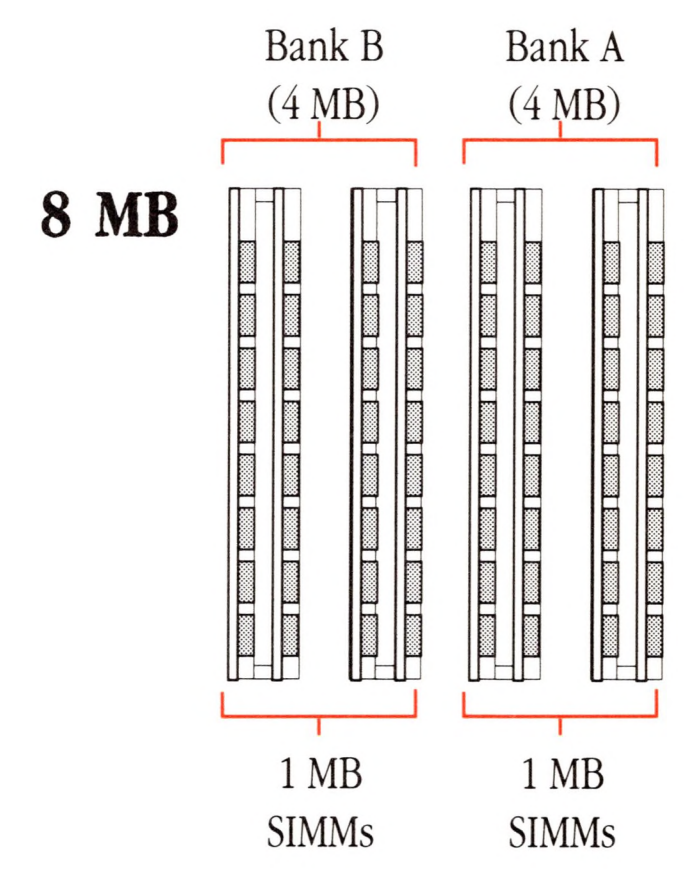
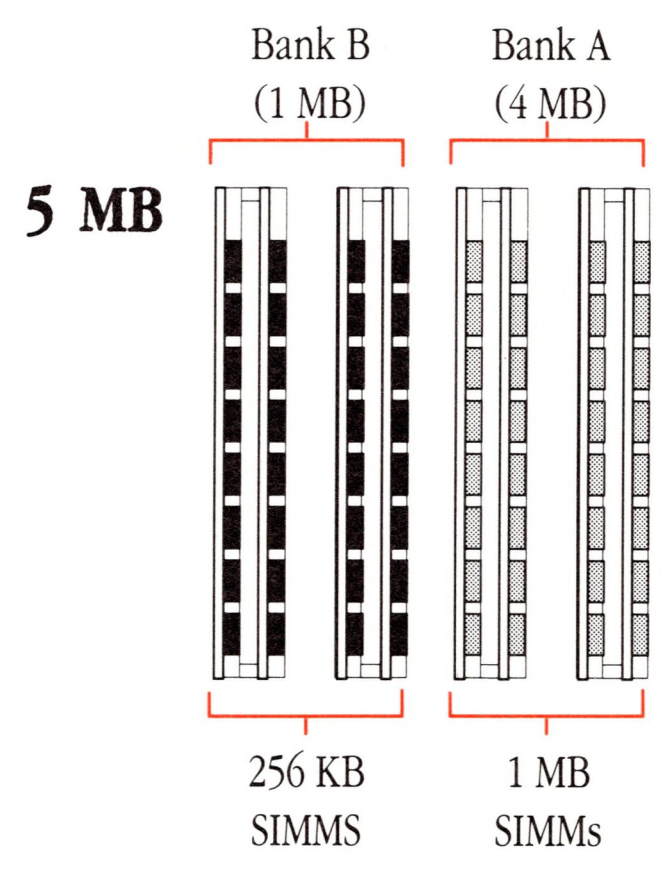
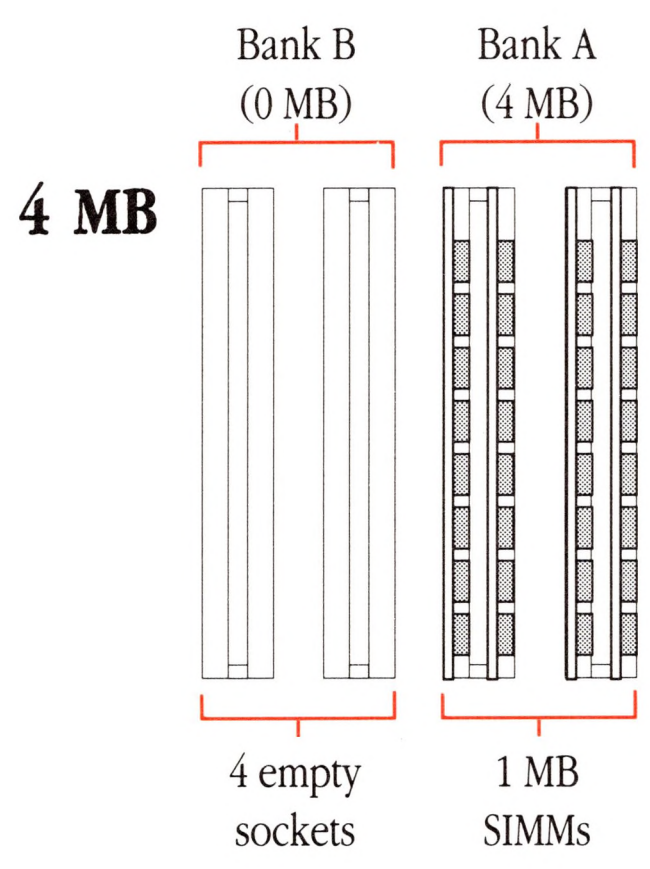
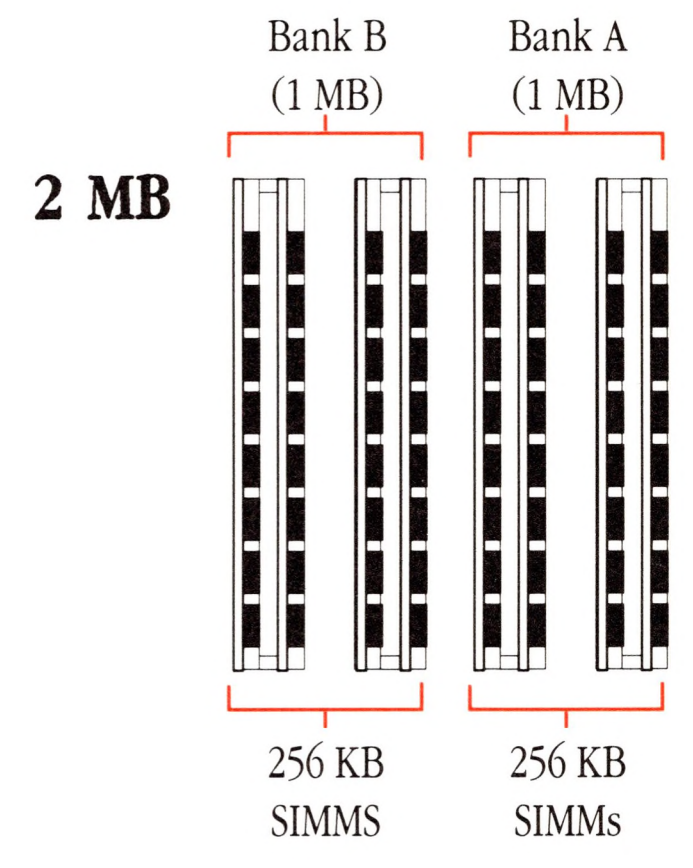
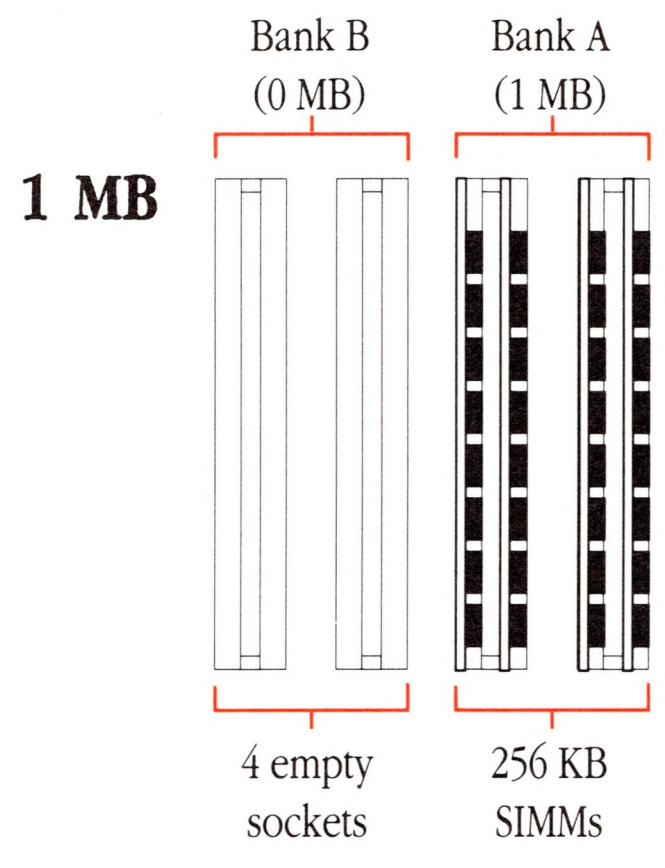
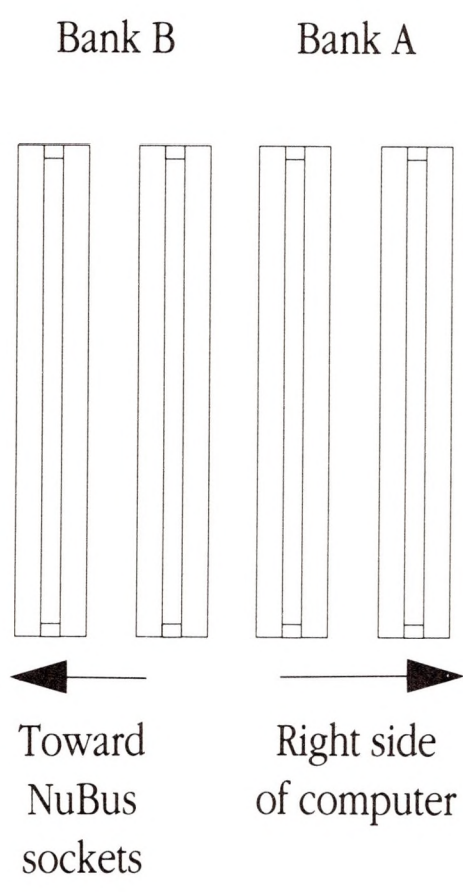
▲ Warning

Be sure your computer is plugged in but turned *off* and has had time to cool down before you do any work inside the main unit. Touch the power supply case to discharge any static electricity from your clothes or body before handling components inside the Macintosh II. ▲

Five RAM configurations are available for the Macintosh II, depending on how many SIMMs are used and on the density of the RAM chips that are mounted on the SIMMs. They are:

- 1 MB
- 2 MB
- 4 MB
- 5 MB
- 8 MB

Macintosh II SIMMs are arranged in two memory banks (bank A and bank B); each bank consists of four SIMM sockets. Each SIMM socket holds one SIMM card. A minimum of four SIMMs with the same density DRAM chips must be used. SIMMs of different densities may be combined; however, they must be in groups of four. Some configurations—such as mixing RAM chips of different densities in a bank of SIMMs, or using fewer than four SIMMs in a bank—are not allowed. If RAM chips of different densities are used, their placement in the SIMM banks is critical. Use the diagrams on the facing page for proper installation:



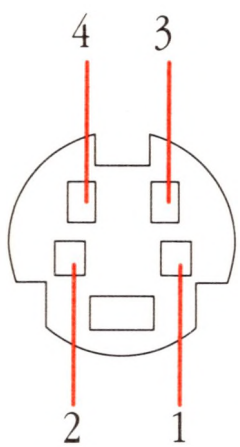
△ Important Macintosh II SIMMs should be 120 nS RAM-access time or faster. Installing the slower 150 nS SIMMs available for other models of Macintosh computers is not recommended. △

Pin assignments

This section presents the pin assignments and functions for all the external connectors on the back panel of the Macintosh II.

△ Important The connector type listed for each port indicates the correct *plug* to use with the port illustrated in the margin. △

Apple Desktop Bus port

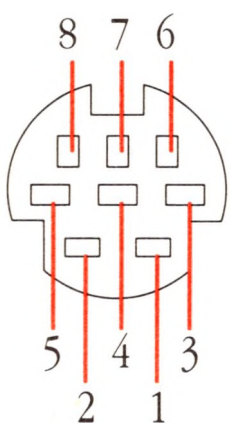


Pin number	Signal name	Signal description
1	ADB	Data
2	PWRON	Power on
3	+5v	+5 volts DC
4	GND	Signal ground

Connector type: Mini-4

Total length of all cables not to exceed 16 feet (5 meters).

Modem and printer ports

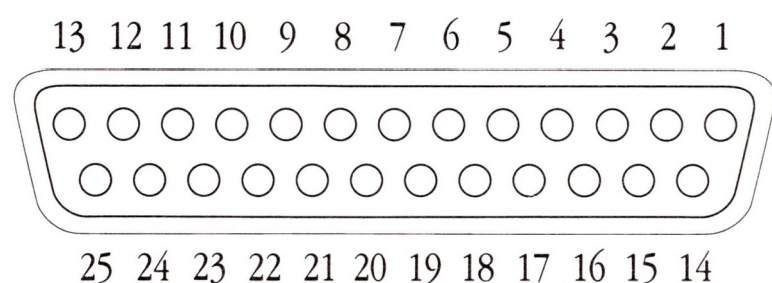


Pin number	Signal name	Signal description
1	HSKo	Handshake out
2	HSKi	Handshake in/external clock
3	TXD-	Transmit data -
4	GND	Signal ground
5	RXD-	Receive data -
6	TXD+	Transmit data +
7	GPi	General purpose input*
8	RXD+	Receive data +

Connector type: Mini-8

*Modem port only: Can be set in software to be a second external clock.

SCSI port



Pin number	Signal name	Signal description
1	REQ/	Request
2	MSG/	Message
3	I/O/	Input/Output
4	RST/	SCSI bus reset
5	ACK/	Acknowledge
6	BSY/	Busy
7	GND	Signal ground
8	DB0/	Data bit 0
9	GND	Signal ground
10	DB3/	Data bit 3
11	DB5/	Data bit 5
12	DB6/	Data bit 6
13	DB7/	Data bit 7
14	GND	Signal ground
15	C/D/	Command/Data
16	GND	Signal ground
17	ATN/	Attention
18	GND	Signal ground
19	SEL/	Select
20	DBP/	Data parity
21	DB1/	Data bit 1
22	DB2/	Data bit 2
23	DB4/	Data bit 4
24	GND	Signal ground
25	TPWR	Terminator power

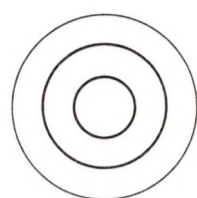
Connector type: DB-25

Total length of all cables not to exceed 20 feet (6 meters).

▲ Warning

This port uses the same type of connector as a standard RS-232, DB-25 serial interface, but is electrically very different. Do not connect any RS-232 device to this connector. Doing so can result in damage to both the device and the Macintosh II. ▲

Audio jack



Pin number	Signal name	Signal description
(Sleeve)	GND	Signal ground
(Ring)	RIGHT	1.5 volt peak-to-peak audio signal, right channel
(Tip)	LEFT	1.5 volt peak-to-peak audio signal, left channel

Connector type: Stereo miniature phone plug

The internal speaker is disabled when this port is in use.

Macintosh peripheral cables

This table is a guide to the cables you should use with your Macintosh II and peripheral devices.

Hard disks	Apple Hard Disk 20SC (DB-25)	M0206 Apple SCSI System Cable
	Apple Hard Disk 40SC (DB-25)	M0206 Apple SCSI System Cable
	Apple Hard Disk 80SC (DB-25)	M0206 Apple SCSI System Cable
Modems	Apple Personal Modem (Mini-8)	M0197 Apple System/ Peripheral-8 Cable
	Apple Modem 300/1200 (DB-9)	699-0372 Macintosh Plus Peripheral Adapter (use with existing cable)
	AppleFax™ Modem (Mini-8)	M0197 Apple System/ Peripheral-8 Cable

ImageWriter printers

ImageWriter® (DB-25)	699-0372 Macintosh Plus Peripheral Adapter (use with existing cable)
ImageWriter II (Mini-8)	M0197 Apple System/ Peripheral-8 Cable
ImageWriter LQ (Mini-8)	M0197 Apple System/ Peripheral-8 Cable
AppleTalk ImageWriter II (Mini-8)	M2068 LocalTalk Locking Connector Kit DIN-8

LaserWriter printers

LaserWriter® (DB-9)	M2065 LocalTalk Locking Connector Kit DB-9
LaserWriter Plus (DB-9)	M2065 LocalTalk Locking Connector Kit DB-9
LaserWriter IINT (Mini-8)	M2068 LocalTalk Locking Connector Kit DIN-8
LaserWriter IINTX (Mini-8)	M2068 LocalTalk Locking Connector Kit DIN-8
LaserWriter IISC (DB-25)	M0206 Apple SCSI System Cable

△ Important

The Macintosh II was FCC-certified under test conditions that included the use of shielded cables and connectors between system components. It is important that you use shielded cables and connectors to reduce the possibility of causing interference to radio, television, and other electronic devices. △

Connecting SCSI Devices

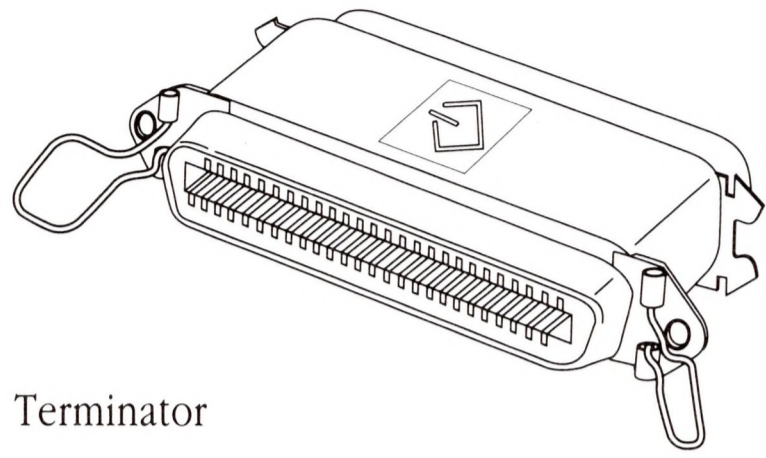
THIS APPENDIX PROVIDES INFORMATION YOU'LL NEED TO CONNECT SCSI devices to your Macintosh II computer. You'll find instructions for assembling a SCSI chain and including the correct number of terminators. You'll also find instructions on setting the SCSI ID numbers on the devices you connect to your computer.

SCSI cables and terminators

Devices connected to the SCSI port on the back of the main unit must have the proper number of **terminators** for the devices to work correctly and to prevent damage to the SCSI chip inside your computer.

Apple SCSI Cable Terminators are hardware devices that attach to a SCSI device or SCSI cable. There must be no more than two terminators in a SCSI chain—one at the start of the chain and one at the end.

Knowing when you do and don't need a terminator can be confusing. Sometimes a terminator is inside a SCSI device where you can't see it, as with an internal hard disk. (The manual for the device should tell you whether it has a terminator.) Find the situation that applies to you in one of the following sections. In all cases, it's assumed that you're using Apple's 18-inch SCSI System Cable from your computer to the first SCSI device.



Terminator

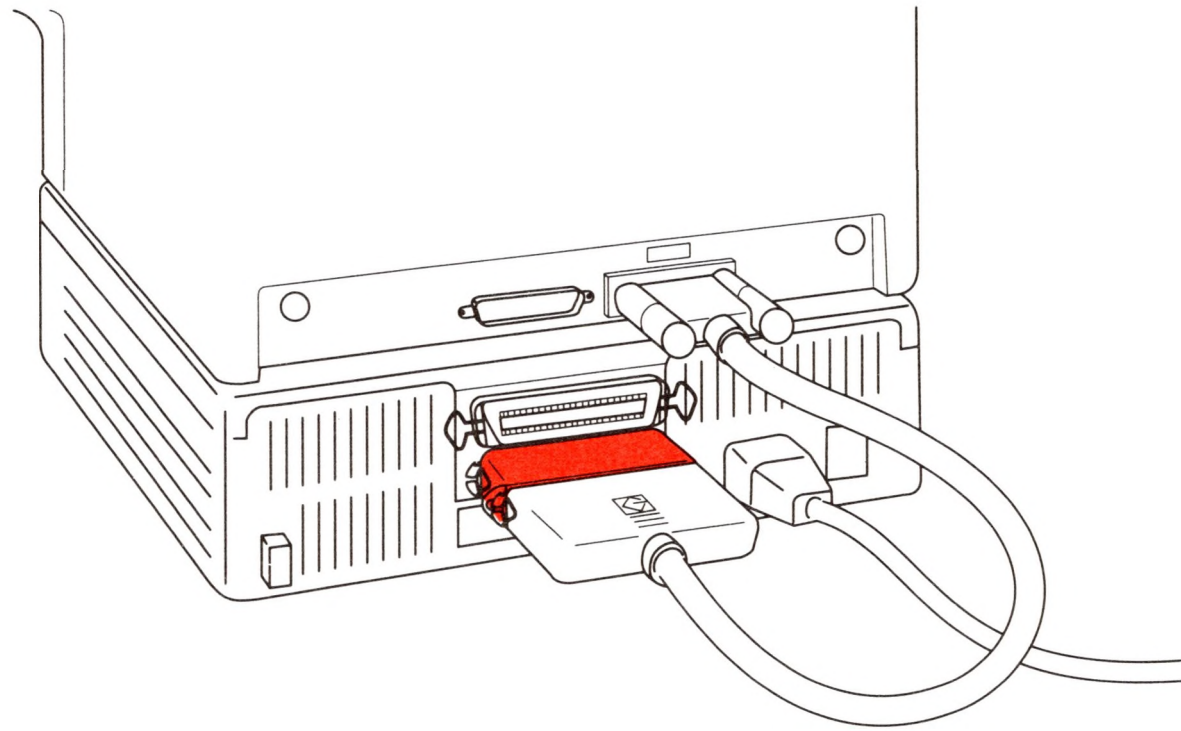
▲ Warning

You can have no more than two terminators in the entire SCSI chain. More than two terminators in the chain may damage your computer. Check the manual that came with the device to be sure.

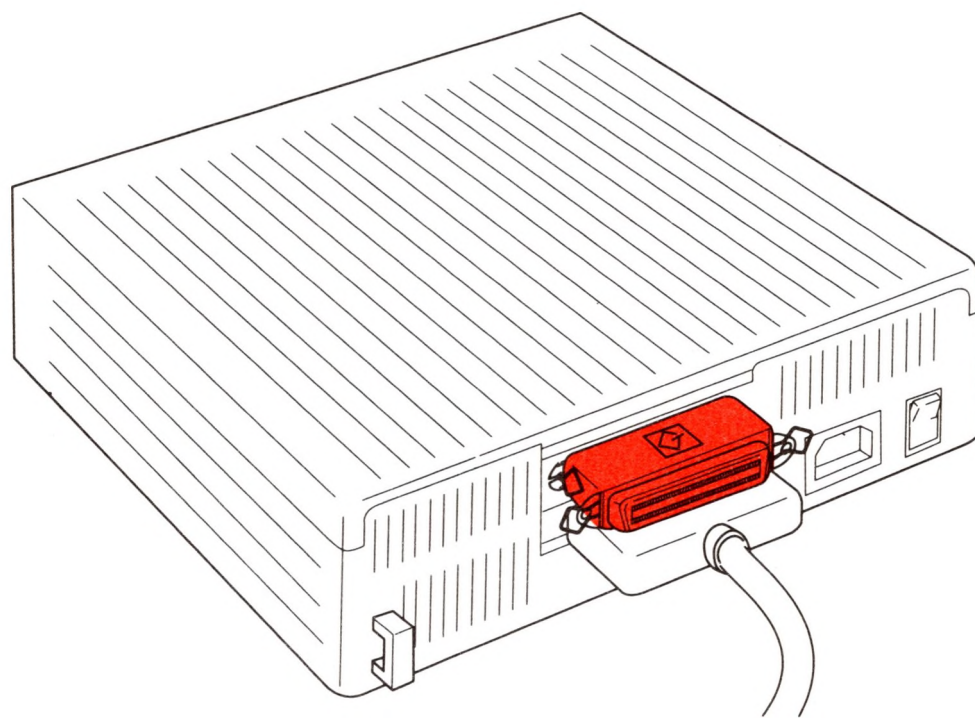
Never connect an RS-232 device to the SCSI port. Even though the SCSI port looks like an RS-232 connector, it is not a serial port or parallel printer interface. Attaching anything other than a SCSI device to the SCSI port can damage your computer.

If you're not sure what type of device you have, or whether it's OK to plug it in, contact your authorized Apple dealer or representative. ▲

Terminators are used in one of two ways in a SCSI chain. A terminator is either added between the SCSI System Cable and a SCSI connector, or added to the last available port on the SCSI device. Use the following diagrams in setting up your own SCSI chain.



Terminator added between SCSI System Cable and SCSI connector



Terminator added to last available port

Connecting a single device

- If you are connecting an Apple device, or another device that does not contain a terminator, add a terminator to the last available port on the device.

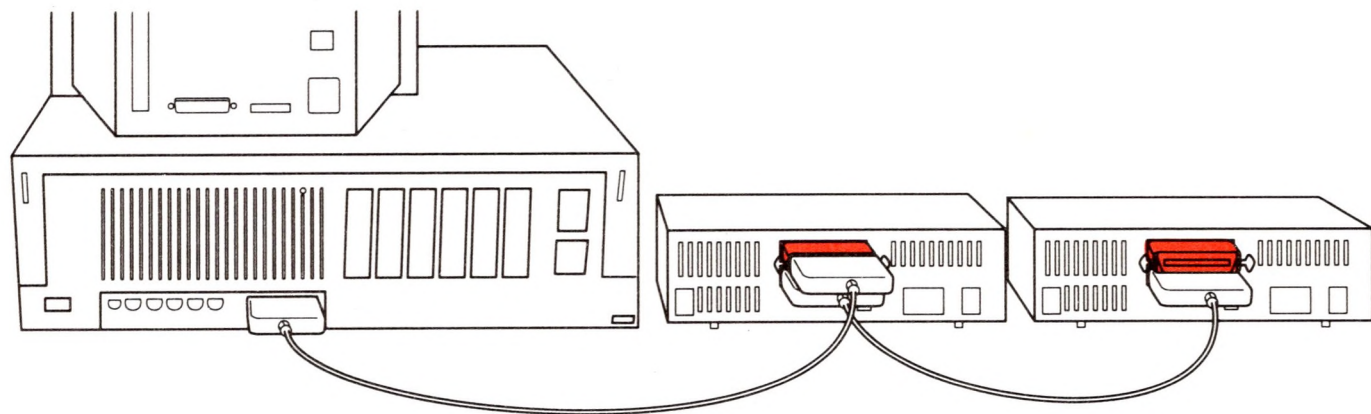


- If the device already contains a terminator, do not add one.

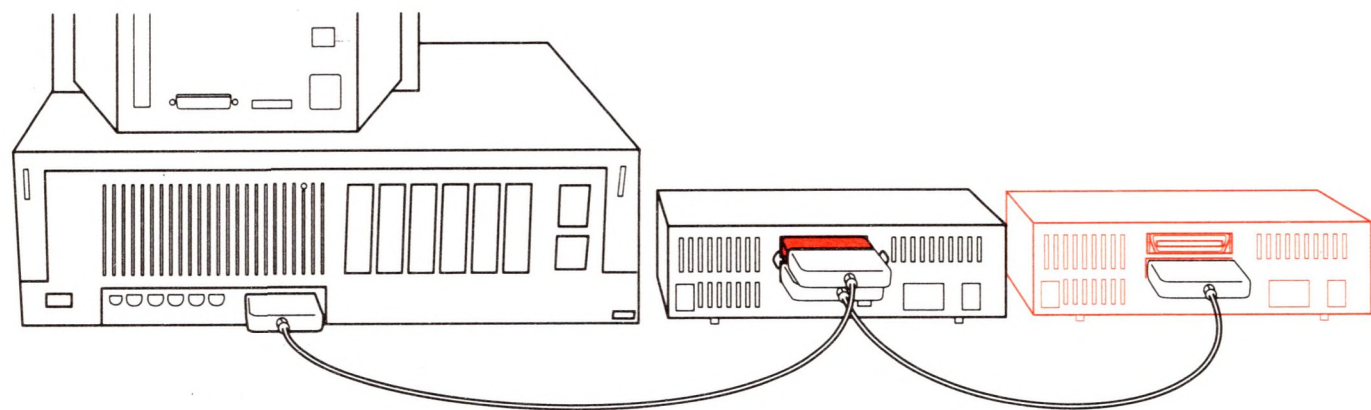
Connecting multiple devices

To systems without internal hard disks

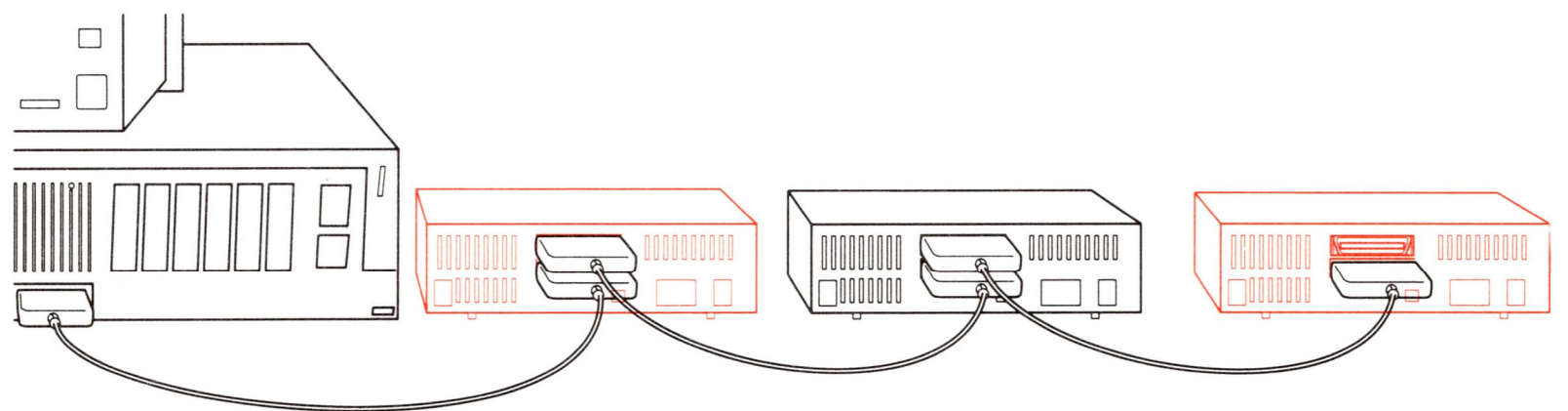
- If you are connecting only Apple devices, or other devices that do not contain terminators, add a terminator between the SCSI System Cable coming from your computer and the connector on the first device, and also add a terminator to the last available port on the last device in the chain.



- If one of the devices in the chain contains a terminator, place that device at the end of the chain and add a terminator between the SCSI System Cable coming from your computer and the connector on the first device.



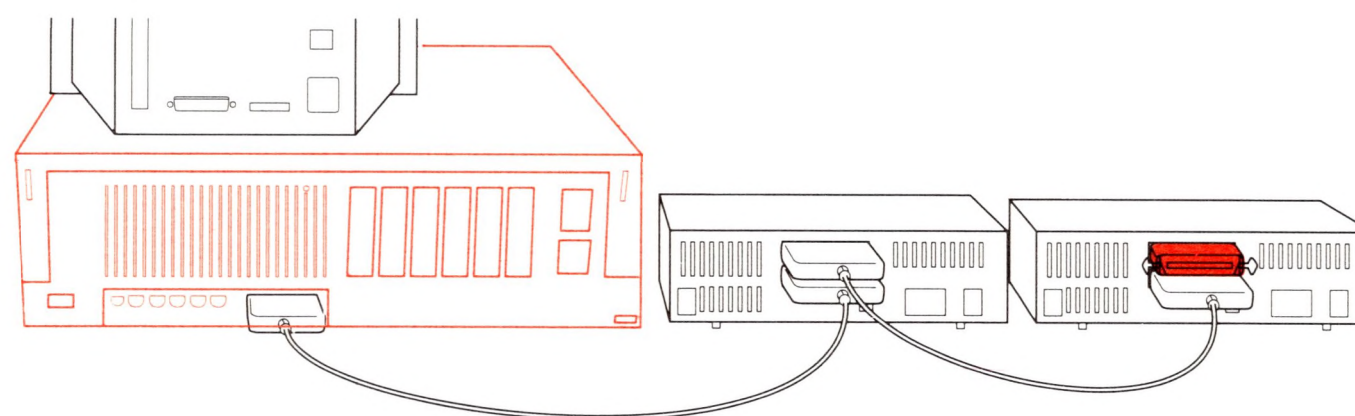
- If two of the devices in the chain contain terminators, place one device at the beginning of the chain and the other at the end of the chain, and don't add any terminators.



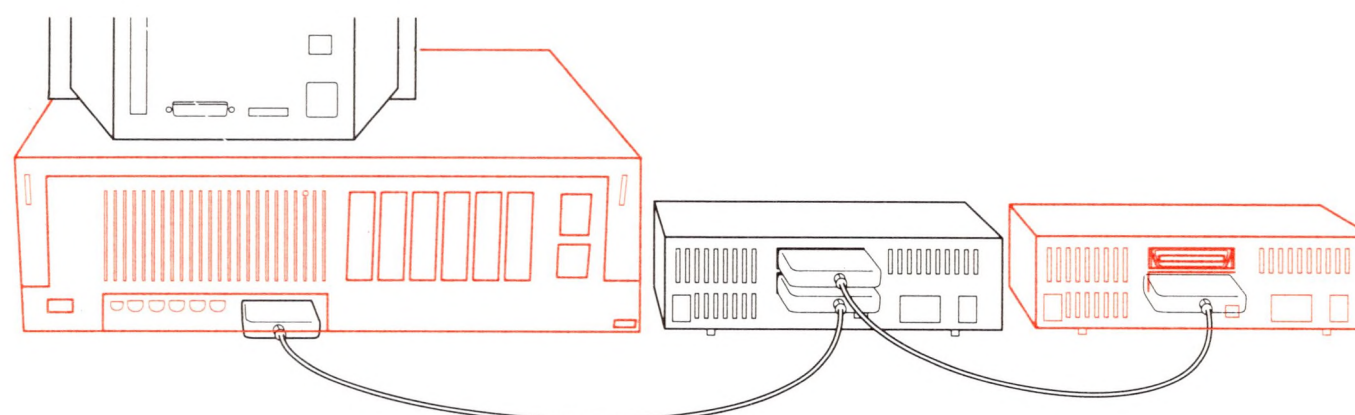
- If more than two devices in the chain contain terminators, remove the terminators from all but two of the devices, or have your dealer remove them. Then place one terminated device at the beginning of the chain and the other at the end of the chain.

To systems with internal hard disks

- If you are connecting only Apple devices, or other devices that do not contain terminators, add a terminator to the last available port on the last device in the chain.



- If one of the devices in the chain contains a terminator, move that device to the end of the chain and don't add any terminators.



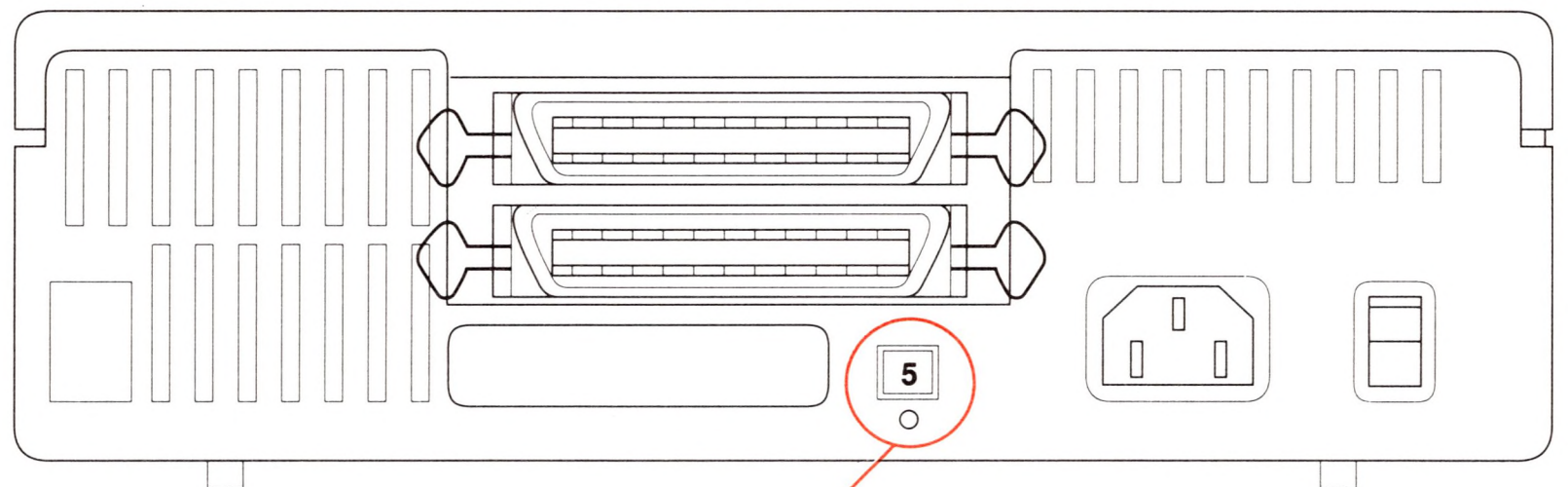
- If two of the devices in the chain contain a terminator, place one device at the end of the chain and remove the terminator from the other device, or have your dealer remove it.
- If more than two devices contain terminators, remove the terminators from all but one of the devices, or have your dealer remove them. Then place that device at the end of the chain.

Setting the SCSI ID numbers

Before you begin using the SCSI devices connected to your computer, you may need to set the SCSI ID number on each device. The computer uses the SCSI ID number to communicate correctly with the devices connected to it. Each device must have its own ID number. It identifies the device and assigns priorities on the SCSI chain; devices with higher ID numbers have higher priority in communicating with the computer. Generally, you assign the higher ID numbers to devices you use most often.

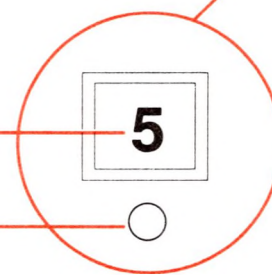
Eight numbers —7 through 0—are used to distinguish SCSI devices on the chain. The Macintosh itself is always assigned ID #7; you don't need to set the computer's ID number. If your system contains an internal hard disk, it is set to ID #0. (You can override the normal sequence by using the Control Panel desk accessory to select a preferred startup device.)

Apple SCSI peripheral devices are shipped with assigned SCSI ID numbers. The SCSI ID switch shows the ID number on the back panel of the device. If you don't have more than one of the same type of Apple SCSI device, you shouldn't need to set any ID numbers.



Priority switch

Priority switch setter



If you need to assign a different SCSI ID number to a device, follow these steps:

- 1. Make sure the device is turned off.**
- 2. Choose an unassigned SCSI ID number.**
- 3. Insert the point of a push pin or straightened paper clip into the SCSI ID number switch.**
- 4. Push gently.**
The number increases.
- 5. If you go past the number you want, keep pushing until the numbers cycle around to your choice.**

Guide to Technical Documentation

IF YOU NEED TECHNICAL INFORMATION THAT ISN'T INCLUDED IN THIS MANUAL, or if you're interested in learning more about the Macintosh family of computers, this appendix will direct you to the information you need.

Technical documentation

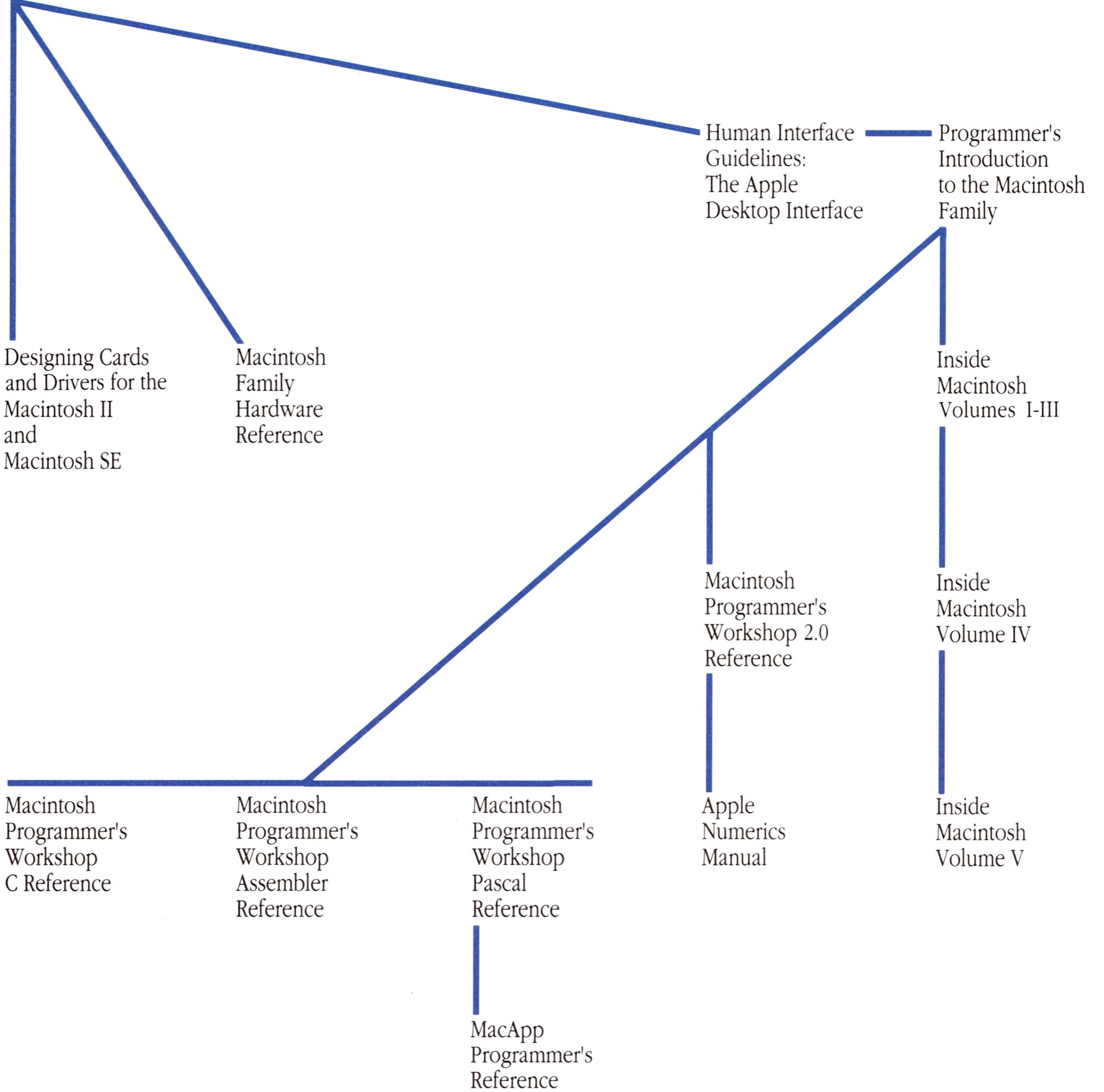
The *Inside Macintosh Library* is a set of technical books that explain the hardware and software of the Macintosh family of computers. The *Inside Macintosh Library* is a part of the Apple Technical Library—a series of official technical publications from Apple Computer, and published by Addison-Wesley Publishing Company. You'll find the Apple Technical Library in most well-stocked bookstores.

The original Macintosh technical documentation consisted solely of *Inside Macintosh*, a three-volume compendium covering the Macintosh Toolbox and Operating System for the original 64K Macintosh ROM, together with user interface guidelines and hardware information. With the introduction of the Macintosh Plus (128K ROM), Volume IV of *Inside Macintosh* was released. A fifth volume has now been added, covering the Macintosh SE and Macintosh II computers (both containing 256K of ROM). Volumes IV and V are delta guides; that is, they explain only what is different about the new machines.

With the growth of the Macintosh family, the documentation set has also grown, and *Inside Macintosh* has now expanded into a whole family of books: the *Inside Macintosh Library*. These books contain the complete reference information for the entire Macintosh family.

The following diagram illustrates the relationship of the various components of the Macintosh documentation set. The diagram shows which manuals comprise the original *Inside Macintosh*, which comprise the new *Inside Macintosh Library*, and which are related to both sets of books. These books are described briefly in the bibliography that follows the diagram.

Technical
Introduction
to the Macintosh
Family



Inside Macintosh Library

Inside Macintosh, Volumes I-III Definitive guide to the Macintosh Toolbox and Operating System for the original 64K ROM. Volume III also includes hardware information and comprehensive summaries.

Inside Macintosh, Volume IV A delta guide to the Macintosh Plus, introducing the hierarchical file system (HFS), the Small Computer System Interface (SCSI), and the other new features available with the 128K ROM.

Inside Macintosh, Volume V A delta guide to the Macintosh SE and Macintosh II, introducing color, slots, new sound capabilities, the new Apple Desktop Bus, and all the other features available with the 256K ROM.

Technical Introduction to the Macintosh Family Introduction to the Macintosh software and hardware for all Macintosh computers: the original Macintosh, Macintosh Plus, Macintosh SE, and Macintosh II.

Programmer's Introduction to the Macintosh Family A short guide replete with examples illustrating the ins and outs of Macintosh programming.

Macintosh Family Hardware Reference Describes the hardware of the various Macintosh machines. It provides the information you'll need to connect non-Apple devices to the computer and to write device drivers or other low-level programs. The book consists of three parts, which describe the "Classic Macintosh" (Macintosh and Macintosh Plus), the Macintosh SE, and the Macintosh II.

Designing Cards and Drivers for the Macintosh II and Macintosh SE A guide for developers who are creating hardware products that will plug into the expansion slots of the Macintosh II and Macintosh SE. Parts of this book are also important to application software developers who need to understand slot devices.

Related books

Human Interface Guidelines: The Apple Desktop Interface Detailed guidelines for developers implementing the Macintosh user interface.

Apple Numerics Manual A guide to the Standard Apple Numeric Environment (SANE™), a full implementation of the IEEE floating-point standard, for developers who need high-precision floating-point support.

Macintosh Programmer's Workshop 2.0 Reference Description of the Macintosh Programmer's Workshop (MPW), Apple's software development environment for all Macintosh computers.

For more information

Another source of technical information about the Macintosh II (and other Apple products) is the Apple Programmer's and Developer's Association (APDA™). For more information about the association, call (206) 251-6548.

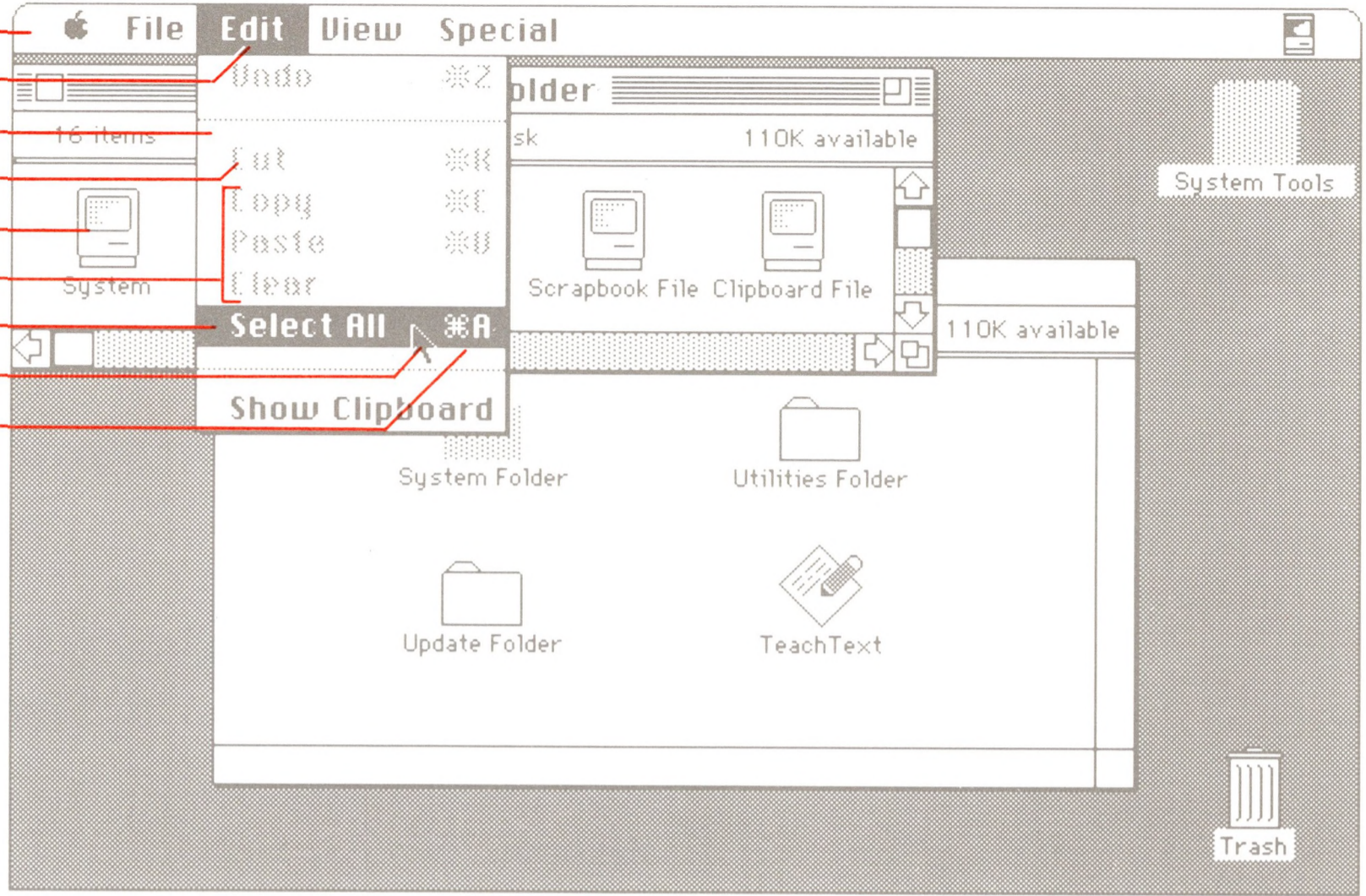
You can also write to

Apple Programmer's and Developer's Association
290 SW 43rd Street
Renton, WA 98055

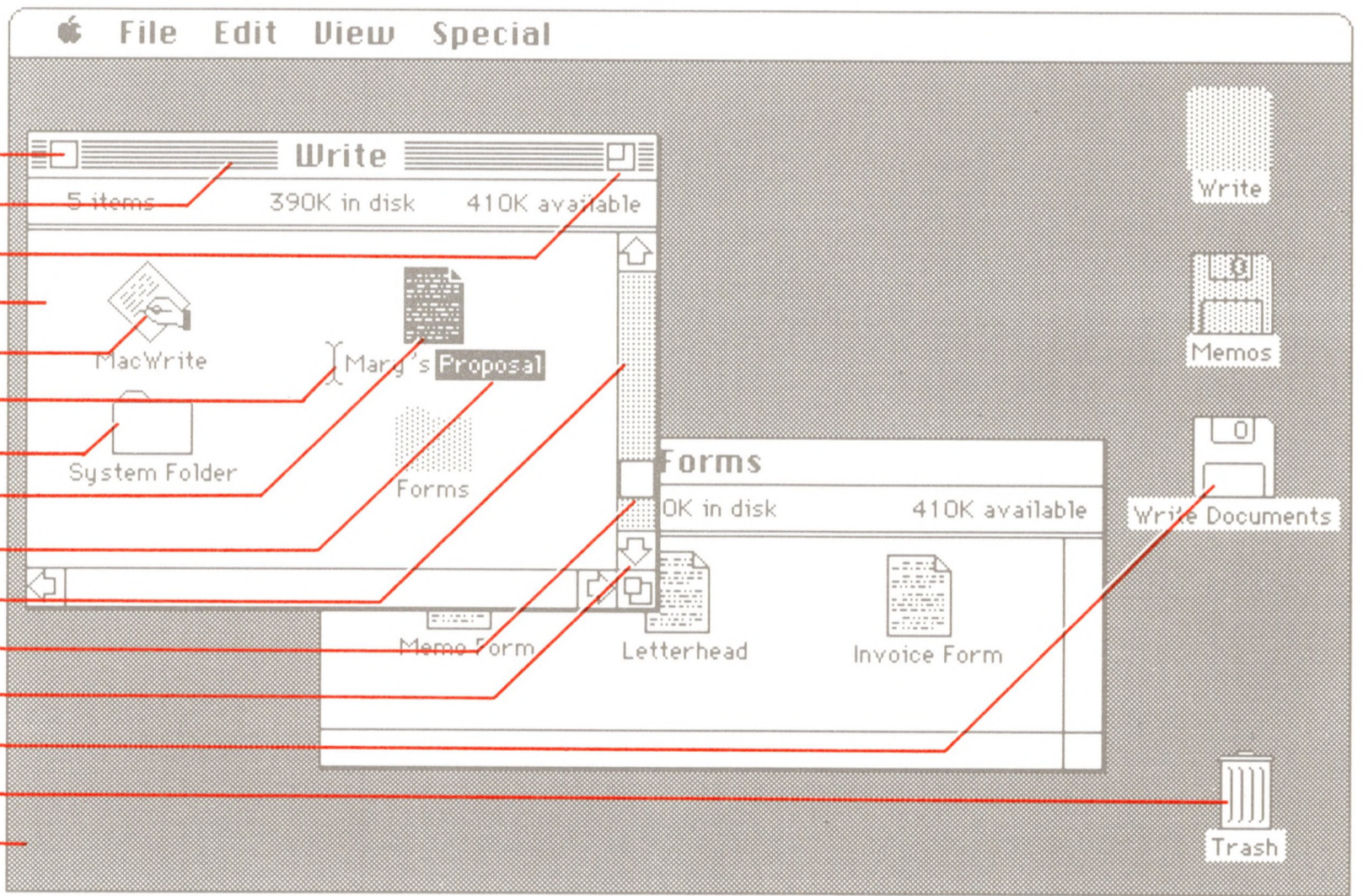
If you plan to develop applications for sale through retail channels, you can get valuable support from Apple Developer Relations. Write to

Apple Developer Relations
Mailstop 27-W
Apple Computer, Inc.
20525 Mariani Avenue
Cupertino, CA 95014

- Menu bar
- Menu title
- Pull-down menu
- Dimmed command
- System icon
- Commands
- Highlighted command
- Pointer
- Command-key equivalent



- Close box
- Active window's title bar
- Zoom box
- Directory window
- Application icon
- I-beam pointer
- Folder icon
- Document icon, selected
- Selected text
- Scroll bar
- Scroll box
- Scroll arrow
- Disk icon
- Trash
- Desktop



- Dialog box
- Insertion point
- Button



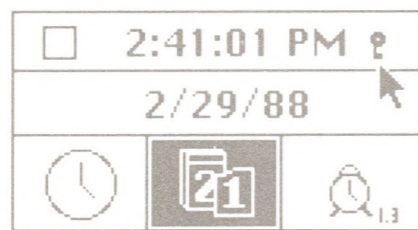
Glossary

accelerator card: An expansion card that contains another processor that shares the work normally performed only by the computer's main microprocessor. An accelerator card speeds up processing time.

active window: The frontmost window on the desktop; the window where the next action will take place. An active window's **title bar** is highlighted.

address: A number that specifies the location of a single byte of data in RAM.

address bus: The hardware path along which the addresses for specific memory locations are transmitted. The width of the path determines how much memory can be used (addressed) directly by the computer.



Alarm Clock: A **desk accessory** that displays the current date and time, and lets you set an alarm.

alert box: A box that appears on the screen to give a warning or to report an error message. The warning is accompanied by an alert sound.

Apple Desktop Bus (ADB): A low-speed serial bus with connectors on the back panel of the computer to which you attach the keyboard, mouse, and other Apple Desktop Bus devices, such as graphics tablets, hand controls, and specialized keyboards.

Apple HD SC Setup: A utility program that you use to initialize and test SCSI hard disks.

Apple menu: The menu farthest to the left in the menu bar, indicated by an Apple symbol, from which you choose **desk accessories**.



AppleTalk network system: The system of network software and hardware built into the computer and used in various implementations of Apple's communication networks.

application program: A program that performs a specific task, such as word processing, database management, or graphics—sometimes called an *application*.

arrow keys: The four directional keys on the keyboard that, when pressed, move the insertion point. Sometimes called *cursor keys*.

ASCII: Acronym for *American Standard Code for Information Interchange*, pronounced “ASK-ee.” A standard used to represent text inside a computer and to transmit text between computers or between a computer and a peripheral device.

audio jack: A connector on the back panel of the computer to which you can attach headphones or other audio devices.

background printing: A type of background processing that lets you print documents in the background while using the computer to perform other work.

background processing: In multitasking environments, the operating system’s ability to process lower-priority tasks while you perform other work on the computer.

Backspace key: A key that backspaces over and erases the previously typed character or the current selection. Its function is identical to that of the Delete key on newer Macintosh keyboards.

binary: Characterized by having two different components, or by having only two alternatives or values available; sometimes used synonymously with **binary system**.

binary digit: The smallest unit of information in the binary system; a 0 or a 1. Also called a **bit**.

binary system: A numbering system analogous to the more familiar decimal system, but using only 0 and 1 instead of 0 through nine, and each digit representing successive powers of two instead of ten. For example, the binary number 101011 is 43 in decimal. The binary system is useful because the values 0 and 1 can easily be represented in a variety of ways, such as the presence or absence of current, positive or negative voltage, or a white or black dot on the display screen. A single binary digit—0 or 1—is called a **bit**.

bit: A contraction of *binary digit*. The smallest unit of information that a computer can hold. The value of a bit (1 or 0) represents a simple two-way choice, such as yes or no, on or off, positive or negative, something or nothing. See also **binary system**.

bitmapped display: A display whose image is a representation of bits in an area of RAM called the **screen buffer**. With such a display, each dot, or **pixel**, on the screen corresponds, or is “mapped,” to a bit in the screen buffer.

bridge: A device that lets you connect two or more networking systems together. See also **zone**.

bus: A path along which information is transmitted electronically within a computer. Buses connect computer devices, such as processors, expansion cards, input devices, and RAM. See **Apple Desktop Bus**, **NuBus**, and **SE Bus**.

OK

button: A pushbutton-like image in dialog boxes where you click to designate, confirm, or cancel an action. Compare **mouse button**.

byte: A unit of information consisting of a fixed number of **bits**. A byte can represent any value between 0 and 255. The sequence of bits in a byte represents an instruction, letter, number, punctuation mark, or other character. Compare **gigabyte**, **kilobyte**, **megabyte**.

Calculator: A desk accessory that works like a four-function pocket calculator. Calculation results can be cut and pasted into your documents using the Edit menu.

Cancel button: A button that appears in a dialog box. Clicking it cancels the command.

Caps Lock key: A key that, when engaged, causes subsequently typed letters to appear in uppercase. It is like a Shift key that applies only to alphabetic characters.

character keys: Any of the keys on a computer keyboard—such as letters, numbers, symbols, and punctuation marks—used to generate text or to format text; any key except Shift, Caps Lock, Command, Option, Control, and Esc. Character keys repeat when you press and hold them down.

check box: A small box associated with an option in a dialog box. When you click the check box, you may change the option or affect related options.

chip: A term for *integrated circuit*, an electronic circuit entirely contained in a single piece of semiconducting material, usually silicon.

choose: To pick a command by dragging through a menu. You often choose a command after you've selected something for the application to act on; for example, selecting a disk and choosing the Open command from the File menu.

Chooser: A desk accessory that lets you configure your computer system to print on any printer for which there's a printing resource on the current startup disk. If you're part of an AppleTalk network system, you use the Chooser to connect and disconnect from the network and to choose among devices connected to the network. You can also specify a user name that the computer uses from time to time—when you're printing on a LaserWriter, for example.

Clear key: A key on the numeric keypad that clears the entry in the Calculator desk accessory and in applications that require numeric entry and calculations, such as spreadsheets.



click: To position the pointer on something, and then to press and quickly release the mouse button.

Clipboard: The holding place for what you last cut or copied. Information on the Clipboard can be inserted (pasted) into documents.



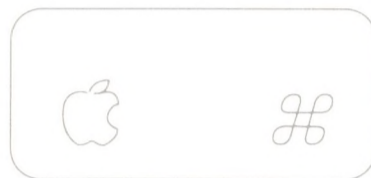
close: To turn a window back into the icon that represents it by choosing the Close command or by clicking the close box in the left corner of the window's title bar.

close box: The small white box on the left side of the title bar of an active window. Clicking it closes the window.

code: The statements or instructions that make up a computer program.

color wheel: A dialog box that appears when you click the Change Color button in the Control Panel desk accessory. The color wheel lets you adjust hue, saturation, and brightness.

command: A word or phrase, usually in a menu, describing an action for the computer to perform.



Command key: A key that, when held down while another key is pressed, causes a command to take effect. The Command key is marked with a propeller-shaped symbol. On some keyboards, the Command key has both the propeller symbol and an Apple symbol on it.

compatible: Capable of running without problems on the computer system. Applications are normally written to run on specific types of computers; applications that run on a computer system are said to be "compatible" with the computer.

configuration ROM: A chip on a NuBus expansion card that contains the information the computer's microprocessor needs to communicate with the card, or with peripheral devices attached to the card.

Control Panel: A desk accessory that you use to change the speaker volume, the keyboard repeat speed and delay, mouse tracking, and color display; set the system clock; create a RAM cache; and set other preferences.

convergence: An adjustment you make with an RGB color monitor to ensure that its red, green, and blue beams are aimed correctly for the best color picture. You can test your monitor's convergence by using the Control Panel desk accessory.

coprocessor: An auxiliary processor designed to relieve the demand on the main microprocessor by performing a few specific tasks. Coprocessors may favor a certain set of operations, such as floating-point calculations. Generally, coprocessors handle tasks that could be performed by the main microprocessor running appropriate software, but which would be performed much more slowly that way. Other coprocessors allow you to run software that would otherwise be incompatible with the computer's main microprocessor.

copy-protect: To make a disk uncopyable. Software publishers frequently copy-protect their disks to prevent them from being illegally duplicated by software pirates.

current startup disk: The disk that contains the System Folder the computer is currently using. The startup disk icon always appears in the upper-right corner of the Finder desktop.

cut: To remove something by selecting it and choosing Cut from a menu. What you cut is placed on the Clipboard. In other editing applications, delete serves the same function.

daisy-chain: To link together sequentially.

data: Information, especially information used or operated on by a program. The smallest unit of information a computer can understand is a **bit**.

data bus: The path along which data is transmitted within the computer. The wider the data bus, the more data can be transmitted at once.

Delete key: A key that moves the insertion point backward, removing the previously typed character, or that removes the current selection. Its function is identical to that of the Backspace key on some Macintosh keyboards.

desk accessories: “Mini-applications” that are available on the desktop from the Apple menu regardless of which application you’re using. Examples are the Calculator, Alarm Clock, and Scrapbook.

desktop: Your working environment—the menu bar and the gray area on the screen. The desktop displays the Trash icon and the icons of any disks in the system’s disk drives.

destination: The duplicate, as opposed to the original (or **source**), in making a copy of a document, folder, or disk.

dialog box: A box that contains a message requesting more information from you. Sometimes the message is a warning that you’re asking your computer to do something it can’t do, or that you’re about to destroy some information. In these cases the message is often accompanied by a beep. See also **alert box**.

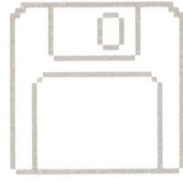
dimmed command: A command that appears gray rather than black in a menu bar because that command is unavailable at the moment. For example, in an application, the Cut command is dimmed unless you have selected a piece of text or graphics to cut.

dimmed icon: An icon that represents an opened disk or folder, or a disk that has been ejected. You can select and open dimmed disk icons, but you cannot open the documents on them.

directory: A pictorial, alphabetical, or chronological list of the contents of a folder or a disk.

directory dialog box: A type of dialog box you use to work in the hierarchical file system from within an application. Such dialog boxes appear whenever you choose the Open or Save As commands from within an application. See **hierarchical file system**.

directory window: A window that shows you the contents of a disk or folder.



disk: An information-storage medium consisting of a flat, circular, magnetic surface on which information can be recorded in the form of small magnetized spots, in a manner similar to the way sounds are recorded on tape. See **hard disk, 3.5-inch disk**.

disk buffer: An area in RAM used by the operating system as a temporary holding area before it saves the information on a disk.

disk capacity: The maximum amount of data a disk can hold, usually measured in kilobytes (K) or megabytes (MB). For instance, Apple 3.5-inch disks typically have a disk capacity of either 400K or 800K.

disk directory: An index of a disk's contents. It holds the names and locations of every file on its disk.

disk drive: The device that holds a disk, retrieves information from it, and saves information to it. A hard disk drive has the disk permanently encased. A 3.5-inch disk drive requires that you insert a 3.5-inch disk.

disk drive port: A port used to attach external disk drives to the Macintosh Plus and Macintosh SE.



document: Whatever you create with an application—information you enter, modify, view, or save.

dot pitch: A measure of the distance between dots on the screen. The closer the dots, the sharper and clearer the image.



double-click: To position the pointer where you want an action to take place, and then press and release the mouse button twice in quick succession without moving the mouse. Double-clicking is typically a quicker way of performing common tasks.



drag: To position the pointer on something, press and hold the mouse button, move the mouse, and release the mouse button.

Easy Access: A feature of system software that assists people who have difficulty typing with both hands on the keyboard, or manipulating the mouse. See **mouse keys, sticky keys**.

Enter key: A key that confirms an entry or sometimes a command.

ergonomics: The science of designing work environments that allow people and things to interact efficiently and safely. Sometimes called *human engineering*.

EtherTalk: A high-speed AppleTalk network system that uses the cables of an Ethernet network. Ethernet is a widely used communications network.

expansion card: A circuit board that implements specialized functions not otherwise supported by the computer. Expansion cards are installed in expansion connectors or expansion slots.

expansion connector: A connector inside the computer that lets you install an **expansion card** to enhance or extend the computer's performance.

file: Any collection of information stored on a disk—a document, a folder, a system file or resource, an application.

file server: A combination of controller software and a mass-storage device that allows computer users to share common files and applications through a network.

Finder: The application that maintains the Macintosh desktop and starts up other applications at the user's request. You use the Finder to manage documents and applications, and to get information to and from disks.

Find File: A desk accessory that lets you find any folder or file on a disk.

firmware: Software instructions contained in the Macintosh ROM. Firmware is permanent and unchangeable.

floating-point unit (FPU): See **Motorola 68881**.



folder: A holder of documents, applications, and other folders on the desktop. Folders allow you to organize information in any way you want.

font: A complete set of characters in one design, size, and style. Geneva 9-point Italic is an example of a Macintosh font.

Font/DA Mover: A utility program that lets you add or remove fonts and desk accessories in your System file.

gigabyte (GB): A unit of measurement equal to 1024 (2^{10}) megabytes. Compare **byte, kilobyte, megabyte**.

gray scale: Shades of gray on the screen that are created by varying the intensity of the screen's pixels, rather than by using a combination of only black and white pixels to produce shading.

hard disk: A disk made of metal and sealed into a drive or cartridge. A hard disk can store very large amounts of information compared with 3.5-inch disks.

hardware: In computer terminology, the machinery that makes up a computer system. Compare **firmware, software**.

hierarchical file system (HFS): A feature of system software that lets you use folders to organize documents, applications, and other folders on a disk. Folders (analogous to subdirectories in other systems) can be nested in other folders to create as many levels as you need.

highlight: To make something visually distinct from its background, usually to show that it has been selected or chosen.

I-beam: A type of pointer used in entering and editing text.

icon: A graphic representation of an object, a concept, or a message, usually used to represent disks, applications, folders, documents, and so on.

initialize: To prepare a disk to receive information. Initializing a disk divides its surface into **tracks** and **sectors**, which the operating system uses to keep track of the contents of the disk.

input device: A device that sends information to the microprocessor. The mouse and keyboard are the Macintosh's primary input devices. Compare **output device**.

insertion point: The place in a document where something will be added. You set an insertion point by clicking. It is represented by a blinking vertical bar.

Installer: A utility program that lets you choose an Installation script for updating your system software.

instruction set: The complete range of instructions a microprocessor can interpret. Each brand of microprocessor has its own instruction set.

K: See **kilobyte**.

Keyboard shortcut: A keystroke that you can use instead of a mouse action to perform a task. For example, pressing the Command and the X keys at the same time is the same as choosing the Cut command from the Edit menu.

Key Caps: A desk accessory that shows you the optional character set available for a given font family.

kilobyte (KB): A unit of measurement consisting of 1024 (2^{10}) bytes. Often abbreviated *K*. Compare **byte**, **gigabyte**, **megabyte**.

local-area network (LAN): A group of computers connected for the purpose of sharing resources. The computers on a local-area network are typically joined by a single transmission cable, and are located within a small area such as a single building or section of a building.

LocalTalk: A low-cost AppleTalk network system that lets you link up to 32 computers or devices together to form a local-area network.

lock: To prevent documents from being edited, discarded, or renamed, or to prevent entire disks from being altered. Compare **write-protect**.

Macintosh Operating System: The combination of ROM-based and disk-based routines that together perform basic tasks such as starting the computer, moving data to and from disks and peripheral devices, and managing memory space in RAM.

Macintosh User Interface: The standard conventions for interacting with Macintosh computers. The interface ensures users a consistent means of interacting with all Macintosh computers and the applications designed to run on them.

main unit: The computer console, which contains the processor, memory, the built-in disk drive(s), the optional internal hard disk, and, on the Macintosh Plus and SE, the screen.

megabyte (MB): A unit of measurement equal to 1024 (2^{10}) kilobytes. Compare **byte**, **gigabyte**, **kilobyte**.

memory: The place in the computer's main unit that stores information. Macintosh computers include a minimum of 1 megabyte of RAM (random-access memory) that you can use for your work, and 256K of ROM (read-only memory) that stores certain system information permanently. See also **RAM** and **ROM**.

menu: A list of commands that appears when you point to and press the menu title in the menu bar. Dragging through the menu and releasing the mouse button while a command is highlighted chooses that command.

menu bar: The horizontal strip at the top of the screen that contains menu titles.

menu title: A word or phrase in the menu bar that designates one menu. Pressing on the menu title causes the title to be highlighted and its menu to appear below it.

microprocessor: An integrated circuit on the computer's main circuit board. The microprocessor carries out software instructions by directing the flow of electrical impulses through the computer.

modem port: One of two **serial communication** ports on the back panel of the computer.

Motorola 68000: The microprocessor in the Macintosh Plus and SE computers.

Motorola 68020: The microprocessor in the Macintosh II. The Motorola 68020 can also be added to the Macintosh SE by means of an accelerator card installed in the SE Bus expansion connector.

Motorola 68851: An optional coprocessor available for the Macintosh II that allows paged memory management, a technique that lets the microprocessor access a much larger body of data than can fit in RAM at one time. Sometimes referred to as the *Paged Memory Management Unit*, or *PMMU*.



Motorola 68881: A coprocessor chip that provides high-speed support for processing scientific computations. Sometimes also referred to as the *floating-point unit*, or *FPU*.



mouse: The small mechanical device whose movement on your desk corresponds to pointer movements on your screen.

mouse button: The button on the top of the mouse. In general, pressing the mouse button initiates some action on whatever is under the pointer, and releasing the button confirms the action.

mouse keys: An Easy Access feature that lets you manipulate the pointer using the 10-key numeric keypad instead of the mouse. See **Easy Access**.

MultiFinder: A multitasking operating system for Macintosh computers that makes it possible to have several applications open at the same time, including background applications that let you perform one task while the computer performs another.

nesting: Placing folders inside other folders. See **hierarchical file system**.

network: A collection of interconnected, individually controlled computers, together with the hardware and software used to connect them. A network allows users to share data and peripheral devices such as printers and storage media, to exchange electronic mail, and so on.

Note Pad: A desk accessory that lets you enter and edit small amounts of text while working on another document.

NuBus: An **address** and **data bus** incorporated into the system architecture of the Macintosh II. The NuBus architecture lets you add a variety of components to the system, by means of **expansion cards** installed in **NuBus expansion slots** inside the Macintosh II.

NuBus expansion slots: The six slots on the main circuit board of the Macintosh II to which you add cards for video monitors and peripheral devices, coprocessors, and network interfaces. See **expansion card**.

numeric keypad: The set of keys on the right side of the keyboard that let you enter numbers and perform calculations quickly.

numeric keys: See **numeric keypad**.

open: To create a window from an icon so you can view a document or directory.

open architecture: A computer system's ability to use a variety of optional components designed to meet specialized needs, such as video, coprocessing, networking, and so on. An "open" system is one to which a user with no technical background can easily add devices and expansion cards to customize the system.

operating system: See **Macintosh Operating System**.

Option key: A key used to give an alternate interpretation to another key you type. You use it to type international characters or special symbols.

output device: A device that receives information from the microprocessor. The monitor is the Macintosh's primary output device. Compare **input device**.

Paged Memory Management Unit (PMMU): See **Motorola 68851**.

parallel communication: A form of data communication in which the eight bits in each byte of data move along eight separate parallel lines inside a single cable.

paste: To put a copy of the contents of the Clipboard—whatever was last cut or copied—at the insertion point.

patch code: Software instructions contained in the System file that override some routines in ROM. Patch code is used for periodic upgrades of ROM routines.

peripheral device: A piece of computer hardware—such as a disk drive, printer, or modem—used in conjunction with a computer and under the computer's control. Peripheral devices are usually physically separate from the computer and connected to it by wires or cables.

pixel: An individual dot on the screen. With a simple monochrome video display, a pixel is the visual representation of a single bit in the screen buffer (white if the bit is 0, black if it is 1). With color or gray-scale video displays, each pixel on the screen may represent several bits.

plain-text documents: Documents consisting only of readable ASCII characters, without any formatting codes specific to a particular full-feature word processing application.

pointer: A small shape on the screen, most often an arrow pointing up and to the left, that follows the movement of the mouse.

port: A socket on the back panel of the computer where you can plug in a cable to connect a peripheral device, another computer, or a network.

Power On key: A key on the keyboard that starts the Macintosh II.

press: To position the pointer on something and then hold down the mouse button without moving the mouse.

PrintMonitor: An application that monitors background printing and provides options intended to give you additional control over what happens to documents you are printing. See **background processing**.

printer port: One of two **serial communication** ports on the back panel of the computer.

printer resource: A file in the System Folder that provides information the microprocessor needs to communicate with a printer.

RAM: An acronym for *random-access memory*, the memory chips that store information temporarily while you're working on it. RAM can contain both application programs and your own information. Information in RAM is temporary, gone forever if you switch the power off. See also **ROM**.

RAM cache: RAM you can designate to store certain information an application uses repeatedly. Using the RAM cache can greatly speed up your work, but may need to be used sparingly or not at all with applications that require large amounts of memory. You set the RAM cache in the Control Panel.



Read Me documents: Plain-text documents that are included on application and system software disks to provide you with late-breaking information about the product. You'll usually find Read Me documents in the Update Folder on the disk.

read-only memory: See **ROM**.

register: A location in a processor or other chip where an item of information is held and modified by a program.

resources: Files contained in the System Folder that provide information the microprocessor needs to communicate with devices attached to the computer system.

Return key: A key that makes the insertion point move to the beginning of the next line. It's sometimes used to confirm or terminate an entry or a command.

ROM: An acronym for *read-only memory*, the memory chips that contain information the computer uses (along with system files) throughout the system, including the information it needs to get itself started. Information in ROM is permanent; it doesn't vanish when you switch the power off. See also **RAM**.

routine: A sequence of software instructions.

save: To store information from RAM onto a disk.

scanning order: The order in which the operating system scans the disk drives looking for a startup disk.

Scrapbook: A desk accessory in which you can save frequently used pictures and text.

screen buffer: A portion of memory in RAM from which the video display reads the information to be displayed on the screen.



scroll: To move the contents of a window, or a list in a dialog box, by means of the scroll bar or scroll arrows.

scroll arrow: An arrow on either end of a scroll bar. Clicking a scroll arrow moves the document or directory one line. Pressing a scroll arrow scrolls the document continuously.

scroll bar: A rectangular bar that may be along the right or bottom of a window. Clicking or dragging in the scroll bar causes the view of the document to change.

scroll box: The white box in a scroll bar. The position of the scroll box in the scroll bar indicates the position of what's in the window relative to the entire document.

SCSI: An acronym for *Small Computer System Interface*, an industry standard interface that provides high-speed access to peripheral devices.

SCSI port: The port on the back panel of the computer to which you connect **SCSI** devices.

SE Bus: A direct data path to the microprocessor, implemented through a 96-pin expansion connector inside the Macintosh SE. Expansion cards for the SE Bus include accelerator cards and coprocessor cards.

SE Bus access port: An insert on the back panel of the Macintosh SE that allows access to the SE Bus expansion connector inside the computer. Used only for cables that run between an **expansion card** and a **peripheral device**.

sector: A part of a track on the surface of a disk. When a disk is first initialized, the operating system divides the disk's surface into circular tracks, with each track divided into sectors. Tracks and sectors are used to organize the information stored on a disk.

select: To designate where the next action will take place. To select, you click or drag across information.

selection: The information affected by the next command. The selection is usually highlighted.

serial communication: A form of data communication in which the eight bits in each byte of data move single-file—serially—down one line inside a cable.

serial interface: An interface in which information is transmitted sequentially, one bit at a time, over a single wire or channel.

serial ports: The connectors on the back panel of the computer for devices that use a **serial interface**. See also **modem port** and **printer port**.

Shift-click: A technique that lets you extend or shorten a selection by holding down the Shift key while you select (or deselect) something related to the current selection.

Shift key: A key that, when pressed, causes subsequently typed letters to appear in uppercase, and causes the upper symbol to appear when number or symbol keys are typed.

SIMM: An acronym for *Single In-line Memory Module*, a circuit board that contains eight RAM chips. SIMMs attach to SIMM sockets on the computer's main circuit board.



size box: A box at the bottom-right corner of most active windows that lets you resize the window.

software: Programs, or instructions for the computer to carry out. The computer reads these instructions from disks or from ROM.

source: The original, as opposed to the duplicate (or **destination**), in making a copy of a document, folder, or disk.

spooling: In printing or sending a document, the application's ability to create a temporary file for the document and return control of the computer to you while the document is processed in the background. See **background processing**.

startup disk: A disk that contains the system files the computer needs to get itself started. A startup disk must have at least a Finder and a System file. It may also contain files such as printing resources, Scrapbook, and Clipboard.

sticky keys: An Easy Access feature that lets you type combination keystrokes without actually pressing the keys simultaneously. See **Easy Access**.

style: A stylistic variation of a font, such as italic, underline, shadow, or outline.

System file: A file the computer uses to start itself up or to provide system-wide information. Although system files are represented by icons just as documents and applications are, they can't be opened in the usual way. You can, however, alter their contents. For example, you can use the Font/DA Mover to change the contents of the System file. See also **startup disk**.

System Folder: A folder on a disk that includes at least the Finder and the System file—two files the computer needs to start itself up. When you first turn on the computer, the operating system looks in the disk drives for a disk containing a System Folder. The first disk it finds with a System Folder becomes the **current startup disk**.

system software: The set of files and resources in the System Folder that the computer uses to run itself.

Tab key: A key that, when pressed, moves the insertion point to the next tab marker or, in a dialog box with more than one place to enter information, to the next text box.



TeachText

TeachText: An application on the *Macintosh System Tools* disk that lets you read **plain-text documents**.

terminator: A device used in a SCSI chain to maintain the integrity of the signals passing along the SCSI chain. A SCSI chain should never have more than two terminators, one at each end of the chain. See **SCSI**.

text box: The place or places in any dialog box where you can type information.

3.5-inch disk: A flexible plastic disk measuring 3.5 inches in diameter and having a hard-shell plastic jacket.

title bar: The horizontal bar at the top of a window that shows the name of the window and lets you move it.

track: A portion of a disk's surface. When a disk is first initialized, the operating system divides the disk's surface into circular tracks, with each track divided into sectors. Tracks and sectors are used to organize the information stored on a disk.



Trash: An icon on the desktop that you use to discard documents, folders, and applications.

Update Folder: A folder on the System Tools disk, and on other application and system disks, that contains **Read Me documents**.

user group: A computer club where computer users exchange tips and information, usually about a particular brand of computer.

user interface: See **Macintosh User Interface**.

User Interface Toolbox: Routines in ROM that provide application program developers with templates for windows, dialog boxes, icons, menus, and other standard elements of the **Macintosh User Interface**.

utility program: A special-purpose application that alters a system file or lets you perform some useful function on your files. Examples are the Font/DA Mover and the Installer.

window: An area that displays information on the desktop. You view documents through a window. You can open or close a window, move it around on the desktop, and sometimes change its size, edit its contents, and scroll through it.

word wrap: The automatic continuation of text from the end of one line to the beginning of the next. Word wrap lets you avoid pressing the Return key at the end of each line as you type.

wristwatch: The pointer that you see on the screen when the computer is performing an action that causes you to wait.

write-protect: To protect the information on a disk. You write-protect, or **lock**, a 3.5-inch disk by sliding the small tab in the left corner on the back of the disk toward the disk's edge.

zone: A network in a series of interconnected networks, joined through **bridges**.



zoom box: The small box on the right side of the title bar of some windows. Clicking the zoom box expands a window to its maximum size. Clicking it again returns the window to its original size.



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Tell Apple about your


Macintosh II

Return Address: _____

■ Please contact your authorized Apple dealer when you have questions. Computer and are given the resources to handle service and support for authorized Apple dealer in your area, call toll-free: 800-538-9696.

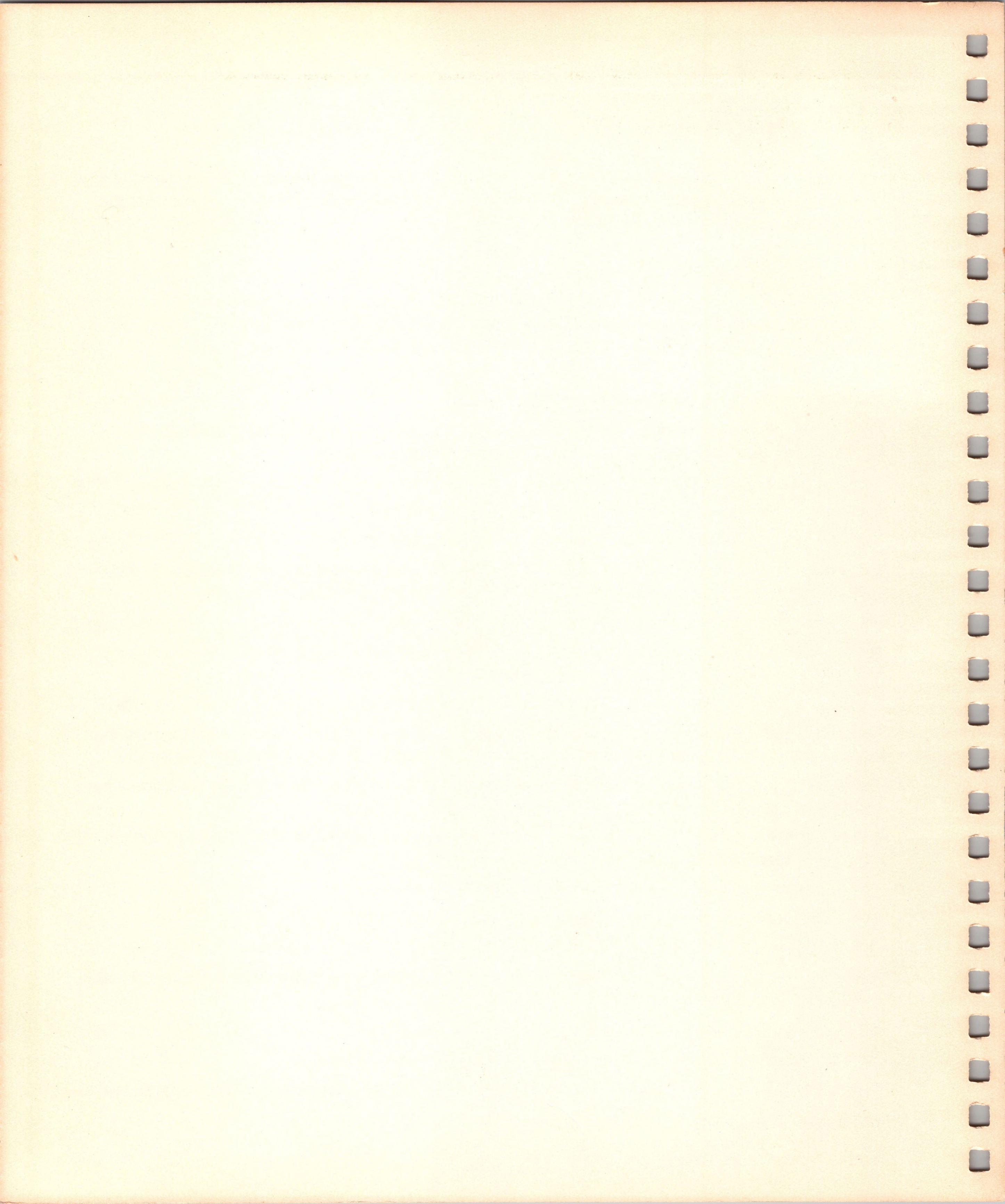
■ Would you like to tell Apple what you think about this product? After would like to hear from you. You can help us to improve our product the appropriate boxes on the card at the right with a #2 lead pencil. mark all the boxes that apply. Please detach the card and mail it to Ap

1. How would you rate the Macintosh II overall? (1=poor...6=excellent)
2. Where did you purchase your Macintosh II? (1=dealer, 2=corporate purchase plan, 3=university, 4=university, 5=government purchase plan, 6=Certified Developer Program)
3. Which Apple computer did you own before buying your Macintosh II? (1=Apple II, 2=Apple II+, 3=Apple IIx, 4=Apple IIcx, 5=Apple IIgs, 6=Apple IIx+)
4. How much experience have you had with computers? (1=none...6=expert)
5. Where is your Macintosh II used most often? (1=work, 2=home, 3=other)
6. What software applications do you use most often with your Macintosh II? (1=word processing, 2=spreadsheet, 3=communications, 4=communications, 5=desktop publishing, 6=engineering/scientific, 7=other)
7. How many 3.5-inch disk drives do you use with your Macintosh II? (1=0, 2=1, 3=2, 4=3)
8. What type and size of hard disk drives do you use with your Macintosh II? (1=none, 2=20 MB hard disk, 3=20 MB hard disk, 4=40 MB hard disk, 5=80 MB hard disk, 6=other)
9. What is the memory configuration of your Macintosh II? (1=1 MB, 2=2 MB, 3=4 MB, 4=8 MB, 5=16 MB, 6=other)
10. What monitors are you using with your Macintosh II? (1=Apple High-Resolution RGB Monitor, 2=Apple High-Resolution RGB Monitor, 3=other monochrome monitor, 4=other RGB monitor)
11. What printer do you use with your Macintosh II? (1=LaserWriter family, 2=LaserWriter family, 3=daisy wheel printer, 4=daisy wheel printer, 5=other laser printer, 6=other)
12. What type of expansion cards are installed in your Macintosh II? (1=video accelerator, 2=video accelerator, 3=communications or network, 4=communications or network, 5=other)
13. If you are connected to a network, which type is it? (1=AppleTalk, 2=AppleTalk, 3=other)
14. Do you run the UNIX operating system? (1=no, 2=yes)
15. What keyboard are you using with your Macintosh II? (1=Apple Keyboard, 2=Apple Keyboard, 3=other)
16. Which other devices do you use with your Macintosh II? (1=modem, 2=modem, 3=Apple Desktop Bus device, 4=Apple Desktop Bus device, 5=other)
17. How would you rate the product training disks overall? (1=poor...6=excellent)
18. How would you rate the *Macintosh II Owner's Guide* overall? (1=poor...6=excellent)
19. Please describe any errors or inconsistencies you may have encountered.
20. What suggestions do you have for improving the Macintosh II?

Thanks for your time and effort.

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THE APPLE PUBLISHING SYSTEM

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Tuck end flap inside back cover when using manual.

Apple® Macintosh® II Owner's Guide



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